

Where Model Meets Reality: A Mixed Methods Analysis of Economic Development in North West Wales

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Abstract

This is a PhD thesis entitled *Where Model Meets Reality: A Mixed Methods Analysis of Economic Development in North West Wales*. The thesis is above all an attempt to reconcile the latest in quantitative regional economics and theoretical geographical economics with qualitative methods of regional studies and economic geography. The research seeks a triangulation whereby the merits of both quantitative and qualitative methodologies can be appreciated within both theoretical and empirical contexts, without claims of the superiority of one approach being made. This is an ambitious objective and means that the research must be divided into two streams, one exploring each methodology and advancing research in those fields. Further, each methodology must be applied to the same area of study so that the results produced can be evaluated and compared.

The thesis thus has three self-contained objectives that are part of this overarching aim. The first aim is to advance the scenario analysis methodology of considering the future to regional economic planning, and more generally to test the reliability and resilience of qualitative data in a rapidly changing economy. The second is to advance geographical economics (Krugman, 1991) in its discussion of the public sector as provider of public services and jobs, and to advance policy recommendations from the theory. The third aim is to use the geographical economic policy discussion and the scenario analysis to build a resilient economic policy for North West Wales from 2009, with resilient policy defined as a set of policies that can be applied in any foreseeable circumstance, so that policymakers can move seamlessly between individual policies within the policy framework depending on events. This is done through the application of these methodologies to North West Wales and identifying the commonalities and differences of the outcomes.

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DECLARATION

No portion of the work referred to in the dissertation has been submitted in support of an application for another degree or qualification of this or any other university or other institution of learning

This work has not previously been accepted in substance for any degree and is not being currently submitted in candidature for any degree.

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This thesis is the result of my own investigations, except where otherwise stated. Other sources are acknowledged by citation. A bibliography is appended to each chapter.

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CHAPTER ONE

Introduction

1.1 Introduction

This chapter is the introduction to this thesis, and is structured as follows. The first section gives a detailed introduction to the aims and objectives of the research together with its motivation, explaining the two complementary parts of the research and the three core objectives of the thesis. The second section discusses the research paradigm that runs through the thesis and outlines the research methodologies employed. The final section details the thesis structure and summary outlines of each chapter.

Following the introductory chapter, the thesis is divided into two parts, reflecting the thesis' two complementary research strands. Part One is largely qualitative, describing an interview-led approach culminating in the application of a scenario analysis and its implications for policy design and planning. Part Two is largely theoretical and involves the development of geographical economics models, so that rather than being only generalised models they can be contextualised to specific regional economic environments. The derived policy prescriptions are compared and contrasted with those arising from the scenario analysis of Part One, with their triangulation providing the basis of a consolidated set of policy recommendations.

1.2 Aims and Objectives

This thesis is, above all, an attempt to reconcile the latest in quantitative regional economics and theoretical geographical economics with qualitative methods of regional economies. In many ways, this is an attempt to bring together two strands in regional studies; what von Böventer (1975) identified as applied (qualitative) regional theory and 'pure and exact' (quantitative) regional economics, although the latter discipline has advanced much since 1975, and is now led by the mathematical modelling of regional economies. The problem with modelling as a central part of economic research is that a model is a simplified, often mathematical, representation or analogy of some aspect of

reality, for the purposes of description and/or calculation. Being a simplified representation of reality, a quantitative model lacks the sensitivity to allow the modeller to draw detailed lessons from the model, whatever the phenomenon modelled. In general, the complexity of the model is a trade-off between the mathematical tractability of the model on the one hand, and its simplicity on the other. This means that the more complicated the model the more variables considered. The more complex the assumptions made, the more ‘real’ it becomes, and the less likely it is that the model will be mathematically solvable. This means that conclusions drawn from the solution of a model apply only to the world as described in that model, and that interpretation is the only tool that can be applied beyond this boundary.

However whilst ‘pure and exact’ research may lack sensitivity, ‘applied’ regional theory has its own drawbacks. Methods of data collection and analysis in qualitative research are often criticized as not being robust. Data collection in these cases is carried out in a process that has no controls, and that may be influenced by the collector, and a similar argument holds for data analysis. After all, a critic may point out, how can it be known that any two researchers in the same context will gather the same data, let alone arrive at the same conclusion. This thesis is built on a fundamental recognition that modelling offers a direct route to the heart of an economic issue, but is often based on unrealistic or simplistic assumptions, and necessarily in data that can only ever be considered an useful approximation of one aspect of the economy. At the same time, it is also accepted that qualitative methodologies, whilst being superior to quantitative ones in their recording of real economies, are not completely reliable and are often hostage to fortune. This sets the thesis a distinctly post-positivist typology, in the sense that the notion of a single version of the truth is discarded in favour of the idea that there is no externally valid and objective reality.

This thesis seeks a reconciliation, whereby the merits of both quantitative and qualitative methodologies can be appreciated (Mahoney and Goertz, 2006) within both

theoretical and empirical contexts, without claims for the superiority of one approach being made. This is an ambitious objective, and means that the research must be divided into two streams, one exploring each methodology and advancing research in those fields. Further, each methodology must be applied to the same area of study, so that the results produced can be evaluated and compared. Triangulation of these distinct fields emerged as the primary objective of the research. In many ways, the research draws on the post-positivist tradition in research methodology (Trochim, 2000) whereby all knowledge, including recorded data, is considered conjectural and open to challenge. This means that interpretation is given centre-stage and that data and theories are only meaningful through interpretation.

However, there are grounds for these conjectures and interpretations, although these justifications may change. Justification is a normative activity, implying that the theoretical work, which provides its normative baseline, will alter our interpretations of the qualitative and empirical data. Analysis and exploration of the empirical data, extensive use of qualitative methodology, together with attempts to gain new theoretical insight through normative approaches may seem wildly contradictory approaches to the investigation of a regional economy, but mixed-method approaches to analysis are increasingly respectable across fields of social science (Creswell, 2003). The triangulation of the qualitative and the quantitative approaches is made possible through the use of reflexive methodology, which emphasizes the primacy of interpretation in research (Alvesson and Sköldbberg, 2009). The use of mixed-methods research in this thesis is grounded in the post-positivism discussed above, with the underlying assumption being that research is stronger when it mixes research paradigms, because a fuller understanding of human phenomena is gained (Maxwell and Loomis, 2003).

The thesis thus has three self-contained objectives that are part of this overarching aim.

The first aim, pursued in Part One of the thesis, is to advance the scenario analysis methodology of considering the future to regional economic planning, and more

generally to test the reliability and resilience of qualitative data in a rapidly changing economy. The second aim, dealt with in Part Two of the thesis, is to advance geographical economics (Krugman, 1991a) in its discussion of the public sector as provider of public services and jobs, and to advance policy recommendations from the theory. The third aim is to use the geographical economic policy discussion and the scenario analysis to build a resilient economic policy for North West Wales from 2009, and triangulation between the two Parts of the thesis is detailed in Chapter Seven. This process gives a resilient policy set, defined as a set of policies that can be applied across a wide range of foreseeable circumstances, so that policymakers can move seamlessly between individual policies within the policy framework depending on events. This is done through the application of these methodologies to North West Wales, and identifying the commonalities and differences of the outcomes. The objective of this is to construct an economic development pathway for the region which is both empirically and theoretically, and quantitatively and qualitatively, grounded, thus bringing some common discourse to these approaches to regional economics, and advancing both fields of study. The thesis focuses on the case of North West Wales because it is a uniquely extreme case for testing methodologies. Not only is it very economically peripheral, it is a bilingual region with a strong minority culture, and it is geographically challenging, containing the fourteen highest mountains in England and Wales, as well as an extensive coastline.

The first part of the research is empirical, and largely qualitative, with research leading up to a scenario analysis (Schwartz, 1996) to improve policies supporting regional economic development in North West Wales. Firstly, the case study research would be focused on critically examining the present state of the area's economy, through use, analysis, and interpretation of statistical data, and through interviews with local policy-makers and economic leaders using the semi-structured interview methodology. Such local level discussions with key stakeholders and decision makers in a regional

economy can provide direct insights into transactions and interactions within and across boundaries, a clear appreciation of context and the specific environment in which they occur, their relations with the wider economy, the aspirations of residents, and opportunities for and constraints on policy development. Conventional regional economics methodologies (Capello, 2006) are also used to refine and interpret the raw statistical data, as is the concept of increasing returns and monopolistic competition.

Enhancing the mixed-methods approach is the alternative interpretation of the statistical data and quantitative research informed by the heterodox theories of economic geography (Coe, Kelly, and Yeung, 2007). The current plans to regenerate the economy of North West Wales, including the Wales Spatial Plan, will also be discussed thoroughly. The area's most distinctive feature is the prevalence of the Welsh language, and it is unique in this way. What this means for the economy is unclear, and has, perhaps, not had its due focus of attention in economic research.

The scenario analysis is to be embedded in this more general case study approach, aimed at discovering the state of the economy in North West Wales, and the routes along which it may develop. This is key to the reality referred to in the title 'Where Model Meets Reality'. Reality is not seen as merely an assemblage of empirical and quantitatively-derived data, and the meeting point being searched for is not that where this data fits theoretical model. Rather, reality is understood to concern the 'messy' factors of the perceptions and irrationality of economic agents, as is discussed in relation to economic geography (Martin and Sunley, 2011). This second strand of qualitative research involves a variant of the scenario-building approach of discussing future developments in a series of workshops with selected participants, and developing a complete scenario from this recursive discussion of drivers, trends and uncertainties.

The resources for this project were limited, and in an attempt to overcome this difficulty, a web-based alternative to an intensive workshop series seemed appropriate, as well as having a few significant advantages over the use of scenario-building workshops.

This involves a series of questionnaires designed to elicit and develop initial responses, allowing an individual expert to refine their answers as the group's understanding develops.

This approach leads to discussion of the implications for policy, and the identification of a possible regeneration strategy for the area. It also gives an idea of the effects of an ageing population, changes to transport infrastructure and local labour markets on rural area, and the returns from new technologies in rural areas, such as north-east and central Wales. One of the aims of this process is to improve the economic understanding of the economy of North West Wales in academic circles. This region, whilst an object of regular discussion amongst policy-makers, remains on the periphery of academic economic discussion. The previous piece of academic research concerning North West Wales was commissioned by the Welsh Development Agency and published in 2000 (NWEA, 2000). At the same time, this means that policy options and consideration of the future is limited by the views of policy-makers, making judgments based on projections from current events. This often leads to an overly simplistic set of expectations. Another aim is to challenge these expectations of the future, by creating a set of scenarios that describe the possible situations of 2025. The hope is that these will present policy-makers with a way to gauge the impact of their policy decisions and to what they may lead, starting a process of institutional learning from participatory action research (Reason and Bradbury, 2007), where institutions work together to engage with a reflective discussion and development of strategy and policy.

The second part of the research is theoretical, but involves a question that is highly pertinent to the case of North West Wales and is often asked; what makes one area more economically successful than another? Geographical economics puts discussion of economics in spatial terms, and thus puts this question on a firmer footing than ever before. When modelling an economic geography, there are three categories of agglomeration and dispersion forces. The agglomeration forces are Marshall's trinity of

external economies; thick markets, backward and forward linkages, and knowledge spillovers. The dispersion forces are the immobility of factors such as capital, labour or raw materials, land rents and transport costs, and congestion. These forces allow a regional economy to evolve endogenously, and to be shocked by exogenous influence into new patterns.

This part of the research begins with a detailed literature review of the fundamental elements of geographical economics, developed up to recent advances, and a discussion of the ways the field may be developed in the future. As a relatively new set of advancement in economics, there are a number of recognized weaknesses in the work and a wealth of possible improvements. After the literature review is complete, this line of enquiry is continued by setting out the particular advancements in geographical economics that are included in this thesis. Discussion of the role of the public sector in the economy as one of the forces governing agglomeration is lacking from the geographical economics literature, and constructing a model that treats the role of the public sector in peripheral regions is the key objective of this part of the thesis. Models of geographical economics with public sector involvement through the provision of public services, tax and subsidy, and provision of public services are examined, and then developed to fill the gap noted.

The two parts of this thesis are representative of contrasting approaches to regional economics, but these are brought together in the final discussion of policy options aiming to promote regional resilience (Bristow, 2010). The approaches of the first and second parts of the thesis are considered to be linked by their outcomes. Both parts use a form of theoretical reasoning to derive descriptions of the study economy; both methods allow and encourage speculation as to how changes will impact on the economy; it is then easy to triangulate between the results of these approaches. Regional resilience involves a region's capacity to experience economic success within its own context, and the ability to re-organize in case of an economic shock. The

contrasting methodologies are placed alongside each other within a post-positivist approach to meet the third self-contained objective of the thesis; building a resilient economic policy for North West Wales. The concept of policy resilience is a development of regional resilience, with resilient regions being those able to cope despite economic turmoil, and to flourish economically when presented with the opportunity. Policy resilience is a tool which can be used to secure regional resilience. Thus the change that is sought is a more resilient North West Wales.

The first part of the research produced policy recommendations derived from a scenario set that is resilient to change between the outcomes noted in the scenarios, and the second part ended with a set of policy recommendations for North West Wales, based on the set of geographical economics models. The triangulation takes the form of a simple comparison exercise, so that if recommendations from one methodology contradict the other they are downgraded in the combined recommendations according to their success in historical records. Comparison and interpretation are the best tools available to bring these recommendations into the same framework, given that the merits of methodologies that attempt to quantify data obtained through the use of qualitative methodology are unclear.

The insights gained from the two research streams are then interpreted together in a process of recursive abstraction (Denzin and Lincoln, 2000), up to the point that a successful triangulation of the streams has taken place. The research holds theoretical insights up to the scrutiny of 'real-world' data and to on-the-ground intuition, thereby producing a set of policy recommendations that is more robust than any of these approaches could produce alone. This push towards a resilient economic policy for North West Wales enables the formal setting out of a section, fulfilling the overarching aim of this thesis through a process of generalization from a specific case, to triangulation of quantitative and qualitative approaches to regional economics. The reconciliation is then based entirely on interpretation and reflection, meaning that the

thesis had to be written with an emphasis on reflexivity.

1.3 Methodologies

1.3.1 Post-positivism and Reflexive Methodology

Mixed methodology research (Tashakkori and Teddlie, 1998) is also key to this thesis, allowing both quantitative and qualitative research to be considered, and enabling both theoretical and empirical conclusions to be drawn. This means that additional insight may be drawn from qualitative methods where mainstream quantitative analysis falls short, and that theoretical discussion may be used to extend and enhance empirical conclusions. Results derived from varying approaches can then be validated, enabling a deeper understanding of regional development. The mixed-methods approach is facilitated by adopting a post-positivist research paradigm for the entire thesis. Whilst quantitative methods are usually linked to positivism, post-positivism can be applied to both qualitative and quantitative research.

Post-positivism entails a rejection of any external, objective social reality, abandons the divide between researcher as object and the researched as subject, and negates the concept of value-free social science. A post-positivist accepts that the socio-economic context does not exist outside the human consciousness, but rather that it both impacts on, and is impacted upon. This is a theme that runs throughout the thesis. This thesis can also be considered an exercise in reflection, a post-positivist methodology, in the sense that both the qualitative (Mauthner and Doucet, 2003) and the quantitative (Ryan and Golden, 2006) streams of research outlined above are ultimately subject to reflexive methodology. The first strand of this thesis intends to utilize reflexive empirical research, proceeding from the perspectives and actions of the subjects studied, whilst the second part of the thesis is more concerned with applying reflexive thought to normative theories.

The two central characteristics of reflexive research are interpretation and reflection. Reflection begins with the post-positivist tenet that there is no such thing as value-free data, so that whenever data is considered or referred to, it is the result of interpretation.

It is important that researchers realize that their treatment and placement of data is entirely subjective, and do not fall into the trap of believing that measurements, observations or statistics have any sort of unequivocal relationship to anything beyond the empirical material. Moreover, qualitative research often involves observing and interviewing, and thus interpreting, the interpretations of others. Indeed, the researcher must not feign objectivity when presenting the data, since the data is interpreted in the act of presentation. Interpretation is therefore of utmost importance to the work, as is an awareness of normative assumptions and the researcher's own subjectivities. Scenario analysis, in particular, is a necessarily reflexive research method, in that the approach fosters an open attitude to the importance of interpretation in understanding social phenomena, and provokes critical reflection on relevant political and ideological contexts

(Alvesson and Sköldbberg, 2009).

Indeed, the key lesson of reflection is that the researcher should abandon claims to a position of epistemological authority by assuming the identity of the objective researcher. Rather, the researcher should become familiar with the perpendicular pronoun, placing their own identity at the heart of the research. Reflexive methodology recognizes that there is no objective social research, so that researchers take an objectivist stance to the research, and no matter how honest they are, may be influenced by their subjectivities in framing the research questions, and in interpreting the answers. Accepting that social research is not objective does not mean that the researcher should abandon all objectivity and cultivate bias - good research practice still applies in this framework, and reflexive methodology must not be seen as a panacea for flawed investigation. In order to present a reflexive piece of research I had to be aware of and had to document any subjectivities that could have influenced the scope of the

research or my interpretation of the results. Accordingly, I embrace the multiple identities that I have inhabited throughout the research, and discuss these as they become relevant in subsequent chapters, with the outcome being a piece of research that is both honest in discussing my subjectivities as a researcher, and is of higher integrity due to the constant questioning of results, searches for supplementary or alternative data, and re-examination of my conclusions that were driven by the awareness of my own subjectivities which are discussed briefly in the methodology sections of relevant chapters.

The first such note to be made must concern the central assumption of this thesis; that research is stronger when it mixes research paradigms, because a fuller understanding of human phenomena is gained. This is an entirely subjective assumption, in that there is no objective case to be built. Many mainstream economists have argued that theories should be judged by their ability to predict events, rather than by the realism of their assumptions. Friedman (1953) was a proponent of this view, saying that: ‘the only test of the validity of a hypothesis is comparison of prediction with experience’ (pp.7-8). That is, understanding the phenomena modelled is beside the point. I subscribe to the assumption that research is stronger when it mixes methods, because of my dissatisfaction with the mainstream assumption. My belief is that economists should look to multiple research paradigms, because predicting events is only possible when the underlying issues are fully understood.

The second characteristic of reflexive methodology is simply the idea that the researcher must interpret their own interpretation being aware of the reasons they have interpreted the data in the way they have. The key is looking inward and conducting self-examination, and also the seeking and understanding of the relevant research community, as well as the social, cultural and intellectual context in which the data was interpreted. The best definition of this idea is as the interpretation of interpretation. Then, as far as possible, the perceptual and intellectual background of interpretation

become the focus of reflective empirical research, rather than the data itself. (Alvesson and Sköldbberg, 2009; pp. 276-277) have suggested that good qualitative research must be characterized by empirical arguments and credibility, so that interaction with quantitative data is logical and rigorous, by an open attitude to the importance of interpretation in understanding social phenomena, by critical reflection regarding the political and ideological context of the research, by an awareness of the ambiguity of language, and by the use of these characteristics in theory development.

As discussed above, since the primary aim of the thesis is to triangulate from two strands of thinking on regional economics which cannot be analysed quantitatively together, the only recourse is to consider the output in each case and compare this in a process of recursive abstraction. More accurately, each strand relies on interpreting empirical or theoretical data of some kind results in the second part are based on my interpretation of the theoretical modelling data, whilst results in the first part are based on the interpretation of empirical evidence. Further, a large part of this empirical evidence is derived from my intuition as applied to human interaction. This means that triangulation of the two parts of the thesis, and thus qualitative and quantitative methodologies of considering regions in economics, is a matter of bringing them together in a recursive process, and using the researcher's intuition and experience to form a common insight.

This section is concluded by the introduction of 'policy resilience' as an innovation in this thesis that depends on reflexion. Policy resilience is linked to notions of economic resilience, in the sense that a resilient policy is one that can 'roll with the punches' of an uncertain future. The concept emerged during my initial research on the economy of North West Wales, where it became apparent to me that policymakers often face difficulties, beyond those that arise from the policy-making context, due to the inability of policy to react to changes beyond a narrow set of forecasts. The focus on policy resilience in this thesis is a response to this reflexively informed interpretation of regional

policymaking, and the stated wish of policymakers for a stable basis for planning. This was the motivation for participation in the research amongst regional policymakers.

1.3.2 Quantitative Modelling, Data-gathering and Qualitative Research

The empirical part of the research uses a mix of methodologies, mostly qualitative, to answer questions about the economy of North West Wales, including why it developed as it has, and how this came about. The qualitative research in this part of the thesis is supported and informed by empirical research, and the analysis and interpretation of the data using a small number of analytical methodologies from regional economics (Armstrong and Taylor, 2000), as well as a more extensive theoretical insights from both regional economics and economic geography. These methodologies are used to enable a scenario analysis within a case study framework. The scenario analysis technique is a way of analyzing possible futures through the creation of a set of scenarios. Scenarios are not predictions but are representations of the future, as interpreted by the scenario-builders.

Further quantitative empirical research, modeling through regional econometrics, and related statistical research are avoided completely, for two reasons. The first is the simple question of the availability of data. North West Wales data is often aggregated into that for Wales in many UK-level datasets, and into North Wales on Wales-level datasets. This makes it harder to separate out data for North West Wales, though this is not impossible as a number of North West Wales-only datasets do exist. The second, and more important, reason is that such methods cannot be used to answer the research questions given that the methodology would contradict the post-positivist approach outlined above. Econometrics allows economists to measure the relationship that exists between two or more variables, given a large enough set of data. Spatial econometric methods can even account for spatial autocorrelation, so that the gathering of the data

in a restricted geographic location, and consequent autocorrelation between variables, is compensated for. These tools could be very useful in analysing North West Wales, especially given the common use of econometrics for forecasting, though since econometric forecasts are based on current data the forecasts are quite specific and vulnerable to change. The problem relates to the discussion of the previous section on the impossibility of value-free data. The data that is used for modeling will be assigned value that depends on the survey questions; the econometric model is given value by the modeler, who decides which variables to make explicit. The use of econometrics thus purports to give value-free results but fails to do this in truth, while a great deal of effort goes into constructing a model and testing it. I made the decision that using methodologies that were implicit in terms of their value-laden nature was more productive since it is far simpler to apply reflexive methodology in such a case. This is not to claim that econometric modeling should never be applied to North West Wales - in which case it would surely produce some interesting results - but that, in the context of this thesis, it is not useful enough to merit the time that econometric analysis demands.

On the theoretical side, mainstream economists have traditionally avoided issues of economic geography, such as asking where growth and agglomeration occur, why such dynamic processes begin, and under what conditions this happens. These questions have been left to economic geographers, who often apply a heterodox economic analysis in a discursive fashion. This has been the case because of the technical intractability of these issues for the purposes of quantitative modelling. Geographical economics addresses this intractability (see Chapter Six) providing insight into regional economic development. However, geographical economics does not deal fully with the role of the public sector in a region's economy. This thesis aims to address the omission, which proves informative in light of the nature of the economy of North West Wales. The insight gained from the geographical economics are then used to inform a reflexive discussion of policy.

Many economic geographers, notably Martin and Sunley (1996) and Martin (1999), have criticized Krugman's 'new economic geography' (NEG) on the grounds that it is a reinvention of location theory using new mathematical tools, and that the usefulness of NEG models for policy analysis is constrained by the questionable plausibility and credibility of those models. Krugman (2011, p. 3) responded by saying, 'I do not understand the mindset of those who disdain the search for general conclusions about geography (or anything else) on principle.' The approach taken in this thesis lies somewhere between the views above, and echoes that of Alfred Marshall, one of the great figures in the mathematization of economics, once advised a friend (Dimand, 2007) to, '(1) Use mathematics as shorthand language, rather than as an engine of inquiry. (2) Keep to them till you have done. (3) Translate into English. (4) Then illustrate by examples that are important in real life (5) Burn the mathematics. (6) If you cannot succeed in four, burn three. This I do often'.

The ideal economic theory or model should be consistent with available data, offer insight and understanding of the topic being modeled, and be used to forecast future trends and, in particular, the model should be general with respect to time and place. And, as Martin and Sunley (2011, p. 357) say, 'although proper economic geography can claim to be based much more closely on the observation of real-world phenomena, its methods and explanatory accounts are difficult to use for the sort of counterfactual 'what if' type policy analyses found in NEG.' However, this quest for mathematical generalisation in regional science means that qualitative methodologies are more widely used in economic geography, which is informed by a heterodox set of economic theories, geography and sociology. As Krugman (2011, p.4) notes: '[geographical economists] definitely read too little by people from outside our tribe, and should look over the fence more often.' This statement extends to regional economists. Economic geographers proper are far better versed in the understanding of how the "messy" social, cultural and institutional factors in spatial economic development' (Martin, 1999, p. 75) actually

work, so that geographical and regional economists should look to them for understanding prior to attempting to generalise. To do this, they must emulate economic geographers and gain an understanding of those ‘messy’ factors by varying their use of methodology, and using the qualitative alongside the quantitative.

1.3.3 Roots and Sources

There are two main categories of data source used in this thesis; qualitative and empirical.

The bulk of raw empirical data are statistical outputs defined as official statistics by the Statistics and Registration Service Act 2007. They are produced according to the principles of the Code of Practice, and obtained through the Office for National Statistics or Statistics for Wales. Some of the data are also National Statistics, certified by the UK Statistics Authority. Any other data used normally come from reports commissioned by the Welsh Assembly Government, or by local authorities using official statistics as the basis for their work. A few statistics come from smaller surveys commissioned by local authorities, and use of such data is placed alongside official statistics for comparison.

Qualitative data has been sourced over the duration of the thesis from sets of semi-structured interviews, a structured series of questionnaires, and a discursive workshop including a plenary discussion. The methodologies used in the gathering of data are presented in detail in the relevant chapters. The methodology developed and used in Chapters Four of this thesis is entirely original to the project. However, gathering data of a qualitative nature can never be unbiased or value-free. The participants in interviews, workshops and questionnaires were selected stakeholding professionals, though individual selection from this subset was conducted at random. The limited number of possible participants leaves the research open to accusations of bias, albeit due to necessity, in the same way that quantitative methodologies can suffer

from autocorrelation due to neighbourhood effects in regions. A reflexive methodology was applied to counter such accusations, as the reflexive framework dispenses with the notion of value-free data, placing an emphasis on a justifiable interpretation of the data.

The theoretical insights are, for the most part, derived from peer-reviewed journal articles and books on regional economics, economic geography and geographical economics, as well as a few working papers. Some of the policy insights in Chapter Nine are original to this thesis, derived from journal articles on geographical economics models. This is especially true when discussing North West Wales in particular. The mathematical modelling in Chapter Six is entirely original to this thesis, with use of Maple software to produce the diagrams and to test the model, though developed from prior insights in the geographical economics. This model and its development has been written in the form of an academic paper and submitted to a peer-reviewed journal. The reconciliation of qualitative and quantitative methodologies through the use of reflexive methodology is entirely original to the thesis.

1.4 Structure of the Thesis

Chapter One - Introduction

Part One

The first part of this thesis focuses on the ‘reality’ of North West Wales. It is the qualitative and interpretative aspects that define the work. The point is to understand the reality of the economy North West Wales as shaped by the perception and intuition of economic agents through direct experience, empirical data and modeling discussion.

Chapter Two North West Wales: A Narrative Profile

This chapter provides a review of available economic information on North West Wales, in order to develop a baseline representation of the key issues and problems. The chapter includes an in-depth introductory socio-economic profile of the economy of the region in 2009, including dynamic and comparative data, with trends from 1980 onward noted. Some historical notes are made where relevant, and a recent history of economic policy in the region are provided. The chapter then presents a location quotient analysis for the region using 2007 data, using the results to discuss the characteristics of all important sectors of economic activity. The chapter closes with a shift-share projection of these location quotients up to 2025, presenting a picture of North West Wales in that year, given current trends. The chapter is considered as belonging to Part One of the thesis, as it has a direct influence on Chapter Three and Four - however, it also has an influence on the way North West Wales is considered in Part Two.

Chapter Three ‘Discovering’ North West Wales

This chapter provides details of the background qualitative research carried out for this thesis, and a discussion of qualitative methods used in this section, including interview and case study. Semi-structured interviews, with questions built on the profile of North West Wales given in Chapter Two, were used to elicit responses on the structure and development of the North West Wales economy, drawing on a number and range of participants, covering the key public and private sectors with most potential contribution to make to the area. The analysis of these interviews gives details of the range of perspectives uncovered. A synopsis of the interviews is presented, followed by discussions of issues, opportunities, and challenges for the region’s economy, forming the first stage of research for the scenario analysis described in Chapter Four. The final section discusses anecdotal evidence and interview data pointing to a Welsh language multiplier effect in the region.

Chapter Four Learning From the Future

This chapter presents a scenario analysis for North West Wales based on the initial research of Chapter Two and the interviews of Chapter Three. The first section begins with an introduction to scenario analysis and its applications. The innovation of Delphi-based scenario identification and development is explained at length in this section. After this, the practical issues of the scenario-building process are described, detailing the way in which the workshop was set up to elicit information from stakeholders. A record of proceedings is then given for each stage of the process, describing the development of ideas throughout. This is followed by presentation of the full scenario narratives for North West Wales, up to 2025. The final section concentrates on a policy prescription for this area, developed from the scenario narratives. The first step is to link the scenarios to strategic options, and then to develop a vision from these strategic options. These visions are then fleshed out to form policies, and the implications of these policies are explored, until a resilient policy prescription emerges that is applicable to each of the possible futures described.

Part Two

The second part of the thesis focuses on developments in modeling, and attempts to derive some implications for North West Wales. These results must be approached with healthy scepticism, as the modeling implications apply generally rather than to any specific region, and shaping them for North West Wales depends on interpretation of the region's profile in Chapter Two.

Chapter Five Geographical Economics: A Literature Review

This chapter is a literature review of geographical economics, with a focus on Krugman's first core-periphery (CP) model that explained economic agglomeration in a

two-region model through the presence of increasing returns to scale. The chapter begins by exploring the Dixit-Stiglitz (1979) model of monopolistic competition and its spatial version. The ‘home market’ effect discussed for this spatial model links geographical economics to post-Keynesian economics and the circular cumulative causation discussed in Chapter Two. The next parts cover the development of the core-periphery model, as well as its extension beyond a two-region setup, and some enhancements to the model. The final section investigates the very tractable ‘footloose’ models. The basic model discussed in this chapter is advanced in Chapter Six.

Chapter Six Periphery and the Public Sector

This chapter expounds a new set of geographical economics models developed as part of this research, based on the discussion of Chapter Five. This is a public-private sector model which explains the over-representation of the public sector in peripheral areas. This can be related to the public sector in North West Wales and the phenomenon of ‘crowding out’. The first section of this chapter reviews the groundwork for this model, including other models dealing with public goods. The second section develops an original model including a public contribution, through a flat tax, to the provision of public service. The final section discusses the possible brief development of this model, with regards to a public sector that explicitly interacts with private sector production.

Conclusion: Where Model Meets Reality

This chapter is intended to be the meeting point between the empirically-induced portrait of reality and the results of the (geographical economics) model. The chapter begins with a generalised and abstracted discussion of the differences and similarities between the implications of the qualitative and quantitative methodological strands explored in this thesis. Direct comparison is the most navigable through the use of interpretation as it allows a central role for reflexive methodology in this thesis. The

chapter also discusses the policy recommendations from the geographical economics, including the model developed in Chapter Seven, for North West Wales as profiled in Chapter Two. The chapter then contrasts the policy prescription developed out of the scenario narratives from Chapter Four with the policy recommendations from geographical economics. This enables the building of a comprehensive policy framework supported by the geographical economics and other quantitative modelling, and by qualitative evidence.

Structure of the Thesis - Schematic

The schematic below displays the chapters in sequence, and their relation to one another:

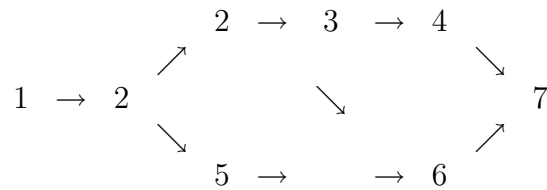


Figure 1.1: Schematic of the Thesis

1.5 Summary

This chapter has introduced the aims and objectives of this thesis, and the reflexive empirical methodology used in the research. This thesis is unusual in combining such qualitative and theoretical techniques with qualitative and empirical research, but it aims to use the primacy of interpretation to ensure that these distinct strands become interwoven into a meaningful study of the economy of North West Wales.

Part I

Part One

CHAPTER TWO

North West Wales: A Narrative Profile

2.1 Introduction

This chapter aims to give a detailed account of the economy of North West Wales, (WAG, 2008d) its history, and its present structure, through conceptual and narrative profiling. The profiling is supported by some simple economic analysis of current (2007) data on the region, using the economic base analysis described in O'Donoghue and Cleave (2004) owed by a discussion of the future, which also treats projection from the present time up to 2025. The narrative profile explores further into the region's past, as an industrial centre and as an area of rich social and cultural history. The profile forms the background for the interviews of Chapter Three, but influences discussion of North West Wales throughout the thesis.

2.2 Definition of region under study

In light of the post-positivist and reflexive approaches that inhabit this research, it is important that North West Wales is defined clearly as a region in terms of its society, culture and history, as well as its geography. The history and culture of the region are especially important given the path dependence (Arthur, 1989; Hodgson, 1993) in regional economies.

North West Wales is generally considered as the region of Wales consisting of Anglesey (Isle of Anglesey County Council, 2007), Conwy (Conwy Borough County Council, 2007) and Gwynedd (Gwynedd Council, 2007). This is a vast area, comprising almost one quarter of Wales' land area; one of difficult terrain, with the fourteen highest peaks in Wales (and England) lying within a neatly defined area of a few square miles that straddles the border between Gwynedd and Conwy. The most important rivers are the Conwy and Dyfi, which form a neat border with north-east and south-west Wales respectively. There are three local authorities, formed by the Local Government (Wales) Act 1994, which cover the area the Isle of Anglesey County Council

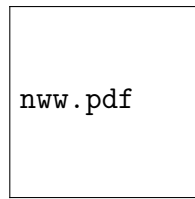


Figure 2.1: Map of North West Wales

on the island of Anglesey in the far North West, Conwy County Borough Council in the north-eastern quarter of the area, and Gwynedd Council, which covers most of the area.

Gwynedd is often subdivided into three areas: Arfon which is the northernmost area, between Anglesey and Conwy, and surrounding the town of Caernarfon and the city of Bangor; Dwyfor which, roughly, corresponds to the LLŷn peninsula; and Meirionnydd which covers half of Gwynedd below this peninsula. Snowdonia National Park Authority (SNPA) is the planning authority for Snowdonia National Park (SNPA, 2007a), which covers nearly two-thirds of Gwynedd and a third of Conwy. From its formation in 1951 (SNPA, 2007c), its powers over planning and development make it an important policy making body in the region. The Welsh language is spoken by a large majority in Anglesey, Gwynedd, and the eastern and southern parts of Conwy. The administrative towns are Llangefni in Anglesey, Conwy in Conwy, and Caernarfon in Gwynedd, whilst the largest economic centres are Holyhead, Bangor, Colwyn Bay and Llandudno. These economic centres are on the A55 North Wales Expressway (The Motorway Archive, 2008) which runs across North Wales from Holyhead to Chester, along which most of the region's non-tourism economic activity is distributed. The decision to define North West Wales as the combined local authorities of Anglesey, Conwy and Gwynedd was taken by considering these cultural factors together with the region's geography, and the borders of the existing administrative divisions for simplicity in data gathering. The total population (StatsWales, 2007c) of North West Wales is 297,900, or ten per cent of the Welsh population, with 118,400 in Gwynedd, 110,800 in Conwy, and 68,700 in Anglesey. The population of Snowdonia National Park Authority (SNPA, 2007b) is 25,480, although this population is included in data for Conwy and Gwynedd.

A clear definition of North West Wales has existed since the fifth century (Davies, 2004).

Recorded history in this area dates back to the Roman conquest, when Segontium auxiliary fort was built in present-day Caernarfon to subdue the surrounding region, with road networks to other minor forts in Holyhead, near Bangor, near Conwy and

near Porthmadog in Dwyfor, and between Ffestiniog and Trawsfynydd in Meirionnydd.

The *Iter Britannium*, a Roman road map of Britain, shows the fort connected to a legionary fort, *Deva Victrix* (Chester), by what was a Roman super-highway, part of a network of roads leading to London. The modern A5 was partly built following this road, and several major economic centres in North Wales were built along its route so that the extractive West-East orientation of the economy of North West Wales originates with Roman-Britain. North West Wales as a region is almost identical to Gwynedd Uwch Conwy, the core of the Kingdom of Gwynedd (Davies, 1994) which emerged following the withdrawal of the Roman Empire from Britain. Gwynedd's fortunes waxed and waned over the following centuries, at times absorbing neighbouring kingdoms through war or dynastic marriage, but always retaining Gwynedd Uwch Conwy at its heart. Llywelyn ap Gruffydd, the last ruler of Gwynedd, was one of a handful of Gwynedds rulers to establish dominion over most of Wales, and to claim the title Prince of Wales. Alongside this military history there is a religious aspect, with Holyhead being a parish dating back to Roman-Britain, and the city of Bangor being established as a medieval bishopric.

After the defeat (Lloyd, 2004) and deaths of Llywelyn in 1282, and his brother Dafydd early in 1283, during the final skirmishes of the Norman conquest, the principality of Wales was legally incorporated into England, and King Edward I set about consolidating the conquered territory. The statute divided the principality into the counties of Anglesey, Merionethshire, Caernarfonshire, and Flintshire, which were created out of the remnants of the ancient Kingdom of Gwynedd which had spanned most of North Wales. A great many modern-day economic settlements can trace their roots to the Norman conquest, and many of these Norman developments were built on Roman foundations. The other Welsh counties were not established until Henry VIII's Laws in Wales Act 1536, which completed the annexation, with Denbighshire being formed in north-east Wales alongside Flintshire. Merionethshire lost a few of its

constituent cantrefi to Denbighshire, and parts of the Aberconwy area have regularly been traded between the north-east and west in the various re-organizations of local government over the past few centuries, but what is considered an integral part of the area is unchanged.. Evidence of the conquest is most obvious in the iron ring of fortresses built around Snowdonia by Edward I, in order to consolidate the territory. There are also a few surviving Welsh castles built by Llywelyn ap Iorweth, grandfather of Llywelyn ap Gruffydd. The castles of Edward I are now world heritage sites, and all this history is a huge draw for tourism in the area. The subjugation of Gwynedd saw the iron ring of fortresses and fort town being orientated along an east-west corridor, making trade and transportation of goods safer and simpler in that direction.. The fortifications linked to the English market, opening up new possibilities for the economy of old Gwynedd. This influences the orientation of North West Wales even today. The proposition could be made that the west to east nature of extraction in the economy of North West Wales is partly due to Roman road building, and also to the pattern of fortification and colonization following the 13th century Anglo-Norman invasion of the Kingdom of Gwynedd. The Dyfi, Mawddach and Dwyryd rivers lie in Meirionnydd, together with some of the harsher terrain in the region, whilst the northern coastal trip has offered comparatively unrestricted travel from west to east. Geographical obstacles such as the Dyfi estuary and the Cader Idris massif, and human obstacles posed for example by the banditry of Gwylliad Cochion Mawddwy, and other dangers, combined to make north-south trade less attractive than trade with the north of England which could be conducted safely and probably in greater comfort.

This cultural history is dominated by the history of the Welsh language and culture. The language is spoken by over half the people of the region, and over 70 per cent in Anglesey and Gwynedd. The area has a huge number of Welsh speakers, 20 per cent of all those in Wales and nearly 40 per cent of these are fluent users of the language. South-west Wales is the only place where the proportion of Welsh speakers approaches

the levels found here. The strength of the language leads to strong bilingual and Welsh language cultural roots. Of the 128 National Eisteddfods held since 1880, 28% have been held in North West Wales. Nearly half of annual sales of Welsh-language books take place here. The same phenomena hold for music, broadcasting and other Welsh language media. Consequently, the area is recognized as the heart of the Welsh language and culture, and it perceives itself as such. There is a palpable sense of pride in this status, and the feeling that the area has retained its Welshness in spite of centuries of oppression of the language, from the Middle Ages up to early modern times, and this has doubtless been a factor in its development. The status of a once independent nation, together with the Welsh language which the 1536 Act attempted to extirpate, has shaped the areas character, and it is no exaggeration to say that these long-past events have a continued impact on the local economy.

2.2.1 The Economy of North West Wales

On mainstream measures of economic performance, North West Wales falls significantly behind in the UK economy (ONS, 2009), with productivity around three-fifths of the average. Conwy has the fifth lowest productivity for a local authority in the UK, with Anglesey being the lowest. The region also performs below average for the Welsh economy (BERR, 2008), with Conwy being placed fourth from bottom of Welsh local authorities. Anglesey is a very poor area relative to most neighbours, and although Gwynedd and Conwy perform marginally better they still fall below 70% of UK GVA per capita. The entire North West Wales area is also a part of the European Union Convergence Programme region of West Wales and the Valleys, NUTS 2 (WEFO, 2007a) which was awarded the highest level of support known as Convergence (WEFO, 2007a), from the European Union for structural funds programming in 2007/2013. Convergence was the successor to the Objective One programme 2000/06, for which the same West Wales and the Valleys area also qualified (WEFO, 2007b). Anglesey (NAW,

2008a) is the poorest local authority in the whole NUTS 2 region, whilst Conwy (NAW, 2008b) performs less well than West Wales and the Valleys as a whole. Gwynedd (NAW, 2008c) performs quite strongly in comparison with the regional average, but is still much weaker than the average for Wales (ONS, 2009). North West Wales has a very fragile economy (Bywyd Mn, 2007; Ymchwil a Gwybodaeth Corfforaethol, 2007; Ymchwil a Gwybodaeth, 2007), vulnerable to sudden shocks in agriculture and public-funding levels, with Anglesey also vulnerable to shocks in the manufacturing sector. This is a highly peripheral and marginalized economy. There is a ferry connection from the busy port of Holyhead to Dublin (Department of Transport, 2008), and the recent creation of an airline route (BBC News, 2007) from Cardiff International to RAF Valley in Anglesey, as well as the A55. The route is designated part of Euroroute E22 (Holyhead - Leeds - Amsterdam - Hamburg - Malmo - Riga - Moscow - Perm - Ekaterinburg - Ishim). As might be expected for a National Park area, the region is recognized for its natural beauty, with the highest mountains in the British Isles outside of Scotland, and it also has two coasts which are Areas of Outstanding Natural Beauty (AONB). These are but a few aspects of the area's geography that shape the local economy, with tourism being just one. The natural beauty of the area, and especially the unspoilt wilderness of Meirionnydd and the coastal resorts, attracts the in-migration of retirees, many from North West England. This brings wealth into the area, but also creates new pressures on public services. The brief administrative history of the area also suggests the unique historical status of the area, from pre-Roman times to modern industrial history. This is another resource for tourism, and there is evidence that forms of tourism have been important to the area for centuries.

Manufacturing and primary industries have been in decline since the inter-war period of the 1920s and 30s. The area was dealt serious economic blows when the slate industry collapsed, when wool was replaced by cotton as the material of choice for making clothes, and with the decline of shipping in the port of Holyhead. There are many towns

here that were once amongst the largest in Wales, due to the trade in wool and slate quarrying, and are now but glorified villages. The social and economic impact of these events are relevant even today. As such, a brief history of the area is vital. Gwynedd and Conwy are wealthier because of the history of mineral extraction, whereas Anglesey's economy has historically tended to have a narrower focus. Most of the wealth of North West Wales came from mineral extraction, and principally slate, lead and copper and some gold around the Dolgellau Gold Belt. Parys Mountain near Amlwch in Anglesey was the centre of the world copper industry in the late 18th century, when it was used to sheath wooden ships, and was being mined up until the early 20th century.

The mines of Gwydyr Forest in the Betws-y-Coed and Llanrwst areas were rich in sphalerite and galena, the most common zinc and lead ores. Copper has been found in Llandudno since the Bronze Age. Unsuccessful iron mines worked the Nant Ffrancon formation of iron ore which occurred widely in Gwynedd, at Bangor and Betws Garmon in the late 19th to the early 20th century.

Slate has been central to North West Wales for centuries (Lindsay, 1974). Cilgwyn quarry in Dyffryn Nantlle is the earliest known quarry in Wales, dating back to the 12th century and used to roof Caernarfon Castle, but even the Roman era Caer Llugwy and Segontium forts were roofed with local slate. Penrhyn quarry near Bethesda and Dinorwig quarry near Llanberis were the two biggest slate quarries in the world, and accounted for 46 per cent of UK production in 1882. Alun Richards noted that, It dominated the economy of the North West of Wales, where, by the middle of the 19th century. it accounted for almost half the total revenues from trade, industry and the professions, and in Wales as a whole, its output value compared with that of coal. Transport of slate to global markets was a linked industry, with local ports expanding, ships being constructed, and small railways being built. Lead was also mined in Dyffryn Conwy and Gwydyr Forest, which, together with the wool trade, made the Llanrwst area very prosperous.

The causes of decline in the slate industry have been charted comprehensively (Jones, 1981). The industry was hit by a series of recessions towards the end of the 19th century, leading to widespread industrial disputes, worsened by linguistic and cultural differences. This culminated in a lock-out at Penrhyn Quarry which lasted three years from 1900, and divided the people of Bethesda for generations afterwards. The loss of production led to a temporary shortage of slate, and kept prices high, but part of the shortfall was made up by imports. After 1903 there was a depression in the slate industry, which led to reductions in pay and job losses. New techniques in tile manufacture had reduced costs, making tiles more competitive for roofing purposes. For example, the number of men at work in the Ffestiniog area fell by 28 per cent, and eight Ffestiniog quarries closed between 1906 and 1913; in Dyffryn Nantlle the number at work fell by 38 per cent during the same period. The loss of exports to Germany hit the industry in 1914, slate quarrying was declared a non-essential industry, and in 1917 a number of quarries were closed for the remainder of the war.

Although there was a pick-up in trade in the post-war period, this was followed by the Great Depression, increased mechanization of quarries, and then the Second World War.

The war saw industry employment in the region fall by 54 per cent, with decreased demand due to imported slate and tiles. After the war, the use of slate for new buildings was banned, apart from the smallest sizes, preventing any increase in demand for slate.

The next two decades saw the end of large-scale quarrying, with closures in Nantlle, Ffestiniog, and Dinorwig. Gwynedd's population in 2009 was below its total in the 1934 census, which followed the peak of the slate industry in the 1880s, and the consequent population peak of 138,444 in 1881. The slate industry today holds out as a shadow of its glory days. This is not surprising given the long history of slate quarrying and mining in Gwynedd, although a steady trickle of job losses in the sector means that it will continue to decrease in importance. Welsh Slate, a company based in Bethesda, employs around 240 people in Gwynedd at Penrhyn Quarry, and there are three quarries

in Nantlle, and Blaenau Ffestiniog. The firm is bringing in new machinery, which means fewer workers will be needed at the quarry. In April 2009, Welsh Slate announced it was asking staff to accept a ten per cent pay cut because of the slowdown in the construction industry at this time. In August 2008, the company announced it was cutting 50 jobs because of the global economic downturn. The decline of these traditional industries, especially slate, is a cause that cannot be overstated, as it has had a huge effect through most of the 20th century and into the 21st, with a brief overview in the narrative profile. Agriculture has also seen a substantial decline, if less dramatic than in the slate industry and other forms of mineral extraction.

2.2.2 Sectoral Analysis of North West Wales

Having run through the a basic profile of the region, it is natural to seek more information regarding the most important industries in the area. The simplest way to do this is by economic base analysis, as described in the previous chapter. Using data from the Annual Business Inquiry 2007 (ONS, 2008), the location quotient method is employed to find basic and non-basic industries. The location quotients below are calculated from data for UK Standard Industrial Classification (2003) sectors relative to both Wales and the UK. The broad sectoral breakdown presented below gives a rough idea of the nature of the region's economy and labour market. Basic and total employment in North West Wales are given by B and T.

	<i>T</i>	<i>B</i>	<i>Employment(Wales)</i>	<i>Employment(UK)</i>	<i>LQ_W</i>	<i>LQ_{UK}</i>
<i>Primary</i>	1734	939	9230	242319	2.18	1.87
<i>Manufacturing</i>	8286	0	160891	2820868	0.60	0.77
<i>Construction</i>	4948	0	59558	1291332	0.96	1.00
<i>Distribution</i>	36887	8669	327429	7757443	1.31	1.24
<i>Business</i>	14887	0	228486	7145009	0.76	0.54
<i>Non – market</i>	34473	961	388851	7163138	1.03	1.26
	101215	10569	1174445	26420109		

Table 2.1: LQ Analysis of Broad Sectors

A breakdown of GVA by industry and Welsh NUTS 3 area (ONS, 2009) is used together with this location quotient analysis, enabling identification of the most important broad sectors. The location quotients vary depending on whether it is Wales or the UK that serves as the reference region. This is easily explained. For example, the manufacturing sector is very small in North West Wales compared to the UK as a whole, but manufacturing is important to Wales generally due to high activity in the South and East. This means that using Wales as the reference region yields a smaller location quotient for manufacturing than when using the UK for the same purpose. Once we have identified the basic broad sectors, we can find the basic employment in those broad sectors. In practice, much of the non-marketed services sector serves local demand, and much of the manufacturing sector will serve non-local demand, meaning that the figures for basic employment are not reliable they do, however, serve as an useful guide to local economic activity. The Primary sector includes agriculture, fishing, mining and electricity production - any sector that deals in the production or extraction of basic 'raw' goods. Distribution covers retail, accommodation, food, transport and communication. Business includes financial services and any other business or professional services. The Non-market sector includes charities and voluntary organisations, as well as private clubs, but most of it comprises of the public sector. In North West Wales agriculture is a very important sector, so the long-term decline of agriculture is concerning. In Anglesey agriculture and fishing contributed 8m or 1.05% of GVA, 10.7m or 0.76% of GVA for Conwy, and 15m or 0.95% for Gwynedd. This means that North West Wales derives 0.9% of GVA from agriculture compared to 0.76% for the UK and 0.46% for Wales. Anglesey is particularly involved in agriculture, and Gwynedd derives an above-average proportion of its GVA from the industry. Despite the relative importance of agriculture (WAG, 2009c) in the region, the long-term decline in the industry is readily apparent. In 1999 agriculture and fishing was worth 21m or 4.37% of GVA to Anglesey, 28m or 2.8% of GVA to Conwy and 39m or 3.65% of GVA to

Gwynedd. This continues a long term trend (WAG, 2000).

Interestingly, livestock bred for meat is one area where numbers have increased or remained steady, and this type of livestock farming is prevalent in North West Wales. Agriculture and fishing accounts for 0.3% of GVA in Wales, and The relative importance of agriculture is because the agriculture practised in North West Wales is, overwhelmingly, livestock farming. There are no precise figures for North West Wales alone, but statistics (WAG, 2009d) show that North West Wales has around 20% of sheep, 15% of cattle, 15% of pigs and 26% of poultry in Wales, and that cattle, sheep, poultry and pigs account for 45.9% of gross output in basic prices for Welsh agriculture. It is then not surprising that North West Wales derives double the proportion of GVA that Wales does from agriculture with 0.6% in Gwynedd, 0.5% in Conwy, and 0.8% in Anglesey.

The region has little in terms of viable agricultural land, other than grazing and as a livestock-based area, it has very little impact on the areas GVA. However, it is important to the area in terms of the indirect employment that it creates - although it is shrinking and this is a long-term trend, as with the decline of manufacturing. For example, if we look at UK production statistics for 2007, it is apparent that around half of output at 2.3 trn is spent on intermediate consumption, with the rest plus taxes less subsidies comprising UK GVA at market prices. That is, GDP is 56% of gross output. However, 2007 gross output at market prices for agriculture in Wales was 998.9m whilst GVA at market prices was only 136.9m, or 13.7% of gross output.

The reason for this is that 862 m, or 86% of gross output, is used up in intermediate consumption. These costs include feed, veterinary expenses, fertilizer, machinery expenses, farm maintenance, contracting, and a huge 223.9m on other costs. Running a farm is expensive, and both goods- and labour-intensive. Additionally, many of these goods and services are procured, and even produced, locally. Out of this value added and other subsidies comes the fixed capital costs of 198.1 m, including building,

machinery, and livestock, as well as compensation of employees at 72.1m, much of which is spent in the local economy with a large local multiplier.

GVA from agriculture and total income from farming, at 46m, is low, but these figures do not consider the fact that agriculture kept 1.132 bn spinning in the Welsh economy in 2007. The number of agricultural businesses in North West Wales have doubled from

300 to 600 since 2005, and employees nearly doubled from 860 to 1585, although

forestry, fishing and hunting are included and the increases are mainly due to improvements in the coverage of the data source. Agriculture and fishing are very important basic industries, relative to the UK and Wales. This is especially true of

Anglesey, with geographical factors meaning that the island is open to types of agricultural endeavour which are not feasible in upland Conwy and Gwynedd. Most enterprises choose to specialize in livestock farming, with sheep being favoured in the area of Snowdonia, cattle and a small number of dairy cows reared in Dwyfor, the south and east of Meirionnydd, and the east of Conwy, whilst the better quality of land in Anglesey allows the growing of some crops together with a wider range of livestock.

The second broad sector that should be considered is production. This encompasses mining and quarrying, manufacturing, and energy, gas and water supply. Production accounts for around 14.9% of GVA for North West Wales, compared to 20% for Wales as a whole. However, there are huge internal disparities with production accounting for 11.4% and 11.7% of GVA in Conwy and Gwynedd respectively, but 27.9% of GVA in Anglesey.

Mining and quarrying produces 0.4% of GVA for Wales whilst employing 0.155% of workers. In West Wales and the Valleys, the economic sub-region that contains North West Wales, 0.6% of GVA comes from the sector. The sector employs 0.166% of workers in North West Wales and 0.221% in Gwynedd, so it can be surmised that GVA from mining and quarrying is marginally higher in North West Wales but significantly higher in Gwynedd, where the once-booming slate industry with quarries at Bethesda and

Blaenau Ffestiniog producing small volumes of slate and employing a few hundred people - still exists, albeit in a much-reduced state. Anglesey Mining plc owns and explores Parys Mountain for copper, and has discovered reserves of 6,500,000 tonnes, although plans to re-open the mines at 350,000 tonnes per year have never come to fruition. The decline in this sector is also clear in historical statistics, with quarrying continuing to haemorrhage jobs in the recent past, back to the 1870s when quarries in Gwynedd employed thousands.

Energy and water are also basic to North West Wales. Gwynedd has two large hydropower stations, four small windfarms and Trawsfynydd nuclear power station which is in the process of decommissioning and produces no electricity, whilst Anglesey has Wylfa nuclear power station near Amlwch, producing 23 million kWh daily, but scheduled for decommissioning in the next few years. Water means management of the water supply and waste management and this is undoubtedly more labour intensive in a topologically-challenging rural area with a rainy climate. Energy, gas and water supply account for only 1.8% of GVA and 1.2% of employment in Wales, whilst 2.1% of workers in North West Wales are in the sector, indicating that this industry makes a relatively larger contribution in the region.

Manufacturing is the second smallest sector in North West Wales in terms of employment at 9.9% compared to 14.6% for Wales, and it is likely that this is also true for its contribution to GVA. Manufacturing accounts for 17.9% of GVA in Wales, and whilst there are no sub-regional statistics available, the figures for the relevant local authorities are likely to mirror those for the production broad sector with manufacturing employing 15.1% in Anglesey, 3.7% in Conwy and, and 7.7% in Gwynedd. The sector is small with respect to the UK economy, but especially relative to Wales where the manufacturing sector is larger than the UK average due to manufacturing along the 'M4 Corridor', the Valleys, and Deeside. Conwy's manufacturing base is run by SMEs after all remaining large manufacturers left in the past decade with Dolgarrog Aluminium

which closed in the final months of 2007, an early victim of the economic turmoil at that time. Gwynedd has a few larger manufacturers, with Siemens Healthcare Diagnostics Ltd. being the biggest, but is similar to Conwy in that most big manufacturers have pulled out. Anglesey is the only local authority in the region where manufacturing is a basic industry, relative to both Wales and the UK, mostly due to Anglesey Aluminium Metals Ltd. and two food processing plants on the island.

Construction in North West Wales contributes nearly 7.8% of regional GVA and 5% of employment, as opposed to 7% of GVA and 5.3% of employment for Wales.

Construction in Anglesey accounts for 8.4% of GVA, with the contribution being 8.3% in Conwy and 7.1% in Gwynedd. Manufacturing work in Conwy and Deeside require a number of construction workers, whilst publicly-funded buildings have been built and improvements made to transport infrastructure across North Wales in the past decade, with regeneration work in the Liverpool and Manchester also ongoing.

Distribution, transport and communication is a very important sector for North West Wales as it accounts for 24.1% of GVA against 19.9% for Wales, and employing a massive 38% of workers in the region as opposed to 29% for Wales. The sector delivers 23.8% of GVA in both Anglesey and Conwy, 24.5% of GVA in Gwynedd. Transport and communication contribute 5.5% to GVA in Wales as well as 5.5% of employment, so the 5.2% of employment in North West Wales is highly indicative of its role in regional GVA. That the transport and communications sector in North West Wales is smaller than in the UK is no surprise, but it may seem strange that the sector is not much smaller relative to Wales considering that the region contains the most rural parts of Wales excluding Powys and Ceredigion. The reason is that the sector contains the information technology and broadcasting areas of communication. The region, and especially the Arfon area of Gwynedd, are centers of creative industry, from television, radio, and film, to journalism and the writing and publishing of books. There is also a software technology cluster developing in this area, and much production of

Welsh-language software. Anglesey is the one local authority where transport and storage are present on a similar scale to the UK. Holyhead is the terminus of the A55/Euroroute 22, and the North Wales Coast Line along which operates six direct trains to London daily. Holyhead also offers a regular sea link to Dublin and to Dun Laoghaire and there is a daily air connection from Cardiff to RAF Valley nearby.

Wholesale and retail trade contributes a hefty 19.4% to employment in North West Wales against 16.3% for Wales, and given that the sector contributes 11.2% to GVA in Wales it can be supposed that the sector contributes a significantly higher proportion to GVA in North West Wales. However, although supermarket presence has exploded in the past fifteen years for the north of the region, the retail of non-food items is limited, and the more rural areas are devoid of any large-scale retail activities. The exceptions are Llandudno and Colwyn Bay in Conwy which are retail centers, but increasingly ignored in favour of Chester, Liverpool and Manchester.

Hotels and restaurants account for only 3.2% of GVA in Wales and 7.1% of employment, but a massive 13% of employment in North West Wales and 15.2% in Conwy. The disparity between the contribution to GVA and sectoral employment highlights why tourism is considered a low value activity in the region despite its overall contribution. Tourism-related industries employ 10.3% of workers in Anglesey, 17% in Conwy and 13.6% in Gwynedd, so that tourism accounts for 14.2% of jobs in North West Wales against just 8.9% in Wales. Tourism-related industries are thus important employers in the region and make a significant contribution to GVA. However, the industry has entered stasis with a long-term struggle to attract new visitors. There has been a gradual decline in the sector since the peak of 1978 with advent of package holidays and then cheap flights.

Business services and finance is a small sector for North West Wales contributing just 15.4% of regional GVA and 2.2% of employment against 23% of GVA and 3.4% of employment in Wales, with only Conwy approaching the national average employment

and the sector contributing 18.2% of GVA. The sector contributes 15.1% to GVA in Anglesey and 13% in Gwynedd. Business services and finance is a high value-added activity as demonstrated by the high GVA to employment ratio, and North Wales lacks this kind of job. It is not surprising to see that financial intermediation, and real estate, renting and business activities is the smallest sector in the region: small relative to Wales, and tiny relative to the UK. North West Wales has very few financial services on offer, outside high-street banking and building societies, and even access to these is limited by rurality and relative poverty. The same principle is true for real estate services. Both professional, scientific and technical services, and administrative and support services are limited by the business environment of North West Wales. Law and accountancy is practiced, scientific research and development is done, and services for business are provided but a shortage of businesses in most other sectors means that these activities are not common.

Other services is a very broad sector, comprising high-value-added professional services and academic work together with low value-added activities in entertainment. North West Wales employs 11.9% of its workers in this broad sector against 14.5% in Wales, including 13.4% of workers in Anglesey, 12.7% in Conwy and 11.5% in Gwynedd. The broad sector contributes 5.2% to GVA in Wales, and the lack of high-value added activity explains the employment disparity. There are three reasonable explanations for the size of this sector. First is that the majority Welsh linguistic and cultural nature of North West Wales provides more scope for the performing and creative arts than in other regions of Wales. Secondly, the area exploits tourist demand through the provision of museums archives and other exhibitions. Third, and most importantly, we must consider that half the area's population live in a rural economy. In such an area, it is likely that there will be a higher incidence of the undifferentiated production of goods and services for subsistence as well as a greater focus on the repair of goods.

The public sector and other services contributed 30.7% to GVA in Wales for 2007. The

sector was worth 23.5% or 178m of GVA in Anglesey, 37.2% or 522m in Conwy and 42.9% or 680m in Gwynedd. Making the very tenuous assumption that the 5.2% figure for the sector applies throughout Wales, this means that the public sector, including public administration and social security, education, and health, contributed 25.5% to GVA in Wales and 36.4% to the GVA of North West Wales. At the same time other services is worth 195m to the region with 39m in Anglesey, 73m in Conwy and 82m in Gwynedd. The public sector also employed 32.4% of workers in North West Wales, including 26.2% in Anglesey, 32.1% in Conwy and 35.1% in Gwynedd. The public sector is, unsurprisingly, much more important to North West Wales than to the UK as a whole. But it may be a surprise to note that, relative to Wales, the sector is marginally less important. This is primarily due to Anglesey having a public sector which is very small relative to Wales, and also significantly smaller than for the UK. Gwynedd has a large public sector relative to Wales as the demands of geography and rurality, coupled with linguistic demands, mean higher employment in education, health and social care, and public administration. Conwy faces less of a challenge to public administration as a more compact area with two-thirds of its population living on the coastal strip. Anglesey is also a very compact area, but fewer large public institutions than its neighbours.

Calculation of location quotients means that base multipliers can be found. The Base Multiplier can provide insight as to how many non-basic jobs are created by one base job. The basic sector is made up of local businesses or institutions that are entirely dependent upon external factors. Manufacturing and local resource-oriented firms are usually considered to be basic sector firms because their fortunes depend largely upon non-local factors. The non-basic sector, in contrast, is composed of those firms that depend largely upon local business conditions. The base multiplier for any area is simply calculated from the ratio of non-basic employment to total employment during the same time period. Anglesey has a base multiplier of 1.34 whilst Conwy's base multiplier is 1.375, and Gwynedd's is 1.37. North West Wales as a region has a base

multiplier of 1.32, since basic employment is 77,790 and total employment is 102,974.

This means that 0.32 non-basic jobs are created for each basic job.

2.3 Economic ‘Model’ of North West Wales

This section introduces a conceptual model of the economy of North West Wales. What is meant by conceptual model is that this is a detailed, yet simplified, explanation of the North West Wales economy and the way its sectors and economic drivers interact. As previously in this chapter, a detailed listing of statistics, detracting from the underlying economic portrait, is avoided in favour of the pursuit of a more comprehensive understanding of the region’s economy. Below is a schematic of how the region’s main

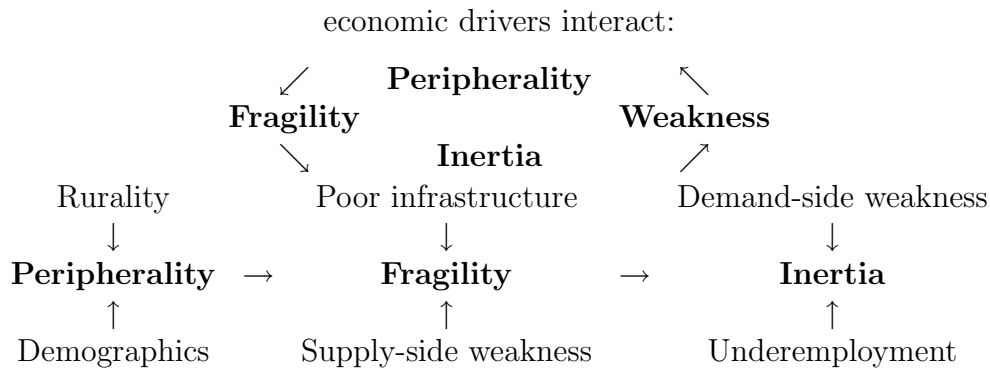


Figure 2.2: Primary and Secondary Drivers in the Economy of North West Wales

Peripherality refers to refer to the characteristics of the economic geography of North West Wales impacting on its population. Fragility refers to the structural issues and lack of diversity in the supply-side of the North West Wales economy. Inertia refers to the failure to diversify in production. Weakness refers to GVA figures and other economic indicators, including poverty and inequality. The lower half of the schematic discusses some, but not all, of the secondary drivers of the economy of North West Wales. The schematic was derived from intuitive links in the following paragraphs. Much of North West Wales is very rural, and the geography has an overriding influence over many considerations to this day. First, there is a very low population density.

Second of all, population centers are far apart with a smattering of small villages in between. Third of all, the hills and mountains create huge physical barriers to movement in the region with long and winding roads, making the large-scale transportation of goods an impossibility. North West Wales is a highly peripheral economy, with limited and therefore relatively high cost inter-regional transport links - that is, low regional accessibility (Vickerman et al., 1999) - as well as limited transport infrastructure within the region and little industry (Rizov et al., 2011). Even though the region is reliant on tourism to a large extent, rurality counts negatively even here as it is argued (Zhang et al., 2007) that rural regions have smaller tourism multipliers than urban regions due to factors such as interregional trade, commuting and shopping leakage. Despite the problems noted above, North West Wales displays a high degree of socio-economic resilience. The lack of openness in a region, together with a low population density, may lead to low economic performance (Gambardella et al., 2009), though it is notable that there has been a shift to urbanization around the population centers (Turok and Edge, 1999) of North West Wales despite low population growth and corresponding to a decline in rural population. The isolation of remote towns in relatively sparsely populated areas is a hindrance to growth so that economic activity tends to be increasingly concentrated in the larger cities and their hinterlands (Collits, 2000). Transport costs play a part in this process where regional agglomerations of economic activity provide an advantage (Krmenc and Esparza, 1999).

The clearest sign of a trend to urbanization is the development of new supermarkets driven by the increasing mobility and expectations of rural residents (Powe and Shaw 2002), with a concentration of retailing service provision at higher levels of the retail hierarchy, and the loss of provision in the smaller centers (Hall et al., 2001). The trend to urbanization also is reflected in findings that over the last century there has been a shift in the provision of services towards larger population centers. Population density is an obvious issue in the region as the populace is heavily agglomerated in three areas

along the route of the A55. These agglomerations represent the region's 'home market' and economic activity is overwhelmingly based at these locations. Interestingly, Anglesey will be at a near standstill in terms of population growth by 2025, whilst Conwy and Gwynedd experience very slow growth in the years surrounding this date. Annual population growth for Anglesey is already quite low, and will steadily become weaker. These are central estimates (StatsWales 2007, f,g,h), so it is possible that Anglesey will be shrinking at this time. It is likely that this population growth will be centred on the northern coastal towns of Arfon and Conwy, with the populations of Dwyfor, Dyffryn Conwy, and Meirionnydd continuing to shrink.

The peripheral nature of the economy has led to a smaller local market through the usual circular processes (Berger, 2009; Krugman, 1999). This has created an area dependent on a multitude of small businesses, which may increase innovative activity (North and Smallbone, 2000; Thompson, 2010) although it is likely that region lacks the required industrial deepening and R&D investment to take advantage of this (Athreye and Keeble, 2002). There is a relationship, if not a clear causal link, between firm location and proximity to relevant university departments (Abramovsky and Simpson, 2011), and this can be seen in North West Wales. More 'traditional' and less productive firms exhibit stronger ties to the region and the size of the local intermediate goods market influences the extent to which they source locally so that the local context is important in explaining the pattern of spatial economic behaviour displayed (Courtney et al., 2008) in North West Wales. There are only a few large employers and traded clusters, which is a possible indicator of a weakly performing regional economy (Porter, 2003), excepting a large public sector. It is often considered to be a very fragile economy, in the sense that it is highly vulnerable to shocks in a small number of contracting sectors. The low overall population density reflects a significant dependence on agriculture (WRO, 2010) and tourism away from the northern coast, and even the areas with relatively large concentrations of population are former seaside resorts, slate

quarrying towns, or administrative centers (WRO, 2006). Finally, poor service provision, the high cost-of-living usual in a rural area (WRO 2004, 2009), relatively high housing costs driven by the attractiveness of the area for recreation and retirement, and generally lower wages than outside are causing a loss of population in the younger age categories (StatsWales, 2007a,d,e).

The economy is highly dependent on the provision and administration of public services for skilled, high-wage employment (Henley and Thomas, 2001), and also on tourism and related small businesses stemming from the area's natural beauty. On mainstream measures of economic performance, the area falls significantly behind both the Welsh and UK economies. The area is not recognized as having high levels of poverty, but rural poverty in the area, along with the expected detrimental social and economic effects, is often underestimated as it exists in small pockets over a large area. Poor service provision, the high cost-of-living usual in a rural area, relatively high housing costs driven by the attractiveness of the area for recreation and retirement, and generally lower wages than outside are causing a loss of population in the younger age categories (StatsWales 2007c, d). This out-migration, coupled with low birth-rates and an ageing population are leading to demographic imbalance and further strain on public service provision, especially in more rural areas. This ageing workforce, coupled with decreased local demand, drive investment elsewhere so that the out-migration reinforces the region's peripheral status.

Environmental forces have created rural, isolated pockets of land in-between formidable obstacles, meaning that the area is largely unsuitable for urbanization. Overall, the geography is similar to Cumbria and Northumberland. Anglesey is less imposing terrain, but lies beyond a mountainous area, meaning that it too is effectively cut off. The economy of North West Wales was based in part on these geographic factors, with mineral wealth in the hills, whilst the same hills with their poor-quality land enabled livestock farming to be concentrated there, allowing the better quality of land elsewhere

to be used exclusively for crop-based agriculture. Although beauty is an altogether subjective matter, the region's geography is widely considered aesthetically beautiful, and there is research that suggests a role for beauty in community satisfaction (Florida et al., 2011) and thus on migration decisions (Mellander et al., 2011). Community satisfaction, as an aspect of quality of life, is a less tangible driver that Wong (2001) defines this as the desirability of a place for living, as determined by the quality of the built and natural environments, public amenities and cost of living. Quality of life can influence business location through its impact on the location and availability of skilled workers and on the wages that have to be paid to obtain their services, although to what extent this is true is unclear. Skilled workers are attracted to places offering a high quality of life firms may need to seek out such locations and workers may be prepared to accept a lower wage (Rogerson, 1999) given that the richest countries in the European Union show little evidence of significant urbanrural differences in quality of life (Shucksmith, 2009). Another boost for North West Wales is the suggestion (McGranahan et al., 2011) that the interaction of entrepreneurial context with the share of the workforce employed in the creative class of the knowledge economy is strongly associated with growth in the number of new establishments and employment, particularly in rural counties endowed with attractive outdoor amenities.

The region's geography does create some economic opportunities (Hyde and Midmore, 2006) in terms of tourism and heritage protection. The four World Heritage Sites in North West Wales are all 13th Century castles built to consolidate the English invasion of the Kingdom of Gwynedd (CADW, 2011a). There are also four castles (CADW, 2011b) of this Kingdom within Gwynedd in the care of CADW, together with other properties and ruins across North West Wales. Many ruins in the area date back to the Romans, Iron Age hill forts and hut circles. Ancient and medieval history aside, the region also has a long industrial heritage from copper and other metal mines to the slate industry and related developments. This long heritage strongly impacts the job market

(StatsWales, 2007b), through the ongoing development of tourism and hospitality. The way tradition acts as a driver is primarily through an ingrained resistance to change and the new. Tradition and heritage drivers create a strong sense of identity, manifesting in a community cohesion that is apparent both socially and economically. The loss of agricultural land is a long-term trend, due to the decline of agriculture. The loss of biodiversity is another trend that will become more apparent in future, along with environmental change from global warming. The area's natural beauty has led to high levels of statutory protection for the area, effectively keeping its rural status assured. Agriculture and tourism have become strongly interrelated, with most farmers tending to diversify into tourism in their efforts to combat the effects of a more general agricultural decline with little diversification into specialized produce (Ilbery and Bamford, 2000; Skuras et al., 2005).

The effects of this rural isolation can be seen in the widespread use of the Welsh language, and a degree of cultural homogeneity which brings its own economic rewards. North West Wales falls within *Y Fro Gymraeg* (Jones and Fowler, 2007), an unofficial area of Mid- and West Wales where there is a high proportion of Welsh speakers (StatsWales, 2006; WLB, 2006) and most within a geographical area where over half of the population speak Welsh. This has the effect of creating a unique need for Welsh-language service and some goods, meaning that there are links between earnings and linguistic proficiency (Henley and Jones, 2003) and the beginnings of a cultural economy (Markusen, 2006; Markusen, 2010). Though there is no clear link between entrepreneurship and Welsh language skill, it is true that Welsh-speakers are more likely to own a business (Jones-Evans et al., 2011). Welsh language legislation, making it compulsory for public bodies to provide service in the language, is an important driver in the labour market. The decline of the usage of the Welsh language in North West Wales, and a large Welsh diaspora in primarily English-speaking cities are also important drivers. The tangible and intangible heritage of North West Wales, natural

and historical, leads to public demands for protection and appreciation. However, bilingual regions may suffer in terms of openness and thus economic performance. It is important to understand the Welsh language as being culturally embedded in the region, emerging as both a social factor and a factor which influence firm behaviour and competitive performance (James, 2005).

The slow-but-steady growth of the region's population has been accompanied by changes in the housing market which have been a cause for concern. The demand for owner-occupied housing in rural areas is high and in a situation in which the supply of new housing is often constrained, prices have risen. House prices are generally higher in rural wards than in non-rural wards. Demand for rural housing comes from a number of sources as well as local populations: including those working in nearby urban areas; retirees; and those acquiring second homes. Second homes are a pressing issue as working-class families native to the region perceive non-Welsh speakers as second home owners who are resident in England as pricing them out of the market, as well as damaging the 'Welshness' of the community. However, patterns of in-migration and second-home ownership are highly variable, with greatest pressure in coastal areas, national parks (Mace et al., 2002) and locations close to major centres of employment. The demand for rural housing creates problems of affordability for those on low and moderate incomes in rural areas (Bramley and Smart, 1995). Losses of council housing stock brought about by sales of properties under the Right to Buy legislation have been high (Lambert et al., 1992). Turnover in the remaining rural social housing also tends to be low so that together these trends mean that few properties become available for letting in rural areas. Low levels of new social housing provision by registered social landlords (RSL) in rural areas contribute to the problem. The affordability of rural property is also influenced by local incomes. It is also notable that in larger settlements for reasons connected with the promotion of sustainable development (Tetlow et al 1996).

Education is a key social driver with a number of low achievers in North West Wales (WAG 2008a,b,c) but also a high number pursuing further education. The number of school pupils, both in primary and secondary education, is relatively low, demonstrating the region's skewed demographic composition. North West Wales outperforms Wales at GCSE/GNVQ points score, and at A level points score excepting Gwynedd.

Performance in the region at all levels has increased continually over the long term, though failing to keep pace with the overall improvement in Wales. The high proportion of schoolchildren who have special educational need, at primary and secondary level, as well as low teacher-pupil ratios compared to the national average highlight the region's material disadvantage. Despite this, enrollment for further and higher education is quite high. However, the proportion of students in higher education at undergraduate level in the region is low, whilst the number of postgraduate and research students is much higher, so that enrollment for higher education does contribute to the out-migration of young people. This is compensated for by the in-migration of older people, but leads to a shifting demographic profile. Skills is also a powerful driver in North West Wales. The region performs above the Wales average for basic qualifications but only Gwynedd performs well on high-level qualifications. This, together with the earlier observation that educational levels in the region are concentrated on basic and advanced levels, reflects the region's economic orientation to low-value added activities requiring few qualifications, and a large public sector requiring high-level qualifications. Part of this is due to Welsh speakers being more likely to gain higher qualifications of some kind, and that Welsh language skills are important in the area's labour market. Anglesey underperforms in all areas, reflecting the level of deprivation in the area. North West Wales as a whole performs less well than England or the UK as a whole, but has narrowed the gap in the previous decade. The area outperforms Wales, except in the highest category of qualifications. This may be due to the link between low educational achievement and poorer market access (Lopez-Rodriguez et al., 2007).

This level of education and skills in the region is intertwined with the labour market driver, with wage levels, unemployment, and inactivity (StatsWales, 2007b).

Employment rates in North West Wales show that only Gwynedd has employment above the average for Wales, but unemployment is low except in Anglesey. It can be surmised that this low level of unemployment is due to the fact that employment specialization in North West Wales has become specialized in a mixture of low skill (tourism) and high skill (public) sectors so that there is greater efficiency in matching unemployed people to work than in high unemployment regions of the UK (Robson, 2006). Economic activity and, especially, inactivity is a deep problem for all parts of the region which is not surprising when it is considered that regional labour markets that have job deficiencies result in an increase in the risk of negative labour market outcomes (Baum et al., 2009) and that job access is causally related to the probability of obtaining a job among workers with poor average labor market status (Aslund et al., 2010). Demographic change is an important issue with the working age population being relatively small and skewed towards older workers, although net in-migration is skewed towards people of working age. The number of jobs in the region has increased since 2003, with a slight increase in employment and a larger fall in economic activity. However, Anglesey is notable for the lack of jobs per working age person. The region is faced with declining industries and agricultural sectors; and many of their young and skilled men and women leave. Such regions do not seem to participate in the knowledge economy to the same extent as larger towns (Cooke et al., 2002). The presence of Bangor University in the region, and of two other higher education institutions bordering North West Wales, bring some advantages, as university research exerts a positive influence on the regional distribution of private innovation of high-technological content (Barrio-Castro and Garcia-Quevedo, 2005). Together with a number of further education institutions within the region this creates a spillover effect that is strongly localised but provides a basis for competitive advantage through innovation (Audretsch,

2002). However, the strength of this spillover effect is debatable (Goldstein et al., 2004). The decline in the mining and quarrying industries, caused by the exhaustion of reserves and falls in global demand due to alternative manufactured goods, have never been eased by the advent of replacement industries - apart from a Keynesian postwar drive to bring industry to peripheral regions, the effects of which have faded completely - possibly an effect of keeping the area rural. There is little variety in terms of industrial sectors so that the region is open to economic shocks and dampened employment growth (Frenken et al. 2007), whilst low levels of investment and research and development expenditures lead to dampened productivity growth. Implications for regional policy follow. North West Wales compares well to the national average on earnings, but this holds better for lower earners. GVA per head in North West Wales is very low and this is again reflective of the region's orientation to low value-added activities. North West Wales is dominated by micro business, often home-based (Mason et al., 2011) and small business (WAG. 2007c), more so than for Wales, with over three-fifths of employees working in firms employing under fifty people, with few large employers or industries that contribute substantially to GVA. North West Wales is, surprisingly, more entrepreneurial than Wales and the UK, although the region is lagging in terms of high growth entrepreneurship (Jones-Evans et al., 2007; Thompson et al., 2008). The sectoral structure of the North West Wales economy should also be discussed. As discussed in the sectoral analysis above, public sector employment dwarfs that in any other in North West Wales, and especially so in Gwynedd, and the public sector likewise dominates GVA statistics. This means that a public sector crowding out of economic activity must be considered as a possibility. Sectoral employment is important. For example, over four-fifths of employees in Gwynedd work in the services sector. Anglesey has a below Wales-average three-quarters in services and a huge nine in ten employees in Conwy work in the services sector.

Poverty and inequality are relatively high in some areas, such as the wards coming out

badly in terms of multiple deprivation, and this has an undoubted effect on the economy. The hugely varying incidence of these economic drivers on the population means that there are significant pockets of disadvantage, poverty and social exclusion, many of them disguised - so that, for example, the Welsh Index of Multiple Deprivation 2008 (WAG, 2008i) only identifies 9 of its 190 Lower Super Output Areas (LSOA) as being among the 10% most deprived in Wales. As an example of disguised rural poverty, it is generally true that average household incomes of the over 65s in remote rural areas are less than those of their non-rural and accessible rural counterparts, and older people living in remote rural areas are the most likely to experience persistent low income (Philip and Gilbert, 2007). Lack of opportunity in the area shows up in these statistics, and there are a number of highly deprived wards. However, the most highly deprived wards are noted in the population centers to the north of the area. Rural poverty is, to some extent, overlooked in the area even though there are some pockets of obvious and serious poverty in the rural parts of North West Wales. The lack of recognition for rural poverty is counter-intuitively opposed to the perceptions of local people, and ignores the link between income polarization and low economic growth (Ezcurra, 2009) This is despite the fact that the area's claimant count for both 'out-of-work' benefits, and for all benefits, are significantly lower than the figure for Wales, and have declined significantly since 2003. Lagging in terms of average earnings, levels of self-employment, informal and seasonal work and the average size of businesses is a feature of rural Wales and other rural parts of the UK (Jones, 2004). However, the fact that North West Wales has low average earnings does not necessarily translate to low job satisfaction (Jones and Sloane, 2007).

The critical factors for development - in terms of the performance of the local economy emphasising relative performance, income, employment and standard of living (Begg, 1999, Malecki, 2002) - in smaller towns (National Assembly for Wales, 2006), rural areas (Terluin, 2003) and economic regions (Wong, 1998) all earn mentions above. These

factors include: location; infrastructure; the availability of land and housing; labour quantity and quality; industrial and business structure are all key, and all are challenging issues in North West Wales.

The statistical profile used to inform the above conceptual model of North West Wales presented above was much enhanced by the application of a reflexive empirical methodology. Statistical data such as that which is prepared by the Office of National Statistics may seem to be value-free but the decision to include or exclude data is a subjective act of interpretation. The data is also interpreted again by the person using the resulting dataset. This researcher may assume causal links between various datasets, an interpretative act that changes the way the data is observed and assigning new meaning to it. This means that some reflection is required when compiling a regional profile, as there is so much value implicit in this data. A narrative profile such as the one presented above involves understanding the region's history and plotting a rough timeline, into which events, facts and the researcher's interpretation of data can be woven. Maintaining integrity demands that the narrative should reflect empirical observation, and that it should be able to explain real world circumstance in a simplified way.

2.4 Review of Economic Planning in North-West Wales 1999-2010

In 1999, the UK Parliament devolved secondary legislative powers, within narrowly defined legislative areas, to the National Assembly for Wales. Power over economic development and transport policy were amongst the areas devolved to Wales. As such, the question of British regional policy is superseded by a review of regional policy in Wales, but institutional factors combined with economic realities mean that British and Welsh regional policies are closely linked. Regional policy in the past decade, still

dominated by the hegemonic discourse of competitiveness, has also been influenced by endogenous growth theories (H.M. Treasury, 2001; Gill, 2005) which highlight five key drivers of local productivity growth - skills, investment, innovation, enterprise and competition.

There are a number of recent policy documents relating to the economic development in North West Wales. Although interest in the economic development of this region is not new to the past decade, the focus prior to 1999 tended to be on Wales as a whole with the Welsh Development Agency (WDA), established in 1976, taking a lead role. The pre-devolutionary approach tended to minimize the consideration of big regional divergences within the nation, although the WDA did take some interest in the regions.

Rather, economic development initiatives in Wales tended to be part of a wider UK regional policy, or lack thereof after 1979. Where regional policy existed, it was generic and designed to treat the differences between Wales and other peripheral regions of the United Kingdom. Since devolution and the creation of the National Assembly for Wales in 1999, the focus of regional development has shifted from Wales as a region of the UK to the Welsh Assembly Government (WAG) concern with development of lagging regions within the newly devolved nation being equally as important as the gape between Wales and the rest of the UK.

These new priorities are clearly demonstrated by the Wales Spatial Plan (WSP) 2004 and its 2008 update, with six Spatial Plan Areas (SPA) over Wales, and in the creation of Strategic Regeneration Areas (SRA) in selected location throughout Wales. The North Wales Economic Forum published the North Wales Development Strategy (NWDS) in 2004. The local authorities of North West Wales have attempted to adapt the WSP and the SRAs within the region, adapting the plans to address development from a local perspective. This document is the North West Wales Development Strategy developed in 2009 between WAG and Conwy County Borough Council, Gwynedd Council and the Isle of Anglesey County Council. There are also a number of other

strategies, including the Local Development Plans (LDP) developed by each council and Snowdonia National Park Authority (SNPA), and the North Wales Tourism Strategy 2003-2008 and 2010-2015. We begin with an overview of national policy since 1999, and then turn to North West Wales specific policy documents and research.

2.4.1 Economic Policy in Wales: A Review

Economic development is one of WAG's key responsibilities, as seen in *A Winning Wales* (WAG, 2002), *Wales: A Vibrant Economy* (WAG, 2005b), and *Economic Renewal: A New Direction* (WAG, 2010a), with the 2005 document being the model for economic development after the WDA was disestablished in 2004. The decline of heavy industries and agriculture in Wales, as in North West Wales, bequeathed the legacy of a peripheral economy, low employment and high economic inactivity, to the National Assembly for Wales. West Wales and the Valleys were awarded around 1.2 billion of EU Objective One funding designed to promote structural adjustment in very poor regions - between 2000 and 2006. Delivering the Objective One programme became another of the main responsibilities of the new Assembly.

A Winning Wales is the first economic development strategy published by the Assembly, and draws heavily on the competitiveness discourse. The strategy's central focus is raising regional productivity with an eventual aim of raising GDP per capita in Wales to parity with the UK average. It sets out plans regarding what are perceived as drivers of growth and competitiveness - for encouraging innovation, entrepreneurship and enterprise, to improve skills in the employment market, and to promote the use of information and communication technology. It also sets out plans for supporting Welsh business and inward investment through indirect and direct fiscal policy means, constructing a Rural Development Plan (WAG, 2007b), and publishing a spatial planning policy for Wales, as well as setting out plans on sustainable development, transport, and community regeneration.

Wales: A Vibrant Economy developed on this framework by recontextualizing approaches to competitiveness, setting out plans to encourage economic growth and competitiveness together with sustainable development and an improved quality of life. Economic Renewal set out a number of priorities that were set out in *A Winning Wales*, but with a greater emphasis on digital and green infrastructure and on making Wales a more attractive place to do business, less of an emphasis on entrepreneurship, and a more targeted approach to fiscal policy in the wake of the 2008-2009 recession. These policy documents each play a role within the WAG policy framework.

The Wales Spatial Plan (WSP) is an application of spatial planning to development in Wales, with economic development being a key area of action. The WSP (WAF, 2008e) was published in 2004 and is dominated by the five themes of Building Sustainable Communities, Promoting a Sustainable Economy, Valuing our Environment, Achieving Sustainable Accessibility, and Respecting Distinctiveness. The stated aims are to sustain communities by tackling the challenges presented by population and economic change; to grow in ways which will increase Wales' competitiveness while assisting less well-off areas to catch up on general prosperity levels and reducing negative environmental impacts; and to enhance the natural and built environment and to sustain the country's distinctive identity. The key features of the plan are fuzzy boundaries between Spatial Plan Areas, the identification of key settlements, cross-boundary settlements and socio-economic hubs for economic activity in each area, and regional, interregional, and international transport links.

Spatial Plan Areas are not defined by administrative boundaries. This enables partners to work together on common issues in a flexible way, and some may be involved in more than one Spatial Plan Area Group. For example, the North West Wales Area covers Anglesey, Arfon, and Dwyfor, and it has a fuzzy boundary with Meirionnydd which lies in the central Wales Area. Conwy lies within the fuzzy boundary between North West, north-east, and central Wales. The reasoning behind these boundaries is that they will

enable co-operation and flexibility. On the one hand, this may seem reasonable, but to leave areas dependent on cooperation for economic development may be labelled fuzzy thinking. Certainly, the main criticisms of the Wales Spatial Plan are that it falls short on outlining specific actions, and that it makes too few provisions for implementation, whilst it could be argued that many ideas are underdeveloped.

The plan's vision for North West Wales is; 'A high-quality natural and physical environment supporting a cultural and knowledge-based economy that will help the area to maintain and enhance its distinctive character, retain and attract back young people and sustain the Welsh language'. The vision for the second theme is one of an innovative, high value-added economy for Wales which utilizes and develops skills and knowledge. At the same time, an economy which both creates wealth and promotes the spreading of that prosperity throughout Wales is desired, and this might be criticized as a contradiction to the aim of a knowledge economy, as it is highly likely that such an economy would create wealth only for a highly-educated few, rather than improving the quality of life, the standard of living and the working environment for the general population. The WSP, as part of its thematic structure, many other department-specific plans and programs linked to economic development such as Rural Development Plan 2007-2013, the Transport Framework for Wales (2001) which was superseded The Wales Transport Strategy (WAG, 2008g), the Communities First Programme (2001) where the Welsh language played a part in the regeneration of some areas (Pearce, 2008), the Social Enterprise Strategy for Wales (2005) and the Social Enterprise Action Plan (2009), Achieving Our Potential (WAG, 2000) and the Tourism Investment Strategy 2008-2013 (WAG,2008h), many skills and education strategies, as well as plans relating to other departments. The Plan splits Wales into six SPAs acting as a framework for the development of regional perspectives on all areas of devolved responsibility. Each part of these areas shares, supposedly, a common development path. Each SPA is demarcated by 'fuzzy' boundaries, intended to acknowledge that economic activity flows between

regions.

The WSP seems to have been influenced by growth-pole theory, as each SPA has its own economic pole or hub, made up of the largest, strategically placed settlements. The economic development of the SPAs will be shaped around that of the hub. Another possible criticism is the uniformity of the vision across SPAs. Spatial planning should lead to each SPA developing its existing strengths. Although the strategies for each SPA do take account of local features and existing infrastructure, the WSP's overall vision is imposed on each so that the outcomes are broadly similar.

The concept of strategic regeneration covers a variety of activities, from sustaining distinctiveness in physical renewal of urban spaces to improve economic viability and address market failures, to working with people in their communities to tackle underlying causes of deprivation. Such activities take place all over Wales through different organizations and partnerships. The Welsh Assembly Government has a number of programmes that specifically aim to support regeneration, from Communities First to the Rural Development Plan, that are applied within the seven SRAs in Wales. The status of SRA signals greater spending than in other economic hubs in many of the more prosperous SPAs. The SRA concept (WAG, 2010a) was first developed in 2005, with the Môn a Menai Action Plan (WAG, 2008d) following in 2006, and five more SRAs developed after 2008 including the North Wales Coast Action Plan. SPAs are distinct from their component SRAs, but the development of each SRA is important to the wider SPA.

The region of North West Wales, as defined for the purposes of this thesis, falls within three of these SPAs, with Anglesey, Conwy and the North of Gwynedd covered by the North West Wales Eryri a Môn SPA, Meirionnydd and the southern parts of Conwy falling under the central Wales SPA, and the easternmost part of Conwy also falling into the North East Wales SPA. The WSP's fuzzy boundaries mean that Eryri a Môn is the SPA to be detailed. There are four hubs in the SPA, with the largest circling both sides

of the Menai and the Bangor-Caernarfon-Llangefni triangle, the second circling the main coastal towns of Conwy-Colwyn Bay-Llandudno in Conwy, and two smaller ones around Holyhead in Anglesey and Penrhyndeudraeth-Porthmadog-Pwllheli in Gwynedd. The goal is a high-quality natural and physical environment supporting a cultural and knowledge-based economy. The region's main assets are seen as Snowdonia National Park and the Heritage Coasts of Penllŷn and Anglesey, the Welsh language and culture, and Bangor University. The aims are to develop creative industries, financial intermediation, the care and health sectors, aerospace, construction (particularly around nuclear energy), higher-value tourism (for example marine and business tourism), renewable energy technologies, aquaculture, geo-sciences, and software technology clusters (particularly focusing on visualization) within the region from the existing assets. However, there seems to be a lack of methodological basis for the identification of these opportunities.

There are two SRAs in North West Wales – Môn a Menai, and the North Wales Coast. These SRAs were developed from the two main original economic hubs of the Eryri a Môn SPA. The Môn a Menai SRA focuses around the Menai hub, with some attention to links to Dublin from Holyhead, the North-South air link and RAF Valley, and more focus on the nuclear sector. Its other priorities are those outlined in the WSP, but with more discussion of specific regeneration projects, and greater discussion of spending, in particular the drawing down of EU Structural Funds for projects in the SRA. The North

Wales Coast SPA covers Colwyn Bay, and the towns to the east in Denbighshire.

Overall, it is a far more balanced strategy for regeneration, with a focus on health, housing, and community development. This Action Plan, coming four years after the notion of Môn a Menai, is less advanced. The main project in the North West Wales region is the regeneration of Colwyn Bay. The weakness of the SRA Action Plans, like the SPA Strategies, is the lack of an evidence-base for the goals set out, and the lack of detail.

2.4.2 Specific North West Wales Policy

The NWDS is, in contrast to the WSP Strategy for the North Wales SPAs, a much more grounded and objective plan, based on research by the North Wales Economic Forum. As such, it is guided by a clear analysis of the area rather than the conflicting political visions off the WSP. The final strategy outlined, in a series of themes as in the WSP, do look similar to the SPA objectives for North -east Wales. Important priorities are increasing the business birth rate and the number of high-growth start ups, supporting innovation, increasing productivity and competitiveness, and creating a social economy, as well as a focus on skills, supporting community cohesion, developing infrastructure, and improving North Wales as a place to visit, do business, work and live. However, the themes were identified by analyzing the existing challenges in North Wales, leading to a more convincing strategy. The main weakness is that, as most of the population of North Wales live in the North East, the NWDS is biased in its outcome.

Tourism is a key area of economic activity in North West Wales, and has been for almost two millenia. It is also an activity that is more likely to ensure that the whole region shares in the creation of wealth, rather than the restricted entrepreneurialism of the knowledge economy. The Tourism Strategy North Wales 2010-2015 is both well-researched and comprehensive, aiming to maximize returns from a sector which generates 1.8bn annually, approximately half the region's GVA in 2009. Challenges are outlined from reviews of data, both qualitative and quantitative, and strategies are presented to address these supported by feedback responses. The stated aim is to develop a successful and sustainable tourism industry in North Wales which generates wealth for the region, draws on and sustains its special environment and culture, contributes to quality of life and brings enjoyment to visitors. Recommendations on how to achieve this are discussed for North East and North West Wales, respecting the cultural and geographical distinctiveness of each region.

The WAG, the three local authorities and National Park Authority in North West Wales

have worked together to modify the WSP and SRA Framework using local knowledge.

In particular, it had been felt that both had ignored settlements outside of the A55 corridor running through the North Wales Coast SRA, the Menai hub and the Holyhead hub. This, together with the fact that there were few meaningful plans for the Penrhyndeudraeth-Porthmadog-Pwllheli hub, led to both plans being reconsidered and reformulated according to local preferences. The result was the North West Wales Spatial Development Strategy, intended as recognition of the economy of North West Wales outside of the Môn a Menai hub. The strategy also recognizes the failure to include implementation details in the WSP. The attempts at remedying this include the composition of a detailed monitoring system for the strategy, and an implementation plan. This plan includes the creation for local development plans for each unitary authority, Gwynedd's newly adopted Unitary Development Plan reforming the authority's planning system, coordinating areas by mapping the spaces between socio-economic hubs of the WSP, researching the strengths of specific areas within the region, developing a focus area or hub in Meirionnydd, developing Gwynedd's affordable housing programme, and the development of regional programmes to keep the region's young population and attract leavers to return. Many of the recommendations are, again, similar to the overall thrust of the SPA Strategy in the WSP. However, local knowledge adds elements such as adding value to agriculture and land-based industries, traditional industries such as quarrying, putting a focus on entrepreneurialism, and investment across the region, removing the focus on a growth pole. The economic hubs of the WSP and a fifth settlement cluster is included, covering all of Meirionnydd and the southern parts of Conwy. Each focus generates its own particular responses, from the knowledge economy around Bangor University in the Menai hub, knowledge-based services and tourism in the North Wales Coast hub, transport and nuclear energy in the focus around Holyhead and Amlwch, and tourism and leisure in the Penrhyndeudraeth-Porthmadog-Pwllheli hub. One weakness is the same lack of an

evidence base as in the WSP, even though local knowledge aids the differentiation and consideration of advantages in each focus area.

2.4.3 Policy Research on North-West Wales

The North-West Wales Economic Strategy (NWWES) was developed by SBARD, University of Wales, Bangor in 2000. It was commissioned by the WDA (North Division), in co-operation with the informal North West Wales Objective One Partnership for the region. The aim of the strategy is to establish a set of key priorities, emerging from detailed analysis of the regional economy, for economic development which, if adopted and followed, that would enable the region to raise its Gross Domestic Product to such a level that it no longer qualifies for Objective One funding, the EU Structural Fund for regional convergence when the report was written. The Welsh Assembly, in its Single Programming (1999) document for Objective One, presented a vision is a dynamic region notable for: a high quality, job creating, innovative and knowledge-driven economy; a skilled, enterprising and adaptable workforce, spreading prosperity across all parts of the region both urban and rural. The Strategy recognizes that, 'achieving these aims within the next ten years' would require clear and coherent strategies. The document sets out priorities to be addressed, a set of strategies for each priority as well as for economic sectors, and offers examples of such strategies elsewhere. The priorities are similar to the themes of the WSP, but the strategies presented are far more detailed. The reason for this is detailed research of North West Wales, including economic projections and structural analysis, followed by a detailed SWOT analysis, drawn from various sources, including a number of 'key informant interviews' with various representatives of economic development bodies within the region. The end product is a comprehensive strategy that sets out the challenges that face the region over the next decade. One weakness in the document is the lack of appreciation for the role of the Welsh language in the economy.

North West Wales Economic Futures (NWWEF) is a 2006 report, commissioned by WAG. The report is not designed as a policy document, but rather as an informative piece. The research begins with stakeholder interviews, moving to econometric analysis of performance to date, informed through the compilation of a socio-economic database, and then subject to further trend, statistical and comparative analysis, followed by a scenario analysis workshop. This leads to an employment model based on ABI data broken down for the agreed geographies and sectors. Projections cover the period to 2020. Projection rates are informed by recent research by the IER, Warwick University and Cambridge Econometrics – a cutting down of national UK projections for regional application. Spatial analysis of the results is achieved through the mapping of data (from the econometric analysis and employment modeling) on a Geographical Information System (GIS), although this downplays human geography, and local distinctiveness. The report closes with a policy analysis to identify the major trends, spatial challenges and opportunities, policy options and implications, including identification of key sectors and clusters. Overall, the report moves too often between modeling and other technical methods, and qualitative methodology, without compensating for or even acknowledging the fundamental differences in approach. The scenario analysis in particular is not a true scenario analysis, as the process was seeking confirmation of modelling, rather than being investigatory. A large number of scenarios were produced, including a no-change base scenario, with all the scenarios accompanied by improbably precise employment projections. These points all contradict accepted scenario analysis methodology.

2.5 Beyond The Model: An Uncertain Future

Uncertainties can be placed in the same categories as drivers and trends, and to a certain extent we can say that all the drivers and trends listed are ‘uncertain’. What makes the list below special is that they are ‘known unknowns’. We know from trends

and forecasts what demographic change to expect; what the labour market might look like in fifteen years; which growth and economic sectors might dominate. The uncertainties are the areas where trending is not sensible; for example, given the 20th century, we might expect exponential growth in energy use. The truth is that energy use is likely to decline substantially, with more energy produced from renewable sources. This is not a foregone conclusion, and we are unable to predict innovation and specific technologies. This is uncertainty. It is natural to ask, after determining the economic base of North West Wales in 2009, what the economic base will be in 2025. The growth sectors in the first decade of the new century have included environmental goods and services, marine science and geo-science, information and communications, leisure and tourism, the creative industries, retail, and hi-tech manufacturing. Projections for employment change (WAG, 2006a) and population growth (StatsWales, 2007h) can be used as a basis for analyzing changes in work patterns. Using this data, by applying to it the economic base projection methodology an approximation of the state of the economy at a future date can be derived.

In 2004, the Welsh Assembly Government produced North West Wales Economic Futures, which attempted to forecast growth in the region. The problem here is that while the fast-growth industries are highlighted, these industries are not necessarily the ones that will be most important to the area between 2009 and 2025. A very small industry that grows very quickly for a few years will still be a small industry at the end of this period. There is a danger that, by focusing on the fast-growth industry groupings, economic planners may inadvertently undermine areas of the economy that are part of the regions economic base in 2009, and will continue to be so despite experiencing only low growth or even decline. The WAG report includes this table of employment growth in key industry groupings up to 2020:

It may seem obvious to economic planners that Marine Sciences and Geo Sciences are the place to focus their effort. Even the best-laid economic plans may fall into the trap

	2004	2009	2014	2020	2004 – 2020	2004 – 2020(%)
<i>Marine/Geosciences</i>	244	311	397	533	289	118.29%
<i>Environmental Knowledge</i>	932	1,000	1,071	1,163	232	24.87%
<i>Leisure</i>	6,187	6,550	6,976	7,525	1338	21.63%
<i>Creative</i>	10,673	11,247	11,793	12,482	1809	16.95%
<i>Retail</i>	1,158	1,217	1,277	1,355	197	17.03%
<i>HighTech</i>	9,817	9,990	10,191	10,438	621	6.33%
<i>Medium – HighTech</i>	323	321	319	315	–8	–2.37%
<i>Food – Processing</i>	1,789	1,770	1,744	1,714	–74	–4.16%
<i>Medium – LowTech</i>	2,320	2,288	2,254	2,214	–106	–4.56%
<i>LowTech</i>	2,662	2,613	2,555	2,486	–176	–6.59%
	3,594	3,514	3,447	3,369	–225	–6.25%

Table 2.2: North West Wales Economic Futures

of taking these figures at face value or of interpreting them out of context. The only way to be sure in our interpretation is to work out the economic base for the future and compare it to the economic base for 2009. Projections for sectoral employment in 2017 have been made for the UK and its constituent regions by the Warwick Institute of Employment Research . The WAG report makes similar projections for sectoral employment in North West Wales up to 2020. Using these data sources, and assuming that the annual rates of employment growth in each sector will be unchanged, we can project the economic base for 2025. The assumption we make is tenuous, as it is likely that the annual rate of employment growth in an industry will change in 5 years, as it is possible that new industries will develop that will grow much faster than any forecasts. However, it is likely that aggregate growth over broad sectors will not deviate wildly from the forecasts. As such, the data below is a rough guide to the future. First we include the employment projection up to 2020 from North West Wales Economic Futures:

These projected employment figures result from a simple econometric model based on employment in 2004, trend employment for 1998-2004, annual growth rates for industrial classifications, and adjustments to growth rates reflecting policy changes. The Working Futures report gives the following for employment growth in the UK and in

	2004	2009	2014	2020	2004 – 2020	2004 – 2020(%)
<i>Primary</i>	3,223	2,970	2,692	2,394	–829	–25.72%
<i>Manufacturing</i>	8,362	8,196	8,019	7,811	–551	–6.59%
<i>Construction</i>	4,547	4,434	4,346	4,243	–304	–6.68%
<i>Distribution</i>	25,991	26,553	27,182	27,955	+1,964	+7.86%
<i>Business</i>	7,285	7,701	8,275	9,032	+1,747	+23.81%
<i>Non – market</i>	33,102	34,523	35,740	37,299	+4,197	+12.68%

Table 2.3: Projected Full-Time Employees in Broad Sectors

Wales up to 2025 by using a similar, but more complex, econometric model:

	$Growth_{UK}(pa)$	$Growth_W(pa)$	$Employment_{UK}$	$Employment_W$
<i>Primary</i>	–2.3%	–1.7%	166994	7015
<i>Manufacturing</i>	–1.4%	–1.6%	2251196	124295
<i>Construction</i>	+0.8%	+0.7%	1466920	66590
<i>Distribution</i>	+0.6%	+0.7%	8536627	366091
<i>Business</i>	+1.4%	+1.3%	8925038	280938
<i>Non – marketed</i>	+0.6%	0.7%	7882628	434765
<i>Total</i>	+0.6%	+0.5%	29073833	1272007

Table 2.4: Employment Projection 2025, UK and Wales

These figures show that the Primary sector in the UK will shrink rapidly in the sixteen years to 2025, less rapidly in Wales, and more slowly in North West Wales. This is, perhaps, not as surprising as it seems due to the comparative rurality of Wales. More rural areas will require a larger workforce to provide utilities. There is also the fact that primary sector activities are basic to North West Wales, and less likely to decline rapidly. Manufacturing continues its long term decline, with a more rapid shrinking in Wales. Surprisingly, despite the cessation of smelting work at Anglesey Aluminium Metals, the decline of manufacturing in North West Wales is much slower than in either reference region. Construction is another surprise sector which, growing moderately in both reference regions, shrink in North West Wales. However, factoring in the confirmation of plans for Wylfa B in November 2009 and the announcement of the building of a 4.2 GW offshore windfarm near Anglesey in January 2010 throw some healthy suspicion on the forecast growth data. These figures, together with the sectoral growth rates from North

West Wales Economic Futures, allows us to gauge the local economy in 2025:

	<i>Growth</i>	<i>Shift_{UK}</i>	<i>Shift_W</i>	<i>T</i>	<i>B</i>	<i>LQ_{UK}</i>	<i>LQ_W</i>
<i>Primary</i>	-1.84%	0.05	-0.02	1288688	2.20	2.36	
<i>Manufacturing</i>	-0.43%	0.14	0.16	7740	0.92	0.75	
<i>Construction</i>	-0.45%	-0.205	-0.187	4608	0.84	0.84	
<i>Distribution</i>	+0.46%	-0.025	-0.042	39676	8346	1.24	1.31
<i>Business</i>	+1.59%	0.037	0.057	19152	0.57	0.82	
<i>Non – marketed</i>	+0.51%	-0.016	-0.034	37387	181	1.27	1.04
<i>Total</i>	+0.46%	-0.03	-0.01	108857			

Table 2.5: Employment Growth 2009-25 in North West Wales

The calculation of shift terms for each broad sector allows us to readily identify the long-term impact of the differences between local growth and growth in the reference region. For example, the Primary sector will shrink locally and in both reference regions, but the shift terms show us that this decline will be 5.4% less locally than in the UK reference region. and 1.7% more locally than in the Wales reference region. The Business sector is thus discovered to be the only sector in North West Wales where employment will grow faster than in both indeed, in either of the reference regions. Over the sixteen-year period 2009-2025, employment in this broad sector will grow 5.7% faster than in Wales and 3.7% faster than in the UK. In either case, this is not the type of startling growth to radically shift the economic base. The location quotients for each sector allow us to identify the basic and non-basic broad sectors in 2025. The basic employment in each basic broad sector can also be calculated, albeit with the same caveats as the previous example. However, the most interesting figure shows that North West Wales will lag Wales and the UK in growth.

It is highly informative to compare the shift terms for each reference region with the respective location quotients. It is apparent that the Business sector, a broad sector including professional services, research and development, and many of the expected ‘growth sectors’ of the local economy, remains a non-basic sector with location quotients little changed from 2009. Indeed, there seems to have been surprisingly little change in

the local economy's structure in terms of basic and non-basic broad sectors. The word surprisingly is used advisedly, as existing literature and policy seems to expect a big shift in sectoral structure. This is not to say that the economy of 2025 will look the same as that of 2009, but the dominant economic activities may not be that different.

	<i>Share</i>	<i>Mix</i>	<i>Differential</i>	<i>Shift</i>	<i>Employment</i>
<i>Primary</i>	144	-560	-30	-590	-446
<i>Manufacturing</i>	688	-2573	1339	-1234	-546
<i>Construction</i>	411	173	-925	-751	-340
<i>Distribution</i>	3064	1291	-1567	-275	2789
<i>Business</i>	12372181	848	3029	4265	
<i>Non – marketed</i>	2864	1207	-1156	51	2914
<i>Total</i>	8408	0	-766	-766	7642

Table 2.6: Employment Change in North West Wales

2.5.1 Quantifying Change from 2007 to 2009

Any study of the economy over a three-year period must consider changes within that period. The economy of North West Wales underwent a period of rapid change over the time-period of this research project, due mainly to global economic conditions. In early 2008, the economy of the UK slumped into a deep recession, along with most of the developed world. This recession lasted 6 quarters from Q2 of 2008 to Q3 of 2009, and was the most severe since the Second World War with massive monetary policy intervention required around the world to prevent a global depression. The recession can be seen as part, and indirect consequence, of the global financial crisis of 2007-2010, itself triggered by the subprime mortgage crisis which first became readily apparent in mid-2007, and first hit the UK with the run on Northern Rock in September 2007. That year saw a marked downturn in the economy, and especially in the availability of credit to individuals and small businesses, leading to the recession. The recession led to unemployment, a drop in export demand and lower productivity. This period of financial and economic upheaval led to lower spending in North West Wales, with

several small firms and even a few large employers collapsing, especially in manufacturing, a shift away from medium and large employers towards small and micro business, cuts in government and local authority spending being enforced.

Measuring changes to the economic base from 2007 to 2010 is not possible, as detailed employment data for 2010 will not be available until the end of 2011. However, the data available (ONS,2010) does cover the period of the 2008/09 recession. There are two changes to data-gathering that must be noted. Firstly, SIC2003 has been replaced by the Standard Industrial Classification 2007 (SIC2007), itself reflecting changes in the economic base of the UK in the period 2003-2007. The data presented for 2007 previously was later updated to SIC2007 format which we use here. Secondly, in 2008 the Annual Business Inquiry was superceded by the more detailed Business Register and Employment Survey (BRES) which uses SIC 2007. Taking these changes into account, we can see how the regions economic base has changed since 2007 in terms of broad industrial groups:

From the BRES 2010 (ONS, 2010) it is easy to see that the Primary sector is stronger in 2009: this is due to a huge increase in quarrying (gravel) in Gwynedd and the decline of agriculture in Wales and the UK, though the increase in employment in energy production in the UK does weigh against the region. Manufacturing has declined in importance relative to both Wales and the UK, though not very much as most developed nations have seen similar declines in face of global economic conditions. Construction has become basic relative to both reference regions, with construction employment having increased by 17.5% on 2007 in North West Wales, with the biggest increases from the development of building projects and the construction of buildings. This growth has been driven by WAG building projects, the WAG-driven work on improving council houses, and local authority targets on affordable housing. Distribution declined marginally in importance, although the increase in recession-driven 'staycations' did boost the tourism-related industries. The Business sector was not significantly changed,

with an increase in financial services matched by declines in the importance of real estate and the knowledge economy. The most significant changes were in the Non-market sector, with increased importance attributable to 2300 new jobs in education, with the net effect of changes in other areas of the public sector being neutral.

The base multiplier for North West Wales is 1.266 relative to Great Britain meaning that 0.266 non-basic jobs are created for each basic job. In the period 2007-2009 the regions multiplier has declined by 11%, from 1.425 in 2007 using 4-digit analysis on SIC2007 data. This means that 0.159 fewer non-basic jobs are created for each basic job.

It can also be seen that Anglesey and Conwy have seen their base multipliers decline especially rapidly. All this data shows how the 2008/09 recession impacted severely on the economy of North West Wales, weakening the regions base multiplier significantly.

There is little significant change in which sectors are basic and which are non-basic. Rather, sectors that were basic in 2007 have tended to emerge relatively stronger or not significantly weaker, even where sectoral employment has declined. At the same time, weak sectors tended to grow weaker, even where employment grew. The economic base projection presented above was reviewed in relation to this updated data, but it was decided not to focus on this as the conclusions of projection were similar with either set of data.

2.5.2 A Note on UK Public Expenditure

The UK Budget for 2009 was presented to Parliament on 22 April 2009. Fiscal pressure was apparent in all areas due to the size of the bank bail-out of 2008 following on from the financial crisis of that year, as well as lower tax revenues due to, and the cost of fiscal and monetary policy responses to, the recession of 2008-2009. It is likely to have a very negative impact on devolved, identifiable public expenditure in Wales up to 2013-4.

The estimates given below are due to ap Gwilym (2009), based on the Governments forecasts for the coming years as set out in the Budget 'Red Book together with some

analysis of the budget by the independent Institute for Fiscal Studies (IFS).

Whilst Budget 2009 does not spell out the forecasts for Wales there is sufficient information in the Budget Red Book to come to an informed estimate based on two key statements by the Chancellor:

- UK current expenditure will grow at 0.7% per year in real terms from 2011-12 onwards; and
- public sector net investment will move to 1.25% of GDP by 2013-14. Moving to 1.25% represents an average real cut of 17.2% per year compared with current levels of 2.2% GDP.

Using this information allows an estimate to be made of the Departmental Expenditure Limits (DEL) for Wales up to 2013-14 and is set out below. All estimates are in real terms.

	<i>Plan</i>	<i>Plan</i>	<i>Estimate</i>	<i>Estimate</i>	<i>Estimate</i>
	2009 – 10	2010 – 11	2011 – 12	2012 – 13	2013 – 14
<i>Current</i>	13.6	14.0	13.9	13.8	13.6
<i>Capital</i>	1.7	1.7	1.4	1.2	1.0
<i>Total DEL</i>	15.3	15.7	15.3	15.0	14.6
<i>Annual(%)</i>		+0.4	-0.4	-0.3	-0.4

Table 2.7: Departmental Expenditure Limits (DEL): Wales (bn)

Plan: Table C 11. HM Treasury Budget 2009 and Estimate: Dr. Eurfyl ap Gwilyms (2009) estimates for IWA

ap Gwilym concludes that:

for the first time since the establishment of the National Assembly in 1999, there will be real cuts in public expenditure in Wales. Between 2011-12 and 2013-14 there could be a cumulative loss in real terms of 2.2bn compared with the position if funding remained at the 2010-11 level for each of the following three years. Of this reduction 0.7bn is in current expenditure and 1.5bn in capital expenditure.

Cuts in education and health will affect all areas, whilst cuts in spending on the economy and transport, heritage and rural affairs will have a big effect on specific areas of Wales, including the North West. Since local government is a devolved function, these real cuts in public expenditure in Wales will inevitably lead to cuts in local government funding. The Local Government Revenue and Capital Settlement from 2005-06 to 2009-10 suggests that North West Wales will be the part of Wales worst hit by any cuts. The current methodology used for the Standard Spending Assessment (SSA) of annual local government settlements is often criticized for seriously underestimating the cost of providing services in rural areas and not giving consideration to rural deprivation and poverty, through relying on the Welsh Index of Multiple Deprivation which is also much criticized on these grounds.

The cuts will hit all local authorities, but it is not unfair to assume that North West Wales will be hit badly since all authorities have seen their Aggregate External Finance (AEF) increase below the national average for each year since 2005-06, with the exception of Conwy in 2006-07 which saw a 5.5% increase compared to a national average of 5.1%. Likewise with the rankings of the increase for Wales 22 unitary authorities since 2005-06: Anglesey has had the lowest increase in Wales for the past three years, and its highest increase was 2006-07 ranked 15th in Wales; Gwynedd has the 15th highest increase in Wales for 2009-10, but has twice been ranked last since 2005-06 and never ranked above 18th; Conwy was ranked 8th in 2006-07 and 13th in 2007-08, but has otherwise never ranked above 21st.

Gwynedd Council must save 14m over the four years up to 2009-10, and has said that it will seek to save a further 16m over the three years up to 2012-13. Isle of Anglesey County Council has also announced plans to save 10m up to 2011-12. Conwy County Borough Council has so far avoided making such announcements in 2009, but it seems likely that they too will be forced to revisit spending priorities given the current spending crisis. However, Conwy staff seem markedly more confident about their

financial stability. An advantage for Anglesey and Conwy is that the SSA consider Floor Funding (FF), meaning that an annual budget increase below 1.5% is not possible.

Anglesey and Conwy were both already at the FF in 2009-10 meaning that their annual budget increase will not change, whereas Gwynedd has further to fall.

Energy usage, fuel prices and transport costs, and commodity prices are all key issues for the economy of the region. Life in North West Wales, a largely rural region where agriculture and transportation are important, is relatively high cost. The trend to urbanisation in the region seems inevitable, as does the continuing decline of agriculture, and may accelerate depending on fuel costs. The Anglesey Aluminium saga in Anglesey has its root in uncertainty over the future of cheap energy supplies for the smelting company, and any rise in energy prices or usage may impact on other production industries. Changes in agriculture are also uncertain, from a retreat to subsistence farming, centrally managed efficiency, localization, and alternatives in the face of a changing climate. How far the agricultural sector and individual businesses will diversify to encroach on other businesses is unknowable. It is important to consider diversification and alternative usage for land from bio-fuel crops and alternative farming, to tourism.

Especially interesting is the trend for renewable energy generation, and especially micro-generation. Local control of energy supply has the potential to empower communities, local enterprise and business development in the region, reinforcing the recent discussions of localization.

The future for transport is also uncertain, especially due to the trend of urbanisation in the region. A comprehensive network linking all parts of the country remains a possibility. The demand for faster and more efficient public links may or may not be answered. The need for cleaner and greener transport will change means of transport, but may also increase use of public transport, and mean that people travel less often, with changes in working and socializing patterns. The future of the public sector is highly uncertain, and this is important to consider on both an economic and a social

level. The public sector has an economic impact in terms of direct employment but also in terms of supporting and regulating the private sector, but also acts on a social level in many ways from education to community support, so that any change will have some social impact. Since re-organization in 1996, recent policy indications have been of reversion to larger local authority units, driven by the political climate and public finances. Despite the tentative trending evidence, facts such as the demographic make-up of Welsh speakers make the future of the language uncertain. This uncertainty means that there is uncertainty in the cohesion of what are Welsh-language communities.

Future health and education policy are uncertain, but will obviously have impacts on the economy, as nearly one in three of the North West Wales population work in public services. Constitutional change is also an uncertainty, with further devolution from Westminster to Cardiff in the balance and the devolution of some tax-raising powers to Wales being a possibility that could change the Welsh economy dramatically.

2.5.3 The Future of Economic Policy in North-West Wales

Contemporary (c. 2011) economic policy in Wales is shaped by the processes of fiscal consolidation and deficit reduction outlined by HM Treasury in the Emergency Budget of June 2010 and the Comprehensive Spending Review of 2010. The fiscal consolidation will lead to a retrenchment of the public sector during the 2010-15 parliament, and cuts in most areas of UK government spending including regional policy across England.

Whilst regional policy in Wales falls into the remit of WAG rather than the UK government, the UK level cuts will be reflected in devolved expenditure through the mechanisms of funding devolved bodies. The impending cuts have been noted by policymakers in Wales with Economic Renewal being an example of a policy document that was obviously put together with a strained budget in mind. As is explained above, economic policy in Wales is spatial, and so we can discuss economic and regional policy interchangeably. The cuts will change the face of regional policy in Wales which, from

1999-2004 was free spending and from 2005-2010 was still that of direct state intervention. The new fiscal paradigm in the UK means that regional policy in Wales is, as with most other policy areas, becoming ever more concerned with doing more for less. Although Economic Renewal signalled a more selective approach to financial assistance and tighter controls on spending, direct state intervention is still an accurate description of the regional policy design. Of particular note is the abolishment of International Business Wales, a moderately successful agency of WAG which aimed to secure inward investment, as part of the new policy of no big subsidies. The performance for IBW for the year 2009/10 was very good, with 65 new projects, 3,431 jobs created, and 3,931 jobs safeguarded in Wales. The number of jobs created and safeguarded together is higher than the figure for the other devolved nations of Scotland and Northern Ireland. Overall, IBW has been responsible for 7.8 per cent of all inward investment related jobs in the UK. It is clear that its performance was not the justification for its abolition.

This regional policy may well be changed further during the 2011-2015 term of the Welsh Assembly as finances become tighter in line with CSR 2010. There have been no major ideological changes in WAG since 1999, and it is likely that the WAG for 2011-2015 will again be broadly unchanged in its ideological outlook favouring state intervention, although it is possible that ideology will shift to favour market-based solutions. However, economic policy may become aligned with a market-based approach due to cost issues alone, regardless of ideology. State intervention of any kind is costly, whereas embracing market-based solutions implies minimal regional policy and is therefore very low cost. The free market approach which sees state intervention and lack of an entrepreneurial culture as causes of the regional problem is an ideological lynchpin of the 2010-2015 UK Government, and as a result England is embracing market-based solutions to the regional problem, with a rolling back of state intervention which, much as in the early 1980s, is deemed excessive, and liberates the labour market. This approach is further justified by its necessity as part of the fiscal consolidation begun by

the previous government. This apparently low-cost approach to economic policy will appeal to a WAG searching for cuts, and the policy outlined in Economic Renewal may well be augmented to become a quasi-free market policy, although ideological issues are likely to prevent the adoption of full free market policies.

There are other issues that may impact on regional policy that are beyond the remit of the WAG. Whilst economic development, transport, and housing are amongst the areas devolved to the Welsh Assembly, areas such as the payment of state benefits remain with the UK Government. The Emergency Budget 2010 and CSR 2010 made unemployment benefits far more difficult to access, and lowered the maximum level of housing benefit available. This will definitely mean that housing in London will be unaffordable for those on low wages, and raises the prospect of a wider North-south divide as poor families are forced out of regions where employment exists. Rents in Cardiff and Liverpool are not as high as in London, but it is possible that some individuals will need to move to low-cost areas such as North Wales, in the face of these measures, and new competition for employment driven by a migration of Irish nationals to the UK following the financial crisis of November 2010. The effects of immigration will be a major difficulty for North West Wales, as Holyhead is the major ferry port connecting Dublin with Liverpool and London. A surplus of labour, some of it highly skilled, may prove beneficial to the region, but creating such opportunity will be a challenge for regional policy in Wales. The UK Government are planning further welfare reform, forcing the long-term unemployed to work for their benefits. Setting up a low-cost labour force may lead to those currently in work becoming unemployed themselves, as was the experience in New York in the early 2000s. Whether these reforms are effective or not, it is clear that regional policy in Wales will be impacted upon by welfare policy for the UK, driving Wales towards a market-based solution to regional policy.

2.6 Conclusion

This chapter has presented a narrative profile of North West Wales, analysing the main features of the region's economy. It is the aim of this chapter to give a more rounded portrait of the region's economy than a simple statistical profile, considering historical, social and geographical background. This approach was considered more appropriate to this thesis, given the post-positivist background for the thesis, and the limited economic base analysis guiding the profiling is not detailed for the sake of narrative flow and cohesion. For similar reasons, discursive theorising is applied in favour of more detailed quantitative techniques such as input-output or social accounting matrices. It is hoped that this chapter is more interesting, informative, and accurate in its description of the region's economy than if a more formal, qualitative chapter had been written. This chapter now feeds directly into Chapter Three and Four.

CHAPTER THREE

‘Discovering’ North West Wales

3.1 Introduction

This chapter takes the form of a report that explores the state of the economy of North West Wales in 2009 through interviews with some key people in the area's economy, complementing the profile of Chapter Two. Although mainstream social and economic indicators can provide useful measures, particularly when making inter-regional comparisons, a descriptive profiling of any region is enriched by considering a broader set of empirical data and the inclusion of qualitative elements (Carp, 2008). These interviews are necessary for the understanding of the North West Wales economy because, even though the interview questions are based on the empirical data informing Chapter Two, a description of any economy in terms of structural statistics is incomplete. Economic transactions depend on perception as much as data, so a full picture of North West Wales economy requires an understanding of how participants in economic transactions view the economy. Understanding the transactions in a society requires a clear appreciation of the regional context and the specific environment in which they take place (Crang, 1997; Rose, 1997). This understanding is then built on to inform the scenario analysis in Chapter Four.

3.2 Methodology

The application of reflexive methodology in this thesis impacts quite obviously on this chapter. The interview process was the stage of research where I was most directly involved with participants in the North West Wales economy, and this meant that I was constantly forced to question my own interpretation of the interview summaries that were produced. Information gathered in an interview is clearly value-laden, both in its original form where the interviewee's subjective assessments must be noted and in the interviewer's interpretation of what has been said. The act of interpretation was, potentially, affected by my own relationship to the interviewer, my own political

leanings, the relation of their comments to my personal circumstances, and the values that I applied to the interpretative act.

This interview process has been produced by using the narrative profile of Chapter Two as the basis for the application of a semi-structured interview methodology (Lindlof and Taylor, 2002), a research tool that is designed to be flexible, allowing new questions to be brought up during the interview as a result, or interpretation, of what the interviewee says. As such, the technique is responsive to the particular requirements of the interviewer, and used widely in social research (Straits and Singleton, 2006). The interviewer in a semi-structured interview generally has a framework of themes to be explored, but can vary the emphasis on certain themes according to the direction of the interview, and deviate completely should new topics be presented. The general themes and specific topic or that the interviewer wants to explore during the interview are prepared carefully in advance, in the form of an interview protocol: a grouping of themes, topics, and specific questions, that should be raised during the interview, but with flexibility in the method and timing of discussion considered. Freedom to decide the format of each interview in relation to context allows the interviewer to tailor the interview to each interviewee, thereby enabling the interviewer to elicit answers of a higher quality (Hancke, 2009).

There are a few themes that seem to be obvious when constructing a method for these types of interviews. The interview protocols were designed to cover these themes. I have used a semi-structured interview approach, since this enabled the process to cover a core of common themes whilst putting questions to wide range of enterprises, individuals and organisations. Two protocols were run concurrently: a key participant (KP) and a real economic actor (REA) stream. The reasoning behind this structure was to interview economic policy-makers, lobbyists, and representatives, as the KP stream that would hold most general information, and to interview employers, employees, and some of the economically inactive, as the REA stream. That is, it was felt that it was important to

get the views of policy-makers and real' people for a complete study of the economy of North West Wales. The interview protocols designed were similar, but with the REA protocol being less specialized.

The selection for interview was made in accordance with a framework of interviewee categories. Interviews were all conducted in spring-summer of 2009. Participation was generally excellent, with policy-makers being especially generous with their time. The interviews were, mostly conducted between Easter and the summer holidays, and so the tourist season did not pose the difficulties envisaged. Smaller business and the public sector were more inclined to help, but the small number of big businesses in North West Wales meant that this was not a huge obstacle to progress. The KP interview protocol was piloted rigorously beforehand; the REA protocol was an evolution of the KP original. The interview process began with questions related to the overall interaction of the interviewee and their organisation with the local economy, in terms of both significant contributions currently being made and the benefits which accrue. Following this were six interview themes (five for the REA protocol), listed below with a full description and indication of each theme's purpose:

- The first theme was the size and performance of the economy of North West Wales, and the details of its sectoral structure. The theme was informed by the narrative profile of Chapter Two, in order to gauge how the interviewees perceived the region and how different this perception was from that profile.
- The second theme dealt with the drivers of change in the local economy. This theme was partly informed by the narrative profile of Chapter Two, but mostly by an interest in the way theory (Armstrong and Taylor, 2000) influences economic reasoning.
- The third theme was a discussion of opportunities, both current and planned, for change and growth in North West Wales. This theme pursued the topic of change,

attempting to build on the profile of Chapter Two.

- The fourth theme dealt with differences in North West Wales, with a specific focus on the reason for the local economy's relatively poor performance. Informed mostly by the various theories on regional performance (Capello, 2006), and backed-up by Chapter Two.
- The fifth theme dealt with a short-term historical perspective, asking participants to detail major and minor changes that they had noticed in North West Wales over the past 10-20 years. Designed to gather opinion on past influences on the economy described in Chapter Two.
- The final theme asked participants to describe the economy of North West Wales in 2025, both as they hoped it would be, and what they thought it would be given current trends and plans. This theme would form the basis for the scenario analysis in Chapter Four.

Interviews were recorded after appropriate permission was gained from interviewees and then reviewed in the form of a single-page summary as part of the analysis process.

These summaries were further condensed into the summary of the entire interview process presented below, allowing a focus on the salient points in and the broad themes of the collective answer. These summaries were clearly an act of interpretation. The integrity of this process was ensured by the application of reflexive methodology. When

compiling a summary of an interview, it is too easy for the interviewee's original meaning to be submerged by the compiler's own interpretation of their interpretation.

Being aware of a two-part interpretative act in this summarising, adds honesty to the process, and understanding that the interviewer is interpreting an interpretation offers

scope for further empirical research.

3.3 Summary of the interviews

A number of interviews were held with key policy-makers from all sectors of the economy during the period April-July 2009. All interviewees mentioned the smallness, and peripherality or fragility of the area's economy at the beginning of the interview, with a summary of key features and their perceived causes below:

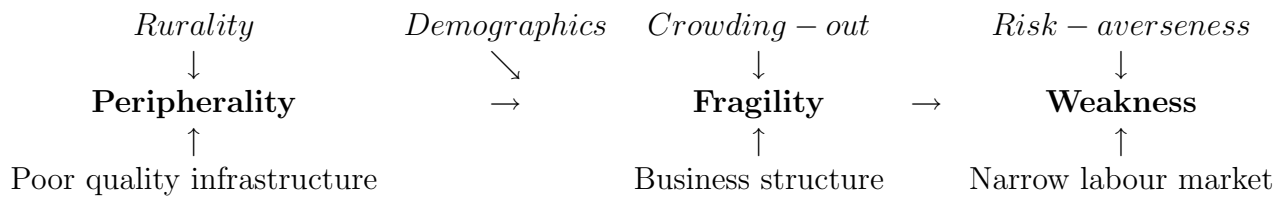


Figure 3.1: Primary Issues in Interviews

Some discussed the historical reliance on traditional industries, and most interviewees mentioned the current over-reliance on the public sector. A minority of interviewees thought that economic diversity in the region was under-estimated. Most interviewees highlighted the predominance of small business in the area, where over 60 per cent of employees work in firms employing fewer than 50 people, and the shortage of good employment prospects. Discussed less often was the fact that most big employers, outside Anglesey, are public sector bodies. Many interviewees noted a high demand for low quality employment. The public sector, agriculture, and tourism were the sectors most often mentioned as being key to the region in 2009. The cultural and linguistic make-up of the region – majority Welsh-speaking – was also noted as an economic feature. All interviewees discussed the region's geography, rural isolation and poor intra-regional transport links to some extent, with some feeling strongly about the centralization of employment in the south-east and north-east, but others seeing the isolation as an opportunity. Technical infrastructure and the lack of it was seen as key. Most interviewees mentioned the peripheral status of the economy as an economic driver, either directly or indirectly. Poor performance for mainstream economic indicators and high levels of economic inactivity were often mentioned. Very few participants discussed

globalization directly, although most interviewees did talk about issues arising from or related to it. All interviewees mentioned the area's demographic profile and out-migration, although the importance attached to this driver varied. A significant minority of participants felt that an endemic lack of entrepreneurialism and competition the risk-averseness of society was another important driver.

Most Welsh Assembly Government civil servants or local authority officers stressed central policy as a driver, and market demand was a topic that all interviewees discussed, but more so amongst government officials. Most interviewees felt that it was important to balance development with the environment and quality of life. The Welsh language and culture was felt to be an economic driver, and tradition often clashing with economic development needs, but with a strong local multiplier created by the Welsh language. Some participants bemoaned the lack of a north-south transport link, whilst others felt that trade in Wales moved west-east, and that a transport link to connect the north with Swansea Bay and the Capital Network would be superfluous to needs.

As well as the key economic issues raised, there are a few other points that were made clear by interviewees, including:

- the importance interviewees attached to the Welsh language and culture in promoting social cohesion and community; and thus a set of internal economies attached to the Welsh language;
- the influence of the region's geography and history in the formation of the regional economy;
- the importance the decline of traditional industries
- the uncertainties facing the region due to the poor state of the UK's public finances.

The application of reflexive methodology in this thesis impacts quite obviously on this chapter. The interview process was the stage of research where I was most directly

involved with participants in the North West Wales economy, and this meant that I was constantly forced to question my own interpretation of the interview summaries that were produced. Information gathered in an interview is clearly value-laden, both in its original form where the interviewee's subjective assessments must be noted, and in the interviewer's interpretation of what has been said. The act of interpretation was, potentially, affected by my own relationship to the interviewer, my own political leanings, the relation of their comments to my personal circumstances, and the values that I applied to the interpretative act.

3.4 Issues for the Economy

It should be noted that all further discussion in this chapter is my report and interpretation of a series of interviews. I may offer more likely interpretations or offer alternative interpretations of views, but it should be understood that all values expressed belong to the interviewees.

All interviewees mentioned the smallness, and peripherality or fragility of the area's economy at the beginning of the interview. Some discussed the historical reliance on traditional industries, and most interviewees mentioned the current over-reliance on the public sector. A minority of interviewees thought that economic diversity in the region was under-estimated. Most interviewees highlighted the predominance of small business in the area, where over 60 per cent of employees work in firms employing fewer than 50 people, and the shortage of good employment prospects. Discussed less often was the fact that most big employers, outside Anglesey, are public sector bodies. Many interviewees noted a high demand for low quality employment. The public sector, agriculture, and tourism were the sectors most often mentioned as being key to the region in 2009. The cultural and linguistic make-up of the region – majority Welsh-speaking – was also noted as an economic feature.

All interviewees discussed the region's geography, rural isolation and poor intra-regional transport links to some extent, with some feeling strongly about the centralization of employment in the south-east and north-east, but others seeing the isolation as an opportunity. Technical infrastructure and the lack of it was seen as key. Most interviewees mentioned the peripheral status of the economy as an economic driver, either directly or indirectly. Poor performance for mainstream economic indicators and high levels of economic inactivity were often mentioned. Very few participants discussed globalization directly, although most interviewees did talk about issues arising from or related to it. All interviewees mentioned the area's demographic profile and out-migration, although the importance attached to this driver varied. A significant minority of participants felt that an endemic lack of entrepreneurialism and competition the risk-averseness of society was another important driver.

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3.4.1 Structure and Performance

The almost total absence of high-value added or manufacturing activities was one of the first issues raised by most interviewees, with the freeze in bank lending exacerbating this (Daily Post, 2009). There are seven firms which are members of the CBI in the whole region, and although there are a few manufacturing SMEs these are in the minority. As

J, one of my interviewees who works in economic development, said;

‘[GDP and GVA in this area stay low] simply because we don’t produce anything’

This was probably intended as a statement of fact, rather than a damning accusation, and she saw production statistics as only one aspect of the economy. It is a reference to low productivity in the region as represented by the value of goods and services and the efficiency with which they are produced by firms, together with the business environment depending on things like skill levels, information flows, infrastructure management, supply-chain quality, the quality of research in the region, and the level of competitive pressures.

These issues arose regularly during the interviews. As can be seen in the profile of the region in Chapter Two, the proportion of small and micro-business is vast. Many of these are small retailers, or are part of the hospitality and tourism sectors classic examples of what are perceived as low GVA industries (Walmsley, 2004). But even where there are high value-added small businesses (and there are some), there simply are not enough of them in the area to make up for the lack of productive capacity. Large public sectors are often considered barriers to growth (Blanchard, 2008), but this area is so large and rural that the public sector’s size may just be a reflection of need. The public sector provides a high proportion of local jobs especially the North West Wales NHS Trust, Local Health Boards (LHB), Bangor University, and the three local authorities and provides a great deal of support, both passive and active, for the fragile local economy. Q, an interviewee who has a high profile in local government matters, told me that;

‘[the area’s] public sector isn’t big or small it is the size it needs to be to provide public services of high quality and to support local business. It is a shield and support, rather than a barrier.’

The danger of crowding-out was felt to be present, but not overwhelming if carefully monitored. This was a refreshing viewpoint, heard early in the interview process. Many others made similar statements, and few interviewees were worried by the size of the public sector as might have been expected. This accurately reflects the nature of public service provision in North West Wales - the provision is geared to meet the needs of the area, which are far more challenging than in other rural UK regions because North West Wales is the only UK region where over 50% of the population speak a non-English native language.

Tourism was performing well in the middle of the 2008/09 recession, due to the increase in the number of people holidaying in the UK. A, an interviewee with expertise in this field, told me;

'you can't import a tourism job'

That is, tourism is a stable industry, necessarily located in one area and spawning multiple-generation businesses. This is a seemingly heterodox viewpoint, as tourism is usually seen in terms of low-quality jobs and seasonality, meaning instability. The interviews were surprising in that a great many participants reflected similar views, highlighting a number of high-quality jobs in tourism and the extending of the tourist season. The concerns are that there is still a gap between most jobs in this industry and others, meaning that many of the low-paid jobs go to applicants from overseas and are avoided by local workers, according to industry experts.

Agriculture is small in terms of direct employment, and very small in terms of GVA. I was surprised when D, a representative of the industry, told me that;

'Not enough emphasis is attached to agriculture in this area'

This statement was made with reference to the fact that agriculture and fishing only contributes 0.7 per cent to GVA per capita in the UK. It is not unreasonable then to

assume that livestock in North West Wales accounts for a similar proportion of GVA per capita. However, the near absence of farming for livestock products, especially dairy farming, and a dearth of crop-based agriculture, means that GVA per capita from agriculture is at the same level, or even lower, than it is in Wales as a whole. The apparent insignificance of agriculture was raised by several of my interviewees, including

I who thought that;

‘[In North West Wales] we don’t have quite the agrarian economy that we think we do; if you think of the development of the region, it’s come out of slate, generally.’

The UK economy had been supported by strong domestic demand in the boom years up to 2006 but there have also been company closures on a North West Wales level (BBC News, 2007), concentrated in Anglesey (BBC News, 2008b), particularly in manufacturing sectors, with the prospect of further closures in the near future in North West Wales. These included the shutdown of the Great Lakes bromine plant at Amlwch in 2003, the closure of the Hedestrom toy factory at Holyhead in 2004 with 100 job losses, and 200 jobs lost in 2006 at Grampian Country Foods in Llangefni when work at their poultry packaging factory was reduced to a single shift (BBC News, 2006), as well as the closure of a medium-sized chemicals company and a medium-sized manufacturer. Anglesey will soon be forced to ride out the closure of Anglesey Aluminium Metals Ltd. (Anglesey Aluminium, 2007) and of the Wylfa Nuclear Power Station (NDA, 2006b), with the latter to cease operation in the near-future (BBC News, 2006) with the closing down during the writing of this chapter (BBC News, 2009). The private economies of Gwynedd and Conwy are more diverse, but are based almost entirely on SMEs, apart from a small number of larger businesses (BBC News, 2008a). However, a third of employees in this are work in the public services, which face an increasingly bleak future. As such, L told me that;

'the economy has too many eggs in too few baskets.'

3.4.2 Causes

There are many reasons why the economy of North West Wales looks like it does. It must be noted that the economic structure and performance described above has no relation to the 2008/09 recession (Financial Times, 2011), and the deep-rooted issues discussed were present long before financial instability began to sweep across world markets in mid-2007. Interviewees pointed to the issues discussed below as important factors.

Non-equilibrium economics (Berger, 2009) such as the field of evolutionary economics (Metcalfe, 1998) tells us that 'history matters', and this is just as true for centuries old history as for more recent policy decisions. Increasing returns bring with it the concept of path-dependence, meaning that small events in the past, that arose by chance, may have disproportionate effects on current developments. This means that recourse to history is imperative to the analysis of a sequence of economic events.

The region has developed as a very rural area, for both geographical and historical reasons as explained in the previous chapter, with high transport costs for both inter- and intra-regional travel. Even with improved inter-regional links, interviewee R suggested another dimension by saying;

'I would not suggest that a big manufacturing business move to North West Wales simply because it's too far away from London and too hard to get to'

This comment seems to reflect the lack of manufacturing firms moving into the region, with the only manufacturers being indigenous to North West Wales. Manufacturing has faced a steady decline in the region over the past quarter of a century. For example, Indesit/Hotpoint owned a site in Llandudno Junction which closed in 1998 some work was kept at one of the company's other sites in Bodelwyddan, Denbighshire, where some

workers from the Llandudno Junction site were kept on, until this site also closed in mid 2009 (Denbighshire Visitor, 2009) as manufacturing moved to the Far East. The Ferodo brake-lining factory in Caernarfon employed hundreds of people when it opened in the 1960s, many of the former slate quarrymen, and over 1000 employees worked on the site at its peak. By the late 1990s when Ferodo pulled out of the area, only 93 workers were still there. The site limped on for a few years, under the name Friction Dynamics, until the site ground to a halt under an acrimonious industrial dispute over the unfair dismissal of workers (Daily Post, 2011). Electrical engineering firm Denis Ferranti in Bangor shed 250 jobs in March 1992. Dolgarrog Aluminium closed in 2007 (BBC News, 2007) due to rising commodity prices, and Anglesey Aluminium announced an end to aluminium smelting at the site in September 2009.

As interviewee L, an economic development expert, told me;

'The reason why [economic development] is so hard in this area is that we are starting from such a low base.'

As explained in Chapter Two, a peripheral economy may find it hard to attract investment and new business from outside. This has been a noticeable cause of the region's economic status. The outflux of manufacturers has discouraged the influx of replacement industries, except in some specialist areas. A smaller market due to decreased production will lead to decreases in capital stock, decreases in internal demand, leading to a decrease in the labour supply, and thus an even smaller market. There is also the possibility of a wage-price spiral, where falling average income leads to falling prices. The region also has a large public sector, and although there are many reasons for this, the commercial services sector may have been discouraged from replacing the departing manufacturers due to a crowding-out, whereby highly skilled employees choose to work for the public sector in an area where such jobs are easily available.

Linguistic and cultural issues are detailed at length later on, so we need include only a brief analysis here. As the statistical data shows, the region is majority Welsh speaking, with Gwynedd and Anglesey especially so. Welsh is, in many cases, the language of work and business, as well as retail, services, leisure and family life. The region's culture and traditions tend to be quite insular, with a high degree of cultural homogeneity. The region's history, language and geographical isolation all come together to explain this. These issues confront anyone, individual or multinational corporation, wishing to move into the area, and they are factors in why the regional economy takes the form that it does.

Demographic change is quite a recent phenomenon in its importance. Young people have always left North West Wales for more prosperous areas traditionally, and perhaps stereotypically, for the bright lights of Liverpool and Manchester, but increasingly to Cardiff, Swansea and London, but this has tended to have a small impact on the region's demographic profile. However, in recent years, the number of out-migrants has increased and fewer return, as shown in the statistical profile. The other reason for the impact of out-migration is the number of in-migrants, especially those who are retired. North West Wales, especially the coast of Anglesey, Dwyfor and Meirionnydd, and parts of Conwy such as Rhos-on-Sea (Llandrillo) have become very popular amongst retirees from the north of England, which is reflected in house price averages for the area, which seem high for such a rural area. This influx of retirees does tend to raise house prices and increase demand on the local health services, as well as creating some linguistic and cultural tension between the incomers and the local, Welsh speaking population. This means that, despite the possible positive contributions that older people can make to the economy, the effects are negative in this region since their in-migration fundamentally alters a delicate linguistic/cultural balance and thus social cohesion and economic relations.

A significant minority of participants felt that an endemic lack of entrepreneurialism

and competition the risk-averseness of society were another important factor to consider. This adds to the sense of inertia that, to a lesser degree, also surrounds SMEs in the region. Interviewee C noted;

‘an endemic lack of competition; nothing to make people pull their socks up’,

and several other interviewees noted a distinct unwillingness amongst businesspeople in the region to take risks and to consider new ideas. As interviewee I put it;

‘in Gwynedd you have computer science graduates working at Woolworths rather than getting out there. Life is comfortable, and they don’t feel the need to use their talent.’

This may be a slight exaggeration, but it does underline a general consensus that the area’s labour market is not geared to exploit all of its talent, and that this leads to a weaker business environment. It must be noted here that the North West Wales Skills and Labour Market Assessment (WAG, 2006) suggested that removing barriers to enterprise and growth may be more cost effective than changing the attitudes of young people to ensure that demand for entrepreneurial management skills is met. This seems a slightly short-termist approach to the issue.

Though competitiveness was not widely discussed explicitly, and was only overtly counted as an economic driver by a minority of interviewees, the competitiveness discourse was a substantial presence in the interviews. The above mentioned perception of a lack of competition and inward investment, the discussion of low productivity, and issues raised concerning the business environment, all suggest that the discourse of competitiveness (Bristow, 2011) is hegemonic in North West Wales as well.

Interestingly, only a minority of participants seemed to adopt a stance on placeless competitiveness, with a common emphasis on what Bristow describes as contextualized competitiveness, with a role for local business interests and clusters based on

comparative advantage, together with a role for embedded economic activity. This contextualized approach to competitiveness in the region signal a more nuanced attitude to economic development in the region after confidence in mainstream economics had been shaken by the financial crisis of 2007, the consequent recession that was ongoing during the interview period and the economic turmoil of the previous years.

3.5 Opportunities

Despite a perception that they are working in a difficult economic context, interviewees did identify a number of opportunities. Interviewee K underlined the fact that there seems to be a mainstream consensus that the future for the region will involve;

'to turn to the English jargon, high-value/low-volume enterprise'

Economic development has moved on from the classical belief that manufacturing industry alone could drive growth. Instead, the development of clusters in software, technology especially visualization, chemistry, environmental sciences including aquaculture and geo-science, and ocean sciences are now held to be key to the area's development. Gwynedd perceive themselves as up and coming competitors in this area with DeepStream Technologies, a fast growing new venture (Bryan, 2005), a decision in January 2008 by Siemens Healthcare Diagnostics to transfer manufacturing of an important system from Los Angeles to Llanberis (Insider, 2011), and the hope of more such business to spin-out from Bangor University.

Links with Bangor University in this field are also held to be key. As interviewee T said, referring to the linkages between higher education, research, innovation, and development:

'it isn't grants and support that attract investment; it's graduates'

A great many interviewees thought that developing the university's leading departments, including in the creative industries, and building spin-off clusters around these should be a starting point. The possibilities of a new medical school and a more comprehensive engineering department were raised by interviewee F, which would enable the region to grow in the fields of renewable energy, as well as in the manufacture medical diagnostic equipment. Support for entrepreneurialism to drive these spin-offs is felt to be essential.

The creative industries are an especially interesting sector as North West Wales, and especially Gwynedd, is already well established as a hub for broadcasting in the Welsh language. However, interviewee P, and many others, noted;

'exciting new opportunities from new media technologies',

which would offer new opportunities for the region, both within the Welsh media and further afield.

Interviewees A and H both gave the impression that North West Wales has opportunities in the 'green sector'. A felt that the region could develop its tourism sector, especially in green tourism, and a 'slow' tourism described by asking;

'What is fast food? I can describe in three words: it's a McDonald's. The same for fast tourism: fly in, fly out; all destinations are made the same.'

It was suggested that the area could emphasize its geographical and cultural uniqueness, attracting a different type of tourist. By linking tourism and conservation, and taking advantage of the region's rurality, the idea of a 'psychological escape' from urban life could be key to the area. H was especially eager to see developments within green tourism, and A noted the possibility of an entire spectrum up to more extreme types of green holiday. Marine and business tourism are also thought to be crucial components of higher-value tourism in this area.

The differences between North West Wales and other regions create the possibility of niche markets and the manufacture of specialized goods, as well as the possibility of

regional branding. Interviewee J felt that more should be done to enable regional branding, and especially in agriculture and food production, as;

'the emergence of niche markets present a real opportunity, especially for the future of town centers'.

The opportunities above were said by J to depend upon;

'good transport and telecommunications links',

with fast broadband enabling software development and other less location intensive activities to take place in more rural settings. The,

'enabling of quality-of-life decisions',

was noted by interviewee E as being key to the area's economic development, as the area's environment and natural beauty would give it an advantage when such choices were made. These options are created only by the 'low-volume' industries mentioned by K, such as those in the knowledge economy, where North West Wales must concentrate its development due to geographical constraints and its existing human capital resources. One of the main opportunities away from the knowledge economy and energy sector has been identified as belonging to the health and care sector. The ageing demographic of the region suggests that demand for health and care goods and services will increase in the next decade, and that the personal care sector in particular will create many lower-skilled jobs. At the same time, demand for medical services and equipment will create more skilled and professional jobs as well.

Interviewee B told me that;

'the education curriculum is changing to meet market demand',

and that an area where this was apparent was the teaching of construction skills. A number of large, public building projects over the next decade have meant that the

construction sector is considered a growth sector, together with a sense that this sector will offer employment to a wider cross-section of the region's population than the knowledge economy.

Social enterprise and community economic development is another important part of the regional economy which offers opportunities as an income generator, employer and capacity developer. Interviewee U also felt that these enterprises also,

'have the potential to assist in combating economic inactivity and to assist in the regeneration of both rural and urban communities.'

Even though the majority of interviewees stated support for cluster development in the area, interviewee T stated that he is;

'not a fan of Michael Porter',

preferring a big splash' and then maximizing spin-offs reminiscent of growth pole theory (Perroux, 1949), to an endogenous cluster development. The idea that a region must develop what it has already' is implicit in the analysis of Porterian clusters and Porter's diamond model (Porter, 1990). The argument given was that;

'if you invest enough, you can create whatever sectors you like'.

The only problem here is finding the institutions willing to invest heavily in an economically peripheral area which has natural obstacles to large-scale development. With the exception of the Welsh Assembly Government, and the possibility of UK Government investment, it is difficult to see where the big splash might come from. Interviewee T felt that the Welsh Assembly Government could be doing more to find private investment, but that the source was less important than the development of spin-off industries related to them. The prospects for a few large investment projects in the region over the next decade are given below.

3.5.1 Capital Investment Projects

Interviewees pointed to a number of big capital investment projects planned for the period leading up to 2020. These projects seem likely to constitute a multi-billion investment in the area. The biggest project by far is nuclear new-build, in the form of the Wylfa 'B' power plant (Horizon, 2010). This project alone will constitute a £2bn investment in the area, with the creation of 10,000 jobs, although it will not be operational, or even built, by the time that Wylfa A (NDA, 2006b) is decommissioned.

Wylfa A has won a nine month extension beyond its end of 2010 shutdown, with the realistic hope of further extensions to come. However, even in the best case scenario, the work of building Wylfa B will only be starting as Wylfa A is shut down. There is also a great deal of confidence that a Wylfa C plant will be operational alongside Wylfa B, which is another huge potential investment. Anglesey and Gwynedd will invest £2m in developing the nuclear workforce and redirecting the futures of the 1200 employed at Trawsfynydd and Wylfa. Coleg Menai will develop an energy and manufacturing centre on Anglesey offering training for both the renewable energy and nuclear industries. Another huge capital investment project identified was the outsourcing of Gwynedd's council housing stock. This repair and refurbishing will cost £136m over the next five years, up to 2014, and will total nearly £440m over the next thirty year period.

The newly approved bypass to Porthmadog will represent another capital injection of £50m, with work due to begin in 2010. The extension of the Fibrespeed network across north Wales during 2009-2010 also represents a capital injection of £30m.

The building of the new Welsh Assembly Governments in Llandudno Junction is a smaller, but not negligible capital investment project that should be complete at some point in 2010. A further £28m will be spent by WAG in West Wales and the Valleys during 2009-2010 for growing the knowledge economy by improving information transfer and the development of innovative technologies, and £22m to support academic institutions in the exploitation and marketing of information. Bangor University will

spend £30m on the development of KESS, a scholarship which it is hoped will encourage SMEs to engage in research by linking it with a PhD project for its employees. This money will come from the ESF Convergence programme for West Wales and the Valleys. A project of similar size is the relocation of the headquarters of the North West Wales NHS Trust to Bangor. This will be quite far reaching, as Bangor University has made tentative plans for a medical school and a medical industrial cluster built around this project. As a step to realizing these plans, the university will spend £30m on developing a Health and Technology Campus in the period 2009-2012.

Bangor University will also spend £29m on SEACAMS, which is intended to increase the value of the ocean sciences sector by supporting innovation, research and development, marketing and the exploitation of new technologies.

Finally, there is the plan by Bangor University to build an Arts and Innovation Centre that is being discussed as a replacement for Theater Gwynedd in Bangor. Architects have developed options ranging in cost between £25m to £30m. It will include greatly improved arts facilities for the whole community including a theatre, lecture theatres, exhibition spaces, bar and caf. There is also provision for an external amphitheatre that could be used for some performances.

The North West Wales spatial development strategy executive plan, developed by the region's unitary authorities, detailed in the next section, sets aside sums of money for a number of projects. £14m is earmarked for a regional business support service, whilst a regeneration fund will be created although its value is as yet unknown. A plan for supporting local produce, a Meirionnydd and Llŷn plan, and a Far Llŷn peninsula development are also elements of the strategy, although no specific sums have been committed at this time.

The regeneration of town centres is another key element in the strategy with £3m for Blaenau Ffestiniog, £1.8m for the Dolgellau heritage redevelopment, a £4.4m Holyhead regeneration, together with £10m for improvement of the breakwater and a £22m

upgrading of the port, a £1.9m Llangefni regeneration scheme, an as yet unknown sum for the regeneration of Amlwch, and £25m for the regeneration of Colwyn Bay regeneration. The Porthmadog bypass mentioned above and the £14m to redevelop Pont Briwet on the coast of Meirionnydd, together with the Fibrespeed projects, planned improvements to the A55 and the port at Holyhead, all demonstrate the commitment to enabling efficient transport and connections to promote quality of life decisions. It is hoped that projects such as the development of a North Wales Sailing Academy in Pwllheli for £7m, the development of the outdoor activities sector in the region, the development of harbourage for cruise ships at Holyhead, and the focus on the landscape and built environment, will encourage these decisions

The above are all publicly funded projects. Only two major projects are planned by private investors. The first is the £600m Anglesey Aluminium 300MW biomass plant that is tentatively scheduled for 2011-2013 construction. The company applied for planning permission to the Department of Energy and Climate Change (DECC) in September 2009. Construction is estimated to create 6600 jobs, with 100 permanent jobs at the plant, and further indirect employment effects, with part of the biomass being sourced locally. The company are applying to build two wood-burning furnaces to secure Anglesey Aluminium's electricity supply. However, it is unknown whether smelting activities will return after 2013. The other project is RWE npower's £2.2bn 750 MW Gwynt y Môr windfarm (4C Offshore, 2010a) which was given approval by the Department for Energy and Climate Change in December 2008. Construction will begin in 2011, with final commissioning in 2014. These projects demonstrate the renewable resources (BERR, 2008; DECC, 2010) in the area, which will still be severely under-exploited even when Gwynt y Môr is built. Large scale hydropower projects may still be possible, alongside existing operations (FirstHydro, 2010a; FirstHydro, 2010b), whilst there is also a huge potential for micro-hydro and small-scale wind energy projects, whilst the prospects for tidal energy projects along the coast and the potential

for wave energy generation in some areas mean that the region is well placed to take advantage of the demand for renewable energy and the projected increase in Irish demand, as power plants there come to the end of their life-cycle (Imera Power, 2009).

As interviewee I told me;

'the branding of Anglesey as Energy Island is quite a brilliant idea, given the sheer scale of resources there'.

Plans to build a 1,000 place prison on the outskirts of Caernarfon were cancelled in 2009, after being announced late in 2008. This project would have created up to 1,000 jobs, representing a £17m capital injection to the area's economy and, given the annual costs of maintaining an inmate, would have required a revenue stream of £44m a year from central government to cover running costs. An estimate of the cost of building the prison was not released, but the cost of building similar sized prisons in the past few years make it clear that the project would have cost in the tens of millions. Interviewee I felt that the prison would have created opportunities for potential employees, right down to;

'the lower skilled demographic, unsuited to the knowledge economy'.

The cancellation of the plans, and the public reaction by politicians, underlines the fragility of the regional economy, where a relatively small public investment project is considered vital. The prison would have been built on the former Ferodo site, and the cancellation of the plans may be due to recession driven cuts, meaning that new-build is more attractive than shouldering the costs of cleaning the Ferodo site of asbestos. The owners of the site, Bluefield Caernarfon Ltd, are looking at developing the site in other ways.

3.5.2 Wales Spatial Plan

The Welsh Assembly Government saw the Wales Spatial Plan (WSP), discussed fully in Chapter Two, addresses matters including economic development and regeneration in

the six Spatial Plan Areas of Wales. The plan is notably silent on implementation details, despite identifying the areas of community regeneration and economic development to address. However, the loudest criticism is that the North West Wales SPA will focus on its two primary socio-economic hubs of Menai (Bangor-Caernarfon-Llangefni) as detailed in the Welsh Assembly Government's Môn a Menai regeneration strategy, and to a lesser extent Llandudno (Colwyn Bay-Conwy-Llandudno Junction), a point made by many interviewees. Interviewees argued that this would be to the detriment of the rest of the area, notwithstanding the inclusion of secondary hubs at Holyhead and Penrhyndeudraeth-Porthmadog-Pwllheli. Indeed, Meirionnydd lies between this secondary hub and the primary hub of Aberystwyth. The reasoning is that wealth will flow from these hubs into the surrounding areas. Interviewee T described this hope as; 'nothing more than trickle-down economics'.

The positive aspects of the plan are that it has demonstrated a significant potential to political audiences; and that meeting the challenges of regional economic development is considered in a spatial setting and has been tailored to local need.

The North West Wales spatial development strategy, announced in the middle of 2009, was, it emerged from the interviews, a reaction to these criticisms. It stated the intention of building on the contents of the Wales spatial plan and developing them further. The strategy was developed for and by all regional local authorities, with North West Wales defined as Anglesey, Gwynedd and Conwy in their entirety, recognizing the need to remove the sole focus from the Menai hub, and dealing with the areas that were previously ignored. Despite this, it remains to be seen whether the layer of detail included, such as the specific projects listed above, will convince critics that these spatial plans are not merely wishful thinking.

3.6 Challenges and Surprising Issues

3.6.1 Shrinking of the Public Sector in Wales

This is a very real fear which was mentioned by all interviewees. West Wales and the Valleys will not qualify for the EU's 2013-2019 successor to the Convergence programme which draws money from the European Regional Development Fund (ERDF) and the European Social Fund (ESF). There will also be problems due to the reform of the Common Agricultural Policy (CAP) covering the period 2009-13. More subsidies will be transferred to rural development and conservation, further reducing the traditional EU incentives for farmers to produce. Farmers fear CAP reform, and they have good reason to do so;

'The reality is that I can't name a single farm that wouldn't operate at a loss without the CAP'.

If the CAP were to grow smaller, many farms would not be able to exist. One interviewee warned that;

'The reforms being put in place at the moment place more emphasis on environmental protection, and that is good. But the way it [CAP reform] is structured will favour bigger farms; so you'll see more part-time farmers who farm in the evenings and on weekends, and fewer small farms.'

Details of how cuts in UK public expenditure will affect Wales are given in Chapter Two, but it seems likely that North West Wales will be particularly affected.

3.6.2 Closure of Wylfa and Anglesey Aluminium

Whilst the development of replacements will be a boost to the area's economy, the 300 MW biomass plant planned by Anglesey Aluminium will not become operational until

2013 at best, whilst, if given the go-ahead, Wylfa B (Horizon, 2010) is unlikely to be operational until around 2020. Wylfa (NDA, 2006b) directly provides around 900 jobs, with 650 staff and 250 contractors, and produces around ten per cent of Wales's energy needs. The plant is due to close in December 2010 with decommissioning to begin in 2012, after being granted a nine month extension from March 2010. This extension has boosted hope of further extensions up to 2014. Decommissioning of Wylfa would create some jobs, especially to replace decommissioning work at Trawsfynydd (NDA, 2006a) which will end in the early part of the decade. However, the closure of Wylfa, even if it is delayed, will still mean a net loss of 1500 jobs on Anglesey in the next few years.

This is because Anglesey Aluminium Metals Ltd. was dependent on a 250 MW agreement with Wylfa to power its aluminium smelter, without which it is not economical for the company, a joint venture between Rio Tinto and Kaiser Aluminium and Chemical Corporation, to continue producing. As a result of the decision to cease production in September 2009, 470 jobs at the site were lost, including the 140 voluntary redundancies and 250 redundancies announced over the previous twelve months. The company's smelter ceased operation in September 2009 when the agreement with Wylfa ends, leaving 80 jobs in re-melt operations and plant maintenance. The decision by AAM, made after months of wrangling and the refusal of the UK Government's offer of a £48m support package in exchange for keeping the smelter operational, was a significant blow to Anglesey's economy, and it is not known whether smelting operations will return once the company has built a 300 MW biomass power plant on the Holyhead site (Anglesey Aluminium, 2009), or even whether this proposal will ever go ahead. Whilst construction of this plant will create some 600 temporary and 100 permanent jobs, there will still be a large net loss, and there is no certainty that the plant will be built. Anglesey Aluminium dealt with a number of local firms, in fields such as welding and haulage, as their biggest customer, and the closure of the AAM smelting business means that these smaller firms face a very uncertain future.

3.6.3 Overall Indifference to an Integrated North South Transport Link

The reaction to the proposed north-south transport link was very mixed, and this surprised me as I had begun the project with the expectation that a majority of people in this region would support improved north-south links. A third each of my interviewees seemed to feel strongly one way or the other, whilst a third were ambivalent. Those working in economic development fields were, generally, against the idea as being of little economic merit as both north and south Wales 'think' east-west, towards Liverpool-Manchester and London respectively. Most of those against the link seemed more concerned that the costs of a link would outweigh the benefits, whereas many of those in favour seemed to be favouring the principle of a link rather than stressing any particular economic benefit. The strongest statement against came from interviewee I, saying;

'The idea of north and South Wales trading together is, frankly, a ridiculous construct we're making up ourselves. Just because we desperately want something to be true, it doesn't make it so.'

Interviewee R added;

'I don't think it's likely I'm not against it, I'm not for it but in terms of priority, people naturally gravitate from west to east.'

There is a very good reason why a north-south transport link does not exist. Railways in the United Kingdom were not centrally planned to ensure efficient connectivity in all areas, but developed through private investment, meaning that east-west railway lines are a symptom of this pattern, where Wales is a regional economy within the UK. The A470 is the only north-south road link, and this is of poor quality. It has not been upgraded to the standard of the A55, or even the M4, because of the lack of political will

to do this, strongly connected to the weak economic arguments in favour of such a link. There were a small number of those in favour of a link who did think that trade internal to Wales would make such a link worthwhile in terms of access for industry and tourism. One of these was interviewee F, a development policy leader, who pointed to the early 1980s, when a journey from Llandudno to Caernarfon took 90 minutes, before the A55:

‘the transformation that the A55 has made is unbelievable in such a short space of time’

Of course, it is dangerous to suppose that a north-south link would have the same transformative effect. There is a visible east-west gradient in Welsh annual household income, as worked out by the Welsh Rural Observatory, whereby incomes in local authority wards are higher close to England, and only remain at a reasonably high level in the North West around the A55. There would be boosted trade along a new north-south link as businesses take advantage of new opportunities, but it is unlikely that this will justify the cost of the link as the planned bypass to Porthmadog would cost £15m per mile, a new motorway costs £30m per mile, and a new railway track costs £6m-£7m per mile. It is likely that the east-west orientation of this area’s economy will mean that such a link is not economically attractive.

3.6.4 Faith in a Knowledge Economy and Capital Investment

The plans for Gwynedd, and Conwy to a lesser extent, focus on the development of the knowledge economy. A large scale manufacturing region is unlikely to return if Anglesey Aluminium do end operations permanently by abandoning plans for the biomass power station, the public sector will shrink considerably up to 2014 and probably beyond this date, and the traditional industry may end production completely if recent trends are continued. The region has many reasons to develop its knowledge economy, with some sectors clustered in Bangor near to the University and along the A55, and smaller

micro-businesses in the knowledge economy scattered throughout the region. Quality of life decisions seem to be a major consideration, with the expectation that a more interconnected, digitally-equipped region will enable firms that do not need to transport large volumes to relocate with other factors in life. The natural beauty, outdoor activities from mountain-climbing to sailing, the low crime rate and rural lifestyle; all are hoped to draw relocation from the urban lifestyle and its constraints. The danger here is that the coming of the knowledge economy is taken as an article of faith in economic development circles.

WAG and the local authorities have exhaustively researched the prospects of a knowledge economy, and it is not in doubt that it could, and probably will, happen. Whether it will happen to the extent hoped for is a different matter depending as it does on preferences remaining the same, 50 Mbps bandwidth being developed through Meirionnydd and Dwyfor beyond Pwllheli where it is now, and other uncertainties. There is also the danger of ignoring the fact that some people can not be upskilled to take advantage of such an economy. As interviewee I pointed out;

'[] not the whole world is a knowledge economy person - not everyone is going to be a biophysicist you do need those [middle-skilled] jobs that pay well and regularly, and will withstand a recession.'

This was probably the view that best reflected the gravity of the situation that there is a danger in focusing on the knowledge economy to the exclusion of other sectors. It can be seen above that most opportunities are in the knowledge economy or energy generation sectors.

The other item of faith, which is seen to complement the knowledge economy, are the big capital investment project noted above. WAG and the local authorities do seem to be open to the possibility that Wylfa B and C may not be developed, in the same way as the prison in Caernarfon was cancelled and there is no real danger that optimism over these developments is infectious. The problem is that these developments are seen

as projects that will create a great deal of construction work, with jobs numbering 9,000 for the construction of Wylfa B, as well as boosting local suppliers. The problem would seem to be that little thought has been given to what these construction workers will do after these projects, which will be coming to an end by 2025. It seems to be necessary for planners to consider what a large number of medium and low-skilled workers becoming unemployed at the same time will do to the economy in 2025. At the same time, the growth of the personal care sector depends on the current demographic shift, which, given the inevitability of human mortality, will not be a permanent feature of the area indeed, the population of older people will peak in the period 2025-2030. This reasoning leads to the conclusion that development of sustainable employment opportunities for lower-skilled workers is still an issue in the area.

3.6.5 The Informal Economy

An interesting phenomenon in North West Wales is the presence of a gift or barter economy to a greater extent than in other areas of Wales. The sector producing undifferentiated goods and services in the region is well above average size in the UK, and is also big relative to Wales. It is certainly not officially recognized or recorded, but it is accepted that direct exchange of goods and services without the use of a common unit of exchange is a part of everyday life in some parts of the region. Goods and services exchanged in this way mean that less money is spent locally on purchasing locally produced goods, and that there is lower demand for employment. Interviewee N seemed to think that this informal economy contributed to economic inactivity, saying that;

‘[] in a rural area, there’s often less of a need to be economically active because there’s a bit more of, shall we say, a barter market going on.’

An informal economy operates within all economies to some extent. The concepts are especially relevant to all rural and deprived areas, and it is probably more of a direct

issue in areas such as the Scottish Highlands, and is a definite feature globally in rural and deprived areas. There is substantial literature on the informal economy, in terms of alleviating poverty, rural development, and within socially cohesive groups united by class or culture. In North West Wales, the Welsh language and culture may play contribute to this.

3.7 'Rediscovering' North West Wales: Updating Stakeholder Perspectives

The initial research study was undertaken and completed at a time of considerable economic uncertainty, and in advance of a UK general election that was to produce a change of government. Although study participants were aware of the contemporary context and the potential policy changes in the offing, with particular regard to spending cuts, it was felt that the nature of the scenario analysis would benefit from a review. This took the form of new interviews with a subset of original participants, providing an opportunity to gauge how much their opinions had changed, if at all, over the intervening period, and to see whether opinions had moved uniformly. The re-visit could also provide some test to the robustness and/or sensitivity of the scenario approach. The changes and dramatic events (Roberts, 2009; Roberts, 2011) in the North West Wales economy over the period 2009-2011 were monitored in Chapter Two, and the empirical data presented there informed the interviews. The follow-up interview protocol followed a similar design to that of the initial interviews, revisiting the participant's initial reactions when questioned about the region's economic drivers, the uncertainties in and opportunities for the local economy, before moving on to the subject of economic change over the 2009-11 period. The interview questions would begin as general queries on the topics covered in the first interviews, only feeding back the participant's initial response in the Delphi style after first noting the 'off-the-cuff'

responses, enabling a better monitoring of change in response over time.

While discussion of changes in the economy was the central focus, as in the initial interviews, it was again decided that it would be useful to build the interview to this point rather than asking explicitly from the beginning. This created the opportunity to elicit fuller responses, and to elicit information that may not have been divulged otherwise. The explicit questions on change would be accompanied by discussion of noteworthy aspects of the initial interview, requiring familiarity with the initial interviews. This would mean that the interviewee could be reminded of a quote from their initial interview, and asked how the change had altered their responses to that particular issue.

Setting up the interviews in this way proved more complicated and time-consuming than using a less structured interview protocol, in the sense that the interviews would still be semi-structured, but with more interviewer prompting and intervention than usual. However, the process did yield the desired result, with interviewees being relatively free to expand upon the point they had made, with prompts and cross-examination not distracting them from this. Because the participants were only informed that the interviews were follow-ups to verify the scenario analysis, they saw the monitoring of change as separate from the interview's primary objective and were generally freer and less inhibited in discussion.

During the interview process it became immediately clear that the situation facing economic policymakers in North West Wales had changed significantly since the initial interviews. This could be seen indirectly in the behaviour of interviewees and their staff when organizing the interviews, as well as the time pressure and workloads of interviewees. This interpretation was borne out by the direct responses of interviewees; from informal remarks at the beginning and end of the interview about being 'stressed' or 'very busy' given the economic context, to detailed explanations about how their institutions were coping with problems arising from the recession and its aftermath.

North West Wales had experienced some major changes and economic setbacks since the beginning of the interview process. 400 jobs had been lost with the ceasing of smelting operations at Anglesey Aluminium Metals Ltd.; 200 jobs were announced to be at risk on the 12th of January, 2010, when Welsh Country Foods revealed a restructuring of its meat processing business due to a fall in demand in the aftermath of the 2008/09 recession; DeepStream had entered administration (Roberts, 2011), raising doubts about the region's future as a technology cluster; and a few major public projects were cancelled.

However, views on the region's economic drivers were broadly unchanged when analyzed carefully. There was a general consensus that continuing low GVA (ONS, 2009b; ONS, 2010b), relative to both Wales and the UK (BERR, 2009; BERR, 2010; BERR, 2011), was a key driver in a circular and cumulative sense, and that the region's comparatively small economy, in multiple senses, contributed to the region's slow growth rate. The view of a region overestimating its poverty and complacent due to its non-pecuniary attractiveness as a place to live, and thus contributing to its own economic inertia, persisted amongst many. The drastic changes in Anglesey's economy meant that participants felt vindicated over airing fears about the island's narrow economic base during initial interviews, and some felt that any Energy Island branding could repeat this mistake while ignoring the opportunities for renewable energy elsewhere in North West Wales.

The most striking issue to emerge was that interviewees generally seemed to accept that they had very little control over the local economy, and even less influence than most of them had thought originally. While the initial interviews had shown that most participants were aware of the global economic forces which dictate much of what happens to the local economy, the follow-ups saw interviewees almost resigned to these global forces, and downplaying the role of local intervention as a generality. There was also a greater awareness of the role that freak occurrences geo-political instability in the

Middle East, natural disasters in Japan, unusually cold months in Britain could have on the regional economy, and especially when the national economy was already weak.

As a result of recent occurrences there were general concerns about rising oil prices, uncertainty over the future of nuclear power and other fears. It was noted that one sector which was performing relatively well was agriculture, largely due to a doubling in the price of wool in the intervening period since beginning of 2009, and a rise in red meat prices as well, both attributed to increased market demand from China, although this renaissance was viewed as at risk from rising oil prices.

Tourism was viewed as a sector that had actually profited from the recession, with many British families opting for 'staycations' (Burns and Bibbings, 2009) in Wales, with an increase in oil prices deemed unlikely to harm this new market, with many long-term plans and developments built around it. It was announced near the end of March 2011 that the slate industry of Gwynedd would be shortlisted as a possible future UNESCO World Heritage Site, and some excitement about this was apparent during the later interviews. A general lack of discussion on the subjects of innovation, either in farming or tourism, perhaps reflect the fact that businesses consistently profiting are less driven to innovate. Traditional industries such as slate quarrying were notably absent from discussion, except for brief mentions of closure upon prompting.

For various reasons, such as spending restrictions, innovation in the knowledge economy seemed to escape notice and it seemed that the future importance of this sector had been, perhaps subconsciously, downgraded compared to the previous interviews.

Discussion of renewable energy, the energy economy, knowledge-based services, programming and the digital economy had been enthusiastic during initial interviews but was now more subdued, with an implicit recognition that the knowledge economy would only form a limited aspect of the region's future economy.

The downgrading of the knowledge economy is, perhaps, linked to the uncertainty surrounding the future development of technical infrastructure required to support it.

The uncertainty is once again linked to the issues around the public finances. A number of specific infrastructure and community projects mentioned in the first round of interviews, now appeared to exist in a state of limbo, with others confirmed but anticipated to be at risk following the 2011 Welsh Assembly elections. This led to doubts over the future of broadband provision, transport and the development of the knowledge economy. Speculation about major project commitments was understandable, with the new prison proposal for Caernarfon being passed over, indicating that only cautious optimism regarding Wylfa B (Roberts, 2011) and the large Irish Sea windfarm (4C Offshore, 2010b) could be justified.

Most interviewees supported some forms of governmental intervention, but on a limited scale and quite tightly focused. This seemed to be a reaction to looming public sector cuts, in the aftermath of the recession. There was general agreement that North West Wales had avoided the brunt of the recession, partly due to the region's very large public sector, and partly by virtue of being of the fact that WAG public sector cuts have been delayed by at least a year, compared to the UK situation. However, although major job losses had been avoided as yet, most interviewees seemed despondent that grant schemes had been cut back and that money was tight.

Newer grant schemes seemed to be on a smaller scale with economic intervention leaning towards making the system of private loans more accessible and efficient. Increasing efficiency in the private sector generally seemed to be a recurring theme when discussing public sector intervention. One particular aspect of discussion concerned the negative aspect of funding that allowed the foundation of businesses which were employing a single person and which had no prospect of growth, even wanting to remain as they were. In North West Wales, and especially often discussed in Gwynedd, this appeared to be a common feature, with a high number of businesses but a surprisingly low number of those being large or growing enterprises (ONS, 2009a; ONS, 2010a).

Another topic that came up for regular discussion was the joint delivery and

centralization of services on a North West Wales or north Wales basis. This raised some concerns that such rationalisation of public sector management would potentially denude parts of North West Wales of management level staff. This would restrict employment in some areas to mostly low-paid jobs, dealing further blows to the economy in the form of reduced spending power and reductions in local demand. This would then, in turn, mean that the future of many low-paid services jobs are in doubt, especially as many of the region's inhabitants currently hold down multiple part-time and occasional services jobs, leading to a stagnant economy and out-migration.

Overall, however, and despite the clear shifts in attitude, and a few new concerns, amongst interview participants as noted above and a firmer view on the impact of fiscal tightening, opinion on the regional economy's future had remained remarkably consistent over the period of this project. Participants suggested, once again, that the economy of North West Wales is resilient compared to north-east Wales and the south Wales valleys; Anglesey, and especially the Holyhead and Amlwch areas, is a notable exception. Again, part of this resilience was attributed to public sector dependency, which will be forcibly reduced in the coming rounds of spending cuts. However, it was also noted that some of this resilience was due to a 'subsistence' attitude, with many lower earners prepared to work long hours in a number of jobs in order to make ends meet.

Whilst unemployment has risen (StatsWales, 2011b), except for a mixed picture in Anglesey, the region can still claim a low unemployment rate relative to the rest of Wales (ONS, 2011), and although economic inactivity is persistent in pockets has declined in all the region's local authorities (StatsWales, 2011a). Low wages (DWP, 2011) were likewise thought to remain a key driver, linked to the 'subsistence' attitude mentioned above. However, it was noted that direct comparison is complicated by the fact that the Welfare Reform Act 2007 was implemented during the period. The Act enforces conditionality on benefits claimants, meaning that economic inactivity has declined over the reference period. The continuing welfare reform agenda will also see

sickness and disability benefits rules being changed. Some participants raised concerns over the flooding of the labour market with individuals who are not fit to work or are under-qualified, increasing unemployment and poverty in the region.

As a final observation, the follow-up interviews showed participants again responding positively to the scenario analysis, with many reporting that the scenarios themselves allowed participants to step back and consider the future in a more abstracted sense. The interviewees all seemed to understand that the scenarios were not predictions but a structured set of possible futures. When analyzing the interviews with consideration given to the scenarios, it is notable that the initial interviews had leant towards a combination of 'the knowledge hub' and 'the investments spin-out' type futures, whereas the follow-up interviews show that interpretation shifted to a more neutral setting, with all four scenarios considered fully.

3.8 Conclusion

This chapter has focused on the findings of a set of interview conducted in mid 2009, with key figures in the economy of North West Wales. Whilst these interviews are intended to provide informative material for further study into the region, specifically as initial research for the scenario analysis of Chapter Four, and not as final data from which to draw conclusions. However, supported by the profiling in Chapter Two, this chapter forms a case study of the state of the North West Wales economy in mid-2009.

CHAPTER FOUR

Learning From the Future

4.1 Introduction

This chapter presents a scenario analysis process (James et al., 2012) entitled *Learning From the Future: The Economy of North West Wales in 2025* which identifies alternative contexts for economic development within the peripheral economy of the region, using the narrative profile of Chapter Two and the interview process of Chapter Three as the initial research upon which the scenario analysis is based. The output of scenario analysis enables the design of policies that are resilient, in the sense that the overall policy framework has been created to cope with a range of events and scenarios, and can move seamlessly from one possible future to another. The chapter concludes with development of policy threads that deliver the potential for economic growth and socio-economic well-being within these contexts,

Scenario building is an interesting process in general as it allows participants to consider the long-term future holistically and comprehensively, rather than making a short-term projection that considers only the prospects for their own organisation, and to set these possible futures in a narrative framework. Scenario analysis also allows scope for and invites the use of reflexive methodology within the process. This is because scenario analysis is an interpretative and descriptive methodology, which can only be strengthened by reflexive consideration. The process builds on the work of previous chapters, with data from statistical profiling and interview data forming the basis for deeper questioning on the regional economy's structure.

4.2 Methodology

4.2.1 Scenario Analysis

A scenario is a narrative description of a possible future (Schwartz, 1996) which identifies events, their drivers, and their function. Scenario analysis consists of a spectrum of

approaches differentiated by the degree to which qualitative judgmental descriptions and interactions based on mathematical modelling procedures are combined (Bradfield et al., 2005) and the scenarios themselves can be predictive (what will happen?), explorative (what can happen?) and normative (how can a target be reached?) in nature (Börjeson et al., 2006). The methodology does not attempt to forecast the future but rather to describe possible futures and linking them to contemporary knowledge (Robinson, 2003). All possible outcomes are considered without preference (Kahn, 1962), providing the opportunity to clarify options for decision-makers (Wack, 1985a), on the basis of a better appreciation of the possible changes that might occur in the future and the range of new circumstances which they might have to deal with (Wack, 1985b). This is achieved through using the information gained in an initial research period, typically involving statistical research and interviews, to feed a scenario-building process. The methodology has become increasingly used in policy studies (Ringland, 2002) and to enhance institutional learning (Pahl-Wostl, 2002; Robinson, 2003). with territorial scenarios for Europe, including potential evolution of spatial structures and the challenges future policies are likely to face, being explored by Dammers (2010). Scenario building most often takes place through a series of workshops, consisting of discussions with key stakeholders in the topic. The first step following the initial research period is an orientation workshop, where the core team are briefed on the topic, with the aim of deepening understanding and framing the research question. After this comes the workshop, or workshop series, when the refined questions and research are considered by participants to the purpose producing a list of driving forces and opportunities for change. The scenario-builders then consider the combined effects of these forces, with individual forces being strong or weak, to outline the scenarios for potential futures. Once the scenario structure is outlined the remaining task is the deductive ‘fleshing-out’ of the scenarios so that the logical temporal chain of events is complemented by a narrative progression. A final affirmation workshop is then held to

examine these final drafts, testing them for both rigour and plausibility ahead of dissemination. The scenarios will require periodic renewal, and especially so following protracted change and instability. Over this period, both the target readership and the context in which they operate will change significantly, meaning that the scenarios must be updated.

4.2.2 Delphi-type Scenario Analysis

The Delphi method involves developing a group consultation process for dealing with a complex problem, and is used to elicit and develop opinions by obtaining a collective response from a panel of experts, and then allow these responses to be refined. Importantly for this research, the Delphi method involves iteration with controlled feedback. This method fits in with the need for ‘rounds’ of activity required for the purpose of scenario building. The group interaction in Delphi is anonymous, in the sense that comments are not attributable to any individual. Previous studies combining these two techniques (Nowack et al., 2011) but have mainly used the Delphi approach to provide judgements on the credibility and objectivity of the scenarios developed, whereas this study has chosen to focus our inquiry mainly on idea-generation and consolidation to support the goals of widespread engagement and institutional learning.

Using a modified Delphi methodology, whereby the study is conducted online, it is possible to replace the scenario building workshops with online questionnaires. Although this does cut down on interaction between participants, this approach has the potential to be far more inclusive, in the greater number of participants and in the fact that participant anonymity and absence of ‘physical presence’ prevents the potential for a small number of forceful personalities to dominate the development of perspectives. However, the absence of workshop interaction will mean that the scenarios produced are basic and lacking in detail, even though their development casts a wider net. The inclusion of a scenario affirmation workshop, involving a review of the scenario

'building-blocks' and enhancement of basic scenario structures, at the end of the process provides this balance between inclusivity and diversity of ideas, on the one hand, and the detail stemming from participant interaction, on the other. That is, a workshop is an integral part of the scenario analysis as the face-to-face interaction involved forces participants to discuss ideas, strategies, and problems, across disciplines and contexts.

4.2.3 Questionnaire Rounds

The questionnaire rounds were informed by an initial research period that provided material for Chapter Two and Chapter Three. The population of stakeholders, including economic planners and other public sector officials, representatives of the region's dominant economic sectors and growth sectors, and academics, was set at 100 policy-makers in fields relating to economic development, because three Delphi-type rounds with completion rates of around 59 per cent were hoped for, meaning that there should still be over twenty participants at the end of the process. The first Delphi-type questionnaire was sent out in mid-September 2009. Two weeks prior to the launch of the online stage of the process, invitation letters and instruction booklets were posted to the 100 selected stakeholders. The booklets were carefully designed, with the need to remain simple and accessible being a priority, in order to ensure that invitees did end up participating. At the same time, the booklet had to introduce the reader to the concept of scenario analysis, the goal of this particular process, and its benefits for their organizations. The booklet also included a review of the economy of North West Wales, drawn from the initial research period and the interview series. An online survey tool was used to build a survey website, with a link to this address being e-mailed to participants on the launch of the website. Like the booklet, this website needed to be simple and user-friendly. The booklets were created partly in order to keep on-screen text to a minimum, and the questions were designed likewise. Multiple-choice tick boxes accompanied by boxes for text were thought to be the best options, with questions

remaining brief and uncomplicated. This approach was successful in the sense that all questionnaire rounds yielded response rates that were above expectation, with an average response rate of 66 per cent for each questionnaire.

	<i>Response(%)</i>	<i>Respondents</i>	<i>Periods</i>
1	71	71	<i>Sept – Oct2009</i>
2	59	42	<i>Dec2009 – Jan2010</i>
3	68	28	<i>Feb – Mar2010</i>
<i>Average</i>	66		

Table 4.1: Actual Response per Round

The first questionnaire consisted of three broad questions or themes, each one on a separate page, regarding the driving forces, opportunities and uncertainties manifesting themselves in the economy of the area. The questions on drivers were theory-based, and informed by the review of Chapter Two; the other questions were informed by the empirical researches detailed in Chapter Two and Chapter Three. Having gathered a lot of information in the initial interviews and statutory data, it was possible to construct tick box matrices in which participants could provide a rough idea of the magnitude of each variable: for example, how strong a driver, how good an opportunity, how great an uncertainty. In the case of drivers, an exogenous increase in spending in an economy will, through post-Keynesian mechanism, cause a greater than proportional increase in aggregate demand - applied to the case of North West Wales, this could be called a ‘local multiplier’. Participants were also free to include new variables, and note their strength. Text boxes for comments and notes were also provided, and their use was encouraged; this questionnaire did prove to be good at eliciting detailed responses. The next step was to link the identified drivers together to provide a meaningful framework. This may be obvious, where some of the factors are clearly related to each other in one way or another. For instance, a technological driver

may lead to market changes, but may be constrained by policy drivers. The drivers can be sub-categorized, but this may be artificial, and drivers may be accepted but not rejected at this stage. Their rankings may be taken, in order to assign rough probabilities to event strings. The intention of sub-categorizing is to gradually merge these categories of drivers into a small number of provisional or outline scenarios, by taking note of the uncertainties identified.

The second questionnaire was more complex, as it involved consideration of these mini-scenarios. There were five broad themes in this questionnaire, with the first three being invitations to re-assess in the context of information on the first questionnaire. Driving forces, opportunities and uncertainties were all presented in the multiple-choice matrix format of the first questionnaire, but the individual choices were modified according to the first round results, and augmented with new choices. The division between theory-based and empirically-informed questions was no longer relevant, with the questions based on answers in the previous round, though these answers were processed with reference to Chapters Two and Three. The aggregate results of the first round were also presented along with each choice. Other themes included asking participants to construct event chains from options presented in the questionnaire, and requiring participants to comment on the mini-scenarios. The second round of the Delphi-type process allowed the refinement of these mini-scenarios, enabling the presentation of full draft scenarios in the third round, which focused on the plausibility, relevance and feasibility of these draft scenarios.

Fewer themes were presented in the final questionnaire, although some driving forces and uncertainties were re-introduced where the results of the first two rounds had not yielded any explicit consensus. The theme of event

chains was also explored further, augmented by the results of the second round. However, as a central aim, participants were asked to analyze, to amend, and to expand upon these scenarios. This enabled the construction of a new set of more detailed exploratory scenarios, together with a set of policy packages to accompany them. The use of reflexive methodology in this chapter was both enhancing to the scenario analysis, and necessary for the integrity of scenario development. The Delphi based process itself was indirect, with most communication with participants being through the questionnaires discussed above. Information gained in such a way is clearly full of the participant's own subjectivities, but is also harder to interpret. Answers to multiple-choice questions are very difficult to interpret, and when they are the interpreter can do so entirely from the perspective of their own subjectivities; answers such as those in the free-text boxes offer more scope for the interpreter to understand what the participant meant, but are still subject to the interpreter's own values.

An interview normally involves meeting with the interviewee so that the interviewer can note extraneous visual and audio clues that may aid the interpretation of answers. Because this element was missing during the Delphi-type stage, the interpretation of the replies to each questionnaire was reinforced by reflexive methodology. The process of reflection partly replaced the visual and audio clues available in other qualitative research methods, making detailed and honest interpretation possible where it would otherwise not have been.

The best example concerns potential answers to a multiple-choice question regarding transport links between north and south Wales, which could be ranked from one to ten for its economic effect as a driver. With very scant supplemental information to facilitate and guide interpretation, the process of interpreting the rankings assigned by questionnaire respondents was wide open to my political, social and cultural subjectivities. The application of reflexive methodology ensured that I remained aware

of these subjectivities and was able to note, upon re-reading my work, where they had influenced my interpretation in ways that were indefensible. Where my interpretation was questionable, I undertook to repeat the interpretative act after having sought further information, including repeat questions in subsequent Delphi type rounds, seeking to understand my interpretations, and ensuring that my interpretations were reasoned and fitted the empirical data.

4.2.4 Scenario Affirmation Workshop

The exploratory scenarios having been constructed, these scenarios were tested at the workshop. A number of key stakeholders participated in the workshop, and, because the development of exploratory scenarios was already complete, could take place over the course of a single day. The make-up of participants was an even split between participants in the online stage of the project, and representatives of sectors and groupings that had emerged as important during the online stage. However, participants were invited to approach the event with an open mind, and asked not to take institutional stance or make set-piece arguments defending their interest. The meeting location was chosen to incentivize attendance through its central situation and ease of access, and to provide the facilities and ambience necessary for the encouragement of collaborative participation. The proceedings were led and facilitated by Rhydian Fñ James, assisted by three workshop facilitators, with each participant receiving a briefing document prior to the meeting and supplied with a workbook for the duration of the meeting. The workbook served a dual purpose of presenting the information that participants would require, and enabling participants to keep factual and reflective notes on proceedings. The scenario analysis was presented in these workbooks as a dynamic, time-linked framework, rather than a static snapshot, covering the economic development of North West Wales up to 2025.

The workshop was designed to complement the online stage of the process, rather than

as a simple follow-up exercise. This entailed some doubling-up of themes covered online, in an effort to ensure that these results would also emerge in a more discursive setting. Following a welcome session and an introductory presentation on the topic of scenario analysis, the programme involved morning and afternoon working sessions, in which the participants conducted ‘break-out’ sessions into four small groups before gathering together for presentations and plenary sessions involving the development of scenarios and policies. The group were each assigned to an exploratory scenario for whose development they would be responsible.

Once the groups had been formed and assigned to a workshop facilitator, work began on discussing the regional economy’s key variables, including economic drivers, opportunities, and uncertainties. The groups were not presented with the results of the online stages in order to ensure that the results were considered answers. Having done this, the groups were asked to identify key sectors in the regional economy, and to use their identifications of sectors and variables to construct event chains up to 2025. This was intended as a scoping exercise, allowing participants to consider the skeletons around which their scenarios would be built. A second presentation followed, summarizing Learning From the Future up to that point, and introducing skeleton versions of the exploratory scenarios to the guests.

The afternoon session was intended to develop both scenarios and policies. Having constructed a few event chains, the groups were well placed to consider their assigned exploratory scenarios and to examine plausibility and feasibility. This process led to a deductive process of ‘fleshing out’ the scenarios with narrative descriptions, identifying underlying causal processes that would interact to produce scenario outcomes. This was the reason a workshop had been included in the methodological design. The groups then gathered for a plenary session, where each group selected a representative who presented that group’s scenario to the workshop. This session was planned as a device to ensure that each group spent time considering a coherent and presentable narrative.

The groups then conducted a final ‘break-out’ session where they were required to evaluate appropriate policy options and alternative strategies that would maximize economic development in their scenarios, with the intention of prioritizing policies and testing them for robustness in the variety of situations that could be envisaged. The final step was another plenary session in which groups presented their ‘policy prescriptions’ to the workshop groups.

All final presentations shared a common desire for the future of the region, in improved quality of life, prosperity, greater strength and cohesion of local communities, and better opportunities for the younger segment of the population to settle and thrive within them. The participants did, however, often differ on the way this vision was attainable, and sometimes on whether it was attainable at all. The presentations covered the full range of quality of life issues, wide-ranging definitions of prosperity and the strength and cohesion of local communities, and the role of the public sector and local and central government and other institutional bodies, as well as the deep cultural and linguistic threads running through the region. At several points in the workshop process it was noted that geographical diversity within the region had implications for the local impact and significance of the changes conceived in various scenarios.

4.3 Scenario Development

The morning session of the workshop was dedicated to the same identification of variables and scenario building blocks as the Delphi type questionnaires, and it is not surprising that most of the identified forces were, broadly, the same in both stages. The main driving force influences can be divided into a small number of interrelated general categories, covering economic and social drivers, infrastructure and geography, and socio-cultural pressures.

Given that the workshop was held during the world’s emergence from a recession

triggered by the instability of financial markets, it was unsurprising that the influence of international markets was highlighted more often than in the preceding Delphi-type stage. On a smaller scale, yet a microcosm of these global issues, lack of access to finance for business was noted, both locally and for firms bringing inward investment.

Investment and gross fixed capital formation were also felt important, with the workshop discussions emphasizing the shortage of growth capital to enable expansion, restructuring, or entry to new markets. The context of economic downturn had also led to policymakers considering, subconsciously at least, a more resilient region or at least a highly contextualised competitiveness. Policymakers seemed to consider a range of activities for each scenario, perhaps in an effort to avoid 'having too many eggs in one basket', which was highlighted as a problem in stakeholder interviews.

Economic driving forces (Wong, 1998; Courtney et al., 2008) were felt to relate, primarily, to the state of out-of-region competition, affecting the profitability of local firms and the size of workforce they can support. Export demand was generally felt to be much more important than import demand and local demand as a driver. The workshop noted that the extent to which the UK economy as a whole is exposed to international competition provides a critical influence, as does the level of demand in the region's export markets, especially in England. External competition was also identified as having key effects on patterns of migration in the region. There was more attention given to the role of individuals, and collectives, in economic development, than to the role of communities. The issue of turning a few investment 'hotspots' into a functioning regional economy was related to individual enterprise and exogenous influences.

Tourism and niche marketing were noted as key, and underdeveloped, areas of economic activity in the region. Tourism might benefit due to the relative cost of holidaying abroad and that this should be a focus point to strengthen inter- and intra-industry multipliers within the region by developing new forms of tourism, applying new marketing strategies, and improving cultural links to tourism. However, the

economically driven out-migration of the younger population combined with the in-migration of older people attracted by the ‘holiday home’ syndrome has led to a rapidly ageing population in the area. Overall, competitiveness as a driver was contextualized, with a lot of attention given to embedded economic activity. The public sector’s crucial importance to the region was underlined, not only as an employer and service provider, but also in its role in supporting and developing the economy. It was noted that a public sector squeeze would have a substantial, or even devastating, impact on the structure of the regional economy and on communities, in resulting unemployment, limited provision of services, and lack of support for business.. This would lead to a depressed labour market, partly due to a lack of skills investment leading to out-migration, as well as a loss of capital. This loss of human capital would restrict the development of large capital projects in the region.

With social drivers, education was seen as key, associated with public expenditure.

Some level of education was thought to be a prerequisite to innovation and entrepreneurship. Innovation in higher technology and the usual markers of a knowledge economy were linked more closely to higher education, but also to public expenditure in areas such as health, energy and transport. The lack of inter-generational capital, due to significant pockets of poverty, was felt to be an important driver, whereby poor families have neither the money for large inheritances nor the means to education that would enable entrepreneurship. This leads to a transmission of poverty across generations, along with the low aspirations for and expectations of children growing up in deprived families. In turn, low-wage employment, unemployment and economic inactivity all run deeply in certain areas of the region.

It was recognized that rural economic development posed additional problems (Terluin, 2003). Although most of the region is sparsely populated, much of the open land is either unsuited for urban or industrial development, or covered by a variety of controls over its potential uses. The region’s climate and the potential effects of general climate

change were also felt to be important drivers, with references made to low-lying coastal areas at risk of flooding. Transport and communication was a topic where there was a wealth of opinion, with infrastructure improvement being noted as important, but with no consensus as to the type of transport to be used, and disagreement about the orientation of the transport networks to be built.

Technological change was frequently highlighted in this regard, particularly with reference to IT. Broadband services were seen as a strategic requirement for economic and social well-being, and, in particular, a barrier to progress if the region were left behind in access. Aside from computer services availability and familiarity, both in commercial and residential contexts, other technological issues discussed were renewable and nuclear energy provision, biotechnology and software development.

With socio-cultural pressures, the Welsh language and culture were often mentioned in relation to preservation, economic benefits, and regulatory pressure, alongside many other contradicting viewpoints about its impact on economic activity. It was also noted that the region was, historically, a manufacturing and working-class area, with the transition to a post-industrial economy having left its own social casualties.

4.4 The Scenarios

The four scenarios for *Learning From the Future* result from a process of eliminating and rewriting exploratory and anticipatory scenarios constructed using inductive, deductive, and normative means. The anticipatory scenarios derived from the initial research period and outline exploratory scenarios constructed from the first questionnaire were tested and revised in subsequent rounds. The addition and enhancing of certain aspects, and the combination and elimination of others, allowed the process to arrive at four draft scenarios. The scenarios produced in the workshop were very much dependent on the inductive methodology of using narrative to ‘flesh out’ an event chain. These workshop

scenarios were used to enhance the initial scenarios, bringing them to their final forms. An evocative title for scenarios is important in creating the necessary tone and urgency for the narrative, and the following scenarios have been given titles that attempt to encapsulate the region's economy as envisioned in 2025:

Scenario One is named *The Perfect Storm*, in reference to the meteorological term referring to a worst-case scenario. Whilst scenario analysis is not concerned with 'good' and 'bad' scenarios, the term is employed for the challenge represented rather than the outcome. The distinctive characteristics of this scenario are that the initial conditions involve large cuts in public expenditure, with financial and economic constraints on economic activity, perhaps due to a double-dip recession in 2011 or the collapse of the Euro. This scenario envisages the area negotiating itself, with mixed success, through these difficulties. The portrait is one of a lack of competitiveness in the form of low productivity, a lack of inward investment, a poor business environment, and a lack of competition. The end result is regional resilience by default, with economic and social activity in the region shrinking to survival within its capacities. It is true that the economy is highly diverse and businesses are locally owned, but the smallness of the economy and constraints on development mean that this is a very limited type of regional resilience.

Scenario Two is called *The Investment Spin-Out*, and presents a dynamic global economy which prompts investment in the area, from multiple sources. This scenario sees the region in an advantageous position to capitalize on its natural energy resources, and to use this to attract investment in renewable technologies and in other energy production, specifically in nuclear generation. The scenario also envisages strong economic planning which

enables the region to take advantage of the inward investment and to maximize the agglomeration effect, spinning-out the investment into related technological fields from the production of solar PV panels to the extraction of hydrogen from seawater. The initial portrait is of an ultra-competitive region, where the focus is on the most globally competitive hypermobile firms in a competitive business environment and on the attraction of inward investment, especially with regards to energy. North West Wales will also be able to attract and take advantage of speculative investment in other sectors. However, it becomes clear that there is some local ownership of businesses and significant economic diversity. The region displays some resilience, but the focus on a limited number of sectors and on exceeding its environmental capacities mean that the scenario is one of contextualised competitiveness at best.

Scenario 'Two is entitled *The Knowledge Hub*, and envisions a strong knowledge economy networked throughout the region. The scenario gives more of a role to endogenous driving forces, and less emphasis on a benign economic context. Growth is centered on a few urban conurbations, but sophisticated communications and networking enable the entire region to benefit from the growth. Although the knowledge economy drives development, the beneficial effects are seen in migration trends, local demand and niche production. The portrait depicts a highly contextualized form of competitiveness, with a greater emphasis on embedded economic activity alongside the features of competitiveness. Economic activity is centered on a wide range of knowledge-based activities but spreads to a diversity of other sectors. Some elements of the competitiveness discourse still exist in this scenario, but there are also signs of regional resilience.

Scenario Three is named *The Dormitory Region* and explores a future where the area is primed to take advantage of opportunities in tourism-related services, and also to become a permanent home for commuters and retired people, but is also able to move steadily into a variety of other sectors through small enterprises and indigenous investment. The scenario was originally named *The Tourist Trap*, but this was changed due to its negative connotations, and this scenario does offer many positive economic and social outcomes. The dependence on tourism in this scenario is not seen as a negative, as it has allowed economic activity to flourish beyond the sector, and provides high-quality employment and quality of life. The picture that emerges from the scenario is somewhere between contextualized competitiveness and a resilient region. The focus is a handful of key sectors, but we see that activity spreads and develops under local ownership to encompass many of the activities discussed in other scenarios but at a scale that lies within the region's environmental capacities. The four *Learning From the Future* scenarios are detailed on the following pages;

The Perfect Storm

There are further severe cuts in public expenditure for 2014-2019 and beyond, which leads to limited investment in education and therefore stalling in the improvement of standards, attainment and appropriate learning experiences. This compounds the withdrawal of the successor to EU Convergence funding from West Wales and the Valleys due to the GDP effects of A8 countries. The aftermath of financial turbulence in 2010 means that the EU is in no position to extend further regional assistance. At the same time, CAP reform leads to a major overhaul of, and cuts in, agricultural subsidy, which are damaging to small agricultural holdings. There are no new capital investment projects, and many existing projects are cancelled. Tight public expenditure does not allow for those projects that are executed to have a real impact on local economic development through employment and spin-out projects. Local service provision, especially provision of discretionary services, is also affected by the cuts, and public sector employment falls dramatically.

The private sector is unable to compensate, due to consequent lack of public support for business and the weak recovery of the global economy following the 2008/09 recession, and the lack of access finance for new and expanding business. Market forces lead to a complete departure of large-scale manufacturing from the region and further job losses, whilst micro-manufacturing stagnates due to the shortage of growth capital and relatively high labour costs. The lack of new jobs and the loss of former employers leads to high unemployment, and the out-migration of younger people. This combination of local service cuts, out-migration and high unemployment leads to shattered communities with little discretionary support. The weakness of community cohesion impacts on the private sector by discouraging much entrepreneurialism and social enterprise, although the potential for small-scale entrepreneurialism driven by need is great.

The weakness of sterling affects the value of regional exports, whilst there is a concomitant increase in the value of regional imports due to the ubiquity of large

retailers and online shopping. Lack of public investment means that the high-speed digital network does not cover the region, precluding forms of digital industry. As a consequence of this and the large unskilled workforce, the knowledge economy and other high value activities never become embedded in the region, although software development and ocean sciences do survive in Bangor. Environmental services are also active in the area. An element of local conservatism and lack of entrepreneurial zeal contributes to this, and a ponderous approach to new development in general. The energy economy remains limited as there is not enough private or public investment in renewable and low-carbon generation. Much higher fuel prices lead to a concentration of population, as people migrate to the coastal towns of the region.

Two sectors become key in the region, in the absence of other opportunities, tourism and care. Rising fuel prices and the weakness of currency does mean that holidaying in Wales becomes the norm, whilst greener holidays are also in demand. The relative cheapness of marketing with a focus on heritage, culture, and natural beauty, is attractive to regional policymakers working with limited resources. Improved and innovative marketing experiences mixed success, as the infrastructure investment needed and the community cohesion required to build a visually attractive region are lacking.

The region's demographic imbalance creates demand for low-paid care workers and non-clinical healthcare workers.

Despite the growth of tourism, care, and associated sectors, unemployment is high due to the general weakness of the private sector. Meanwhile, regional GDP and median wages are very low due to dependence on these low-value sectors. Furthermore, the concentration of population accentuates existing pockets of poverty. This weakens the region's local multiplier, means that people start to leave the region in search of work other than tourism or care. There is some technical and scientific employment, but the under-investment in education means that much of this labour is not local. Lower wages lead to lower demand, lower productivity and further emigration, significantly

depopulating the region. A low value for the multiplier then deters inward investment to counter the out-migration of labour and capital. The remaining population is centered on the coastal towns, where travel costs are lower, and where some services, including limited retail, are still available.

The Investment Spin-Out

There is a great deal of effort to obtain investment from both public and private sources after a strong global economic recovery, although public sector spending remains below that in the 2000-2006 boom. The public sector thus plays a role in facilitating growth rather than being part of the growth. Capital investment projects are a focus area, and local firms are provided with the appropriate skills to tender for work and supported to tender collaboratively. The biggest projects are in the energy sector, with further nuclear and renewable developments. At the same time, local conservatism is overcome by central government forcing measures in order to secure energy supplies and to meet demand for green energy. There is simultaneous investment, much of it from private sources, in the construction sector, enabling the infrastructure required to support these developments to be put into place. This includes transport infrastructure, digital infrastructure, urban planning, commercial buildings and housing, and energy infrastructure. A part of this infrastructure is owned co-operatively, with investment from the region's population.

There is recognition that human and physical capital resources play important roles in future development, and a great effort to develop this into effective policy. Much of the effort involves education, especially in providing for the broad uptake of vocational education and up-skilling required for this scenario, with simultaneous investment in scientific and technological education, and in research and development. The development of digital networks and transport infrastructure, as well as buildings and housing, means that the spin-offs from this R&D form a meaningful knowledge economy. The concentration of the labour force, achieved by planning urban areas, together with geographical considerations, attracts further inward investment in energy generation.

FDI is limited, restricted to a few large energy-related projects and niche goods.

The booming alternative energy sector includes very significant exploitation of the region's renewable resources, together with nuclear generation at multiple sites, meaning

that there is opportunity for a large number of skilled workers. At the same time, the construction sector creates employment for unskilled workers involved in manual labour.

The strong alternative energy sector and supportive fiscal measures encourages other green development including carbon management. More traditional agriculture has declining employment levels, but the sector as a whole is still significant to the region, despite the fact that younger people are likely to work in other sectors within the region.

This gives rise to many farms being run by part-time owners, less unprofitable dairy, beef cattle and sheep farming, and diversification to profitable activities such as growing bioengineered crops and management of upland soil for its carbon sequestering potential. The region's economic expansion stimulates local demand for goods and services, which in turn drives development of local producers, supply chains and retailers. The inflow of capital to the region enables a wave of entrepreneurialism to create these services, often through co-operatives and social enterprises, in turn strengthening the region's local multiplier. The local demand for services reverses the trend of out-migration amongst young people, with the in-migration of unskilled labour also a feature. These moderate levels of in-migration create difficulty in maintaining sustainable Welsh-speaking communities. Living patterns in the region shift to greater urbanity, with sprawling towns, although a small but economically viable agricultural sector exists in rural areas.

The region's population growth is steady but controlled.

The Knowledge Hub

Communities and businesses work together to target the expansion of existing clusters, supported by governmental initiatives. The global economy has recovered from the lows of 2009, but recovery has been faltering and therefore requires greater public sector involvement in regional development. There is substantial investment in education, and especially higher education, and in spinning out the benefits of research. Bangor's status as a city of learning is developed to this end. Ensuring that local young people take advantage of the education on offer is prioritized, with more opportunities to learn and continue in education. There is also an increased role for higher education in linking with business. This leads to increased opportunities for employment in both skills provision and in an increased business workforce, thereby developing innovation hubs with higher education.

These innovation hubs are linked by an advanced digital network, which facilitates the transfer of knowledge. There are also improved transport links, and especially transport to major airports. The knowledge economy becomes firmly embedded in the region, from chemistry, the small-scale manufacture of advanced technology to advanced software development. The university is home to both academic research and technological development, often with Bangor in partnership with Aberystwyth or Glyndŵr, leading to other cutting-edge industries and specialist production. Solar energy is one field in which research and academic work bring extensive dividends to the region, along with other fields in the green sector and renewable energy. This extends to research into hydrogen technologies. A new generation of nuclear power in the region is accompanied by public investment in research into cleaner and more efficient nuclear reactors and fissile materials. There is also development in marine sciences and in medical science. The expansion supports cultural innovation in both languages, bringing economic growth, including further Welsh language software development.

This growth drives the development of service industries, including knowledge-based

services. This professional class are serviced by a large bilingual choice of personal services, together with care services for the ageing population and retail services. A market for local niche goods is developed. The rural heartland of the region is inhabited by the professional classes and retirees, especially given the improved digital connectivity. The economic hubs allow for heritage conservation in the rural heartland whilst the economies of scope applying to tourism are improved. Along with niche marketing, outdoor activities, and infrastructure development, the tourist industry develops an employment market to complement that of the knowledge economy. Alternative farming is the only type of agricultural endeavour that succeeds, with limited niche marketing of local produce proving popular with the professional classes. A small number of skilled workers find employment in producing niche goods in the same way. The region's population and economic growth is overwhelmingly centered on the coastal towns, with this population shift, and the consequent changes in public service provision, being encouraged and supported by central government in order to overcome local conservatism. The towns are surrounded by relatively prosperous suburban 'satellite' villages. The overall population of the region shifts substantially to the urban and suburban areas, and whilst it remains broadly steady there is an influx of young professionals seeking jobs in the knowledge industries, and an out-migration of unskilled workers. The Welsh language then becomes the language of the professional classes, with migrants learning Welsh in order to socialize with their indigenous Welsh-speaking peers. At the same time, the out-migration of younger unskilled workers leads to a decline in Welsh language use in this section of the population. The population shifts thus lead to a pronounced linguistic divide between high- and low-earners.

The Dormitory Region

Policymakers have recognized that tourism and care offer the best opportunities for employment in the region, and focus on maximizing the output of these sectors. Rising fuel prices and the weakness of currency does mean that holidaying in Wales becomes the norm, whilst greener holidays and ‘staycations’ are also in demand. Resources are devoted to the development of services sector skills through vocational education, together with quality enhanced by digital networking and capital investment in tourist attractions and accommodation, making it a powerful sector and an employer of quality.

The importance of tourism allows for further conservation of rural areas. The relative cheapness of marketing with a focus on heritage, culture, and natural beauty, is attractive in terms of an investment prospect. The region’s image is improved by strong community cohesion, and bolstered by powerful and innovative marketing which involves community effort and youth involvement. Entrepreneurs break into the gastronomic experience market, niche goods and services, and enhance outdoor activities.

There is a concerted effort to ‘beautify’ the region, by ensuring that all buildings and built areas look attractive and tidy, and also ensuring that transport links are improved. The enhancement and preservation of the region’s natural beauty and ecology are also seen as important, meaning that there is opportunity for environmental services and marine and ocean sciences to flourish. Domestic standard, and some faster in population centres, digital connectivity is ensured throughout the region, and east-west transport infrastructure is upgraded. It becomes worthwhile to improve the built environment by renewing old buildings. Enhancing the region also takes the form of ensuring the standard of current tourist attractions, as well as improving the standard and variety of outdoor activities on offer. Improving the quality of destinations and attractions extends to hospitality and catering.

The Welsh language and culture forms a key part of the tourism marketing strategy.

The cultural aspect of tourism focuses on this unique identity, and protecting and

enhancing the status of the Welsh language is a priority for this reason. The tourism sector creates work, and some well-paid jobs, in the area. WAG spending has led to the region becoming one of the top five tourist destinations in the UK. This is aimed at attracting tourism, but a secondary effect is to attract people to a dormitory region. Here they can live with natural beauty, and convenience and digital connectivity, whilst travelling to work in Deeside, Liverpool, and even Manchester. The digital connectivity also allows for the partial development of a secondary knowledge economy, with firms in economic hubs linking with towns in the region and enabling some teleworking. There is also the possibility of a small indigenous knowledge economy.

The region's dormitory status means that it also becomes a retirement region for these commuting professional and their families. Services are developed, especially by entrepreneurial locals, but also by large retailers, in order to meet the demand of tourists and the dormitory villages. Niche farming is popular with the commuting residents and tourists alike, and this helps to sustain the rural heartland of the region.

The ongoing efforts to preserve the region's natural beauty and heritage are also an important source of employment in rural villages. The high population of elderly people means that the care sector is forced to grow very quickly, and to improve quality in the face of increasing competition. There is a far-reaching network of firms providing community care, but also a number of retirement and care homes. The care sector creates a great many, mostly low-paid, jobs in the region, due to the number of elderly residents and retirees who take up residence in the region.

The region's population is split between the coastal towns and the rural heartland, as is the region's economic growth. Quality-of-life for residents is good, as the majority have stable and well-paid employment. The overall population of the region grows although the demographic of the region ages with out-migration of many younger people who do not wish to work in a service industry, and the in-migration of older professionals. The Welsh language remains in majority use as most of the indigenous population remain in

the region, working in the services sector and the indigenous local economy, and there is an upsurge in Welsh national identity due to the level of in-migration.

4.5 Resilient Policy ‘Prescriptions’ for the LFF Scenarios

The final step of scenario analysis is evaluation of appropriate policy options and alternative strategies (Porter et al., 2011: 178-182) following Fuller-Love et al. (2006,a,b). The four scenarios constructed in this chapter are narrative aids to policy-making rather than forecasts; it is certain that none of the four scenarios identified will materialize in their entirety. However, as an expression of the joint concerns and aspirations of the affirmation workshop participants, and their interpretation of the empirical evidence with which they have been presented, they contain much of relevance to developing strategic perspectives of the future. Expectation is often the wild card that turns trend analysis on its head and makes things happen that had seemed impossible, meaning that expectations must be accounted for in policy-making. The output of scenario analysis enables the designing of policies that are resilient to change, in the sense that the overall policy framework has been created to cope with a range of events and scenarios, and can move seamlessly from one possible future to another and thus accommodate a future that is inherently unknowable. This does not mean that policy aims towards a default, self-reliant outcome for all possible policy contexts. The various contexts are the four scenario outcomes, and the resilient policy is that which can lead to any combination of these outcomes without favour our prejudice.

The concept of a resilient policy package is linked to that of regional resilience (Bristow, 2011).. Regions are resilient if economic, social, cultural and environmental factors enable that region to be economically successful under the right conditions, and to weather negative global economic conditions. Policy resilience places regional resilience at the heart of economic development, by ensuring that there is a policy framework in place that will allow a region to adapt to any economic condition, fostering regional

resilience. The fact that there is resilience in this policy framework means that policy-makers are not required to fundamentally revise their plans in the face of the unexpected; from economic crisis to natural disaster, whether local or international in scale, giving regional development a stable base. This stability is important as the history of regional policy is unsettled, with changes as governments come and go and as the economic context changes. In the face of uncertainty following the financial crisis and recession of 2007-2009, it was important to help policymakers in outlining the key policy principles of North West Wales. Participants in the scenario analysis outlined in the previous chapter were asked to draft ‘policy prescriptions’ after the scenarios were outlined. These prescriptions were then analysed and presented with a focus on regional resilience in the subsequent interpretation together with an awareness of the possible approaches to regional policy and its history.

The policy prescriptions that participants were asked to develop were intended to lead to some common strategic vision that would apply to promoting and reinforcing the positive outcomes of any scenario. For example, discussion of The Knowledge Hub saw participants seeking to maximize the knowledge-based economy envisaged, and trying to broaden this by widening their focus to include knowledge-based services rather than manufacture only, Welsh language application, and using higher connectivity to stimulate the region’s traditional sectors from agriculture to quarrying. In The Perfect Storm positives were more difficult to identify and the policies were concerning the encouragement of indigenous growth in extremis.

However, it became clear that not only were participants independently concerned with this strategic vision, but were attempting, to some extent, to homogenize the scenario outcomes through policy development, using these policy tools to achieve a measure of convergence and a balanced, resilient economy. In particular, concerns became apparent about the geographically uneven nature of growth and development in all scenarios. The growth of one sector, or grouping of sectors, or the development of certain geographic

areas and not others, could result in significant improvements in the quality of life for some, perhaps even the majority of the region's population, whereas alongside there could be considerable reinforcement and even worsening of social disadvantage. The south of the region, Meirionnydd and parts of Conwy in particular, were felt to be at risk as development was least likely in this area. As such, participants immediately recognized the interdependence of economic development and socio-cultural agendas. This meant that the policy discussion often covered issues from housing policy and community development to land use and urban planning, as natural extensions of economic policy. The growth of an unbalanced economy was also a concern, with such growth having occurred previously and, in Anglesey especially, with disastrous effects as previously flourishing sectors collapse. Ensuring a more balanced economy with multiple strong sectors is important.

In *The Perfect Storm* scenario, with its public sector cuts and sluggish private sector, was felt by the final plenary discussion to be 'frighteningly' realistic, as a continuation of present trends and arising from planned policies. The policy prescription constructed for this scenario was concerned with mitigation. The prospect of deep, and likely long-term, cuts in public expenditure motivated a number of policies designed to safeguard a regional quality of life that has been, up to now, highly dependent on the public sector.

For example, ensuring that cuts do not fall in areas where they might unduly harm economic growth, and targeting public expenditure at growth sectors. There were also suggested policies on joint-working and rationalization in the public services, as well as voluntary and private sector involvement. At the same time, it was noted that tourism and care were the key sectors, and that, given the limited options, community cohesion would also be key. Policies encouraging indigenous growth and the development of social capital are the main focus points. The spatial reallocation of labour tends to be a costly policy to pursue and faces a number of impediments. Mobility policies involving the flow of information about employment and housing could be used cost-effectively given the

tight budgets involved in this scenario, possibly including voluntary input on social networks. Efficiency policies on local collective bargaining instituting a North West Wales pay structure might be useful and is feasible in public sector wages, where a large proportion of the region's population work. The fiscal environment precludes the payment of subsidies to support migration and the reallocation of capital, as well as any tax changes. Reallocation of capital through administrative controls are most useful when applied nationally, and are unlikely in the contemporary policy climate. The development of social capital through community economic development is an alternative. Encouraging community participation through payment in kind was felt to be an option, through a local exchange trading system or community currency for trading within the region, or the issuing of educational credits for volunteer work.

Recognizing the Welsh language in community housing provision, encouraging community micro-generation and recycling of resources, and local procurement were all suggested to promote community cohesion. The link between cohesion and the key sectors was also apparent; better training for community care volunteers, and raising wages and status for care workers. Tourism could be maximized by community efforts to improve visual impact, from street tidying, using the Welsh language to create a cultural tourism, to coordinated house painting. Improving the efficiency of capital markets would complement social capital development, offering easy credit and venture capital to new and expanding SMEs and providing micro-credit schemes to encourage entrepreneurialism. LETS is a form of local currency designed to overcome local liquidity constraints, especially in low-income communities. Such a scheme in North West Wales would ensure that local needs are met by employing local people, paid in the local currency. LETS currency would be used as a medium of exchange for goods and services within the region, as well as a unit of account and store of value. LETS would be useful in stimulating the social economy, as well as in retaining local income.

The widespread establishment of credit unions will also aid the local retention of

income, and may be involved in micro-credit schemes. Social risk capital could also be made available for the start-up and expansion of organizations in the social economy, perhaps through credit unions using LETS currency.

The *Investment Spin-Out* scenario was accompanied by the briefest of policy prescriptions, for the reason that this scenario is almost entirely dependent on inward investment of some form. Most of the policies required to implement, complement or mitigate this scenario are far beyond the control of policy-making in Wales, and so the prescription was constructed with reference to the powers that Wales can, or is likely to be able to by 2025, exercise itself. In order to spin-out the inward investment, it was felt a policy of ‘graduates not grants’ should be pursued, by producing a high volume of graduates, especially in engineering and the sciences. It was also felt that there should be encouragement to invest in areas other than energy production, such as bioengineered agriculture and carbon management, which have the potential to be profitable if encouraged to develop. Life-long skill development was also considered a necessary service provision in this context, together with research and development capability. The recognition of ‘graduates’ from both higher and further education was desired, and for funding to be allocated accordingly. Meanwhile, educational institutions should be aiming at a broad skill-base, to ensure that a few sectors do not rise to an unhealthy dominance in the regional economy. Finally, development of fast transport links to major cities was noted as important in attracting further investment. However, it was agreed that, application of policy measures notwithstanding, development would still be very uneven, geographically, and in terms of growth sectors. Re-allocation of labour could take the form of both transfer policy and in situ policies, with the migration of labour encourages with subsidies and moving grants, together with re-training for construction workers and technicians. The reallocation of capital would also be encouraged by migrating key workers such as scientists and engineers, at least initially. Social capital development will be less important, and the main tools for reallocation of

capital will be grants, subsidies, and tax varying powers which may be devolved by 2025.

Subsidies for R&D and grants for capital and commercial buildings will be especially important, and these should be accompanied by freight subsidies. The creation of a low-corporation tax enterprise zone in the Môn-Menai and Conwy areas may be useful. *The Knowledge Hub* scenario, with its dominant knowledge economy and active services sector, was felt to require policies to steer the economy towards more evenly distributed growth, rather than outright mitigation. The context of this scenario presents excellent opportunities, but there is a great deal of work in terms of public sector involvement in the direction of private enterprise. As such, this scenario has the most extensive policy prescription. Many of the ideas involved education, from modernization of the curriculum, to a greater degree of marketization in further and higher education, and related research and innovation, together with set funding targets for further and higher education. Incentives for graduates to research in potential breakthrough areas, such as the hydrogen economy, nuclear physics, and in more speculative areas of possible long-term gain. In infrastructure, a region-wide world-class fibre-optic network was felt crucial to create a regional knowledge economy, rather than one based in a few coastal towns. Satellite villages, modelled on American suburbs, would be promoted out of existing villages, as pleasant places to live for the professional classes. There would also be a rolling improvement to transport links between urban centres and satellite villages, designed to ensure that out-migration was reversed in key sections of the population. Incentives for these sections of the population to stay in the region, and for business to link up with FE institutions, would operate for similar reasons. Ensuring a strong base for the Welsh language would also be important in this context, so that making things like business support grants dependent on Welsh-language ability could be crucial. The re-allocation of labour is not a priority in this case, with subsidies for the migration of graduate employees and the provision of information being the limit to such policies. The up-skilling of unqualified local workers to the level where they can productively

contribute to the knowledge economy would be expensive, and the re-allocation of labour in general is undesired. However, attracting students to Bangor University with subsidies and offering tax breaks to graduates who stay in the region could be an option. The movement of capital is of greater importance in this scenario, with the subsidized migration of key workers being important, and especially the in-migration of quality academic staff for Bangor University and for private enterprises. Capital grants, tax allowances on capital investment, and development subsidies will also be useful. Together with the aforementioned public infrastructure investment, this will serve to attract knowledge capital. If possible, North West Wales should become recognized as a knowledge enterprise zone, with lower corporation tax for companies innovating in the knowledge economy, stimulating investment in the region whilst expediting constant innovation. The goal would be a learning region, with knowledge spin-offs from academic and industrial research. A complement to this strategy should be the heavy subsidizing of R&D in relevant fields of the economy. Venture capital should be made available for the outcome from this research and development, together with making loans available to expanding knowledge enterprise. The efficiency of the knowledge economy must also be ensured, especially for new and small enterprises, with marketing and management advice and support being subsidized.

The Dormitory Region was acknowledged as feasible and, whilst not wholly desirable to many participants, quite simple to develop evenly with carefully applied policies. The policy prescription, the most detailed of the four scenarios, reflected this. Policies on tourism ranged from marketing through viral videos and social networks involving the application of local knowledge and enthusiasm, and making better use of local cultural and historical features, to extending the tourist season by creating indoor attractions. Improving east-west transport links with direct train links to the major cities of North West England and the Midlands, with possible high-speed services, was felt crucial to the creation of a dormitory. It was also thought that towns not on the railway must be

connected by express bus services to train stations, and that there must also be improved road links between important towns such as Amlwch, on Anglesey, Caernarfon, and the A55. Financial, retail and other professional services should also be developed in anticipation of the dormitory region. This involves the basic development tool of skills provision. There is already provision for the transfer of basic retail skills and this must be continued. However, the provision of financial and professional services skills is lacking and must be improved to ensure that the dormitory status benefits the region by ensuring that the commuting dwellers are able to access these services in the region. This initiative may involve partnerships between universities and colleges, and firms that offer these services. Ensuring investment in agricultural support and development was also felt to be a key application of policy. This means that, rather than focus on subsidies and diversification, farmers would be supported in branding and marketing local and specialized produce. It would also mean the development of a more structured and managed industry, and the end of the family owned farm. There would be attention given to the development of new products, and the adoption of new methods and technologies. The reallocation of labour is not that important for this scenario, beyond non-intensive in situ schemes re-training and up-skilling workers with services industry skills, as it is assumed that the region's population will form the mostly unspecialized workforce. Local collective bargaining will be important in this scenario, especially in the tourism and retail services industries. The re-allocation of capital is given more attention, with the development of buildings and transport infrastructure given priority, meaning that land development and building improvement subsidies must be offered, and that public spending on transport development must increase. Making venture capital available to entrepreneurs, and ensuring that credit is available for business growth, is important. The establishment of a LETS currency would ensure local income retention, stimulate entrepreneurialism and remove local liquidity constraints. Many elements of the policy prescriptions were common to all four

scenarios. They can be considered the foundations of a resilient policy package that will further the development of regional resilience. These may form the focus of a regional development plan, including;

- **Community development** All scenarios will require the development of self-sustaining, socially inclusive, bilingual communities, which will support the voluntary effort and community involvement required to support development in the region. Support for the Welsh language and the strengthening of cultural identity is key to this. Issues such as the maintenance of environmental quality, community-based micro-generation of renewable energy, the integration of housing and transport planning, the improved acquisition and retention of skills and the development of successful, collaborative networks of SMEs, and social enterprise in the restoration of community buildings for business purposes, were raised. Establishing a LETS currency or similar for North West Wales would remove local liquidity constraints, whilst promoting local employment, goods and services, thus promoting social capital.
- **Facilitating demographic balance** - Young people will want to remain in the region because of appropriate housing provision and attractive community infrastructure, because of Welsh language provision, because of the availability of a wide range of career paths, the availability of niche products and local produce of good quality, and the provision of excellent education opportunities in further and higher education, but also in the provision of lifelong education.
- **‘Making the most of what we have’** - Success in the development of tourism and leisure will be achieved because it is combined with the development of ICT infrastructure, improved inter-regional transport links, skills to market and service the tourism sector, identification with socio-cultural and historical life, and enhancement of the berthing at the port of Holyhead as part of the creation of a stronger regional cultural economy. North West Wales must also take advantage of its cul-

tural and linguistic heritage to develop its arts and media for consumption in Wales and beyond through modest, small-scale investment. Similarly, niche production in the area must be supported. Support for basic education, from public, private, and voluntary bodies, will be required in order for the region to develop its human capital resources, focusing on sciences and engineering, but also on the Welsh language and culture. The geographic features of the region, which are the basis for its appeal to tourists, also create ideal conditions for generation of renewable energy, and this must be exploited.

- Focusing on research and its links to economic activity This will require an ability for educational institutions to match public sector funding for their own research, and some teaching, through a combination of fees, private sector funding, and strong marketing and product development of academic research and innovation, together with non-cash incentives for graduates and education spin-outs to ‘stay local’. Educational institutions in the region should work closely together, and Bangor University should advance collaborative effort with universities in neighbouring regions. Education should also be linked to business needs, as business must be made more responsive to academic research and innovation. In particular, training in business skills, management and marketing for local business should be a key responsibility for this sector.
- Institutions supporting one another There should be a blurring of distinction between organizations. This is true for joint-working, rationalization and collaboration in public service delivery, but it is also true for public, private and voluntary sector interaction and collaboration, from easy migration to active sharing of staff, infrastructure and buildings between sectors. Community involvement in public service delivery may be encouraged by a time-banking scheme, though this involvement must be used to enhance delivery and not to compensate for public funding cuts.

Funding for new initiatives may come from a variety of sources, aimed at regional benefit. All sectors must become responsible for promoting entrepreneurship in the region, through funding, support and training. Institutions must also develop local supply-chains through local procurement.

None of the four scenarios constructed envisage a free spending period of public sector expansion, as was the case in the early years of this century, and so, when constructing a strategic vision, ‘making most of what we have’ emerged as a central theme, with the National Assembly and WAG supporting, rather than driving, regional development.

This would suggest the development of an agreement across all economic sectors on supporting a framework for regional development. This would involve not only public sector bodies, but all private and voluntary sector entities, no matter how big or small.

It would also involve a civic commitment to this framework.

4.6 Dissemination and Feedback

Learning From the Future was published in early July 2010, and was circulated electronically amongst the core team before being launched for the wider public later that month, with hard copies sent out to all organizations and individuals involved, in any capacity, in the development of economic policy. Reaction was uniformly positive amongst the core team, with these participants feeling that they had contributed to the outcome, whilst general response was enthusiastic. A few participants who had been doubtful of the value of such a qualitative exercise were convinced after reading the final report that the research had delivered a plausible set of possible futures, and were content with the level of detail that was embedded into the narrative. Some readers responded that the report was very helpful in helping them to visualize futures to which their policies might lead, and many even commented that the absence of predictions of the levels of employment and such minutiae were helpful, as this encouraged them to

consider the future in a broader way. This is, of course, the entire object of scenario analysis. The report included the development of a responsive policy framework that can be applied to either one of the scenarios and is thus robust in the face of change.

This scenario analysis was followed-up by interviews with some key stakeholders in March 2011, discussed in the final section of the previous chapter in more general terms. It also became apparent that the scenario analysis was well-regarded and deemed useful

by participants, and that the scenarios and policy suggestions remained relevant to policymakers, who understood the structure of the scenarios presented to be resilient to change. This follow-up research was important as the initial research period fell in the first and second quarters of 2009, the fourth and fifth quarters of the longest recession in post-war British history, meaning that all empirical data was recessionary data.

Although care was taken to compensate for the fact, by looking at pre-recession data with equal weighting, the economic downturn did have some impact on the scenarios produced. As such, it was important to gather data in the post-recession period, at a time when the economy was slowly recovering, in order to verify that the scenarios remain plausible, or whether the process must be re-commenced. If the scenarios do indeed remained plausible, which they did.

4.7 Conclusion

Learning From the Future offers four alternative possible futures for North West Wales, together with policy structures designed for those scenarios. Overall, the process indicated that the way forward for development in the region is to focus on the endogenous and the indigenous. It is likely that none of these scenarios will emerge, but each offers realistic, feasible, and even probable elements. Scenario analysis, in a regional development context, offers participants the opportunity of considering paths that may be taken towards future economic development. It can also offer policy-makers

the chance to consider the future beyond their remit within the framework their institution, and such a holistic approach can be refreshing, helping them gain new insight into regional development. By learning how to prepare for all these scenarios, not just the vision they want, or the polar opposite, policy-makers can truly be prepared for any future that comes to pass.

The scenario analysis was a resounding success, both in the sense that interesting information was gathered, and in that participants were able to take advantage of the chance to think in ways that they had not done before. This process used a series of online questionnaires to great success in order to elicit information and included a diverse set of participants, as well as using a scenario-building workshop. Apart from enriching the consultation process, the use of scenario workshops can provide significant benefits in terms of their implications for the institutional learning process and their contribution to regional development planning. Learning From the Future has constructed a set of feasible and realistic scenarios that will be important steps in a regional development plan built around the principle of regional resilience (Bristow, 2010) rather than focusing on competitiveness (Bristow, 2005) to the exclusion of all else that can play a part in the development of North West Wales.

The above resilient policy prescription closes Part One of the thesis, an investigation of the ‘reality’ of the North West Wales economy. The bulk of Part Two is unrelated to this work, focusing rather on modeling activity, but a key aim is to produce policy options based on quantitative research. Chapter Seven will then focus on triangulation between these policy options, assessing the differences between quantitatively- and qualitatively-derived policies.

Part II

Part Two

CHAPTER FIVE

Geographical Economics: A Literature Review

5.1 Introduction

Geographical economics is a recent development in regional economics, and one that places theoretical discussion of economics in spatial terms on a firmer quantitative footing than ever before showing how trade and the location of firms can be influenced by pecuniary externalities. Economic geography can be defined as the study of where economic activities take place and why (Coe, Kelly and Yeung. 2007); geographical economics has been successful in formalizing this subject. Part Two of this thesis is in no way linked to the qualitative research of Part One. The aim of Part Two is to produce policy objectives for North West Wales that are informed by quantitative theoretical discussion, ready for triangulation with the qualitative policy prescriptions of Part One in Chapter Seven.

A crucial element in modelling geographical economic activities is that there must be increasing returns to scale of spatial concentration, so that agglomeration of economic activity is favoured. Apart from non-uniform endowments of natural resources nothing else would cause the unevenness in the spatial distribution of people and economic activities observed in the real world. The earliest model used in geographical economics is the core-periphery model, explaining how the interactions among increasing returns at the level of the firm, transport costs and factor mobility can cause spatial economic structure to emerge and change. Developed in the early 1990s (Krugman, 1991a) and others, this early geographical economics model builds on previous conceptions of spatial economics to give a theory which gives results closer to real-world observation. This chapter reviews the theoretical precursors to NEG, its genesis and developments. Although the detailed policy implications of the modeling is left to Chapter Eight, the general implications of each model discussed in this chapter is important to the policy development for North West Wales.

5.2 The Dixit-Stiglitz Spatial Economy

Dixit and Stiglitz (1977) formulated a model of Chamberlinian monopolistic competition which has proved useful for modelers needing to look beyond perfect competition and constant returns to scale in production. Take a monopolistically competitive sector with each firm producing a single differentiated good under increasing returns to scale. It is assumed that there are no economies of scope, so there is no reason for a firm to produce multiple varieties. Since consumers have an unbounded taste for variety, as will be demonstrated, every firm will produce a distinct variety rather than producing another firm's type and losing profits to competition. The result is one variety per firm. Thus, the distinction between the number of firms and the number of varieties collapses in our discussion of these topics.

The Dixit-Stiglitz spatial economy (Baldwin et al., 2003) arises from some fairly simple mathematics. The representative consumer of the monopolistically competitive sector has constant elasticity of substitution (CES) utility function

$$U = \left(\int_0^n q(i)^\rho di \right)^{\frac{1}{\rho}}, 0 < \rho < 1, \quad (5.1)$$

where $q(i)$ denotes the consumption of variety i , n is the mass of variety available, and ρ represents the intensity of preference, or taste, for variety, so that ρ near to 1 means that goods are perfect substitutes. (5.1) is also the *quantity index* - a composite index of the representative consumer's consumption in this sector. Remembering that U^ρ is a strictly increasing transformation of U so yields the same optimization solutions, the consumer's constrained maximisation problem may be solved by taking the Lagrangian

$$L = U^\rho - \lambda \left(\int_0^n p(i)q(i)di - 1 \right) \quad (5.2)$$

and taking first derivatives of (5.2), we end up with

$$q(i) = \left(\frac{\lambda p(i)}{\rho}\right)^{\frac{1}{1-\rho}}. \quad (5.3)$$

From (5.3) we can derive an expression relating relative demand for two varieties i, j to their price ratio:

$$\frac{q(i)}{q(j)} = \left(\frac{p(i)}{p(j)}\right)^\sigma, \quad (5.4)$$

where $\sigma = \frac{1}{1-\rho}$ and this is the constant elasticity of substitution (CES). Rearranging (5.4) and integrating with respect to i gives

$$E = q(j)p(j)^\sigma \int_0^n p(i)^{1-\sigma} di \quad (5.5)$$

where $E = \int_0^n p(i)q(i)di$ is the representative consumer's income. Dividing (5.5) by

$$p(j)^\sigma \int_0^n p(i)^{1-\sigma} di, \quad (5.6)$$

we get

$$q(j) = \frac{Ep(j)^{-\sigma}}{\int_0^n p(i)^{1-\sigma} di}, \quad (5.7)$$

which is the Marshallian demand function, or uncompensated demand function, for j . If we define $G = \left(\int_0^n p(i)^{1-\sigma} di\right)^{\frac{1}{1-\sigma}}$ to be the composite index of prices for the differentiated goods, then Marshallian demand is given by

$$q(i) = p(i)^{-\sigma} G^{\sigma-1} E = \left(\frac{p(i)}{G}\right)^{-\sigma} \frac{E}{G}. \quad (5.8)$$

We call G the *true price index* such that the expenditure function of the consumer is

$e(G, u) = Gu$. This can be seen by plugging our final expression for the Marshallian demand into the CES utility function, giving

$$U = \frac{E}{G}. \quad (5.9)$$

. This may seem a straightforward use of demand theory, but the original result is that the range of manufacturers becomes an endogenous variable.

To see that consumers prefer variety;

Proposition 1. *Consumers prefer to diversify their consumption*

Proof:

Suppose that all varieties have the same price p and consumed in the same quantity q : so

$$E = \int_0^n pq di. \quad (5.10)$$

Then $E = npq$ so

$$U = \left[n \left(\frac{E}{np} \right)^\rho \right]^{\frac{1}{\rho}} = n^{\frac{1-\rho}{\rho}} \frac{E}{p} = n^{\frac{1}{1-\sigma}} \frac{E}{p}, \quad (5.11)$$

and utility is increasing in n , with a greater increase for lower σ . •

The Dixit-Stiglitz demand system is popular because it provides a tractable means of introducing monopolistic competition and increasing returns. The simplest means of introducing increasing returns is to assume that the production of a good involves a fixed cost in addition to a constant marginal cost, so that the average cost is decreasing in quantity. Rather than writing the production function, we write the labour demand function:

$$l(q) = F + cq, \quad (5.12)$$

where l is the labour demanded, and F and c are the fixed cost and constant marginal cost of production respectively. Then firm i 's profits are given by

$$\pi = p(i)q(i) - w(F + cq(i)). \quad (5.13)$$

Since price is set to maximise profits, we take the first derivative of (5.13) with respect to p and set it to 0, giving

$$p = \frac{wc}{\rho}. \quad (5.14)$$

The fixed mark-up of price over marginal cost implies a fixed operating profit margin.

(5.10) implies that

$$(p - wc)x = \frac{px}{\sigma} \quad (5.15)$$

meaning that operating profit is equal to consumption at consumer prices times a fixed profit margin. The implication of this constant mark-up together with free entry and a homothetic cost function is an invariant equilibrium firm scale. From the consumer's perspective the number of available varieties n is exogenous, but we might expect more firms to enter if incumbents are earning positive profits. The free entry condition is zero profits, so that equilibrium output is:

$$q^* = \frac{F(\sigma - 1)}{c}. \quad (5.16)$$

The associated labour input is $l^* = F\sigma$. Firms enter the market until they are of sufficient number that no firm earns a profit. Note that the scale of firms under free entry is determined solely by the cost structure and the elasticity of substitution. l and q are common to all firms, so if L is the labour force at all firm, then $n = \frac{L}{l}$ is the

number of manufacturing firms (varieties). Consider the implications of growth of the labour force. It is evident that real wages are unaffected, but output must rise.

Similarly, the number of goods produced must rise, and hence so must welfare.

Let there be two sectors in the economy, with one sector being our monopolistically competitive sector. The other sector produces a homogeneous good with constant returns to scale technology facing perfect competition. For the whole economy, we say that the representative consumer has a Cobb-Douglas utility function

$$V = U^\mu W^{1-\mu}, \tag{5.17}$$

where U is the quantity index defined above, W is the quantity of the homogeneous good consumed, and μ is the expenditure share of the monopolistically competitive sector. Treatment of the sub-utility function U is as above. The upper-level step of the representative consumer's problem is to divide income between the sectors - to maximise utility such that

$$GU + p^W W = E. \tag{5.18}$$

This returns $U = \mu \frac{E}{G}$ and $W = (1 - \mu) \frac{E}{p^W}$. The latter is the Marshallian demand for the homogeneous good; for the other sector the uncompensated demand for each variety is

$$q(i) = \mu E \frac{p(i)^{-\sigma}}{G^{-(\sigma-1)}}. \tag{5.19}$$

The indirect utility function can then be written as

$$V = \mu^\mu (1 - \mu)^{1-\mu} E G^{-\mu} (p^W)^{-(1-\mu)}. \tag{5.20}$$

The term

$$G^\mu (p^W)^{1-\mu} \tag{5.21}$$

is the economy's cost-of-living index.

The particular model of geographical economics that is introduced next depends on the formulation of a spatial variant of the Dixit-Stiglitz model - one where there are multiple locations and transport costs for shipping from one location to another. Let the economy consist of R cities spread across a continuous space. Assume that each firm produces in only one location, and that all varieties produced at any particular location are symmetric. Denote the number of firms at location r as n_r , and let the mill price for one of these varieties be p_r^U . The W good and U -type good can be transported around the R cities, incurring some cost. To avoid creating a third courier sector of the economy we assume iceberg transport costs (Fujita et al., 2001a). Let a constant T represent the amount of good dispatched for each unit that is delivered. If any good, say the W -good, is transported from city r to city s , then only a fraction $\frac{1}{T_{rs}}$ arrives at the final destination. This iceberg technology implies that the price after transport is equal to the good's mill price times the ratio of good dispatched from r to quantity delivered to s :

$$p_{rs}^U = p_r^U T_{rs}^U. \tag{5.22}$$

Then the price index will vary for each location, so that iceberg transport costs and the assumption that all varieties produced at the same location are symmetric gives:

$$G_s = \left[\sum_{r=1}^R n_r (p_r^U T_{rs}^U)^{1-\sigma} \right]^{\frac{1}{(1-\sigma)}}, s = 1, \dots, R. \tag{5.23}$$

Demand at s for a variety produced in r is then

$$q_{rs} = \mu E_s (p_r T_{rs}^U)^{-\sigma} G_s^{(\sigma-1)}. \quad (5.24)$$

To supply this level of consumption, T_{rs}^U times this quantity has to be dispatched. This means that the total sales of a single location r variety is

$$q_r^U = \mu \sum_{s=1}^R E_s (p_r T_{rs}^U)^{-\sigma} G_s^{\sigma-1} T_{rs}^U. \quad (5.25)$$

In this spatial model, producers behave in the way we have already described profit maximisation. We know that the zero-profits condition is equivalent to requiring that firms produce the quantity q . (5.25) tells us that the firms at r produce q as long as

$$q = \mu \sum_{s=1}^R E_s (p_r T_{rs}^U)^{-\sigma} G_s^{-(\sigma-1)} T_{rs}^U. \quad (5.26)$$

This means that firms break even if and only if:

$$p_r^U = \left[\frac{\mu}{q} \sum_{s=1}^R E_s (T_{rs}^U)^{1-\sigma} G_s^{\sigma-1} \right]^{\frac{1}{\sigma}}. \quad (5.27)$$

We already have a pricing rule for location r , and substituting into (5.25) gives:

$$w_r^U = \frac{\sigma-1}{c\sigma} \left[\frac{\mu}{q} \sum_{s=1}^R E_s (T_{rs}^U)^{1-\sigma} G_s^{\sigma-1} \right]^{\frac{1}{\sigma}}. \quad (5.28)$$

Real income is proportional to nominal income deflated by the cost of living index for that location. Then the real wage for U -sector workers at location r is given by

$$\omega_r^U = w_r^U G_r^{-\mu} (p_r^W)^{-(1-\mu)}. \quad (5.29)$$

Assume that we are looking, once again, at a one-sector economy, but with two locations

and transport cost T between them. The equations for the price indices and wages are symmetric, and the equilibrium values satisfy:

$$1 + T^{1-\sigma} = \frac{\mu}{L} \left(\frac{G}{w}\right)^{1-\sigma} = \frac{w}{E} \left(\frac{G}{w}\right)^{1-\sigma}. \quad (5.30)$$

Differentiating price indices and wage equations gives:

$$(1 - \sigma) \frac{dG}{G} = \frac{L}{\mu} \left(\frac{G}{w}\right)^{\sigma-1} (1 - T^{1-\sigma}) \left[\frac{dL}{L} + (1 - \sigma) \frac{dw}{w}\right], \quad (5.31)$$

and

$$\sigma \frac{dw}{w} = \frac{E}{w} \left(\frac{G}{w}\right)^{\sigma-1} (1 - T^{1-\sigma}) \left[\frac{dE}{E} + (\sigma - 1) \frac{dG}{G}\right]. \quad (5.32)$$

The first equation lets us see the effect that a change in location has on the price index. Suppose that the supply of labour to the economy is perfectly elastic $dw = 0$. Then the equation implies that that a change in manufacturing employment has a negative effect on the price index - the *price index effect*. The effect is that the location with the larger workforce also has a lower price index for the varieties produced in the economy, because a smaller proportion of this location's consumption bears any transport costs. This effect complements the *home market effect*, where the location with the larger home market has the larger workforce, and therefore exports goods. This effect can be shown by defining a trade-cost index

$$H = \frac{1 - T^{1-\sigma}}{1 + T^{1-\sigma}}, \quad (5.33)$$

which has a value of 0 if trade is free, and 1 if there can be no trade. This index can then be used to eliminate G from the above equations, giving:

$$\frac{dE}{E} = \frac{dw}{w} \left[\frac{\sigma}{H} + H(1 - \sigma)\right] + H \frac{dL}{L}. \quad (5.34)$$

If we suppose again that the economy has a perfectly elastic supply of labour, the home market effect is obvious. If the labour supply curve slopes upward, some of the home market advantage goes into higher wages rather than exports, but the price index effect means that if E is high in one location, the real wage is high because the nominal wage is high and the price index is low. So locations with higher demand for goods tend to offer higher real wages to workers.

The demonstration of the final detail of this spatial Dixit-Stiglitz model requires a one-sector, closed economy with $H = 1$. This means that we are taking as constant the price of agricultural output, allowing us to differentiate the above real wage equation as

$$\frac{d\omega}{\omega} = \frac{dw}{w} - \mu \frac{dG}{G}. \quad (5.35)$$

The above derivatives of the relationships for the symmetric equilibrium values then give

$$\frac{d\omega}{\omega} = (1 - \mu) \frac{dE}{E} + \frac{dL}{L} \frac{\mu - \rho}{\rho}. \quad (5.36)$$

This tells us that, supposing we add workers to the closed economy, holding expenditure constant, an increase in labour will mean a directly proportional decrease in nominal wages. However, the increase in employment reduces G by increasing variety, so that real wages increase. This type of economy is to be avoided, because agglomeration forces are so strong that the economy will tend to collapse into a point. Thus the *no black hole* condition $\rho > \mu$ is imposed.

5.3 The Core-Periphery Model

To map out the core-periphery model (Krugman 1991a), as in figure 5.1, a spatial Dixit-Stiglitz economy with a monopolistically competitive manufacturing sector, with increasing returns to scale (IRS) M and a perfectly competitive agricultural sector, with

constant returns to scale (CRS), A is considered. Each sector employs a single resource that is in fixed supply in the economy, manufacturing labour L^M and agricultural labour

L^A respectively. Let there be R regions in the world, and let each region r have an exogenous share ϕ_r of the economy's agricultural labour L^A . Manufacturing labour is mobile and, at any time, region r has λ_r of the economy's manufacturing labour L^M . Choose units so that $L^A = 1 - \mu$ and $L^M = \mu$. M -goods face iceberg transport costs, while the A -good is costless to transport. Set the agricultural wage as numeraire $w^A = 1$ since constant returns to scale in production and free transport means that agricultural wages are equal in all regions. Manufacturing wages are different across regions, in nominal w_r^M and real ω_r^M terms. Assume the ad hoc dynamics

$$\dot{\lambda}_r = \gamma(\omega_r - \bar{\omega})\lambda_r \tag{5.37}$$

determines how workers move between regions, where $\bar{\omega} = \sum_r \lambda_r \omega_r$ is the average real wage.

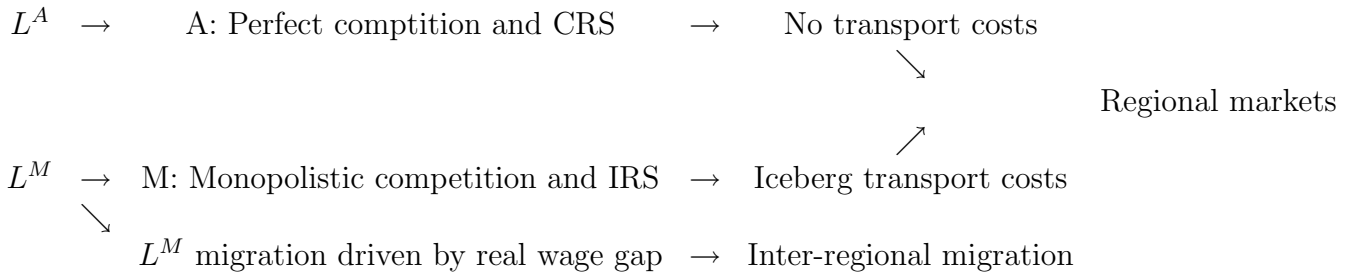


Figure 5.1: Schematic of the CP Model

It is simple to see that the income equation is given by

$$E_r = \mu\lambda_r w_r + (1 - \mu)\phi_r, \tag{5.38}$$

and we see that the price index is given by:

$$G_r = \left[\sum_s \lambda_s (w_s^M T_{sr}^{1-\sigma}) \right]^{\frac{1}{1-\sigma}} \tag{5.39}$$

where G_r is the true price index for region r . Forward linkages are demonstrated here because the higher the share of manufacturing in regions with lower transport costs, the lower the price index. The wage equation is

$$w_r^M = \left[\sum_s E_s T_{rs}^{1-\sigma} G_s^{\sigma-1} \right]^{\frac{1}{\sigma}}, \quad (5.40)$$

and we can see that backward linkages are demonstrated here because, assuming that all price indices are similar, the nominal wage in r is higher if incomes in other regions with low transport costs to r are high. The real wage equation

$$\omega_r^M = w_r^M G_r^{-\mu} \quad (5.41)$$

follows easily. This model's instantaneous equilibrium is determined by the solution of

$3R$ simultaneous equations, R each of the 3 forms given above. The long-run

equilibrium is then determined by calculating the real wage.

This model is not analytically solvable for wages in terms of manufacturing workers' location as it requires treating $3R$ simultaneous non-linear equations (Brakman et al., 2009). This can be demonstrated by recalling that, for variety i , the labour input for manufacturing firms (5.12) is given in terms of manufacturing labour only. Prices then depend on manufacturing wages with $w_i = p_i$ which implies that firm size is independent of equilibrium wages $q = \frac{F(\sigma-1)}{c_M}$. The manufacturing labour market then clears when the number of firms is $n_r = \frac{L_r}{F\sigma}$, where L is manufacturing labour, and, using the demand function for manufactured goods we see that the market for manufactured goods clears

when:

$$1 = \frac{w_r^{1-\sigma} \mu E_r}{w_r^{1-\sigma} L_r + \tau w_s^{1-\sigma} L_s} + \frac{\tau w_s^{1-\sigma} \mu E_s}{\tau w_s^{1-\sigma} L_s + w_s^{1-\sigma} L_s}, \quad (5.42)$$

where $\tau = T^{1-\sigma}$, which is non-linear in w_r and w_s . preventing analytical solution for

manufacturing wages in terms of location. The core-periphery model is a special case of the above model, with agriculture divided equally between the economy's $R = 2$ regions and long-run equilibrium given by eight simultaneous equations, but even this case defies analytical solution. Figure 5.2 below is a simple demonstration of the workings of the CP model with regards to the 'home-market' effect (Trionfetti, 1998), which operates in a similar way to the post-Keynesian notion of Circular Cumulative Causation (CCC). Let there be an exogenous increase in the number of consumers in a region. This means that firms will relocate to meet this increased demand. The adjusted number of firms will then seek to diversify their production, in response to consumers' taste for variety. Adjustments to the price indices for goods in the region result in higher real wages in the region. prompting the relocation of more consumers.

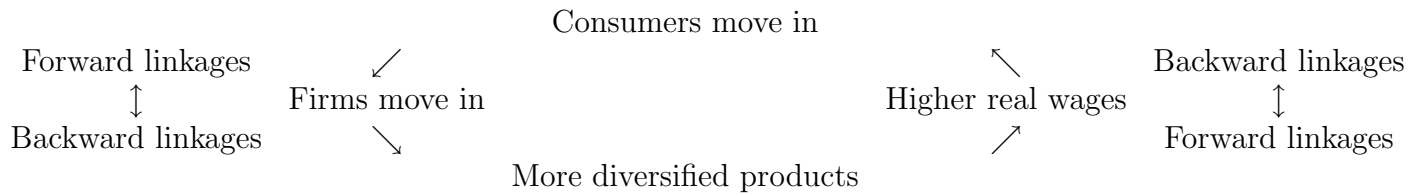


Figure 5.2: Circular Cumulative Causation in the CP Model

Panes a) to c) of Figure 5.3 below plots $\omega_1^M - \omega_2^M$ against $\lambda_1 = \lambda$. The constant elasticity of substitution $\sigma = 5$ and the expenditure share of manufacturing $\mu = 0.45$ are held constant, but transport costs are $T = 1.25$ in panel a), $T = 1.75$ in panel b), and $T = 2.25$ in panel c). When $T = 1.25$, the wage differential is strictly increasing in λ , so that the higher the share of manufacturing in a region, the more attractive is that region for manufacturing labour, from a combination of the forward and backward linkages discussed above. Equal division of manufacturing labour between the two regions is an unstable equilibrium, with two stable equilibria at concentrations of manufacturing labour in one region. The intermediate case of $T = 1.75$ increases and then falls away to a hump with a minimum at the symmetric equilibrium, and increasing thereafter. The symmetric equilibrium is now stable, with two unstable equilibria flanking it. and two

more stable equilibria at a concentration of manufacturing in one region. The case $T = 2.25$ slopes downward with a symmetric equilibrium being stable. Thus, if a region has more than half the manufacturing in the economy, it is less attractive than the other region. Panel d) of Figure 5.3 shows the core-periphery bifurcation, which takes a reverse tomahawk shape.

Krugman (1991a) ends his paper by asking what the necessary conditions for manufacturing concentration are. To find out whether a CP pattern is sustainable, let all manufacturing be concentrated in one region. It is easy to see that $\omega_1^M = 1$, and

$$(\omega_2^M)^\sigma = \frac{1 + \mu}{2} T^{1-\sigma-\mu\sigma} + \frac{1 - \mu}{2} T^{\sigma-1-\mu\sigma}. \quad (5.43)$$

When there are no transport costs, $\omega_2^M = 1$ so location is irrelevant. At low levels of transport cost $\omega_2^M < 1$ so the CP pattern is sustainable because the function $\omega_2^M(T)$ has its maximum at $T = 1$. If the transport cost is greater than $T(S)$, the sustain value, then the second term of the real wage equation for region 2 has $T^{\sigma-1-\sigma\mu}$ tells us that if $\rho < \mu$

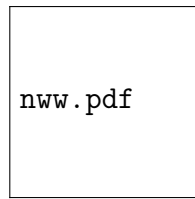


Figure 5.3: Dynamics of the Core-Periphery Model

then the CP pattern is sustainable. If $\rho > \mu$, the no-black-hole condition holds, as in panel e) of Figure 5.3.

The core-periphery model described is simple to extend to a three region case, as in Fujita et al. (2001b). If the two-region model can be visualised as a straight line between two points (regions), a third region is offset from these points, so that an equilateral triangle is formed with one region located in each corner. In the high transport cost case there is a unique stable equilibrium at the centroid of the unit simplex where manufacturing is divided equally between the region. This point is at the centre of a basin of attraction which drains to the centre. The low transport cost case has three stable equilibria, one at each corner of the triangle. The equilibrium at the centroid where manufacturing is equally divided is clearly unstable and the simplex is divided into three basins of attraction which drain to a concentration of manufacturing in a single region. The intermediate transport cost case is more complex as there are four stable equilibria (the corners of the triangle and the centroid of the unit simplex) and four basins of attraction (a central basin surrounding the centroid), and three basins draining towards concentration in a single region), and three unstable equilibria (the centroids of the three outer triangles found by dividing the simplex into four smaller equilateral triangles along lines between the midpoints of each unit line in the equilateral triangle. This is a qualitatively similar outcome to that of the two-region case. The three-region model works neatly as it can be represented in two dimensions, but representing an n region case is not so simple. The many-regions case is most easily dealt with by assuming that the R regions are evenly laid out one unit distance apart a circle (Brakman et al, 1996) with transportation only along the circumference. All manufacturing ends up in only two regions which are on opposite sides of the circle and share the manufacturing workforce equally. The two regions which end up as the only manufacturing regions were already relatively big, but initial size is not the only factor in determining the outcome as other regions which are slightly larger to begin with can

still lose out to an initially smaller region which is advantageously located.

5.3.1 Intermediate Goods and Agricultural Transport Costs

Krugman and Venables (1995) showed that the alternative use of M-sector goods as intermediate goods in the same sector can be the backwards linkage, instead of allowing labour mobility between regions to be the mechanism behind agglomeration. It is then assumed that labour can move between A and M sectors within a region or region, but immobile between regions. This leads to results that are very similar to the previous section, but rather than having workers of the manufacturing sector concentrated in one region, we may now get the workforce in one region, all in one sector. A variation on this idea is explored in the next section. The starting point for the model is still the basic model described earlier. Assume that intermediate goods used in manufacturing are a CES aggregate of all manufactured goods. Assume further that it has the same elasticity of substitution as the consumers' utility function. Then the price index for intermediates is just the same price index we have used previously. Intermediates and labour are taken together to form a Cobb-Douglas composite input cost for each region, given by

$$p_i = w_i^{1-\alpha} G_i^\alpha. \quad (5.44)$$

This replaces the wage rate in the mill pricing equation derived when exploring profit maximisation, because units are chosen so that the mark-up firms choice of price over marginal cost is unity. The other alteration to the basic model is that expenditure on manufactured goods in each region is both from consumers and the manufacturing industry. This expenditure is given by

$$E_i = \mu E_i + \alpha n_i p_i q^*. \quad (5.45)$$

In addition to μE_i spent by consumers, the n_i firms spend the fraction α of their total revenue $p_i q^*$ on intermediates. The latter is the backwards linkage in this model. The expenditure on manufactured goods in region 2 is analogous. The expenditure on manufactured goods in regions 1 and 2 is naturally directed towards manufactured goods produced in both regions. These expressions for expenditure replace μE_i in the wage equations. Now let there be two countries with a total workforce of 1 in each country, and the total manufacturing labour in each country being λ_i . The

manufacturing wage bill for i is

$$w_i \lambda_i = (1 - \alpha) n_i p_i q^* \quad (5.46)$$

and we choose $q^* = \frac{1}{1-\alpha}$ so that

$$n_i = \frac{w_i}{p_i} \lambda_i. \quad (5.47)$$

The price indices become

$$G_1^{1-\sigma} = \lambda_1 w_1^{1-\sigma(1-\alpha)} G_1^{-\alpha\sigma} + \lambda_2 w_2^{1-\sigma(1-\alpha)} G_2^{-\alpha\sigma} \tau \quad (5.48)$$

and

$$G_2^{1-\sigma} = \lambda_1 w_1^{1-\sigma(1-\alpha)} G_1^{-\alpha\sigma} \tau + \lambda_2 w_2^{1-\sigma(1-\alpha)} G_2^{-\alpha\sigma}. \quad (5.49)$$

firms make zero profit when they sell q^* units of output, and this defines the manufacturing wage consistent with zero profits:

$$\frac{(w_1^{1-\alpha})^\sigma}{1-\alpha} = E_1 G_1^{\sigma-1} + E_2 G_2^{\sigma-1} \tau \quad (5.50)$$

and

$$\frac{(w_1^{1-\alpha})^\sigma}{1-\alpha} = E_1 G_1^{\sigma-1} \tau + E_2 G_2^{\sigma-1}, \quad (5.51)$$

which says that quantity times price to the power of the elasticity must equal demand from the two regions. To solve the equilibrium wage we must also reformulate E so it

includes the wage rate:

$$E_1 = \mu E_1 + \frac{\alpha w_1 \lambda_1}{1-\alpha} \quad (5.52)$$

and

$$E_2 = \mu E_2 + \frac{\alpha w_2 \lambda_2}{1-\alpha}. \quad (5.53)$$

With this information it is possible to solve the model and determine short-run equilibria, by determining the equilibrium wage for the two regions, income in the two regions, the price indices and the wage gap between sectors in a region. If the wage in the manufacturing sector in region i is larger than the agricultural wage there, labour is assumed to move to manufacturing, and conversely. A long-run equilibrium occurs when

either the wage gap between manufacturing and agriculture sectors is zero in both regions, or when one region has only agricultural or manufacturing production. In the

latter case there can be a wage gap. If both sectors are operating in a region in a

long-run equilibrium, then the wages must be equalized there. If the long-run equilibrium in a region constitutes a single-sector economy there, then the wage in that sector must be greater or equal to the wage in the sector that has contracted completely. It is now possible to investigate the case where agricultural output is an increasing but concave function of labour employed in the sector. Let A be the agricultural good, and

define the strictly concave agricultural production function for each region as

$$(1 - \lambda_i)A. \quad (5.54)$$

Then we have

$$\frac{dA}{d(-\lambda_1)} = A'(1 - \lambda_1) \quad (5.55)$$

and identical for region 2. Since the wage in the agricultural sector in each region equals the marginal product of labour there, an expansion of the manufacturing sector in that region may raise wages in manufacture, but it will certainly increase wages in agriculture. The stability of the equilibrium will depend on the relative changes in these wages with respect to manufacturing labour, given by

$$\frac{dw_i}{d\lambda_i} + A''(1 - \lambda_i). \quad (5.56)$$

A'' is always negative while $\frac{dw_i}{d\lambda_i}$ is positive but tends to zero as transport costs tend to zero. Hence at some T the sign of the derivative of the wage gap in manufacturing employment may change sign. At high transport costs, as before, the diversified and symmetric pattern is stable and unique. When transport costs go below a certain value the core-periphery patterns becomes the stable outcome, but as before a diversified economy is possible but unstable. At yet lower transport costs the economy goes back to the diversified pattern, because when transport costs tend to zero the value of the forward and backwards linkages in the region become insignificant. Then the manufacturing wage in the two regions must be equal. But agricultural wages can only be equal between the two regions if the agricultural employment is also the same in the two regions. Hence the symmetric diversified pattern is the only possible one. Agricultural transport costs are simple to treat, as shown by Donald Davies (1998). We

first assume that agriculture is a homogeneous good and one unit of agricultural labour produces a unit of the agricultural good. The endowment of agricultural labour is divided equally between the regions, and the agricultural wage in region r is w_r^A . Agricultural wages and prices are now not equalized between regions because we assume iceberg transport costs on agriculture T^A . The difference between agricultural wages in the regions depends on whether the region is an importer of agriculture or not, and this depends on demand in each region. If income in region 1 is a small part of world income, so that demand in the region is low, then $\frac{w_1^A}{w_2^A} = \frac{1}{T^A}$. Conversely, this ratio is T^A when region 1's income is high as a proportion of world income. If incomes are equal across regions, there is no agricultural trade, so agricultural wages are equal in both regions. We also note that regional income will be high if manufacturing is concentrated there, and equal across regions if manufacturing is spread out between regions, so that there is a clear link between the location of the manufacturing sector and agricultural wages. Income in each region now takes the form

$$E_1 = \mu\lambda w_1^M + \frac{1-\mu}{2}w_1^A, E_2 = \mu\lambda w_2^M + \frac{1-\mu}{2}w_2^A,$$

and real wages take the form

$$\omega_1 = w_1^M (G_M^1)^{-\mu} (w_1^A)^{\mu-1}, \omega_2 = w_2^M (G_M^2)^{-\mu} (w_2^A)^{\mu-1},$$

while the price indices and nominal wage equations for each region remain the same. The next step is to ask whether a core-periphery structure is sustainable with these new equations for symmetric equilibrium. Suppose that $\lambda = 1$ so that all manufacturing is concentrated in region 1. Region 1 must import the agricultural good so that, if the region 2 agricultural wage is set as numeraire, we have $w_1^A = T^A$. Total world income is

$$E_1 + E_2 = \mu w_1^M + \frac{1-\mu}{2}(+T^A),$$

and since there is equality between the demand for manufactured goods and the value of manufacturing output, we must have $w_1^M = \frac{1+T^A}{2}$. Then $E_1 = \frac{T^A+\mu}{2}$, and $E_2 = \frac{1-\mu}{2}$, so agricultural trade costs increase nominal income and the manufacturing wage in region

1. $G_1^M = w_1^M$ and $G_2^M = w_1^M T^M$ follows from $\lambda = 1$, so that

$$\frac{w_2^M}{w_1^M} = \left[\frac{T^A + \mu}{1 + T^A} (T^M)^{1-\sigma} + \frac{1 - \mu}{1 + T^A} (T^M)^{\sigma-1} \right].$$

The cost-of-living index in region 1 is

$$(w_1^M)^\mu (T^A)^{1-\mu}$$

and in region 2 it is

$$(w_1^M T^M)^\mu.$$

The ratio between the indices is $(T^M)^\mu (T^A)^{\mu-1}$ because agriculture is cheaper but manufacturing more expensive in region 2 than in region 1. The ratio of real manufacturing wages is then

$$\frac{\omega_2}{\omega_1} = (T^M)^{-\mu} (T^A)^{1-\mu} \left[\frac{\mu + T^A}{1 + T^A} (T^M)^{1-\sigma} + \frac{1 - \mu}{1 + T^A} (T^M)^{\sigma-1} \right]^{\frac{1}{\sigma}}.$$

If this ratio is less than one the manufacturing labour has no incentive to leave region 1 for region 2, meaning that the core periphery structure is an equilibrium. This reduces to the sustain point condition we derived in the last section when $T^A = 1$. The first thing we notice is that $T^A > 1$ reduces the value of the ratio of real manufacturing wages making it a core-periphery structure more sustainable. We can see the backward linkage in that region 1 agricultural wages are higher, so nominal income demand are also higher here, making agglomeration of manufacturing more attractive. Acting to

raise the ratio, thus making core periphery less sustainable, is the term $(T^A)^{1-\mu}$ which measures the effect of higher prices for agriculture on the cost of living. The region with manufacturing has higher priced agriculture with $T^A > 1$ so it is more difficult for that region to attract workers and it increases the incentive to move to another region. The latter effect dominates for a region importing agriculture. To see whether the symmetric equilibrium is stable or not, we differentiate the equilibrium around the symmetric point and evaluate the differential. If this is positive, the symmetric equilibrium is unstable.

The analysis is essentially the same as in the previous section, but with an extra endogenous variable dw^A . Around the symmetric equilibrium there is no agricultural trade so agricultural prices adjust to equate the values of demand and supply in each region. The value of supply of agriculture in region 1 is

$$\frac{(1-\mu)}{2}w_1^A$$

and expenditure on agriculture is $(1-\mu)E_1$, so we have

$$dw^A = 2dE.$$

Derivation of

$$\frac{d(\omega_1 - \omega_2)}{d\lambda}$$

proceeds as at the end of the last chapter. Providing $\rho > \mu$, agricultural trade costs are sufficient to ensure that the differential is negative for all $T^M > 1$ so that symmetry is never broken. Starting with high manufacturing trade costs at which the core-periphery is unsustainable, reducing the costs move the economy to a place where core-periphery is possible. However, the equilibrium never becomes unstable so there is no reason to think that a core-periphery pattern will form. That is, adding a manufacturing worker

to a region raises agricultural prices, preventing migration from raising real wages.

When agglomeration is sustainable, agglomeration and the symmetric equilibrium are stable equilibria. Between these stable equilibria, there must be unstable ones. But the symmetric equilibrium never becomes unstable, so there is no reason to suppose that a core-periphery pattern will form as T^M falls when $T^A > 1$. If $T^A \gg 1$, then the range of values T^M can take within which agglomeration is sustainable disappear.

Differentiated agricultural products are required for a more empirically satisfactory analysis, reflecting that regions may produce different crops, and to ensure that very small transport costs do not have a major qualitative impact on the economy's dynamics, as in the homogeneous case. The reason that small agricultural transport costs imply that a symmetric equilibrium is always stable is that the stability of an equilibrium is tested by looking at an infinitesimal derivation. The perturbation caused by this $d\lambda$ is always in the band around the point $\frac{E_1}{E_1+E_2} = 0.5$ and the change has the same effect on agricultural prices and wages regardless of the magnitude of $T^A > 1$. A good way to respond to this implication is to allow regions to produce slightly different agricultural goods, thereby smoothing out the relative wage schedule.

This smoothing out suggests that agricultural product differentiation reduces agricultural wage and price differentials between regions, so that it is more likely that a given level of agricultural transport costs is consistent with a core-periphery structure. Naturally, the smaller is the constant elasticity of substitution ν , the less each region's products are substitutes, so that the relative wage schedule becomes flatter. To see this we assume CES preferences for agricultural products and denote the agricultural price index as G_r^A . Using the same setup as for manufacturing, we have

$$G_1^A = \left\{ \frac{1}{2} [(w_1^A)^{1-\nu} + (w_2^A T^A)^{1-\nu}] \right\}^{\frac{1}{1-\nu}}$$

and

$$G_1^A = \left\{ \frac{1}{2} [(w_1^A T^A)^{1-\nu} + (w_2^A)^{1-\nu}] \right\}^{\frac{1}{1-\nu}}.$$

Agriculture remains perfectly competitive as before. We also see

$$w_1^A = [E_1(G_1^A)^{\nu-1} + E_2(G_2^A)^{\nu-1}](T^A)^{1-\nu}]^{\frac{1}{\nu}}$$

and

$$w_2^A = [E_1(G_1^A)^{\nu-1}(T^A)^{1-\nu} + E_2(G_2^A)^{\nu-1}]^{\frac{1}{\nu}}.$$

- we arrive at these equations by the same route of working out demand for manufacturing. The cost of living index for each region then depends on the agricultural price index, so that the real wage of manufacturing workers becomes

$$\omega_1 = w_1^M (G_1^M)^{-\mu} (G_1^A)^{\mu-1}, \omega_2 = w_2^M (G_2^M)^{-\mu} (G_2^A)^{\mu-1}.$$

These equations, plus the ones described in the last section, define a new equilibrium.

5.4 The Footloose Models

The Footloose Capital (FC) model (Martin and Rogers, 1995) is the simplest of the footloose models, and displays agglomeration, but the price paid for its extreme tractability is the absence of the circular causality displayed in the CP model. The key difference is that, whereas the CP model featured mobile manufacturing labour and immobile agricultural labour, the FC model features immobile labour and capital which is mobile between regions whilst the reward from this capital is spent in its owner's

'home' region. Non-homotheticity of the cost function for manufacturing means that the factor intensity of the fixed cost is not the same as that of the variable cost. It is also important to note that, while increasing returns to labour in production of the manufactured good are a feature of the model, only capital is employed in the fixed cost and only labour in the variable costs - an extreme assumption to give simplicity. Specifically, each manufacturing firm requires one unit of capital, and c_M units of labour per unit of manufactured good. This assumption guarantees that a region's share of world capital is the same as its share of manufacturing. The agricultural sector again displays perfect competition, and features only labour as a factor of production. Tastes are identical to the CP model and the only difference for the representative consumer is that the real wage equation for region r is replaced by the indirect utility function

$$V_r = \frac{E_r}{G_r^\mu}, \quad (5.57)$$

where E_r is expenditure in region r . Capital moves to the region with the highest nominal reward, since this income is spent in the owner's home region regardless of where the capital is employed. Thus we assume

$$\dot{\lambda}_r = \gamma(\pi_r - \bar{\pi})\lambda_r \quad (5.58)$$

where π_r is the rent on capital in region r , and $\bar{\pi} = \sum_r \lambda_r \pi_r$. The short-term equilibrium results where there are two regions are identical to the CP case where the agricultural sector is concerned. For manufacturing, utility optimization yields a constant division of expenditure between sectors

$$E_1 = \pi_1 K + w_1^L L \quad (5.59)$$

and CES demand functions for manufactured goods

$$q(j) = \mu I_1 \frac{p(j)^{-\sigma}}{G^{1-\sigma}}. \quad (5.60)$$

This CES demand, together with DS monopolistic competition, implies that mill pricing is optimal for manufacturing firms, so that the ratio of a region 1 good in its local and export markets is T , giving

$$p_1^M = \frac{w^L c_M}{1 - \frac{1}{\sigma}}, p_2^M = T p_1^M. \quad (5.61)$$

This is different to pricing rules for the CP model where the marginal cost of manufacturing depends on the manufacturing wage. In FC the factor prices, thus producer prices, are equalized across regions so that consumer prices only vary due to transport costs. Physical capital is used only in the fixed cost element of production, meaning that operating profits are the reward to capital. Using the demand function and mill pricing we can find the expression for this reward in the same way we found the expression for the manufacturing wage. Finding the expression for the operating profit confirms that the reward to capital is dependent on the spatial distributions of industry and expenditure. The same normalizations are used as for the CP model, with the added implication that $p = 1$. Since λ is the north's share of industry, we can also take it to be the share of capital employed in the north. But in this model, capital can be employed in a region without its owner being a resident. This means that we must define κ as the share of capital *owned* by northern residents. We choose to write the equilibrium expressions for reward to capital as

$$\pi = \frac{\mu}{\sigma} B I, \pi^* = \frac{\mu}{\sigma} B^* E, \quad (5.62)$$

where

$$B = \frac{\iota}{G_1^{1-\sigma}} + \tau \frac{(1-\iota)}{G_2^{1-\sigma}}, B^* = \tau \frac{\iota}{G_1^{1-\sigma}} + \frac{(1-\iota)}{G_2^{1-\sigma}} \quad (5.63)$$

and

$$G_1^{1-\sigma} = \lambda + \tau(1-\lambda), G_2^{1-\sigma} = \tau\lambda + (1-\lambda). \quad (5.64)$$

The B 's are the northern and southern biases in sales; ι is the northern share of expenditure E , G is the true price index, and τ is the freeness of trade. It is easily seen that $\iota = \kappa = \varpi = \frac{1}{2}$ in the symmetric-region case in which we are interested, where ϖ is the northern share of labour. Make the assumption that half of the capital in each region belongs to northern capital owners. This means that northern capital earns the world's average reward, which is easily seen to be $\frac{\mu}{\sigma}E$ because μE is the value of sales worldwide. We can then see that

$$E_1 = \varpi L + \frac{\mu}{\sigma} \kappa E, \quad (5.65)$$

with L being the world supply of labour, and this means that using the simple result that

$$E = \frac{L}{(1 - \frac{\mu}{\sigma})} \quad (5.66)$$

we find

$$\iota = (1 - \frac{\mu}{\sigma})\varpi + \frac{\mu}{\sigma}\kappa. \quad (5.67)$$

There are two types of long-run equilibrium: the interior outcomes where the reward to capital is the same in both regions $\pi = \pi^*$, and core-periphery equilibria $\lambda = 0$ or

$\lambda = 1$. Solving the location condition for the division of the mobile factor between region was impossible in the CP model but is trivial in an FC setting, giving

$$\lambda = \frac{1}{2} + \frac{1 + \tau}{1 - \tau} \left(\iota - \frac{1}{2} \right) \quad (5.68)$$

where this is valid for $0 \leq \lambda \leq 1$. Indeed, it is simple to see that the spatial division of manufacturing can be expressed as a simple function of trade freeness and factor endowments, which is very useful for policy analysis. The northern expenditure share can be plotted against against the northern industry share, giving a ‘scissor diagram’ represented by two equations. These key expressions are the location condition and relative market size, or λ and ι . These expressions are plotted, and the location condition shows how the northern share of industry increases with its expenditure share, increasing with gradient

$$\frac{1 + \tau}{1 - \tau} \quad (5.69)$$

and getting steeper as trade become freer. It always passes through the point $\lambda = \iota = \frac{1}{2}$ and only increases in the interval $\iota \in [\frac{\tau}{1+\tau}, \frac{1}{1+\tau}]$. This shows the home-market effect - a change in market size leads to a more than proportional change in a region’s manufacturing share. The market size condition gives a simple vertical line in the symmetric-region cases that are the focus here. At all points to the right of the location condition, northern rewards are greater than southern ones. Given this, capital and firms flow north if the economy is at a point to the right of this line. To the left of the line, capital and firms head in the other direction. We can also see that the symmetric outcome is always stable, implying that the FC model never displays the catastrophic agglomeration of CP. Ottaviano (2001) gave a simple method of describing the forces at

work in the FC model:

$$\text{sgn}(\pi - \pi^*) = (1 - \tau)\text{sgn}\left\{(1 + \tau)\left(\iota - \frac{1}{2}\right) - (1 - \tau)\left(\lambda - \frac{1}{2}\right)\right\}. \quad (5.70)$$

When trade is perfectly free $\tau = 1$, the right-hand side of this expression is zero implying that capital rental rates are the same for any λ , so that with no trade costs the location of firms does not matter. For τ , there is pressure to relocate driven by two opposing forces. The only agglomeration force working in the FC model is the market access effect. The first term inside the curly brackets of the above expression shows the relationship between spatial division of expenditure and geographical division of firms. This shows the advantage of producing in the larger market when there are no barriers to trade. The second term depends on λ , and we see that it shows the disadvantage of being in the region with the most firms. This is the only disagglomeration force in the FC model. The weight of access advantage with respect to crowding disadvantage grows as σ falls. The smaller the elasticity the smaller is the relative weight of market crowding, and this weight rises as trade costs decrease. This is because a larger fraction of the firm's operating profits is independent of the spatial distribution of firm with lower trade costs, and this means that the pull of firms towards the region with most firms is stronger. The stability of the symmetric equilibrium can be analyzed by first differentiating the reward gap:

$$d(\pi - \pi^*)|_{\iota=\lambda=\frac{1}{2}} = 4\frac{\mu}{\sigma}\frac{1 - \tau}{1 + \tau}d\iota - 4\frac{\mu}{\sigma}\frac{1 - \tau^2}{1 + \tau}dn, \quad (5.71)$$

where $d\iota = \frac{\delta\iota}{\delta\lambda}dn$. Capital owners are immobile and rewards are repatriated so $\delta\iota\delta\lambda = 0$ so expenditure shifting does not operate. This leaves only the market-crowding effect so that the symmetric outcome is always stable when trade is not perfectly free $\tau = 1$. When trade is free, relocation of firms has no effect on the reward gap. This means that the break point in the symmetric FC model is $\tau = 1$. The symmetric equilibrium is

stable and, implied by the relative slope of these expressions, a small positive migration shock takes the economy to the left of the location condition where $\pi < \pi^*$. At such a point the initial shock would generate capital flow moving the economy back to the symmetric outcome. To analyze the stability of the core-periphery equilibrium, we start by differentiating the reward gap:

$$d(\pi - \pi^*)|_{\lambda} = -\frac{\mu(1-\tau)^2}{\sigma\tau}, \quad (5.72)$$

where $\iota = \frac{1}{2}$. When all industry is in the north, the southern reward to capital is higher for any level of trade freeness up to $\tau = 1$ which is the sustain point in the symmetric FC model, shown in panel a) of Figure 5.4. The scissor diagram shows that having the core in the north is always to the left of the location condition so that $\pi < \pi^*$ at any level of freeness except perfectly free trade. This means that there is the tendency for the system to move from this core-periphery outcome towards the symmetric outcome unless trade is perfectly free, as shown in panel b) of Figure 5.4. The supreme tractability of the FC model has allowed us to derive these results, but the price paid is the sacrificing of many of CP's more interesting features, although some return in the non-symmetric cases. Locational hysteresis from the CP model is absent here because FC never features multiple locally stable equilibria; similarly, there is no catastrophic agglomeration, no price index effect, and no circular causality. The home-market effect, at least, is present. We calculate the relocation induced by a small change in the spatial distribution of expenditure. Firms move to equalize rental rates, so we set $d(\pi - \pi^*) = 0$ and solve for $\frac{dn}{d\iota}$. This is greater than one for positive trade costs, and so the home-market effect is in operation since the relocation of industry is more than proportional to the shift in expenditure, so that spatial concentration of economic activity generate forces to encourage further agglomeration. Moreover, the home-market effect is more powerful when trade is freer.

The Footloose Entrepreneur (FE) model (Forslid and Ottaviano, 2002) is very similar in terms of setup, but slightly less tractable and much more interesting. The basic structure is almost identical to the CP model - indeed, the only difference is that the fixed cost of production involves an unit of the mobile factor H (entrepreneurs) as the fixed cost and a variable cost of a_m units of labour L for each unit of the good produced. It is easy to

see that

$$w + w^L a_m x$$

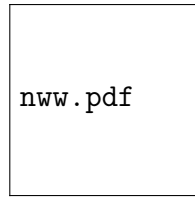


Figure 5.4: Dynamics of the Footloose Models

is the total cost of producing x units of a variety. We also see that there is only one change from CP in terms of the manufacturing sector results: the FE model is like the FC model in that the prices of industrial goods depend on the wages of the immobile factor which are equalized across regions. Profit maximization in the manufacturing sector gives the prices for manufactured goods and market clearing for entrepreneurs gives $n_r = \lambda_r$, while equilibrium output per firm can be determined as $x_r = \sigma w_r$ when $E_r = \lambda_r w_r + L_r$. The manufactured goods market-clearing conditions are then given by:

$$w_r = \frac{\mu}{\sigma} \left[\frac{E_r}{\lambda_r + \tau \lambda_s} + \frac{\tau E_s}{\tau \lambda_r + \lambda_s} \right],$$

giving an explicit analytical solution for equilibrium wages.

For a more detailed investigation, we note the reward to entrepreneurs is the operating profit of a typical variety, so we let $w = \pi$ in the expressions derived in the FC case. In

the FE case, we have

$$E = w^L L + wH$$

meaning that

$$\iota = \left(1 - \frac{\mu}{\sigma}\right)\varpi + \frac{\mu}{\sigma}B\lambda.$$

In this case, as opposed to FC, relative market size depends on the location of the mobile factor λ as well as its profitability B . This means that production shifting leads to expenditure shifting. Taking normalizations similar to the FC case, we can deal with the long-run equilibrium. Once again, the location condition is exactly as in the CP model, and unlike the FC case it is not possible to find a closed-form solution. This is because such a solution for the equilibrium spatial allocation of industry would mean solving the location conditions for the spatial distribution of industry. The location

condition involves real wages, and thus CES prices which involve a non-integer power, meaning that it is insoluble except in special cases. The FE scissor diagram (Baldwin, et al. 2003: p. 98) is equivalent to the FC scissor diagram, and is derived similarly, except that the analysis is simplified by working with the logs of real wages, and using the fact that the location condition also applies to these. Given the symmetry of the model, the location condition curve passes through the midpoint. The location condition has slope $\frac{d\lambda}{dt} = \frac{1+\tau}{[1-a]-\tau[1+a]}$ where $a = \frac{\mu}{\sigma-1}$, and when trade is very free the slope is negative, and positive for highly restricted trade. As in the FC model, λ increases to the right of the location condition. The market-size condition passes through the midpoint, and its vertical through this midpoint when $\tau = 0$ but has slope $\frac{\sigma}{\mu}$ through the midpoint when

$\tau = 1$. Generally, the slope is given by

$$\frac{d\lambda}{dt} = \frac{(1 + \tau)[(1 + \tau) - \frac{\mu}{\sigma}(1 - \tau)]}{4\frac{\mu}{\sigma}\tau}.$$

The endpoints of the market size condition curve are unaffected by trade costs. The economy is always on this curve, as the condition holds at any short-run equilibrium. For freer trade, the market size condition straightens out without its endpoints moving, shown in panel c) of Figure 5.4. The location condition also moves, but its endpoints change as trade cost τ changes push the ratio of price indices even at catastrophic agglomeration. When τ is high enough, the location condition has a negative slope. For restricted trade, the economy has three long-run equilibrium shown in the FE scissor diagram in panel d) Figure 5.4: two CP equilibria and the symmetric equilibrium. The symmetric outcome is stable as a small increase in λ brings the economy to the left of the location condition, generating a self-correcting force. The CP outcomes are then obviously unstable. At very free trade, the symmetric outcome is unstable as a shock would generate self-reinforcing forces. The sustain and break point for this model are easily found, and we then conclude that equilibrium and local stability properties of the

FE model are qualitatively identical to those of the CP model, as the tomahawk diagram in panel e) of Figure 5.4 suggests. The Footloose Entrepreneur has most features of the CP model except for cost-linked circular causality, and a weaker home-market effect, and although not as tractable as the FC model it has significantly more interesting results.

5.4.1 Capital Construction

Baldwin (1999) added another model to the family of Dixit-Stiglitz CP-type models with iceberg transport costs. This model is known as the Constructed Capital (CC) model, is as tractable as the FC model but has more CP-like features. Industrial relocation in the CC model is driven by the construction and depreciation of capital. Trade costs and region size lead to the construction of capital in one region and depreciation in the other so that inter-regional capital flows are assumed not to exist. As the capital stock increases in one region, total expenditure rises in one region and falls in the other. This generate a demand-linked circular causality that supports further agglomeration of capital in one region. This agglomeration force dominates the market-crowding effect when trade is freer. The CC model only requires a small modification to the FC model, in that divergence of FC regional stocks of firms is driven by capital mobility, whereas in the CC model it is driven by the accumulation of capital. As in the FC model, the global economy consists of two regions, two sectors and two input factors. The distribution of factor ownership is such that κ units of world capital supply and λ units of world labour supply belong to northern residents. The agricultural (A) sector is Walrasian and uses only a single unit of L to produce an unit of homogeneous A -good. The output attracts no trade costs; thus sold intra- and inter-regionally. The A -good is numeraire for this model. The industrial sector supplies a set of differentiated varieties to increasing returns under DS monopolistic competition. Production uses an unit of K for each variety of M -good together with a variable cost of c_M units of L per unit of variety. The first difference between the CC and FC models is the assumption that all factors of

production are immobile across regions. Then capital must be employed in the same region as its owner so that $\lambda = \kappa$. Since λ is endogenous in the FC model, we use this to represent the spatial division of both labour and capital. The second difference is the assumption that capital does depreciate, with an unit of capital facing a constant probability that it will cease to exist at any instant, with this probability being equal to δ . The strong law of large numbers, which states that the sample average converges pointwise to the expected value, implies that the proportion of the capital stock κ that disappears in each period is exactly δ . The third and most notable difference is the assumption that a new unit of capital can be constructed from labour. This means introducing a perfectly competitive capital construction sector which we denote C . The assumption made is that a new unit of K is constructed with c_C units of L , so that the cost of a new unit of capital is equal to $w_L c_C$ where w_L is the wage of L . The amount of new capital constructed is $\frac{L_C}{c_C}$ where L_C is the amount of labour used in the C sector. This gives the production technology for the C sector explicitly. To summarize, capital undergoes destruction in the same region as that of its construction, having remained here throughout its lifetime.

Capital is the key difference between consideration of short-run and long-run equilibrium in the CC model, because each region's share of world capital stock is exogenous in the short-run, but endogenous in the long-run. What this means is that, as long as we don't normalize world capital stocks to unity, then the CC results for the short-run are the same as those for the FC model. The reward to capital is dependent on λ and expenditure share. The difference between FC and CC is that capital construction uses some resources, and so expenditure on consumption is not equal to income meaning that we need a new symbol ϵ for the north's expenditure share as well as ι for its share of income. Consumption expenditure E is equal to world income E minus the share of spending on new capital, so that world income is equal to the wage

bill plus operating profits

$$E = L + \frac{\mu}{\sigma}E. \quad (5.73)$$

Spending on capital construction is equal to the value of resources used by the C sector,

that is L_C , which gives

$$E = L + \frac{\mu}{\sigma}E - L_C. \quad (5.74)$$

We know, from the explicit statement of the production technology, that $L_C = c_C\delta K$

because this is how much labour is needed to maintain capital stocks. Finally,

$$E = \frac{L - c_C\delta K}{1 - \frac{\mu}{\sigma}}. \quad (5.75)$$

The north's labour income is ϖ , its capital income is $\lambda\frac{\mu}{\sigma}BE$. and $\lambda\delta K$ is northern capital depreciation. Then expenditure in the north is

$$E_1 = \varpi L + \lambda\frac{\mu}{\sigma}BE - \lambda c_C\delta K, \quad (5.76)$$

Dividing this by the expression for world expenditure yields

$$\epsilon = \frac{\left(\frac{\mu\tau}{\sigma G_2^{1-\sigma}}\right) + \frac{(1-\frac{\mu}{\sigma})(\varpi L - \lambda c_C\delta K)}{[L - \delta c_C K]}}{1 - \left(\frac{\mu\lambda}{\sigma G_1^{1-\sigma}}\right) + \left(\frac{\tau\mu\lambda}{\sigma G_2^{1-\sigma}}\right)}. \quad (5.77)$$

This tells us that the market size in the north relative to the whole world depends on the spatial distribution of labour and capital, which are both endogenous in the long-run.

In the long-run, regional capital stocks adjust until the cost of constructing a new unit of capital equals the value of the income stream it generates. As such, finding the long-run equilibrium is a matter of evaluating the costs and benefits of this new capital. In an interior long-run equilibrium, both regions must be constructing enough capital to

replace the δK which depreciates for every period. Then the number of firms in each region (north 1 and south 2) must adjust to equalize the value of the extra capital ν and

c_C , so that $\nu_1 = (c_C)_1$ and $\nu_2 = (c_C)_2$. In a core-periphery with $\lambda = 1$ outcome $\nu_1 = (c_C)_1$ but $\nu_2 > (c_C)_2$. Tobin's q (1959) is equal to unity for all interior equilibria. Without depreciation the value of having an extra unit of capital is equal to the present value of the income stream equal to π_1 , the equilibrium level of operating profits, so that the present value is $\nu_1 = \frac{\pi}{\rho}$ where ρ is the discount rate for this income stream. Since we recognize that a certain unit of capital faces probability δ of depreciation, the present value of this unit is lowered, so that

$$\nu_1 = \frac{\pi_1}{\rho + \delta}, \nu_2 = \frac{\pi_2}{\rho + \delta}. \quad (5.78)$$

It follows from these expressions for present value that operating profits in both regions are equal at all interior equilibria, which means these interior equilibria are also characterized by

$$\lambda = \frac{1}{2} + \left(\frac{1 + \tau}{1 - \tau}\right)\left(\epsilon - \frac{1}{2}\right). \quad (5.79)$$

Capital earns the same in any core-periphery outcome, meaning that each unit of capital earns the world's average reward in any long-run equilibrium, and this is given by total payments to capital divided by total capital $\frac{\mu E}{\sigma K}$. This must equal $c_C(\rho + \delta)$ so that

$$K = \frac{bE}{c_C(\rho + \delta)}. \quad (5.80)$$

Solving together with our earlier expression for E we get:

$$K = \frac{\frac{\mu\rho}{\sigma(\rho+\delta)}L}{\left(1 - \frac{\mu\rho}{\sigma(\rho+\delta)}\right)\rho c_C}, E = \frac{L}{1 - \frac{\mu\rho}{\sigma(\rho+\delta)}}. \quad (5.81)$$

The equality of capital earnings in long-run equilibria also imply that B is unity in such cases, so that

$$E_1 = \varpi L + \lambda \frac{\mu}{\sigma} E - \lambda c_C \delta K. \quad (5.82)$$

Using the expression for K , we have

$$\epsilon = \frac{1}{2} + \frac{\mu\rho}{\sigma(\rho + \delta)} \left(\lambda - \frac{1}{2}\right) + \left(1 - \frac{\mu\rho}{\sigma(\rho + \delta)}\right) \left(\varpi - \frac{1}{2}\right). \quad (5.83)$$

From this expression we can note the endogenous nature of the expenditure share as it depends on λ . In the CC model, production shifting leads to expenditure shifting. By inserting this expression of ϵ into the expression of λ , we get :

$$\lambda = \frac{\frac{1-\tau}{2(1+\tau)} + \left[\left(1 - \frac{\mu\rho}{\sigma(\rho+\delta)}\right)\left(\varpi - \frac{1}{2}\right) - \frac{\mu\rho}{2\sigma(\rho+\delta)}\right] \frac{1-\tau}{1+\tau}}{\frac{1-\tau}{1+\tau} - \frac{\mu\rho}{\sigma(\rho+\delta)}}. \quad (5.84)$$

In the case of symmetric regions, this means that the equal division of the industrial sector is always a long-run equilibrium.

In this symmetric region case, we can see that the scissor diagram (Baldwin et al., 2003: p. 144) is quite similar to the FC model, in that λ has slope $\frac{1+\tau}{1-\tau}$. As such, the CC model displays both the home market effect and home market magnification. The difference from the FC scissor diagram is that expenditure share ϵ is positively sloped, rather than vertical like ι in the FC model. The gradient of ϵ is $\frac{\sigma(\rho+\delta)}{\mu\rho}$. Since λ slopes upwards, we can see that production shifting leads to expenditure shifting, and since ϵ also has positive gradient, expenditure shifting leads to production shifting. That is, circular causality operates in the CC model. Since both lines pass through the midpoint of the graph, the symmetric outcome is seen to be a long-run equilibrium. The core-periphery outcomes are on ϵ rather than λ because operating profits are not equalized at these points. As in the FC model, all points to the right of λ imply that

$\pi_1 > \pi_2$, but the FC model attributes inter-regional capital flows to this price pressure, whereas in the CC model, since capital is immobile, this price pressure results in increased construction of capital in the north and zero construction in the south. The CC scissor diagram also demonstrates the difference between cases of high and low trade freeness τ . When trade is very free, as in panel a) of Figure 5.5, the line given by λ is steeper than ϵ , and as trade becomes less free, ϵ becomes steeper than λ . If there were a small positive shock to λ , starting from the symmetric-region outcome, and such a production shock were allowed to alter market size, then the shock would take the economy to a point where $\pi_1 > \pi_2$. It is then clear that the symmetric equilibrium is unstable whilst the core-periphery equilibria are stable, since a shock to either of these

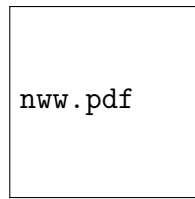


Figure 5.5: Dynamics of the Constructed Capital Model

equilibria will move the economy to a position where λ tends to increase back to its initial value. When trade is less free, as in panel b) of Figure 5.5, the symmetric equilibrium is stable, as a shock will move the economy to a point where λ tends to decrease back to its initial values, whilst the core-periphery outcomes are unstable as any shock will cause λ to move towards the symmetric outcome. The break and sustain point occur when the curves λ and ϵ have the same gradient, $\frac{1+\tau}{1-\tau} = \frac{\sigma(\rho+\delta)}{\mu\rho}$. This means

that both break and sustain point is given by $\tau = \frac{\mu\rho - \sigma(\rho+\delta)}{\mu\rho + \sigma(\rho+\delta)}$. A catastrophic agglomeration occurs in this case, since the symmetric outcome becomes unstable with the core-periphery outcomes becoming stable, as in panel c) of Figure 5.5.

The set of unstable trade freeness expands as ρ increases and δ and σ decrease. δ dampens the expenditure rise that comes with a higher stock of capital as higher depreciation means that more resources must be set aside for maintenance, so that a decreasing δ increases the expenditure shifting that comes with production shifting, expanding the instability set. ρ raises the profit rate as it increases so that it amplifies

the expenditure shifting that comes with production shifting, strengthening agglomeration and expanding the instability set. The symmetric equilibrium is only stable if $\frac{d(\pi_1 - \pi_2)}{d\lambda}$ is negative, so that a positive shock generates capital construction that pushes the economy back to the point at which it started. It is easy to find

$$\frac{d(\pi_1 - \pi_2)|_{sym}}{c_C(\rho + \delta)} = 4 \frac{1 - \tau}{1 + \tau} d\epsilon - 4 \left(\frac{1 - \tau}{1 + \tau} \right)^2 d\lambda \quad (5.85)$$

when $d\lambda > 0$. Unlike the FC model, a change in λ alters the size of both markets as production shifting leads to expenditure shifting. The impact of a shift in the distribution of industry on expenditure shares depends on the share of capital's net income in expenditure, $\frac{\mu\rho}{\sigma(\rho+\delta)}$, which we can label α as a summary statistic for the fundamental strength of agglomeration forces. It can be seen from the above expression that higher trade freeness weakens α but weakens the dispersion force even more.

It has already been shown that the CC model does feature the home-market effect and home-market magnification, as well as demand-linked circular causality. There is no factor migration so that capital production is not incentivized by the local price index, meaning that cost-linked circular causality is not a feature of the CC model.

Catastrophic agglomerations are known to occur at the break point, and it is not hard to see that locational hysteresis can occur above the break point. The CC model displays a number of useful new features. Capital accumulation is the source of per capita growth, and the symmetric equilibrium breaks down with sufficiently free trade when capital is accumulated. This is because increased production in a region will encourage capital accumulation in that region, so that growth affects geography. With factor immobility, the model also says that geography can affect growth in a region. Regions can become growth poles (Perroux 1955) in the sense that freer trade can lead the symmetric equilibrium to become unstable, meaning that a shock will lead to a core-periphery outcome. The instability arises because operating profits rise in the core, inducing an investment rate above what is needed to maintain the region's initial capital stock. This is agglomeration-induced, investment-led growth, since the increased investment rate boosts the capital-to-labour ratio, and thus per capita income and output. The final, and perhaps most interesting, feature is that of permanent income differences. The CP model is a neoclassical growth model in that it predicts convergence of regional incomes. At the break point of the CP model, all industry moves to the core region raising per capita income in that region so that an income gap is created, with inter regional per capita incomes diverging due to cost-of-living effects. In the CC model, the core-periphery outcome is due to a change in capital-to-labour ratios so that per capita income is always higher in the core region. In the CC model, progressive trade liberalization leads to the core-periphery outcome and a permanent income gap, contrary to the assertion (Barro and Sala-i-Martin, 1995) in the growth literature, economic integration in the CC neoclassical growth model produces divergence in per

capita income.

5.4.2 Agglomeration and Endogenous Growth

The CC model can be extended to include endogenous growth. The basic structure of the Global Spillovers (GS) model (Martin and Ottaviano, 1999) are almost identical to the structure of the CC model, with the difference being in the C sector technology. Continuous growth in the GS model is driven by continuous expansion in the world knowledge base. Each unit of capital is associated with a variety, so that the range of goods produce expands as well. In a Dixit-Stiglitz setting, this leads to a falling rate of operating profits per variety, implying the existence of a point where growth stops as the operating profits from a variety do not cover the marginal cost of constructing a new unit of capital. For continuous growth to be possible, the cost of new units of capital must decrease over time. The assumption made by is that the marginal cost of producing capital decreases as the cumulative production of ideas increases. The C sector employs only labour, producing an unit of capital with c_C units of labour, so that the marginal cost of an unit of capital is $w_L c_C$. The 'learning curve' assumption made implies that c_C decreases as the C sector's cumulative output rises due to technological spillovers, $c_C = \frac{1}{K}$. Perfect competition is maintained by the assumption that firms in the C sector are too small to internalize spillovers, so that each firm consider c_C when setting a price for capital. It is also assumed that instantaneous utility is given but the usual method of a CES sub-utility function nested within a Cobb-Douglas utility function, together with a CES intertemporal utility function with th elasticity of intertemporal substitution set to one for simplicity so that

$$U = \int_{t=0}^{\infty} e^{-\rho t} \ln C dt, C = C_A^{1-\mu} C_M^{\mu}, C_M = \left(\int_{i=0}^n q(i)^{\rho} di \right)^{\frac{1}{\rho}} \quad (5.86)$$

where ς is the rate of time preference. The final assumption is that of a perfect financial market for investment in innovation that allows perfect diversification, and the existence of a safe bond bearing interest r in the north and r^* in the south in units of A . This is to ensure that there is no aggregate depreciation uncertainty for capital.

The short-run outcomes for the GS model are identical to those in the CC model, provided it is remembered that $c_C = \frac{1}{K}$. At a global level, expenditure equals factor income minus spending on new capital, so we have

$$E = L + \frac{\mu}{\sigma}E \tag{5.87}$$

as before. Global spending on innovation is L_C meaning

$$E = L + \frac{\mu}{\omega}E - L_C, \tag{5.88}$$

which solves to

$$E = \frac{\sigma(L - L_C)}{\sigma - \mu}. \tag{5.89}$$

The difference now is that L_C involves the creation of net new capital, so that $(\gamma + \delta)K$ is the amount of new capital required to keep the stock of capital growing at rate γ . We

then see

$$E = \frac{\sigma(L - \gamma - \delta)}{\sigma - \mu}. \tag{5.90}$$

It is easy to see that

$$E_1 = \varpi L + \lambda \frac{\mu}{\sigma}BE - \lambda(\gamma + \delta), \tag{5.91}$$

so that

$$\epsilon = \frac{\frac{\mu T^{\sigma-1} \lambda}{\sigma G_2^{1-\sigma}} + \frac{(1-\frac{\mu}{\sigma})[\varpi L - \lambda(\gamma+\delta)]}{L-\gamma-\delta}}{1 - \frac{\mu \lambda}{\sigma G_1^{1-\sigma}} + \frac{\lambda \mu \tau}{\sigma G_2^{1-\sigma}}}. \quad (5.92)$$

This means that the relative market size depends upon the long-run variables γ, λ .

Optimal intertemporal consumption is expressed by the Euler equation

$$\frac{\dot{E}}{E} = r - \varsigma \quad (5.93)$$

That is, the marginal benefit of postponing consumption minus the marginal cost of postponing consumption is equal to the rate of decline of marginal utility given log preferences.

Finding long-run equilibria is, again, very similar to the CC model. The value of introducing a new industrial variety in the north ν_1 . The big difference is that in the GS model, long-run operating profits are decreasing, as the continuous introduction of varieties crowds the market. Since both E and λ are constant in the long-run, the average operating profit is $\frac{\mu E}{\sigma K}$ and the individual's profit stream falls at rate γ . Then

$$\nu_1 = \frac{\pi}{\varsigma + \delta + \gamma}, \quad (5.94)$$

and analogously for the south. Substituting E into the expression for the present value of the profitstream, we get

$$\gamma = \frac{\mu}{\sigma} L - (1 - \frac{\mu}{\sigma}) \varsigma - \delta, E = L + \varsigma. \quad (5.95)$$

We can also find

$$\lambda = \frac{1}{2} + \left(\frac{1+\tau}{1-\tau}\right)\left(\epsilon - \frac{1}{2}\right), \quad (5.96)$$

and this expression can be used to simplify the expression for spatial division of expenditure in the long run,

$$\epsilon = \frac{\varsigma}{L + \varsigma} \lambda + \left(1 - \frac{\varsigma}{L + \varsigma}\right) \varpi. \quad (5.97)$$

The growth of capital is related to growth in real income. World income is equal to

$$L\left(1 + \frac{\mu}{\sigma}\right) + \frac{\mu}{\sigma} \varsigma \quad (5.98)$$

and does not grow over time, but the price index in both nations decreases thus implying sustained growth in real incomes. Price indices for both regions in the symmetric equilibrium is given by:

$$\left[\frac{(1 + \tau)n}{2}\right]^{\frac{\mu}{1-\sigma}} \quad (5.99)$$

. The number of varieties n manufactured increases at rate γ meaning that the price indices decrease at a rate of $g = \frac{\mu}{\sigma-1}\gamma$, where g is GDP growth. Analysis of the equilibria for the GS model proceeds very similarly to that for the CC model. The outstanding new feature is the capacity for endogenous long-run growth. Endogenous growth makes the flow of relocating capital permanent meaning that when regions are asymmetric in terms of capital and private knowledge capital is mobile then capital will relocate continually. The direction of relocation depends on transport cost, with capital moving to rich regions when trade is free, but relocating to poor regions when trade is restricted. It is also possible to go one step further than the GS model to allow the marginal cost of an innovation to differ in either region. This is the Localised Spillovers (LS) model (Baldwin et al., 2001). Specifically, the learning curve becomes

$$\frac{1}{KA_1}, \frac{1}{KA_2}. \quad (5.100)$$

This is for

$$A_1 = \kappa + \xi(1 - \kappa), A_2 = \xi\kappa + 1 - \kappa \quad (5.101)$$

applying in the north and south respectively, where ξ is a measure of the degree of globalization of knowledge spillovers. The short-run equilibrium is almost identical to the GS model, given the assumption about local spillovers. Proceeding from here we get

$$E = \frac{2\zeta}{1 + \xi} + L \quad (5.102)$$

and

$$\gamma = \frac{\mu(1 + \xi)}{2\sigma} - \left(1 - \frac{\mu}{\sigma}\right)\zeta - \delta \quad (5.103)$$

where both regions are innovating at the same rate. The main new features of the LS model is the consideration of endogenous growth as an agglomeration force and knowledge spillovers as a force of dispersion. The intuition is straightforward. Any shocks will cause capital stocks in each region to diverge, lowering the cost of replacing capital faster in the core and attracting more resources to the C sector of that nation. The LS model also differs from other CP models by allowing economic integration to be ambiguous, rather than a straightforward agglomeration force. The other new features are that economic geography affect growth, and that the loss of industry is not unambiguously harmful to the periphery when there are trade costs. That is, trade integration triggers agglomeration, which in turn shifts the economy to a higher growth path, and that this dynamic gain can compensate for the static loss due to relocation of firms.

An endogenous growth model of geographical economics with inter-regional labour mobility is provided by Baldwin and Forslid (2000), combining the structure of the CP

model with the dynamic framework of intertemporal optimisation in a bid to explain per capita output growth. The Baldwin-Forslid model varies from the CP model by assuming that production of a manufactured variety requires a one-off fixed cost of an unit of capital K and a variable cost in terms of labour. The cost function is given by $r + w\beta x_i$ where r is the reward of capital, w is the wage rate β is the unit labour requirement, and x_i is the output of variety i . The capital needed for the production of manufactures is created in the innovation sector which produces under perfect competition with labour as its only input and the flow of new capital given by $F = \frac{L_I}{c_I}$..

One unit of capital is made using

$$c_I = \frac{1}{(K_1)_{-1} + \zeta(K_2)_{-1}}, 0 \leq \zeta \leq 1 \tag{5.104}$$

units of labour. The subscript -1 indicates that knowledge spillovers have a one-period time lag leading to a fall in the unit labour requirement, and ζ represents the degree to which knowledge accumulated in region 2 contributes to the stock of knowledge in region 1 so that $\zeta = 0$ indicates that knowledge is local and $\zeta = 1$ indicates that global knowledge enriches all regional knowledge stocks. Meanwhile, capital depreciates in one period. The innovation sector benefits from knowledge spillovers but the unit labour requirement for the sector falls as output rises. This fall is required for long-run growth.

Manufacturing activity will affect the degree of knowledge spillovers and firms will benefit more from locally accumulated knowledge. Intertemporal preferences are given

by

$$U = \int_{t=0}^{\infty} e^{-\rho t} \ln Q_M^\mu A^{1-\mu} dt. \tag{5.105}$$

Migration arises from differences in real wages with the wage pressure related to the log difference between the present value of real wages to allow for forward-looking behaviour. Manufacturing workers then take account of expected future development in

real wages when deciding to migrate. The results are derived using intertemporal optimization, with only three possible stable long-run equilibria. The distribution of the manufacturing workers remains stable over time at complete agglomeration in one region or at the interior equilibrium with an even division of manufacturing between regions. The difference between this model and the static CP model is that manufacturers keep innovating indefinitely, so that the economy grows and contemporaneous utility rises without bound.

5.5 Implications of NEG for North West Wales

The broad implications of geographical economics for North West Wales are easily understood, though giving too much weight to the interpretation is unwise given that theoretical models are merely simplified approximations of reality. The title of this thesis *Where Model Meets Reality* should not be construed as an invitation to confuse model and reality. This is especially true given evidence (Fingleton, 2011) that predictions from NEG-type models does not accord well with empirical data from small (sub-regional) areas. However, this thesis is premised on the idea that such modeling results and predictions can still be useful as guides to an economy when tempered by qualitative study.

The manufacturing (M) and agriculture (A) sector are so called for convenience rather than for any real purpose, and are better thought of as ‘sector producing for export’ and ‘home consumption sector’. This is, more or less, identical to the ideas on basic and non-basic sectors discussed in Chapter Two. It also means that we can build a North West Wales core-periphery model by taking μ , the non-basic share of labour, to be 0.245 as follows from Chapter Two. The original core-periphery model of NEG has some very simple implications for North West Wales, which are highly informative even though the results are general.

Firstly, as transport costs decrease, economic activity increasingly moves away from peripheral regions and agglomerates in the core regions of the economy, even if the intermediate goods model tells us that this may happen with very low transport costs as well. In the North West Wales model, the diversified transition at which there are three stable equilibria occurs at $T = 1.35$. Although the real economy is infinitely more complex than a multi-region NEG model, this can be interpreted as suggesting that economic activity will move away from North West Wales and towards, in the first instance, Liverpool and Manchester, whenever transport or communication link between the regions, such as the A55, are improved. Moving away from the core-periphery model to a more general (and realistic) case where transport costs can vary between regions, it is clear that lower transport costs means lower price indices, favouring urban living patterns over the rural patterns that hold sway in much of North West Wales. Increasing μ from 0.245 means that the transition point with three equilibria is at a higher transport cost, so that transport costs may be higher but still disadvantaging the peripheral region as the non-basic sector gets bigger. The elasticity of substitution σ works in the opposite direction so that an increased taste for variety the economy is advantageous to a peripheral region. Taken together, these points suggest that engaging in a variety of low-volume artisan and niche production, rather than homogeneous mass production, may be beneficial to peripheral regions such as North West Wales, though not to the point of dramatically reducing economic openness. It should also be considered that maintaining high transport costs for basic goods can benefit the peripheral region, though this is a speculative idea in reality.

Whereas the FC and FE models, though advanced in tractability, are not substantially different from the CP model in terms of results, the CC model does present some implications for North West Wales. Since capital accumulation is the source of per capita growth, and the symmetric equilibrium breaks down with sufficiently free trade when capital is accumulated, it is important that transport costs are maintained to

ensure that the results of business development stay in the peripheral region and that growth in the periphery does not shift to the core region due to the periphery's geography. It is suggested by the CC model that maintaining North West Wales (and Wales as a whole) as a region need not mean targeting the equalisation of income, since equalisation will not secure a symmetric equilibrium in the CC model. Lastly, the introduction of endogenous growth implies capital investment in North West Wales when transport costs are high, that the region's economic geography, as presented in Chapter Two, matters to economic planning,

5.6 Conclusion

This chapter has demonstrated how models of the CP family with Dixit-Stiglitz monopolistic competition have evolved with the inclusion of new features and the inclusion of neoclassical and endogenous growth. The final paragraph discusses other extensions of geographical economics thought that are not central to the following chapters of this thesis. This demonstrates how cross-fertilisation and the introduction of alternative mathematical methods have enhanced the geographical economics. In most models of the geographical economics so far, agglomeration forces arise solely from pecuniary externalities through linkage effects among consumers and industries, neglecting all other possible sources of agglomeration economies such as knowledge externalities and information spillovers. This section has introduced some new ideas, that will be important in later chapters. The CP model and standard setup of geographical economics represents a synthesis of polarization theory and neo-classics. Agglomeration tendencies of industrial production are explained in a methodologically rigorous fashion. But a series of limiting suppositions are also encountered, such as the no-black hole condition, which are diametrically opposed to reality. In this chapter we have highlighted all these assumptions and suppositions, and their consequences on

spatial agglomeration processes. I have focused in particular on transport costs for agricultural goods, spatial spillover effects, the presence of non-tradable services and limited mobility of the labour force. It becomes clear that a tendency towards disagglomeration of production is more marked the higher the transport costs for agricultural goods, the stronger the positive spillovers between the regions, the more income spent on services, the more limited the regional mobility of workers. The chapter has also discussed more recent developments in the field that make the geographical economics much more compatible with reality than the original version, and far more tractable as well.

In particular, two conclusions can be drawn because modifying the CP model in the right way allows us to explain any particular concentration of industrial production that happens in reality by means of the limited mobility of the labour force, whereas the original geographical economics is able to give reasons for only total agglomeration.

Firstly, in a world of falling transport costs the result of the original model of geographical economics is an inevitable tendency towards an increasingly strong agglomeration of industrial production. Contrary to this simple conclusion, in the modified geographical economics models, it is less certain what tendencies prevail. In addition to diminishing transport costs, which have a concentrating effect, positive spatial spillovers and non-tradable services are two factors that have a deconcentrating effect because of their growing significance. Development of the geographical economics is allowing far better modeling of regional economies, and the evolution of this theory is far from over. However, care must be taken not to blindly accept its predictions for North West Wales as it does not perform well empirically with relation to small areas, so that this chapter must be considered as a more general review of the field.

The aim of this review was to present models in a tractable form with the emphasis on realistic features of the models Chapter Six develops on the theoretical output of this chapter, by considering the role of the public sector in the economy. The decision to

focus on the public sector is informed by Chapter Two which highlights the importance of this sector in North West Wales. However, like this chapter, it is a purely theoretical and general discussion. It is in Chapter Seven, following a general treatment of the policy implications of geographical economics, that the policy implications for North West Wales are discussed.

CHAPTER SIX

Periphery and the Public Sector

6.1 Introduction

This chapter will expound a new geographical economics model developed for this thesis and published in James et al. (2012). This is a public-private sector model which will aim to demonstrate the over-representation of the public sector in peripheral areas. The modeling activity follows the review presented in Chapter Five. though the focus on the public sector is informed by the importance of the public sector in North West Wales. In particular, the discussion can be related to the public sector in North West Wales and ‘crowding out’ by interviewees in Chapter Three of the thesis.

The first section of this chapter will review the groundwork for this model, including other models dealing with public goods. The second section develops an original model including public contribution (a flat tax) to the provision of a public service. The third section discusses the possible development of this model, and the final section discusses the public sector’s role, as interpreted by geographical economics, in North West Wales.

6.2 Where The Public Sector Fits Into Geographical Economics

The absence of the public sector in the discussion of Chapter Five is notable because large public sectors seem to be a feature of developed, Western peripheral economic regions. This is relevant to the profiling of North West Wales in Chapter Two given that North West Wales has an unusually large (for the UK) public sector. This section focuses on models of geographical economics that inform original modeling activity in subsequent sections.

Südekum (2003) produced a model of non-tradable goods and services using the same machinery as CP models. In the standard models of geographical economics, such as CP, there is only an industrial and an agricultural sector, and no services. Südekum

introduced an appropriate extension to the model which suggested that non-tradable services S exists, for which, borrowing from export base theory, there is a demand because of the income generated in the other sectors. The non-tradable services include both private and public services. These household and manufacturing oriented services make up a considerable proportion of total employment. The paper finds a relationship between transport costs and the employment share of services, and shows that T falls to 1 as industry is eliminated by the services sector. An even distribution of production becomes manifest in both regions with $T = 1$, because no manufactured goods have to be transported, making transport costs irrelevant. The presence of non-tradable services then has a disagglomerating effect, even when low transport costs are favouring agglomeration. However, this model is unsatisfactory for two reasons; firstly, experience tells us that non-tradeable services do not have a disagglomerating effect at low transport costs, and secondly that the effect does not exist for all non-tradable services. These reflections suggest that investigation of distinct private and public sector goods is required.

In the models of the geographical economics, regions are separated by transport costs and agglomeration is brought about by factor mobility due to differences in regional economic incentives. Because of decreasing average costs in production, factor rewards are higher, the higher the local demand is. A high share in total expenditure thus leads to an even higher share in industrial capital. This indicates obvious points at which public policy can affect this mechanism. Firstly, and most clearly in direct intervention, tax policy directly affects net factor income, in turn influencing factor mobility. Most studies of public policy within the geographical economics take this aspect on board (Baldwin and Krugman, 2004; Behrens, 2004; Borck and Pflger, 2006; Brakman et al., 2002, 2006; Commendatore et al., 2005, 2006, 2008). Dupont and Martin (2006) analyzed the effect of different regional subsidies to poor regions on industrial location, employment, income inequality and welfare in the presence of agglomeration forces when

firms are mobile. Such subsidies have a greater effect on location when trade costs are low. With mobile capital, regional subsidies such as tax breaks in the poorer region lead to higher profits for firms in both regions. If financed at the national level, such subsidies given to firms in the poor region increase inequality between and within regions. Finally, with relocation costs, such regional subsidies may hurt the poor region.

There are many other ways of including the public sector in geographical economics models, both explicitly and implicitly by proxy. Applying taxes to a model is one of the simplest ways of representing the public sector. Lanaspa et al. (2001) presented an extension to Krugman's core-periphery model that introduces the public sector as a new economic agent through assuming proportional taxes on agricultural rents and wage rents. They demonstrated theoretically that regions with lower tax-burdens in net terms offer greater incentives for firms and consumers to locate there. This greater efficacy on the part of the public sector can be placed in relation to a higher level of or quality in the provision of public services, and the effect of these two elements on location decisions would be equivalent in their impact. The paper also shows that the introduction of new parameters in the model alters the influence on the equilibria of those already existing so that the new relation of interdependence between them means that the effects of the transport costs on the outcomes are not monotonous. Gruber and Marattin (2009) showed that the core-periphery pattern becomes more sustainable for a wider range of trade costs when substantial public investment in infrastructure is introduced. Increasing either the tax rate or the fraction of public revenues devoted to infrastructure renders the agglomeration equilibrium even more sustainable, unless the tax rate becomes too high. This work confirms that of Andersson and Forslid (2003), which shows that an equilibrium with mobile workers dispersed across countries is destabilized by increased taxes on these workers, even for perfectly coordinated tax increases. It is also shown that while tax competition gives rise to standard distortions in a tax-competition game when mobile workers are dispersed, different distortions result

when they agglomerate in one country. Gruber and Marattin also demonstrated that the effects on prices are the following. With respect to the regions' sizes, for the region ending up as periphery, generally the price index for manufacturing goods decreases, since the negative import price effect prevails on the positive price index effect. This effect occurs due to the relocation of firms away from the periphery into the core, and through importing these manufacturing goods in the periphery. Trade costs are low enough to render this possible. For the region ending up as the core, the price index is rather high, since the distortionary effect of increased taxation dominates. The price index in the setting with infrastructure spending approaches the value of the same index in the setting without infrastructure spending as trade costs approach zero. The former price index decreases as trade costs increase, thereby displaying the beneficial effects of public investment. Centrally financed infrastructure investments promote economic development in the periphery. Infrastructure being financed by the central region only makes its equilibrium agglomeration path sustainable over the whole range of trade costs. Furthermore, the periphery can devote all its tax revenue to local demand support, thereby generating additional income and a positive home market effect. Pecorino (2009) developed a model of public good provision in which private goods are supplied in a monopolistically competitive market. In this context, increases in the size of the group are increases in the population of a society. Pecorino found that increases in population lead to reduced public good provision. The reason is quite simple; as population increases, the number of private goods available for consumption also increases. This raises the marginal utility of income and increases the opportunity cost of contributing to the public good. While the level of voluntary contributions falls in this model, the optimal level of provision is shown to increase with population. Thus, there is a growing divergence between the optimal and equilibrium levels of provision of the public good. The model is important as, although not a geographical economics model, it is based on Krugman's (1979) paper on increasing returns. This means that it

can, potentially, be extended into an geographical economics model. Taking lessons from the papers explored above, that is the aim of this chapter. The provision of public goods can also impact upon the migration decision (Baldwin et al., 2003). However, public policy is also a central factor determining both the level and the composition of local demand. In a framework with decreasing average costs this directly influences gross factor rewards. Income taxes change the disposable income and thus private expenditures; public expenditures are typically different from the private ones as far as their regional and sectoral structure is concerned. Public expenditure in the core-periphery model (Trionfetti, 1997; Brülhart and Trionfetti, 2004) creates a new and independent source of backward linkage. This ensures that incomplete specialization occurs in the long run, and it is shown that there is a stable equilibrium where the manufacturing is divided between the two countries in multiple example cases. This result occurs regardless of the value of the structural parameters, so that location matters even in the absence of transport costs. It is also true that public expenditure is an effective instrument that can be used to influence the long run geographical distribution of manufacturing. This distribution, in fact, takes any desired value in response to the setting of the parameters of public expenditure. For a quite large constellation of values of the parameters, it is simply the allocation of expenditure that affects equilibrium location; in these cases the level of expenditure can be small. This is important because it enhances the viability of the instrument. For a small constellation of values of the parameters, it is necessary that the level of expenditure is high in order to obtain the same effectiveness. The important policy implication of this two results is that reduction in transport costs, when accompanied by appropriate public expenditure never results in geographical agglomeration. Rather, the equilibrium location can be influenced through the use of the policy instrument. Brülhart and Trionfetti (2004) looked at the location effects of public procurement theoretically in models with both perfectly competitive and monopolistically competitive sectors and in models with

cumulative agglomeration features. While this analysis confirms that home-biased procurement is neutral in perfectly competitive sectors, it suggests that there are pull and spread effects in monopolistically competitive sectors. The pull effect means that a country with relatively large home-biased government expenditure on a certain good will tend to host a relatively large share of world production of that good. The spread effect means that symmetrically large home-biased public procurement reduces the likelihood and intensity of agglomeration of increasing-returns industries. The latter effect is at the core of Commendatore and Kubin (2006) where it is explored whether sectoral differences in public policy may lead to industry agglomeration. Commendatore et al. (2008) consider two effects arising from public policy decisions on expenditures; the demand effect and the productivity effect. The interplay of these two effects determines the final impact of an increase in productive public spending in one region on the spatial distribution of firms. Furthermore, the latter result is influenced by the way in which tax payers of the two regions contribute to the financing of productive public expenditures. Finally, in the case of symmetric regions, the impact of an increase in productive public services is unambiguously welfare enhancing. They find that assuming that productive expenditures could be used effectively to enhance factors' productivity in a backward region, policy measures aimed at reducing regional asymmetries could work only if advanced regions contribute to the financing of such policies. Roos (2004) demonstrated that the provision of a public good, which is financed by a tax on an immobile local factor only, can induce households to immigrate. If this results in a higher income of the immobile factor, the supply of the public good can be larger triggering further immigration. A fiscal externality works as a centripetal force which can cause agglomeration. Local governments, which maximize the utility of residents receiving income from housing, have an incentive to provide the public good strategically. Regional competition for mobile population thus causes overprovision of the public good. With regional productivity differences, the regions strategic behaviour distorts the

interregional labour allocation so that too few workers live in the more productive region. These inefficiencies can serve as arguments against the decentralized provision of local public goods. If the regional supply of the public good were determined centrally, the negative externalities would be internalized. All individuals in the model demand both the consumption good and housing and only homeowners are taxed; the supply of housing is not fixed. But even if it were inelastic, the tax would influence the migration decision because the mobile individuals benefit from the public good without having to bear a tax burden. This difference is important because immigration due to higher taxation of immobile property is the model's central mechanism. The model does not rely on increasing returns to scale in production or technological externalities. There is an externality which is due to a pure public good. The agglomeration forces completely arises from a pecuniary or fiscal externality. This contrasts sharply with the existing theories explaining agglomeration. Looking for causes of agglomeration, one is not restricted to Marshallian externalities or market size effects as in Krugman's *New Economic Geography*. In addition, governments can influence the location decision not only of firms but of households as well. The agglomeration of population is thus not necessarily a consequence of the agglomeration of firms but can have its own causes. Transport costs can be reduced by public expenditures for infrastructure (Martin and Rogers, 1995; Martin, 1999). Martin and Rogers (1995) developed a FC model in which public policy plays a role in facilitating trade both within and across regions. The FC model departs from the CP model for two crucial assumptions; a fixed capital requirement for each variety of the differentiated good and workers' international immobility. In contrast with Krugman (1991a), the mobile factor (capital) earnings are repatriated and spent where the capital owner resides. Therefore the typical CP feature of demand-linked circular causality — production changes brought about by factor movements yield expenditure switching that in turn generates further production changes — does not arise. Furthermore, since costs-of-living are irrelevant to the

production location decisions of capitalists, the cost-linked circular causality of the CP model shifts in production alter prices inducing workers migration with further production shifting is eliminated. Hence, the CP outcome of catastrophic agglomeration in one region is ruled out; however, agglomeration still occurs due the working of the home market effect. An improvement in domestic (international) infrastructures is modelled as a reduction in transaction costs within (across) regions. Hence, public infrastructures are viewed as any publicly provided ‘good, facility or institution which facilitates the juncture between production and consumption’ (Martin and Roger, 1995, p. 336), affecting the actual amount of output that reaches the consumer. In this view, public infrastructure and services affect industrial location through demand, while neither domestic nor international public infrastructures are assumed to affect the production function, that is, any impact on factors’ productivity is neglected. Given these assumptions, better domestic infrastructures imply higher demand and lower prices for industrial goods produced in the region, thus attracting mobile capital. When regions are integrated, differentials in domestic infrastructures drive the relocation of capital, with firms tending to locate in regions with better infrastructures. Furthermore, a higher level of international infrastructure tends to magnify such a relocation process. Hence, regional policies aimed at improving domestic infrastructure in poorer regions favour the relocation of industrial firms in these regions.

On the other hand, improvements in international infrastructures lead to less concentration in poorer regions.

Public expenditure can also affect factor rewards in a region through its effect upon productivity. This aspect has been also studied to some extent in the geographical economics models (Brakman et al., 2002, 2006). Brakman et al. (2002) introduced the government sector in the FE model developed by introduced in Chapter Five assessing the effectiveness of public spending as an instrument for locational competition across regions. The crucial assumption in the FE model is that producing a new manufactured

variety requires one unit of mobile human capital. Contrary to the FC model, the mobile factor and its owner move together, which implies demand linked-circular causality. The attractiveness of one region as compared to the other is then judged on the basis of real rewards paid to the mobile factor, thus leading to cost-linked circular causality. In the model by Brakman et al. (2002), the total amount of capital in each region is defined by the sum of public and market capital, with the government assumed to produce public goods by means of the former, while manufactures use the latter. The provision of public goods enhances both fixed and variable costs of manufacturing firms.

Since public goods also enter the utility function of agents, the location decision of capital owners involves, in addition to price levels, tax rates and factors rewards, the relative size of the public goods sector. As a main conclusion, it is shown that local governments can change the equilibrium between agglomeration and dispersion forces, as the introduction of public goods fosters agglomeration. Since the attractiveness of locations for footloose entrepreneurs is influenced by its endowment of public goods, depending on the share of total regional capital used to produce public goods, a periphery can turn into a core and vice versa.

Before we go on to some original modelling, it is worth exploring the literature on transport costs and peripherality. This is because there are clear links between high transport costs and economic reliance on the public sector. Behrens et al. (2006, 2007) studied the impacts of changes in international trade and domestic transport costs on the internal geography of countries in the presence of geographical asymmetries. To do so, they developed a two-country four-region model in which one country has a region that exhibits a 'geographical advantage' in better access to the other country's markets.

The paper found that the economies of the trading partners are interdependent in equilibrium and that agglomeration in one country then reduces the occurrence of agglomeration in the other. This means that certain quirks of a shared physical geography build strong connections between economies. We also show that remoteness

need not be a geographical disadvantage, since a landlocked region may well be the location that attracts the larger share of firms. This is so when internal transport costs are high and, therefore, act as a barrier to competition from abroad. Ramcharan (2009) asked what determines the spatial distribution of economic activity, and why economic activity is distributed in a core-periphery pattern in some countries. The paper uses contemporary sub-regional data on the spatial distribution of economic activity for a large cross section of countries, as well as information on roads, rails and surface topographies to help understand the role of domestic transport costs in shaping economic geography. A significant role for physical geography and transport costs in determining the location of economic activity is suggested by the evidence presented. Countries with rougher surfaces have less developed road and rail transport networks, and greater spatial concentration of economic activity.

6.3 A Public/Private Sector Model

Does public spending displace an equal amount of private spending? The notion has shaped public discourse and policy-making since the 1970s (Spencer and Yohe, 1970), though some economists (Malley and Moutos 1996) argued otherwise with little impact on mainstream economics. Likewise, many economic geographers have long argued for the role of the public sector in regional economies, with such discourse all but ignored (Overman, 2004) by mainstream economics and only in the earliest stages of exploration by geographical economists (Trionfetti, 1997). This issue has substantial bearing on contemporary political discourse on budget cuts aimed at deficit reduction. At the same time, neoclassical approaches to economic development in the face of this austerity are forcing the retreat of regional policy, despite the positive effect on employment of a regional capital subsidy (Swales, 1981). The arguments made for this point to large public sectors in peripheral regions, suggesting an ‘unhealthy’ economic

dependence on public sector employment and spending. The solution offered is to cut public spending, and let the private sector expand. However, counter-arguments are often made on the basis that it is not the public sector that is too big in peripheral region, but that it is the private sector that is too small. A large public sector is closely associated with peripheral economies, although it is unclear to what extent it is a cause of peripherality rather than a symptom.

Having reviewed the literature on public good provision and tax competition the next step is to develop a model that shows how a country can endogenously become differentiated into a private-sector dominated ‘core’ region and a public-sector dominated ‘periphery’, following Krugman’s (1991a) core-periphery (CP) model with footloose manufacturing labour and a fixed agricultural sector, and the CP model’s ‘identical twin’ (Robert-Nicoud, 2005), built on footloose labour and fixed capital (Forslid and Ottaviano, 2003). The model was inspired by the author’s concurrent qualitative research into the peripheral economic region of North West Wales, the growing interest (Fingleton, 2005; Brakman, Garretsen and Schramm, 2006) in applying new economic geography, and suggestions made in (Fujita and Mori, 2005) as to the future of the new economic geography.

The innovation in this thesis is to take a minimum public sector size, dependent on each region’s population size, to present a public sector increasing in size relative to a falling population. This work built on that of Commendatore, Kubin and Petraglia (2008) by including an active public sector as employer, rather than simply a factor influencing production. Their paper develops the basic model of a private sector producing a differentiated good at increasing returns to scale, and a public sector producing a homogeneous public good at constant returns to scale. Preferences are given by a two-stage utility function, with the upper-tier being Cobb-Douglas and the lower tier being CES, with the consumption of the public good being a function of contribution to the public good (tax) and income. In order to take advantage of scale economies in

production whilst seeking to minimize transport costs attached to trade, private sector firms tend to locate in the more heavily populated region, so that they may benefit from the larger demand. However, the location of demand itself depends on the distribution of the private sector. Emergence of a core-periphery pattern depends on transportation costs, economies of scale, and the share of the private sector in national income. The first step to constructing this model is to explore a spatial version of Dixit-Stiglitz monopolistic competition, in the same way as in Chapter Five, but within a mixed public/private economy. As in James et al. (2012). the next step introduces a two-level utility function for this economy, as in the CP model, involving a Cobb-Douglas upper-level and a CES sub-utility function prior to discussing producer behaviour in this economy. Using this, This allowed me to construct a model for public and private sectors in a bi-regional economy, where the size of these sectors are exogenously imposed, before building on the model to allow the size of the public sector in a region to vary endogenously in the size of the region's population. Section Five then highlights the implications of the results that come from these models.

6.3.1 Consumer Behaviour in a Public-Private Model

The economy consists of is a monopolistically competitive private sector (M) with each firm producing a single differentiated good under increasing returns to scale, together with a public sector (P) producing a public service. Labour (L) is taken to be the only input required for either sector, following Brulhart and Trifonetti (2004).

The utility of the representative individual is given by:

$$U = (Q_M)^\mu P(y)^{1-\mu}, \quad (6.1)$$

where Q_M is a quantity index for the differentiated good, and $P(y)$ is consumption of the public good. μ is the overall expenditure share of the private sector, and also the

share of the workforce employed by the sector. Pecorino (2009) assumes a quasi-linear utility function with otherwise similar conditions - the reason a Cobb-Douglas utility function is assumed rather than Pecorino's function is to ensure the complementarity of public and private goods.

The representative consumer of the monopolistically competitive sector has constant elasticity of substitution (CES) subutility function

$$Q_M = \left(\int_1^n q(i)^\rho di \right)^{\frac{1}{\rho}}, 0 < \rho < 1, \quad (6.2)$$

where n is the mass of variety available, and ρ represents the intensity of preference, or taste, for variety, so that ρ near to 1 means that goods are perfect substitutes. Q_M is also the *quantity index* - a composite index of the representative consumer's consumption in this sector.

The representative consumer's consumption in the public sector is given by $P(y)$, which is a production function for the public services. In this function $y = \frac{G}{L}$ is the number of workers that can be hired with a total contribution of G to the public services from a tax on each individual's income. L is the total workforce, with each individual contributing $\frac{P(y)}{L}$.

The individual's budget constraint is equal to

$$E = \int_1^n p(i)q(i)di + \frac{P(y)}{L}, \quad (6.3)$$

where

$$E_M = \int_1^n p(i)q(i)di \quad (6.4)$$

is expenditure on the private good. P is increasing in L .

The consumer's problem is to maximize utility (6.1) with respect to the budget

constraint (6.3), and this can be solved as a two-stage problem. The first stage is to solve the representative consumer's expenditure minimization problem for private goods;

to minimize (6.4) with respect to (6.2).

From the first-order condition for this expenditure minimization problem they can derive an expression relating relative demand for two varieties i, j to their price ratio:

$$\frac{q(i)}{q(j)} = \left(\frac{p(i)}{p(j)}\right)^\sigma,$$

where $\sigma = \frac{1}{1-\rho}$ is the constant elasticity of substitution (CES). Rearranging this equality

and substituting into (6.2) gives

$$Q_M = q(j)p(j)^\sigma \left(\int_1^n p(i)^{1-\sigma} di\right)^{\frac{1}{\rho}} \quad (6.5)$$

Dividing (6.5) by

$$p(j)^\sigma \left(\int_1^n p(i)^{1-\sigma} di\right)^{\frac{1}{\rho}},$$

they get

$$q(j) = \frac{p(j)^{-\sigma}}{\int_1^n p(i)^{1-\sigma} di} Q_M, \quad (6.6)$$

which is the Hicksian demand function, or uncompensated demand function for the private good.

If

$$J = \left(\int_1^n p(i)^{1-\sigma} di\right)^{\frac{1}{1-\sigma}}$$

is defined as the price index for private goods, then demand is given by

$$q(i) = \left(\frac{p(i)}{J}\right)^{-\sigma} Q_M. \quad (6.7)$$

We can also see that

$$\int_1^n p(i)q(i)di = Q_M J. \quad (6.8)$$

The upper-level step of the consumer's problem is to divide expenditure between the consumption of the private and public good. This means solving the upper-level utility maximization problem with respect to the budget constraint

$$E = Q_M J + \frac{P(y)}{L}. \quad (6.9)$$

We can then see that

$$Q_M = \mu \frac{E}{J} \quad (6.10)$$

and

$$P(y) = (1 - \mu)LE. \quad (6.11)$$

Substituting (6.10) into (6.7) gives the Marshallian demand function

$$q(i) = \mu E \frac{p(i)^{-\sigma}}{J}. \quad (6.12)$$

This information means that the indirect utility function can be expressed as:

$$V = \mu^\mu (1 - \mu)^{1-\mu} \frac{E}{J^\mu} L^{1-\mu}, \quad (6.13)$$

where

$$J^\mu L^{-(1-\mu)}$$

is the cost-of living index for the overall economy. Thus far, this treatment of consumer behaviour is little different from Krugman's original model, except that utility is slowly increasing and the cost of living decreasing with L . Thus when there is provision of public services as defined above, the representative consumer's utility increases with the total number of workers in the economy, whilst the cost of living decreases with population size. The price index can again be used to give a mathematical proof the representative consumer's taste for variety.

Consider a multi-regional economy with iceberg transport costs T_{rs} between regions r and s for private goods, so that only $\frac{1}{T_{rs}}$ units of private good arrives at its destination with the rest melting away en route. Assume that all varieties produced in one location have the same price. This means that

$$J_s = \left(\sum_{r=1}^R n_r (p_r T_{rs})^{1-\sigma} \right)^{\frac{1}{1-\sigma}} \quad (6.14)$$

is the price index for goods produced at s . Consumption demand at s for a product produced in r is equal to

$$\mu I_s (p_r T_{rs})^{-\sigma} J_s^{\sigma-1}.$$

To supply this level of consumption, T_{rs} units must be shipped from r . Summing over all regions where the product is sold,

$$q_r = \mu \sum_{s=1}^R I_s (p_r T_{rs})^{-\sigma} J_s^{\sigma-1} T_{rs}. \quad (6.15)$$

6.3.2 Producer Behaviour

The private good is produced by the monopolistically competitive M-sector. The production of a quantity Q_r of any variety produced at location r requires the private sectors labour input $L_r - y_r$ of amount l_r given by

$$l_r = F + cq_r. \quad (6.16)$$

This is where F is the fixed cost, and c is the marginal cost of labour. With a factory gate price p_r for the private good, and wage w_r for workers at r , a firm at r has profit

$$\pi_r = p_r q_r - w_r (F + cq_r). \quad (6.17)$$

Consumer demand q_r is given by the demand function worked out in the last section.

Profit maximization then gives

$$p_r = \frac{cw_r}{\rho} \quad (6.18)$$

for the differentiated good produced at r . There is free entry and exit in response to profits, and the pricing rules give:

$$\pi_r = w_r \left[\frac{cq_r}{\sigma - 1} - F \right]. \quad (6.19)$$

The zero-profit condition then implies that the equilibrium output of an active firm is

$$q^* = \frac{F(\sigma - 1)}{c}, \quad (6.20)$$

and the equilibrium labour input condition is

$$l^* = F\sigma.$$

This means that

$$n_r = \frac{(L_r - \frac{S}{I})}{F\sigma}. \quad (6.21)$$

Using (6.15) they can then see that

$$q^* = \mu \sum_{s=1}^R I_s(p_r)^{-\sigma} (T_{rs})^{1-\sigma} J_s^{\sigma-1} \quad (6.22)$$

This equation can be rearranged to show

$$p_r = \left[\frac{\mu}{q^*} \sum_{s=1}^R I_s (T_{rs})^{1-\sigma} J_s^{\sigma-1} \right]^{-\sigma}. \quad (6.23)$$

By using the pricing rule (6.18) they can then show that the private sector wage is:

$$w_r = \frac{\rho}{c} \left[\frac{\mu}{q^*} \sum_{s=1}^R I_s (T_{rs})^{1-\sigma} J_s^{\sigma-1} \right]^{-\sigma}. \quad (6.24)$$

If they define the real wage at r as the nominal wage at that location deflated by the cost-of-living index J_r^μ , they can write

$$\omega_r = w_r J_r^\mu. \quad (6.25)$$

One unit of the public sector good is produced with a single unit of labour, and the public sector wage is taken as numeraire. Perfect competition in the P -sector forces marginal cost pricing, so that the price of the P -good is unity.

The normalization $c = \rho$, which reduces the pricing equation to

$$p_r = w_r$$

and gives $q^* = l^*$. By setting $F = \frac{\mu}{\sigma}$ they get $n_r = \frac{L_r - y_r}{\mu}$, which means that $q^* = l^* = \mu$.

These normalizations reduce the price index to

$$J_s = \left[\frac{1}{\mu} \sum_{r=1}^R (L_r - y_r) (w_r T_{rs})^{1-\sigma} \right]^{\frac{1}{1-\sigma}}, \quad (6.26)$$

and, as a consequence of this, the wage equation becomes

$$w_r = \left[\sum_{s=1}^R I_s (T_{rs})^{1-\sigma} J_s^{\sigma-1} \right]^{\frac{1}{\sigma}}. \quad (6.27)$$

By considering a two-region version of these equations and inspecting the symmetric equilibrium values, we can derive the home market effect and the price index effect so that locations with a higher demand for the private good tend to offer a higher real

wage, other things being equal and that the location with a larger private sector has a lower price index for private goods because a smaller proportion of the region's private sector competition bears transport costs. It is also necessary to adopt a 'no black hole' condition, as in the usual core-periphery model, because an increase in the number of private sector workers tends to raise real wages.

6.3.3 Public-Private Core-Periphery Model

The basic structure of this model is that of a single factor of production, labour (L), and the sectors M and P discussed above. There are two regions, north (1) and south (2), that are symmetric in terms of tastes, technology, and freeness of trade. Their endowment of the mobile factor of production, L , is given by share

$$\lambda_1$$

in the north and

$$\lambda_2 = 1 - \lambda_1$$

in the south. We choose units so that $L = 1$,

$$L_M = \mu$$

is the world expenditure share of the private sector, and

$$L_P = 1 - \mu$$

is the share of expenditure by the public sector. Production technology for M is as above, with the fixed cost F and the marginal cost c in L , whilst an unit of public good

can be constructed with an unit of L . Labour is paid w_i in region i when employed in the private sector, whilst the public good is numeraire. The P -sector is Walrasian, with the marginal cost of production in L . The M -sector good faces iceberg transport costs

$$T_{12} = T_{21} = T \text{ on inter-regional trade, so that}$$

$$p_1 = \frac{w_1}{\rho}$$

and

$$p_2 = \frac{w_2}{\rho}.$$

The representative consumer faces the same two-tier utility function as given above.

Labour is assumed to be mobile, so that the inter-regional supply workers is endogenously determined. In the north there is share λ_1 of L , and

$$\lambda_1 \mu$$

units of L work in the private sector M whilst

$$\lambda_1(1 - \mu)$$

workers are employed in the public sector P , so that an increase in the north's population implies a greater private sector workforce and an increase of the same magnitude in the public sector. This is true for the south with a total workforce share of

$$\lambda_2,$$

a private sector workforce of

$$\lambda_2\mu,$$

and public sector workforce of

$$\lambda_2(1 - \mu).$$

Migration is governed by the equation

$$\dot{\lambda} = (\omega_1 - \omega_2)\lambda_1\lambda_2, \quad (6.28)$$

where ω_i are the real wages paid to labour in region i , so that movement of L between regions is governed by private sector wages only. Equilibrium is at the simultaneous solution of four pairs of equations, determining regional income, wage rate and real wage rate in a region, and the price index for that region.

We can then write

$$Y_1 = \lambda_1\mu w_1 + \lambda_1(1 - \mu) \quad (6.29)$$

and

$$Y_2 = \lambda_2\mu w_2 + \lambda_2(1 - \mu) \quad (6.30)$$

for regional income,

$$J_1 = [\lambda_1 w_1^{1-\sigma} + \lambda_2 (w_2 T)^{1-\sigma}]^{\frac{1}{1-\sigma}} \quad (6.31)$$

and

$$J_2 = [\lambda_1 (w_1 T)^{1-\sigma} + \lambda_2 w_2^{1-\sigma}]^{\frac{1}{1-\sigma}} \quad (6.32)$$

are the regional price indices,

$$w_1 = [Y_1 J_1^{\sigma-1} + Y_2 J_2^{\sigma-1} T^{1-\sigma}]^{\frac{1}{\sigma}} \quad (6.33)$$

and

$$w_2 = [Y_1 J_1^{\sigma-1} T^{1-\sigma} + Y_2 J_2^{\sigma-1}]^{\frac{1}{\sigma}} \quad (6.34)$$

are the wages in each region, and the real wages are

$$\omega_1 = w_1 J_1^{-\mu} \quad (6.35)$$

and

$$\omega_2 = w_2 J_2^{-\mu}. \quad (6.36)$$

in regions 1 and 2 respectively.

This is quite a simple model, summarised in below, and gives a straightforward core-periphery for all transport costs.

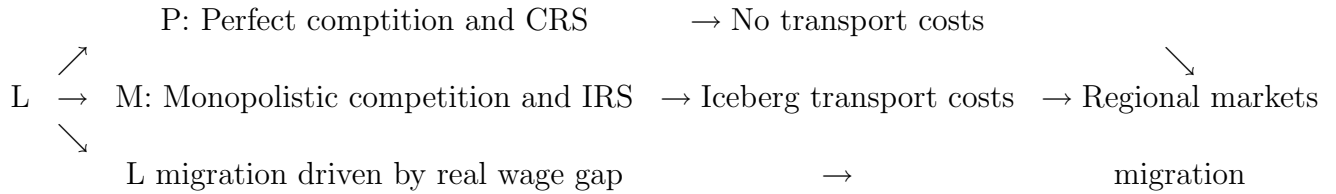


Figure 6.1: Schematic of the PP Model

Assuming that $w_1 = 1$ gives the situation

$$Y_1 = \lambda_1; Y_2 = \lambda_2.$$

Suppose they set $\lambda = 1$, then this reduces to

$$Y_1 = 1; Y_2 = 0.$$

When $\mu = 0.55$ and $\omega = 5$, they see that low transport costs lead to an upward sloping line, where wages are equal at the unstable symmetric equilibrium, and higher in the region with the bigger population leading to stable core-periphery equilibria as shown below. This is true for any feasible transport cost T , and well above this.

However, it is not satisfactory if they are wanting regional public sector employment to respond to that region’s population. Specifically, they desire a situation where a smaller population implies a proportionally larger public sector workforce. The simplest way to do this is to allow for a fixed public sector expenditure with private and public sector labour being mobile and immobile respectively. However, this leads to a barely-modified version of Krugman’s (1991) original geographical economics model. The detail missing from this model would be the capacity for the public sector to vary with population size.

Alternatively, they can set the size of the private sector and the public sector at 1,

rather than the whole population. Assume that $\mu = \min L_M$, and d is the difference

$$\max L_P - \min L_P$$

which it is possible to estimate from empirical data. We can then write

$$Y_1 = (\mu + d.\lambda_1)\mu w_1 + ((1 - \mu) - d.\lambda_1)(1 - \mu) \quad (6.37)$$

and

$$Y_2 = (\mu + d.\lambda_2)\mu w_2 + ((1 - \mu) - d.\lambda_2)(1 - \mu) \quad (6.38)$$

for regional income,

$$J_1 = [(\mu + d.\lambda_1)w_1^{1-\sigma} + ((1 - \mu) + d.\lambda_2)(w_2T)^{1-\sigma}]^{\frac{1}{1-\sigma}} \quad (6.39)$$

and

$$J_2 = [(\mu + d.\lambda_1)(w_1T)^{1-\sigma} + ((1 - \mu) + d.\lambda_2)w_2^{1-\sigma}]^{\frac{1}{1-\sigma}} \quad (6.40)$$

are the regional price indices,

$$w_1 = [Y_1J_1^{\sigma-1} + Y_2J_2^{\sigma-1}T^{1-\sigma}]^{\frac{1}{\sigma}} \quad (6.41)$$

and

$$w_2 = [Y_1 J_1^{\sigma-1} T^{1-\sigma} + Y_2 J_2^{\sigma-1}]^{\frac{1}{\sigma}} \quad (6.42)$$

are the wages in each region, and the real wages are

$$\omega_1 = w_1 J_1^{-\mu} \quad (6.43)$$

and

$$\omega_2 = w_2 J_2^{-\mu}. \quad (6.44)$$

in regions 1 and 2 respectively.

This model delivers some interesting results for the wage differential. When $\mu = 0.55$ and $\omega = 5$, they see that low transport costs lead to an upward sloping straight line as in panel a) of Figure 6.2, where wages are equal at the unstable symmetric equilibrium, and higher in the region with the bigger population leading to stable core-periphery equilibria. For intermediate transport costs, however, the wage differential is complicated, and shows stark changes in the straight lines, as in panel b) and c) of Figure 6.2. The symmetric equilibrium is stable, flanked by two unstable equilibria, leading up to stable core-periphery equilibria. If λ_1 starts between the symmetric equilibrium and either of the unstable equilibria, then the system converges to a symmetric outcome rather than to a core-periphery pattern, with wages being higher in the smaller region. If λ_1 starts out between an unstable equilibrium and the core-periphery equilibrium, the system converges to the core-periphery, and wages are

always higher in the region with the greater population along this section of the line. At high transport costs, the line slopes downwards, with a stable symmetric equilibrium and unstable core-periphery equilibria, so that wages are higher in the region with a smaller population as in panel d) of Figure 6.2. The tomahawk diagram corresponding to this model is shown in panel e) of Figure 6.2. As μ grows then, *ceteris paribus*, T must be larger in order to induce the diagram of wage differential with five equilibria. That is, the lower is expenditure on the public sector, the higher transport costs must be for a situation where the smaller region is more attractive to labour. However, the above is quite an unsophisticated approach itself as it does not allow for the minimum employment share of the public sector in a region. to change with the region's population, and sector sizes are linear in λ so that increasing (decreasing) returns to employment are not present.

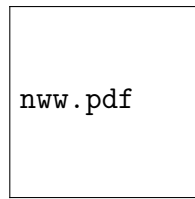


Figure 6.2: Dynamics of the Public-Private Model

6.4 Endogenously differentiated public sector size

To allow the size of a region's public sector to vary endogenously, functions must be employed for the private sector and the public sector that respond to changes in λ_i in the way specified above. In this section, I drop the assumption that expenditure on the private (public) good is equal to employment in that sector. Furthermore, it must be ensured that increasing (decreasing) returns are made explicit. That is, it is natural to expect that, as a region's size increases, the marginal labour required to provide public services would decrease. To do this, I set the manufacturing labour force to be

$$L_M = a(\lambda_1) + a(\lambda_2),$$

where $a(\lambda_i)$ is the manufacturing labour force in region i , and the public sector labour force as

$$L_P = 1 - a(\lambda_1) - a(\lambda_2),$$

where

$$L = L_M + L_P = 1.$$

This means that the private and public sector labour shares are endogenous, depending only on each region's share of labour. Suppose that the manufacturing sector in i is of size:

$$a(\lambda_i) = a \cdot \lambda_i^2, \tag{6.45}$$

where a is the maximum size possible for the private sector. The minimum size of the

public sector can be gauged from empirical data on regional economies. The function $\lambda_i - a(\lambda_i)$ is the size of the public sector in i and is increasing at a decreasing rate in λ_i up to a at $\lambda_i = 1$. L_P is concave in λ_i , increasing from $1 - a$ to some maximum public sector size at $\lambda_i = 0.5$, before decreasing back to $1 - a$. The function $a(\lambda_i)$ implies that the size of region i 's public sector is decreasing in λ_i , and the rate at which it shrinks is

given by

$$1 - 2a.\lambda_r.$$

A proportion of the workforce L are manufacturing workers L_M and are paid the wage w_r in region r and the others are public sector labour L_P paid wages for public sector work w_P . Labour L is interregionally mobile, migrating in search of the highest real

manufacturing wages:

$$\dot{\lambda} = (\omega_r - \omega_s)a(\lambda_r)a(\lambda_s).$$

One problem with simply building on from the CP model is that they assume $L = \mu$.

Generally, making the required adjustments the price index equation:

$$J_s = \left[\sum_{s=1}^s n_s (w_s T_{sr})^{1-\sigma} \right]^{\frac{1}{1-\sigma}}, \quad (6.46)$$

This reduces to

$$J_s = \left[\frac{1}{\mu} \sigma_{s=1}^R L_s^M (w_s T_{sr})^{1-\sigma} \right]^{\frac{1}{1-\sigma}}, \quad (6.47)$$

and only becomes part of the system of CP equations when this assumption is made.

This model is explored in James et al. (2012) and we can write and solve the system of simultaneous equations, which is only slightly modified to include $a(\lambda_r)$ and the new expression for J_s . The wage differential when $\mu = 0.55$ and $\omega = 5$ is upward sloping, as in panel a) of Figure 6.3, only for very low transport costs ($T < 1.25$), the intermediate case with three stable equilibria, as in panel b) of Figure 6.3, applies across most plausible transport costs with the downward sloping wage differential applying only for very high transport costs ($T > 3$). The lower is expenditure on the public good, the higher transport costs must be for a situation where the smaller region is more attractive to labour when near the symmetric equilibrium, and where the smaller region can be smaller as T grows

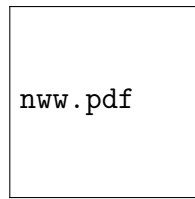


Figure 6.3: Dynamics of the Endogenous Public-Private Model

larger, as shown in the tomahawk diagram, on panel c) of Figure 6.3.

6.4.1 Public Sector Contribution

This model could be extended to allow public sector involvement in manufacturing. The public sector wage is the same for both regions and workers are intersectorally mobile between all three types of occupation. In the manufacturing sector it is assumed that public sector labour paid w_P is used in the variable-cost part of production β with manufacturing labour paid w_r in region r is used only in the fixed-cost part of production $\alpha = 1$, where the labour input l_i required to produce q_i units of a variety in region r is given by:

$$l_r = \alpha + \beta q_r.$$

Public services are freely traded at zero transport costs, and is produced under constant returns to scale with labour paid w_P as the only input. Choosing units so that public services are numeraire implies that the wage rate for labour producing homogeneous public services is $w_P = 1$ when both regions produce public services.

The labour input requirement for a manufacturing firm is known and the total cost of manufacturing at r is

$$TC_r = w_r \alpha + w_P \beta q_r. \quad (6.48)$$

Substituting this expression into the profit function for a manufacturing firm in r and maximizing leads to

$$p_r = \beta \frac{w_P}{\rho}. \quad (6.49)$$

Market clearing for manufacturing labour in region j determination of the number of

varieties produced in this region:

$$n_r = a(\lambda_r),$$

as the number of firms (varieties) is equal to the number of manufacturing workers in the region over the equilibrium labour input of manufacturing workers.

Free entry and exit in the manufacturing sector keeps profits at zero, and using mark-up pricing this determines the equilibrium output per firm in region r : $q_r^* = \sigma w_r$.

This means that income in r is given by

$$E_r = w_r a(\lambda_r) + [\lambda_r - a(\lambda_r)]. \quad (6.50)$$

Letting $\tau = T^{1-\sigma}$ we can write the manufacturing clearing conditions as:

$$\sigma w_r = \frac{p_r^{1-\sigma} \mu E_r}{P_r^{1-\sigma}} + \frac{\tau p_s^{1-\sigma} \mu E_s}{P_s^{1-\sigma}}, \quad (6.51)$$

where P_i is the price index in r , equalising equilibrium output and demand in region r and can be rewritten as:

$$w_r = \frac{\mu}{\sigma} \left(\frac{E_r}{a(\lambda_r) + \tau a(\lambda_s)} + \frac{\tau E_s}{\tau a(\lambda_r) + a(\lambda_s)} \right). \quad (6.52)$$

Since the economy consists of two regions we can see that we have a linear system of two equations in two variables, w_r and w_s , which is readily solved for w_r . The solution for wages at r can be written as:

$$\frac{\frac{\mu}{\sigma} [\tau((\lambda_r - a(\lambda_r)) + (\lambda_s - a(\lambda_s)))a(\lambda_r) + (((1 - \frac{\mu}{\sigma} + \frac{\mu}{\sigma}\tau^2)(\lambda_r - a(\lambda_r))) + \tau^2(\lambda_s - a(\lambda_s)))a(\lambda_s)]}{[1 - \frac{\mu}{\sigma}][\tau[a(\lambda_r)^2 + a(\lambda_s)^2] + [1 - 2\frac{\mu}{\sigma} + (1 + \frac{\mu}{\sigma})\tau^2]a(\lambda_r)a(\lambda_s)]}. \quad (6.53)$$

The model is solvable because equilibrium prices are equalized across regions and are

independent of location, We can then write $\frac{\omega_1}{\omega_2}$ as:

$$\frac{\tau((\lambda_1 - a(\lambda_1)) + (\lambda_2 - a(\lambda_2)))a(\lambda_1) + (((1 - \frac{\mu}{\sigma} + \frac{\mu}{\sigma}\tau^2)(\lambda_1 - a(\lambda_1))) + \tau^2(\lambda_2 - a(\lambda_2)))a(\lambda_2)}{\tau((\lambda_2 - a(\lambda_2)) + (\lambda_1 - a(\lambda_1)))a(\lambda_2) + (((1 - \frac{\mu}{\sigma} + \frac{\mu}{\sigma}\tau^2)(\lambda_2 - a(\lambda_2))) + \tau^2(\lambda_1 - a(\lambda_1)))a(\lambda_1)} \frac{G_2^\mu}{G_1^\mu}, \quad (6.54)$$

where labour migration is determined by the difference in regional real wages for private sector workers $\omega_r = w_r G_r^{-\mu}$. Labour has no incentive to migrate when the private sector real wage offered in both regions is the same, but labour is incentivised to relocate from region 2 to region 1 if the private sector real wage offered is higher in region 1 and vice versa for migration from region 1 to region 2. The tomahawk diagram for this latter model is qualitatively similar to that for the previous model of this section.

By evaluating the derivative of $\frac{\omega_1}{\omega_2}$ at $\lambda_r = 0.5$, at which point the expression reduces to that used by Forslid and Ottaviano (2003) gives the model's break point at

$$\tau_B = \frac{(1 - \frac{\mu}{\sigma})(1 - \frac{1}{\sigma} - \frac{\mu}{\sigma})}{(1 + \frac{\mu}{\sigma})(1 - \frac{1}{\sigma} + \frac{\mu}{\sigma})}.$$

For freer trade (above this threshold) the symmetric equilibrium is unstable. Starting again at $\frac{\omega_1}{\omega_2}$ but with $\lambda_r = 1$, we can derive

$$1 = 0.5\tau_S^{\frac{\mu}{\sigma-1}} [(1 + \frac{\mu}{\sigma})\tau_S - (1 + \frac{\mu}{\sigma})\tau_S], \quad (6.55)$$

where τ_S is the model's sustain point at which labour is indifferent to either region. This means that the implications of the endogenous public sector model also hold for this model. However, this model is important in its own right because it formalizes public sector involvement in the private sector.

6.5 North West Wales and the Public Sector

The models developed above are particularly useful in the analysis of North West Wales because public sector employment is very important to the region at over 30 percent of total employment. That there is some interdependence between the region's peripherality, in both the economic and geographical senses, as well as the overall level of economic activity in the region, is readily apparent, but these new models allow us to discuss this interdependence with firm theoretical backing. The first model teaches us that North West Wales is, generally, unattractive to labour. North West Wales is a peripheral region, and so the wage differential between it and the core economic region is negative, and this gap will increase as labour leaves the region. The model implies that a shrinking public sector will reinforce this since the implication for a peripheral region is that lower public spending will emphasize and lock-in the core-periphery pattern. Higher transport costs in North West Wales due to this increased economic peripherality may be of further advantage to the core region, due to a stronger price index effect coming from the incentive to buy locally, though this depends on the size of the peripheral region.

The second and third models allow for regions with different public sector sizes, so it is possible to reflect the fact that North West Wales has a larger public sector than the core region. In this model, North Wales having a small population will mean that the region's private sector is smaller and its public sector is larger than for the economic core. The size of the public sector is due to the fact that proportionately more workers are needed to provide public services for a smaller population. At low transport costs the situation is similar to that in the first model. However, increasing transport costs mean that the wage differential between the core region and North West Wales becomes smaller, until the situation reverses and it is North West Wales with the higher real wage. This is due to a strong home market effect in the region with the larger public sector, so that an increase in peripherality for North West Wales need not be

overwhelmingly negative. However, cuts to the public sector may make North West Wales more vulnerable to increases in transport costs. Overall, they see that the key element North West Wales is the influence of the large public sector on promoting a strong home market effect. As public spending decreases in North West Wales, the home market effect for this peripheral region can become much weaker than the price index effect in the larger region, thus making real wages lower in North West Wales. However, this pattern only arises once the region is above a certain level of peripherality, and the level of peripherality required increases as public spending decreases.

Ramcharan (2009) implies that North West Wales will always remain very peripheral compared to the North of England, London and even Cardiff, simply because the access to products and markets possible in urban centers will always be more attractive to firms and people than basing themselves in North West Wales. However, the modeling work above suggests that this need not be the case if North West Wales maintains a large public sector and transport costs do not become too high. Roos (2004) suggests a convergence of the regional economies, although only in the case of extreme divergence in local public expenditure which is not realistic. Lanaspá et al. (2001) suggest that North West Wales can attract greater economic activity through offering a lower net tax burden, either by lowering council tax income or by increasing efficiency in the management of public expenditure, across all local authorities in the region, and increasing the proportion of council tax income reverted to taxpayers by improving the provision of public services. Though Lanaspá et al. find that if the transport costs fall below a critical threshold, the scale economies become dominant and there is agglomeration; if the transport costs are increasingly lower, there is a point where the net tax-burden causes dispersion, this is not a consideration for North West Wales as a highly peripheral region in both economic and geographic senses and, consequently, higher transport costs.

6.6 Conclusion

This chapter presents a new means of understanding the public sector's role in the economy, and especially in regional economies. The modelling activity, building on the core-periphery approach of Chapter Five, has been an attempt to quantify empirical and quantitative observations on public sectors in terms of the 'new economic geography'.

These models have been successful in terms of placing regional economics on a firm quantitative basis, and this topic, which is a matter of debate in regional economics, seems topic worth considering. It has been demonstrated, under various conditions, that a large public sector can be of real benefit to a peripheral region. This demonstration is completed by an overview of the public sector in North West Wales, linking to policy discussion in Chapter Seven.

CHAPTER SEVEN

Conclusion: Where Model Meets Reality

7.1 Introduction

Three goals for the research documented in this thesis were presented in the introductory chapter. Firstly, the research should advance the scenario-analysis methodology of considering the future to regional economic planning, and more generally to test the reliability and resilience of qualitative data in a rapidly changing economy. Secondly, the research should advance geographical economics (Krugman, 1991a,b,c) in its discussion of the public sector as provider of public services and jobs, and to advance policy recommendations from the theory. Thirdly, the research should use the geographical economic policy discussion and the scenario analysis to build a resilient economic policy for North West Wales from 2009, through triangulation between the two parts of the thesis.

Two of these objectives have so far been achieved. The application and development of scenario analysis and the use of qualitative methodology to ‘discover’ North West Wales are detailed in the first part of the thesis. The work in geographical economics was completed in the second part of the thesis, with the public sector introduced as an explicit factor in a two-region model. This model has a number of implications for public policy which will be detailed in this chapter, along with those for the existing literature in geographical economics. Completion of the third and final goal is presented in this chapter, which details the process of triangulation between the policy recommendations forthcoming from each part of the thesis.

7.2 Reliable Qualitative Data

This section examines the reliability of qualitatively-sourced data; a key element of the proposed triangulation is the assumption that the comparison of data sourced using quantitative tools and qualitative methodologies is valid. It is a discussion of the differences and similarities between the implications of each methodological strand,

empirical evidence and policymaker interpretation. Familiarity with these divergent strands leads to a close examination of the policies designed in Chapter Four, out of the scenario analysis against the policy implications of geographical economics for North Wales which are discussed in the next section. The policy threads will be examined for commonalities, and attempts made to explain where the implications are different. The use of qualitative data to test the validity of a model, or to inform the description of a new model, is rare in mainstream theoretical economics. The argument against qualitative methodologies are that the data are based on perceptions and interpretations of human interaction and are therefore unreliable, subject to bias and error, hence the resistance to their use for mathematical generalisation. But the interpretation of behaviours and decision-making should equally be considered a strength that no empirical or theoretical methodology can match in a field where behaviour is the key to understanding. Furthermore, data on the economy is often gathered at the national level so that regional resources on a particular aspect of the economy will not exist. In such a case the gathering of qualitative data may be the only source of information available. In addition, the use of statistics and econometric data produces results that are only as reliable as the initial observation and are open to misinterpretation, while quantitative modelling relies upon building a much simplified model of what the researcher feels to be the salient features of the real world and approximating from this. However, it is possible for the searches for knowledge and for understanding to co-exist and to complement each other. The fundamental problem is that the search for knowledge, in the form of modelling, is not preceded by understanding. The solution is to seek understanding through intensive qualitative research prior to seeking generalized results from modelling activity. To do this, however, the interpretation of qualitative data cannot be ambiguous, and the data itself must be rigorous and reliable in a way that qualitative data may not be.

Such qualitative data can be found using reflexive methodology. The rigour pertaining

to qualitative data in this thesis, sourced from reflexive empirical research, was demonstrated by a ‘follow-up’ process to qualitative data-gathering for a regional economy. This process, presented in the penultimate section of Chapter Four, is undertaken two years after initial contact with participants, with the realisation that the process offered an opportunity to explore the reliability of qualitative evidence, and especially in the context of economic uncertainty in the intervening period, as well as the opportunity to verify the conclusions of the project. The period in question was one of dramatic change in the world economy, with the economic instability on a level unseen for many decades. As such, the follow-up opportunity took place following a restructuring of the economy, offering an opportunity to monitor changes in policymakers’ responses. It should be noted that, despite the changes to the economy, it had become very clear as the research project progressed that the views of participants had not shifted as radically as might have been thought, given the sensitive economic context, and that there was a large variance in individual response changes to certain issues.

The decision to proceed with the interview format was made given the rigour needed to examine the reliability of qualitative data. Had the follow-up process concerned only noting the changes in the region’s economy and reviewing the responses to the scenario analysis project, it is likely that some form of questionnaire would have sufficed, as the main question would be standard across all interviewees and with answers analyzed as being representative of the policy-making community rather than as individual responses. As such, and in light of the other objectives, an interview process proved necessary.

Although changes were noted by interviewees, views on the regional economy were broadly unchanged as to what the region’s economic drivers were, what uncertainties were faced, and what opportunities the future held. Detailed analysis had changed substantially as preoccupations had shifted and some economic sectors had collapsed,

but broad opinions on drivers, uncertainties and opportunities were unchanged. The shift in interpretation was from the neo-classical synthesis to a broadly post-Keynesian approach. This shift did not appear to be the result of a conscious awareness of circular cumulative theories, as the neo-classical tendency was still observable, but driven by empirical observation. Thus it was interviewee interpretation of the way that regional economy operated that had changed, for the most part, rather than the data on economic perceptions itself.

These follow-up interviews did confirm that the interviewees had constructed the narratives of their assessments of the region's economy with a reassuring degree of internal consistency, even after allowing for changes. This means that it does seem that qualitative research can produce a robust narrative, and reliable sets of data. As such, it could be suggested that regional economics is ignoring a valuable source of information when discounting qualitative methodology. A reliable set of data from the real world means that, for example, geographical economists could start building their models from an accurate representation of their subjects that move beyond a positivistic approach to link local knowledge to wider stylized facts and conceptual frameworks.

7.3 Triangulating in North West Wales

In order to reconcile the research streams for North West Wales from qualitative sources with those from geographical economics, the differences between the policy prescriptions for Part One and Part Two of the thesis must be ascertained. This is because triangulating between two fields of data requires firm knowledge of these fields and their differences. Triangulating between research methodologies is more than forcing ideas together; triangulation is the combination of data or methods so that the diverse viewpoints resulting from this mixing 'can be used to cast light on the topic' (Olsen, 2004). As explained in the first chapter, triangulation is, in this case, only possible

through examining and comparing the policy discourse resulting from the completion of the other research objectives. This is the simplest and most effective way to complete the proposed methodological triangulation. Triangulation in this sense involves the application of two or more methodologies, or two or more theories within the same methodology, in order to double-check results (Denzin, 2006). Examples of theory triangulation and methodological triangulation can be found throughout this thesis: Part 1 sees methodological triangulation between qualitative and quantitative research; Part 2 sees triangulation between theory and empirics; both Parts are triangulated with the theory-based discussion of Chapter 2. Triangulation in this final chapter is a matter of interpreting the areas of policy discourse in each Part of the thesis that reinforce the conclusions of the other and bring new ideas or depth to policy discussion, and identifying those areas that contradict each other or weaken the scope of conclusions. The main triangulation of this thesis begins with a brief summary of the main points of the core-periphery model of geographical economics, showing that an economically peripheral region such as North West Wales will become more peripheral over time unless inter-regional transport costs are raised/kept high, or some other intervention is undertaken. Transport links to the urban centres of South Wales are not low cost but the economy is very open to the North-West of England, with excellent transport links that have improved continually for the past 25 years. It is unsurprising that the empirical data does show that North West Wales is losing relative importance as core regions of Southern Wales and South-East England experience faster economic growth and population growth, and is outpaced by other marginal regions. The models assume a spatial heterogeneity and say nothing about what happens within the regions modelled, but agglomeration economies suggest that the region's population would converge gradually around the northern coastal towns. Empirical data would again support this prediction, with the population of the rural areas in North West Wales and that of the coastal belt increasing, but perhaps less quickly than might be expected. A

similar portrait results from post-Keynesian consideration of cumulative circular causation, though models of geographical economics are essentially neo-classical, and applying Marshallian agglomeration economies gives another broadly similar picture. The neo-classical growth (Solow-Swann) model is the source of policymakers' concern with regional investment. The one-sector neo-classical growth model also suggests that regions will converge in growth rates over time, but there is little empirical evidence to support the conclusion, whilst the two-sector neo-classical and Keynesian models would suggest that a regional gap would persist, and even widen, over time. This means that neo-classical models predict that the rate of economic growth in North West Wales will eventually converge with the overall UK growth rate without any intervention, with the papers of Barro and Sala-i-Martin (1991) influencing the opinion of many regional economic policymakers. Models informed by Keynesian and post-Keynesian theory predict that the gap between this area and the rest of the UK will persist or widen without intervention. Keynesian intervention is viewed as advantageous, in order to promote convergence sooner rather than later, but not strictly necessary; post-Keynesian theory sees intervention as necessary just to prevent further regional divergence in growth rates. Geographical economics is, broadly, in agreement with post-Keynesian theories on convergence and on intervention. Neoclassicists would prefer a more open economy, with transport costs kept low and regional competitiveness boosted.

The policy recommendations contained in both parts of this thesis place a great deal of weight on entrepreneurship and innovation, and it is important to consider the reasons for this in order to complete the triangulation. The attention paid to entrepreneurship and innovation is partly inspired by the work of Schumpeter (1912), but is mostly driven by work on knowledge accumulation (Lucas, 1988) in endogenous growth theory. Keynesian and post-Keynesian economics is less overtly enthusiastic, but does not give any explicit advice against. The importance of bringing new varieties to market, and on variety and differentiation above scale in geographical economics suggests the

importance of entrepreneurship and innovation in Part Two of the thesis. Geographical economics also contains implicit warnings about the regional effects of cutting transport costs or amending competition policy, contradicting the ‘obsession’ with competitiveness seen in policy circles.

These differing approaches to interventionist policy are important to understanding policy-making attitudes, and thus interpreting the qualitative data of Part One of the thesis. As discussed in Chapters Three and Four, regional economic policymakers are strongly influenced by neoclassical interpretations of the economy, but also reflect a Keynesian approach in those areas where the predictions of neoclassical theory fail. Newer theories are often misinterpreted or erroneously applied, but for the most part are never considered. One interpretation of the qualitative data is that this can be understood when it is considered that those who shape economic policy today are likely to have been educated 20-30 years ago, meaning that their thinking has been shaped by approaches to economics that do not reflect recent developments. This means that current economic policy in North West Wales, and regional policy in the UK and EU generally, has no solid theoretical base, but is the result of a pick’n’mix approach considering whatever neoliberal idea is in fashion.

Thus policy intervention is seen as necessary on a small to medium scale, in order to promote regional convergence, and there is disappointment and confusion when North West Wales’ growth path inevitably diverges from the UK, and an underestimation of the scale of intervention required for convergence in the Keynesian model. This may be the key difference as far as we are concerned. Discussion of the stability of equilibrium and the non-linear effects of policy predicted by geographical economics and demonstrated by empirical evidence, but ignored by other theoretical approaches, is another key difference, and one that is not fully appreciated by policymakers, who treat policy as highly linear with predictable outcomes. A detailed breakdown of policy implications is presented below.

7.3.1 Geographical Economics in North West Wales

An analysis of the local stability of the CP model (Baldwin et al., 2003), and of the Baldwin-Forslid (2001) model which includes the effects of knowledge spillovers, suggests that North West Wales is fighting a losing battle if it aims to outcompete core regions of the UK economy. The economic dominance of these regions is supported by forward and backward linkages, ensuring that whenever relative wages in the core regions increase, their advantage grows. The core-periphery system will remain, without major policy intervention, and the question is whether the peripheral region can be maintained or not. The best way to navigate through the threshold effects common in geographical economics models (Ottaviano, 2003) is to undertake gradual infrastructure improvement on a continuous basis, rather than embarking on large short-term projects. For example, let us imagine the construction of a motorway between, say, Bangor and Cardiff. The advantages might be the liberalization of trade between North West and south-east Wales. Another possible outcome would be wholesale de-location of manufacturing to the south-east, which could not be easily reversed by production subsidies in the North West. Constructing a network of roads in stages would allow careful monitoring of the effects of improved trade freeness, thus enabling policymakers to take steps avoiding de-location for the areas surrounding this road link.

The implication of such non-linear effects in geographical economics models that history matters is important for North West Wales. The history of industrial agglomeration in the region tends to be interpreted in resource allocation, but several of the larger economic centres are based around ancient military and religious influences as discussed in Chapter Two. Many major towns are built on sites of military and religious importance, and most settlements owe their roots to the Norman conquest of Gwynedd or to the Roman road between the forts of Segontium (Caernarfon) and Deva Victrix (Chester). Economic activity seems to flow naturally along an east-west corridor, and a transport route has never been developed to allow much trade with south Wales. That

contemporary economic patterns seem to be aligned to 1900 years of history carries an important message to policymakers; it is rarely worth attempting regional development that ignores this history. The example of the north-south link presented above is worth considering again. East-west trade links have been economically locked-in over millenia, so that the economy of north Wales as a whole has become a sub-economy of North West England rather than part of a Welsh economy. As such, it would be likely that the initial cost of such a project would far exceed any benefit, even if trade patterns were to change over time.

Non-linear effects and hysteresis also apply to policy intervention such as subsidy (Baldwin et al., 2003) so whilst the nominal average wage paid in a core region such as London will be far higher than in North West Wales, the difference in real wages between the regions will be more reasonable, and out-migration could be countered with a large enough subsidy. London's real wage is likely to be far higher than that in North West Wales, so any subsidy aimed at promoting in-migration must necessarily be quite generous, and perhaps unaffordable except where targeted at specialist labour. This suggests that the best approach to subsidy for such an economically peripheral area is to target big subsidies at a few key goals and away from speculative ventures and short-term job creation. The offer of grants should only be made in areas where success is more than speculative, and no support should be given to other business which would limit the financial assistance available.

It is important that policymakers in different fields talk to each other regularly. It is evident that areas such as economic development, community development, education, and transport, go together, and cooperation between policymakers is commonplace. However, it is, perhaps, less immediately obvious how education might be affected by an increase in the freeness of trade, thus having an unknown secondary impact on economic development. The point is that discussions on policy must be multi-disciplinary, even when certain policy areas are directly not impacted upon by proposed changes. Only by

being aware of policy interactions can economic development be fully successful. Related to this is the idea that ‘one size fits all’ policy is to be avoided. As can be seen around Bangor, funneling money into the development of industrial units intended as a software development cluster will not be successful in one area just because it has in another.

Likewise, applying the same idea twice will not necessarily be successful.

When the costs of migration are low, it is expectations and not history that matters (Krugman, 1991c; Baldwin, 2001). This implies that the management of expectations in North West Wales is important, and the use of marketing skills and public relations can be key to retaining the labour force or attracting more workers. Migration can be instigated or halted by expectation. This would include the offer of a production subsidy, even if the subsidy is never actually paid, and the impression of infrastructure improvement or a good business environment. The expectations of labour are as important as those of firms, and the region must work to develop communities and soft infrastructure from parks and playgrounds to libraries. Improving towns and villages through coordinated decoration, and so forth, could also be a way forward.

The home market effect and price index effect tell us that North West Wales will continue as a peripheral economic region, or economic sub-region of North West England, becoming less important with time, unless there is some large exogenous shock. At the same time, economic activity in the North West of England will continue to agglomerate around Liverpool and Manchester, perhaps forming some greater metropolitan area. Areas of high economic activity benefit from the home market and price index effects, and North West Wales is one of the regions in the UK that will lose out. The same effects will drive urbanization and centralization in this area and Wales in general. Of course, such a scenario arises only if the effects apparent in the core-periphery model are the only ones to apply. Looking at the model derived in

Chapter Six, it is clear that a strong public sector can prevent a catastrophic agglomeration through its role in the employment of labour. Further, we have seen in

this chapter that the market equilibrium outcome for the FC model is not necessarily socially optimal. This means that a social planner, such as a strong public sector, could reasonably expect to improve well-being. Many economic centres arise due to the presence of some innovation, and working to create this innovative culture could also prevent an agglomeration elsewhere, causing disagglomeration in North West Wales. Separating out the factors that increase welfare in a geographical economics model it is clear that policymakers in North West Wales should focus on raising productivity, across the economy but especially in industries that experience strong increasing returns. Policymakers should also work on increasing the variety of goods produced in industries where returns to scale are weaker. It is also important to boost expenditure through in-migration, or at least stemming the flow of out-migration from North West Wales. By encouraging locally-based saving and investment, this could lead to economic development. Further analysis of these effects would imply that policymakers in North West Wales should work to ensure in-migration, should encourage production linkages within /north West Wales, and should pursue methods to ensure production of high value-added goods Lastly, welfare analysis of geographical economics models suggests that the free market will always result in a socially sub-optimal growth rate. The above implies that strong, active and interventionist regional economic policy is necessary to secure faster growth, meaning that policymakers should not automatically interpret a need for intervention in North West Wales as a sign of economic weakness, Geographical economics results only imply things within that model, but with care these implications may be interpreted and extended to ‘real-world’ policymaking. Applying results from geographical economics directly to a region, such as North West Wales, is not especially helpful, but, it is possible to use these results as a guide or general rulebook for economic development in North West Wales. Below is a list of policy lessons from the geographical economics that are applicable to North West Wales:

- Economic activity will move towards the core regions if policymakers do nothing.

Regional policy is important;

- A socially-optimal growth rate can only be achieved through intervention;
- Intervention may take the form of production subsidies and related financial assistance, tax breaks, or assistance and advice services for administration, management and marketing;
- Setting strong conditionality for financial assistance is important, including strong business plans and response to market demand, in order to avoid diminishing returns on production subsidies whereby money is scattered about North West Wales to little effect;
- Urban living patterns offer lower living costs. Economic policymakers will continue to face rural depopulation as younger people move to urban parts of the region or out-migrate from the region;
- Access to products and markets possible in urban centers will always be more attractive to firms and people than basing themselves in North West Wales, but this could be countered with a large public sector;
- Economic performance in North West Wales is limited by its physical, socio-cultural and economic geography, as well as its history, and economic planners should bear this in mind regarding how best to pursue development;
- Investment in transport infrastructure could mean depopulation of the smaller regions connected. Economic policymakers must consider that perpetual improvement of transport linkages to the North-West of England may not benefit the region;
- Policymakers may find it useful to consider how imports to North West Wales can be kept expensive relative to locally-sourced goods, but exports from the region made cheap. For example, imports can be made expensive by keeping transport costs high

or legislating that goods packaging must be bilingual Welsh/English. Exports can be simultaneously kept cheap by ensuring that the region specialises in knowledge goods that depend on telecommunications rather than physical transport;

- North West Wales may be better off developing new varieties of goods and selling at a small-scale - artisan and niche production for niche markets - than in trying to attract large- or even medium-scale producers to the region;
- Policymakers in North West Wales should focus in developing strong forward and backward linkages between sectors in the region;
- A large public sector may promote a strong home market effect (forward and backward linkages) in North West Wales;
- Policymakers should intervene to keep business in North West Wales, but should focus on ensuring a high number of successful start-ups in the region;
- Policymakers in North West Wales should not concern themselves with targets on the equalisation of average income, as this will lag behind Wales and the UK for the foreseeable future;
- Lower public spending in North West Wales may emphasise and lock-in economic disadvantage;
- An increase in peripherality for North West Wales need not be overwhelmingly negative in terms of real wages;

These policy lessons are derived from the implications of the models discussed in Part

Two of the thesis. It is important to note here that the lessons listed are my interpretation of these implications, rather than unassailable fact, and produced by applying reflexive consideration to the modeling activities documented here. The list of policy lessons was so formulated. rather than as a full policy prescription as derived in

Chapter Four, because trying to emulate the latter on the basis of modeling implications would be to enter the realm of speculation, whereas the above list has a firm theoretical grounding.

7.3.2 Convergence Through Outcomes

The next step is reconciling policy recommendations from the scenario analysis with the lessons from geographical economics. To fulfill the third objective of this thesis the combined policy prescription at the end of Chapter Four must be held up to scrutiny with regards to the policy lessons drawn from the geographical economics literature in the next section. This section builds on the work of Potter (2009) which explores the relation of regional competitiveness policies to insights from geographical economic. This section evaluates regional policy, as applied by policymakers in North West Wales. in general using those insights.

Transport costs are the most obvious influence on the behaviour of a core-periphery model. The results have been interpreted in such a way that lower transport costs are seen as unambiguously good, just as in other mainstream economics theories and in the view of most policymakers in North West Wales. I question this presumption in favour of lower transport costs as geographical economics demonstrates that the way welfare is improved is by an emptying of the peripheral region. In the real-world. this would have harmful social and cultural effects not considered in mainstream economics. This disaccord between geographical economics and regional policy informed by mainstream opinion can be resolved through undertaking the lowering of transport costs on a sub- and inter-regional level, through gradual improvements. Whilst more expensive, the project can be reversed or altered as the effects become clear over time.

This idea can be extended by shifting the emphasis on physical transport and distribution to information and telecommunications. This could be advantageous through reduction of out-migration, and also by ensuring that market access in North

West Wales is partly restricted to local firms. Of course, a shift to ICT above transport implies a shift towards the knowledge economy. The latter idea is already actively and enthusiastically discussed by policymakers in North West Wales. A strong knowledge economy coupled with good ICT infrastructure in North West Wales, together with maintenance or even an increase in transport costs would effectively mean cheap export of (knowledge) goods from North West Wales together with costs in importing goods, thus making locally-produced goods more attractive.

The geographical economic models constructed in Chapter Six support the prediction implied by many policymakers in North West Wales, as the public sector is shown to have a disagglomeration property, thus supporting peripheral regions. Geographical economics also implies that a large public sector in North West Wales would aid this outcome by countering the superior market access of core regions. Policymakers also agree with the clear prediction from geographical economics that urban living patterns offer lower living costs, so that rural depopulation in North West Wales is a possibility and must be planned for, with a large public sector being a partial solution to out-migration.

Policymakers are restricted to considering a more open economy, with transport costs kept low and regional competitiveness boosted, which explains the general direction of contemporary policy, and the contradiction whereby policymakers in North West Wales accept the case for intervention, but also have faith in neoclassical policies to bring convergence. However, it is generally accepted by policymakers in North West Wales that economic activity will move towards the core regions if policymakers do nothing, so that regional policy is important. Many of these policymakers also agree with the implication of geographical economics that cutting public spending in North West Wales may emphasise and lock-in economic disadvantage in the region. Geographical economics implies that this intervention may take many forms. from transport improvements and infrastructure investment, to subsidies and other financial and non-financial assistance.

Policymakers seem to agree with this, though the pressure on public spending since 2007 means that financial assistance is more targeted and conditional. However, this fits geographical economics implications, suggesting that scattering small subsidies about North West Wales is ineffective, and that the money is better used in a smaller number of larger subsidies that are subject to methodical selection

Innovation and entrepreneurship are at the forefront of policymaking discussion in North West Wales, and this would seem to the importance of this theme in geographical economics. The importance of bringing new varieties to market, and on variety and differentiation above scale in geographical economics is definitely suggestive of a need for innovation and entrepreneurship. The difference in approaches here is that, as discussed above on subsidies, geographical economics supports a methodical approach to innovation, whereas policymakers have looked to quantity rather than quality. The current economic climate has changed this attitude, so that policymaking in the future will be undertaken with more care to projected outcomes. The geographical economics points to the necessity of support for start-up businesses in North West Wales in a variety of sector, but also backs the setting of clear conditions for support, so as to develop over a number of sectors with sufficient depth and fast growth.

Developing strong forward and backward linkages between sectors in North West Wales is key to developing businesses over a number of sectors. These linkages must be a focus of the conditionality of support, thus taking an active approach to economic planning, and a large public sector can also have a demand-side role through its procurement policy. This idea is being developed by policymakers. Something that has not yet been considered fully is these forward and backward linkages as part of the home market effect in geographical economics whereby a larger set of diversified products is merely the end-stage of a virtuous circle that starts with higher real wages. Real wages are products of nominal wages and trade freeness so, either wages must increase in North West Wales, or transport costs can be increased as discussed above. It is real wages that

matter as raising these will lead to in-migration of consumers, an increase in the number of producers, and more diversified products - the whole virtuous circle. Policymakers in North West Wales waste time in concerning themselves with targets on the equalisation of nominal wages or average income, as peripheral region always lag in this respect and this is unlikely to change for North West Wales.

The first theme noted in the combined policy prescription is that of community development. This emerged as a common element of economic development according to policymakers, with a strong economy requiring the development of self-sustaining, socially inclusive communities. Initiatives for community development are supported by geographical economics, emerging most strongly as an ICIR (Imperfect Competition/Increasing Returns) scale effect whereby decreasing average cost as output increases - the aim of community development - means that increased scale also improves welfare in that region. Community development would also boost the volume of trade carried out locally, which implies an additional boost to welfare via the trade-volume effect. Developing community infrastructure would also enable more local production, taking advantage of a combination of the trade-price and ICIR production-rent effects to increase and regional welfare. The only inconsistency here is that the core-periphery model of geographical economics suggests that the best approach to subsidy for such an economically peripheral area is to target big subsidies at a few key sectors rather than having a policy of offering smaller subsidies which will not make a difference. This guidance does conflict somewhat with the aim of community development.

Promoting a demographic balance means encouraging young people to stay in or move to the region, and thereby avoiding an unhealthy proportion of economically inactive pensioners pressuring the health and social care systems in the region. Policymakers reason that this would be achieved through the construction of attractive community infrastructure from intra-regional transport links to housing, including the provision of public and private services. The core-periphery models all display agglomeration effects

to some extent, implying that encouraging in-migration (or at least halting net out-migration) and establishing strong public services would lead to further agglomeration thereby taking advantage of the home-market effect. Increased in-migration and induced capital formation also has positive effects on local welfare due to increased local production through the migration/accumulation effect. Increased local production will also induce further agglomeration through the price index effect.

‘Making the most of what we have’ is the most well-defined theme emerging from the scenario policy prescriptions, and fits in well with lessons from geographical economics. This is due to the general truth that big regions grow and small regions shrink due to circular cumulative effects. Taking advantage of the home-market and price-index effects in the region can only be done by maximizing and spinning-out opportunities that already exist to kick-start the process of agglomeration. The policy theme would involve maximizing use of the region’s comparative advantages and harnessing the trade-price and ICIR scale effects to maximize local welfare. The only point at which the scenario-driven policy theme departs from what might be recommended by geographical economics is the improvement of inter-regional transport links.

The management of expectations in North West Wales is important, according to both strands of research in this thesis. Migration can be instigated or halted by expectation, so it is crucial that the area is marketed well. As noted above, core-periphery models of geographical economics suggest that working on improving road, rail, sea, or air links to economic centres is risky as this increases the freeness of trade. This is intuitively sensible as North West Wales is an extractive economy, with the neighbouring North-West of England being more accessible as a destination than some geographically local destinations, so that increasing the freeness of trade would not *ceteris paribus* strengthen local economies. With regard to the scenario-building process, it is apparent that policymakers conflate the development of inter-regional links and economic development.

It is difficult to judge at which point the increasing freeness of trade will result in a massive de-location. What can be anticipated is that out-migration from the region and its relative poverty have increased in the years since the A55 expressway was built, and crippling de-location could result from further improvements unless the improvement is instigated by heavy investment in the region. The same problems could result from a direct north-south link. Other infrastructure improvement, including digital expansion, may be less damaging if the benefits of increased trade of locally produced goods outweighs the costs to the local economy of goods and services being purchased from outside the region as there is less danger of out-migration.

Focusing on education and its links to economic activities is a core recommendation that we can draw from geographical economics, which was modeled using knowledge spillovers, learning-by-doing and ‘thick’ labour markets as key agglomeration mechanisms from the beginning. Education in this context encompasses basic and higher education, as well as training and lifelong learning, with the business links being, primarily, means of creating specialized local labour markets and ensuring that these markets are utilized by local business, new start-ups and established incomers. A highly educated workforce will be more productive, with benefits accruing through the price-index effect and home-market effects. Welfare is then increased via the operation of the location effect, both ICIR effects and the trade-price effect.

The final theme derived from the scenario-building is that of institutions supporting one another. The models developed in Chapter Six suggest the importance of public services in marginal economies, having a disagglomerating effect whereby a smaller region may have a real wage advantage due to the relative public sector size. This suggests that, when efficiency savings, rationalization and cuts are expected in the public services, an emphasis must be placed upon protecting jobs. This could be done by collaboration between institutions and a sharing of backroom functions to ensure that public sector job losses are minimal. Collaboration would also mean joint-working in the field of

regional development with the freeness of trade monitored by interdisciplinary teams, in order to avoid damaging threshold effects in economic policy. Developing regional supply chains through local procurement is also useful, as this would involve outsourcing public sector work to the local private sector as well as localizing production, with the aforementioned beneficial welfare effects of increased production.

In the introduction to this chapter, it is made clear that this section does not propose a generalized policy for marginal regions. Doing so would be futile because, unsurprisingly, no two regions are exactly alike and any generalizations would lead to an overly simplified set of policies. However, some generalisable lessons can be drawn out of a North West Wales-specific case. The combination of geographical economics and the qualitative investigation of this thesis would prescribe:

- *Community development*: The development of self-sustaining, socially inclusive communities (Mellander, 2011) which will support voluntary effort and community involvement (Osborne et al., 2002) is required to support development in the region. The strengthening of a regional cultural or multicultural identity is viewed as key to this. Issues such as the maintenance of environmental quality (Florida et al., 2011), the integration of housing and transport planning, the improved acquisition and retention of skills, the development of successful, collaborative networks of innovating SMEs (North and Smallbone, 2000a,b), and social enterprise in the restoration of community buildings for business purposes, are also viewed as important.
- *Promoting a demographic balance*: Young people will want to remain in the region because of appropriate housing provision and attractive community infrastructure, the availability of a wide range of career paths, the procurability of niche products and local produce of good quality (Skuras et al., 2006), as well as the provision of excellent education opportunities in further and higher education, and also the provision of lifelong education.

- *‘Making the most of what we have’*: Success depends on noting those areas where the region in question has a comparative advantage relative to surrounding regions, and noting those fields where investment might bring comparative advantage. Production subsidies should be heavily targeted at these fields, and at infrastructure necessary to maximize this advantage. Maximizing advantage will also require the management of expectation, with a special focus on the marketing of locally manufactured goods. ICT and intra-regional transport must be prioritized. Inter-regional transport must be closely monitored and subject to staged improvement, and should only be improved where the case is made that the long-term benefits of substantial investment in a field where the region has a comparative advantage outweighs the cost of out-migration and extra-regional competition to local producers. Support for basic education, from public, private, and voluntary bodies, will be required in order for the region to develop its human capital resources, focusing on science and engineering.
- *Focusing on human capital and its links to business*: This will require an ability for educational institutions to fund themselves through a combination of fees, private sector funding, and strong marketing and product development of academic research and innovation, together with non-cash incentives for graduates and education spin-outs to ‘stay local’, building on the propensity of individuals to stay and display entrepreneurship in the region in which they studied (Baltzopoulos and Brstrom, 2011), in order to maximize the link between universities and regional development (Goldstein and Renault, 2004). Educational institutions in the region should work closely together so that there is a coherent framework for research and development. Education should also be linked to business needs (Barrio-Castro et al., 2005) with special note of the link between creativity and entrepreneurship (Lee et al., 2004), as business must be made more responsive to academic research and innovation. In particular, training in business skills, management and marketing for local business

should be a key responsibility for this sector.

- *Institutions supporting one another*: There should be a blurring of distinction between organizations. This is true for joint-working, rationalization and collaboration in public service delivery (Di Domenico et al., 2009), but it is also true for public, private and voluntary sector (Birch and Whittam, 2008) interaction and collaboration, from easy migration to active sharing of staff, infrastructure and buildings between sectors. Funding for new initiatives may come from a variety of sources, aimed at regional benefit. All sectors must become responsible for promoting entrepreneurship in the region, through funding, support and training. Institutions must also develop local supply-chains through local procurement.

The above is a comprehensive discussion of the overlaps between policy, inspired by the two stages of the thesis. The areas of overlap are a matter of interpretation, and the scope for interpretation was rigidly controlled through reflexive methodology, so that discussion was restricted to the clearest commonalities between the two parts of the thesis, and that tentative overlaps requiring interpretative leaps or straining logic were not considered. As discussed in the introductory chapter, the triangulation of the divergent strands of this thesis is carried out with the secondary aim of composing a policy package for the development of North West Wales that reflects upon the notion of regional resilience (Bristow, 2011). By adopting the notion of regional resilience, where a resilient region is one that is resilient to external shocks due to the cultivation of a strong regional economy based on indigenous factors, the goals of participating stakeholders in the policy recommendations of Chapter Four have been met.

7.4 Triangulation in Policy Discourse

The work detailed in this thesis affords an opportunity for generalisation on the topic of triangulation, especially for triangulation between policy discussions for which a system

is derived below. This chapter does not attempt to force agreement or uniformity upon the policy sets that emerge from the two parts of this thesis, and does not pretend that

a regional economic ‘theory of everything’ will emerge. Rather, it reflects the overarching aim of this thesis to bring theory within touching distance of reality, or at least the interpretation of reality that comes from empirical evidence, and to use that interpretation to inform modeling. This thesis has used insight from real-world situations for the updating of geographical economic models from contemporary empirical portraits. Triangulating between policy discourses builds on the updating of realism geographical economics and, instead, updates the realism of the resulting policy discourse. Policy resulting from theoretical models is often stilted and general, sometimes bearing no relation to reality, and this is a major criticism of geographical economics. Policy triangulation between theory-based and empirically-based discussion can be used to bring real-world applicability to policy resulting from these model, whilst retaining the ‘what if?’ advantages of modeling. A basic system for this process, as applied in this thesis, can be written down as:

- Develop point by point breakdowns of the theory-based and empirically-based policy prescriptions;
- Compare the lists and place an emphasis on complementary policies (those that appear on both lists);
- In the case of a policy on one list contradicting the other, conduct a thought experiment!

Whilst not a particularly advanced system, it is honest in stating that comparison and interpretation is the only way to bring realism into economics. Models can be improved by taking advantage of new mathematics to add features without the loss of tractability, but it is only through comparison and interpretation that real meaning beyond the mathematics can be ascribed to these models. By isolating the common threads between

theoretical and empirical/discursive research paradigms, a regional policy that emerges from specific, locally-informed conclusions as well as more generalised, abstract ideas. It is not possible to produce generalized set of results for any given region, as there would be in a purely quantitative setting, but there are also general lessons for regional economists and policymakers. The question posed and discussed in the final section of this chapter is how this normative portrait can be used to inform a new generation of models in geographical economics.

7.5 Discussion and Implications

The specific advances recorded in this thesis are methodological and two-fold: firstly, proposing a Delphi-type scenario analysis offering a less intensive alternative that has distinct advantages over the standard approach to scenario-building; as well as demonstrating the applicability of mixed-methodologies research, and what it can offer over and above single methodology research. Further research may refine the Delphi-type scenario analysis as an useful tool for social scientists in general. Although this research assumed that aggregate response feedback was sufficient, this should be explored further. Mixed-methodologies research also requires more application in order for the validity of such research to be put beyond doubt and so that a comprehensive routemap to such research can be completed.

The thesis also notes theoretical advances in bringing the public sector into geographical economics. Future research can build geographical economic models where the public sector plays a role in private sector production. Inclusion of the public sector may be key in geographical economics models of knowledge transfer and innovation. The public sector could also be important in the development of models where location space and workers are heterogeneous. The most pressing need is the need for more empirical application of geographical economics and a continuation of the *rapprochement* with the

more empirically/qualitatively -oriented economic geography through the application of mixed-methodologies research.

This thesis also lays the foundations for a more empirically-oriented geographical economics. The models presented in Chapter Six of this thesis result from an iterative process of triangulation between empiricist methodology and theory. Using the geographical economics to model a feature of North West Wales was one of the goals set in Chapter One, but the decision to focus on the public sector followed-on from empirical research of Part One showing its importance to the present and future North West Wales. The resulting model, presented in Chapter Six, captured this but failed in terms of realism when considered against empirical evidence. A more sophisticated model was then developed, which again failed when considered in this way due to its failure to allow the size of the public sector to develop endogenously. This thesis has in this way developed a process whereby empiricism and theory can be triangulated in search of realism in modeling. A model was developed allowing endogeneity in public sector size which was extended yet further after triangulation. The iterative process of triangulation has no clearly defined limits, so that a theoretical model can always be improved upon in terms of realism. The only bound is that of solvability, or, more precisely, tractability: there should be an algebraic or numeric solution to the model. A process of this type can make geographical economics more 'policy relevant' (Martin and Sunley, 2011), and can also be applied in economics more generally. The research presented in this thesis may be developed by formalising this process. More generally, this chapter has been successful in demonstrating the usefulness, and even the advantages, of mixed-methodologies. The two parts of this research apply qualitative and quantitative approaches to regional economics, and then triangulate with an inductive approach to hypothesising and theorising in this field. This idea is especially important, as normative theories can be richer when empirical evidence is used to induce a theory rather than just being used to test the theory, making

mixed-methodologies a useful tool for theory construction. Theory produced using such a methodology is, potentially, far richer and more reflective of the real world than existing theory, meaning that there may be a distinct advantage to mixed-methodologies research over separate qualitative and quantitative inquiry. Care must be taken when using qualitative data which is, by nature open to bias and error. As seen above, rigorous and reliable qualitative data can be gathered by utilizing a reflexive methodology. Once this data is available, mathematical models of geographical economics can be informed and made more realistic by this information. The production of a set of comprehensive triangulated policy recommendations demonstrates the usefulness of mixed-methods approaches to producing conclusions that reflect, and have the potential to improve, the interpretation of economic theory and its application to real regional economies. This brings geographical economics closer to a *rapprochement* with economic geography, providing answers to criticisms of geographical economics by economic geographers.

Finally, the advances above were made on the basis of empirical research in North West Wales. This thesis represents the first academic research undertaken on the region's economy in over a decade, and is especially important given the context of global economic turmoil. North West Wales is a special case even amongst similarly marginal economies, due to the fact that it is the only region in the UK where a majority of the population share a common language that is not English. As such, the regional profile in this thesis is another distinguishing feature, as is the way this is achieved. The profile presented is a narrative profile - a profile in the form of the region's story - based on both statistics and quantitative data, but with the profile itself aiming for logical discussion above presentation of data, offering an accurate portrait of North West Wales in 2009 which may be updated in future.

7.6 Concluding Remarks

This concluding chapter completes the third and final objective set out in the first chapter by triangulating from the first and second strands of research. The chapter has presented the problem of ambiguity in quantitative and qualitative research, with each strand pulling in different directions and thereby contradicting each other. It has been demonstrated that this ambiguity may be removed by triangulating from the two research strands of this thesis, and the validity of using qualitative data for such triangulation is examined, with the finding that qualitative data can be ‘made reliable’. Common threads are then uncovered between the separate parts of the thesis in order to locate triangulation. The final section details this triangulation between the policy recommendations that round off each strand of research. Policy recommendations are provided for North West Wales that draw on those produced for each strand, but incorporate only those recommendations derived in both strands, completing a successful triangulation.

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