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Local Financial Development and Firm Performance: Evidence from Morocco

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Abstract

Combining data from the Moroccan census of manufacturing enterprises with information from a commune survey, we test whether firm expansion is affected by local financial development. Our findings are consistent with this hypothesis: local bank availability is robustly associated with faster growth for small and medium-size firms in sectors with growth opportunities, with a lower likelihood of firm exit and a higher likelihood of investment. The findings also suggests a channel for the effect of the availability of financing on firm growth in our data, namely that access to credit was used to invest in labor saving technology.

Keywords: manufacturing, credit constraint, firm size

JEL codes: O16, L25

1 Introduction

Ever since the seminal works of Schumpeter (1911) and Gerschenkron (1962) the effect of credit availability on firm performance has attracted much attention. There is an abundant theoretical literature arguing that transactions costs and asymmetric information are likely to restrict access to capital especially for small firms. This is expected to have a detrimental effect on firm growth and the entry of new firms because alternatives – e.g., equity finance – suffer from similar problems and are not readily available.

There is now a large empirical literature, going back to King and Levine (1993), showing that a country's financial development matters for firm performance and aggregate growth. What has received less attention is within-country heterogeneity with respect to the availability of financing. Asymmetric information and transaction costs considerations suggest that physical distance between lender and borrower is likely to affect access to finance (e.g. Petersen and Rajan, 2002). Indeed borrowers' actions are harder to observe when lender and borrower are far apart, leading to adverse selection (of potential borrowers) and moral hazard (for current borrowers). These issues are of particular importance in less developed economies, increasing the probability that local financial development matters for firm performance. In the context of household survey data, Burgess and Pande (2005), for example, show that branch expansion into previously unbanked rural areas of India led to a significant decrease in poverty.

This paper empirically addresses the question of whether local financial development

matters for firm growth in a developing country context. To this end we combine Moroccan data on bank availability at the local level with manufacturing census data over the period 1998 to 2003 to study the effect of bank availability on firm growth, entry, and exit. We find that value added grows faster in fast growing sectors for small and medium-size firms located near a bank, providing evidence for the importance of local financial development.

There are only few papers that study the importance of within-country variation in financial development. Jayaratne and Strahan (1996) use cross-state variation in bank regulation within the US to study the link between financial development and growth, mainly over the 1970s and 1980s. Dehejia and Lleras-Muney (2007) exploit state-level variation in banking regulation in the US to study regulation, financial development, and growth over the period 1900-1940. Guiso et al. (2004) investigate the role of financial development in Italy, exploiting variation across regions.

These papers generally confirm the role of financial development at levels below the national level. But they only allow for heterogeneity at a relatively aggregate level – 19 regions in Italy and 50 states in the US – and only cover developed economies. For policy purposes, we need to know whether financial development matters at lower levels of disaggregation as well. This question is particularly relevant for developing countries like Morocco where manufacturing is geographically concentrated and localities differ widely in terms of financial infrastructure. One novel aspect of this paper is therefore that we study financial development at a highly disaggregated level, i.e., that of the *commune* which, in the studied country, corresponds roughly to that of a city or county elsewhere.

There is considerable difficulty in providing rigorous evidence of a causal link between access to finance and firm performance. Any firm-level correlation between firm performance

and access to finance is subject to omitted variables bias or reverse causation since banks are expected to lend to firms with high performance and prospects. To avoid this problem, we use local bank availability measured in an earlier *commune* survey as proxy for access to finance. Although this approach reduces the risk of endogeneity bias, it does not eliminate it entirely because banks may locate in places that are expected to grow faster – and hence where firms should perform better. Consequently it is difficult to ascribe causal interpretation to a correlation between firm performance and local bank availability.

Rajan and Zingales (1998) have proposed a possible resolution of this difficulty. Their approach is based on the assumption that, because of structural/technological reasons, there is variation across sectors in how much firms in a sector have to rely on external funds. The central test is then whether firms in sectors that rely heavily on external finance are growing faster in countries with more developed financial systems, which is interpreted as evidence for the existence of financial constraints. They control for a full set of country dummies, thereby controlling for unobserved country effects that influence financial development and render it endogenous in standard cross-country regressions. Subsequent work by Fisman and Love (2007) provides a reinterpretation of the original findings by Rajan and Zingales (1998). Fisman and Love (2007) argue that the test by Rajan and Zingales (1998) is implicitly a test about whether financial development facilitates firms' investment in the presence of growth opportunities. Keeping production unchanged only requires replacement investment, which can typically be financed out of retained earnings. In contrast, if there are opportunities for growth, firms need capital for expansion purposes. If funds cannot be found rapidly, opportunities will be seized by others. It follows that access to external finance is most critical for firms that face growth opportunities.

This suggests identifying the effect of local credit on firm growth by interacting local bank availability with a proxy for growth opportunities: if the effect is positive, it indicates that firms with easier access to finance can take better advantage of opportunities to growth. As proxy for growth opportunities Fisman and Love (2007) suggest using sectoral growth in the US. The idea behind this is that (1) firms in the US are relatively unconstrained and can take advantage of global shocks that affect growth opportunities and (2) if US firms in a sector are growing rapidly, presumably there are opportunities for growth to all firms in that sector, including those in other countries. As in Rajan and Zingales (1998), the advantage of this approach is that it allows the researcher to control for location-specific growth trends, the expectation of which may have influenced bank placement.

In this paper, we exploit within-country variation to follow an approach similar to that suggested by Fisman and Love (2007) for cross-country data. Our approach also differs in that we use firm-level data, while previous work has used sector-level data. Using firm-level data we estimate growth opportunities in a sector. The key assumption is that large firms are less likely to be financially constrained, and therefore are more able to take advantage of growth opportunities in their sector. Under this assumption, the observed growth of large firms is a reasonable proxy for growth opportunities in a sector. See Guiso et al. (2004) for a similar assumption, which is based on findings by Berger et al. (2001) and Petersen and Rajan (2003).

Focusing on small and medium-size firms, we find that value added grows faster in fast growing sectors for firms located in a *commune* with a bank. This result is robust to different choices of the cut-off point for large firms. Similar findings obtain if we use the growth of foreign-owned firms instead of large firms to proxy for growth opportunities. In our data,

1998 to 2003 is a period of slow growth for the main manufacturing sectors of Morocco, which are textile, garments, and leather goods. We find that pre-existing small and medium firms located in a commune with a bank experience an increase in value added by investing in physical capital. They also increase output per worker and reduce labor costs per unit of output. This suggests that, during the study period, outside funds were used by existing firms to finance labor-saving investment.

We also find more entry and less exit in growing sectors for communes with a bank. When we aggregate data at the sectoral level in each commune, we find that communes with a bank witness more growth in expanding sectors. This is true not only for value added, but also for aggregate output and employment. These findings are robust to changes in the method used to obtain a proxy for sectoral growth. Taken together, these results confirm the importance of access to finance for firm growth, but also demonstrate that only looking at panels of pre-existing firms misses an important part of the effect of credit access on aggregate growth.

The paper is organized as follows. We begin in Section 2 by describing the testing strategy used in the empirical analysis. The available data is presented in Section 3 where we also present descriptive statistics that set the stage for the subsequent econometric analysis. Empirical results for pre-existing firms are presented in Section 4 while in Section 5 we present econometric results at the district level not only for firm growth but also for entry and exit.

2 Testing strategy

A critical stumbling block when studying the effect of local financial development on firm growth is the possible endogenous placement of banks. To deal with this endogeneity issue, we follow an estimation strategy which is similar in spirit to the ones used by Rajan and Zingales (1998) and Fisman and Love (2007).

The idea behind the testing strategy is the following. Suppose we can identify firms that are a priori less financially constrained. These can be large firms, known to have easier access to credit if only because bank transactions costs are smaller as a percentage of amounts borrowed. Alternatively, these can be firms owned by residents of countries with more developed financial institutions, and which for that reason have easier access to external finance. Yet another possibility is that firms that have made the effort of obtaining a corporate legal status may signal higher ability and thus may have easier access to bank credit. This issue is studied in detail by Quinn (2009) who finds that this is indeed the case for Morocco. For this paper, we focus primarily on firm size as indicator of access to credit, but we verify the robustness of our results with alternative proxies of access to credit.

Using data from less constrained firms, we estimate, for each sector, the average growth of value added in those firms over a time interval of interest, say, from t to $t+1$. Let this be denoted as G_s. This serves as proxy for the growth opportunities in that sector. When we use firm size as indicator of access to credit, we do not have to assume that large firms are fully unconstrained. It just needs to be the case that they are less constrained than smaller firms, a reasonable assumption, which is also used in Guiso et al. (2004), and supported through findings by Berger et al. (2001) and Petersen and Rajan (2003). Growth of larger

firms could be even faster if large firms were fully unconstrained. In this sense, the average growth of value added in large firms only provides a lower bound on growth opportunities in their sector.

It is also conceivable that banks refrain from lending to sectors in difficulty. In this case, differences in growth opportunities across sectors will be magnified by banks' lending behavior. This will not, however, affect our testing strategy which only requires that our proxy be correlated with sectoral growth opportunities. We also do not require that growth opportunities of large and small firms be the same within each sector. All we need is that growth opportunities of large and small firms be sufficiently correlated within each sector so that sectoral differences in growth opportunities for large firms proxy for sectoral differences in growth opportunities for small firms.

Armed with G_s, we compare the growth of small firms across locations. Some locations have a reasonable level of financial development, others do not. Let B_i denote the financial development in location i at time t. We hypothesize that small firms in locations with high B_i are financially less constrained and therefore grow faster. This relationship, however, is only apparent when strong growth opportunities are present. Firms in sectors with low growth opportunities are less likely to be constrained by poor financial institutions in their location. This is our key identifying assumption. It enables us to devise a testing strategy based on an interaction term $G_s \times B_i$. We also control for a full set of sector and location dummies.

Formally, let Δy_{fis} be an outcome variable of interest – e.g., growth in y over the given

time interval – for firm f in location i in sector s. Our estimated equation is of the form:

$$\Delta y_{fis} = \beta B_i G_s + \mu_i + \upsilon_s + e_{fis} \tag{1}$$

where μ_i is a vector of location dummies and υ_s is a vector of sector dummies. These dummies control for different average growth rates across sectors and locations. Firms that were used as reference group to calculate G_s are excluded from regression (1). We interpret a positive coefficient β as evidence for a positive effect of local financial institutions on y_{fis}. Put differently, a positive estimate for β implies that a firm in a high growth sector located in a commune with good financial development grows faster than a firm in the same sector but in a less financially developed location. In the empirical analysis, we mainly use the growth of value added, but investigate the robustness of our results to the use of different measures of firm performance, such as growth in sales, output, or employment. In all regressions standard errors are corrected for clustering at the sector $\times$ commune level.[1]

Equation (1) is used to test whether access to finance affects the growth performance of individual firms, conditional on them being already present at time t. It does not take into account the entry and exit of firms. Yet firm entry and exit may constitute a significant part of the response to growth opportunities, and it too is affected by funding availability. To investigate these issues, we also estimate a model of the form:

$$\Delta y_{is} = \gamma B_i G_s + \mu_i + \upsilon_s + e_{is} \tag{2}$$

[1] We also show robustness to two-way clustering at these two levels.

where Δy_{is} represents an outcome of interest – e.g., growth in aggregate value added or in the number of firms – for sector s in location i. The same testing strategy applies, with the same interpretation.

3 The data

The data used for this study come from two sources: a 1997 World Bank survey containing information about the presence of financial institutions in 369 localities – called *communes*; and data until 2003 from the census of manufacturing enterprises collected annually by the Ministry of Commerce and Industry. The manufacturing census is collected each year since 1985 by experienced regional teams. Responding to the census questionnaire is a legal obligation for all firms. For this reason, we expect data quality to be good. Census data contain information about output, value added, and employment.[2] All values reported in the census have been deflated using a GDP deflator with 1997 as base year.

Communes are the smallest administrative subdivision in Morocco; they correspond roughly to the concept of city or county. Since we have information on financial institutions only for 1997, we ignore manufacturing census data prior to 1997 and focus our analysis on the period from 1998 onwards. This enables us to regard B_i as pre-determined. Any factor affecting the placement of a bank or financial institution in commune i in or prior to 1997, including anticipated future growth in that commune, is captured by the commune fixed effect μ_i.

[2]The census records permanent workers, that is, those with a permanent labor contract, in man-years. Casual and temporary workers are recorded in man-days. For the analysis presented here we convert man-days into man-year equivalent units and focus on total employment. Many Moroccan firms employ casual workers on a regular basis – especially in the garment and textile sectors.

Starting from 1998, manufacturing census data contain an identifier for the commune in which each enterprises is based.[3] In the data from the demographic census, there are some 1500 communes in Morocco, but most of them are purely rural and do not host manufacturing firms. The core of our analyses requires that we have data both from the 1997 World Bank survey and the manufacturing census, which is the case for 195 communes. These communes constitute the focus of our investigation.

3.1 Descriptive analysis

Using firms for which we have complete data in 1998 and 2003,[4] we report in Table (1) the mean of value added per firm in those two years. We also report the corresponding standard deviation and median. There is enormous variation in levels of value added across firms, and a 10 times difference between the mean and median value added. This serves to remind us that the size distribution of firms in Morocco, as elsewhere, is skewed, with a few large firms and many small ones.

We observe a rise in value added over the 5 year interval, but the rise is relatively modest. It corresponds to a 5.5% increase over 5 years. Next we restrict attention to firms with at least 100 employees. There are 639 firms that meet this criterion among firms present in

[3]From 1985 to 1993 manufacturing census data is recorded at the level of the province only. There are around 140 provinces in Morocco, but not all of them have manufacturing enterprises. From 1994 to 1997 census data also contain a city identifier which provides more detailed location information. The commune identifier is available from 1998 onwards. We know that the overwhelming majority of manufacturing firms in Morocco have a single establishment, but for those with multiple establishments we do not know where they are located. Since firms with multiple establishments are large and large firms are only used to obtain G_s at the national level, the issue of multiple establishments and their location can be ignored for our purpose.

[4]For this part of the analysis we drop firms with negative value added for which the growth rate of value added cannot be computed. For later parts, e.g. when studying location-level value added growth, we keep observations with negative value added. We also investigated value added changes, in which we also keep observations with negative value added.

1998 and 2003. For these firms, the rise in value added is even more modest. We repeat the exercise for the 1041 firms with at least 50 workers; the growth in value added is less than 3% over five years. We also repeat the analysis at the commune level, this time including all firms, that is, firms that either exit or enter between 1998 and 2003. We again find a small increase in the median total value added as well as in the mean and median growth of value added.

variable	# obs	mean	std. dev.	median
Firm level:				
value added 1998	3473	10,754	124,139	983
value added 2003	3473	11,298	96,675	1,023
change in value added 1998-2003	3473	544	35,587	45
growth of value added 1998-2003	3473	0.055	0.967	0.089
growth of vad, only $\geq$ 100 employees	639	0.050	0.713	0.096
growth of vad, only $\geq$ 50 employees	1041	0.029	0.814	0.079
Commune level: (all communes in data)				
value added 1998	241	197,139	760,526	2,845
value added 2003	241	192,496	665,291	2,923
change in value added 1998-2003	241	-4,642	546,400	407
Commune level: (value added >0 in 1998 and 2003)				
value added 1998	161	291,207	916,552	17,422
value added 2003	161	284,282	798,653	17,177
change in value added 1998-2003	161	-6,924	668,213	867
growth of value added 1998-2003	161	0.14	1.962	0.27
Note: values are in constant 1997 Moroccan Dirham				

Table 1: Summary Statistics Value Added (vad)

Table (2) reports similar figures for employment. We observe a 2% fall in employment for firms present in both 1998 and 2003. As shown in the Table, this fall is much stronger among firms that had a large labor force in 1998. This implies that the period under study is characterized by a mild contraction in manufacturing employment among those firms in existence in 1998.

variable	# obs	mean	std. dev.	median
Firm level:				
employment in 1998	3678	82.8	254.6	20.0
employment in 2003	3678	80.5	250.1	20.0
change in employment 1998-2003	3678	-2.3	166.5	0.0
growth of employment 1998-2003	3678	-0.019	0.676	0.0
growth of employment, only $\geq$ 100 employees	654	-0.227	0.738	-0.14
growth of employment, only $\geq$ 50 employees	1078	-0.186	0.722	-0.103
Commune level: (all communes in data)				
employment in 1998	241	1,929.0	5,680.9	101.1
employment in 2003	241	1,705,2	4,727.4	77.0
change in employment 1998-2003	241	-223.8	3,357.3	9.32
Commune level: (employment >0 in 1998 and 2003)				
employment in 1998	167	2,740.5	6,667.3	279.0
employment in 2003	167	2,394.7	5,530.0	247.9
change in employment 1998-2003	167	-345.7	4,001.7	9.3
growth of employment 1998-2003	167	-0.016	1.584	0.153%
Note: values are in constant 1997 Moroccan Dirham				

Table 2: Summary Statistics Employment

This firm-level picture, however, is incomplete. In the second panel of Table (2) we report employment changes at the commune level, including firms that exit and enter between 1998 and 2003. Mean and median employment falls over the study period, but the median change in employment is small but positive. A similar picture obtains if we limit ourselves to communes with positive manufacturing employment in 1998 (third panel of Table 2). Communes with small levels of initial manufacturing employment seem to have enjoyed some growth while communes with high employment levels in 1998 witnessed a sizeable contraction. This implies a deconcentration of manufacturing employment across space during the study period.

Variable	# obs	mean	std. dev.	median
Firm level:				
output in 1998	3677	29,304	242,246	2,774
output in 2003	3677	32,050	219,863	2,802
change in output 1998-2003	3677	2,746	60,379	45
growth of output 1998-2003	3677	0.018	1.025	0.038
growth of output, only $\geq$ 100 employees	654	0.017	0.812	0.074
growth of output, only $\geq$ 50 employees	1078	-0.002	0.881	0.041
Commune level: (all communes in data)				
output in 1998	241	575,110	2,074,672	327
output in 2003	241	617,952	2,004,011	1,145
change in output 1998-2003	241	42,842	1,135,833	2,105
Commune level: (employment >0 in 1998 and 2003)				
output in 1998	165	832,640	2,466,775	72,720
output in 2003	165	887,913	2,374,125	70,195
change in output 1998-2003	165	55,272	1,369,848	5,258
growth of output 1998-2003	165	0.231	2.029	0.372
Note: values are in constant 1997 Moroccan Dirham				

Table 3: Summary Statistics Output

If we look at output, we see that firms that already existed in 1998 and remained in existence until 2003 experienced a small increase in output. This is clear from the first panel of Table (3) which shows a 1.8% growth in output on average between 1998 and 2003. If we include entering and exiting firms and aggregate manufacturing output at the commune level (second and third panels of Table 3), we find a healthy increase in output over the study period: over all communes that had some manufacturing output in 1998, the average growth rate in commune output is 23%. This is much higher than the growth rate in aggregate output, which is only 7.4% across all communes – and 6% for communes that had some manufacturing in 1998.[5] These figures confirm that during the study period there was a

[5]We cannot entirely rule out the possibility that that part of the increase in manufacturing in communes with no initial manufacturing reflects improved coverage over the study period. This is one of the reasons why in regression (2) we control for commune fixed effects to eliminate this possible source of bias.

deconcentration of manufacturing output away from communes with initially high levels of manufacturing towards commune that had little or no manufacturing in 1998.

The combination of contraction in employment and increase in value added in existing firms means that output per worker, measured at the firm-level, increased by 3.7% between 1998 and 2003. Over the same period wage per worker increased by 23%, possibly because layoffs were concentrated among unskilled workers.

3.2 Growth opportunities

Essential to our testing strategy is the need to compute G_s, a proxy for growth opportunities available to firms in sector s. To ensure the robustness of our results, we follow several complementary strategies. Our preferred approach is to let G_s be the growth of value added in a sector over the period 1998-2003, calculated as $log(sum(vad2003)) - log(sum(vad1998))$. This growth is calculated as the sum of value added over firms that can a priori be considered less constrained by the local availability of financial institutions.[6]

We also experiment with growth in sales as proxy for growth opportunities. On theoretical grounds, value added is a more satisfying proxy for growth opportunities since it measures returns to labor and capital. On the other hand, Fisman and Love (2007) argue that sales have less measurement error: sales are measured directly in the census, while value added is constructed from several variables. The same can be said for employment. Given that, over our study period, employment, sales, and value added moved in different directions, we study all three.

[6] To avoid spurious results driven by firms moving across the size threshold between 1998 and 2003, we only use those firms that were above the threshold at the beginning of the period, i.e. in 1998.

In the analysis that follows, less financially constrained firms are called the reference group. To ensure the robustness of our analysis, we use different reference groups, that is, different ways of dividing out data into firms used to compute G_s and firms used to estimate model (1). Once again, firms allocated to the reference group are not used in the firm-level or commune-level regression analysis.

We use three possible ways of identifying less constrained firms: firm size; foreign ownership; and corporate status. Large firms are more likely to be able to draw financing from a broad geographical area. Consequently, for them the local availability of bank agencies is expected to be less important. In the analysis we investigate robustness by using two cut-off values: firms with more than 100 permanent employees in 1998 (our preferred measure); and firms with more than 50. Foreign firm are less likely to be constrained by local financial markets. We use two different cutoffs to identify foreign firms: firms with a 100% foreign ownership; and firms with more than 50% foreign ownership. Finally, using survey data on manufacturing firms in Morocco between 2000 and 2003, Simon Quinn (2009) has shown that corporations ("Société anonyme / SA") are less financially constrained than other types of firms. Based on this, we use corporate status as our third proxy for credit constraint.

Our preferred reference group is the group of firms with at least 100 employees. For this group we present in Appendix Table (17) the values of G_s calculated for each of the 17 two-digit ISIC sectors covered by the census and which have firms with at least 100 employees in 1998.[7] Figures are presented using value added, sales, and employment. We observe considerable variation across sectors. All sectors, except for three, experience an

[7]In addition to these 17 sectors, there is one sector "other light industries", in which no firm had more than 100 employees in 1998. This sector is excluded in the main analyses that use firms with more than 100 employees as reference group.

increase in value added. The evolution is similar in terms of output, with a 63% correlation between sectoral growth in value added and output. In contrast, in all sectors except one large firms reduced their total employment over the study period. The correlation between sectoral employment and value added is -0.43, suggesting that value added was increased in part by reducing employment. There is no correlation across sectors between employment growth and output growth.

We also present some summary information regarding firm entry and exit rates in the study population as a whole (Table 4). We see that entry and exit rates vary a lot across years. In general the rate of entry exceeds that of exit, resulting in a net increase in the number of firms. This pattern is nevertheless reversed in 1997, 1999, and 2000. Over the period 1995 to 2003, entries barely exceed exits.

	entry	exit
1995	7.7%	6.8%
1996	7.3%	4.0%
1997	6.7%	7.8%
1998	8.7%	4.4%
1999	3.7%	8.6%
2000	9.8%	14.6%
2001	18.4%	12.8%
2002	10.9%	10.3%
2003	11.3%	.
all years	9.3%	8.7%

Table 4: Entry and exit by year

3.3 Financial development

Local financial development is measured using information from the commune survey. The survey reports the number of bank agencies available in the commune in 1997. Descriptive

statistics for financial development variables, at the commune level, are presented in Table (5). We see that 46% of communes in the commune survey sample have no bank. We take this as our main measure of local financial availability: presumably, it is easier for a small or medium-size firm to obtain bank finance if a bank is present in their locality. Seeking credit from a bank agency in another commune is not only inconvenient, it is also more likely to fail given that the bank has less location-specific information to judge the validity of the credit application ex ante, or to monitor ex post. Our main measure of local financial development B_i is equal to 1 if there exists at least one bank in a commune, 0 otherwise.

variable	# obs	mean	std. dev.	median
at least one bank	366	0.538	0.499	
exactly one bank	366	0.134	0.341	
two banks	366	0.104	0.305	
three banks	366	0.063	0.243	
four banks or more	366	0.238	0.426	
# of banks per 1000 people	366	0.069	0.107	0.038
# of banks per hectare	364	0.004	0.010	0.0004

Table 5: Financial development: summary statistics at the commune level

As alternative measures of bank access, we combine information on bank agencies with data on population and land area per commune. This gives two alternative measures of bank availability: banks per capita, and banks per hectare. The first measure seeks to correct for possible congestion in obtaining bank finance: presumably bank staff are busier if there is a large population to serve, and consequently they may be more likely to reject application for funding. This measure, however, is non-linear: it is 0 for communes with no bank agency, jumps to a high positive value for communes with one bank but a low population, and typically falls for more densely populated communes. The second measure seeks to control for transaction costs in visiting the bank: other things being equal, it is easier for firm staff

to visit a bank if the density of bank agencies is higher. As indicated in Table (5), the numbers of banks per inhabitant or hectare show a great deal of variation across communes.

4 Econometric results

4.1 Baseline results for value added

We now turn to the econometric estimation. We begin by presenting estimates of our core model (1), using value added growth as dependent variable and the bank dummy as measure of local financial development B_i:

$$\Delta V_{fis} = \beta B_i G_s + \mu_i + \upsilon_s + e_{fis} \tag{1b}$$

The dependent variable ΔV_{fis} is constructed as $\log(value\,added)_{fis,2003} - \log(value\,added)_{fis,1998}$. It can therefore be interpreted as 1+ growth rate.

Results are presented in Table (6). The first column uses firms with more than 100 employees to calculate G_s. These firms are excluded from the estimation and only observations on manufacturing firms with at most 100 employees in 1998 are used to estimate the regression. Fixed effects are included for each sector υ_s and each commune μ_i. Robust standard errors are reported corrected for clustering at the sector $\times$ commune level. The coefficient of interest β is the coefficient of the $B_i G_s$ interaction term. If this coefficient is positive, it implies that firms in growing sectors grow more if they are located in communes with at least one bank agency. The effect is strongly significant and large in magnitude. In the first specification, the coefficient of $B_i G_s$ is about 3. This implies that, everything else

being equal, a firm in a sector in which large firms experienced, say, 8% growth, such as the garment sector, is predicted to have a value added growth that is 24 percentage points higher if it is located in a commune with at least one bank.[8]

One may be concerned about outliers driving the results, given the relatively small number of sectors for which we have data. Therefore we reestimated the first specification, each time omitting a different sector. The results are basically unchanged, with a parameter estimate for β of around 3, which is always highly statistically significant. So it is not the case that one sector is driving the results. Omitting the three sectors with negative value added growth G_s also does not affect the main result: in that case the parameter estimate for β is 2.920 with a standard error of 1.028 (and a p-value of 0.005).

In column 2 of Table (6) we repeat the analysis using firms with more than 50 employees to compute G_s. This means that only firms with 50 employees or less are used in the regression. We obtain similar results. In columns 3 and 4 we revert to the G_s measure used in column 1, but we restrict observations to firms with at most 50 employees (column 3) and at most 30 employees (column 4). Results are qualitatively similar. From this, we conclude that our results do not hinge seriously on the cut-off threshold used to separate the data in large and small firms.

Results reported in Table (6) are based on $\Delta V_{fis} = \log V_{fis,2003} - \log V_{fis,1998}$. This formulation offers the advantage of normalizing the dependent variable across firms of different size. But it has the drawback of losing observations with a negative value added in one of the two years. To investigate whether our results are sensitive to this loss, we reestimate all

[8] The sample mean of $B_{it}G_s$ taken over all observations in the data is about 0.08 (the median is approximately 0.10). The mean of G_s is very similar (also about 0.08), which is also the value added growth for large firms in the garment sector (see Table 17).

Dependent variable: growth of value added				
Reference group[a]	≥ 100	≥ 50	≥ 100	≥ 100
Sample[a]	< 100	< 50	< 50	< 30
	1998-2003 period			
	(1)	(2)	(3)	(4)
$B_i G_s$	3.040	3.654	3.911	2.756
	(1.117)***	(1.444)***	(1.322)***	(0.756)***
Sector fixed effects	yes	yes	yes	yes
Commune fixed effects	yes	yes	yes	yes
Number of observations	2,822	2,432	2,421	2,008
R^2	0.11	0.12	0.12	0.13
	1995-2003 period			
	(5)	(6)	(7)	(8)
$B_i G_s$	1.673	1.798	2.030	0.628
	(0.694)***	(1.160)	(0.987)**	(1.413)
Sector fixed effects	yes	yes	yes	yes
Commune fixed effects	yes	yes	yes	yes
Number of observations	2,180	1,841	1,841	1,530
	0.10	0.12	0.12	0.13

Robust standard errors in parentheses, with clustering by sector $\times$ commune
* significant at 10%; ** significant at 5%; *** significant at 1%
a based on 1998 employees

Table 6: Baseline results

four regressions using $\Delta V_{fis} = V_{fis,2003} - V_{fis,1998}$ as dependent variable. Robust standard errors are used as before. Results, not shown here to save space, are basically identical: β is large and significant in all four regressions.

As we have seen in Section 3, the 1998-2003 period was marked by a contraction in employment for those firms that were in existence in 1998. In contrast the 1995-98 was a period of rapid growth. We are concerned that our results may be specific to periods of economic contraction for pre-existing firms. To check whether this may be the case, we reestimate model (1b) using firm data covering the 1995 to 2003 period. The results are presented in the second panel of Table (6). They are qualitatively similar to those for the

shorter 1998-2003 period, albeit estimated coefficients tend be smaller in magnitude and less statistically significant.

Next, we reestimate model (1b) using foreign owned firms to identify less constrained firms when computing G_s. Results, not shown here to save space, are generally less significant. We note, however, that many firms listed as foreign owned are quite small[9], and thereby unlikely to access funding outside Morocco. Furthermore, there are few foreign owned firms in some sectors. Consequently growth opportunity estimates in those sectors are imprecise. These factors probably combine to yield non-significant results.

Results obtained using corporate firms to calculate G_s are stronger (results not shown). They are large in magnitude and significant at the 5% level when using either all non-corporate firms as observations, or only those non-corporate firms with fewer than 50 employees.

We conduct a number of other robustness checks. We reestimate model (1b) without sectors that have few observations and hence imprecisely estimated G_s. Results, not shown here to save space, are, if anything, stronger. Next we drop all large sectors, in case banks respond to growth opportunities in large, visible sectors. Results are basically unchanged: $\beta = 3.6$ and is significant at the 1% level. This means that earlier results are not simply driven by what happens in a few large sectors.

Adding additional controls for the level of development Next, we investigate whether bank availability in a commune proxies for other commune characteristics that we

[9] At the median, fully foreign owned firms have 60 employees in 1998, and a quarter of fully foreign owned firms have less than 20 employees. Among firms that have at least 50% foreign ownership, the median number of employees is 70 in 1998.

may be picking up with our bank variable, such as some general level of (formal) development that prevails in a commune. To this end we use additional information about the level of development in commune i in 1994. In particular, we use the poverty headcount ($Poverty$) and the (log) average household expenditure ($LogExp$) as direct measures of levels of development, data which we obtain from a spatially disaggregated estimation of poverty that is described and published in Royaume de Maroc (2004). Other more indirect measure of development are based on the World Bank community survey, namely the (log) distance to the district center ($logdist$) and an indicator function $SecSchool$ that is one if a commune has at least one public or private secondary school and zero otherwise. Recall that the level of development is captured through the commune fixed effects, therefore we only have to include the interaction terms of those variables with the growth opportunity measure G_s. Results are in the following table 7. Column 1 repeats the baseline analysis. Column 2 adds the interactions of G_s with poverty and the log of expenditure per capita, as well as the indicator for whether a secondary school exists. Column 3 omits the key interaction term of interest, B_iG_s, column 4 omits the poverty measure (because poverty and average expenditure are presumably highly correlated). We do not find anything significant in those additional interactions. Column 5 also adds the initial value added of the enterprise, as well as an interaction of that initial value with bank presence. Column 6 adds the distance to the district center as a possible proxy for development and remoteness (before taking the log we add 1 km so that we do not lose observations in the district center itself). Column 7 provides an alternative approach to clustering the standard errors, namely a two-way clustering at the commune and sector level (as opposed to the commune x sector level), following Cameron et al. (2010). The results are very robust. It is therefore improbable that B_iG_s simply captures

a formal development effect.[10]

Dependent variable: growth of value added							
							two way clustering
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$B_i G_s$	3.040	3.898			3.224	3.275	3.275
	(1.166)***	(1.364)***			(1.157)***	(1.156)***	(1.316)***
$\text{Poverty}_i G_s$		-2.791	-1.327		-1.299	-0.762	-0.762
		(2.963)	(2.868)		(3.059)	(3.290)	(0.825)
$\text{LogExp}_i G_s$		-1.056	-0.215	0.041	-0.698	-0.551	-0.551
		(0.764)	(0.692)	(0.438)	(0.674)	(0.749)	(0.602)
$\text{SecSchool}_i G_s$		-0.682	2.060	1.977	-1.638	-1.649	-1.649
		(1.476)	(1.586)	(1.517)	(1.172)	(1.161)	(1.634)
$\log(\text{vad}_{1998})$					-0.504	-0.505	-0.505
					(0.160)***	(0.160)***	(0.157)***
$B_i \log(\text{vad}_{1998})$					0.270	0.270	0.270
					(0.161)*	(0.161)*	(0.165)*
$\text{LogDist}_i G_s$						0.057	0.057
						(0.151)	(0.214)
sector FE	yes	yes	yes	yes	yes	yes	yes
commune FE	yes	yes	yes	yes	yes	yes	yes
Observations	2822	2822	2822	2822	2822	2822	2822
R-squared	0.11	0.11	0.11	0.11	0.20	0.20	
Robust standard errors in parentheses							
* significant at 10%; ** significant at 5%; *** significant at 1%							

Table 7: Robustness: other controls for level of economic development

In our next set of robustness checks, we examine whether results change if, for B_i, we replace the bank dummy with more detailed information about financial development, such as the number of banks per capita C_{it} or per hectare H_{it}. Because both C_{it} and H_{it} are highly skewed, we take their logarithm to reduce heteroskedasticity. To avoid losing all communes with no bank, we define $B_i = \log(C_{it} + \varepsilon)$ or $\log(H_{it} + \varepsilon')$ where ε and ε' are approximately half of the smallest observed non-zero value in the data.[11]

[10] In results not shown, we have also investigated robustness to the inclusion of other sector-level measures, such as capital growth or capital intensity. The results are robust to including those measures.

[11] ε =0.004 in the case of bank agencies per capita, and ε =0.0005 in the case of bank agencies per hectare.

To allow for other forms of non-linearities we also use indicator functions for different parts of the distribution of the absolute number of banks, the banks per capita and the banks per hectare distributions. To generate those dummy variables we use cut-offs that are roughly the 25th and 75th percentile of the locations that have at least one bank. $Q1$ is quartile 1 of the distribution, $Q23$ is quartile 2 and 3 of the distribution, $Q4$ is quartile 4 of the distribution, B_Q1 means Quartile 1 of the banks distribution (if at least one bank), Bpc_Q1 means quartile 1 of the banks per capita distribution, $Bpha\_Q1$ means quartile 1 of the log(banks per hectare) distribution. For the absolute number of banks, for example, these numbers are 2 and 7. Results are shown in Table (8). We see that the coefficients of financial development $\times$ growth opportunity remain positive and, in most cases, significant. The least significant results are obtained using $B_i = \log(C_{it} + \varepsilon)$ (see column 3), in which case β is only marginally significant (p-value is 0.12).

Dependent variable: growth of value added						
Reference group	≥ 100	≥ 50	≥ 100	≥ 100	≥ 100	≥ 100
	(1)	(2)	(3)	(4)	(5)	(6)
B_Q1$_i$× G$_s$	2.694	3.491				
	(1.353)**	(1.551)**				
B_Q23$_i$×G$_s$	3.175	3.983				
	(1.210)***	(1.371)***				
B_Q4$_i$×G$_s$	3.016	3.904				
	(1.166)***	(1.322)***				
log(bankspc$_{it}$+0.0004) × G$_s$			0.281			
			(0.181)			
Bpc_Q1$_i$ × G$_s$				3.234		
				(1.191)***		
Bpc_Q23$_i$×G$_s$				2.962		
				(1.172)**		
Bpc_Q4×G$_s$				2.946		
				(1.178)**		
log(bankspha$_{it}$+0.0004) × G$_s$					0.184	
					(0.109)*	
Bpha_Q1$_i$ × G$_s$						3.380
						(1.297)***
Bpha_Q23$_i$ × G$_s$						2.928
						(1.205)**
Bpha_Q4$_i$ × G$_s$						2.972
						(1.201)**
sector FE	yes	yes	yes	yes	yes	yes
commune FE	yes	yes	yes	yes	yes	yes
Observations	2822	2421	2822	2822	2816	2816
R-squared	0.11	0.12	0.11	0.11	0.11	0.11
Robust standard errors in parentheses						
* significant at 10%; ** significant at 5%; *** significant at 1%						

Table 8: Robustness: other indicators for local financial development

We also reestimate Table (6) using the growth of sales among large firms as indicator of growth opportunities G_s. Once again, results are very similar to the results that we obtain when value added is used to measure growth opportunities, albeit slightly weaker. To summarize, the data show a strong and very robust positive effect of $B_i G_s$ on the growth of

firms.[12]

4.2 Measurement error in the estimates of growth opportunity

In a series of recent papers Ciccone and Papaioannou (2006, 2007, 2010) have pointed out a possible source of non-classical measurement error in the literature that uses country-industry interactions. In our case, the corresponding concern is that our measure of growth opportunities is based on large firms, which are mostly based in communes with banks. Thus, the proxy of growth opportunities can reasonably be expected to be a better proxy of growth opportunities in communes with banks than those without banks. This in turn may lead us to overestimate the effect of bank availability on firm growth. The usual situation involves identifying a benchmark country (typically the US) which is assumed to be unconstrained in some respect and the solution proposed by Ciccone and Papaioannou (2006, 2007, 2010) starts from this setup. However, our setup does not identify one location (here: one commune) that can be considered unconstrained, but rather uses a subset of firms in each location (commune) to identify a set of firms that can be used to estimate growth opportunities. Therefore, to deal with the above mentioned measurement issue, we propose three different solutions. In addition, note that we have shown above (table 7) that adding firm size and an interaction term of firm size with bank presence to the controls, which should capture some of the effect that is due to differences in firm size more directly, does not affect

[12] We also used the strategy employed by Guiso et al. (2004) whereby, instead of interacting local financial development with growth opportunities, we interact local financial development with firm size. The underlying assumption is that larger firm rely less on external finance than smaller firms. If the interaction term has a negative coefficient, this is interpreted as suggesting that local financial development matters. In results not shown, we do not find anything significant using this strategy, possibly because local financial development at the geographically very disaggregated level that we investigate has little or no effect on firm growth when growth opportunities are absent.

the central findings in a significant way. The first solution that we propose acknowledges the problem that most large firms are based in communes with banks and therefore we reestimate growth opportunities just based on communes with no or very few banks. The second solution, then, is more in the spirit of Ciccone and Papaioannou (e.g. 2007) in that it uses an IV-strategy based on within-Morocco variation. Finally, we also implement an IV-strategy using the established benchmark dataset of growth opportunities in Fisman and Love (2007) to instrument for the proxy that we construct from Morocco.

1. Estimating growth opportunities just based on communes with no or very few banks: The measurement concern arises because growth opportunities are measured using the growth of (initially) large firms and those are concentrated in locations that have more than one banks, in fact most are based in locations that have several banks. One response might be to drop all the large firms in locations with many banks and estimate growth opportunities only using firms in locations with no banks. However, there are not enough observations to estimate growth opportunities precisely for the majority of sectors. The approach chosen here is therefore to estimate growth opportunities using firms that are located in communes with few banks, where "few banks" is defined as "2 or fewer banks", "6 or fewer", and "10 or fewer", respectively. Otherwise, estimation proceeds as before. The results are shown in table 9. The coefficient on the interaction of bank presence x growth opportunities is smaller, but still statistically significant. Note that the smaller coefficient is consistent with the upward bias that Ciccone and Papaioannou (e.g. 2007) suggests in the presence of non-classical measurement error. In addition, our particular solution here bases the proxy for growth opportunities on fewer observations (only communes with few banks),

so that classical measurement error might also play a role, which leads to an attenuation bias.

Column 4 also adds additional development controls, to show that the results are robust.

Dependent variable: growth of value added				
banks cutoff used for calculating G_s	≤ 2	≤ 6	≤ 10	≤ 10
	(1)	(2)	(3)	(4)
$B_i G_s^2$	0.701			
	(0.416)*			
$B_i G_s^6$		1.135		
		(0.606)*		
$B_i G_s^{10}$			2.673	1.921
			(0.924)***	(0.686)***
$\log(\text{vad}_{1998})$				-0.504
				(0.161)***
$B_i \times \log(\text{vad}_{1998})$				0.270
				(0.162)*
$\log(\text{avexp}) \times G_s$				-0.285
				(0.473)
sector FE	yes	yes	yes	yes
commune FE	yes	yes	yes	yes
Observations	2618	2822	2822	2822
R-squared	0.11	0.11	0.11	0.20
Robust standard errors in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%				

Table 9: Dealing with measurement error: using communes with few banks

2. Instrumenting growth opportunities based on many-bank communes with data from few-bank communes: As indicated above, a direct application of the Ciccone and Papaioannou (e.g. 2007) approach is not feasible in our situation. However, we can exploit the fact that we have firm-level data to identify a subset of firms in each location that we consider to be (at least) less constrained, namely the large firms. This allows us to estimate proxies for growth opportunities in diverse locations, which in turn can be exploited for an instrumental variables strategy. More specifically, we start from the assumption that measuring growth opportunities using growth of large firms in locations with many banks, $G_s^{many\_banks}$, is a good proxy for growth opportunities in Morocco generally, albeit one measured with error as explained above. In addition, we exploit the fact that there is a strong positive correlation between $G_s^{many\_banks}$ and the sector-level growth of large firms in locations with few banks, $G_s^{few\_banks}$. If we then assume that the unobserved part of firm growth in the baseline regression that uses $G_s^{many\_banks}$ instead of G_s is uncorrelated with $G_s^{few\_banks}$ we can use $G_s^{few\_banks}$, as an instrument for $G_s^{many\_banks}$. This assumption seems justified, as the measurement error that is specific to the type of commune, i.e. those with high and those with low level of financial development, should be uncorrelated. Note that we control for commune dummies in our regressions, such that commune-level shocks that are specific to communes with many or few banks, respectively, are controlled for.

The results are shown in columns 1-4 of table 10. Column 1 is an OLS regression in which $G_s^{many\_banks}$ is used instead of G_s, this can be seen as the baseline for the IV regressions in columns 2-4. Columns 2 and 3 use communes with less than 30 banks and communes with less than 10 banks, respectively, to estimate $G_s^{few\_banks}$. Column 4 combines this IV approach with the approach in which initial size (where size is measured as value added) and initial size

are interacted with the bank presence indicator function. Here, we also add the interaction of B_i with the log(expenditure per capita) variable as a control for economic development. Although we lose some statistical significance, results are robust.

Dependent variable: growth of value added						
	instrument G_s^{30} (measured in communes with ≥ 30 banks) with data from few-banks comm.				instrument G_s using G_s^{FL} (Fisman & Love measure of growth opportunities)	OLS with G_s^{FL}
	baseline OLS	instrumental variables				
banks cutoff used for calculating IV	-	<30	<10	<10	-	-
	(1)	(2)	(3)	(4)	(5)	(6)
$B_i G_s^{30}$	0.654	1.505	1.562	1.202		
	(0.346)*	(0.826)*	(0.781)**	(0.659)*		
$B_i G_s$					2.791	
					(1.400)**	
$B_i G_s^{FL}$						15.432
						(7.009)**
$\log(\text{vad}_{1998})$				-0.445		
				(0.164)***		
$B_i \times \log(\text{vad}_{1998})$				0.209		
				(0.165)		
$\log(\text{avexp}) \times G_s$				-0.479		
				(0.529)		
sector FE	yes	yes	yes	yes	yes	yes
commune FE	yes	yes	yes	yes	yes	yes
Observations	2803	2803	2803	2803	2822	2822
R-squared	0.11	0.11	0.11	0.20	0.11	0.11
Robust standard errors in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%						

Table 10: Dealing with measurement error: instrumental variables estimates

3. Instrumenting using the Fisman and Love (2007) growth opportunities benchmark: As a final way to address the concern about measurement error in our estimate of G_s, we use the measures of growth opportunities that are reported in Fisman and Love (2007), which refer to industries in the US. There are likely important differences between US and Morocco in the types of products that are produced within each sector, which may induce differences in growth opportunities, which in our view makes a measure based on Moroccan data attractive. However, to the extent that these growth opportunities are correlated and shocks to sector-level growth opportunities in Morocco and the US are uncorrelated, the US-measures can be used as instruments.[13] The result is shown in table 10, column 5. Again we find that results are quite robust. Finally, one could simply use the Fisman and Love (2007) growth opportunities proxy directly, the result is shown in column 6, which shows the robustness of the central result (note that the unit of the Fisman and Love measure is different, therefore the magnitude of the coefficient of column 6 is not directly comparable to previous columns).

Another concern is due to the following possibility: Large firms are concentrated in larger communes and those are the ones most likely to have a bank branch. If at the same time there are strong within-industry linkages at the local level, then the bank presence indicator might capture the indirect effect of large firms' demand for intermediate inputs. Unfortunately, we do not have information about the commune-sector level trade. However, from a country-level input-output table (Bussolo and Roland-Holst 1993) we can infer that few industries have significant within-industry trade activities. In particular, there are only three sectors

[13]Note that the Moroccan manufacturing census uses industry codes that are different from the standard SIC codes and therefore we need to aggregate the numbers from the literature somewhat.

(leather, paper and printing, transport equipment) which have at the aggregate level more than 10% within industry trade. Omitting those sectors, for which the concern raised above is most likely to apply, does not change the results in important ways.

4.3 Employment, output, and labor costs

We have seen that, over the study period, access to banks is associated with faster growth for small and medium-size firms in growth sectors. The question is then: How do firms achieve higher value added growth?

We have seen in Section 2 that the study period corresponds to a time of slow growth in manufacturing output for pre-existing firms. Given this, it may seem a priori strange that access to external finance matters: after all, if production is contracting, firms do not need funds to expand production. External finance may nevertheless matter if firms must invest to remain competitive internationally to reduce labor cost by increasing output per worker.

To investigate this issue, we begin by reestimating model (1b) using investment in lieu of value added as dependent variable. More precisely, let Δy_{fis} be cumulative 1998-2003 investment divided by 1998 output. Regression results are presented in Table (11). In column 1 G_s is calculated using all firms with 100 employees or more. Results show a significant β coefficient, suggesting that access to credit was critical for investment. Similar results are reported in column 2 using firm with 50 or more employees to compute G_s. The magnitude of the estimated β is the same, but it is only borderline significant (with a p-value of 0.103), perhaps because of the reduction in sample size: in column 2 all firms with 50 to 100 permanent employees in 1998 are omitted since they enter into the calculation of G_s.

They also are the firms most likely to qualify for bank credit. Dropping them leaves too many small firms for which access to investment finance is likely to be more problematic irrespective of the presence of a bank, hence the loss in significance.

Dependent variable:	total investment 1998 -2003 as a share of output in 1998	total investment 1998 -2003 as a share of output in 1998
Reference group	≥ 100 (in 1998)	≥ 50
Sample	< 100 (in 1998)	< 50
$B_i G_s$	4.285	4.735
	(1.892)**	(2.902)
Sector FE	yes	yes
Commune FE	yes	yes
# of obs	3,011	2,599
R^2	0.04	0.06
Robust standard errors in parentheses, corrected for pooling at the sector × commune level * significant at 10%; ** significant at 5%; *** significant at 1%		

Table 11: Dependent Variable: cumulative investment / investment per year, relative to output in initial year

The question that arises then is: what was the investment used for? To investigate this, we estimate model (1b) using output and employment as dependent variables. Results are shown in Table (12). As in Table (11), column 1 computes G_s using firms with more than 100 employees; column 2 uses firms with 50 employees or more. We see that access to credit is associated with a significant increase in output and employment, although the effect is noticeably larger in magnitude and more statistically significant for output than it is for employment. Results are similar whether we use 100 or 50 as cutoff firm size for the calculation of G_s.

Coefficient estimates should be interpreted in the same way as in section (4.1) where value added was the dependent variable. Let us use the garment sector again to illustrate. Growth in the reference group was 8%. The coefficient estimate of 0.87 in column 1 implies

that, everything else being equal, employment growth in a pre-existing garment firm was on average $0.87 * 8\% \simeq 7$ percentage points larger if the commune has a bank.

Dependent variable	Employment growth 1998-2003 (1)	Employment growth 1998-2003 (2)	Output growth 1998-2003 (3)	Output growth 1998-2003 (4)
$B_i G_s(> 100)$	0.883		1.678	
	(0.455)*		(0.796)**	
$B_i G_s(> 50)$		1.050		2.743
		(0.623)*		(0.873)***
Sector FE	yes	yes	yes	yes
Commune FE	yes	yes	yes	yes
# of obs	3,012	2,600	3,011	2,599
R^2	0.11	0.12	0.09	0.10
Robust standard errors in parentheses, with clustering by sector × commune * significant at 10%; ** significant at 5%; *** significant at 1%				

Table 12: Dependent variables: employment and output growth

Results so far suggest that investment was used to expand output and employment. To investigate this more closely, we estimate (1) using output per worker, wage per worker, and wage per output as dependent variable. If investment was used to increase labor productivity, we expect output per worker to increase. If this labor productivity increase served to reduce costs, we expect wage per worker to increase less than output – or remain constant – so that wage per output falls.

This is indeed what we find. Regression results presented in the first two columns of Table (13) indicate that output per worker increased more for firms with access to credit, irrespective of the cutoff value used for G_s. At the same time, wages per worker did not increase significantly while wage per output fell (albeit only significantly so in one of the two regressions).

Yet another way of economizing on labor is to replace permanent workers with casuals,

Dependent variable	Output per employee growth 1998-2003 (1)	Output per employee growth 1998-2003 (2)	Wage per employee growth 1998-2003 (3)	Wage per employee growth 1998-2003 (4)	Wage per output growth 1998-2003 (5)	Wage per output growth 1998-2003 (6)
$B_iG_s(>100)$	0.798		0.321		-0.476	
	(0.478)*		(0.273)		(0.459)	
$B_iG_s(>50)$		1.700		0.041		-1.659
		(0.659)***		(0.503)		(0.426)***
Sector FE	yes	yes	yes	yes	yes	yes
Commune FE	yes	yes	yes	yes	yes	yes
# of obs	3,011	2,599	3,011	2,599	3,011	2,599
R^2	0.08	0.09	0.09	0.09	0.07	0.09
Robust standard errors in parentheses, corrected for pooling at the sector × commune level * significant at 10%; ** significant at 5%; *** significant at 1%						

Table 13: Growth of output per worker, wage per worker, wage per output

who typically in Morocco receive fewer benefits. To investigate this possibility, we compute the share of permanent workers in total firm employment.[14] Over the study period, this ratio increased slightly for surviving firms – from 0.93 to 0.96 – as would happen when firms reduce employment by shedding casual workers. But when we regress the change in this ratio on G_sB_i as before, we find a negative effect, suggesting that firms with access to finance reduced the proportion of casuals in their labor force less.[15] This effect is significant only when the 100 employee cutoff is used for G_s, i.e., when firms with 50 to 100 employees are used in the regression. This suggest that it is those medium-sized firms that retained casuals thanks to better access to finance. This probably contributed to economizing on the cost of labor.

Taken together, the evidence suggests that, over the study period, access to credit was used by pre-existing Moroccan firms to mobilize investment funds with some evidence that

[14]Recall that total firm employment includes the labor supplied by casuals. Not all firms use casual workers.

[15]Regression results are not shown here to save space.

they were partly used towards reducing labor costs.

4.4 Commune level analysis

The analysis conducted so far has focused on firms that were present in 1998 and persisted until 2003. While it is instructive, this analysis ignores the potential effect of credit availability on the entry and exit of firms. If credit is more readily available, firms may find it easier to enter. In contrast, if credit is tight and the economic climate is weak, firms may exit because they are unable to overcome short-term liquidity problems.

To investigate these issues, we turn to the second part of our regression analysis which focuses on communes as the unit of analysis. The model we estimate is of the form:

$$\Delta y_{is} = \gamma B_i G_s + \mu_i + \upsilon_s + e_{is}$$

where Δy_{is} is now the number of entry and exit, or the growth of value added, output or employment, depending on the regression.

We begin by examining firm entry and exit. Since G_s is calculated using firms with more than the cutoff number of employees, we only consider entry and exit of firms with less than the cutoff. Sector and commune fixed effects are included, as before, but standard errors are no longer clustered at the sector $\times$ commune level since the commune is the unit of analysis.[16]

Regression results, with G_s calculated using a 100 employee cutoff, are reported in Table

[16]Note that in the previous analyses firms that only appear after 1998 and/or disappear before 2003 do not enter the firm-level data sets. For the study of entry and exit however, we also include firms that entered and/or exited between 1998 and 2003.

(14) together with robust standard errors.

The first three columns refer to exit. Column 1, estimated with an OLS regression shows the baseline results. Because exit (as well as entry) are non-negative count variables, we also estimate a Poisson model (column 2), column 3 uses the exit rate instead of the number of exited firms as dependent variable. In all three specifications, we observe less firm exit in sectors that are growing faster in communes with easier access to banks: In column 1, $\widehat{\beta}$ is equal to -1.8 and significant at the 5% level.

For firm entry (columns 4-6), the estimated β coefficient is positive as anticipated, but it is statistically significant only for the Poisson model and the entry rate (note that the entry rate is not defined for commune-sectors that do not contain firms in 1998). The net effect of entry and exit on the number of firms is shown in columns 7 and 8. Here we see that bank availability has a positive effect on the change in the net number of firms. Taken together, these results confirm the beneficial effect of access to finance on manufacturing, and they suggest that, for the period under consideration, much of the effect comes from reduced exit. This suggests that the main role of banks during this period was to protect firms against liquidity shortages induced by increased competition.

Next we repeat the analysis with growth in value added, employment, and output. Communes with no manufacturing in any sector are omitted from the analysis. The results, reported in Table (15), confirm those reported for individual firms: sectors with growth opportunities at the national level grow faster in communes with more bank availability. This is true for value added, output, as well as employment. When we employ the IV-strategy that we introduced above to control for measurement error in G_s, we find smaller coefficients throughout, however, the results are still statistically significant for value added growth and

Dependent variable:	number of firms exited post 1998		exit rate: firms exited post 1998/ firms in 1998	number of new firms post 1998		entry rate: firms entered post 1998/ firms in 1998	net change in number of firms '98 - '03	growth-rate firms '98 - '03
	OLS	Poisson model	OLS	OLS	Poisson model	OLS		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
B_iG_s	-1.774	-1.234	-0.536	0.041	1.659	1.164	1.816	1.472
	(0.858)**	(0.654)*	(0.204)***	(1.437)	(0.848)*	(0.505)**	(1.007)*	(0.460)***
sector FE	yes	yes	yes	yes	yes	yes	yes	yes
comm. FE	yes	yes	yes	yes	yes	yes	yes	yes
Obs.	1414	1414	1414	1414	1414	1016	1414	1016
R-squared	0.44		0.35	0.35		0.38	0.33	0.41
Robust standard errors in parentheses								
* significant at 10%; ** significant at 5%; *** significant at 1%								

Table 14: Entry and exit - regressions at the commune x sector level

employment growth (columns 2, 4, and 6).

We note that the point estimates on B_iG_s in the employment growth regressions are larger than the ones in the output growth regressions at the commune-level, while at the firm-level (table 12) we found the opposite ordering. Overall, this suggests that output and employment growth are both affected, but we are unable to say whether one effect dominates the other.

Sector $\times$ commune observations with zero values in 1998 or 2003 naturally drop out of the regressions reported in Table (15) since the dependent variable is expressed as a growth rate. To investigate whether this affects inference, we reestimate the same regressions using the absolute change as the dependent variable instead of the growth rate.[17] Similar results obtain.[18] We also worry that omitting large firms from the regressions reported in Table

[17]For the purpose of this analysis a sector with no manufacturing activity recorded in a commune for 1998 or 2003 is coded as 0, if we have data from other sectors for this commune.

[18]Absolute changes, however, follow a very skewed distribution. To investigate whether results are driven

Dependent variable	value added growth (at comm x sector level)		output growth (at comm x sector level)		employment growth (at comm x sector level)	
		IV using growth based on <30 bank communes as instrument		IV using growth based on <30 bank communes as instrument		IV using growth based on <30 bank communes as instrument
	(1)	(2)	(3)	(4)	(5)	(6)
B_iG_s	7.096		2.799		3.629	
	(3.730)*		(1.479)*		(0.899)***	
$B_iG\_30_s$		2.750		0.914		1.742
		(1.597)*		(1.014)		(0.778)**
sector FE	yes	yes	yes	yes	yes	yes
commune FE	yes	yes	yes	yes	yes	yes
Observations	626	618	650	641	652	643
R-squared	0.42	0.42	0.43	0.43	0.46	0.46
Robust standard errors in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%						

Table 15: Regressions at the commune x sector level

(15) may bias the results. To verify this, we reestimate the model using all firms to compute value added, output and employment at the sector × commune level.[19] Results, not reported here to save space, are similar in magnitude and slightly more significant.

As a final robustness check, we investigate whether the effect of bank availability is stronger in communes with little manufacturing. We started the paper by arguing that bank availability is probably more important for small and medium size firms than for large firms who can obtain finance from a variety of sources. Is the same true at the commune level, i.e., is bank availability more important in locations that start small? We suspect it is because

by outliers we drop the upper 5% (or 10%) of the dependent variable and reestimate the model in with the remaining observations. When we do so, estimates of β remain positive but are all non-significant. This suggests that, in regressions in levels, findings are influenced by a small number of fast growing locations.

[19] We still use firms with 100 employees or more to calculate G_s for each sector at the national level.

alternatives to bank finance – such as supplier credit or equity finance through partnerships – are probably easier to find in locations with more intense industrial activity.

To investigate this possibility, we expand the estimated model to be of the form:

$$\Delta y_{is} = \gamma_0 B_i G_s + \gamma_1 B_i G_s y_{is,t-1} + \gamma_2 B_i y_{is,t-1} + \tau y_{is,t-1} + \mu_i + \upsilon_s + e_{is} \tag{3}$$

where $y_{is,t-1}$ is the value of y in sector s in commune i in 1998. We are interested in the coefficient γ_1 of the interaction term with $B_i G_s$. We include regressors $y_{is,t-1}$ and $B_i y_{is,t-1}$ as controls to avoid spurious results. If bank availability is more important for small sector $\times$ communes, we expect γ_1 to be negative: the beneficial effect of bank availability falls with $y_{is,t-1}$.

Results are reported in Table (16) for growth in value added, output, and employment. In all cases γ_1 is negative, significantly so for value added and employment. Similar results, albeit only significant for value added, are obtained if we use changes in levels instead of growth in the dependent variable. These results confirm that bank availability is critical not only for small and medium size firms, but also for less industrialized locations. To illustrate the magnitude of the effect, consider the estimate for $\widehat{\gamma}_1$ in column 1. For a sector with $G_s = 8\%$, e.g., garments, $\widehat{\gamma}_1 = -0.030$ means that the value added growth benefit from having a bank would be 2.4 percentage points lower in a commune at the 75th percentile of the value added distribution than in a commune at the 25th percentile.[20]

[20] Value added at the 75th percentile of value added in the sample that is underlying column 1 is roughly 11,000. The 25th percentile is roughly 1,000. Note that values are divided by 1000 in the regressions. Thus, for a sector with 8% growth of reference group firms, we have: at the 75th percentile: -0.030*0.08*11=-0.0264, and at the 25th percentile: -0.030*0.08*1=-0.0024. 0.0264-0.0024=0.024.

Dependent variable	value added growth (at the commune × sector level) (1)	output growth (at the commune × sector level) (2)	employment growth (at the commune × sector level) (3)
$B_i G_s$	6.189	2.315	3.510
	(3.079)**	(1.413)	(0.822)***
$B_i G_s V_{it}$	-0.030		
	(0.012)**		
$B_i V_{it}$	0.112		
	(0.033)***		
V_{it}	-0.118		
	(0.033)***		
$B_i G_s \times \text{output}_{it}$		-0.003	
		(0.003)	
$B_i \times \text{output}_{it}$		0.016	
		(0.004)***	
output_{it}		-0.017	
		(0.004)***	
$B_i G_s \times \text{employment}_{it}$			-2.093
			(0.843)**
$B_i \times \text{employment}_{it}$			2.609
			(1.773)
employment_{it}			-2.868
			(1.774)
Sector FE	yes	yes	yes
Commune FE	yes	yes	yes
# of obs	626	650	652
R^2	0.45	0.44	0.47
Robust standard errors in parentheses			
* significant at 10%; ** significant at 5%; *** significant at 1%			

Table 16: Regressions at the commune x sector level, including initial levels

5 Conclusion

In this paper we have combined data from the Moroccan census of manufacturing enterprises with information from a commune survey to examine whether firm expansion is affected by local bank availability. The five year period we study is characterized by a mild contraction in manufacturing employment among pre-existing firms, a feature that should be kept in mind when considering the external validity of our findings.

Results show that, in sectors that are growing faster and where growth opportunities are thus expected to be stronger, bank availability is robustly associated with faster firm growth and a lower likelihood of firm exit. We also find evidence that the effect of bank availability is more significant for medium size firms and in less industrialized communes. Taken together, these findings indicate that bank availability is more critical for certain firms and for locations and sectors at the onset of industrial development.

We also investigate the channels through which bank availability affects firm performance. We find that firms in a growing sector with a bank nearby are more likely to invest and hire workers. They also increase output per worker and reduce labor costs per unit of output. This suggests that, in our data and over the studied period, access to credit was used by firms to invest in labor saving technology so as to increase value added by reducing labor costs. These results confirm previous studies and refine earlier findings in various important directions.

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Appendix

sector	vad growth	emp growth	output growth
food processing (bakeries)	0.077	-0.459	0.102
other food processing	0.153	0.071	0.186
beverages and tobacco	-0.204	-0.095	-0.159
textile	0.016	-0.072	0.059
garment	0.089	-0.024	0.121
leather	0.268	-0.040	0.171
wood and wood products	0.336	-0.006	0.831
paper and printing	0.220	-0.145	0.237
metal transformation	0.170	-0.271	0.220
basic metal industries	-0.109	-0.292	0.039
metal products	0.141	-0.284	0.230
mecanical equipment	0.290	-0.304	0.056
transport equipment	0.010	-0.196	-0.187
electric and electronic	0.124	-0.044	0.037
office equipment	0.637	-1.454	0.344
chemical	0.065	-0.253	0.002
plastics and rubber	-0.325	-0.409	-0.006

Table 17: Growth of the large firms (>=100 employees) by sector