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Dynamic externalities, local industrial structure and economic

development: panel data evidence for Morocco

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abstract

The impact of industrial structure on local economic development is analyzed for the case

of Morocco. Using annual data for 6 urban areas and 18 industrial sectors indicators for

specialization, 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

specialization 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 externalities are found within this specific region.

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.

Localization economies emerge when similar firms cluster, while in case of urbanization

economies it is diversity of the industrial structure that matters. For example, localization

economies permit firms to have better access to natural resources and lower transport

costs, while urbanization economies enhance diversity of products and firms and increase

market size.

While localization and urbanization 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) emphasizes 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 localization and urbanization economies, dynamic externalities explain

both the formation of urban areas and local economic development over time.

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 increased concentration of firms of the same industry within a region facilitates

knowledge spillovers, which in turn increases productivity. Another feature of MAR

externalities is that local monopoly rather than competition is better for growth as the

benefits from innovations are then maximized. 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.

The empirical evidence on the sources of dynamic externalities is mixed and depends on

the period and country analyzed. Existing studies, however, are strongly biased to

industrialized countries like the U.S. (Glaeser et al., 1992; Henderson et al., 1995;

Henderson, 1997), France (Combes, 2000; Maurel, 1996) or Spain (De Lucio et al., 1996,

2002). In this study, we use data on the manufacturing sector of Morocco to distinguish

which type of externality is predominant for local economic development in this country.

To our knowledge no case study on the relation between dynamic externalities and local

economic development exists for developing countries.

Regarding dynamic externalities predictions for industrialized countries might not be

applicable to the case of developing countries for various reasons. First, the stage of

economic development is different. Morocco, for example, may be classified as a country

in the late industrialization phase. After the debt crisis in 1983 this country has been

submitted to a far reaching liberalization of its trade regime and an active exchange rate

policy. As a result of this and the improved world economy, Moroccan GDP and

especially manufacturing exports grew at a relatively fast rate in the late eighties although

the early nineties showed a more volatile behavior of major economic indicators (World

Bank, 1999). Instead, in industrialized countries like U.S. or European countries many

traditional manufacturing sectors showed an economic slowdown in the last few decades.

Moreover, these modern economies tend to have a declining share of manufacturing in

total GDP as there has been a shift to services (Rowthorn and Ramaswamy, 1997).

Second, the structure of the manufacturing sector in developing countries is different.

Among other things the type of manufactured products, regional spread of production and

size distribution of firms are different from that in industrialized countries (Tybout,

2000). For example, Morocco has a well-developed set of light manufacturing activities

and relatively high levels of employment in sectors that use natural resources intensively.

Manufacturing industries in Morocco are concentrated in a few regions with the bulk of

manufacturing produced in the agglomeration of Casablanca. The local industrial

structure shows a preponderance of small firms in especially the traditional low-tech

sectors e.g. the textile and clothing industries. On the other hand, in sectors that serve

primarily the domestic market there is a relatively high degree of concentration, i.e. these

sectors are dominated by a few large firms only.

Apart from being a case study on a developing country, 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. An

exemption is De Lucio et al. (2002), who use value added as measure of economic

activity. Regarding employment regressions Cingano and Schivardi (2004) point out an

identification problem. Most theory on dynamic externalities assumes that local industrial

structure affects productivity and that productivity changes lead to proportional shifts in

labor demand. However, this approach ignores labor supply conditions leading to non-

structural estimates using employment regressions. Hence, as our data contain both

employment and value added we present two sets of results using either quantity as a

proxy for economic development.

Second, we examine the sensitivity of the estimation results both across sectors and to the

choice for the geographical area. Regarding the former dynamic externalities should be

relatively important for export-oriented sectors as they are less limited by local demand.

Hence, following Glaeser et al. (1992) we divide our sample into export-oriented sectors

and sectors which primarily serve local demand. Regarding the latter in most of the

empirical studies the finest geographical unit of observation is cities. 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 the next section a more detailed description of the sources of dynamic externalities will

be presented. Also we review the main results of earlier empirical studies to compare our

own results with. Next, we discuss the data, background for the empirical specifications

together with estimation issues and estimation results. Finally, we discuss our empirical

findings.

local economic development and dynamic externalities of agglomeration

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 localization and urbanization 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 labor force. Examples of the latter are a relatively strong local demand or increased market size. The difference between localization and urbanization economies is the type of firms grouping together. While localization economies cause a high concentration of firms of the same industry, urbanization economies lead to clustering of firms of many different industries.

According to Glaeser et al. (1992), static externalities explain existing concentration and urbanization 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

(Audretsch and Feldman, 1996).

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, 1890; Arrow, 1962; Romer, 1986). MAR externalities represent the positive role of specialization 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 specialization or MAR effects refer to Marshallian externalities resulting from knowledge spillovers between firms of the same industry. This idea of Marshall (1890) is formalized 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 organization of production, or indirectly, e.g. through movements of qualified employees between firms. MAR externalities are maximized in cities with geographically specialized 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 maximized 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 specialization that stimulate innovations and local economic growth. In other words, regions with a diversified economic structure will tend to grow faster than specialized 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 emphasizes 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 specialized, geographically concentrated industries than between geographically isolated firms. However, they differ on the role of competition 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. In contrast, MAR theory insist on the fact that local competition negatively affects economic growth.

Summarizing, 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 urbanization

economies and MAR and Porter externalities with localization economies.

empirical evidence

There is a growing number of empirical studies, which analyze the relationship between

sources of dynamic externalities of agglomeration and local economic development.

Three main sources of externalities are considered, i.e. specialization, diversity and

competition. The majority of these studies tries to identify whether externalities for a

particular industry are consistent with the theory of MAR, Jacobs or Porter.

Glaeser et al. (1992) use data on U.S. 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 specialization, 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 specialization.

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 analyzed is one in which U.S.

industries were not doing particular well, they emphasize 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 criticized 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 analyze eight different industrial sectors. They

concentrate on the effects of diversity and specialization, but exclude competition from

the analysis. Contrary to Glaeser et al. (1992) they find positive evidence for

specialization in low-tech industries. Regarding high-tech industries they find positive

specialization and diversity effects in line with 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 decentralize their production to smaller, specialized cities.

Henderson (1997) uses annual data for the period 1977-1990 for 742 urban U.S. counties

to estimate the impact of dynamic externalities on economic activity. By using a dynamic

panel data model with general lag structure, he emphasizes 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. The

results obtained confirm the existence of strong positive specialization externalities as

well as moderate positive diversity effects.

For European countries empirical studies have been conducted for Spain, France, Italy

and Germany (De Lucio et al, 1996, 2002; Maurel, 1996; Combes, 2000; Cingano and

Schivardi, 2004; Blien et al., 2006). 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 specialization, 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 diversity and competition effects but no

evidence has been found for specialization.

Using the same data De Lucio et al. (2002) extend the analysis in De Lucio et al. (1996)

in several directions. First, they use growth rates of labor productivity 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 empirical evidence is mixed

on the effects of specialization and diversity, but negative on competition externalities.

Hence, these results differ considerably from De Lucio et al. (1996), which might be due

to the different empirical models used.

In the case of France, Maurel (1996) analyzes industrial sectors at the level of 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 specialization, diversity

and competition. The results obtained by Maurel show positive effects for specialization,

diversity and competition.

Combes (2000) analyzes data of both industrial and service sectors. The data cover 341

French employment zones for the period 1984-1993. The results obtained by Combes

(2000) 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, specialization and

diversity have negative effects in many industrial sectors, but exceptions are also found.

Third, in service sectors specialization and diversity respectively have negative and

positive effects on economic growth always.

For Germany Blien et al. (2006) use annual data for the period 1980-2001 for 326 so-

called NUTS3-districs to estimate employment equations. Following Henderson (1997)

by using a dynamic panel data model they emphasize the timing and persistence of the

effects of local economic structure on current employment levels. The estimation results

show positive effects from diversification, but no clear benefits from specialization.

<center>**<Table 1 about here>**</center>

In Table 1 we have summarized the empirical evidence. One can conclude that there is a

wide variety of estimates available depending on time period, country, unit of observation

and empirical model. In most of the empirical studies, diversity is positively correlated

with economic development. However, the evidence on specialization differs in sign and

magnitude. Finally, in those studies analyzing local competition positive effects on

growth have been reported in most cases. All together, the empirical evidence coincides

roughly with the theory of Jacobs and is mixed on MAR and Porter externalities.

It should be noted that all empirical evidence discussed above is only indirect evidence of

dynamic externalities. First, knowledge spillovers themselves are unobservable, hence

they only provide a theoretical explanation for the observed correlation between local

industrial structure and economic development (Blien et al., 2006). Second, Cingano and

Schivardi (2004) point out an identification problem with the employment regressions as

used by most studies above. Typically economic theory on dynamic externalities assumes

that local industrial structure affects productivity and that productivity changes lead to

proportional shifts in labor demand. However, this approach ignores labor supply

conditions leading to non-structural estimates using employment regressions. Estimating

both employment and total factor productivity based regressions Cingano and Schivardi

(2004) acquire opposite empirical evidence indicating this potential identification issue

with especially employment based regressions.

data and descriptive statistics

The available data (see the Appendix for a detailed description) contain annual time

series of among other things value added, production, investments, employment, wages

and number of establishments. The first data set covers the period 1985-1995 and data

have been collected for 18 different manufacturing sectors and 6 different urban areas in

Morocco, i.e. Casablanca, Rabat, Tangier, Fez, 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 sources of externalities have to be quantified.

The data include three indicators based on production figures which aim to measure the

different sources of dynamic externalities. Data about sectors $s = 1,...,S$ and regions

$r = 1,...,R$ are available, so each cross-section unit i has a unique[1] combination of s and

r. We can identify each cross-section unit $i = 1,...,SR$ uniquely with $i = (r-1)S + s$.

Denote with X_{srt} production of industry s in region r at time period t. Furthermore,

define X_{st}, X_{rt} and X_t as production at time t in sector s, region r or the whole country

respectively.

Using the notation introduced above the definition of concentration or *specialization*

becomes

$$sp_{it} = \frac{X_{srt} / X_{rt}}{X_{st} / X_t}. \tag{1}$$

This ratio measures the fraction of production in sector s located in region r relative to the

fraction of country-wide production in sector s of total production in Morocco. Therefore,

high levels for sp_{it} indicate that production of sector s is relatively concentrated in region

r.

The measure for *diversity* is

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

The ratio in this indicator is production in sector k in region r relative to the total other

manufacturing production in region r. If this ratio is low for the majority of the sectors

then there are many diversified activities in the region. The construction of the diversity

indicator is such that more diversity is associated with higher levels for dv. This has been

established by taking the negative of the sum of squared ratios, which is more convenient

when interpreting the estimation results below.

The *competition* indicator is defined as

$$cp_{it} = \frac{E_{srt} / X_{srt}}{E_{st} / X_{st}}, \tag{3}$$

where E_{srt} are the number of establishments of industry s in region r. If the number of

establishments per production 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 specialization and competition indicators given above are similar to those used in

Glaeser et al. (1992). The negative of 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. Note that the indicators can be based on any variable of interest. Earlier

studies used employment figures, probably due to lack of availability of other data, but

we use production data for several reasons. First, production (or value added) data better

approximate economic activity than employment. Second, as we build empirical models

for both value added and employment, to avoid trivial endogeneity problems we cannot

base our indicators on either of these variables. In that case part of the indicators is the

dependent variable itself, which should be avoided. Of course, production is correlated

with value added (defined as output minus intermediate goods) and employment, but

trivial endogeneity problems are avoided by using this variable. In addition, possible

endogeneity problems are mitigated as the production variable occurs in relative

(specialization, competition) or dispersion (diversity) measures only[2].

The other variables employed in the analysis are employment (L), value added (Y),

wages (W) and a measure of capital stock (K). The latter variable has been constructed

using deflated investment data, see the Appendix.

<Table 2 about here>

Table 2 shows some year averages and average annual growth rates of each variable for

Morocco and Casablanca. In addition, for each variable total sample variance has been

decomposed into within and between variation and the ratio of these two sources is

reported. The general economic situation in Morocco in the period 1985-1995 can be

characterized as volatile. The late eighties show a period of substantial growth, while in

the early nineties there is a slowdown in some years. This is partly due to the effects of

drought on agricultural output, but also other sectors including manufacturing

experienced a slowdown in economic development (Worldbank, 1999). Regarding the

manufacturing sector the first panel of Table 2 gives aggregate developments for the 6

large urban areas contained in our first data source. These 6 agglomerations produce and

employ around 70% of the whole manufacturing sector in Morocco. The pattern of the

year averages suggests a trending behavior in value added, labor, capital and wages. The

average growth rates show a slowdown in economic performance in the early nineties.

Regarding the indicators diversity and competition seem to have increased on average,

while specialization stays more or less unchanged over time. Focusing on Casablanca the

second panel of Table 2 shows a stagnating local economy in the years 1992-1995.

Output and employment do not show a lot of time variation, which is confirmed by the

relatively modest within-between variance ratios and the low average annual growth rates

for these years.

specification and estimation issues

Various specifications of the econometric model are possible depending on the choice for

the dependent variable. In the literature there is no common sense about the ideal

measure of economic development, i.e. real value added (Y) or employment (L). In this

section we develop for both variables an empirical model in which various sources of

dynamic externalities are built in.

empirical specifications for value added and employment

We assume that the production process can be approximated by a Cobb-Douglas

production function, i.e. we specify for each cross-section unit i and time period t

$$Y_{it} = A_{it} L_{it}^{\beta_l} K_{it}^{\beta_k}, \quad i = 1,...,\ N; \ \ t = 1,...,\ T, \tag{4}$$

where Y is output, L is labor, K is capital and A is the level of technology. The

parameters β_l and β_k are the elasticities with respect to labor and capital respectively.

Taking logarithms on both sides of (4) we have

$$y_{it} = a_{it} + \beta_l l_{it} + \beta_k k_{it}, \tag{5}$$

where y, a, l and k are in logarithms. Regarding a_{it} we specify the following model

$$a_{it} = \alpha^* + \eta_i^* + \lambda_t^* + \varepsilon_{it}^* + \beta_{sp} sp_{it} + \beta_{dv} dv_{it} + \beta_{cp} cp_{it}. \tag{6}$$

The elements in (6) represent a myriad of sources which may influence productivity

levels. First, the region-sector specific effect η_i^* reflects heterogeneity in regional and/or

sectoral technologies. Heterogeneity may exist because local resource endowments and

the institutional, cultural and political environment may differ across sectors and regions.

Second, the time specific effect λ_t^* measures aggregate productivity shocks at the

national level. Third, the term ε_{it}^* represents any other idiosyncratic shocks to

productivity levels. Finally, technological externalities may be present as a result of local

industrial structure. We distinguish externalities due to various sources, i.e. specialization

(sp), diversity (dv) and competition (cp). Using the indicators sp, dv and cp as in (1), (2)

and (3) we approximate externalities due to local industrial structure. Combining (5) and

(6) leads to

$$y_{it} = \beta' x_{it} + \alpha^* + \eta_i^* + \lambda_t^* + \varepsilon_{it}^*,\tag{7}$$

with $\beta = (\beta_l,\ \beta_k,\ \beta_{sp},\ \beta_{dv},\ \beta_{cp})'$ and $x_{it} = (l_{it},\ k_{it},\ sp_{it},\ dv_{it},\ cp_{it})'$.

Next, suppose firms are maximizing real profits

$$\Pi_{it} = Y_{it} - W_{it} L_{it} - R_{it} K_{it}.\tag{8}$$

Furthermore, assume that capital K_{it} is fixed in the short-run. Regarding labor the first-

order condition for maximization is

$$\frac{\partial \Pi_{it}}{\partial L_{it}} = \frac{\partial Y_{it}}{\partial L_{it}} - W_{it} = 0,\tag{9}$$

with, using (4),

$$\frac{\partial Y_{it}}{\partial L_{it}} = A_{it} \beta_l L_{it}^{\beta_l - 1} K_{it}^{\beta_k}.\tag{10}$$

Combining (9) and (10) we have

$$W_{it} = A_{it} \beta_l L_{it}^{\beta_l - 1} K_{it}^{\beta_k}.\tag{11}$$

Taking logarithms on both sides of (11) and rearranging gives

$$l_{it} = \frac{1}{1 - \beta_l}\left(\ln \beta_l + a_{it} - w_{it} + \beta_k k_{it}\right)\tag{12}$$

where w_{it} is the logarithm of the wage rate. Combining (12) and (6) leads to

$$l_{it} = \theta' z_{it} + \zeta^* + \xi_i^* + \mu_t^* + v_{it}^*, \tag{13}$$

with $\theta = \frac{1}{1-\beta_l}(-1,\ \beta_k,\ \beta_{sp},\ \beta_{dv},\ \beta_{cp})'$, $z_{it} = (w_{it},\ k_{it},\ sp_{it},\ dv_{it},\ cp_{it})'$, $\zeta^* = \frac{\alpha^* + \ln \beta_l}{1-\beta_l}$,

$\xi_i^* = \frac{\eta_i^*}{1-\beta_l}$, $\mu_t^* = \frac{\lambda_t^*}{1-\beta_l}$ and $v_{it}^* = \frac{\varepsilon_{it}^*}{1-\beta_l}$.

We are primarily interested in getting plausible estimates for the parameter vectors β and

θ in equations (7) and (13) respectively. These equations can be interpreted as

determining long-run output and employment levels in the absence of adjustment costs

and/or lagged response. Examples of the former are transaction or search costs, while the

latter may be due to, for example, lagged perception of environmental changes or habit

formation (Hendry et al., 1984). Hence, actual output and employment levels will depend

on lagged outcomes. In applied time series econometrics the usual way of modeling such

behavior empirically is to fit dynamic regression models to the data. More in particular,

we specify the following Autoregressive Distributed Lag (ADL) representations, i.e.

$$y_{it} = \pi_0 y_{i,t-1} + \pi_1' x_{it} + \pi_2' x_{i,t-1} + \alpha + \eta_i + \lambda_t + \varepsilon_{it}, \tag{14}$$

and

$$l_{it} = \delta_0 l_{i,t-1} + \delta_1' z_{it} + \delta_2' z_{i,t-1} + \zeta + \xi_i + \mu_t + v_{it}. \tag{15}$$

An important feature of ADL models is the inclusion of lagged values of the dependent

variable as regressors to model the relation between current and past outcomes. Next to

lagged dependent variable regressors, both contemporaneous and lagged values of

additional explanatory variables may be included in the model.

In estimating ADL models we do not restrict the data and use all information available

both in the levels and first differences, which becomes clear when rewriting (14) and (15)

as an error-correction model, i.e.

$$\Delta y_{it} = \pi_1' \Delta x_{it} + (\pi_0 - 1)\left(y_{i,t-1} - \frac{\pi_1' + \pi_2'}{1 - \pi_0} x_{i,t-1} \right) + \alpha + \eta_i + \lambda_t + \varepsilon_{it}, \tag{16}$$

and

$$\Delta l_{it} = \delta_1' \Delta z_{it} + (\delta_0 - 1)\left(l_{i,t-1} - \frac{\delta_1' + \delta_2'}{1 - \delta_0} z_{i,t-1} \right) + \zeta + \xi_i + \mu_t + v_{it}. \tag{17}$$

The error-correction representations make a clear distinction between the long-run level

relationship and the short-run dynamics in first-differences. Also they show that the

parameter vectors of interest, i.e. β and θ, can be estimated from the unrestricted ADL

specifications as $\dfrac{\pi_1' + \pi_2'}{1 - \pi_0}$ and $\dfrac{\delta_1' + \delta_2'}{1 - \delta_0}$ respectively, while short-run dynamics and speed

of adjustment are parametrized by π_1 (δ_1) and $\pi_0 - 1$ ($\delta_0 - 1$) respectively.

The unrestricted ADL specifications (14) and (15) are very general and encompass many

specific theoretical models describing short-run dynamics. Two special cases of (14) and

(15) are often used in the literature on dynamic externalities. First, some studies specify

the lagged level of local industrial structure and other control variables to have

productivity growth effects and, hence, to have output and employment growth effects.

From the reparametrized models (16) and (17) it is seen that this implies $\pi_1 = 0$ and

$\delta_1 = 0$ respectively. De Lucio et al. (1996, 2002) consider such a theory when estimating

an empirical model for value added, while Combes (2000) and Glaeser et al. (1992) use

this specification to analyze the determinants of employment growth. Second, other

studies impose the lagged level of local industrial structure to have an effect on current

productivity levels and, hence, output or employment levels. From the original

specifications (14) and (15) it is seen that this again implies $\pi_1 = 0$ and $\delta_1 = 0$

respectively. Considering an employment relationship like in (15) Henderson et al.

(1995) and Henderson (1997) restrict coefficients of contemporaneous explanatory

variables to be equal to zero.

The use of dynamic panel data models in the current empirical analysis is important

because it enables us to control better for omitted variable bias as compared with cross-

section based models like, for example, Glaeser et al. (1992). Especially regarding

productivity it is likely that in addition to industrial structure many other factors are

relevant. For example, the business regime in Morocco has been changed substantially

the last decades (World Bank, 1999). First, from the beginning of 1980s Morocco has

strengthened its trade liberalization policy in order to increase imports and exports of

goods and services by reducing tariffs and quota as well as establishing regional trade

agreements. Second, from the 1990s onwards a large privatization program of public

firms went under way. It is likely that such developments have had their impact on the

efficiency of labor and capital through multiple transmission channels (e.g.

macroeconomic business cycle, technological change, labor market institutions, etc.).

Explicit modeling of all these developments, however, is outside the scope of the current

analysis. Instead, we opt for an empirical approach and, in addition to region-sector and

time effects, extend the modeling of unobserved heterogeneity by allowing productivity

shocks to be correlated over time. For example, Blundell and Bond (2000) model this by

estimating a dynamic production function, which results from imposing autoregressive

productivity shocks. More in particular, they assume $\varepsilon_{it}^* = \gamma \varepsilon_{i,\,t-1}^* + \varepsilon_{it}$ in (6), hence model

(7) has the dynamic common factor representation

$$y_{it} = \gamma y_{i,t-1} + \beta' x_{it} - \gamma \beta' x_{i,t-1} + (1-\gamma)(\alpha^* + \eta_i^*) + (\lambda_t^* - \gamma \lambda_{t-1}^*) + \varepsilon_{it}, \tag{18}$$

which is (14) with the restriction that the coefficient vector π_2 is equal to $-\pi_0\pi_1$.

It should be emphasized that we are not so much interested in the particular type of short-run dynamics, but primarily in the long-run relations as described in equations (7) and (13). The unrestricted dynamic specifications (14) and (15) enable us to estimate the parameters of interest in the long-run relations (7) and (13) without the necessity to limit ourselves a priori to one particular theory regarding the short-run dynamics. Note that the parameter restrictions imposed in the various examples above can be tested using the unrestricted ADL estimates. Inspecting our empirical results most cases discussed above have to be rejected for this particular application, as we shall see.

interpretation and estimation

In the final empirical specifications (14) and (15) different multipliers can be distinguished. First, the vector of short-run multipliers or immediate effects are π_1 and δ_1 respectively. Second, note that the net effect of a particular regressor in x on y is positive (negative) if the sum of the corresponding elements in π_1 and π_2 or δ_1 and δ_2 are positive (negative). Finally, we are primarily interested in the vector of long-run multipliers, which can be calculated as $\beta = \frac{\pi_1 + \pi_2}{1 - \pi_0}$ and $\theta = \frac{\delta_1 + \delta_2}{1 - \delta_0}$. Regarding value added we expect labor and capital to have positive net effects. Regarding employment it is expected that wages and capital have negative and positive effects respectively.

Various sources of externalities are embodied in the final specifications, i.e. historical conditions (lagged variables), specialization (sp), diversity (dv) and competition (cp). A priori one would expect that historical conditions play an important role, i.e. at least some lagged regressors should have significant coefficients. The lagged dependent variable regressor, which measures dependence on past own outcomes, can be interpreted as a

measure of absolute specialization (Henderson et al., 1995; Henderson, 1997) as opposed

to the indicator sp, which measures relative specialization. Both absolute and relative

specialization of firms should have a positive effect on local value added and

employment due to intra industry knowledge spillovers (MAR externalities). The effect

of diversity, i.e. Jacobs externalities, is also supposed to be positive. Finally, the

coefficient of the competition indicator can be either positive (Porter, Jacobs) or negative

(MAR).

For the Morocco data 13 out of the total of 108 cross-section units contain zero

observations because some sectors are absent in some regions. Hence, the dimensions of

the panel used in estimation are $T = 11$ and $N = 95$. For the Casablanca data the

dimensions of the panel are $T = 4$ and $N = 386$. Because of the dynamic nature of the

empirical specifications and the small T, large N dimension of both panels, Generalized

Method of Moments (GMM) estimation has been performed to get consistent estimates of

the unknown parameters in (14) and (15). Regarding the lagged dependent variable

regressor we exploit all available moment conditions arising from the model assumptions.

More in particular, following Arellano and Bond (1991) the levels equation has been

first-differenced to eliminate the individual specific effects and moment conditions have

been used involving lagged values of the dependent variable. The resulting set of moment

conditions has been combined with moment conditions from the levels equation

(Arellano and Bover, 1995; Blundell and Bond, 1998). For example, for the value added

equation this results in $T(T-1)/2 + T - 1$ moment conditions, i.e. $E\left[y_{i,\,t-s} \Delta \varepsilon_{it} \right] = 0$

($t = 2,...,\ T;\ \ s = 2,...,\ t$) and $E\left[\varepsilon_{it} \Delta y_{i,\,t-1} \right] = 0$ ($t = 2,...,\ T$). To economize on the total

number of instruments we use moment conditions for $s = 2,3$ only. Depending on the

nature of the other explanatory variables more moment conditions are available, but not

all of them have been used in estimation. We either assume strict exogeneity or

endogeneity. In the former case we use the regressor itself as an instrument. In the latter

case we use similar moment conditions as for the lagged dependent variable regressor

above. Both one-step and two-step GMM estimation has been performed, but only the

latter is reported. The two-step coefficient estimates are supplemented with bias-

corrected asymptotic standard errors (Windmeijer, 2000) as it is well-known that

uncorrected estimates lead to inaccurate and unreliable inference (Blundell and Bond,

1998). For a more detailed treatment of GMM estimation in dynamic panel data

models [3] , see e.g. Arellano and Bond (1991), Arellano and Bover (1995) or Blundell and

Bond (1998).

empirical results for Morocco

In this section we present empirical evidence on the sources of dynamic externalities

from three different perspectives. First, we show estimation results for Morocco, i.e. the 6

large urban areas contained in the data. Second, we analyze any differences between

exporting and non-exporting sectors. Third, we focus on Casablanca, by far the largest

region in Morocco.

Morocco

In this subsection we focus on whole Morocco. Table 3 presents the estimation results of

specification (14). The first column are the estimation results assuming strictly exogenous

regressors, while in the second column we treated labor and capital as endogenous. In the

third column we removed insignificant dynamics.

<center>**<Table 3 about here>**</center>

The results in Table 3 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 [4] and higher-order dynamics are generally not significant.

Focusing on columns (1) and (2) of Table 3 several regularities are found for the indicators sp, dv and cp. First, the impact multiplier or immediate effect of the specialization indicator is significant and positive, while its significantly negative for the one-period lagged effect. The magnitude of the estimates imply that the net effect is slightly positive. Second, the impact multiplier of the diversity indicator is not significant, while its lagged effect is significantly positive. The magnitude of the estimates imply that the net effect is positive. Third, regarding the competition indicator the immediate and lagged effects are significantly negative and positive respectively implying a negative net effect of competition on value added.

In general the estimation results in Table 3 suggest that industrial structure does matter for local economic development in Morocco. Historical conditions play an important role as both the coefficient of the lagged dependent variable regressor and most of the coefficients of lagged additional regressors are significant. Using the estimates in column (3) the implied long-term relation for value added is as follows

$$y = \underset{(0.08)}{0.75}\,l + \underset{(0.07)}{0.19}\,k + \underset{(0.09)}{0.06}\,sp + \underset{(0.33)}{1.04}\,dv - \underset{(0.04)}{0.17}\,cp \ .$$

The long-term effects of labor and capital are elasticities, while those for the externality indicators are semi-elasticities. Regarding labor and capital we find estimates which are close to constant returns to scale with labor the dominant input factor. Regarding the externalities we find positive long-term effects for specialization and diversity although

the former is not significant. Regarding competition a negative long-term effect on value added has been found.

Table 4 presents the estimation results of specification (15). The first column contains estimation results assuming strictly exogenous regressors, in the second column we treated wages and capital as endogenous and in the third column we removed insignificant dynamics.

<Table 4 about here>

The results in Table 4 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 column (3) of Table 4 the estimation results suggest that industrial structure does matter for local employment patterns in Morocco. First, the coefficient of the lagged dependent variable regressor implies high persistence in employment, hence historical conditions are important. Second, the impact multiplier and lagged effect of the specialization indicator are significantly positive and negative respectively. The magnitude of the estimates imply that the net effect is slightly positive. Third, if there is a significant effect of diversity it is positive and lagged one-period. Fourth, the impact multiplier and lagged effect of the competition indicator are significantly negative and positive respectively. The magnitude of the estimates imply that the net competition effect is negative.

The long-term relation implied by the estimates in column (3) of Table 4 is as follows

$$l = -\underset{(0.25)}{0.42}\,w + \underset{(0.07)}{0.51}\,k + \underset{(0.15)}{0.08}\,sp + \underset{(0.81)}{2.01}\,dv - \underset{(0.19)}{0.48}\,cp \; .$$

The long-term effects of wages and capital are elasticities, while those for the externality

indicators are semi-elasticities. Regarding the wage rate and capital we find elasticities of

around -0.4 and 0.5 respectively, which are plausible values. Regarding the sources of

externalities we find significant long-term effects for diversity and competiton, which

imply positive and negative effects of diversity and competition on employment.

Regarding specialization, although short-run dynamics are significant, no significant

long-term effects are found.

The estimated semi-elasticities of the externality indicators are somewhat difficult to

interpret. To quantify the importance of each externality indicator we calculated the long-

term effects for two cases: (1) average annual change in the sample; (2) one standard

deviation change of the time average in the sample [5] . The former case is related to actual

change over time, while the latter is a more hypothetical change due to cross-sectional

variation. Considering the first case, increased specialization, diversity and competition

indicators lead eventually to an increase in value added of 0.01%, 2.24% and -0.06%

respectively. Regarding employment we have 0.01%, 4.32% and -0.17%. In the second

case, increased specialization, diversity and competition indicators lead eventually to an

increase in value added of 5.22%, 11.59% and -10.31% respectively, while for

employment we have 7.29%, 22.35% and -29.19%. Hence, over time diversity has some

moderate beneficial effects only. However, the second case shows rather large long-term

effects for all indicators.

Summarizing the empirical evidence so far positive effects of specialization and diversity

are found, while local competition turns out to be harmful for economic development.

Also historical conditions are important as coefficients of lagged regressors are often

significant. Finally, we estimated unrestricted dynamic models and did not impose any

parameter restrictions a priori. As discussed in the previous section it is common in the literature on dynamic externalities to restrict local industrial structure to have only lagged effects on output and employment. Inspecting our empirical results in Tables 3 and 4 this hypothesis has to be rejected for this particular application as the contemporaneous effects of specialization and competition are significant.

sectors

It is interesting to analyze whether the results above are robust over sectors. Due to lack of data, however, a detailed analysis on the level of two-digit sectors is not possible. Following Glaeser et al. (1992) we divide our sample into export-oriented sectors and sectors which primarily serve local demand. Dynamic externalities should be relatively important for the export-oriented sectors as they are less limited by local demand patterns. We exploit the classification of Haddad et al. (1996) to make a distinction between export and non-export sectors. Regarding Morocco the most important export-oriented sectors are textiles, clothing, leather and shoes, other food products and chemical products.

To take into account the possible different behavior between export and non-export sectors equations (14) and (15) have been extended with interaction terms for each explanatory variable. The interaction term is the product of the original regressor with a dummy variable, which is one in case of an export sector and zero otherwise. Hence, coefficients of interaction terms measure the difference in behavior between non-export and export sectors.

<Table 5 about here>

Table 5 shows estimation results for non-export and export sectors. Although short-run

dynamics can be considerably different between non-export and export sectors, sign and

magnitude of estimated net effects of the indicators seems more equal across sectors. The

implied long-run relations are for non-exports sectors

$$y = \underset{(0.11)}{0.75}\,l + \underset{(0.10)}{0.18}\,k - \underset{(0.09)}{0.09}\,sp + \underset{(0.44)}{1.03}\,dv - \underset{(0.03)}{0.08}\,cp$$

$$l = \underset{(0.27)}{0.14}\,w + \underset{(0.08)}{0.43}\,k + \underset{(0.15)}{0.02}\,sp + \underset{(0.84)}{1.32}\,dv - \underset{(0.08)}{0.05}\,cp,$$

and for export sectors

$$y = \underset{(0.13)}{0.72}\,l + \underset{(0.10)}{0.20}\,k + \underset{(0.15)}{0.07}\,sp + \underset{(0.75)}{1.18}\,dv - \underset{(0.03)}{0.01}\,cp$$

$$l = -\underset{(0.51)}{0.59}\,w + \underset{(0.12)}{0.61}\,k + \underset{(0.32)}{0.37}\,sp + \underset{(1.61)}{1.35}\,dv - \underset{(0.10)}{0.03}\,cp.$$

Although sign and magnitude of the long-term effects are not equal always, no systematic

statistical differences are found between export and non-exports sectors. Wald-type test

statistics for testing long-run parameter homogeneity between sectors are 2.17 and 2.69

(p-values are 0.83 and 0.75) for the value added and employment equations respectively.

Summarizing, although in the short-run local industrial structure can have differential

effects across sectors long-run multipliers are equal.

agglomeration of Casablanca

As the region of Casablanca is by far the most important area in Morocco, we analyze the

effects of industrial structure on economic development within this particular region

using sector-district data for this specific agglomeration.

<Table 6 about here>

Table 6 shows estimation results for specifications (14) and (15) after having removed

insignificant dynamics. The results show a relatively low coefficient of the lagged

dependent variable regressor in both equations implying less persistence in economic

development in Casablanca for these particular years. However, the coefficient is

significant showing again the importance of historical conditions for local economic

development. The indicators measuring possible sources of dynamic externalities seem to

matter for local economic development within the region of Casablanca although there

are some differences with the results for Morocco. More in particular, specialization and

diversity seem to be the most important sources of externalities, while competition has

significant effects only in the equation for value added.

The implied long-run relations for Casablanca are

$$y = \underset{(0.04)}{0.94}\,l + \underset{(0.02)}{0.11}\,k + \underset{(0.04)}{0.12}\,sp + \underset{(0.14)}{0.43}\,dv + \underset{(0.07)}{0.07}\,cp\,,$$

and

$$l = -\underset{(0.07)}{0.09}\,w + \underset{(0.03)}{0.39}\,k + \underset{(0.05)}{0.10}\,sp + \underset{(0.18)}{0.25}\,dv\,.$$

Restricting the space to Casablanca only we find significant positive long-term effects for

specialization and diversity on both value added and employment. No significant long-

term effect is found for competition.

concluding remarks

In this study the effects of industrial structure on local economic development have been

analyzed empirically using panel data on Moroccan industries and cities. In empirical

models for value added and employment we distinguish several sources for dynamic

externalities, i.e. arising from local industrial structure and historical conditions. The

effects of the local industrial structure have been modelled using indicators for

specialization, diversity and competition of firms. The relevance of historical conditions

has been modelled by allowing for dynamics in the empirical specifications.

For the case of Morocco we find significant long-run effects of industrial structure on

local economic development. More in particular, positive effects of specialization 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 consistent with MAR externalities.

As far as the magnitude of the effects is concerned, considerable long-term effects have

been found asserting the potentially important role for industrial structure in stimulating

local economic development in Morocco. The empirical evidence for Morocco is robust

for the measure of economic development used, i.e. employment or value added. Sector-

specific results reassert the main results although short-run dynamics are significantly

different across export and non-export sectors. Restricting the space to Casablanca, which

is the most important area in Morocco, we again find similar results for specialization and

diversity. Regarding local competition, however, we find no significant long-run effects.

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 specialization and diversity we have found positive effects on

local economic development in Morocco. The positive effects of specialization 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

specialized in one particular phase of the production process. Regarding diversity the

positive effects are not surprising as we analyzed the six largest urban areas in Morocco.

In such large and densely populated areas the benefits from a diversified industrial

structure are maximized.

The majority of our estimates indicate a negative role for competition where many other

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 characterized by traditional management systems and simple

internal modes of organization. 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

organizational innovations. Hence, local competition between firms will be based on

prices and cutting costs (especially for labor) rather than on quality of products, which in

turn may have negative effects on local economic development.

Key policy issues in Morocco are the reduction of unemployment and raising

productivity levels and, hence, economic growth. The current empirical evidence

suggests that local industrial structure is correlated with employment and productivity.

However, the scope of dynamic externalities seems limited given the composition of the

manufacturing sector as outlined above. R&D expenditures are low and not well

integrated in the production process. Research is carried out almost exclusively by the

public sector, while the private sector invests too few in innovation (Khrouz et al, 2000).

Hence, public policy should aim at fostering R&D in private companies and cooperation

between research institutes and the private sector. In addition, it should stimulate the

introduction of technological and organizational innovations to create a business

environment for competitiveness, learning and innovation.

Although we found significant effects of specialization, diversity and competition, like other studies the empirical evidence presented here does not give a definite answer to the existence of knowledge spillovers. The empirical evidence is robust to using either employment or value added as dependent variable, but it is nevertheless problematic to give a structural interpretation to the coefficients of the estimated specifications (Cingano and Schivardi, 2004). Furthermore, the Moroccan economy is characterized by a weak dynamics of productivity and economic development. As argued above, production growth does not imply automatically an increase in productivity, which is of crucial importance for a sustained relation between dynamic externalities and local economic development. Hence, it is not obvious whether knowledge spillovers alone are driving the current empirical evidence.

acknowledgements

notes

1. The typical cross-section unit in the Casablanca data is 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 more than 500 employees. As the data are at firm category level, the constructed indicators are equal for different categories belonging to the same sector and district.

2. In the empirical analysis no severe endogeneity problems for the indicators is found.

The validity of the moment conditions resulting from the assumed exogeneity of the

indicators sp, dv and cp is not rejected.

3. The Ox version of DPD (Doornik et al., 2002) has been used for estimation.

4. The statistics $m1$ and $m2$ test for first-order and second-order residual

autocorrelation in the first-differenced residuals. Under the null hypothesis of no

serial correlation they have a standard Normal distribution. *Sargan* is a test of over-

identifying restrictions and has a χ^2 distribution under the null of validity of both

specification and instruments. Note that the degrees of freedom of the Sargan test

change as we move from strictly exogenous to endogenous regressors. Finally, $\hat{\sigma}$ is

the standard error of regression, which measures the proportion of unexplained

variation in this case as the dependent variables in the analysis have been transformed

to a logarithmic scale.

5. Cases (1) and (2) amount to absolute changes in (sp, dv, cp) of (0.001, 0.02, 0.004)

and (0.87, 0.11, 6.02) respectively.

appendix: description of the data

For the empirical analysis two sources of data have been used. Regarding Morocco we used data provided by the Ministère de l'Industrie et du Commerce (qui produit quoi au Maroc) and the Direction des Statistiques (annuaire statistique du Maroc). Regarding Casablanca data have been taken from REPIND, an exhaustive survey of Moroccan manufacturing firms collected by the Ministère de l'Industrie et du Commerce. Data from the latter source have been aggregated from the firm level into two-digit industry level. In each data set 18 two-digit industrial sectors are available: food products (10), other food products (11), beverages and tobacco (12), textiles (13), clothing (14), leather and shoes (15), wood products (16), paper and printing (17), mineral products (18), basic metals (19), metallic products (20), machinery and equipment (21), transport materials (22), electronics (23), precision equipment (24), chemical products (25), rubber and plastics (26) and other industrial products (27). Following Haddad et al. (1996) we identify sectors 11, 13, 14, 15, 16, 19, 22, 23 and 25 as export sectors. In the Morocco data six urban areas are available, i.e. Casablanca, Rabat, Tangier, Fez, Meknes and Marrakech. In the Casablanca data we distinguish 7 main districts, i.e. Ain Chok-Hay Hassani, Ain Sebâa-Hay Mohammadi, Al Fida-Derb Soltane, Ben M'Sik-Sidi Othmane, Casa Anfa, Mohammedia and Sidi Bernoussi. The following variables have been used in the empirical analysis: value added, production, investments, wages and employment. All nominal variables are measured in current dirhams, the local currency of Morocco. Nominal variables have been deflated into constant dirhams using sectoral price deflators. Employment is measured in total number of workers. Data regarding capital stock (K) have been constructed using deflated investment data (I), i.e.

$$K_{it} = (1 - g_K)K_{i,\,t-1} + I_{it},\,,\quad t = 2,...,\ T,$$

assuming a constant annual depreciation rate g_K. To construct capital stock data for the

first period we used a perpetual inventory method. Assuming a constant growth rate of

past investments g_I we have

$$I_{it} = (1 + g_I)I_{i,\,t-1},\quad t = 1,\ 0,-1,...$$

Combining both expressions leads to

$$K_{i1} = \frac{1}{1 - \frac{1-g_K}{1+g_I}} I_{i1}.$$

In this study we have used $g_K = 0.04$ and $g_I = 0.088$. The depreciation rate has been

taken from Haddad et al. (1996), while the growth rate of past investments has been set

equal to the average annual growth rate of investments in the sample.

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Table 1. Summary of main results from empirical studies

	country	specialization	diversity	competition
Glaeser et al. (1992)	U.S.	-	+	+
Henderson et al. (1995)	U.S.	+	+	na
Henderson (1997)	U.S.	+	+	na

De Lucio et al. (1996)	Spain	-	+	+
De Lucio et al. (2002)	Spain	+/-	+/-	-
Maurel (1996)	France	+	+	+
Combes (2000)	France	-	+/-	+/-
Blien et al. (2006)	Germany	+/-	+	+/-

Note: + positive effect; - negative effect; +/- mixed or not significant evidence; na not included in the analysis. De Lucio et al. (2002) use labor productivity as dependent variable, all other studies employment. Unit of observation is sector-region.

Table 2.   Descriptive statistics

	Y	L	K	W	sp	dv	cp
				Morocco			
level 1985	103.77	2.21	152.53	17.78	1.10	-0.43	4.71
level 1995	205.34	3.55	408.58	22.50	1.09	-0.20	4.32
growth 85-90	7.92	7.59	10.16	2.83	0.83	8.87	-2.47
growth 91-95	3.30	1.05	8.25	2.43	-0.94	0.14	5.25
variance ratio	0.10	0.08	0.16	0.61	0.33	1.02	1.47
				Casablanca			
level 1992	40.94	0.64	66.62	28.36	1.06	-0.28	3.06
level 1995	39.35	0.62	82.73	28.99	1.09	-0.17	3.36
growth 92-95	-0.97	-0.74	6.05	0.56	0.77	9.96	2.52
variance ratio	0.18	0.04	0.02	0.26	0.23	0.81	0.06

Note: Y and K in millions of constant dirhams, L in thousands of workers, W in thousands of constant dirhams; sp, dv and cp are calculated using (1), (2) and (3). Level is average level, growth is average annual growth. The data in the first panel (labeled Morocco) are aggregated figures for Casablanca, Rabat, Tangier, Fez, Meknes and Marrakech.

Table 3. Estimation results of specification (14)

	(1)	(2)	(3)
$y_{i,t-1}$	0.65 (0.07)	0.63 (0.06)	0.63 (0.06)
l_{it}	0.56 (0.12)	0.60 (0.10)	0.61 (0.10)
$l_{i,t-1}$	-0.30 (0.11)	-0.32 (0.09)	-0.33 (0.09)
k_{it}	0.11 (0.04)	0.13 (0.05)	0.13 (0.05)
$k_{i,t-1}$	-0.04 (0.01)	-0.06 (0.02)	-0.06 (0.02)
sp_{it}	0.22 (0.08)	0.21 (0.06)	0.21 (0.06)
$sp_{i,t-1}$	-0.20 (0.08)	-0.19 (0.07)	-0.19 (0.06)
dv_{it}	-0.36 (0.22)	-0.39 (0.26)	
$dv_{i,t-1}$	0.46 (0.13)	0.52 (0.12)	0.39 (0.10)
cp_{it}	-0.11 (0.04)	-0.10 (0.02)	-0.10 (0.02)
$cp_{i,t-1}$	0.04 (0.02)	0.03 (0.01)	0.03 (0.01)
$\hat{\sigma}$	0.378	0.383	0.384
$m1$	-5.05 (0.00)	-5.03 (0.00)	-5.02 (0.00)
$m2$	0.15 (0.88)	-0.10 (0.92)	-0.05 (0.96)
Sargan	37.53 (0.07)	77.76 (0.25)	78.78 (0.22)

Note: Figures in parentheses behind estimates and test statistics are standard errors
and p-values respectively. The results are robust to general heteroskedasticity
patterns across individuals and over time. Column (1) assumes strict exogeneity of
all regressors, columns (2) and (3) assume endogeneity of l and k, column (3) omits
insignificant dynamics.

Table 4. Estimation results of specification (15)

	(1)	(2)	(3)
$l_{i,t-1}$	0.87 (0.03)	0.85 (0.02)	0.85 (0.02)
w_{it}	-0.24 (0.12)	-0.29 (0.10)	-0.29 (0.10)
$w_{i,t-1}$	0.17 (0.12)	0.23 (0.09)	0.22 (0.10)
k_{it}	0.11 (0.04)	0.09 (0.04)	0.08 (0.02)
$k_{i,t-1}$	-0.04 (0.03)	-0.01 (0.03)	
sp_{it}	0.20 (0.07)	0.23 (0.06)	0.23 (0.06)
$sp_{i,t-1}$	-0.18 (0.08)	-0.21 (0.07)	-0.22 (0.06)
dv_{it}	-0.02 (0.22)	-0.09 (0.25)	
$dv_{i,t-1}$	0.28 (0.19)	0.33 (0.18)	0.31 (0.12)
cp_{it}	-0.11 (0.04)	-0.14 (0.04)	-0.14 (0.04)
$cp_{i,t-1}$	0.06 (0.02)	0.06 (0.02)	0.06 (0.02)
$\hat{\sigma}$	0.303	0.305	0.305
$m1$	-4.48 (0.00)	-4.67 (0.00)	-4.65 (0.00)
$m2$	0.56 (0.58)	0.64 (0.52)	0.61 (0.54)
Sargan	40.73 (0.03)	74.34 (0.34)	74.63 (0.33)

Note: see Table 3.

Table 5. Estimation results for export and non-export sectors

y_{it}	non-export	difference with export	l_{it}	non-export	difference with export
$y_{i,t-1}$	0.66 (0.07)	-0.06 (0.08)	$l_{i,t-1}$	0.83 (0.04)	0.03 (0.05)
l_{it}	0.34 (0.11)	0.33 (0.15)	w_{it}	-0.27 (0.18)	-0.03 (0.21)
$l_{i,t-1}$	-0.08 (0.10)	-0.30 (0.13)	$w_{i,t-1}$	0.30 (0.16)	-0.08 (0.20)
k_{it}	0.16 (0.07)	-0.06 (0.07)	k_{it}	0.08 (0.02)	0.01 (0.03)
$k_{i,t-1}$	-0.10 (0.04)	0.08 (0.04)	$k_{i,t-1}$		
sp_{it}	0.07 (0.05)	0.36 (0.08)	sp_{it}	0.10 (0.06)	0.35 (0.13)
$sp_{i,t-1}$	-0.10 (0.06)	-0.30 (0.09)	$sp_{i,t-1}$	-0.10 (0.06)	-0.30 (0.12)
$dv_{i,t-1}$	0.35 (0.13)	0.12 (0.21)	$dv_{i,t-1}$	0.23 (0.14)	-0.03 (0.23)
cp_{it}	-0.08 (0.01)	0.07 (0.01)	cp_{it}	-0.07 (0.01)	0.06 (0.01)
$cp_{i,t-1}$	0.05 (0.01)	-0.05 (0.01)	$cp_{i,t-1}$	0.06 (0.02)	-0.05 (0.02)
$\hat{\sigma}$	0.363		$\hat{\sigma}$	0.291	
$m1$	-5.47 (0.00)		$m1$	-4.88 (0.00)	
$m2$	-0.23 (0.82)		$m2$	0.94 (0.35)	
$Sargan$	58.97 (0.24)		$Sargan$	65.46 (0.10)	

Note: see Table 3.

Table 6.   Estimation results for Casablanca

y_{it}		l_{it}	
$y_{i,t-1}$	0.33 (0.13)	$l_{i,t-1}$	0.29 (0.10)
l_{it}	1.05 (0.06)	$w_{i,t-1}$	-0.06 (0.05)
$l_{i,t-1}$	-0.42 (0.14)	k_{it}	0.28 (0.05)
k_{it}	0.07 (0.02)	sp_{it}	0.16 (0.04)
$sp_{i,t-1}$	0.08 (0.03)	$sp_{i,t-1}$	-0.09 (0.03)
$dv_{i,t-1}$	0.29 (0.10)	dv_{it}	0.18 (0.12)
cp_{it}	-0.15 (0.10)		
$cp_{i,t-1}$	0.19 (0.11)		
$\hat{\sigma}$	0.571	$\hat{\sigma}$	0.764
$m1$	-3.61 (0.00)	$m1$	-4.24 (0.00)
$m2$	NA	$m2$	NA
$Sargan$	8.95 (0.35)	$Sargan$	9.03 (0.34)

Note: see Table 3.