The Business Environment and Moroccan Firm Productivity

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Abstract

The paper focuses on the role of the business environment in understanding differences in the performance of Moroccan firms. We use both the Moroccan Annual Census (1997-2004) and detailed surveys conducted by the World Bank (FACS and ICA). The business environment is captured by measures which include the investment climate in which firms operate, i.e. access to credit, regulatory and institutional environment and infrastructure. Firm-level performance is measured by total factor productivity (TFP), which is estimated using both the classic technique of Olley & Pakes (1996), and a more recent approach suggested by Ackerberg et al. (2007). By using several strategies we address the problem of potential endogeneity between business indicators and firm performance. The evidence on the relationship between credit and productivity is strongly indicative of credit resources misallocation in Morocco. We also find that the lack of fiscal homogeneity across firms by sector is positively linked to lower firm-level TFP. Thirdly we find that, heavier bureaucracy and differences in regulations appear to have a negative effect on firm TFP. But these two last results are particularly relevant for small firms, and/or those that do not export and/or those with no access to foreign capital.

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1. Introduction

The relationship between the economic and institutional conditions which are present in a given country and growth is complex, but ultimately central to economic development. There is a widespread literature that focuses on these issues in the context of physical, institutional, or financial infrastructure; in the context of policies pursued be this with regard trade liberalisation, labour market reforms, or other domestic reforms; and in the context of cross-country analyses or those dealing with individual countries.

The present paper contributes to this literature and sheds light on the importance of features of the business environment, sometimes also referred to as the investment climate (e.g. Stern, 2002), for firm-level productivity in the context of Morocco. The issues we address centre on the "conditions" under which productivity improvements may be more likely to occur. Rather than using a cross-country panel database, we focus on a firm-level panel dataset for Morocco. Moreover, instead of establishing links between growth and the business environment as proxied by subjective and global measures, we are able to test more precisely correlates between firm-level performance and a range of objective variables capturing the key features of the business environment.

Central to economic growth is the change in the productivity of a given economy. That change in productivity can be driven by changes in technical or allocative efficiency. Hence the literature on trade liberalisation and growth identifies both changes in allocative efficiency driven by comparative advantage, or by intra-sectoral reallocation effects in the context of heterogeneous firms; as well as changes in technical efficiency which may arise from increases in competition, economies of scale, access to improved intermediates, technology transfer, as well as foreign direct investment[1]. A clear message which emerges from both the theoretical and empirical literature is that the impact of policies or the institutional environment on growth will depend on the impact on individual firms, and that in order to consider the firm level impact it is essential to consider the importance of firm level heterogeneity.

In this spirit there is now a considerable literature, for example, on the impact of trade liberalisation on firm level productivity (see for example, Pavcnik, 2002; Amiti et al., 2007; Blalock & Veloso, 2007; Fernandes, 2007; de Loecker, 2007; Topalova & Khandelwal, 2010); however the literature on the more specific role of the business and/or institutional environment in the context of firm heterogeneity is considerably smaller. Some of the literature focuses on labour market effects (Aterido, 2007); and several papers deal with the impact on firm "growth" which is typically measure in terms of sales or employment (Beck et al. 2005). Also much of the empirical literature either focuses on subjective measures of the environment in which firms operate; or has an aggregate focus typically based on cross-country regressions, and where a positive relationship between country-level indicators of business environment on GDP-based outcome variables is typically identified; though some more recent work provides a slightly more nuanced picture (see eg. Durlauf, Kourtellos & Tan, 2008).

There are comparatively few papers (Dollar et al., 2005; Van Biesebroeck, 2005; Hallward-Dreimeier, 2006; Fernandes, 2008; Goedhuys et al., 2010) which focus on the relationship between the business environment and productivity. This arises largely from the difficulties in obtaining appropriate data. From the theoretical point of view, the idea that the business environment could impact on output and productivity is primarily based on the capacity of these factors to create incentives to invest. These incentives operate at the level of the firm, where there is likely to be a differential impact by firm, which will in turn depend on a myriad of interdependent factors – industry, size, location within the country etc. Hence in order to understand the role of the business environment and its possible impact on productivity it is important to consider this at the firm level where (a) the heterogeneity between firms can be captured, and (b) the possible interdependence between some of the conditions can be explored. Microeconomic data are in principle better suited for such analyses of productivity growth, are better able to capture possible obstacles to firm performance, and are thus more likely to shed light on the key policy implications.

Relevant recent studies in this vein include Dollar et al. (2005) who consider Bangladesh, China, India and Pakistan and point to the negative role of power outages, customs delays and access to finance on firm-level performance. An important result of their paper is that the empirical link between the investment climate indicators and firm performance is robust to the inclusion of country dummies, confirming that the business environment is not constant within a country, and emphasising the need to use firm-level data. Similarly, Fernandes (2008) focuses on Bangladesh and examines the relationship between TFP and business environment indicators. By using protection payments as proxy for criminal activity, she finds that firms with lower TFP are those making larger protection payments. Her main result is to show the negative effect of crime and corruption on firm performance TFP. She also discusses the positive correlation of TFP with access to short term credit proxied by overdraft facilities, but the negative correlation with longer term financing needs proxied by loan facilities. However, it is important to point out these results are not statistically significant. For China, Hallward-Driemer et al. (2006) show that ownership and investment climate measures matter for the investment rate, TFP and sales growth. In particular, light regulatory burdens, limited corruption, technological infrastructure and labour market flexibility appear to have a positive impact on firm performance, while gains from improved access to banking and physical infrastructure are quite limited. The paper of Asaftei et al. (2008) underlines the importance of market structure and soft budget constraints in ensuring that privatization improves firm productivity in Romania. Eifert et al. (2008) in analysing 17 poor African countries show that productivity is inversely linked to the cost and importance of indirect inputs, related to infrastructure and public services, in production. Finally Gatti and Love (2008) show that improved access to credit impacts positively on the productivity of Bulgarian firms while, as does Goedhuys et al. (2010) , who focus on labour productivity, for Tanzania. Moreno-Badia and Slootmaekers (2009), admittedly with a different methodology, do not confirm this relationship for Estonian firms.

This paper contributes to this literature by providing correlates of key features of the business environment with firm-level productivity in Morocco. Our data allows us to explore a number of

these features, which include the investment, regulatory and institutional climate within which firms operate, as well as the credit facilities and positions of the firms. There are few studies, which focus on productivity in the southern Mediterranean countries and this is primarily due to problems of data availability. However, these countries' experience is a priori interesting as during the last fifteen years they have engaged in major changes and reforms - both domestically and with regard to their trade policy. Morocco is a case in point with reforms with respect to labor law, competition policy, infrastructure, intellectual property, education, gender, the financial sector and transportation, as well as openness to international trade.[2] This openness has taken place both multilaterally, Morocco being a member of WTO since 1995, and through a series of regional or bilateral agreements.[3] In this context, it is important from a policy perspective, to isolate which indicators of business environment impact on firm-level productivity and in particular on any possible impediments.

Our empirical analysis focuses on two main areas related to the business environment. First, we consider the importance of firm-level access to credit, as this is an issue frequently discussed in the literature as impacting on firms' abilities to invest and hence increase their productivity. Here, and perhaps counter-intuitively we find a negative relationship between financial indicators (the loan amount and the share of firms' needs financed by bank loan) and firm-level TFP. Secondly, we consider more broadly the relationship between firm level productivity and the business environment or climate, where we focus on bureaucracy and regulatory issues (such as the number of permits firms are required to have for their business or the presence of differences in taxation between firms in a same sector) and on infrastructure issues (such as water supply outages). We find that lack of symmetry in the treatment of firms for tax purposes by sector is negatively linked to higher firm TFP, possibly because uncertainty over tax treatment may create disincentives to invest and improve firm performance. Thirdly, heavier bureaucracy and differences in regulations, proxied by the number of permits needed each year to operate, are also negatively correlated with firm-level TFP. We show that these business and regulatory issues essentially bear upon specific firms, i.e. small size or no-exporters or without foreign capital.

The paper is structured as follows: Section 2 describes the data and the methodology for TFP estimation. In section 3 we detail the econometric model used in our empirical analysis. The results are presented in section 4. The final section concludes.

2. Data and firm performance measures

2.1 Data description

The data used in this paper derive from two sources: the Moroccan Annual Census, and detailed surveys conducted by the World Bank. The Moroccan Annual Census of Manufacturing covers the period 1997-2004. This Annual Census covers all manufacturing firms with no size limitation. It contains information on sales, value added, output, exportations, employment, date of creation, location, investment and 4-digit industry code using the Moroccan Nomenclature of Economic Activities (NMAE). For a subset of firms we also have access to three much more detailed datasets: (1) FACS which contains production data for the years 1998 and 1999 (with some data for 1997) and business environment data for 1998, (2) ICA-2004[4] which contains production data for three years 2000, 2001, 2002 and business environment data for 2000 and (3) ICA-2007 which contains production and business environment data for 2002 and 2005.[5] The firms included in FACS, ICA-2004 or ICA-2007 are all contained in the Census.

The FACS and ICA surveys cover food, textiles, garment, leather, chemicals, wood & paper including publishing, rubber & plastics, metals & mechanical and electrical & electronic industries. The surveys include firm location with seven distinct geographical areas identified.[6] The data contains considerable detail on production variables, firm characteristics and features of the business environment. We use 2-digit NMAE production price index and investment price index to deflate production, value-added, and investment.[7]

The capital stock is available only for years 1997, 1998, 1999, 2000, 2001, 2002 and 2005 in the FACS and ICA databases and for 2003-2004 in the Census. To obtain the stock of capital for the remaining years of the sample, we use the available data on investment and apply the perpetual inventory method taking a depreciation rate of physical capital of 5%. After cleaning of the dataset we end up with an unbalanced panel containing 35,534 observations and 6,119 firms.[8] Each firm appears in the sample for at least three consecutive years and at most 9 years.

2.2 Measure of firm performance

We obtain consistent estimates of TFP at the firm level in the presence of endogenous input choices and selection issues using investment as a proxy for unobservable firm productivity. We employ both the semi-parametric method developed by Olley and Pakes (1996, henceforth OP), as well as the improvements suggested by Ackerberg, Caves and Frazer (2007, henceforth ACF). Following the semi-parametric method, we estimate a Cobb-Douglas production function by industry. The estimating equation is given by:

$$y_{it} = \beta_l l_{it} + \beta_k k_{it} + \omega_{it} + \varepsilon_{it} \qquad (1)$$

Letting *i* denote the firm and *t* the year, all variables are in logarithms, y_{it} is value added, l_{it} is labor, k_{it} is capital, ω_{it} is productivity and ε_{it} is a mean-zero shock uncorrelated with input choices and unknown to the firm. Initially, the Olley and Pakes method, is based on the firm's profit maximization problem, where investment depends on two state variables: capital and productivity. Capital at *t* is obtained following the perpetual inventory method, where:

$$K_{it} = (1-d)K_{it-1} + I_{it-1} \qquad (2)$$

Thus, the capital will only be impacted by the expected value of productivity ω_{it} conditional on ω_{it-1}. The main recommendation of ACF is the timing of labor input choices. While in the Olley and Pakes method, labor is consider as a free variable input, in ACF the labor is assumed to be chosen in the sub-period *t-b* (0<b<1), after capital is known (at *t*-1), but before investment is chosen at *t*. Therefore, labor can also be affected by the expected value of productivity ω_{it} conditional on ω_{it-1}. The estimation procedure assumes that productivity follows a first-order Markov process. The key idea behind the timing of firm level labor force choices arises from the recognition of possible rigidities in the labor market. Table 2 gives the production function coefficients with OLS, OP and estimations in the spirit of ACF respectively. Here it is interesting to note that the ACF coefficients align much more closely with the OLS regressions than with the OP methodology. This is also consistent with Fernandes (2008), and suggests that the OP methodology may misspecify (typically overstate) the importance of capital in production.

3. Empirical analysis

We investigate the effects of the business environment on firm-level performance while taking into account firm characteristics and with a particular focus on firm-level involvement in international trade. Following on from the above we estimate the following two reduced-form regressions:

$$TFP_{ijlt} = \beta_0 + \beta_1 F_{ijl} + \beta_2 Z_{ijlt} + \eta_j + \eta_l + \eta_t + \varepsilon_{ijlt} \qquad (3)$$

$$TFP_{ijlt} = \beta_0 + \beta_1 BE_{jl} + \beta_2 Z_{ijlt} + \eta_j + \eta_l + \eta_t + \varepsilon_{ijlt} \qquad (3')$$

With *i*, *j*, *l* and *t* designating respectively the firm, the industry, the region, and the year. The dependant variable is firm performance measured by TFP using either the OP or ACF

methodology; η_j , η_l and η_t are industry, location and year fixed effects, respectively; ε_{ijlt} is an unobserved error term; Z_{ijlt} includes firm characteristics which are likely to influence firm performance: age, age squared, the share of exports and a dummy for foreign ownership. In equation (3), F_{ijl} represents financial data at firm level. In equation (3'), BE_{jlt} represents the other business environment indicators at industry and location level.

The FACS and ICA datasets contain widespread and detailed information on the business environment. We first select the key areas to focus on by exploiting information derived from firms' own perceptions as to the most crucial obstacles they faced. Here firms were asked to identify the key constraints they faced. The major obstacles identified by the firms were related to the cost of finance (80% of firms) and access to finance (77%). These are fairly common results found in other papers such as Van Biesebroeck (2005) and Beck (2005). Other key obstacles identified by firm were: levels of taxes and asymmetric tax treatment across firms (65%); difficulties in access to land and industrial sites (41%); the practice of competitors in the informal sector (38%); relations with fiscal authorities (35%); the court system and dispute resolution (29%); inflation and exchange rate fluctuations (26%); and the quality of the workforce (22%). Secondly, we selected key explanatory indicators partly on the basis of similar measures used in the emerging literature, and partly on the basis of the availability of data in both FACS and ICA for a sufficiently large number of firms, and while noting that within each theme there are generally several indicators with a potentially high degree of correlation.

We therefore explore the role of four key areas and their impact on productivity:

1. Finance: This is captured by seven different indicators: the interest rate on short term domestic debt (*Int rate ST*); and on long term domestic debt (*Int rate LT*); a

dummy variable for firms having obtained a loan (*Loan*); the amount of the obtained loan outstanding as a percentage of sales (*Loan amount*); a dummy indicating if the firm has an overdraft facility (*Overdraft*); the share of bank credit in firm financing need (*Loan funded*); and the share of self financing in firm financing need (*Self funded*).

2. To assess the issue of asymmetries in tax treatment, we use the percentage of firms declaring that the treatment is the same across all firms in the same sector (*Equivalent taxation*). To take into account the problem of the access of land, we use the number of days needed to obtain a construction-related permit and a dummy for firms locating in a free area (*Wait construction permit*).

3. Bureaucracy and regulatory environment is captured by the number of permits needed each year to operate (*Adm constraints*), and by the number of permits needed to create a firm (*Creation constraints*).

4. Finally, infrastructure is captured by the number of water outages in a typical month (*Water outages*).

While the data contains considerable information for each of these variables, the data is not consistently available for each firm and year. In order to maximize the data available to us we therefore follow an analogous methodology to that pursued elsewhere (Dollar, 2005; Fernandes, 2008; Aterido 2007). The finance variables are treated at the firm level where we include each firm for which we have the information for at least one year. These are therefore defined as time-invariant firm specific variables. Where the information is available for more than one period then these are defined as a firm-specific average. The business environment variables are measured as location-industry averages of firm-level

observations while excluding the individual firm's own responses (means and standard errors are presented in Table 1). In consequence the business environment in a specific industry *j* and location *l* is assumed to be common for all firms in a given industry *j* and location *l*, as well as being time invariant.

As discussed in Fernandes (2008) the lack of time variability prevents us from using firm-level fixed effects estimation, and exploring the impact of changes over time as well as impacting on the probability of finding significant coefficients. In common with the literature, this procedure then has implications for issues of potential endogeneity. It is therefore important to note that our results need to be treated with some caution, and should be interpretated more as correlates between productivity and the key variables of interest[9]. On the other hand the approach taken here has two distinct advantages. First, by choosing to use the industry-location means we significantly increase the number of observations in our data and importantly it allows us to integrate the Annual Census data with the FACS/ICA data. Previous comparable work is typically based only on ICA (or similar) surveys, which only represent sub-groups of firms with typically an over-representation by large firms more integrated into international world markets. The advantage of our approach is to include all firms from the Annual Census. Secondly, by using the location-industry averages minus individual firm's own responses we reduce the risk of endogeneity between the business environment and firm-level performance.[10] There is, of course, still the possibility of some endogeneity (see Dollar et al. 2005). This is because (a) we cannot exclude the possibility that more (or less) efficient firms tend to be concentrated in locations where the business environment is better (or worse), which for example may apply more to larger more mobile enterprises; (b) that firm performance in particular locations impacts on the business environment arising from pressure by firms on the local

authorities. In the presentation of the results we discuss, however, why endogeneity may not be significant to understanding our results.

Our empirical methodology is therefore to use OLS and random effects while controlling for potential unobserved factors which may affect the correlates of TFP and TFP itself. Hence all the regressions include industry, location and year fixed effects, as well as firm-level characteristics, such as age, age squared, export share, a dummy for foreign ownership as standard control variables. We test for the robustness of our results by running control regressions by groups of firms depending on size, export status and presence of foreign capital[11]. Also, given the large number of possible finance and business environment variables there is a potential problem of multicollinearity. We therefore estimate the regressions including a single business environment variable at a time along with our standard control variables. Given its importance to firms we first consider the role of finance, and then move on to consideration of other business environment variables. Finally, to test the robustness of our results, we use the two alternative measures of TFP outlined earlier, and we re-estimate our equations by groups of firms depending on their characteristics.

4. Empirical Results

4.1. The role of finance at firm level

In Table 3 we focus on the correlates between key finance indicators and firm-level performance (productivity) while controlling for age, age squared, the share of exports and a foreign capital dummy and including industry, year and location fixed effects.

For each regression we use the two TFP estimations where the first is based on the ACF methodology and the second on the OP methodology. Consider first, columns (1) and (2).

Here we find no statistically significant link between the cost of finance measured by the short and long term domestic interest rates paid by firms[12], despite the fact that 80% of firms reported the cost of finance as a major constraint. A possible explanation of this paradox is perhaps a conflation of the financial cost of any given loan (i.e. the rate of interest) and the difficulty of obtaining a given loan. In Morocco the latter can be more difficult to obtain especially in the absence of an appropriate personal network and/or the absence of required collaterals. In this context it is interesting to note that 19% and 26% of overdraft facilities and loan respectively for the firms in our data were guaranteed by personal collateral.

Regressions (3) and (4) show that the dummies indicating the presence of a bank loan and an overdraft facility are also not significantly correlated with firm-level productivity. When TFP is estimated with the ACF method (as with Fernandes, 2008, for the case of Bangladesh) we find a negative and insignificant coefficient for the presence of a bank loan and a positive and insignificant coefficient for access to an overdraft facility. Van Biesebroeck (2005) for several sub-Saharan countries obtains similar signs but with significant coefficients by using probit regressions, while Moreno-Badia & Slootmaekers (2009) for Estonia suggest that financial constraints do not have an impact on firm productivity in most sectors. In contrast, for Bulgaria, Gatti and Love (2008) find that access to credit lines is positively and strongly associated with TFP.

In contrast to the preceding papers, we also examine the role of other indicators of finance - the loan amount as a share of sales ("loan amount"), the share of the firm's financing needs covered by bank loan ("loan funded"), and by self financing respectively ("self-funded"). If we turn first to column (5), we find a negative and significant coefficient for the loan

amount; and similarly with regard to the share of the firm's finance needs covered by a bank loan (column 6). This suggests that less efficient firms borrow more and are more dependent on bank financing. We also find (column 7) that firms that use self-financing are more productive.

These correlates are highly interesting. On the one hand one might expect to find that loans (as a percentage of sales) would be easier to obtain and therefore higher for more "successful" firms – where success could be interpreted as the more profitable and/or more productive firms. If this is the case one would expect more successful firms to borrow more and therefore we might expect a positive coefficient on loan amount, but we find the reverse. However, on the other hand it could be that more successful firms do not *need* to borrow as much. If they can they will use their own resources because that is relatively cheaper (than, for example, typical bank loan rates of between 9-12% over this period). Hence there is a trade-off between ease of access to external finance, but also to own finance. It is not clear what the balance would be and ultimately that is an empirical question.

However, while it may be true that less efficient firms might *need* more financing, if credit markets work efficiently it should also be the case that they will typically find it harder to get that financing, and if that was the case once again we would expect to find a positive correlate, rather than the negative one we find. In order to understand this better, as well as to shed light on possible issues of endogeneity, we therefore decompose these results by different categories of firms. Tables 4a and 4b replicate the preceding regressions on the different categories. Here we consider small versus large firms, high and low debt firms, high and low profit firms, exporter v non-exporter firms, and whether firms have any foreign

capital or not. Groups depending on size, debt and profit are defined in relationship to the median level in each category. The results on “loan amount” and “loan funded” are once again very interesting. From Table 3 we see that less productive firms typically have higher loan amounts. Following on the discussion earlier, if it is the case that less productive firms need more financing one might therefore expect these to be firms with higher debts and lower profits. However, we do not find that this is the case. The “loan amount” is negatively linked to TFP essentially for firms characterised by low debt, and with no difference by level of profit.

In terms of possible endogeneity our results are also interesting. As discussed above the direction of causality between access to credit and firm productivity is not obvious, as firm level performance can impact on the possibility of obtaining credit and vice versa. Either (a) more productive firms should find it easier to get access to credit, and that getting more access to credit makes it easier then for them to be productive, however this is never supported by our results; or (b) less productive firms need credit more because they cannot use their own resources to finance investment; and that some of the credit is used just to survive not to invest thus with no impact on productivity. If the endogeneity is as described by (a) then we would expect a positive coefficient on loan amount which we do not find. If the endogeneity is as described by (b) then we would expect a negative coefficient on the loan amount, but when you break it down by firm type, one would expect these to be firms with higher debts and/or lower profits – but once again this is not supported by our results.

All this strongly suggests that endogeneity may not be a significant issue in our results, and that these correlates provide strong evidence of possible misallocation of credit / resources in Morocco, which is important both from an empirical and policy perspective. Table 4b

tests for the robustness of the results by running a set of random effects regressions, and the same pattern of results emerges. These results suggest that more finance is being allocated to low productivity firms, but that this in turn is not well correlated with profits and/or debts – once again indicative of a possible misallocation of resources.

This can perhaps be understood by considering the distinction between size, export status and the presence of foreign capital. A priori we might expect that the large and/or exporter and/or with foreign capital would be less constrained by the availability of domestic bank credits. For example Beck et al. (2005) find that financial obstacles have a much greater impact on the operation and growth of small firms than of large ones. In contrast our results show that the coefficients that link financial indicators and TFP are more often negative and significant for larger firms, those that export, and those with access to foreign capital. This again is indicative of a possible misallocation of resources as it could be that there may be a bias towards the financing of firms who export and who also tend to be larger and/or with foreign capital but not necessarily because they are more efficient.

A further reason for possible inefficiencies in the allocation of credit could arise from difficulties in obtaining adequate information by the banks in order to evaluate the financial viability / profitability of firms' investment projects. To test for this explanation we do an interaction between the share of the firm's needs financed by bank loan and a dummy indicating whether the firm has its annual financial statement checked and certified by an external auditor. This is reported in column (8) of Table 3, where we find a negative and significant coefficient, which once again lends strong supports to the explanation given above. This negative and significant relationship between bank loans and TFP is also verified for firms that have not had their annual financial statement checked and certified by an

external auditor in the case of large, low debt, high profit, exporter and no foreign capital in the last two columns of Tables 4a and 4b.

4.2. The role of business environment at industry and location level

In Tables 5 and 6 we explore the relationship between firm-level productivity and some further key business environment variables, which are here included as industry-location averages. In Table 5 we consider the whole sample, and interestingly there are only two significant variables. In column (1) we see a positive and significant coefficient associated with the presence of "equivalent taxation" by sector. Lack of symmetry in the treatment of firms arises where firms may be subject to differential taxes either across regions or within a given region. This in turn may occur either because of differences linked to firm size / turnover, or because of firm-level connections enabling it to get waivers or exceptions from paying tax, or because the firm perceives itself as competing with firms in the informal sector. These results suggest that greater fiscal equality and certitude for firms is more likely to create incentives for investment leading to increases in productivity.

There is then also some evidence from column (4) that administrative constraints arising from a heavier bureaucracy and differences in regulations (captured by the number of permits needed each year to operate) are negatively correlated with firm-level performance. It is interesting to note that there appears to be no evidence that difficulties in obtaining construction permits ("wait construction permit") or the number of permits required for establishing a firm ("creation constraints"), or the number of "water outages" are correlated with TFP.

In the preceding we have taken into account firm-level heterogeneity while controlling for age, exports and foreign capital, in addition to year dummies, industry dummies at 2-digit,

and location dummies. In Tables 6a and 6b, similarly to the analysis undertaken for the finance variables, we decompose these business environment variables according to key firm characteristics - size (measured by the number of permanent employments)[13], export status and presence of foreign capital).

In contrast to the results for the financial indicators, these are perhaps more intuitive. If we consider first the results for equivalent taxation, we see that fiscal homogeneity has the greatest impact on small firms, those that do not export, and those that do not have access to foreign capital. Similarly we find that the same categories of firms are sensitive to other indicators of bureaucracy and regulatory climate, except ("wait construct" and "water outages"), which are each associated with lower productivity. The results obtained are highly comparable across the OLS (Table 6a) and random effect estimations (Table 6b). All this suggests that regulatory differences and infrastructure difficulties make it more difficult for smaller firms who typically tend to be non exporters and not to have access to foreign capital to operate as effectively.

5. Conclusion

In this paper, we have explored the linkages between the business environment faced by firms and their performance measured by TFP. In the first place we have considered the role of access to finance (based on firm-level indicators); and in the second place we have used the others indicators of business environment (defined by industry and location). The paper highlights several results that are relevant from a policy point of view in the context of Morocco, and the potential role of trade openness and deep integration.

The firms' own assessments were that the most crucial obstacles to their performance was access to finance, and the issue of tax rates. The regressions go a long way to confirming

these perceptions. We provide strong evidence that there may be a misallocation of financial resources in Morocco with the loan amount being negatively linked to TFP. This is primarily for firms characterised by low debt, but does not appear correlated with differences in profit levels. We also find that the coefficients linking the financial indicators and TFP are more often negative and significant for large, exporting firms, with foreign capital, compared to small, non–exporting firms, without foreign capital. This suggests that financing may be easier for such firms but, that this financing is not correlated with underlying levels of productivity.

As well as financing being more difficult for small, non-exporting firms without access to foreign capital, we also identify the importance of other business environment indicators. Overall we find the absence of homogeneous taxation treatment across firms, and the number of permits needed each year to operate a given business, are the main elements that impact upon the Moroccan firms' productivity.

Table 1. Business environment variables by industry & location

Variables	Number of observations	Mean	Standard errors
Equivalent taxation	20256	0.69	0.14
Wait construction permit	25550	39.11	13.13
Creation constraints	22907	9.83	2.14
Administrative constraints	22814	0.54	0.61
Water outages	22891	2.76	4.86

Table 2. Production function estimates

	OLS				O&P				ACF-recommandations			
Industry	**Labor**		**Capital**		**Obs**	**Labor**		**Capital**		**Obs.**	**Labor**		**Capital**		**Obs**
Food	0.829	***	0.411	***	3325	0.321	***	0.036	***	1829	0.798	***	0.528	***	1829
	(0.017)		(0.011)			(0.059)		(0.294)			(0.032)		(0.033)		
Textile	0.846	***	0.244	***	2091	0.498	***	0.386	***	1275	0.839	***	0.285	***	1275
	(0.018)		(0.012)			(0.070)		(0.131)			(0.225)		(0.118)		
Garment	0.881	***	0.206	***	3022	0.516	***	0.421	***	1883	0.770	***	0.251	*	1883
	(0.014)		(0.011)			(0.056)		(0.130)			(0.231)		(0.139)		
Leather	0.877	***	0.239	***	864	0.399	***	0.433	***	518	0.769	***	0.265	***	518
	(0.025)		(0.017)			(0.100)		(0.147)			(0.047)		(0.030)		
Wood	1.102	***	0.232	***	1939	0.653	***	0.634	*	1070	1.104	***	0.312	***	1070
	(0.027)		(0.019)			(0.105)		(0.376)			(0.044)		(0.058)		
Chemical products	0.972	***	0.337	***	684	0.708	***	0.842	***	483	0.971	***	0.597	***	483
	(0.041)		(0.029)			(0.153)		(0.312)			(0.263)		(0.243)		
Rubber and other	0.894	***	0.289	***	2060	0.519	***	0.777	***	1259	0.856	***	0.567	***	1259
	(0.026)		(0.017)			(0.083)		(0.346)			(0.236)		(0.220)		
Metal	0.978	***	0.259	***	2164	0.300	***	-0.065		1232	0.914	***	0.316	***	1232
	(0.021)		(0.014)			(0.059)		(0.479)			(0.132)		(0.041)		
Electrical machinery	0.722	***	0.404	***	537	0.579	***	0.429	***	332	0.615	***	0.368	***	332
	(0.036)		(0.025)			(0.178)		(0.039)			(0.068)		(0.037)		
Transport and other equip.	1.176	***	0.164	***	661	0.754	***	0.636	***	462	1.145	***	0.294	***	462
	(0.044)		(0.031)			(0.219)		(0.257)			(0.152)		(0.145)		

Notes: Robust standard errors are in parentheses in the column with OLS estimates. Bootstrap standard errors are in parentheses in the columns with ACF and OP estimates. * significant at 10%; ** significant at 5%; *** significant at 1%. The number of observations used for OLS estimation is higher since it includes firms with zero investment contrary to semi-parametric estimations.

Table 3. Finance and firm productivity (OLS)

	Dependent variable : ln(TFP_{it})															
	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
Variables	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**
Int rate ST	-0.160	-0.390														
	(0.239)	(0.348)														
Int rate LT			-0.138	-0.305												
			(0.749)	(0.855)												
Loan					-0.041	0.030										
					(0.049)	(0.058)										
Overdraft							0.002	0.086								
							(0.056)	(0.080)								
Loan amount									-0.027***	-0.037***						
									(0.008)	(0.013)						
Loan funded											-0.182**	-0.082				
											(0.084)	(0.100)				
Self funded													0.098*	0.119*		
													(0.055)	(0.072)		
Loan*cerT															0.003	0.113
															(0.238)	(0.287)
Loan*Nocert															-0.281**	-0.196
															(0.127)	(0.132)
Constant	0.679***	7.155***	0.806***	7.337***	0.682***	7.104***	0.781***	6.876***	0.798***	7.183***	0.813***	6.950***	0.672***	6.842***	0.850***	7.430***
	(0.114)	(0.150)	(0.166)	(0.190)	(0.122)	(0.173)	(0.098)	(0.157)	(0.116)	(0.168)	(0.090)	(0.137)	(0.103)	(0.151)	(0.149)	(0.197)
Inds dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loca dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4023	4023	2553	2553	3872	3872	5681	5681	2262	2262	5643	5643	5594	5594	2065	2065
R-squared	0.67	0.89	0.68	0.9	0.67	0.87	0.65	0.87	0.73	0.91	0.65	0.87	0.65	0.87	0.70	0.90

*Source: authors' calculation. Robust standard errors are in parenthesis. * Significant at 10%, ** at 5%; *** at 1%. All regressions include age, age squared, export share and foreign capital. For simplicity we do not present their coefficients but they are significant and they have the expected coefficient sign. TFP1 is the total factor productivity of firm estimated with ACF recommendations' and TFP2 is the total factor productivity of firms estimated using the OP method.*

Table 4a. Finance and firm productivity by groups of firms (OLS)

	Dependent variable : ln(TFP_{it})									
	Loan amount		Loan funded		Self funded		Loan*cert		Loan*Nocert	
Groups of firms	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**
	-0.033***	-0.046***	-0.211**	-0.247**	0.075	0.095	-0.011	0.228	-0.300***	-0.228*
Large	(0.008)	(0.013)	(0.086)	(0.097)	(0.060)	(0.074)	(0.249)	(0.270)	(0.108)	(0.123)
	-0.028**	-0.01	-0.071	-0.058	0.186*	0.184	0.304	-0.01	0.479	0.519
Small	(0.012)	(0.014)	(0.165)	(0.170)	(0.107)	(0.119)	(0.428)	(0.459)	(0.373)	(0.451)
	-0.025***	-0.030***	-0.165	-0.099	0.112	0.089	0.112	0.161	-0.228	-0.187
High debt	(0.008)	(0.011)	(0.119)	(0.122)	(0.072)	(0.083)	(0.328)	(0.412)	(0.189)	(0.203)
	-0.578*	-0.857**	-0.232**	-0.098	0.107	0.142	-0.228	0.177	-0.235*	-0.016
Low debt	(0.318)	(0.365)	(0.117)	(0.136)	(0.089)	(0.122)	(0.275)	(0.302)	(0.139)	(0.144)
	-0.064*	-0.103*	-0.159*	-0.113	0.099	0.106	-0.039	0.129	-0.293*	-0.269
High profit	(0.038)	(0.062)	(0.096)	(0.113)	(0.065)	(0.083)	(0.250)	(0.298)	(0.160)	(0.174)
	-0.018***	-0.021**	-0.239**	-0.015	0.075	0.114	-0.366	-1.184	-0.120	0.038
Low profit	(0.003)	(0.009)	(0.119)	(0.136)	(0.081)	(0.097)	(0.587)	(0.751)	(0.138)	(0.155)
	-0.289**	-0.416***	-0.205**	-0.287**	0.123**	0.181**	0.209	0.145	-0.326**	-0.300**
Exporter	(0.112)	(0.119)	(0.099)	(0.111)	(0.061)	(0.077)	(0.392)	(0.417)	(0.130)	(0.142)
	-0.019*	-0.016	-0.07	0.229	0.046	-0.006	-0.256	0.031	-0.132	0.028
Non exporter	(0.010)	(0.012)	(0.149)	(0.195)	(0.107)	(0.131)	(0.238)	(0.377)	(0.208)	(0.228)
	-0.033***	-0.061***	-0.388**	-0.405	0.119	0.115	-0.093	0.314	-0.008	0.071
Foreign capital	(0.009)	(0.017)	(0.188)	(0.247)	(0.112)	(0.156)	(0.541)	(0.719)	(0.259)	(0.284)
	-0.023*	-0.029	-0.097	0.072	0.082	0.084	-0.188	-0.18	-0.310**	-0.179
No foreign capital	(0.012)	(0.019)	(0.094)	(0.109)	(0.064)	(0.078)	(0.264)	(0.243)	(0.145)	(0.157)

*Source : authors' calculation. Robust standard errors are in parenthesis. * Significant at 10%, ** at 5%; *** at 1%. All regressions include age, age squared, export share and foreign capital. For simplicity we do not present their coefficients but they are significant and they have the expected coefficient sign. TFP1 is the total factor productivity of firm estimated with ACF recommendations' and TFP2 is the total factor productivity of firms estimated using the OP method.*

Table 4b. Finance and firm productivity by groups of firms – robustness checks (random effects)

	Dependent variable : ln(TFP_{it})									
	Loan amount		Loan funded		Self funded		Loan*cert		Loan*Nocert	
Groups of firms	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**
	-0.029***	-0.041***	-0.191**	-0.257***	0.101*	0.112	-0.071	0.083	-0.262***	-0.195
Large	(0.008)	(0.013)	(0.083)	(0.096)	(0.060)	(0.072)	(0.253)	(0.269)	(0.100)	(0.123)
	-0.028**	-0.013	-0.063	0.028	0.197*	0.161	0.238	-0.075	0.267	0.369
Small	(0.013)	(0.012)	(0.157)	(0.179)	(0.102)	(0.117)	(0.473)	(0.497)	(0.305)	(0.346)
	-0.022***	-0.027**	-0.213*	-0.143	0.171**	0.139*	0.032	-0.033	-0.219	-0.178
High debt	(0.008)	(0.012)	(0.111)	(0.122)	(0.070)	(0.082)	(0.336)	(0.424)	(0.173)	(0.201)
	-0.707**	-0.933***	-0.146	-0.037	0.093	0.14	-0.176	-0.034	-0.166	0.022
Low debt	(0.332)	(0.356)	(0.112)	(0.136)	(0.090)	(0.122)	(0.282)	(0.296)	(0.132)	(0.145)
	-0.035	-0.049	-0.162*	-0.068	0.134**	0.102	-0.035	0.083	-0.256	-0.248
High profit	(0.028)	(0.041)	(0.093)	(0.116)	(0.065)	(0.086)	(0.255)	(0.324)	(0.160)	(0.183)
	-0.017***	-0.020***	-0.225*	0.011	0.078	0.108	-0.513	-1.028*	-0.092	0.163
Low profit	(0.003)	(0.008)	(0.116)	(0.139)	(0.079)	(0.095)	(0.492)	(0.617)	(0.138)	(0.160)
	-0.291**	-0.456***	-0.184*	-0.225**	0.130**	0.180**	0.105	0.08	-0.294**	-0.252*
Exporter	(0.121)	(0.146)	(0.095)	(0.110)	(0.060)	(0.075)	(0.379)	(0.394)	(0.121)	(0.138)
	-0.014*	-0.008	-0.104	0.28	0.095	-0.028	-0.228	-0.050	-0.091	0.116
Non exporter	(0.008)	(0.010)	(0.139)	(0.180)	(0.101)	(0.123)	(0.259)	(0.388)	(0.199)	(0.250)
	-0.033***	-0.052***	-0.407**	-0.345	0.155	0.141	-0.222	0.166	-0.011	0.127
Foreign capital	(0.009)	(0.015)	(0.184)	(0.225)	(0.111)	(0.146)	(0.546)	(0.671)	(0.233)	(0.271)
	-0.023*	-0.026	-0.064	0.168	0.089	0.065	-0.166	-0.183	-0.207	-0.091
No foreign capital	(0.013)	(0.019)	(0.089)	(0.108)	(0.061)	(0.074)	(0.251)	(0.244)	(0.135)	(0.152)

*Source: authors' calculation. Robust standard errors are in parenthesis. * Significant at 10%, ** at 5%; *** at 1%. All regressions include age, age squared, export share and foreign capital. For simplicity we do not present their coefficients but they are significant and they have the expected coefficient sign. TFP1 is the total factor productivity of firm estimated with ACF recommendations' and TFP2 is the total factor productivity of firms estimated using the OP method.*

Table 5. Bureaucracy, regulation and firm productivity

	Dependent variable : ln(TFP_{it})									
	(1)		(2)		(3)		(4)		(5)	
Variables	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**
Equivalent taxation	0.380*	0.506*								
	(0.207)	(0.268)								
Wait construction permit			0.005	0.065						
			(0.062)	(0.099)						
Creation constraints					-0.287	0.063				
					(0.192)	(0.294)				
Adm. constraints							-0.079*	-0.025		
							(0.047)	(0.073)		
Water outages									0.011	-0.012
									(0.025)	(0.041)
Constant	0.543***	5.587***	0.847***	5.771***	1.541***	5.872***	0.784***	5.996***	0.844***	5.959***
	(0.171)	(0.230)	(0.233)	(0.360)	(0.467)	(0.704)	(0.063)	(0.107)	(0.064)	(0.101)
Inds dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loca dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11095	11095	12998	12998	9650	9650	9549	9549	10852	10852
R-squared	0.61	0.83	0.58	0.83	0.62	0.79	0.63	0.80	0.61	0.82

*Source: authors' calculation. Robust standard error cluster by firms are in parenthesis. * Significant at 10%, ** at 5%; *** at 1%. All regressions include age, age squared, export share and foreign capital. For simplicity we do not present their coefficients but they are significant and they have the expected coefficient sign. TFP1 is the total factor productivity of firm estimated with ACF recommendations' and TFP2 is the total factor productivity of firms estimated using the OP method.*

Table 6a. Bureaucracy, regulation and firm productivity by groups of firms (OLS)

	Dependent variable : ln(TFP_{it})									
	Equivalent taxation		Wait construct		Creation constraints		Adm constraints		Water outages	
Groups of firms	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**
	0.127	0.189	-0.023	-0.031	0.021	0.287	-0.062	-0.030	0.021	-0.006
Large	(0.254)	(0.295)	(0.090)	(0.110)	(0.291)	(0.333)	(0.079)	(0.090)	(0.039)	(0.046)
	0.876***	0.886**	-0.017	0.041	-0.660**	-0.410	-0.158***	-0.151**	0.012	0.035
Small	(0.322)	(0.415)	(0.080)	(0.103)	(0.279)	(0.330)	(0.059)	(0.073)	(0.036)	(0.045)
	-0.221	-0.297	0.003	-0.002	-0.434	0.253	0.084	0.046	0.002	0.023
Exporter	(0.276)	(0.340)	(0.098)	(0.132)	(0.328)	(0.461)	(0.081)	(0.103)	(0.039)	(0.055)
	0.850***	0.837**	-0.025	-0.082	-0.523*	-0.718*	-0.209***	-0.203**	0.046	0.044
Non exporter	(0.303)	(0.426)	(0.082)	(0.125)	(0.277)	(0.381)	(0.058)	(0.088)	(0.040)	(0.061)
	-0.053	0.345	0.053	0.143	0.266	0.406	-0.001	-0.043	-0.030	-0.078
Foreign capital	(0.410)	(0.438)	(0.162)	(0.272)	(0.466)	(0.728)	(0.123)	(0.175)	(0.067)	(0.108)
	0.517**	0.508*	-0.004	0.024	-0.401*	0.323	-0.092*	0.032	0.022	-0.012
No foreign capital	(0.225)	(0.279)	(0.068)	(0.107)	(0.215)	(0.303)	(0.048)	(0.074)	(0.027)	(0.040)

*Source: authors' calculation. Robust standard errors are in parenthesis. * Significant at 10%, ** at 5%; *** at 1%. All regressions include age, age squared, export share and foreign capital. For simplicity we do not present their coefficients but they are significant and they have the expected coefficient sign. TFP1 is the total factor productivity of firm estimated with ACF recommendations' and TFP2 is the total factor productivity of firms estimated using the OP method.*

Table 6b. Bureaucracy, regulation and firm productivity by groups of firms – robustness checks (Random effects)

	Dependent variable : ln(TFP_{it})									
	Equivalent taxation		Wait construct		Creation constraints		Adm constraints		Water outages	
Groups of firms	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**	**TFP1**	**TFP2**
	0.074	0.401	-0.064	-0.079	0.115	0.276	-0.058	-0.051	0.020	0.020
Large	(0.274)	(0.301)	(0.088)	(0.099)	(0.266)	(0.312)	(0.062)	(0.072)	(0.028)	(0.032)
	0.587**	0.501*	0.016	0.100	-0.592**	-0.219	-0.154***	-0.116*	0.013	-0.002
Small	(0.263)	(0.298)	(0.073)	(0.085)	(0.252)	(0.294)	(0.055)	(0.059)	(0.034)	(0.038)
	-0.322	0.128	-0.02	0.018	-0.370	0.362	0.002	0.001	0.022	0.013
Exporter	(0.286)	(0.322)	(0.087)	(0.102)	(0.359)	(0.425)	(0.077)	(0.085)	(0.034)	(0.037)
	0.750**	0.593*	0.005	0.120	-0.445*	-0.199	-0.184***	-0.130**	0.041	0.010
Non exporter	(0.293)	(0.335)	(0.078)	(0.097)	(0.245)	(0.307)	(0.053)	(0.062)	(0.034)	(0.042)
	-0.215	0.984**	-0.081	0.138	0.532	1.060*	-0.063	0.015	0.001	-0.023
Foreign capital	(0.426)	(0.432)	(0.115)	(0.133)	(0.471)	(0.570)	(0.099)	(0.114)	(0.047)	(0.049)
	0.452**	0.621**	0.017	0.077	-0.473**	0.159	-0.111**	-0.016	0.024	-0.026
No foreign capital	(0.229)	(0.271)	(0.067)	(0.086)	(0.210)	(0.266)	(0.047)	(0.057)	(0.026)	(0.032)

*Source: authors' calculation. Robust standard errors are in parenthesis. * Significant at 10%, ** at 5%; *** at 1%. All regressions include age, age squared, export share and foreign capital. For simplicity we do not present their coefficients but they are significant and they have the expected coefficient sign. TFP1 is the total factor productivity of firm estimated with ACF recommendations' and TFP2 is the total factor productivity of firms estimated using the OP method.*

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[1] See for example Winters et al., 2004 for an overview of the relationship between trade and growth.

[2] See A. Driouchi and M. Kadiri for a detailed analysis of changes and reforms in Morocco.

[3] The Arab League Free Trade Agreement (FTA), 1998; the FTA with European Free Trade Association, 1997, the Egypt-Morocco FTA, the Tunisia-Morocco FTA and the Jordan-Morocco FT, all 1999, the US-Morocco FTA, 2004; and the Agadir Agreement, 2007.

[4] The World Bank's Investment Climate Surveys are available upon request. (http://www.enterprisesurveys.org/)

[5] On the web site of World Bank the data for ICA-2007 are indicated for 2004 and 2007. In fact, the comparison with Census data shows that the year 2004 corresponds to 2002. In the other hand we have no information to confirm the data of 2007. As 2004 is in reality 2002, we have inferred that 2007 is in reality 2005 but without evidence.

[6] Grand Casablanca, Tanger-Tetouan, Rabat-Sale-Zemmour, Fes-Boulmane-Meknes, Oriental, Chaouia-Ouardigha and Agadir.

[7] Source: IPPI Haut Commissariat au Plan, Morocco.

[8] The procedure used is close to Fernandes's one (2008) but less restrictive. Our cleaning has been realized in 2 steps. In a first one, we have eliminate from the sample (i) firms that have never reported any sales or material costs (ie costs of raw materials), (ii) observations when exports are bigger than sales, and (iii) observations with year-to-year growth rates in any of 3 ratios (sales to total workers, material costs to total workers and capital to total workers) larger (smaller) than 500% (-500%). These year-to-year growth rates are calculated with the constant variables. In a second step, we have always keept the firms who exist at less 3 consecutive years and we have dropped observations when we have one isolated year.

[9] The implementation of instrumental variables in order to control for the endogeneity is particularly difficult given the number of factors considered

[10] Note we drop averages with fewer than four observations as Aterido et al. (2007).

[11] See for example, Aterido et al. (2009) on the differential impact of business environment constraints across firms of different size.

[12] The results are similar whether we drop the share of exports or the foreign capital dummy.

[13] We have created two groups of firms relative to the median.