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Trade and Jobs in Morocco: Why do some firms succeed and others fail to increase employment?

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Trade and Jobs in Morocco: Why do some firms succeed and others fail to increase employment?*

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Abstract:

Using a sample of 644 large and small firms covering seven industries in Morocco, the paper investigates whether the difference in their attitudes toward technological upgrading (in particular investment in human and physical capital) explains their difference in term of job creation during a period of rapid trade liberalization. The lessons drawn from such experience are expected to be useful for other LDCs. The results strongly support that such technological upgrading can help firms creating jobs and this is robust to the inclusion of various additional explanatory variables and to firm size. Concerning the latter, the results show, however, that investment in new machineries is jobs creating irrespective of the firm size but training induces higher employment only in large firms.

Keywords: Training, investment, employment, LDCs.
JEL classification: J24; D24; O24; O33

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1. Introduction

Like in many developing countries, unemployment is a major problem in Morocco. The official unemployment rate, which is already very high (urban unemployment rate was 19.5% in 2001), reflects only partially the severity of the labor market disequilibrium in the country. Taking account of the scale of underemployment, which refers to a situation where individuals are compelled to work less than the standard working week (40 hours per week), gives an even worse picture.[1]

Although the figures should be treated with caution, owing to differences in terms of definitions, the international comparison confirms that unemployment rate in Morocco is very high. For instance, the average unemployment rate in 2001 was 4.36% in East Asia and 10% in Central and Eastern Europe.

An even more worrying aspect of unemployment in Morocco is its importance among university graduates. In 2001, their unemployment rate reached around 26%. This reveals both the mismatch between the demand and supply of skills and the inability of the economy to offer jobs for skilled people.

Actually the deterioration of the Moroccan economic performance in general, and of the employment situation in particular, goes back to the 1970s. At that time, Morocco like many other developing countries (LDCs) was still adopting the 'import substitution' (IS) strategy initiated after its independence. The government was of the opinion that intense competition (either foreign or domestic) might prevent the economy from industrializing and would, therefore, adversely affect the development processes. However, during the 1980s the economic problems the economy had to face induced the country to embark upon a process of economic reform including openness to trade. The process was strengthened during the 1990s. This new strategy is thought to set the economy on a path of higher efficiency and to foster growth and development.

In practice, the period of liberalization coincided with an increase in unemployment. However, careful empirical investigations do not support the hypothesis that openness to trade, by itself, has contributed to the deterioration of the employment situation in Morocco (e.g. Currie and Harrison, 1997; Rutherford et al.,1997 and Achy and Sekkat, 2007). They suggest that the impact of trade liberalization on employment depends on

[1] According to the last available statistics, underemployment in 1998 was 13.7%. Combining both figures almost doubles the share of persons willing to work more but failing to do so.

many factors such as macroeconomic cycle, labor market institutions, technological change and firm's promptness to adapt to changes in its environment.

The present paper focuses on the latter aspect (e.g. firm's behavior) in Morocco. In particular, we investigate whether firms that have invested in new equipments and trained their workers (called technological upgrading hereafter) were able to preserve, or even rise, employment in a period of increasing openness to trade. Our purpose is not to examine the firm's decision to engage in physical investment or training but, taking such a decision as given, the question concerns the impact on employment. The motivation of our analysis is twofold.

First, a strand of the literature supports the role of technological upgrading in a firm's successful participation in the global economy. For instance, Rodrik (1994, 2004) showed that the availability of adequate human capital and co-ordination by the government of substantial capital investment/capital imports have been key factors behind the impressive performances of Korea and Taiwan. Holzer et al. (1993) found that training has a significant and positive impact on product quality. Mody and Yilmaz (2002) provide evidence that investment in machinery, in particular imported machinery, helped lower export prices for export-oriented developing countries.

Second, a recent survey (FACS, 2000) shows that out of 512 Moroccan firms that were present in 1990 and were surviving in 2000, 35% decreased their employment, 3% left it unchanged and 62% increased it. There are differences across sectors. For instance, in the sector "other chemicals" 42% of firms decreased their employment, 2% left it unchanged and 56% increased it while in the “food products” sector the proportions are respectively 29%, 3% and 68%. The same survey shows that these firms had different attitude toward technological upgrading. Some have invested in new equipment, others have changed the type of good they are supplying or the skill composition of their workers and others organized training for their workers. The question is, therefore, whether there is a relationship between such firms' behaviors and employment.

Our analysis is conducted at the firm level. It combines the information from two databases. The first one comes from the Firm Analysis and Competitiveness Survey (FACS) carried out in 2000 by the Ministry of trade and industry and the World Bank.[2] This survey covers a representative sample of 859 firms in the seven most important

[2] At present, only the results of the FACS 2000 survey are available but it seems that the Moroccan government is conducting a similar work for other years. When such data become available, the analysis of the firm's decision to change upgrading efforts can be conducted.

manufacturing industries in Morocco. It is based on a questionnaire about firms' decision in 1999 concerning technology upgrading and other related variables. The second database comes from the yearly survey conducted by the Ministry of Trade and Industry.[3] This survey covers all manufacturing firms with at least 10 employees or with an annual turnover that exceeds 100 000 DH (Between US $ 9000 and 12,000). It collects firm level data on a limited set of variables such as turnover, output, value added, exports, investment, gross labor cost, and the number of permanent and temporary employees.

Assuming Cobb-Douglas production function and profit maximization by the firm, we derive a labor demand equation. The first difference of the latter is estimated using the change of the relevant explanatory variables between 2000 and 2001. Since the upgrading related variables concern 1999, they can be considered as predetermined. Our analysis focuses on how the difference in the share of new equipments and in the intensity of workers' training across firms affects employment. The results support strongly that such technological upgrading can help firms creating jobs. Robustness checks both with respect to additional explanatory variables and to firm size confirm the conclusion. However, it seems that while new machineries are jobs creating irrespective of the firm size, training induces higher employment only in large firms. This implies that some selectivity in the provision of incentives to firms' might be useful. Should policy makers play a role in this context, they must provide adequate incentives to large firms for investment and training and focus the incentives for smaller ones on investment.

The rest of the paper is organized as follows. Section 2 briefly reviews the literature on trade and jobs and the one on the relationship between technological upgrading and firm's performance. Section 3 presents the model and the data. Section 4 discusses the empirical findings and Section 5 concludes.

[3] While the FACS distinguishes between skilled and unskilled labor, the yearly surveys do not. This prevents us from conducting the analysis according to the skill composition of labor, which would have been very interesting.

2. Relation to the literature

2.1 Trade and jobs

Over the last two decades, there has been a large interest regarding the effects of trade on the labor market. The focus was first on industrialized countries and concerns, on the one hand, the role of trade in widening wage inequality between skilled and unskilled workers and, on the other hand, the impact of trade on (un)-employment. More recently, attention has been paid to developing countries. This interest has strengthened with trade reforms implemented in a large number of developing countries since the early eighties. It has also been reinforced by the increasing trend of regional and multilateral free trade agreements in which developing countries are involved, such as NAFTA, and Euro-Mediterranean free trade agreements (EUROMED).

To date, the empirical findings suggest that both for developed (Dewatripont, Sapir and Sekkat, 1999) and developing countries (Lee and Vivarelli, 2005), trade is not the main cause of labor market problems (either unemployment or the wage-gap).[4] The impact of trade liberalization on the labor market is largely context-specific and tends to vary from one country to another. In addition to trade liberalization, one should take account of macroeconomic cycle, labor market institutions and technological capabilities.

Morocco started liberalizing foreign trade in 1983. Over the nineties, it has strengthened the process. As explicitly asserted in the "Foreign Trade law" (1992), trade liberalization intended to promote exports; integrate the Moroccan economy into the world economy; and contribute to consolidate the multilateral trading system. By implementing the foreign trade law, Morocco committed itself to liberalize imports and exports of goods and services, abolish any quantitative restrictions, and use exclusively tariffs in protecting domestic production. When joining the GATT in 1987, Morocco bound 156 tariff lines, which accounted for 30 per cent of its total imports at that time. By the year 2000, bound tariff lines covered 100 percent of its imports.

Morocco has also signed a Free Trade Agreement with the European Union (EU) in 1995, which has been effectively implemented since 2000. This agreement aims at establishing by the end of a 12-year transition period (starting from 2000), a free trade area (FTA) for most products and seeks to promote and enhance economic growth. In addition to the FTA with the EU, Morocco has implemented or negotiated other

bilateral and regional trade agreements such as the free-trade agreement with EFTA (1997), the Arab FTA (1998). More recently, Morocco signed free trade agreements with the United States (2004) and Turkey (2004).

To assess the effects of trade liberalization on employment and wages in Morocco, two empirical approaches have been applied: Computable General Equilibrium (CGE) and econometric models. The CGE models have been used, among others, by Rutherford et al. (1997), Chater and Hamdouch (2001) and Achy and Milgram (2003). Focusing on Morocco's free trade agreement (FTA) with the EU, Rutherford et al. (1997) found that the welfare benefits for Morocco are about 1.5 percent of GDP, and may reach 2.5 percent of GDP if Morocco further liberalized its trade with the rest of the world. Chater and Hamdouch (2001) reached opposite results. The complete dismantling of tariffs against the EU would lead to a net loss of 1.6 percent of GDP. The magnitude of employment losses in their model is estimated to 3 percent among unskilled workers, and 1.1 percent among skilled workers. Achy and Milgram (2003) found that the FTA with the EU is likely to accentuate the Moroccan specialization in low value added industrial products and that at the aggregate level, trade liberalization leads to a small decline of output.

Econometric models that investigate the impact of trade on labor market outcomes in Morocco are presented in Currie and Harrison (1997) and Achy and Sekkat (2006). To our knowledge these are the only papers using such a methodology for Morocco. Currie and Harrison (1997) focused on the impact of trade reform on labor in the Moroccan manufacturing sector during the period 1984-90, which corresponds to the first wave of trade liberalization reform in Morocco. They found that, on average, employment in the manufacturing private sector firms was unaffected. By using micro-level data, the authors were able to trace the relationship between changes in trade policies and manufacturing employment at the firm level. They pointed out that firm's characteristics such as ownership (public versus private) and export orientation have a decisive effect on the response to trade reform. They also found that despite the existence of formal barriers to worker dismissals and minimum wages laws, labor market regulations cannot explain the sluggish labor market response to trade reforms in Morocco. According to the authors, the lack of an employment response can be to a large extent explained in the context of imperfect competition. In Morocco, such as in many other developing

[4] See also Revenga (1997), Levinsohn (1999), Feenstra and Hanson (1997) and Wood (1994).

countries, some sectors are characterized by few players and high barriers to entry. Adjustment to trade reform in such a context occurs trough a reduction of profit margins and productivity improvement.

In order to abstract from short-term adjustments and allows the impact of other companion policies to materialize, Achy and Sekkat conducted a similar analysis over the period 1990-2000 using sector's data. The investigation concerned the relationships between trade and employment and between foreign investment and employment. The estimates revealed an adverse effect of import penetration on employment. Conversely, export orientation tends to exert a positive impact on employment. The magnitude of the exports and imports coefficients is similar implying that foreign trade has almost no effect on employment. However, the authors found that investment in physical capital exerts a positive and significant impact on employment. Moreover, an increase in foreign participation in a firm's capital (i.e. FDI) exerts a positive effect on employment.

2.2 Technological upgrading and firm's performance

Human capital and training

At the macroeconomic level, the positive impact of human capital on growth is now uncontroversial (see Temple, 2001; for a survey). At the microeconomic level, the impact of investment in human capital on firms growth is still debated (Zwick, 2006). The studies focus mainly on the firm's incentive to invest in human capital and therefore examine the impact on productivity and wages. Using data of about 150 Canadian firms and assuming a Cobb-Douglas production function, Bartel (1994) investigated the impact of formal training programs on labor productivity. She first estimated a simple cross-section production function including a dummy for formal training programs and did not find an effect of formal training on productivity. However, when she exploited the time series and cross-section dimensions of the data, a significant impact of training on labor productivity emerged.

Black and Lynch (1996) also used a Cobb–Douglas production function on a data set from the U.S in 1993 but instead of a dummy for formal training they included the training intensity. They find that a high percentage of formal training outside working hours has a positive impact on productivity. In 2001, the same authors published a paper using data of 638 establishments from the US covering the period of 1987–1993. They

included other work practices implemented within the establishment and failed to support a positive effect of training on labor productivity. The authors concluded that the way the whole work practices are actually implemented within the establishment is crucial. Establishments that have adopted practices promoting joint decision making coupled with incentive-based compensation have higher productivity than others (Black and Lynch, 2001).

Boon and van der Eijken (1997) focused on a balanced panel of 173 Dutch firms and confirms the importance of training as an input in the production function. Barrett and O'Connell (2001), studying labor productivity growth of a cross section of 215 firms in Ireland, found that general training has a positive impact on productivity growth but specific training has no effect. Ballot et al. (2006) investigated the effect of training on productivity in France (for about 100 firms) and Sweden (for 250 firms). They found that the firm's 'returns' to investment in training is high in both countries.

We are aware of only one published study examining the issue in LDCs: Rosholm et al. (2007). The paper focuses on 218 Kenyan and 196 Zambian firms in the formal sector. The return of training to workers is found to be of about 20% of their earnings and it is larger for long training durations and large firms.

Physical capital

While the early and the new growth models both show that physical capital accumulation has a positive impact on growth, the former stipulated that the impact is only temporary and the latter contended that the impact is permanent. This is self evident under the assumption of non-decreasing returns to scale of physical capital. However, other considerations may justify the permanent effect of capital accumulation (DeLong and Summers 1991). For instance, capital accumulation may be necessary to put new inventions into practice. Alternatively, some technological innovations are embodied in the physical capital. Moreover, the introduction of new capital may lead to better organization, management and more efficient combination of inputs.

The literature also distinguishes between imported and domestically produced capital arguing that the former might be more conductive to growth. Since it is in general bundled with "knowledge" in various forms (e.g. installation support, quality control software and services of trained engineers and supervisors) it gives access to pool of

higher international knowledge (Mody and Yilmaz, 2002). This idea received empirical support.

The empirical literature dealing with the role of physical capital is almost exclusively conducted at the macroeconomic level. Recently much of this literature concentrated on imported capital. Coe et al. (1997) explicitly examined the role of imported machinery in a sample of 77 developing countries from Africa, Asia, Latin America and the Middle East. They estimated an equation that relates a developing country's total factor productivity to the foreign R&D capital stock, imports of machinery and equipment relative to GDP and the secondary school enrollment ratio. Their results imply that a developing country's total factor productivity is larger the larger is R&D of its trade partner, the more open it is to machinery and equipment imports from the industrial countries and the more educated is its labor force. Moreover, a country that is more open to machinery and equipment imports derives a larger marginal benefit from foreign R&D.

Instead of total factor productivity, Mazumdar (2001) investigated the effect of imported machinery on growth in developing countries. The paper supported the view that imported machinery leads to higher growth in developing countries. Mody and Ylmaz (2002) focused on the relationship between export competitiveness and investment in machinery. The sample included developed, export-oriented developing, and import-substituting developing countries between 1967 and 1990. They found that imported machinery helped lower export prices for export-oriented developing countries.

3. Empirical implementation

Summing up the discussion in the previous sections, it appears that openness to trade is not the main cause of labor market problems and that engaging in technological upgrading (i.e. investment in human and physical capital) boosts economic performance. Based on these, the paper investigates whether technological upgrading explains that firms, facing an increasing openness to trade, are able to preserve or create jobs. To this end, we examine the experience of a sample of Moroccan firms with different attitudes (toward technological upgrading) and performance during a period of rapid trade liberalization. The lessons drawn form such experience may be useful for other LDCs strategy.

3.1 The model

To address the research question we follow Milner and Wright (1998), and Greenaway et al. (1999) in assuming a representative firm that maximizes its profit by using labor and capital. This approach allows comparability with the results of the estimation of labor demand functions commonly used in trade and labor literature. The reduced form of the labor demand is derived from a structural model assuming a Cobb-Douglas production function. Abstracting from the firm's sub-script at this stage, the production function is:

$$Q = A^{\omega} K^{\delta} L^{\alpha} \tag{1}$$

where Q is output, A is an index of technological progress that reflects technical efficiency of the production process, L is labor, and finally K is capital stock.

Under the assumption of competitive markets, firms are price and wage takers. The first order conditions imply that a profit-maximizing firm will use labor and capital such that the marginal revenue product of capital equals its rental cost (r), and the marginal revenue product of labor equals wage (w). Using the first order conditions and solving the system to get rid of capital from the output expression yields the following equation:

$$\log L = \lambda_0 + \lambda_1 \log Q + \lambda_2 \log(A) + \lambda_3 \log(\frac{w}{r}) \tag{2}$$

Theoretically, the demand for labor is positively linked to output, and technological progress. The coefficient of relative costs $(\frac{w}{r})$ is expected to be negative. The empirical implementation of the model consists in taking equation (2) in first differences. This leads to the following equations of the change in labor demand:

$$\Delta \log L = \lambda_1 \Delta \log Q + \lambda_2 \Delta \log(A) + \lambda_3 \Delta \log(\frac{w}{r}) \tag{3}$$

One problem with this formulation is that technology is assumed exogenous and has a similar and uniform impact on different firms. The exogeneity assumption is not consistent with growing empirical evidence revealing that the technological progress is largely affected by other variables (see Section 2). Hence, in the empirical

implementation of the model we will allow technological progress to depend on some relevant economic variables

We follow Greenaway et al. (1999) in assuming that $\Delta \log(A)$ depends on the level of barrier to foreign trade. Higher openness to trade increases competition in import competing industries and put pressure on firms to improve their productivity and reduce their inefficiency. Given our purpose, we also assume that technical efficiency is affected by the technological upgrading. This implies that $\Delta \log(A)$ can be written as follows:

$$\Delta \log(A) = \eta_1(\text{Pr}\, otec) + \eta_2(Upgrad) \qquad (4)$$

where

Protec is a proxy for protection from foreign trade,

Upgrad is a proxy of technological upgrading (e.g. new equipments, workers' training, and so on).

Substituting equation (4) in equation (3) and adding firm's subscript, the resulting equations is:

$$\Delta \log L_i = \beta_1 \Delta \log Q_i + \beta_2(\text{Pr}\, otec)_i + \beta_3(Upgrad)_i + \beta_4 \Delta \log(\frac{w}{r})_i \qquad (5)$$

where i is the firm's subscript. Equation (5) suggests that the change in a given firm's employment depends on the change in its production (β_1 is expected to be positive), its relative costs (β_4 is expected to be negative), its upgrading efforts (β_3 is expected to be positive) and the protection from foreign competition which is, in reality, sector (rather than firm) specific. The sign of β_2 may be positive or negative depending on whether protected firms increases employment (for instance as a counterpart for protection) or decreases it (for instance because of slack and lack of incentive to expand). Note that we allow relative costs to be firm specific because the average wage, although exogenous to the firm decision, may depends on the composition of its labor force. [5]

Equation (5) will serve as our basic specification to examine the impact of firm's human and physical capital investment on employment. However, the equation can not be estimated using ordinary least squares method because the decisions on output and input are simultaneous. To avoid the resulting bias, we adopt a 2SLS estimation method.

[5] As will be clear form the next section, the available data do not allow distinguishing between different categories of labor.

Firm's production is, first, regressed on a set of predetermined (with respect to $\Delta \log L_i$) variables. The fitted values are, then, used as an instrument for $\Delta \log Q_i$.

3.2 The data

To perform our analysis we combine data from the Moroccan Census of Manufacturing with a unique data set from the Firm Analysis and Competitiveness Survey (FACS, 2000)[6] conducted by the World Bank and the Moroccan government on selected firms in 2000.

The Moroccan Census of Manufacturing annually surveys all manufacturing firms with at least 10 employees or with sales revenue exceeding 100,000 dirhams (Between US $ 9000 and 12,000). The firm's activity is described by the four-digit Moroccan nomenclature of economic activities (Nomenclature Marocaine des Activités Economiques or NMAE). The survey gives information about firm's sales revenue, output, exports, investment, labor cost, number of employees (without skill decomposition), location and legal from. A code is allocated to each firm and kept the same over the time which allows combination of the survey's results with other data sets.

The FACS provides data for 859 firms (of which 78% are SMEs) for the following seven industries: Electronics, Textiles, Garments, Processed Food Products, Chemicals, Leather and Shoes products, Plastic products. The 7 industries, drawn from a classification that include 26, represent together around 80% of the manufacturing sector employment and exports and more than 50% of its value added. Three of them (Food, Textiles and Clothing) represent together more than 50% of the manufacturing sector employment and exports and around 1/3 of its value added. If one adds Chemicals, the share in value added becomes more than 50%. Table 1 presents the FACS sample by industry on the basis of firms' number, employment, output and exports.

[6] At present, only the results of the FACS 2000 survey are available. It seems that a similar survey is being conducted for other years but the results are not ready.

Table 1: FACS survey sample by industry, export orientation and foreign ownership

Industry	Number of firms	Share of firms	Employment structure	Output structure	Export structure
Food industry	83	9,7	5,0	18,8	11,7
Textiles	200	23,3	25,3	25,3	24,8
Garment industry	316	36,8	52,4	26,6	50,5
Leather industry	68	7,9	5,5	3,7	6,6
Chemical industry	77	9,0	4,8	14,5	4,2
Plastic industry	77	9,0	4,1	5,1	1,0
Electrical industry	38	4,4	2,9	6,1	1,2
Total	859	100	100	100	100

Note: Authors' computation

Like the Census, FACS concerns manufacturing firms with at least 10 employees. Its instrument was a written questionnaire filled by direct interviews with management and staff of the selected firms. The questionnaire is structured in 3 parts, each divided in sections and sub-sections, reflecting different characteristics of the firms. It contains questions about the origin and shareholding status of the firm (foreign invested versus domestic), the background of the owner or manager, technology, labor market, contractual relations and financial markets, international trade, business environment and regulation, corporate finance and employment dynamics. The following questions are of particular interest to us:

- During the year 1999, did you offer training programs?
- If yes, what was the average number of participants and the average duration (number of days)?
- During the year 1999 what was the share of equipments and machinery aged less than 5 years in your company.

The answers to these questions will be used to construct the explanatory variables relevant for our study.

4. The results

The empirical analysis looks at the impact of human and physical capital investment by the firm on the change in employment between 2000 and 2001. Note that since the questionnaire concerned firm's decisions in 1999, the explanatory variables that will be drawn from its results are predetermined with respect to $\Delta \log L_i$. The two explanatory variables that allow testing our hypothesis are: the ratio of the number of persons-days of training to firm's total employment and the share of equipments and machinery aged less than 5 years. The other explanatory variables are: the change in the effective tariffs rate by sector provided by the Ministry of Commerce, the firm's average wage computed as the ratio of total wage bill over the number of employees, the rental cost of capital and the instrument for the change in the firm's output. Following Martins et al. (1996), the rental cost of capital is computed as the sum of real interest rate and depreciation rate[7] multiplied by the manufacturing sector's investment deflator. The instrument for the change in the firm's output is the fitted values of the regression of firm's production on sector's demand, firm's past production growth rates and the firm's legal status.[8]

After dropping firms with missing responses and combing the two data sets, we end up with 644 firms for which we will investigate the impact of training and equipment on employment. Table 2 summarizes the main characteristics of the resulting sample. Looking at firms across various dimensions shows that the sector representation is similar to the one of the whole manufacturing sector, the share of firms aged between 11 and 20 years is the highest and firms of a size between 20 and 49 workers (i.e. SMEs) are the most frequent. Large firms (i.e. with a number of workers higher or equal to 200) represent, however, a non negligible share of the total. Turning to the figures pertaining to our purpose, the table shows that only around 1/5 of firms provide training. Note however that this is based on the question of "whether firms provide training" and not on the intensity of training. In the empirical analysis, we will use the latter instead of the former. This allows further variations across firms. Finally, over the whole sample the average share of equipment aged less than 5 years old is around 1/3.

[7] Different values of the depreciation rate were considered (i.e. between 0.05 and 0.1) but the main results are not sensitive to the chosen value. We report the results with a rate equal to 0.075.

[8] The corresponding regression is not reported to save on space. All the coefficients are significant and the Adjusted R^2 is 0.81.

Table 2: Main characteristics of the firms in the sample

Characteristics	Percentage
Shares of firms by sector	
Food	9.54
Textile	21.62
Clothing	36.41
Leather and Footwear	11.29
Chemicals	7.00
Plastic products	10.97
Electrical machinery	3.18
Shares of firms by age	
0-5	14.29
6-10	20.36
11-20	35.47
21-30	16.58
31-40	7.39
Above 40	5.91
Shares of firms by size	
0-9	2.44
10-19	13.59
20-49	27.63
50-99	19.69
100-199	18.63
Above or equal to 200	18.02
Shares of firms by training provision	
No training	82.60
Training	17.40
Average share of equipment	
Less than 5 years old	31.76

Source: Authors' computation on the basis of FACS data.

Table 3 reports the results of six variants of Equation 5. A basic specification where the change in output and in relative costs only are introduced as explanatory variables. Three specifications where each of the retained additional variables (Training, share of machines less than 5 years old and the change in the rate of protection) is added separately. Specification 5 includes all the retained additional variables together. Specification 6 is the same as 5 except that sector and legal form dummies are also included. The introduction of the dummies does not add much to the explanatory power of the regression as shown by the adjusted R^2. We will focus on specification 5 which gives the highest explanatory power (i.e. the highest adjusted R^2).

Table 3: Estimation results

Dependent variable Δ Log (Employment)

Explanatory Variables	Specifications 1	2	3	4	5	6*
Constant	2.91	2.68	-1.16	0.95	-2.95	-15.68
	1.74	**1.59**	**-0.55**	**0.40**	**-1.05**	**-0.86**
Δ Log (Production)	0.08	0.08	0.06	0.08	0.06	0.06
	2.15	**2.10**	**1.58**	**2.12**	**1.54**	**1.51**
Δ Log (Wages / Cost of capital)	-0.33	-0.32	-0.33	-0.32	-0.32	-0.32
	-5.09	**-5.09**	**-5.15**	**-5.07**	**-5.14**	**-5.10**
Training: (number of workers-days) / employment		0.48			0.33	0.31
		2.48			**1.68**	**1.44**
Share of machines less than 5 years old			0.12		0.12	0.12
			3.17		**2.97**	**2.86**
Δ Rate of protection				-0.44	-0.41	-0.92
				-1.01	**-0.93**	**-1.16**
Adjusted R^2	0.22	0.22	0.23	0.22	0.23	0.22

Notes: Number of observations is 644. Estimation method is the 2SLS. Estimates are heteroskedastic-consistent. Δ stands for the first difference between 2000 and 2001. * = the regression includes sector and legal form dummies. t-statistics are in bold.

All the variables in Specification 5 have the expected sign although not always significant. The coefficient of production is positive but just below the 10% significance level while the coefficient of relative costs is highly significant and negative. This implies that labor costs (relative to capital costs) are important determinants of jobs creation. In contrast, Currie and Harrison (1997) suggested that labor market functioning does not disable jobs creation in Morocco. Their sample is, however, not fully comparable to ours. The coefficient of the change in trade protection is not significant. The coefficient of physical capital is positive and significant at the 5% level. Interestingly, it seems that new machineries are jobs creating, instead of jobs destructing, in Morocco. Investment in new equipment goes with hiring more workers

than replacing existing one. Although caution is in order, this finding should encourage policy makers to relax constraints on physical investment. The coefficient of the intensity of training is positive and significant at 10%. It was significant at 5% in specification 2. The introduction of new equipment as an explanatory variable lowers its significance; may be because of co-linearity: the purchase of new equipments is often accompanied by training to the new users. Overall, the results support (strongly in the case new investment) that technological upgrading can induce firms to create jobs.

The firm's performance may, however, depend on other factors than only technological upgrading. The literature suggests many factors such as learning from exporting (Tybout et al., 1998), the share of imported machinery (Coe et al., 1997) and the share of foreign participation (De Gregorio, 1992). In order to check for the robustness of the above conclusion, we re-run our preferred regression (Specification 5 in Table 3) to which we add each of the following explanatory variables: The ratio of exports to output, the share of foreign owned capital and the share of new investment that is imported. All variables come from the FACS. The results are presented in Table 4.

Table 4: Estimation results: Robustness to control variables

Dependent variable Δ Log (Employment)

Explanatory Variables	Specifications 1	2	3
Constant	-3.33	-5.45	-3.54
	-1.14	**-1.42**	**-1.26**
Δ Log (Production)	0.06	0.06	0.06
	1.54	**1.51**	**1.53**
Δ Log (Wages / Cost of capital)	-0.32	-0.32	-0.33
	-5.14	**-5.13**	**-5.18**
Training: (number of workers-days) / employment	0.33	0.36	0.30
	1.65	**1.89**	**1.64**
Share of machines less than 5 years old	0.11	0.11	0.11
	2.72	**2.93**	**2.79**
Δ Rate of protection	-0.38	-0.39	-0.40
	-0.86	**-0.88**	**-0.89**
Ratio of exports to output	0.01		
	0.46		
Share of new investment that is imported		0.04	
		1.30	
Share of foreign owned capital			5.41
			1.54
Adjusted R^2	0.23	0.23	0.23

Notes: Number of observations is 644. Estimation method is the 2SLS. Estimates are heteroskedastic-consistent. Δ stands for the first difference between 2000 and 2001. t-statistics are in bold.

Each of the 3 new explanatory variables has the expected sign but none is significant at the 10% level. Moreover, the Adjusted R^2 shows no improvement in comparison to our preferred specification. More importantly, however, is the fact that the coefficients of our variables of interest (training and new equipments) are not altered by the introduction of the additional explanatory variables. Not only they remain significant (at least at 10%) but their size is broadly the same.

Another robustness check may be useful too. It concerns the sensitivity of the results to firm size. Table 2 shows that all firm sizes are present in the sample. One may expect that the attitudes and the outcomes are not the same for a firm with 10 workers than for another with 200 workers. Say, because the smaller is likely to cover only a local market or face more constraints to fund its investment etc. To examine this aspect, we re-run the preferred specification on two sub-samples: one with firms employing less than 50 workers and the other for firms with more than 50 workers. Following Table 2, this gives almost equally large sub-samples.

Table 5: Estimation results: Robustness to firm size

Dependent variable Δ Log (Employment)

Explanatory Variables	Firm size	
	Less than 50 workers	More than 50 workers
Constant	-4.03	-2.43
	-1.06	**-0.56**
Δ Log (Production)	0.08	0.04
	1.22	**1.05**
Δ Log (Wages / Cost of capital)	-0.37	-0.27
	-3.95	**-3.41**
Training: (number of workers-days) / employment	0.42	0.32
	0.52	**2.05**
Share of machines less than 5 years old	0.14	0.10
	2.08	**2.06**
Δ Rate of protection	-0.67	-0.29
	-1.07	**-0.49**
Adjusted R^2	0.24	0.20

Notes: Number of observations is 288 for the sample with firm size of less than 50 workers and 356 for the other. Estimation method is the 2SLS. Estimates are heteroskedastic-consistent. Δ stands for the first difference between 2000 and 2001. t-statistics are in bold.

Table 5 presents the results of the 2 regressions. Overall, the quality of fit remains as good as with the full sample. All the coefficients have the expected signs but are not always significant. In both regressions, the coefficients of production (positive) and of protection (negative) are not significant while the coefficient of relative costs is highly

significant and negative. This shows that labor costs (relative to capital costs) are important determinants of jobs creation irrespective of the size of the firm. The main differences between the two regressions concern the coefficients pertaining to our variable of interest. For large firms (more than 50 workers) both the coefficients of training and of new machines are significant and positive. For small to medium size firms (less than 50 workers) only the coefficient of new machines is significant. It seems that while new machineries are jobs creating irrespective of the firm size, training induces higher employment only in large firms. May be, the small size of the firm allows managers to communicate with employees and monitor their work more easily than in large firms. Such communication is not reported as formal training in the survey which could explain the non significance of the corresponding coefficient.

The results in Tables 4 and 5 confirm that technological upgrading can help firms creating jobs even in period of increasing openness to trade. Should policy makers play a role in this context, they must provide adequate incentives to firms' new investment and training programs. Moreover, the results in Table 5 suggest that some selectivity in the provision of incentives might be useful. While larger firms should be incited to invest and train, the incentives for smaller ones should focus on investment.

5. Conclusion

Faced with the growing globalization of the world economy both economists and policy makers sought to assess its impact on employment and wages. A consensus seems to be that, both in developed and developing countries, openness to trade is not, by itself, the main cause of labor market problems. Depending on factors such as labor market institutions, technological change and firm's promptness to adapt to changes, the impact of trade liberalization on a country's employment may be positive or negative.

For a number of developing countries (LDCs), one main preoccupation is how to adapt their strategy in order to make firms creating jobs (a major issue in almost all LDCs) even in a period of increasing openness to trade. The paper investigates whether technological upgrading by firms (in particular investment in human and physical capital) can help achieving this target. To this end, it examines the experience of a sample of Moroccan firms with different attitudes (toward technological upgrading) and performance during a period of rapid trade liberalization.

The empirical analysis supports strongly that such technological upgrading can help firms creating jobs. Robustness checks both with respect to additional explanatory variables and to firm size confirm the conclusion. However, it seems that while new machineries are jobs creating irrespective of the firm size, training induces higher employment only in large firms. This implies that some selectivity in the provision of incentives to firms' might be useful. Should policy makers play a role in this context, they must provide adequate incentives to large firms for investment and training and focus the incentives for smaller ones on investment.

Appendix A: Data description

Table A1. Descriptive statistics

	Mean	Standard deviation	Minimum	Maximum
	Sample with firm size of less than 50 workers			
Training	0.40	3.68	0.00	52.73
New machines	28.41	34.71	0.00	100.00
Protection	-3.92	3.15	-8.70	1.27
	Sample with firm size of more than 50 workers			
Training	0.57	4.34	0.00	71.52
New machines	38.89	33.64	0.00	100.00
Protection	-4.81	2.62	-8.70	1.27

Table A2. Correlation matrix

	Training	New machines	Protection
	Sample with firm size of less than 50 workers		
Training	1.00		
New machines	0.14	1.00	
Protection	-0.05	-0.03	1.00
	Sample with firm size of more than 50 workers		
Training	1.00		
New machines	0.14	1.00	
Protection	-0.07	0.06	1.00

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