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**The Determinants of Value Creation at
the Firm, Industry and National Levels:
A Framework and Evidence**

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**THE DETERMINANTS OF VALUE CREATION AT THE FIRM, INDUSTRY
AND NATIONAL LEVELS: A FRAMEWORK AND EVIDENCE**

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Abstract

We aim to bridge three (plus one) levels of (strategic) management theory of value capture and sustainable value creation; micro (firm), meso (industry, region), macro (national) (and also global). We propose a framework for value creation by firms and explore firm strategies for value capture and their relationship to value creation. We construct requisite variables and test our framework for 17 OECD countries using panel data. We find support for our integrative framework. We also explore the issue of sustainability and its implications for managerial practises, corporate governance, public policy and global governance that promote sustainable global value creation.

INTRODUCTION

One of the great paradoxes of (strategic) management literature is a failure to bridge micro, meso and macro determinants of value creation. In particular, there is extensive discussion of theories of value creation at the firm level (notably transaction costs and the resource-based view (RBV)), prescriptions for value capture by firms, notably Michael Porter's approach and the RBV, some theories of value capture at the industry level, notably M. Porter's five-forces model, and some, but not extensive yet, work on national competitiveness, for example, M. Porter's Competitive Advantage of Nations. Paradoxically there is very little by way of the three-level interactions, surprisingly not even within the work of authors who have dealt with two or all three levels separately. It is notable, for example, that Porter's (1980, 1985, 1990) books address issues of value creation and capture (productivity and competitiveness) on all three levels, yet there is little by way of integration.

The call for papers of this special research forum on 'Building Bridges Across Levels' provides an excellent opportunity to deal with these lacunae in (strategic) management. It is our aim in this paper to contribute in this direction.

Bridging levels has its intrinsic value but not just. It may also reveal new issues and research questions that could be overlooked when interactions are not considered. An important question, for example, is the relationship between value capture by firms and nations, and sustainable global value creation. Such issues require multi-level analysis.

In Section 2 we discuss value creation and capture at the firm and industry levels. We explore the nature and determinants of value creation, by drawing on extant industrial organisation (IO) and (strategic) management literature. We discuss the relationship between value creation and value capture, and explore its implications on sustainable value creation. Section 3 extends the analysis to the meso (industry, region) and then the national levels. Our claim is that the same variables that effect value creation at the micro level, when suitably adapted and extended, may also explain value creation on the macro

levels. In this context we also explore the issue of value capture by nations and its implication on sustainable global value creation.

In Section 4 we construct macro variables, derived from our analysis, and perform a test of the determinants of value creation for 17 OECD countries. Our results provide support for the integrated framework developed in this paper. Section 5 discusses the importance and implication of sustainability, while Section 6 provides concluding remarks.

VALUE CREATION AND CAPTURE OF FIRMS

Interest on value creation by firms goes as far back as Adam Smith's (1776), 'pin factory', and include influential contemporary management thinkers such as Moran and Ghoshal, (1999). Value creation and capture by firms is a currently popular theme in the resource-based view (RBV) debate of the theory of the firm, see for example Kor and Mahoney (2004). However, there is very little discussion on the determinants of value creation, at the firm level, and its link to the meso and macro levels-our aim in this paper.

The literature in economic, IO and strategic management points to four major determinants of value creation at the firm level – human resources, technology and innovation, unit costs economics and the infra-structure and strategy of the firm. These are summarized in Figure 1. The literature on these determinants is large, so we have to be selective. First, innovation and technology is widely seen as a major determinant of value creation. Its importance goes back to Adam Smith's pin factory, where invention is a crucial factor for productivity increases, but reached its apotheosis with Schumpeter's (1942) classic focus on 'creative destruction'. Penrose's (1959) work on endogenous innovation and growth adds credence to the view, which has been taken on by mainstream IO too, to explain inter-temporal efficiency (Baumol, 1991).

FIGURE 1 ABOUT HERE

The importance of human resources (the quantity, quality and relations between managers, workers and entrepreneurs) in the context of the cohesive shell of the organisation is also an all present theme, from Smith (1776), through Marx (1959), Schumpeter (1942), and Penrose (1959) to modern management and human resources theory, e.g., Pfeffer (1998), and the endogenous growth models in economics, e.g., Lucas (1988).

Unit costs economies need slightly more elaboration. They refer to economies of scale and scope (a la Chandler, 1962), but also learning and growth (Penrose, 1959), transaction costs (Coase, 1937) and external Porter (1990), (Krugman, 1991). All these authors emphasise the critical role of unit cost economies in efficiency, productivity, reduction of costs and thus, value creation.

By firm infra-structure we refer to a firm's systems and routines, while by structure - to its internal organisations form (for example, U-form, M-form, heterarchy, etc.). We adopt the conventional definition of strategy, as the pursuit of a long-term objective supported by the requisite allocation of human and other resources for its implementation. The role of strategy and firm infra-structure is examined in the huge literature on strategic management, see, for example, Grant (2005) for an extensive coverage. Strategy is of essence in increasing efficiency and productivity and effecting product differentiation by reducing transaction and production costs and by increasing perceived value – it is, therefore, an important determinant of value creation. The role of a firm's systems and routines has been explored by the RBV and Nelson and Winter (1993). The importance of organisation form is discussed among others by Chandler (1962) and Williamson (1981) for whom the choice of a firm's internal structure is of essence in carrying out a strategy, increasing efficiency and productivity, acquiring and upgrading knowledge and (thus) adding value.

The four major determinants of value creation form an interacting self-reinforcing system. Strategy and infra-structure impact on innovation, unit cost economies and human resources in ways well documented in the literature we already cited, e.g., Chandler (1962). Human resources impact on the other three determinants, indeed they are the source of both strategy and innovation, and affect unit cost economies through their productivity, effectiveness, ingenuity and imagination. Unit cost economies enable strategy, innovation and the use and upgrading of human resources and are in turn affected by all three other factors

Value capture is the concern of firms, but also individuals and nations. Assuming that a firm has been able to produce a useful, innovative product, the fundamental question becomes how to obtain the maximum possible net present value (NPV) of the anticipated future income streams of this innovation. In addition, the firm, innovator or not, has the wider consideration of how to capture the maximum possible value created by other firms too. This is the essence of competition. Through efficiency, power, strategy, ingenuity and luck, firms need to out-compete rivals in order to capture value. In general, firms can capture less, equal or more value than the one they have created through their activities. The size of the pie captured by a firm will mainly depend on two factors: first, their market power, for example, enabled through structural and strategic barriers to entry, as in Porter (1980). In addition, it will depend on the ability of a firm to create 'impregnable bases' as described by Penrose (1959) and the RBV, for example, Peteraf (1993), and more generally differentiate the firm, vis-à-vis its competitors, thus creating intra-firm-based barriers to entry. In addition to these determinants of value capture, 'generic strategies' (à la Porter, 1985) and integration, diversification and cooperation strategies, as in Coase (1937), and the RBV, for example, Teece (1986), can help capture value. However, 'generic strategies' (cost reduction and product differentiation), as well as integration, cooperation and diversification strategies are also critical determinants of value creation. We explore these issues in the context of Figure 2.

FIGURE 2 ABOUT HERE

In Figure 2 market power and ‘impregnable bases’-type strategies are seen to mainly aim at capturing value, generic to strategic mainly creating, and integration strategies to both creating and capturing value. Total value created is the sum total of all firms value creation efforts. Value captured by Firm A is a subset of the total. It can be equal, larger or smaller than the value created by the Firm itself, as represented by the inner ring.

How large will firm A’s share depends on its ability to out-compete rivals, through devising and implementing, appropriate and effective value capture strategies. While crucial from the firm’s perspective, from the point of view of the society as a whole, a more important question is what type of firm strategy and industry structure is more amenable to increasing (or decreasing) the overall pie (extend of shrink the boundaries of the outer circle in Figure 2). This is tantamount to addressing the relationship of the four major strategies to **sustainable** value creation.

This is an intricate and complex issue to answer comprehensively, but as a rule, firm value capture strategies will tend to shrink the pie if they thwart innovation and the other determinants of value creation, and extend it if they impact positively on the value creation determinants, notably innovation.¹ It is widely recognised that entry deterrence and monopolistic practices result in value destruction, see, for example, Penrose (1959), and in early IO literature that focuses on the welfare losses of monopoly power (e.g., Scherer and Ross, 1990). Building ‘impregnable bases’ has more complex effects. It could lead to value destruction if it restricts competition and innovation, but it could also

¹ The emphasis on innovation is justified by the observation that inter-temporally innovation can be applied to, and thus improves, all other determinants of value creation.

serve to internalise the forces of creative destruction (Penrose, 1959), and/or afford firms a breathing space, for example, to capture the value of their innovation efforts.²

Similar considerations apply to integration, cooperation and diversification strategies. They help firms to create and capture value, but they may also result in restricting competition. For example, vertical or horizontal integration may serve as barriers to entry and/or sources of monopolistic power respectively (Porter, 1980). Even generic strategies that are mainly value creating can help firms capture value through product differentiation and cost advantages, serving as a barrier to entry, as detailed extensively in early IO theory, from Bain (1956) to Porter (1980, 1985). In every case the acid test is the impact of strategy on innovation. This is an issue that goes beyond firms and business strategy to corporate governance, the organisation of industry, and the economy as a whole, but also to public policy.

The conventional approach to corporate governance links value creation to maximisation of shareholder value, see Mahoney (2006). Assuming that managers may pursue different objectives, the aim of shareholder value maximisation boils down to incentive alignment between owners and managers, see Jensen and Meckling (1976). Maximising shareholder value, however, need not engender sustainability. A wider economic and institutional context that effects checks and balances, through ‘enlightened’ management, competition, pluralism and diversity of institutional and organisational form, which can lead to mutual monitoring and stewardship, are likely to be necessary to ensure that corporate strategy for value capture does not undermine sustainable value creation, see Moran and Ghoshal (1999) and below.

Industry-wide, the theory and evidence point to ‘big-business’ competition, combined with small firm creation and clusters of small (and large) firms, being more conducive to innovation; than perfectly competitive, perfectly contestable, or monopolistic markets

² Indeed even conventional entry deterrence strategies may play this role in certain cases of, for example, rapid technological change and (thus) hyper competition. Under such conditions expectations of normal profits may be a disincentive for innovation (Baumol, 1991)

(see Baumol, 1991). Such forms of market structure reduce incentives to innovate, by eliminating above normal profits (contestability) or competition (monopoly), see Penrose (1959), Baumol (1991), Porter (1998), and Krugman (1991).

Yet, neither institutional and organisational pluralism, nor ‘best-practice’ industry organisation can ensure sustainability by themselves. The reason is that firms value capture strategies may lead to value destruction through monopolistic practices (Penrose, 1959). Public policy may be required to ensure that value capture does not undermine value creation, It can include competition, industrial and regulation policies that aim to effect sustainable value creation by enhancing competition and contestability, facilitating innovation, SME and cluster creation and upgrading, big business competition for innovation, a level playing field, the elimination of corruption. Clearly, despite democratic credentials, public policy too may not be captured by organised groups (Olson, 1971) and clearly corruption is not a term unknown to policy makers. This brings back the issue of diversity and pluralism, which can help effect some checks and balances. We return to such considerations in the context of sustainability in Section 5.

FROM FIRMS TO INDUSTRIES, REGIONS AND NATIONS

The nature and determinants of value creation at the national level has not traditionally been a major concern of management theory, being rather dominated by economic theory. A notable exception is Moran and Ghoshal (1999) who explore the role of firm and markets on value creation and macro-economic development, by synthesising and extending extant Penrosean, Schumpeterian, transaction costs and resource-based contributions to management and economic literature. Besides exploring the determinants of value creation at the firm levels our paper aims to go further by also discussing the impact of value capture on sustainable value creation and providing on empirical-econometric test of our framework.

The determinants of value-wealth creation was the theme of the founding father of economics, Adam Smith. In his *Wealth of Nations* (1776), Smith attributed the wealth-creating abilities of market economies to the “visible hand” of the firm and the “invisible hand” of the market. In analysing his “pin factory”, Smith observed how specialisation, the division of labour, teamwork and invention, create value and engender productivity. The marvels of the “visible hand” are enhanced further by the “invisible hand” of the market – the free interplay of demand and supply by economic agents in pursuit of their own interest. The invisible hand helps provide information, incentives, co-ordination, and realise value through exchange. Competition can ensure that “natural” prices will tend to emerge. Restrictive practices by, for example, “people of the same trade” will endanger this result, calling for restraint and/or public policy³.

In the neoclassical marginalist tradition, that followed and gradually dominated economic thinking, the focus shifts from value-creation in production and realisation in markets, to exchange relationships, subjective value and efficiency in resource allocation. The aim of economics becomes one of “economising”, of rational choices between ends and scarce means which have alternative uses, (Robbins, 1935). Given scarcity, rationality and the need for economising, the economic aim becomes one of achieving an efficient allocation of scarce resources.

Efficient allocation has a static and an inter-temporal dimension. The former can be achieved through perfectly competitive markets, the latter through innovations. Unlike static efficiency, perfect competition or perfect contestability (a market with free entry and costless exit) need not lead to intertemporal efficiency, as it removes the incentive to introduce innovations – the Schumpeterian reward of (transient) “excess profits”, see Baumol (1991). For Baumol (1991) the best type of market structure from the point of view of intertemporal efficiency is big-business competition. The potential presence of

³ In this tradition, Joseph Schumpeter (1942) later emphasised the role of innovation and creative destruction as a determinant of economic performance. Edith Penrose (1959) reinvented but also extended the classical tradition, by explaining firm endogenous growth through intra-firm knowledge-creation, leading to “excess resources”, which serves as an incentive for endogenous growth. Building on Penrose, Richardson (1972) pointed to the ubiquitous nature of inter-firm co-operation, in forms other than price-collusion.

increasing returns, originally pointed to by Allyn Young (1928), suggests that imperfect market structures could well be inevitable, too.

Despite such and other challenges, neoclassical economics and economists seem to share a belief that perfectly competitive markets and free trade can deliver sustainable value creation. This is despite the existence of large MNEs. While the latter are an obvious instance of “oligopoly” (thus, alleged “market failure”), it is believed that MNEs can be agents of efficiency and global wealth creation. The recognition of “imperfect competition” and increasing returns leads to the possibility of “strategic trade”, yet the practice of strategic trade is questioned due to “government failures” and possible retaliatory behaviour, see Krugman (1990). In all, it is arguable that neoclassical economic theory fails to explain efficient allocation of resources, let alone value/wealth-creation at the national level.

The absence of a satisfactory framework on national competitiveness, which moreover, accounts for the potentially crucial role of firms, and industries, has led Porter (1990) to propose his now well-known ‘Diamond of Competitive Knowledge of Nations’. In his ‘Diamond’ Porter combines factor conditions (from traditional neoclassical economic theory), with demand conditions (earlier encountered in Vernon’s (1966) product line cycle theory of international trade and foreign direct investment (FDI), firm structure, strategy and rivalry (from management and IO theory and his own earlier contributions, e.g., Porter (1980, 1985)) and related and supporting industries, a very good idea that draws on earlier works on ‘industrial districts’ and ‘clusters’ (see, for example, Pyke, Becattini et al (1990) for a survey). The four factors are said to interact and create the conditions for national competitiveness. Rare and difficult to replicate factors are good (for value capture a RBV idea), sophisticated demanding consumers challenge firms to innovate, domestic rivalry is good and preferable to competition from foreign firms, related and supporting industries help create ‘clusters’. Clusters enhance productivity and innovation (Porter, 1998). FDI is a sign of competitive advantage, outward investment being even a measure of national competitiveness (Porter, 1990).

Despite extensive critiques (see, for example, Hill, 2005 for an account) Porter's 'Diamond' has met considerable success, especially commercial one – helping create, for example, a whole new industry for cluster diagnosis and upgrading. However, Porter did not even attempt to integrate his earlier firm and industry level analysis with the “diamond”, he did not explore the relationship between value creation and value capture, he paid little attention to the issue of sustainability, in particular the impact of firms and nations value capture strategies on sustainable (global) value creation.

In contrast to Porter's approach, our framework on the determinants of value creation at the firm level, lends itself readily to aggregations at the meso and national levels. In particular, the determinants of value creation at the meso, industry, regional and national levels are the same as those for the firm level, when suitably reinterpreted to refer to meso or nation-wide infra-structure and strategy, human resources, unit cost economies and innovation and technology and also when extended to capture special “meso” and macro characteristics. For example the meso level one has to consider the industry-wide structure, and performance, the ‘degree of monopoly’ (Cowling, 1982) and the regional milieu (Porter, 1998). At the macro level, one has to consider the national context, which includes the macroeconomic policy mix and the nature and level of effective demand. These impact upon the context within which firms and industries operate and determine the current “size of the market”, and (thus) the value that can be realised at any point in time. The macro level also includes the institutional context and in particular the “governance-mix”, which is the “market-hierarchy-cooperation” mix of economic governance. The institutional environment is crucial as it provides “sanctions and rewards”, culture and attitudes and the overall “rules of the game” (North, 1991, Moran and Ghoshal, 1999). The “governance-mix” determines the overall efficiency of the mode through which the whole economy operates.

Figure 3 ABOUT HERE

The attached “Wheel of the nation” is finally influenced by the global context. This is the sum of each nation’s ‘wheel’, their synergies, and the institutions and organisations of global governance. These impact upon the size of the global market, and the overall ability of ‘The world’ to generate value and wealth.

The firm has centre stage in the wheel. It is the organisation *par excellence* in the history of humankind for its ability to create value-wealth. This is particularly the case for large firms and MNEs (Penrose, 1959; Chandler, 1990; Hymer, 1979), and larger and smaller cooperating firms in the context of regional ‘clusters’ (Porter, 1998), see Figure 4. These impact positively on the determinants of value-wealth, notably unit cost economies, and innovativeness (Porter, 1998).

FIGURE 4 ABOUT HERE

Another important ‘actor’ is the government. It may, and does, influence the institutional and macroeconomic context, through laws, regulations, ‘leadership’ etc. It can affect the meso-environment through its competition, industrial and regulation policies and the macro-environment through its macroeconomic policies. It can impart upon the determinants of productivity and value and wealth, through education and health policies, the provision of national infrastructure, its policies on innovation and “social capital”.

AN EMPIRICAL INVESTIGATION

In this section we construct the requisite nation-level variables that derive from our analysis so far to test for the determinants of value creation. Below we explain our choice of variables, choice of econometric technique and the obtained results.

Data description and considerations

We use panel data and time-series, cross-section techniques on various grounds. In panel data estimation, variations over both the cross-section and time series dimensions are considered jointly. This has the advantage of using all available information enabling us to control better for the effects of missing or unobserved variables, something that is not attainable with pure cross-sectional or time series data. Additionally, the panel data approach increases the degrees of freedom, producing more efficient estimates. This approach, with a large panel dataset, should moderate the problems of multicollinearity that otherwise bedevil inferences about growth obtained solely from time series data. Moreover, use of panel data allows the estimation of long run relationships with fewer problems than with time series data; in particular, it moderates the problems otherwise involved in estimating relationships between integrated series. (See Baltagi (2001) for detailed discussions of the merits of using panel data.)

Our dataset covers seventeen (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Portugal, Spain, Sweden, United Kingdom, and United States) developed (OECD members) countries for the period 1971 to 2000. The choice was determined by data availability coupled with another consideration as regards the cross-sectional dimension. Durlauf and Johnson (1995), Canova (1999) and Krueger and Lindahl (2000) argue that neither data nor theory support the assumption of parameter homogeneity in such analyses. The relative importance of factors affecting performance might be different for countries at different stages of development. This leads us to select a group of countries that are at comparable levels of development. Another concern is the lower data quality in developing countries' national accounts (Schultz, 1999). Given these problems, we choose to focus on OECD countries. The sample seems representative for the entire OECD. Firstly, it includes all members of the G-7, next some of OECD's smaller countries. Secondly, also non-EU countries are present in the sample. The number of cross-sections relative to the time dimension also allows us to use econometric approaches that require the number of time series observations to be greater than the number of cross section observations.

Specifically, the dataset contains the following variables:

 TABLE 1 ABOUT HERE

GDPPC is the dependent variable and is used as an indicator for aggregate productivity/value creation. USPTO is an indicator of research and development-innovation activity. Since there are usually huge differences among different patenting systems (Soete, 1987; Fonfria et al., 2001) we use the number of patent applications in a single country, specifically the United States. NOS serves as an indicator of realised profits. RULC represents price-competitiveness. Aggregate demand pressures are captured by GAP, see Table 1. All education variables are used as proxies for human resources-capital.

In terms of our model, the following points require elaboration. First, the profit share aims to capture both (effective) strategy and infrastructure, but also the ‘degree of monopoly’ and ‘regional milieu’ as they impact on national productivity. Unit labour costs aim to proxy Unit Costs Economics, in that the last mentioned result in reduced unit costs, Unit Labour Costs being the best proxy available for this. The role of FDI is self-evident, while our measure of national R&D may also be seen as an imperfect proxy for clustering/aggregation effects.

Econometric Methods

Our general specification is:

Productivity/Value Creation=f(Profit, R&D, Education, Demand, Foreign direct investment, Unit labour costs)

Fixed and random effects

The identification of fixed and random effects models has been widely discussed in the literature. When the cross-sectional units are randomly drawn from a large population,

random effects model is appropriate. Whereas, when the interest lays on specific cross-sectional units, fixed effects model is appropriate. The countries under investigation can be classified as developed. Hence the choice of the countries is not random and a fixed effects' approach seems more plausible. Another important consideration regards the omitted variable bias, a problem that pertains especially growth and competitiveness empirical research, since the factors that can plausibly affect them seems limitless. Durlauf (2003) discriminates between two sets of regressors: those (few) provided by the Solow growth model and those proposed by the new growth theories. This latter set contains a vast number of potential regressors, which cannot be included since the number of available observations is not that large. Utilizing fixed effects estimation can reduce the omitted variable bias as the country-specific factors that are fixed over time are eliminated (Forbes (2000); Arjona *et al.* (2001)).

To test the fixed effects versus the random effects model we employ the Hausman test. The test statistic is 237.52. This statistic is asymptotically Chi-square distributed with 6 degrees of freedom. The random effects model can be rejected at any conventional critical level. Consequently we proceed with the fixed effects model. In each case our regression equations follow the same form using the one-way fixed effects model (Least Squares Dummy Variables (LSDV) with country-specific intercepts).

 TABLE 2 ABOUT HERE

Assumptions

The generalized regression model is $Y_{it} = \alpha_i + \beta_i' x_{it} + e_{it}$,

In this setup, assumptions for consistency and efficiency of OLS estimator are:

1. $E(e_i) = 0$, for all i
2. $E(e_i e_i') = \sigma_e^2 I$, for all i

3. $E(e_i e_j) = 0$ if i different from j

The first assumption states that the unconditional mean of the error term is zero. A constant σ_e^2 for all i means no cross-sectional heteroscedasticity and identity matrix $I_{T \times T}$ means no autocorrelation over time within each cross-section. The third assumption implies no cross-sectional correlation. The last notion is analogous to serial correlation but it examines the residuals across cross-sections rather than time. The coefficients and intercepts are BLUE (best linear unbiased estimator) under these assumptions. When these assumptions hold OLS may be used for fixed effects model estimation (Says, 1989). However, these conditions rarely hold (Davidson and MacKinnon, 1993).

The application of formal tests based on the LSDV results reveals problems of heteroscedasticity, serial correlation and cross-sectional correlation. Specifically, following Greene (2000) the Breusch-Pagan statistic for cross-sectional independence in the residuals of a fixed effect regression model was computed. In order to test for serial correlation we have used the test proposed by Wooldridge (2002). This tests for serial correlation in the idiosyncratic errors of linear panel data models. Drukker (2003) presents simulation evidence that this test has good size and power properties. Finally, a common deviation from homoskedastic errors in the context of pooled cross-section time-series data (or panel data) is likely to be error variances specific to the cross-sectional unit. To test for group-wise heteroscedasticity a modified Wald statistic following Greene (2000) has been used.

The tests reveal several problems that rend the fixed effects estimator inefficient and biased, thus unreliable. The BLUE Gauss-Markov condition does not hold. Thus the application of LSDV in the presence of non-spherical disturbances will lead to inefficient estimates and biased standard errors. This implies that the results of the LSDV estimator should be taken with caution and that another estimation technique is needed.

One possible remedy is the use of Feasible Generalised Least Squares (FGLS), which produces efficient estimates and unbiased standard errors. In this case two sequential

transformations are conducted: first eliminating serial correlation and then eliminating contemporaneous correlation of the errors. However, Beck and Katz (1995) identify a number of problems concerning the use of feasible GLS and recommend simple OLS regression plus panel corrected standard errors (PCSEs) as a more precise estimation of TSCS data. They argue that GLS tends to give over-confident estimation of the coefficients by underestimating the errors. According to Beck and Katz (1995), simple OLS coefficient estimates are inefficient but consistent; the degree of inefficiency depending on the data and the exact form of the error process. Therefore, they propose a panel-corrected standard errors procedure to derive more accurate estimations for the errors while retaining the OLS coefficient estimates. Their Monte Carlo simulation shows that their approach is much more accurate than GLS. Another virtuous property of PCSE is that it is able to account for cross-sectional correlation when the time dimension of the data is less than the number of cross-sections, whereas FGLS cannot. However, they acknowledge that GLS provides an efficiency advantage over PCSE in extreme cases of cross-sectional correlation, but only when the number of time periods is at least twice the number of cross-section units. Chen, Lin and Reed (2005) confirm Beck and Katz's result that FGLS consistently underestimates coefficient standard errors. However, they also find that while PCSE generally estimates standard errors more accurately than FGLS, it sometimes produces standard errors that are unreliable. They suggest the use of both estimators, relying on the PCSE estimates for hypothesis testing, while on FGLS for coefficient estimates.

Therefore we continue by estimating a feasible GLS correcting both for heteroscedasticity and cross-sectional correlation assuming an idiosyncratic AR(1) process for each cross-section. Additionally taking into consideration the reservations that Beck and Katz have expressed we have also estimated the model with Prais-Winston panel-corrected standard errors.

Description of Results

Equation 1

The following equation was estimated for annual data:

$$GDPPC_{i,t} = \alpha_i + \beta_1 RULC_{i,t} + \beta_2 NOS_{i,t} + \beta_3 FDIIN_{i,t} + \beta_4 GAP_{i,t} + \beta_5 EDU_{i,t} + \beta_6 USPTO_{i,t} + e_{i,t}$$

where i denotes the country and t the time indicator.

The results obtained are reported in Table 3.

 TABLE 3 ABOUT HERE

In brief, coefficients have the expected signs and both GLS and PCSE indicate that they are highly significant. Profits, inward FDI, expenditure on education, demand and patents have a positive effect on value creation while unit labour costs have a negative effect. All these are very much in line with the implications from our framework in the previous sections. PCSE tends to give higher standard errors than LSDV and FGLS. The magnitude of the coefficients does vary between estimators but not extremely.

Fischer (1993) finds that inflation rate has a negative effect (-0.0310) on performance. So does Barro (1995). Although inflation and unit labour costs share some attributes they are not comparable and we find a much higher effect than those authors.

Five-year averages

The estimation results are based on annual observations. However, there are some concerns expressed by various authors on this point, specifically how to extract the long run information of this annual data. As Barro (1997) points out, data will more likely be influenced by measurement error and short-term disturbances. One method to circumvent this issue is to estimate the model with annual data but to use many lags of the independent variables to capture long-run effects (e.g. Kocherlakota and Yi, 1997).

However, it is more common to use five-year averages in order to smooth over cyclical fluctuations with the consequent loss of degrees of freedom (e.g. Grier and Tullock, 1989; Devarajan, Swaroop and Zou, 1996; Kneller, Bleaney and Gemmell, 1999). Therefore we have also constructed a second dataset consisting of five-year averages. In this dataset we have been able to incorporate data from Barro and Lee (2000) on educational attainment but this comes at the cost of reduction of the degrees of freedom. Now expenditure on education is replaced by average years of schooling devoted in each level of education. In this case we cannot use FGLS to correct for contemporaneous correlation since the time dimension ($T=6$) is less than the cross-sectional dimension ($N=17$). Therefore only LSDV and PCSE results are presented.

Equation 2

The estimation equation was:

$$GDPPC_{i,t} = \alpha_i + \beta_1 RULC_{i,t} + \beta_2 NOS_{i,t} + \beta_3 FDIIN_{i,t} + \beta_4 GAP_{i,t} + \beta_5 HYR_{i,t} + \beta_6 SYR_{i,t} + \beta_7 PYR_{i,t} + \beta_8 USPTO_{i,t} + e_{i,t}$$

where i denotes the country and time indicator t denotes the non-overlapping five-year periods from 1971-1975 through 1996–2000.

The results are summarized in Table 4.

 TABLE 4 ABOUT HERE

Once again, all coefficients have the expected signs. Compared to the annual data results (Table 3) the coefficients of all variables with the exception of inward foreign direct investment are significantly reduced. This can be attributed to the substitution of the education variable. PCSE suggest that all estimates are significant with the exception of primary education. This confirms the findings of Barro and Sala-i-Martin (1995) although

their analysis is placed in an economic growth context. Moreover, like Barro and Sala-i-Martin (1995) and Agiomirgianakis, Asteriou and Monastiriotis (2002) the estimated coefficient for average years of higher schooling is greater in magnitude compared to the coefficient for average years of secondary schooling, which in turn is higher than the coefficient of average years of primary schooling. The role of Demand is now less important, as its p-value is slightly above 10% (0.119).

Equation 3

We have also utilized the Barro-Lee data on educational attainment. Specifically as an alternative measure of human resources we have used data on percentage of the population that have reached each level of education.

The estimation equation became:

$$\text{GDPPC}_{i,t} = \alpha_i + \beta_1 \text{RULC}_{i,t} + \beta_2 \text{NOS}_{i,t} + \beta_3 \text{FDIIN}_{i,t} + \beta_4 \text{GAP}_{i,t} + \beta_5 \text{LH}_{i,t} + \beta_6 \text{LS}_{i,t} + \beta_7 \text{LP}_{i,t} + \beta_8 \text{USPTO}_{i,t} + e_{i,t}$$

where i denotes the country and time indicator t denotes the non-overlapping five-year periods from 1971-1975 through 1996–2000.

The results are summarized in Table 5.

 TABLE 5 ABOUT HERE

The new coefficients also have the expected signs. All estimates are statistically significant at the conventional levels of significance. A comparison with the results presented in Table 4 reveals that the coefficients of the variables that are present both in Table 4 and Table 5 are generally unchanged. As regards the education variables we still observe the linear relationship between the level of educational attainment and the

magnitude of the coefficient. A peculiar result is the negative coefficient of primary education. Still, since our sample consists of only developed countries this might reflect the higher relative importance of secondary and tertiary education on these countries' productivity while primary education might yield positive effects in less developed countries. In fact Psacharopoulos (1994) in a global case study indicated that less developed countries relied heavily on primary education while higher education seems to have a greater effect in developed countries. Equation 2 utilises average years of schooling as a human resources indicator. In equation 3 this human capital indicator consists of educational attainment of persons that most probably have completed their formal education. Therefore the higher the percentage of people that attended primary education only, the lower the corresponding percentages for secondary and tertiary education and hence a negative effect on the competitiveness of developed countries.

In all, our results are in support of our framework on value creation. However, our results too, do not address the issue of sustainability to which we turn.

SUSTAINABILITY, ITS PRE-REQUISITES AND IMPLICATIONS FOR POLICY

For the process of value creation to be sustainable, crucial economic, social and environmental prerequisites need to be in place. Sustainability is threatened primarily when there exists a power structure that allows an agent to pursue its own interest in value capture, in a way that undermines value creation. Typical examples include firms and governments that abuse the environment, excessive inequalities in distribution within and between countries, 'strategic trade' policies by (in particular) developed countries that undermine a level-playing field, regulatory capture of the state by organised groups, 'deals' between MNEs and governments of emerging economies that restrict trade, monopolistic, collusive and restrictive policies by firms, corruption by policy makers, attempts by governments of developed countries to 'attract' valuable human resources from developing and emerging economies.

Despite wide-held beliefs that market forces can address all of these problems, for example through ‘win-win’ environmental strategies by firms (see, for example, Porter and van der Linde (1998), the underlying conditions and requisite power structures that effect sustainability are rarely discussed.

A way to approach this issue is by recognising the existence of a multiplicity of layers of decision making, therefore potential sources of threats to sustainability, and explore the requirements for diffusing such threats, for example, through monitoring and objective alignments.

Starting first from the controlling group of the firm (here, the ‘agent’) and the corporation as an entity comprising of the sum of its stakeholders (here, the ‘principal’), it can be that the pursuit of personal interests by the former compromise those of the latter. This, for example, is the case when the former pursue strategies that favour short-term, share valuation growth and personal compensation packages and perks, which are beyond those required to provide them with adequate incentives to pursue the interest of the corporation as a whole, that is, sustainable value creation and capture. This undermines sustainability of the corporation as a whole and has legitimately led to the extensive focus of recent corporate governance debates on this issue.

The second layer is that of the corporation as the agent and the government as the principal. The ability of firms to realize value-wealth can, and often does, lead them to attempt to appropriate wealth as ‘rent’ through monopolistic and restrictive practices. A high degree of market power can thwart incentives to innovation and be inimical to productivity and value-creation.

In this context, the government (and its governance) becomes crucial. Sustainable productivity value-wealth creation requires competition and regulation policies that thwart the creation and use of monopoly power (while allowing for an innovations-

inducing “degree of monopoly”), and adopt policies to support small firm creation and survival, as well as the diagnosis and upgrading of regional clusters.

In the third layer, nations themselves (now the agents) can try to capture wealth by adopting strategic trade policies that can harm the process of global wealth creation. The aim of the ‘global community’ (now the ‘principal’) should be to require individual governments to adopt policies that enhance global productivity and value-wealth creation. Indicatively, governments of developed economies should refrain from policies that restrain trade, yet recognise the need of developing countries to ‘foster’ infant firms and industries, for their expected competition, innovation and productivity effects.

Going back human resources, are there relationship, it is clear that disaffected labour is likely to be less productive (Pfeffer, 1998), which may undermine the very purpose of the corporation and its controllers. In this context, employees become a privileged ‘stakeholder’. This is not just because employees too invest in firm-specific assets (as do shareholders), but also notably because they are a crucial determinant of a firm’s ability to exist.

The absence of global knowledge (and a global monitor) may call for diversity. In any country or society, a host of other organisations and institutions exist – the family, the church, NGOs, and (even!) state-owned enterprises (SOEs) – that can affect, in their interaction, the ability of firms’ and governments’ incentives to play the productivity and value-wealth enhancement process (see Moran and Ghoshal, 1999). In this context the issue is the specialization and division of labour of alternative institutions and organisations, based on their relative advantages and competencies in production, exchange, legitimacy, ideology and culture, and the identification of institutional and organisational configurations and conducts that promote efficiency in the form of enhanced productivity, value and wealth. Competition and co-operation, self-interest and altruism, big businesses and smaller co-operating firms in clusters, can impact positively on value creation.

Sustainability of value- creation requires appropriate environmental, distribution and social policies, including migration, which also follow endogenously from our proposed perspective. Excessive inequities in distribution, the abuse of the environment, the exodus of educated human resources, can thwart a country's ability to sustainably generate wealth. Policies designed to deal with such problems are also part of a government's remit, with a proviso. Governments should make use of market prices to render the actions of “offenders” expensive (e.g. tax pollutants, require emigrants to developed countries to return public funds-subsidies provided for their education, etc). The use of non-market measures should in general be avoided: it thwarts incentives, and leads to the path of authoritarianism, with predictable consequences. In the absence of a “Dr Pangloss”, an approximate way of effecting sustainable wealth creation is through the free interplay, pluralism and diversity of institutions, organisations, individuals, ideas, cultures, religions, norms, customs and civilizations, as each can serve, in part, as a ‘steward’ or ‘monitor’ for the others. Having said this, it is crucial that this process is “managed”, “guided”, and “moulded” through informed agency, so that democracy is married to performance. This brings our discussion of ‘governance’ centre-stage. A fundamental question is whether different types of power structures intra and international and (thus) (global) governance may impact differently on sustainable value creation. This, however, is a very complex issue for further research.

For our purposes here, suffice is to note that for (corporate) governance to contribute towards sustainable value and wealth creation, internal and also external controls are required, including national and global incentives and sanctions. Importantly, it is necessary to eliminate corruption at all levels: intra-firm, intra-country (regulatory capture) between host governments and multinationals, and internationally. All these presuppose a degree of trust, social capital and the ‘ethical dimension’. Exclusive focus on self-interest may well be the strongest foe of sustainability. As the *Economist* (June 18, 2003) points out, government should be “pro-market, not pro-business”. We would also propose ‘pro-sustainability’.

CONCLUDING REMARKS, LIMITATIONS, FURTHER RESEARCH

In a globalising world value can be created everywhere and also be captured everywhere. An objective of many economic agents is to capture value at a faster rate than its peers – to be competitive. For this game not to undermine the sustainability or the value/wealth process itself, (the objective we believe one should adopt for the globe as a whole) one has to discuss both the determinants of value/wealth creation, and the prerequisite for its sustainability, to involve the ‘right’ power structure. This is not always the case, and crucially these important issues are often not even addressed. The three (plus one) levels, firms, meso, national, (and global) are never bridged.

We suggested that the theory of value creation (and capture) requires a synthesis of resource allocation and resource creation but also the identification of the requisite power structures that allow value creation not to be undermined by value capture. We developed a perspective on the determinants of value/wealth creation at the firm, meso and national levels, and have tested it for 17 OECD countries, with overall promising results. We have then discussed the limitations of extant theory of the firm concerning governance and value in its context, and explored some prerequisites of sustainability. Sustainability requires both internal and external controls, to include the market, but also hierarchy (firm and state), as well as institutional and global controls. Institutional diversity and pluralism can help effect mutual ‘stewardship’ and monitoring. For sustainable value creation, corporate governance needs to be aligned to national and global governance, in a way that thwarts the potentially negative impact of some agents’ pursuit of value capture on sustainable value creation. Such include environmental, social and economic degradation. In our context corporate, social and environmental responsibility, but also requisite public policies are part and parcel of the need for sustainable value creation. Eliminating corruption at all levels is a crucial prerequisite.

There are various limitations in our analysis. First, we have only tested for value creation at the national level, and not for value capture at either the macro or national levels. Moreover, we did not test for value creation and the firm industry and/or regional levels.

Also, our discussion on sustainability derives from our framework, but remains at the level of educated assertion. Our result support the national level framework, and only by implication the lower-level arguments. As a result of aggregation problems, it may be that our results at the macro level would not be replicated at the micro and meso levels. We are currently working on all these issues and hope to motivate others. We also hope that by bridging the three (plus one) levels and testing the integrative framework, adds value to extant theory (and evidence) and is a step in the right direction. Yet, we also realize the limitations and the need for further research.

Data References

For each database we provide hyperlinks. Some of them are publicly accessible while others require registration. We have made every attempt to keep the dataset used up to date.

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FIGURE 1
The Determinants of Value Creation by Firms

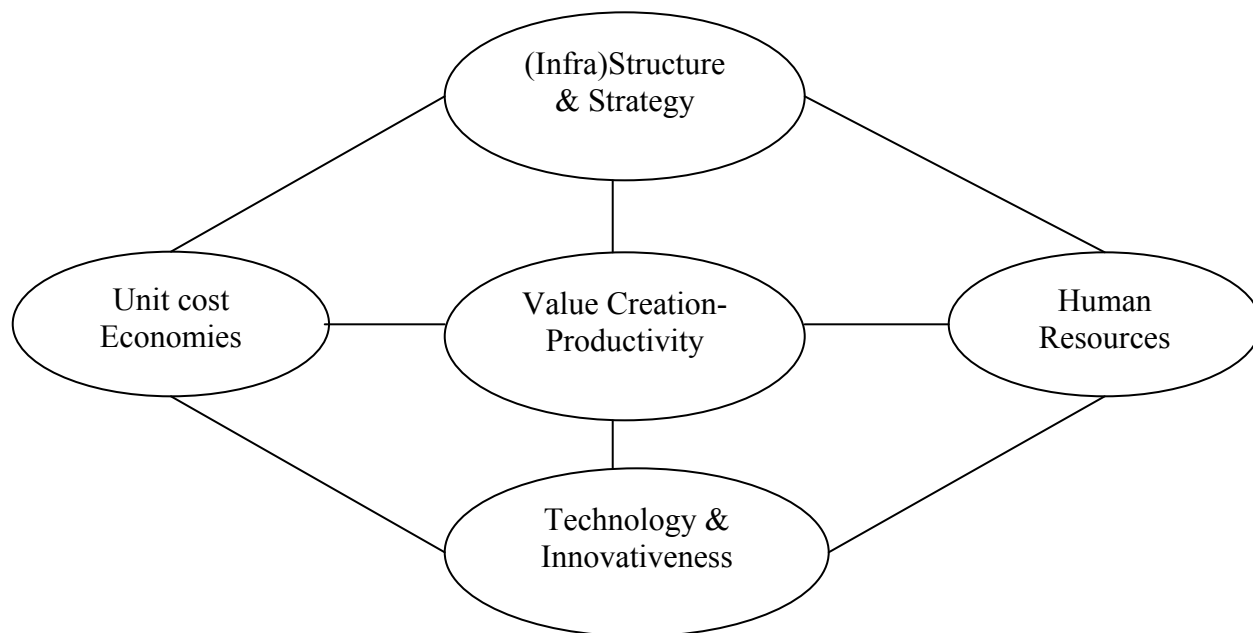


FIGURE 2
Firm Strategy, Value Creation and Value Capture

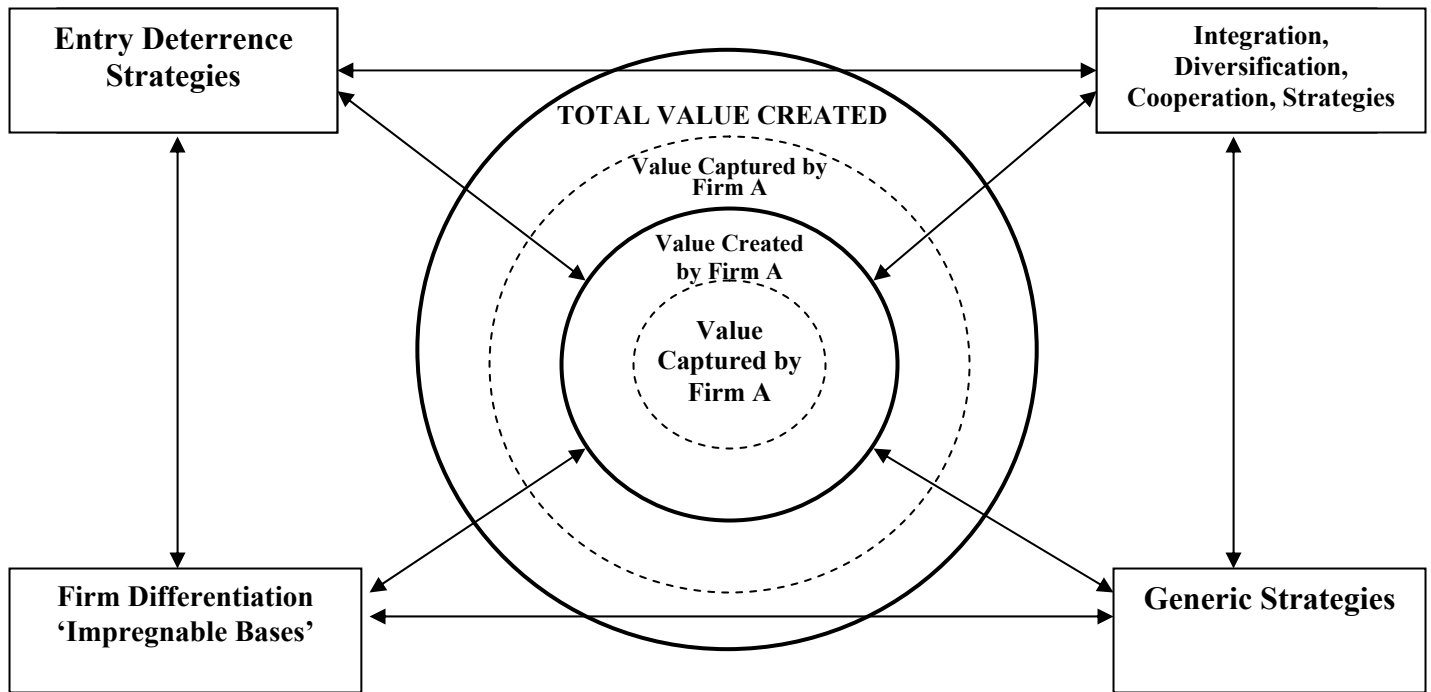


FIGURE 3

**The determinants of productivity, value and wealth at the
firm, meso and national levels**

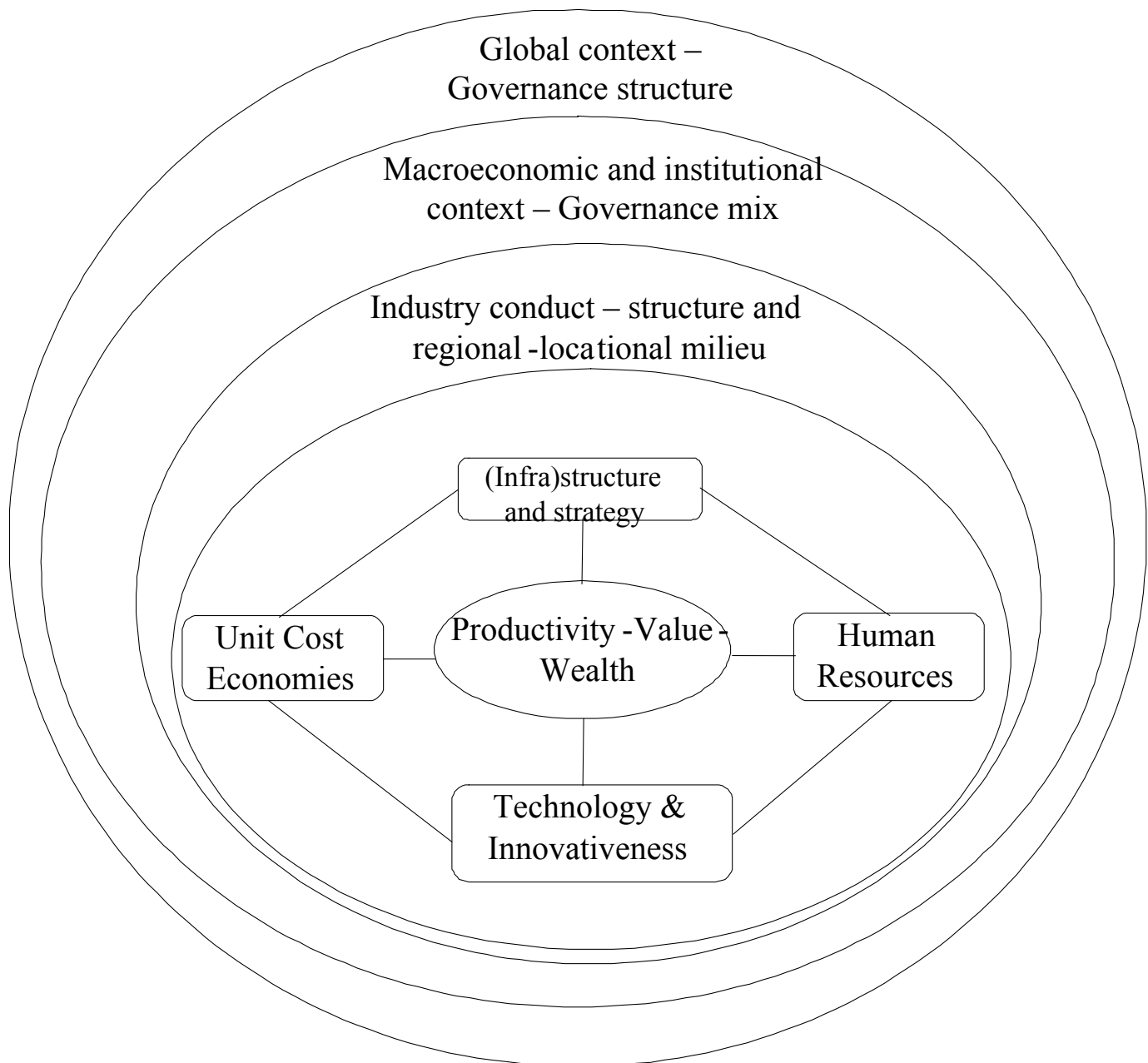


FIGURE 4
Three ‘agents’ of productivity, value and wealth-creation

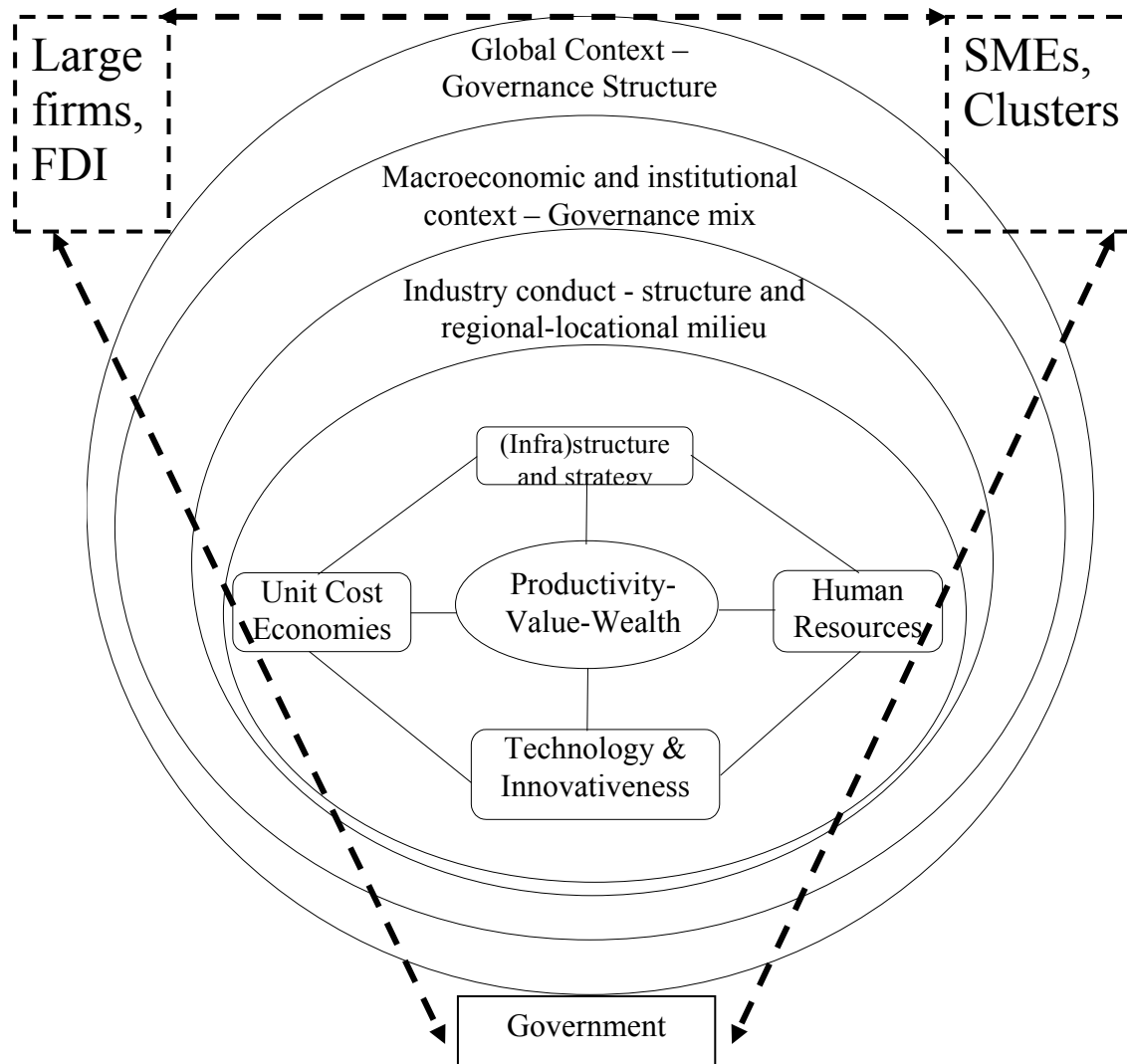


TABLE 1
Definition, Description and Sources of Variables

Variable	Description	Source
GDPC	GDP per capita (constant 1995 US dollars)	WDI (2005)
USPTO	Utility patent applications filed in the U.S.	USPTO (2004)
FDIIN	Foreign direct investment inflows (millions of US dollars)	UNCTAD (undated)
NOS	Net operating surplus adjusted for imputed compensation of self-employed: total economy (millions of 1995 US dollars)	AMECO (2005)
RULC	Real unit labour cost index: total economy (1995=100)	AMECO (2005)
EDU	Total spending on education as a percentage of GNI	WDI (2005)
GAP	Gap between actual and trend GDP at 1995 market price as percentage of trend GDP.	AMECO (2005)
LP	Percentage of the population aged 25 and over that have received only primary education	Barro and Lee (2000)
LS	Percentage of the population aged 25 and over that have reached secondary education	Barro and Lee (2000)
LH	Percentage of the population aged 25 and over that have reached tertiary education	Barro and Lee (2000)
PYR	Average years of primary schooling in the total population over age 25	Barro and Lee (2000)
HYR	Average years of higher schooling in the total population over age 25	Barro and Lee (2000)
SYR	Average years of secondary schooling in the total population over age 25	Barro and Lee (2000)

TABLE 2
Fixed and random effects estimation

	Fixed effects (LSDV)	Random effects
Log(RULC)	-.3360993*** (.0934125)	-.6183997*** (.0971796)
Log(NOS)	.2374197*** (.0164647)	.1869511*** (.0160459)
Log(FDIIN)	.0148243*** (.0023772)	.0175235*** (.0025813)
GAP	.0015445 (.0014935)	.0006092 (.0016501)
Log(EDU)	.1196761*** (.0245462)	.1331904*** (.0268401)
Log(USPTO)	.1494761*** (.0127753)	.1250726*** (.0120031)
Wald $X^2(6)$		2167.45
R ²	0.8522 (within)	0.8469 (within)

Standard errors are given in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% level of significance respectively.

TABLE 3
TSCS estimation (T=29, N=17)

	LSDV	FGLS	PCSE
Log(RULC)	-.3360993*** (.0934125)	-.3120181*** (.0453367)	-.3691967*** (.1240545)
Log(NOS)	.2374197*** (.0164647)	.1901109*** (.0092748)	.2368025*** (.01983)
Log(FDIIN)	.0148243*** (.0023772)	.0018703*** (.0004583)	.0041024*** (.0013975)
GAP	.0015445 (.0014935)	.0033983*** (.000524)	.0038979** (.0016937)
Log(EDU)	.1196761*** (.0245462)	.1484537*** (.0127489)	.2243063*** (.0336859)
Log(USPTO)	.1494761*** (.0127753)	.0912719*** (.0062851)	.0933943*** (.0152083)
Wald X^2 (22)		9380.30	7925.69
R^2	0.8522 (within)	Not Applicable	0.9991

Standard errors are given in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% level of significance respectively. All estimations were carried out with fixed country effects. FGLS and PCSE are corrected for heteroscedasticity, panel-specific autocorrelation and cross-sectional correlation.

TABLE 4
Panel estimation (T=6, N=17)

	LSDV	PCSE
Log(RULC)	-.0929392 (.066352)	-.1073423** (.050033)
Log(NOS)	.1647115*** (.0297902)	.1660655*** (.0391075)
Log(FDIIN)	.0106255 (.007795)	.0142087** (.0062271)
GAP	.0039408 (.0039931)	.0047078* (.0030173)
HYR	.4065242*** (.1003755)	.4222366*** (.0888806)
SYR	.0675261*** (.0217388)	.078254*** (.0189706)
PYR	.0358272 (.0468332)	.0072849 (.0291376)
Log(USPTO)	.0801125*** (.0333983)	.0538696* (.0289491)
Wald X ² (19)		2.20e+06
R ²	0.9302 (within)	0.9998

Standard errors are given in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% level of significance respectively. All estimations were carried out with fixed country effects. PCSE is corrected for heteroscedasticity, panel-specific autocorrelation and cross-sectional correlation.

TABLE 5
Panel estimation (T=6, N=17)

	LSDV	PCSE 1
Log(RULC)	-.0985243 (.0636243)	-.10246** (.0466211)
Log(NOS)	.157264*** (.0298372)	.1546349*** (.0408254)
Log(FDIIN)	.0121512 (.0076132)	.014125** (.0070658)
GAP	.0040364 (.0039805)	.0045172* (.0027626)
LH	.0161347*** (.0031155)	.0162646*** (.002749)
LS	.0041052** (.0020678)	.003827*** (.0010563)
LP	-.0014991 (.0026519)	-.0023032* (.0013253)
Log(USPTO)	.0805617** (.0324814)	.0643332** (.0292269)
Wald X^2 (19)		569592.89
R^2	0.9302 (within)	0.9998

Standard errors are given in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% level of significance respectively. All estimations were carried out with fixed country effects. PCSE is corrected for heteroscedasticity, panel-specific autocorrelation and cross-sectional correlation.