Dynamic externalities, local industrial structure and economic development: panel data evidence for Morocco*

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Abstract

The impact of dynamic externalities on local economic development is analysed for the case of Morocco. Using annual data for 6 urban areas and 18 industrial sectors indicators for specialisation, diversity and competiton of firms within a particular region are constructed for the years 1985-1995. The effects of these and other explanatory variables on local economic activity are estimated using a dynamic panel data model with both individual and time specific effects. The estimation results suggest significant positive specialisation and diversity effects and significant negative competition effects asserting the importance of industrial structure for local economic development. The empirical evidence is robust to the measure of economic activity used in the analysis, i.e. either employment or value added. A similar analysis is conducted restricting the space to the region of Casablanca. Using data on 7 districts and 18 sectors for the period 1992-1995 again significant dynamic externalities are found within this specific region.

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1. Introduction

The existence of cities is often explained by agglomeration economies, which arise as a result of a higher degree of both concentration and differentiation of economic activities. Localisation economies emerge when similar firms cluster, while in case of urbanisation economies it is the diversity of the industrial structure that matters. For example, localisation economies permit firms to have better access to natural resources and lower transport costs, while urbanisation economies enhance diversity of products and firms and increase market size.

While localisation and urbanisation economies describe the existing industrial structure of a region, they do not necessarily explain the pattern of economic development through time. Growth theory (Romer, 1986) emphasises the role of knowledge spillovers as an important source for technological change and hence economic growth. As close proximity of firms facilitates the transmission of ideas and innovations between firms, knowledge spillovers are most likely to occur in urban areas. The agglomeration economies arising from knowledge spillovers are called dynamic externalities. In contrast with traditional localisation and urbanisation economies, dynamic externalities explain both the formation of urban areas and local economic growth.

In the literature on dynamic externalities three main theories are distinguished. All these theories agree that knowledge spillovers are important, but they differ regarding their origins. First, Marshall-Arrow-Romer (MAR) externalities arise from intra industry knowledge spillovers, see for example Glaeser et al. (1992). MAR externalities imply that an increased concentration of firms of the same industry within a region facilitates knowledge spillovers, which in turn increases productivity. In other words, specialisation of firms within a region will have positive effects on local economic development. Another feature of MAR externalities is that local monopoly rather than competition is better for growth as the benefits from innovations are then maximised. Second, contrary to MAR externalities, so called Jacobs (1969) externalities arise from inter industry knowledge spillovers or, in other words, diversity among firms is beneficial. Third, Porter (1990) externalities agree with MAR theory that a higher concentration of similar firms in a region facilitates knowledge spillovers. In contrast to MAR, however, Porter argues that a higher degree of local competition induces firms to innovate in order to remain competitive. In the view of Porter, which is supported also by Jacobs, competition is good for economic

growth contrary to the prediction of MAR.

In this study, we use two data sets for Morocco to distinguish which type of externality is predominant for local economic development in this country. The empirical evidence on dynamic externalities in the literature is mixed and depends on the period and country analysed. Existing studies, however, are strongly biased to industrialised countries like the US (Glaeser et al., 1992; Henderson et al., 1995; Henderson, 1997), France (Combes, 1997; Maurel, 1996) or Spain (de Lucio et al., 1996, 1998). To our knowledge, no case study on the relation between dynamic externalities and local economic development exists for developing countries. As such, this study is a first attempt to quantify these theories for a developing country like Morocco.

The contribution of this study to the existing empirical literature is twofold. First, we consider the robustness of the estimation results to the choice for the measure of economic development. In earlier studies, it has been common practice to measure economic activity by employment. The dynamic externalities are then approximated by indicators based on these employment figures. An exemption is de Lucio et al. (1998), who use value added as measure of economic activity. As our data contain both employment and value added we present two sets of results, i.e. using either quantity as a proxy for economic development.

Second, we examine the sensitivity of the estimation results to the choice for the geographical area. In most of the empirical studies the finest geographical unit of observation is cities. The empirical analysis is then conducted on a city level. Using panel data on 6 urban areas and 18 sectors for the period 1985-1995 we perform a similar analysis for Morocco. However, complete data for the period 1992-1995 are available for 7 districts within Casablanca. As Casablanca is by far the most important region in Morocco, it is interesting to analyse to what extent dynamic externalities influence the pattern of local economic development within this particular region.

In Section 2 a more detailed description of the nature of dynamic externalities will be presented. Also we review the main results of some earlier empirical studies to compare our own results with. Section 3 is the empirical part of this paper: descriptive statistics of the data and estimation results for Morocco will be presented. Section 4 concludes.

2. Local economic development and dynamic externalities of agglomeration

2.1. Theory

In the literature on agglomeration economies a distinction can be made between static and dynamic externalities. Static externalities or agglomeration economies can be divided into localisation and urbanisation economies, both of which explain clustering of firms within a particular region. Examples of the former are abundance of local natural resources or the presence of a specific labour force. Examples of the latter are a relatively strong local demand or increased market size. The difference between localisation and urbanisation economies is the type of firms grouping together. While localisation economies cause a high concentration of firms of the same industry, urbanisation economies lead to clustering of firms of many different industries.

According to Glaeser et al. (1992), static externalities explain existing concentration and urbanisation patterns, but are unable to generate a process of economic growth. In contrast, dynamic externalities explain simultaneously the existing local industrial structure and economic growth. An important ingredient of dynamic externalities are knowledge spillovers, whereby innovations and improvements occurring in one firm increase the productivity of other firms located in the same region. Knowledge spillovers take place by means of the spreading of ideas and information between firms, which are technologically close to each other. Moreover, increased density of firms located in the same place facilitates the circulation and acquisition of information. This is because trade of information, like any other good, may decrease with the distance between firms.

As there seems to be widespread agreement about the importance of dynamic externalities for growth, there is no consensus about whether knowledge spillovers come from firms operating within the same industry or from firms operating in different industries. When dynamic externalities originate from other firms within the same industry they are called MAR externalities (Marshall, 1891; Arrow, 1962; Romer, 1986). MAR externalities represent the positive role of specialisation on growth. When knowledge spillovers occur between firms operating in different industries and sectors, they are called Jacobs externalities (Jacobs, 1969). They represent the positive role of diversity on growth. Finally, when externalities are accompanied by a positive role for competition, they are called

Porter externalities (1990). Below we will discuss the nature of the different types of dynamic externalities in more detail.

Externalities of specialisation or MAR effects refer to Marshallian externalities resulting from knowledge spillovers between firms of the same industry. This idea of Marshall (1891) is formalised first by Arrow (1962) and more recently by Romer (1986, 1990), who argues that this type of knowledge spillovers is an important factor explaining the differences in economic development across regions. MAR-type knowledge spillovers emerge as a result of facility of communication between firms within the same industry. Spatial proximity of firms reduce production and transaction costs and stimulate the share of common knowledge. Knowledge spillovers can either occur directly, e.g. through the exchange of ideas or manner of producing, or indirectly, e.g. through movements of qualified employees between firms. MAR externalities are maximised in cities with geographically specialised industries. Another feature of MAR externalities is that local monopoly rather than competition is better for growth. Competition may reduce the level of profitability of firms, especially when they adopt a strategy of imitation rather than innovation or compete on price rather than on differentiation of products. Local monopoly, however, restricts the possibility of imitation of products, hence the benefits of innovations are maximised by the monopolistic firm.

Externalities of diversity or Jacobs effects refer to the work of Jacobs (1969), who claims that the most important externalities are those which result from interactions between firms of different industries within a particular region. According to Jacobs it is the variety or differentiation of local industrial structure rather than geographical specialisation that stimulate innovations and local economic growth. In other words, regions with a diversified economic structure will tend to grow faster than specialised territories. In contrast with MAR, local competition has a beneficial effect on growth because it induces faster transmission of new technologies, ideas and information across firms.

The importance of externalities arising from competition between local firms has been stressed by Porter (1990), who emphasises the importance of competitive advantage of firms and regions for growth. Both Porter and MAR externalities imply that knowledge spillovers are more likely to occur in specialised, geographically concentrated industries than between geographically isolated firms. However, they differ on the role of compe-

tition for these knowledge spillovers. Porter (1990) agrees with Jacobs (1969) that local competition rather than local monopoly is better for growth because competition stimulates firms and industries to innovate. Porter (1990) gives examples like the ceramic industry in Italy and the watch industry in the Jura of Switzerland. In contrast, MAR theory insist on the fact that local competition negatively affects economic growth.

Summarising, static externalities explain existing patterns of industry location and the formation of cities rather than the development of local economic activity through time. On the contrary, dynamic externalities (MAR, Jacobs and Porter), which are driven by knowledge spillovers between firms, explain the different time paths of economic development across regions. We can assimilate Jacobs externalities with urbanisation economies and MAR and Porter externalities with localisation economies.

2.2. Empirical evidence

There is a growing number of empirical studies, which analyse the relationship between dynamic externalities of agglomeration and local economic development. The majority of these studies tries to identify whether externalities for a particular industry are due to the theory of MAR, Jacobs or Porter.

Glaeser et al. (1992) use data on US cities to estimate the effects of local industrial structure on growth. The unit of observation is the couple sector and city for which they observe the level of employment in two years (1956 and 1987). They take into account the largest cities only and the six largest two-digit industries in each city. To quantify the processes of specialisation, diversity and competition indicators are constructed for these phenomena. They consider employment growth as a function of these indicators and other control variables. The results obtained by Glaeser et al. show positive effects for diversity and competition, but no significant effect has been found for specialisation. Hence, the empirical evidence is in line with the theories of Jacobs and Porter, but negative on MAR externalities. However, Glaeser et al. note that MAR externalities are likely to occur when industries grow. As the period analysed is one in which US industries were not doing particular well, they emphasise that the results may be sensitive to the particular time period chosen.

Glaeser et al. (1992) performed their analysis without making a distinction between industries. This has been criticised by Henderson et al. (1995), who argue that sector

specific characteristics affect local historical industrial conditions. Hence, they advise to perform regressions sector by sector. Henderson et al. (1995) use similar data, unit of observation and variable of interest and analyse eight different industrial sectors. They concentrate on the effects of diversity and specialisation, but exclude competition from the analysis. Contrary to Glaeser et al. (1992) they find evidence in favour of the existence of MAR externalities in low-tech industries. Regarding high-tech industries they find the presence of both MAR and Jacobs externalities. According to the authors these findings are consistent with the notion of the product life cycle. New industries emerge primarily in large, diversified urban areas, but when mature they decentralise their production to smaller, specialised cities.

Henderson (1997) uses annual data for the period 1977-1990 for 742 urban US counties to estimate the impact of dynamic externalities on economic activity. By using a dynamic panel data model with general lag structure, he emphasises the dynamic nature of such externalities and the timing and persistence of their effects on current employment levels. Also time and individual specific effects have been included to model unobserved heterogeneity. For example, the individual specific effects measure time invariant unobserved local characteristics like resource endowments or local institutions. Five capital good industries are considered, i.e. primary metals, machinery, electronics, transport equipment and instruments. The results obtained confirm the existence of strong MAR externalities as well as Jacobs effects.

For European countries empirical studies have been conducted for Spain and France (De Lucio et al, 1996, 1998; Maurel, 1996; Combes, 1997). The study of De Lucio et al. (1996) on industrial sectors and Spanish provinces use the same methodology as in Glaeser et al. (1992). They use a panel data set that covers 30 industrial branches in 50 provinces from 1978 to 1992. The dependent variable is the growth rate of industrial employment with respect to the base year 1978. This measure is then regressed on several variables measuring the local industrial structure (indicators of specialisation, diversity and of competition), wages and employment in the base year. The empirical results are roughly in line with Glaeser et al. (1992), i.e. they confirm the presence of positive Jacobs and Porter effects but no evidence has been found for MAR externalities. As far as static externalities are concerned, the authors confirm the presence of urbanisation economies and the absence of localisation economies.

Using the same data De Lucio et al. (1998) extend the analysis in De Lucio et al. (1996) in several directions. First, they use growth rates of value added rather than employment as measure of economic growth. Second, they use a panel data model with more general lag structures on the explanatory variables. The estimation results confirm the presence of diversity and competition externalities and mixed evidence of specialisation effects. Hence, these results coincide roughly with those obtained by Glaeser et al. (1992) and De Lucio et al. (1996).

In the case of France, Maurel (1996) analyses industrial sectors at the level of the French employment zones (315 zones) for the years 1982 and 1992. The unit of observation is the couple industrial sector and employment zone and the dependent variable is employment in 1992. Control variables are employment in 1982, local variables measuring the geographical situation and indicators representing specialisation, diversity and competition. The results obtained by Maurel show positive effects for specialisation, diversity and competition. Hence, the empirical evidence is in line with the theories of Jacobs and Porter, but mixed on MAR externalities.

Combes (1997) analyses data of both industrial and service sectors. The data cover 341 French employment zones for the period 1984-1993. The results obtained by Combes (1997) show that local industrial structure has a significant influence on local growth patterns. However, the results are somewhat different as compared with other empirical studies. First, local competition affects negatively growth in industrial sectors, but has positive effects on certain activities in the service sector. Second, specialisation and diversity have negative effects in many sectors, but exceptions are also found. In the services sector, for example, specialisation and diversity effects affects negatively and positively economic growth respectively.

Summarising the empirical evidence, one can conclude that there is a wide variety of estimates available depending on the time period, country and unit of observation. In most of the empirical studies, diversity is positively correlated with economic activity. However, the evidence on specialisation differs in sign and magnitude. Finally, in those studies analysing local competition positive effects on growth have been reported in most cases. All together, the empirical evidence coincides roughly with the theories of Jacobs and Porter and is mixed on MAR externalities. In the next section we will quantify the effects of dynamic externalities, if any, on local economic development for the case of

Morocco.

3. Empirical results for Morocco

3.1. Data and descriptive statistics

The available data contain annual time series of among other things gross value added, production, employment, population, wages and number of establishments. The first data set covers the period 1985-1995 and the data have been collected for 18 different manufacturing sectors and 6 different urban areas in Morocco, i.e. Casablanca, Rabat, Tanger, Fes, Meknes and Marrakech. In the second data set the available period is 1992-1995 and data have been collected for 7 districts within Casablanca and the same 18 manufacturing sectors.

In order to establish in an econometric analysis the importance of dynamic externalities for local economic development the various types of externalities have to be quantified. The data include three indicators, which aim to measure these externalities. Data about sectors $s = 1, ..., S$ and regions $r = 1, ..., R$ are available, so each cross-section unit i has a unique combination of s and r. We can identify each cross-section unit $i = 1, ..., SR$ uniquely with $i = (r-1)S + s$. Denote with emp_{srt} employment of industry s in region r at time period t. Furthermore, define emp_{st}, emp_{rt} and emp_t as employment at time t in sector s, region r or the whole country respectively.

Using the notation introduced above the definition of concentration or *specialisation* becomes

$$sp_{it} = \frac{emp_{srt}/emp_{rt}}{emp_{st}/emp_t}. \tag{3.1}$$

This ratio measures the fraction of employment in sector s located in region r relative to the fraction of total employment in sector s of total employment in the country. Therefore, high levels for sp_{it} indicate that production of sector s is relatively concentrated in region r.

The measure for *diversity* is

$$dv_{it} = \sum_{k=1,k\neq s}^{S} \left[\frac{emp_{krt}}{emp_{rt} - emp_{krt}} \right]^2. \tag{3.2}$$

The ratio in this indicator is employment in sector k in region r relative to the total other manufacturing employment in region r. If this ratio is low for the majority of the sectors

Table 1: Descriptive statistics

	va ($\times 10^{-6}$)	emp ($\times 10^{-3}$)	$wcap$	sp	dv	cp
average	0.17	3.06	21.43	0.99	0.45	1.73
st.dev.	0.37	6.24	14.22	0.78	0.32	1.71
minimum	0.00	0.01	1.39	0.02	0.04	0.28
maximum	3.81	50.74	199.04	7.11	1.41	15.86
average 1985	0.10	2.21	17.78	0.97	0.43	1.87
average 1990	0.15	3.22	20.28	0.97	0.45	1.73
average 1995	0.24	3.55	25.79	0.98	0.50	1.65

Figures are based on complete data of 95 cross-section units

then there are many diversified activities in the region. Hence, a low level of dv_{it} implies a high degree of diversity.

The *competition* indicator is defined as

$$cp_{it} = \frac{ne_{srt}/emp_{srt}}{ne_{st}/emp_{st}}, \tag{3.3}$$

where ne_{srt} are the number of establishments of industry s in region r. If the number of establishments per worker for industry s and region r is relatively high to that of industry s in the whole country, then firms of sector s in that particular region are assumed to be relatively competitive.

The specialisation and competition indicators given above are similar to those used in Glaeser et al. (1992). The diversity indicator is similar to the so-called Hirschman-Herfindahl indicator, which has been used also in Henderson et al. (1995) and other studies. The other variables employed in the analysis are employment (emp), real gross value added (va), total regional real manufacturing production (trp) and real unit wages ($wcap$).

Table 1 gives some descriptive statistics of the variables. Since for some sectors/regions the data are not complete, we have simply excluded them from the analysis. Hence, of the total of 108 cross-section units only 95 have been included. Table 1 gives the mean, standard deviation, maximum and minimum of each variable plus the year averages for 1985, 1990 and 1995. The general economic situation in Morocco in the period 1985-1995 can be characterised as volatile. The late eighties show a period of substantial growth, while in the early nineties there is a slowdown. The pattern of the year averages suggests a trending behaviour in real value added, employment and real unit wage costs. The indicators measuring the dynamic externalities, however, stay more or less unchanged in the period 1985-1995.

3.2. Specification and estimation issues

Various specifications of the econometric model are possible depending on the choice of the dependent variable. In the literature there is no common sense about the ideal measure of economic development, so two different variables are tried, i.e. employment (emp) and real value added (va). Explanatory variables measuring local market conditions are total regional manufacturing production (trp), which reflects market size, and real unit wage costs ($wcap$). As said before, three different externalities are considered, i.e. specialisation (sp), diversity (dv) and competition (cp). A priori one would expect that specialisation of firms has a positive effect on local economic development due to intra industry knowledge spillovers (MAR externalities). The effect of diversity, i.e. Jacobs externalities, is also supposed to be positive. The construction of the diversity indicator is such that more diversity is associated with lower levels for dv. Therefore, assuming that more diversity leads to higher production levels this coefficient is expected to be negative. The coefficient of the competition indicator can be either positive (Porter, Jacobs) or negative (MAR).

Apart from the observed characteristics described above, also unobserved factors may influence local growth patterns. For example, regional resource endowments and the institutional, cultural and political environment may explain differing local growth paths. By including individual and time specific effects in our specification, we are able to capture these factors as far ad they are time or individual invariant.

Complete data over all years are available for 95 cross-section units, so the dimensions of the panel used in estimation are $T = 11$ and $N = 95$. Due to the time series

aspect of the data, a general dynamic specification has been estimated including as many lagged explanatory variables as necessary. Also, the one-period lagged value of the dependent variable has been included to capture dynamic adjustment processes. To account for heterogeneity, both individual and time specific effects are included. The estimated specifications are

$$y_{it} = \gamma y_{i,t-1} + \beta' x_{it} + \eta_i + \lambda_t + \varepsilon_{it}, \tag{3.4}$$

with

$$x_{it} = (\ln trp_{it}, \ln trp_{i,t-1}, \ln wcap_{it}, \ln wcap_{i,t-1}, sp_{it}, sp_{i,t-1}, dv_{it}, dv_{i,t-1}, cp_{it}, cp_{i,t-1})',$$

and where the dependent variable y_{it} is either $\ln va_{it}$ or $\ln emp_{it}$. In the latter case we have based the indicators (3.1), (3.2) and (3.3) on production instead of employment figures to avoid trivial endogeneity problems.

Because of the dynamic nature of specification (3.4) and the small T, large N dimension of the panel, Generalised Method of Moments (GMM) estimation (Arellano and Bond, 1991) has been performed to get estimates of the unknown parameters in (3.4). The levels equation has been first differenced to get rid of the individual specific effects and instruments have been constructed from lagged values of the dependent variable. The resulting set of instruments has been combined with instruments from the levels equation (Arellano and Bover, 1995; Blundell and Bond, 1998). Depending on the nature of the other explanatory variables more moment conditions are available, but not all of them have been used in estimation. One-step GMM estimation has been performed, which leads to more reliable inference regarding estimated standard errors than two-step estimation (Blundell and Bond, 1998). For a more detailed treatment of GMM estimation in dynamic panel data models[1], see e.g. Arellano and Bond (1991), Arellano and Bover (1995) or Blundell and Bond (1998).

3.3. Estimation results

Table 2 presents the estimation results of specification (3.4). The second an third columns are the estimation results assuming strictly exogenous regressors, while in the fourth and

[1] The Ox version of DPD (Arellano, Bond and Doornik, 1999) has been used for estimation.

fifth columns we treated wages as endogenous and removed insignificant dynamics[2]. The results in Table 2 show that dynamics play an important role in all equations. In general, the estimated model seems adequate, i.e. imposing a more general lag structure does not lead to better diagnostics.

Focusing on the last two columns of Table 2 several regularities are found for the indicators *sp*, *dv* and *cp*. First, the impact multiplier or immediate effect of the specialisation indicator is significant and positive, while this is significant and negative for the one-period lagged effect. The magnitude of the estimates imply that the net effect is positive. Second, if there is a significant effect of diversity it is negative and lagged one-period. Recall that for this indicator a negative coefficient implies a positive effect on local economic development. Third, regarding the competition indicator the immediate and lagged effects are significantly negative and positive respectively. On balance the competition effect is negative.

To check the robustness of our results we have experimented with other specifications with different sets of instruments or explanatory variables. The estimation results of some of these specifications, which have value added as the dependent variable, are in Table 3[3]. As the indicators have been based on employment figures it is not likely to assume that these variables are strictly exogenous. The second column of Table 3 shows estimation results assuming that indicators are predetermined. The pattern of the estimation results does not change notably. Another way to deal with possible feedback mechanisms from the dependent variable to the indicators is to use alternative measures, which are not based on employment figures. The third column presents estimates using a different set of indicators based solely on the number of establishments, i.e.

$$sp^*_{it} = \frac{ne_{srt}/ne_{rt}}{ne_{st}/ne_t}, \tag{3.5}$$

$$dv^*_{it} = \sum_{s=1}^{S}\left[\frac{ne_{srt}}{ne_{rt}}\right]^2, \tag{3.6}$$

$$cp^*_{it} = \sum_{r=1}^{R}\left[\frac{ne_{srt}}{ne_{st}}\right]^2. \tag{3.7}$$

The specialisation and diversity indicators are similar to those in (3.1) and (3.2), but

[2]Regarding the lagged dependent variable regressor we exploit all available instruments arising from the model assumptions. As there is a limit to the total number of instruments used in estimation, however, not all moment conditions concerning the additional regressors have been used.

[3]Similar regressions with employment as dependent variable do not change the results notably.

Table 2: Estimation results of specification (3.4)

	$\ln emp_{it}$	$\ln va_{it}$	$\ln emp_{it}$	$\ln va_{it}$
$\ln emp_{i,t-1}$	0.87		0.82	
	(0.05)		(0.07)	
$\ln va_{i,t-1}$		0.57		0.57
		(0.09)		(0.08)
$\ln trp_{it}$	0.09	0.40	0.14	0.27
	(0.13)	(0.15)	(0.07)	(0.08)
$\ln trp_{i,t-1}$	0.02	-0.13		
	(0.13)	(0.14)		
$\ln wcap_{it}$	-0.31	0.72	-0.31	0.72
	(0.10)	(0.10)	(0.10)	(0.10)
$\ln wcap_{i,t-1}$	0.24	-0.33	0.21	-0.33
	(0.10)	(0.14)	(0.09)	(0.14)
sp_{it}	0.27	0.37	0.27	0.38
	(0.05)	(0.12)	(0.05)	(0.12)
$sp_{i,t-1}$	-0.20	-0.22	-0.19	-0.23
	(0.07)	(0.08)	(0.07)	(0.07)
dv_{it}	0.29	-0.13		
	(0.25)	(0.14)		
$dv_{i,t-1}$	-0.30	-0.26	-0.23	-0.38
	(0.14)	(0.12)	(0.12)	(0.13)
cp_{it}	-0.15	-0.21	-0.15	-0.21
	(0.05)	(0.03)	(0.05)	(0.03)
$cp_{i,t-1}$	0.08	0.09	0.06	0.09
	(0.02)	(0.03)	(0.02)	(0.03)
$m1$	-4.87 (0.00)	-5.46 (0.00)	-4.80 (0.00)	-5.53 (0.00)
$m2$	0.84 (0.40)	0.12 (0.90)	0.81 (0.42)	0.02 (0.98)
$Sargan$	64.62 (0.13)	70.56 (0.05)	84.06 (0.45)	88.46 (0.32)

Figures in parentheses under estimates and behind test statistics are standard errors and p-values respectively. The results are robust to general heteroskedasticity patterns across individuals and over time

Table 3: Estimation results of specification (3.4) with $\ln va_{it}$ as dependent variable

$\ln va_{i,t-1}$	0.57	0.68	0.55	0.57
	(0.08)	(0.05)	(0.09)	(0.07)
$\ln trp_{it}$		0.27	0.32	
		(0.07)	(0.11)	
$\ln trp_{i,t-1}$	0.26			0.35
	(0.08)			(0.13)
$\ln wcap_{it}$	0.71	0.53	0.73	0.78
	(0.10)	(0.10)	(0.10)	(0.10)
$\ln wcap_{i,t-1}$	-0.31	-0.33	-0.31	-0.26
	(0.13)	(0.12)	(0.14)	(0.13)
sp_{it}	0.44	0.52	0.40	0.38
	(0.16)	(0.14)	(0.12)	(0.11)
$sp_{i,t-1}$	-0.29	-0.36	-0.23	-0.22
	(0.07)	(0.13)	(0.08)	(0.07)
dv_{it}	-0.47			
	(0.16)			
$dv_{i,t-1}$			-0.47	-0.51
			(0.13)	(0.13)
cp_{it}	-0.20	-0.51	-0.21	-0.21
	(0.07)	(0.26)	(0.03)	(0.03)
$cp_{i,t-1}$	0.08		0.08	0.09
	(0.04)		(0.03)	(0.02)
$m1$	-5.22 (0.00)	-5.37 (0.00)	-5.45 (0.00)	-5.55 (0.00)
$m2$	0.98 (0.33)	0.31 (0.76)	0.00 (1.00)	-0.17 (0.86)
$Sargan$	83.11 (0.41)	90.07 (0.28)	88.83 (0.31)	87.46 (0.35)

Figures in parentheses under estimates and behind test statistics are standard errors and p-values respectively. Column 2 uses a different set of moment conditions as in Table 2. Column 3 uses the set of indicators (3.5), (3.6) and (3.7). Columns 4 and 5 use total regional employment and population respectively instead of total regional production.

Table 4: Long-term coefficients

	emp	*va*	*emp*	*va*
trp	0.81	0.63	0.78	0.63
	(0.16)	(0.14)	(0.14)	(0.14)
wcap	-0.54	0.91	-0.53	0.91
	(0.29)	(0.20)	(0.24)	(0.20)
sp	0.50	0.36	0.45	0.36
	(0.22)	(0.24)	(0.20)	(0.24)
dv	-0.06	-0.92	-1.31	-0.88
	(1.63)	(0.35)	(0.79)	(0.31)
cp	-0.55	-0.28	-0.50	-0.28
	(0.28)	(0.05)	(0.21)	(0.05)

Figures in parentheses are standard errors

now based on *ne* instead of *emp*. The competition indicator has been defined as the spread of the number of establishments (*ne*) across regions. The estimation results are slightly different, i.e. the diversity indicator has no significant impact on economic activity. However, the remaining estimates are more or less similar to earlier results. In the last two columns of Table 3 we have experimented with other measures for market size, i.e. total regional manufacturing employment and total regional population. The estimation results of these specifications are again similar to those presented in Table 2 reasserting the validity of the empirical estimates shown there.

In general the estimation results in Tables 2 and 3 suggest that dynamic externalities do matter for local economic development in Morocco. The long-term effects implied by the estimates in Table 2 are in Table 4. The long-term effects of regional production and unit wage costs are elasticities, while those for the externality indicators are semi-elasticities. We find significant positive long-term effects for the specialisation indicator and a significant negative long-term effect for diversity and competition. To quantify the importance of each externality in the long-run we calculated for each indicator the long-term effect of a jump in the indicator from the minimum to the maximum year average. Considering the results for the value added equation, increased specialisation, diversity and competition indicators lead eventually to an increase in value added of 2.7%, 12.1%

Table 5: Descriptive statistics for the case of Casablanca

	va ($\times 10^{-6}$)	emp ($\times 10^{-3}$)	$wcap$	sp	dv	cp
average	0.046	0.640	31.828	1.003	0.754	2.052
st.dev.	0.125	1.046	22.359	0.728	0.294	2.812
minimum	0.000	0.002	3.917	0.010	0.144	0.238
maximum	2.928	9.289	284.257	5.086	1.309	41.375
average 1992	0.040	0.641	28.363	0.921	0.737	1.867
average 1995	0.046	0.622	33.351	0.954	0.835	1.965

Figures are based on complete data on 382 cross-section units

and -8.8 % respectively. These are rather large long-term benefits.

As the region of Casablanca is by far the most important area in Morocco, next we analyse the effects of dynamic externalities within this particular region. Complete data over the period 1992-1995 are available for 382 cross-section units in the region of Casablanca. The typical cross-section unit is now at a finer level than the region/sector level although not at the firm level. Within a region and sector we distinguish several categories of firms according to their magnitude, i.e. with 0-9, 10-49, 50-99, 100-199, 200-499 and >500 employees. We restrict the space to the region of Casablanca, i.e. 7 districts and the same 18 manufacturing sectors as before will be considered. As the data are at firm category level, the constructed indicators are equal for different categories belonging to the same sector and district. Table 5 gives some descriptive statistics of the data for Casablanca.

Again specification (3.4) has been estimated, which regression results are reported in Table 6. The dimensions of the sample are $T = 4$ and $N = 382$ and the estimation period is 1994-1995. The last two columns of Table 6 leave out any insignificant coefficients. The results show a relatively low coefficient of the lagged dependent variable regressor implying less persistence in economic development in Casablanca for these particular

Table 6: Estimation results of specification (3.4) for the case of Casablanca

	$\ln emp_{it}$	$\ln va_{it}$	$\ln emp_{it}$	$\ln va_{it}$
$\ln emp_{i,t-1}$	0.47		0.45	
	(0.13)		(0.13)	
$\ln va_{i,t-1}$		0.38		0.38
		(0.10)		(0.10)
$\ln trp_{it}$	0.01	-0.47		-0.47
	(0.10)	(0.23)		(0.23)
$\ln trp_{i,t-1}$	0.26	0.75	0.27	0.75
	(0.12)	(0.23)	(0.09)	(0.23)
$\ln wcap_{it}$	0.15	1.16	0.12	1.17
	(0.06)	(0.08)	(0.06)	(0.08)
$\ln wcap_{i,t-1}$	-0.07	-0.33		-0.33
	(0.05)	(0.13)		(0.13)
sp_{it}	0.03	0.00		
	(0.06)	(0.18)		
$sp_{i,t-1}$	0.08	0.43	0.11	0.43
	(0.06)	(0.18)	(0.04)	(0.10)
dv_{it}	-0.23	-0.15	-0.23	-0.15
	(0.13)	(0.04)	(0.08)	(0.04
$dv_{i,t-1}$	0.30	0.15	0.30	0.15
	(0.21)	(0.05)	(0.14)	(0.04)
cp_{it}	-0.49	0.24	-0.10	
	(0.30)	(0.57)	(0.03)	
$cp_{i,t-1}$	-0.53	-0.49		-0.26
	(0.35)	(0.54)		(0.11)
$m1$	-4.44 (0.00)	-5.60 (0.00)	-4.21 (0.00)	-5.50 (0.00)
$m2$	NA	NA	NA	NA
$Sargan$	11.56 (0.24)	39.62 (0.00)	11.36 (0.25)	40.98 (0.00)

Figures in parentheses under estimates and behind test statistics are standard errors and p-values respectively. The results are robust to general heteroskedasticity patterns across individuals and over time

Table 7: Long-term coefficients for the case of Casablanca

	emp	*va*	*emp*	*va*
trp	0.51	0.45	0.50	0.45
	(0.09)	(0.09)	(0.09)	(0.09)
wcap	0.15	1.34	0.21	1.34
	(0.12)	(0.12)	(0.09)	(0.12)
sp	0.21	0.69	0.21	0.69
	(0.07)	(0.14)	(0.07)	(0.14)
dv	0.12	-0.04	0.12	-0.03
	(0.19)	(0.23)	(0.17)	(0.23)
cp	-0.19	-0.40	-0.18	-0.42
	(0.03)	(0.17)	(0.03)	(0.16)

Figures in parentheses are standard errors

years. Considering the indicators again dynamic externalities seem to matter for local economic development within the region of Casablanca. The implied long-run estimates for the case of Casablanca are presented in Table 7. Again we find significant positive and negative long-term effects for specialisation and competition respectively, while no significant effect has been found for diversity. Hence, we conclude that the estimation results for Casablanca are roughly in line with those for whole Morocco reasserting the robustness of the earlier results.

4. Concluding remarks

In this study the effects of dynamic externalities on regional economic development has been analysed empirically using panel data on Moroccan industries and cities. As far as we know this is a first attempt to quantify the effects of knowledge spillovers between firms on local economic development for a developing country. Economic development has been measured by either employment or value added. The effects of externalities have been modelled using indicators for specialisation, diversity and competition of firms.

For the case of Morocco we find significant long-run effects of dynamic externalities on local economic development. More in particular, positive effects of specialisation and diversity have been found, while local competition turns out to be harmful for economic

development. As the theories of both Jacobs and Porter imply that competition should stimulate economic development, the evidence here is in favour of MAR externalities.

The empirical evidence is robust for the measure of economic used, i.e. employment or value added. As far as the magnitude of the effects is concerned, considerable long-term effects have been found asserting the potentially important role for dynamic externalities in stimulating local economic development in Morocco. Restricting the space to Casablanca, which is the most important area in Morocco, we again find similar results.

Considering earlier empirical studies our results are in line with those obtained by Henderson (1997) although he did not consider externalities arising from local competition. Regarding specialisation and diversity we have found positive effects on local economic development in Morocco. The positive effects of specialisation can be explained by the local industrial structure in Morocco, which is dominated by traditional low-tech industries with relatively labor intensive production (e.g. the textile and clothing industries). The firms operating in these industries are of relatively small size and highly specialised in one particular phase of the production process. Regarding diversity the positive effects are not surprising as we analysed the six largest urban areas in Morocco. In such large and densely populated areas the benefits from a diversified industrial structure are maximised.

We find a negative role for competition where the majority of the empirical studies find the opposite. The negative effect of competition on local development may reflect the fact that firms compete primarily on price. As already mentioned above, the local industrial structure in Morocco is dominated by traditional low-tech industries consisting of many relatively small firms. The firms operating in these industries can be characterised by traditional management systems and simple internal modes of organisation. As a result of this the majority of the Moroccan industrial companies are concerned primarily with the exploitation of inexpensive labor rather than the improvement of productivity levels and the introduction of technological and organisational innovations. Hence, local competition between firms will be based on prices and cutting costs (especially for labour) rather than on quality of products, which in turn may have negative effects on local economic development.

In light of this it should be emphasised that, although we have found significant externalities of specialisation and diversity, the Moroccan economy is characterised by a weak dynamics of productivity and employment. As argued above, production growth

does not imply automatically an increase in productivity and wages, which is of crucial importance for a sustained relation between dynamic externalities and local economic development.

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