Self Selection versus Learning-by-Exporting Four Arab Economies

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Trade and openness are Pareto optimal, which is the main argument for globalization. Empirically this has been a difficult question to answer. In the past 15 years or so empirical analysis focused on micro-level plant-level, data instead of aggregate time series. There have been two competing hypotheses: "self selection" and "learning-by-exporting". In the former, causality runs from productivity to exporting; the opposite in the latter. Clearly there are serious policy implications. We test those hypotheses for four Arab countries (Morocco, Egypt, Oman and Qatar) using a variety of methods. There is evidence for both self-select and learning-by-exporting in Morocco. Exporting industries' productivity levels dominate those of non-exporting industries in Morocco and Egypt. But there is no evidence in favor of exporting industries in the oil-producing countries, Oman and Qatar.

INTRODUCTION

There is a *Prima facie* evidence that exports and productivity are positively correlated. However, which causes what has serious policy implications. Proponents of free trade, openness and globalizations people prefer to see exports cause (increase) productivity. Export promotion policies would take the lead.[1] There is a reasonably large empirical literature, where two major hypotheses have been tested. There is a good survey on this topic, which covers the literature up to 2004; see Lopez (2005). Also, there is a very useful and up-to-date symposium on the issue; see Wagner (2007). Loecker, (2007) is the latest contribution in this field.

The first hypothesis states that productive firms self-select to be in the exporting business and the less or the unproductive firms can't, thus productivity causes exports. The common explanations are that exporting is a costly business (e.g., transportation costs, distribution costs, marketing costs, networking costs etc). The costs are barriers to entry into exporting, thus, only productive firms could enter. Wagner (2007) also suggests that productive firms might be more forward-looking, where the desire to export tomorrow leads them to be more productive today. There is a *conscious self-selection* explanation. A firm that wants to export works hard to satisfy international buyers. Firms then make investments decisions just for that purpose (e.g., the wine industry in Chile). They make a "technological" effort.

The second hypothesis is called learning-by-exporting. The idea is that knowledge flows from international buyers and competitors, which helps improve the post-entry productivity of export starters. Competition with foreign firms is tough; it induces firms to improve otherwise they lose the markets. See Lopez (2003) for very useful discussions and Lopez (2005) for survey of the literature.[2] There is evidence for both hypotheses.

The self-select and learning-by-exporting hypotheses are not mutually exclusive. The correlation between exports and productivity is an indication that causality might be running in both directions. We do not believe that we could resolve the causality issue empirically because we do not have the statistical machinery to do so. Our best hope remains in economic theory and best econometric practice, where we try to account for all known problems and emphasize robustness.

To appreciate the difficulty of the matter, note that the economic theory is also ambiguous on this issue. The neoclassical growth models and the endogenous growth models have different assumptions, and reach different conclusions, about diminishing marginal product of capital. Some have a clear causality running from openness to economic growth while some have an ambiguous effect depending whether the country is exporting human-capital intensive goods or importing them.[3]

The two major (and different in many aspects) research projects (Bhagwati and Krueger) NBER project in the 1970s[4] and the World Bank project in the 1980s, Papageorgiou – Michaely – Choksi found that import substitution strategy has no effect on the long-run rate of growth and that outward oriented policy is better for growth.[5] Edwards (1993) pointed out the differences in these studies and concluded it is difficult to draw a strong conclusion; he criticized the case-study literature, which usually finds strong positive effect from trade to growth. The main problems were in the econometrics methodologies such as treatments of endogeneity and measurements.

There is also a literature, where cross-sectional evidence for export-led-growth kind of story crumbles once institutional variables that measure the quality of the institutions are included in the regressions, see Rodriguez and Rodrik (2001) for example. Then, the availability of firm-level data motivated micro-level studies. See Lopez for a large list of studies.

Arab countries do not appear in this literature, only Moroccan data were analyzed, Clerides *et al.* (1998) and the World Bank's study *Moroccan Manufacturing Sector at the Turn of the Century* (2002). They found evidence consistent with learning-by-exporting. We chose four Arab countries: Morocco, Egypt, Oman and Qatar for two main reasons. First, there is a very little economic analysis in the literature using the Arab emerging markets. Second, these four are the only Arab countries that have reasonable data to test these hypotheses. Morocco has data on exports, output, capital expenditures, employment, wages by 4-digit ISIC industry classification. Egypt, Oman and Qatar have data on output, value added and exports. Qatar is probably the richest country today, just as rich as Luxemburg in terms of GDP per person.[6]

Lopez (2005) says that studies in this area either do not find empirical support for learning-by-exporting or, when they find some, they seem to be limited to some industries, young exporters, and firms with a very high involvement in exporting. Also when learning is present, the effect seems to last for a short period of time. These studies suffered from small samples and for a selection bias according to Lopez. He explains the lack of evidence for learning-by-exporting. He says that continuous diffusion of newly acquired technology from exporters to non-exporters in a way that both groups follow similar trajectories. That might mean it is difficult to identify the groups. He also cites Westphal (2002) who argues that the reason may be

that continuing export activity is required as an input to maintain an exporting firm's productivity edge. Finally, he cites Tybout (2003) as saying that contacts between a firm and a foreign client may occur before any flow of exports is revealed in the data.

The survey cites a number of macro and micro-level studies. On the macro level the survey cited 11 paper (table 1 p.628), where positive relationship between trade and growth is found, but the correlation disappeared when trade and institutions are instrumented and when a measure of geography is included in the regressions. Also cited were five case studies. At the micro level, however, the survey cited 16 papers, where self-selection and learning-by-exporting hypotheses were tested. Most of the studies find support for both hypotheses, except 3, where support for self-selection only is found.

Wagner (2007) listed 45 studies just on the firm-level. He summarizes the results by saying that exporters are more productive than non-exporters and that they self-select into the export markets, while exporting does not necessarily improve productivity. He argues that it might be too early to speak of the findings as stylized facts and to draw policy conclusions. My reading is that theoretical connections and causality runs from trade to productivity and the establishment economists, e.g., Paul Samuelson, Robert Lucas Jr. and Ed Prescott seem to support it. The empirical macro and micro literature faces lots of challenges.

All that been said, it might be difficult to argue for the self-select hypothesis in the Arab economies. Productivity and innovation are relatively low to begin with. We compare output per worker in the same industries in Morocco with other industrial countries. We compare output per worker in Moroccan industries with arbitrarily chosen economies: Korea, Singapore, Spain, and the USA. Moroccan's industries are relatively less productive. In 2002 for example, Morocco's average (across 91 industries) output per worker growth rate was 2.52 percent while for the same industries, output per worker in Korea was 3.22 percent; Singapore was 3 percent; Spain was 3.1 percent and the USA was 3.4 percent. Also, Moroccan exports are not considered high-tech according to the UN criteria and the government subsidizes the manufacturing sector. We speculate that some manufacturing firms try exporting and when they find it profitable they export more.

It is also important to study the role of imports in the Arab countries; that imports affects productivity. Arab countries import capital and intermediate goods, which affect the innovation process in exporting industries. Exports and imports are complements. As far as we know there are only four papers in this literature that studies the effect of imports, Lopez (2005) cites Braga and Willmore (1991), Pamukcu (2003) for the cases of Brazil and Turkey respectively. Also see Kasahara and Lapham (2008) for more on the theory.

It is also noted that exporting firms invest more in R&D. There is also evidence that firms that began to export in the same year of establishment are systematically more productive than domestic firms which became exporters. So, there is evidence of self-selection.

In this paper, we had to use variety of methods because the data differ across countries. For Morocco, where more data are available, we test the hypotheses stated above using (1) commonly used regressions; (2) Quantile regressions: (3) Generalized Method of Moments to estimate a model based on a production function; (4) For Egypt, Oman and Qatar, which have limited data, we use two non-parametric techniques to test for first-order stochastic dominance for exporters and non-exporters productivity.

The results must be interpreted with extra care and be taken with a grain of salt because the 4-digit industry-level data could not capture the firm and plant-level dynamic. Our data would allow us certain econometric freedom and prevent us from using certain techniques that could

allow us explore the dynamic (e.g., matched sampling). Nevertheless, it is a reasonable beginning to document information about Arab countries, which are absent from the international literature. Future research must gather and use more micro-firm-level data.

The paper is organized as follows: next we describe the data. In section 3 we carry out empirical analyses and present the results. In section 4 we summarize our findings.

DATA DESCRIPTION

Morocco is the only Arab country studied in this literature (Clerides *et al*. 1998) and in the World Bank's study *Moroccan Manufacturing Sector at the Turn of the Century* (2002). These detailed data are not available for researchers outside the World Bank. We could not get such data. Also, we do not know if the data are up-to-date or not. To study the relationship between output per worker and exports we analyze a less comprehensive data, the UNIDO data set. Thus, we provide another empirical evidence about the same hypotheses stated earlier using a different data set.

For Morocco we have five years of data from 2000 to 2004 covering 91 industries. The data include output, employment, gross fixed capital, exports and imports. For Egypt, we have data on value added and exports for the years 1997, 1998 and 2002. For Oman and Qatar we have data on output, employment and exports. The Omani data cover the years 1993, 1994 and 1995. For Qatar the data are for one year only, 2001. Further, the number and the type of industries included in the samples vary from one year to another.

Because of all that we will use different methodologies to test the data. For Morocco we use both parametric (regression analysis) and non-parametric tests (first order stochastic dominance). For Egypt, Oman and Qatar we use non-parametric methods only.

The data do not include firms. The data are for industries at the four digit ISIC level. We removed missing values, hence the samples are shorter. The data for these countries are compatible since they are measured the same way. All variables are measured in current US dollars. We deflate by the US CPI (except for employment). The data appendix includes definitions and the lists of all industries. The only drawback is that we could not distinguish between private and public owned industries. We also have no data on mixed industries.

Let us begin with Morocco. Among the 91 industries, 80 are exporters. They vary in the extent of their exports. We take data for all industries that have positive exports values and for all industries with zero exports. In other words, we treat any industry with a positive exports value as an exporter regardless of the absolute level of its exports. Total exports are the sum of exports to developing and developed countries.

The average annual exports value (at market prices) for these 91 industries to the world is about 19,467,000 US dollar. There are 20 industries only whose exports values exceed this average. About 2/3 of total exports are to developed countries; the rest to developing countries. The average annual exports value for the 91 industries to developed countries is 11,745,000 USD. There are 18 industries only whose exports values exceed this average. Only 10 of 91 industries have a positive *net* exports, i.e., 81 industries are net importers. The data also have information about exports to and imports from developed and developing countries. The majority of industries are net importers. About 80 percent of all exports are destined to the European Union (World Bank Trade Can). UNCTAD (2004) report shows the trade structure. Morocco imports, among other things, machinery and transport equipment, manufacturing intermediate

goods, fuel, ores and metals and agricultural raw material. Europe's share is about 1/3 more or less.

Table 1 reports the mean and the standard deviations for key variables. Table 2 reports the mean and the standard deviations for the rate of growth of these key variables. For real output per worker in Morocco, the overall mean across all industries is 5.81. Out of the 91 industries, there are 40 whose mean output per worker exceeds the overall industry mean. There are 53 industries whose mean exports per worker exceed the overall industry average.

Exports are also reported for developed and developing countries. On average, Moroccan industries, as shown earlier, export more to developed countries than to developing ones. The mean log exports per worker are 2.19 and 0.80 for developed and developing countries respectively. Slightly more than 50 percent of the industries in the sample have more exports, both to developed and developing countries, more capital investments and more workers than the overall average.

As shown earlier, almost all Moroccan industries are net importers. Only 10 industries are net exporters. These are processing of fruits and vegetables; grain mill products; wines; soft drinks and mineral water; made-up textile articles; carpet and rugs, veneers sheets, plywood, particle boards etc; basic chemicals except fertilizer; cement, lime and plaster; and articles of concrete, cement and plasters. The rest are net importers. It is quite plausible that Morocco imports capital goods and intermediate good.

Output per worker grew at 3.4 percent on average over the period 2000-2004. At least 60 industries out of 91 grew at rates higher than 3.4 percent over the sample, which is impressive. The highest growth rate is an amazing 38 percent in ceramic products while the lowest growth is -0.60 percent in non-refractory clay. On average, there has been a decline the rate of growth of capital investments, -4.5 percent. However, 48 industries capital investment rates of growth exceeded that average. The highest rate of growth of capital investments, 74 percent, has been in Bicycles and Carriages. Exports per worker grew at much higher rates than output per worker and capital investments. The average rate of growth is 6.7 percent. When we look at exports per worker growth rates to developed and to developing countries we also see that on average, the growth rate of exports per worker has been higher to developed countries, 8.6 percent, than to developing countries, 6.5 percent. It seems though that there has been an increase in the growth rate of the overall trade (exports and imports per worker) with developing countries. The descriptive statistics also seem to suggest significant variations across industries.

In 1997 Egypt had 96 industries in the sample; 92 were exporters. There were 90 industries exporting to developing countries and 87 exported to developed countries. Average total exports value across all 96 industries is 27,605,000 US dollars. Some industries exceeded that average, but the majority did not. There are 18 industries which exported more than that average in 1997. Egypt exports to developing countries averaged 8,291,000 US dollars and only18 industries exported more than that amount. Egypt's average export value to developed countries was 19,313,000 US dollars, and 16 industries exceeded that average.

In 1998, the sample has 102 industries; 98 were exporters. Average total export value across all industries is 22,527,000 US dollars, less than the average in 1997; 19 industries exported more than that average. The average exports value to developing countries was 7,310,000 US dollars, again less than that in 1997, and 16 industries only exported more than that. For exporters to developed countries, the average exports value was 15,217,000 US dollars; only 15 industries exported more.

In 2002, we have 93 industries in the sample. Remember that the type of industries also vary across samples. In this sample, there is only one non-exporting industry. Ninety industries exported to developing countries and 85 exported to developed countries. The average total exports value was 26,228,000, 19 industries exported more. The average value of exports to developing countries was 10,881,000, which represents a modest increase over the averages in 1997 and 1998. There are 21 industries, which exported more than this average. Refined Petroleum Products were the highest at 30 million dollars. The average value of exports to developed countries was 15,346,000 US dollars. There were 16 industries, which exported more than the average. Again, exports of Refined Petroleum Products reached more than 45 million US dollars. Interestingly, Egypt's exports value of Textile fiber, Preparation and Textile Weaving industry is smaller than that of Refined Petroleum Products industry, which fetched the highest export value of nearly 75 million US dollar in 2002. These numbers mostly reflect high oil prices.

For Oman, we have data for 1993, 1994 and 1995 only. The industries differ from one year to another. The number of industries is 44, 43 and 54 for the years above respectively. In 1993, only 4 industries were not exporting. Also only 4 industries did not export to developing countries. The majority of non-exporting activity was to developed countries. Twenty three industries were non-exporting. The average value of total exports were 3,900,000 US dollars, very small relatively speaking. Only ¼ of the industries in the sample exported more than the average. The average value of exports to developing countries was 3,432,000 US dollar and the average value of exports to developed countries was 470,000 US dollars, which is astonishingly low. Nine industries exported more than the average to developing countries and 3 industries only exported more than the average to developed countries. Basic precious and non-ferrous metals dominated all exports.

In 1994, Oman has 1 industry that did not export and did not export to developing countries, Weapons and ammunition. There were 21 industries that did not export to developed countries. In 1995, one industry did not export and four did not export to developing countries. There were 18 industries, which did not export to developed countries. The average value of total exports was 4,845,000 US dollars in 1992 and 5,947,000 US dollars in 1995. Ten industries exported more than average in 1994 and twelve industries exceeded the average in 1995. The average values of exports to developed countries increased markedly in 1994 and 1995; they were 1,244,000 and 1,641,000 respectively.

Qatar's sample is the smallest; it has 29 industries in 2001. There were 4 non-exporting industries for developing countries and for total exports. There are 23 non-exporting industries to developed countries. The average exports values are 24,229,000, 15,882,000, and 8,367,000 US dollars for total exports, exports to developing countries and exports to developed countries respectively. Qatar's exports values are much higher than Oman. The high value exporting industries are Basic iron and steel and refined petroleum products.

The UN classification system indicates that the majority of exports are classified as low tech. This is also true for Egypt, Oman and Qatar. It is also very important to note that the data do not allow distinction between publicly owned and privately owned industries just like we do at the firm or the plant level.

EMPIRICAL ANALYSIS

Morocco

To test the hypotheses of self-selection and learning-by exporting, we will follow the literature: (1) We provide descriptive statistics, correlation matrices, estimate a few *ad hoc r*egressions of exports dummies on output per workers and exports status using least squares, fixed effect and quantile regressions. (2) We use an instrumental variable (Dynamic Generalized Method of Moments, GMM) approach to estimate a Cobb-Douglas production function type, where technical progress is endogenous, thus exports (trade) affects output per worker through technical progress. (3) We also test for first-order stochastic dominance.

We begin with simple summary of the data, table 3 reports descriptive statistics of the levels and the growth rates of output per worker for the exporters and non-exporters to the world, to developed countries and to developing countries. Although exporting industries outnumber the non-exporters in the sample, it is clear that exporters enjoy a higher average level and growth rates of output per worker, higher wage per worker and higher level of employment.

Table 4 reports the simple correlation coefficients between the levels of output per worker, exports per worker, gross fixed capital investments per worker, wages and salaries per worker, value added per worker and the number of workers. The correlation coefficients are small in magnitudes but significantly different from zero. Again, the association between output per worker and exports is obvious. Table 5 reports the correlation coefficients for the growth rates. The correlation between output per worker growth rates and exports is still positive, small in magnitudes and significant, except for exports to developed countries.

Table 6 reports regressions of exporters' status, where output per worker, capital investments per worker, the number of employees, and wages per worker are regressed on a dummy variable. There are three regressands. In the first regression, a dummy for exports to the world takes a value of 1 if yes, and zero otherwise. In the second regression, a dummy for exports to developed countries takes a value of 1 if yes, and zero otherwise; and in the last, a dummy for exports to developing countries takes a value of 1. The regressions are for the levels and the growth rates of the regressors. One thing is clear, in this *ad hoc* regression usually found in this literature, there is the positive and significant association between the *level* of output per worker and exports. These results are usually interpreted as evidence of, or consistent with, self-selection. Productive firms tend to export. Also evident that exporting is associated with higher wages and higher employment levels. Capital investments have the wrong sign, but statistically insignificant. This is not surprising for the Arab manufacturing industries whose productivity levels are low. Labor is cheaper than capital this low investments in capital. Also, the correlation between output and investments in capital is high. In the second panel of table 6, the coefficients of the *growth rate* of output per worker and exports are insignificant. This is also true for investments, labor and wages.

Further, in this literature researchers compute something called the exporter premia, which is the percentage difference of labor productivity between exporters and non-exporters. This is computed from a regression of the log labor productivity (log output per worker) y_{it} on the current export status dummy XD_{it} (1 if the industry exports in year t, and 0 elsewhere) and a set of control variables usually include industry, region, firm size measured by the number of workers, l_{it}). The subscript i denotes industry $i = 1,2,\cdots N$ and t denotes time $t = 1,2,\cdots T$.

$$1 \quad y_{it} = \alpha + \beta\ XD_{it} + \delta\, l_{it} + e_{it}$$

The *average* percentage difference between exporters and non-exporters, i.e., the exporter premia, is $100(e^{\beta} - 1)$. We estimate equation (1) for the three types of exporters: those who export to the world, to developed countries and to developing countries. To account for unobserved heterogeneity due to time-invariant industry characteristics which might be correlated with variables included in the model, we also estimate fixed-effect regressions, i.e., $e_{it} = u_i + v_{it}$. We report the results in table 7. In this table we have 15 columns, three blocks of 5 regressions in each. The first block is for exports to the world, the second is for exports to developed countries and the third block is for exports to developing countries. In each block we report a EGLS regression without a fixed effect, a EGLS regression with fixed effect, and three quantile regressions, Yasar *et al.* (2006).

The first thing we observe is that the magnitude of β is much larger in non-fixed effect regressions including quantile regressions, when compared with the fixed effect results. The magnitudes of β's in the quantile regressions are similar to those in EGSL non-fixed effect regressions, except for the 90th quantile, which might be the reason for these insignificant effect; the coefficient is insignificant in the 90th quantile regressions. There are only a handful of industries in the upper 90th quantile. The export premia is reported for all statistically significant β's. It varies between 62.5 and 40, where lower values correspond to fixed effect regressions.

Secondly, the following regression is estimated and the exports premia is computed.

$$2 \quad y_{it} = \alpha + \beta_1 Start_{it} + \beta_2 Cont_{it} + \beta_3 Stop_{it} + \delta\, l_{it} + v_{it}$$

The results are reported in table 8. *Start* is a dummy variable meant to capture the industries which began exporting at time t; it takes a value of 1 if $x_{i0} = 0$ and a value of 1 if $x_{it} = 1$, where x is exports, the subscript i denotes the industry and 0 is the base year (year 2000 in the case of Morocco); *Stop* is a dummy that takes a value of 1 if $x_{i0} = 1$ and $x_{it} = 0$, and denotes the industry that stopped exporting; *Cont* is a dummy variable that takes a value of 1 if $x_{i0} = 1$ and $x_{it} = 1$, i.e., for industries that have been exporting continuously. Non-exporting in both years is the reference category. We control for the size of the industry by adding the log of the number of employees, l_{it}. We also tried the growth rate of employees, Δl_{it} without any significant change in the results. We use $\hat{\beta}_2$, which compares exporters and non-exporters. The equation was estimated using least squares, with a fixed-effect when possible and with a random effect. We find the coefficient estimates to be robust to any methodology.

We find that β_2's (of continuous exporters) are the only significant coefficients across all five different regressions and for all three types of exports. Again, fixed effect regressions yield smaller β's. The β's of the 90th quantile are also smaller than others and insignificant most likely because there only a few exporters in the upper quantile.

To test the hypothesis that exporting assists and may lead to a higher output per worker we test whether the coefficient β_1=0. It compares output per worker for exporters and non-exporters. We find the β_1's to be insignificant except in the first block in the fixed effect regression, where

the coefficient estimate is 0.24 and in the fixed effect regression in the third block. The coefficient estimate is 0.15. The result suggests that beginning exporting to developed countries (starters) does not have significant effect on output pr worker and most of the premia is derived from beginning to export to developing countries. De Loecker (2007) using data from Slovenia finds "strong immediate effects of starting to export".

Stopping exporting activity seems to harm exporters. Although the coefficient β_3 is insignificant in all regressions, it is significantly negative in the 0.1 quantile regressions. The lower quantile's results are significant because most exporters are in the lower quantile.[7]

To test whether productive industries self-select to be exporters, the following regression is estimated:

$$3 \quad y_{it-3} = \alpha + \beta\, XD_{it} + \delta\, l_{it-3} + u_{it}$$

The left hand side variable is log output per worker three years ago. If productive industries become exporting industries then one expects to see significant differences in performance between future export starters and future non starters several years before some of them begin to export. The dummy variable XD_{it} takes a value of 1 if the industry exports and zero otherwise. Again, log employment is a control variable for the size of the industry. We estimated this regression using exports to the world, exports to developed and developing countries. These are EGLS and quantile regressions. Fixed effect regressions failed. Results are reported in table 9. The evidence for self-selection is very weak. The coefficient β is significant in the EGLS regression only, and in the cases of total exports and exports to the developing countries.

Finally, we investigates whether output per worker increased more in industries that are export starters in the period before they started than in industries that continue not to export. We estimate the following regression.

$$4 \quad y_{it} - y_{i,t-3} = \alpha + \beta\, XD_{it} + \delta\, l_{i0} + \eta_{it}$$

We estimate the above regression using EGLS and quantile regressions and report the results in table 10. The pre-entry premia also computed the same way as before from the estimate of β. It shows the average percentage difference between today's exporters and today's non-exporters three years before starting to export, controlling for the size of the industry. The estimated β shows the magnitude in which future exporters outperformed the non-exporters in the years prior to entry. In the EGLS regressions, β's are positive and highly significant. The magnitudes are close to the estimates of the β's reported earlier. However, the β's in the quantile regressions are statistically insignificant. Fixed effect regressions also failed, which casts lots of doubt on these results. These results and the results in table 9 are consistent with our prior about this hypothesis in the Arab manufacturing industries. The evidence for learning-by-exporting is present, but it is sensitive to specifications.

All of the above regressions are *ad hoc*. Now we turn to estimating regressions that have more solid theoretical underpinning. Here we test whether exports significantly affect output per worker using a Cobb-Douglas production function:

$$5 \quad Y_{it} = A_{it} L_{it}^{\alpha}$$

Where the industry level output is Y_{it}, A_{it} is technical progress, L_{it} is employment and the subscripts i and t denote industry and time respectively. We do not have data for the stock of capital. Instead, we have data on gross fixed capital formation. We have two options. We could compute the stock of capital using the perpetual inventory approach, which requires assumptions about the depreciation rate by industry. To keep the measurement noise in the data at minimum we will avoid computing the stock of capital and assume that the investment in capital (the change in the stock of capital) and exports affect technical progress *a la* endogenous growth models. Thus, technical progress is endogenous.

$$6 \quad A_{it} = (X/Y)_{it}^{\beta} \ (\Delta K/Y)_{it}^{\gamma}$$

Where investments is ΔK_t, which is measured by gross fixed capital formation. Dividing by Y_{it} is to ensure scale-neutrality.

Substituting (6) in (5) and re-arranging:

$$7 \quad Y_{it} = X_{it}^{\frac{\beta}{1+\beta+\gamma}} \ \Delta K_{it}^{\frac{\gamma}{1+\beta+\gamma}} \ L_{it}^{\frac{\alpha}{1+\beta+\gamma}} \ e^{\varepsilon_{it}}$$

The coefficients could be rewritten as; $\lambda_1 = \beta/(1+\beta+\gamma)$; $\lambda_2 = \gamma/(1+\beta+\gamma)$; and $\lambda_3 = \alpha/(1+\beta+\gamma)$.

Equation (7) is re-written:

$$8 \quad Y_{it} = X_{it}^{\lambda_1} \ \Delta K_{it}^{\lambda_2} \ L_{it}^{\lambda_3} \ e^{\varepsilon_{it}}$$

Dividing through by employment and taking logs we arrive at the productivity equation, which we will estimate from the data. Lowercase denotes log per employee:

$$9 \quad y_{it} = \lambda_1 x_{it} + \lambda_2 \Delta k_{it} + \delta l_{it} + \varepsilon_{it} \ ,$$

$\delta = \lambda_1 + \lambda_2 + \alpha - 1$ measures the deviation from constant returns to scale.

The error term will include an industry fixed effect, b_i, which will include effects such as the stock of capital, location, industry etc. We will estimate this fixed effect.

We estimate equation (9), where x_{it} will be exports to the whole world x_{it}^{w}, exports to developed countries x_{it}^{d}, exports to the developing countries x_{it}^{g}, total trade measured by the sum of exports and imports, $x_{it}^{w} - m_{it}^{w}$; $x_{it}^{d} - m_{it}^{d}$; and $x_{it}^{g} - m_{it}^{g}$ respectively, where the superscripts w, d and g denote world, developed and developing countries respectively.[8]

We tested the variables for unit roots using a few commonly used panel data tests and found no evidence of unit roots. The hypothesis is rejected universally. We think the rejection of the unit root is a good sign since these tests are known to have low power problems.[9]

We report no-fixed effect and fixed effect regressions. The results of the regressions without fixed effects are reported in table 11. Table 12 reports the results of the regressions with fixed effects. Fixed effect regressions are more appropriate because they were designed to deal with heterogeneity. In both tables we report EGLS and GMM results. GMM is the Dynamic Generalized Method of Moments, Wooldrige (2002). We report the Arellano and Bond (1991) standard errors.[10] We also used lagged differences as instruments in the level regressions to increase the efficiency gains because our T is short. For robustness, we report 12 regressions in each table, 6 EGLS and 6 GMM for robustness. The regressors include capital investments and labor in all regressions.

We use the European Union's real GDP per capita and the real 90-day interest rates along with the lags of the RHS variables are instruments. There are two reasons for using the foreign variables as instruments. First, they are strictly exogenous to Morocco. Second, they are relevant. More than 80 percent of Morocco's total exports is to the EU. See figure 1, which is from Trade Can, the World Bank (2005) CD. It includes data from 1999-2002. As the EU GDP per capita increases the EU's imports from Morocco also increases. Thus, Morocco's exports to the EU and the EU's GDP per capita are highly correlated, but the EU real GDP per capita is uncorrelated with the error term of the regression. Morocco also seems to borrow its capital from the EU. The share of Moroccan's debt denominated in Euro is 61 percent of total debt in 2005. Thus the EU's real interest rate is a relevant instrument for capital investments; it is highly correlated with Morocco's investments in capital. These instruments seem to work well.

We do not have long time series. We experimented with the number of lags of the instruments and found no significant changes in the estimates and their standard errors. Note that longer lags are only weakly correlated with the regressor, which undermine the validity of the instruments. The number of instruments should not be large relative to the sample size. However, over-identification tests are also reported. Suspicions about the validity of the instruments can never be eliminated. Further, the instruments can also be weak. And, the coefficient estimates are always going to be biased in finite samples. When the instruments are weak the bias is expected to be large. The literature does not have a solution to this problem in panel data. We hope that the bias is not "too big" and the p-values are more reliable than one would expect.

Given all that, there seems to be overwhelming evidence that exports, whether the total, exports to developed countries or to developing countries, are statistically significantly affecting average output per worker, which is evidence in favor of the learning-by-exporting hypothesis. In the GMM regressions, this evidence is even more suggestive of some sort of causality. There is only one regression in table 11 and one in table 12, where export is insignificant and that is in the case of exports to developing countries.

Fixed effect seems to affect the coefficient of labor in the two methods of estimation. While the first 6 no-fixed effect regressions in table 11 suggest that the production function exhibits an increasing returns to scale, i.e., the coefficient is >0 the other 6 regressions indicate constant returns to scale, i.e., the coefficient =0. The same regressions in table 12 suggest that the production function overwhelmingly exhibits decreasing returns to scale. We believe decreasing returns to scale makes more sense for Morocco's industries because the export market is new, small, and the production of exportable goods could be costly at the early stages of developments, thus doubling output per worker is costly. The magnitude of the coefficients of

exports in tables 11 and 12 seem to differ with the method of estimation. EGLS coefficients are much smaller than GMM. Also, the magnitudes of exporters to developed countries are larger than those of exporters to developing countries.

To examine the effect of exports on the growth rate, we could differentiate the general Cobb-Douglas function and express the production function in growth terms, where the variables are the same as above Y_{it} is industry output, ΔK_{it} is capital investments, L_{it} is the number of workers and X_{it} is exports (exports to the world, exports to developed countries, exports to developing countries and net exports to the same destinations). From 5 and 6 we estimate:

$$10 \quad \Delta \ln Y_{it} = a_1 \Delta \ln L_{it} + a_2 \ln \frac{X_{it}}{Y_{i,t-1}} + a_3 \ln \frac{\Delta K_{it}}{Y_{i,t-1}} + a_4 e_{it},$$

In fixed effect regressions, productivity growth rate varies across industries since $e_{it} = u_i + \varepsilon_{it}$. We estimate this equation with and without fixed effect using EGLS, and dynamic GMM with the same instruments as before. We also tried $\Delta \ln X_{it}$ as a regressor instead of $\ln(X_{it} / Y_{it-1})$ without any significant changes in the results (we don't report these results to save space and they are available upon request).

For the growth rate model, we only report fixed effect regressions. Results are in table 13. The coefficients of export growth are significant everywhere. The results reported in tables 11-13 suggest that exports effect on the level of output per worker and the growth rate of output at the industry level in Morocco are positive and significant.

Egypt, Oman and Qatar

Finally, we test the hypothesis that the distribution of the level of output per worker of the exporters and the distribution of the level of output per worker of non-exporters are equal against the alternative hypothesis that the distribution of the level of output per worker of exporters dominates, i.e., first-order stochastic dominance. We report two results in table 14. First, we report two-sample Wilcoxon rank-sum test. Second, we report Kolmogorov – Smirnov test, see Wagner (2006), Kolmogorov (1933), and Smirnov (1939). In both cases we find strong evidence that the exporters distribution dominates the non-exporters' in Morocco (2000-2004) and Egypt (1997 and 1998).[11] However, the domination is not present in Egypt in 2002. The hypothesis that the distributions of the levels of output per worker for exporters and non-exporters are equal could not be rejected for Oman and Qatar.

SUMMARY AND CONCLUSIONS

Pooled time series – cross sectional 4-digit industry level UNIDO data for four Arab emerging economies: Morocco, Egypt, Oman and Qatar are used to test the self-selection and learning-by-exporting hypothesis. We used a variety of methods to test these hypotheses because the data vary across countries. Morocco has more data so we were able to, more or less, replicate the literature. The literature lacks information about the Arab economies. This paper filled some of the gap. Future research must focus on collecting firm-level longitudinal data to analyze the complex dynamic of the relationship between productivity and trade.

The observed correlation between export and output per worker at the 4-digit industry level can be explained by both self-select and learning-by-exporting, especially in Morocco. The

export premium is high. Exporters pay higher wages, employ more workers and are more productive. Industries that continue to export gain in terms of higher productivity; industries that stop exporting lose in terms of productivity; and the gain from exports is not realized when industries start to export. There seems to be a dynamic and that it takes time to realize the gains from exporting. This evidence could lend more support to learning-by-exporting. It could be saying that industries that survive in the exporting markets longer gain more. The most important question, maybe, whether exporting today predicts higher productivity in the future?[12]

We also found evidence that the distributions of productivity for exporting industries in Morocco (2000-2004) and Egypt (1997, 1998) first-order dominate those of non-exporting industries. The domination is not present in Egypt in 2002 data. The hypothesis that the distribution of productivity for exporting industries equal that of non-exporting is only borderline rejected in Oman (1993-1995) and insignificant in Qatar (2001). These two countries are mainly oil-producing and manufacturing industries are small and weak.

The policy implication favors more trade in manufactured goods. Morocco and Egypt seem to benefit. Manufacturing is an essential ingredient for economic growth, see the Verdoorn Law.[13] Oil producing countries should pursue manufacturing policies including, e.g., a petrol-based manufacturing industry, then attempt exporting these products rather than crude oil and gas. Razzak (2007) finds manufacturing gap to explain the gap in labor productivity in developed countries such as New Zealand, Australia, Canada and the United States.

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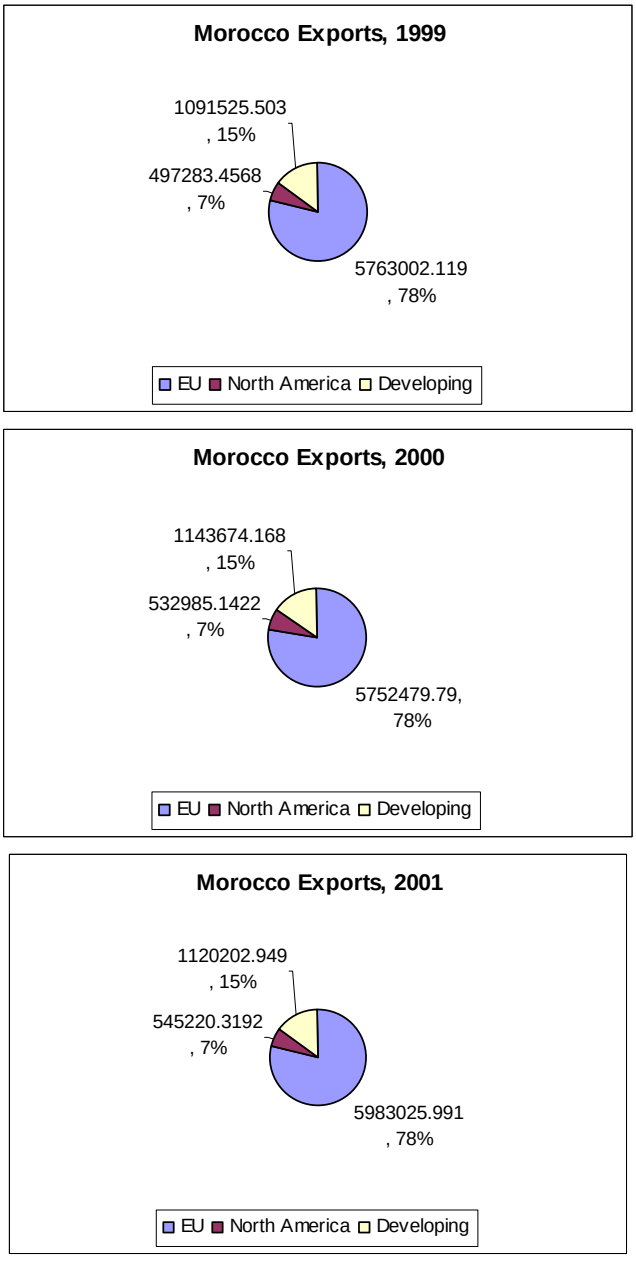
FIGURE 1
MOROCCO EXPORTS DISTRIBUTION



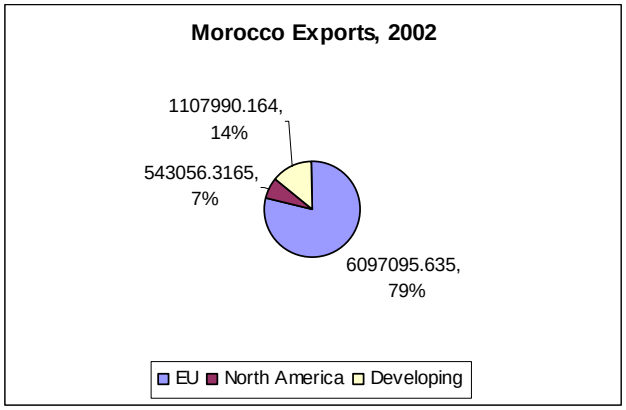


TABLE 1
DESCRIPTIVE STATISTICS – MOROCCO – SAMPLE 2000-2004 – 91 INDUSTRIES.

	y_{it}	x_{it}^{w}	x_{it}^{d}	x_{it}^{g}	$x_{it}^{w}+m_{it}^{w}$	$x_{it}^{d}+m_{it}^{d}$	$x_{it}^{g}+m_{it}^{g}$	dk_{it}	l_{it}
Mean	5.81	2.18	1.48	0.79	14.80	13.81	11.28	2.87	7.15
STD	0.88	2.74	2.82	2.59	3.36	3.48	3.85	1.15	1.40

All variables are in log. y_{it} is output per worker (i.e., log (Y_{it}/L_{it}); Similarly, dk_{it} is gross fixed capital formation (capital investments) per worker; x_{it}^{w} is total exports to the world per worker; m_{it}^{w} is total imports from the world per worker. x_{it}^{d} is exports to developed countries per worker; m_{it}^{d} is imports from the developed countries per worker; x_{it}^{g} is exports to developing countries per worker; m_{it}^{g} is imports from developing countries per worker. l_{it} is the number of workers;

TABLE 2
DESCRIPTIVE STATISTICS – MOROCCO – SAMPLE 2000-2004 – 91 INDUSTRIES.

	Δy_{it}	Δx_{it}^{w}	Δx_{it}^{d}	Δx_{it}^{g}	$\Delta(x_{it}^{w}+m_{it}^{w})$	$\Delta(x_{it}^{d}+m_{it}^{d})$	$\Delta(x_{it}^{g}+m_{it}^{g})$	Δdk_{it}	Δl_{it}
Mean	3.4	4.3	4.2	4.1	2.0	1.9	3.1	-4.5	1.2
STD	0.32	0.26	0.26	0.26	1.57	1.75	1.54	1.02	0.32

All variables are in log. Δ is the first difference operator. y_{it} output per worker (i.e., log (Y_{it}/L_{it}); Similarly, dk_{it} is gross fixed capital formation per worker; x_{it}^{w} is total exports to the world per worker; m_{it}^{w} is total imports from the world per worker. x_{it}^{d} is exports to developed countries per worker; m_{it}^{d} is imports from the developed countries per worker; x_{it}^{g} is exports to

developing countries per worker; m_{it}^{g} is imports from developing countries per worker. l_{it} is the number of workers;

TABLE 3
MEAN OUTPUT PER WORKER FOR EXPORTERS AND NON-EXPORTERS – MOROCCO – SAMPLE 2000-2004, 91 INDUSTRIES

	Exporters			Non Exporters		
	World	Developed	Developing	World	Developed	Developing
y_{it}	5.15	5.07	5.03	0.65	0.74	0.79
	(2.11)	(1.18)	(2.25)	(1.76)	(1.88)	(1.92)
Δy_{it}	4.3	4.2	4.1	-0.009	-0.007	-0.007
	(0.26)	(0.26)	(0.25)	(0.18)	(0.18)	(0.19)

t-statistics are in parentheses

TABLE 4
CORRELATION MATRICES – MOROCCO – SAMPLE 2000-2004 – 91 INDUSTRIES.

	XD_{it}^{w}	y_{it}	dk_{it}	v_{it}	l_{it}	w_{it}
XD_{it}^{w}	1.000000					
y_{it}	0.245109	1.000000				
	(0.0000)					
dk_{it}	0.202115	0.450915	1.000000			
	(0.0000)	(0.0000)				
v_{it}	0.199814	0.615825	0.428807	1.000000		
	(0.0000)	(0.00000)	(0.0000)			
l_{it}	0.284789	0.053807	0.055848	-0.010442	1.000000	
	(0.0000)	(0.2520)	(0.2345)	(0.8242)		
w_{it}	0.484586	0.603028	0.419216	0.652264	0.044184	1.000000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	0.3470	
	XD_{it}^{d}	y_{it}	dk_{it}	v_{it}	l_{it}	w_{it}
XD_{it}^{d}	1.000000					
y_{it}	0.190102	1.000000				
	(0.0000)					
dk_{it}	0.186466	0.450915	1.000000			
	(0.0001)	(0.0000)				
v_{it}	0.286253	0.053807	0.055848	1.000000		
	(0.0000)	(0.2520)	(0.2345)			
l_{it}	0.085176	0.615825	0.428807	-0.010442	1.000000	
	(0.0695)	(0.0000)	(0.0000)	(0.8242)		

w_{it}	0.417762 (0.0000)	0.603028 (0.0000)	0.419216 (0.0000)	0.044184 (0.3470)	0.652264 (0.0000)	1.000000
	XD_{it}^{g}	y_{it}	dk_{it}	v_{it}	l_{it}	w_{it}
XD_{it}^{g}	1.000000					
y_{it}	0.238733 (0.0000)	1.000000				
dk_{it}	0.214050 (0.0000)	0.540843 (0.0000)	1.000000			
v_{it}	0.234307 (0.0000)	0.862561 (0.0000)	0.519697 0.0000	1.000000		
l_{it}	0.471060 (0.0000)	0.258182 (0.0000)	0.361648 0.0000	0.138128 0.0033	1.000000	
w_{it}	0.177780 (0.0001)	0.720359 (0.0000)	0.399464 0.0000	0.871995 0.0000	0.066019 0.1611	1.000000

XD_{it}^{w}, XD_{it}^{d}, and XD_{it}^{g} are exports dummies for exporters to the world, to developed countries and to developing countries. y_{it} is loge real output per worker; dk_{it} is log real capital investments per worker; v_{it} is log real value added per worker; l_{it} is log number of workers; and w_{it} is log real wages per worker. P values are in parentheses.

TABLE 5
CORRELATION MATRICES – GROWTH RATES – MOROCCO – SAMPLE 2000-2004, 91 INDUSTRIES

	XD_{it}^{w}	Δy_{it}	Δdk_{it}	Δv_{it}	Δl_{it}	Δw_{it}
XD_{it}^{w}	1.000000					
Δy_{it}	0.123130 (0.0193)	1.000000				
Δdk_{it}	0.028194 (0.5934)	0.144347 (0.0060)	1.000000			
Δv_{it}	0.083586 (0.1129)	0.605114 (0.0000)	0.130756 (0.0129)	1.000000		
Δl_{it}	0.009984 (0.8501)	-0.202428 (0.0001)	0.028161 (0.5938)	-0.149122 (0.0045)	1.000000	
Δw_{it}	0.032515 (0.5380)	0.581807 (0.0000)	0.168378 (0.0013)	0.708856 (0.0000)	-0.126043 (0.0166)	1.000000

	XD_{it}^{d}	Δy_{it}	Δdk_{it}	Δv_{it}	Δl_{it}	Δw_{it}
XD_{it}^{d}	1.000000					
Δy_{it}	0.060641 (.2505)	1.000000				
Δdk_{it}	0.001473 (0.9778)	0.181722 (0.0005)	1.000000			
Δv_{it}	0.080887 (0.1250)	0.520586 (0.0000)	0.130756 (0.0129)	1.000000		
Δl_{it}	0.015638 (0.7671)	-0.203740 (0.0001)	0.028161 (0.5938)	-0.149122 (0.0045)	1.000000	
Δw_{it}	0.033374 (0.5273)	0.537957 (0.0000)	0.168378 (0.0013)	0.708856 (0.0000)	-0.126043 (0.0166)	1.000000

	XD_{it}^{g}	Δy_{it}	Δdk_{it}	Δv_{it}	Δl_{it}	Δw_{it}
XD_{it}^{g}	1.000000					
Δy_{it}	0.102133 (0.0525)	1.000000				
Δdk_{it}	0.052521 (0.3197)	0.144347 (0.0060)	1.000000			
Δv_{it}	0.073867 (0.1614)	0.605114 (0.0000)	0.130756 (0.0129)	1.000000		
Δl_{it}	0.029772 (0.5729)	-0.202428 (0.0001)	0.028161 (0.5938)	-0.149122 (0.0045)	1.000000	
Δw_{it}	0.022328 (0.6724)	0.581807 (0.0000)	0.168378 (0.0013)	0.708856 (0.0000)	-0.126043 (0.0166)	1.000000

XD_{it}^{w}, XD_{it}^{d}, and XD_{it}^{g} are exports dummies for exporters to the world, to developed countries and to developing countries. y_{it} is loge real output per worker; dk_{it} is log real capital investments per worker; v_{it} is log real value added per worker; l_{it} is log number of workers; and w_{it} is log real wages per worker. P values are in parentheses.

TABLE 6
MOROCCO - EGLS REGRESSIONS OF LEVELS AND DIFFERENCES WITH EXPORTS STATUS AS REGRESSORS – FIXED EFFECTS WITH WHITE DIAGONAL STANDARD ERRORS & COVARIANCE WITH, SAMPLE 2000-2004 AND 91 INDUSTRIES. DEGREES-OF-FREEDOM CORRECTION

	Regressors					
	y_{it}	dk_{it}	l_{it}	w_{it}	$\overline{R}^2$	DW
XD_{it};						
x_{it}^{w} =	0.06	-0.006	0.07	0.03	0.99	2.0
	(0.0000)	(0.1184)	(0.0000)	(0.0097)		
x_{it}^{d} =	0.05	-0.007	0.07	0.03	0.99	2.0
	(0.0003)	(0.1021)	(0.0000)	(0.008)		
x_{it}^{g} =	0.04	-0.007	0.08	0.07	0.99	1.7
	(0.0001)	(0.0247)	(0.0000)	(0.0000)		
	Regressors					
	Δy_{it}	Δdk_{it}	Δl_{it}	Δw_{it}	$\overline{R}^2$	DW
XD_{it};						
x_{it}^{w} =	0.03	-0.001	0.04	0.001	0.75	2.3
	(0.4627)	(0.9448)	(0.2935)	(0.9663)		
x_{it}^{d} =	0.01	-0.003	0.03	0.03	0.74	2.0
	(0.7148)	(0.8435)	(0.3389)	(0.4305)		
x_{it}^{g} =	0.01	-0.001	0.09	0.07	0.74	2.2
	(0.7168)	(0.9471)	(0.0186)	(0.1257)		

y_{it} is log real output *per worker*. dk_{it} is log capital investments *per worker*, l_{it} is log number of workers, and w_{it} is log real wages *per worker*. XD_{it} is a dummy variable takes a value of 1 in industry exports in year t and zero elsewhere. The superscripts w, d and g denote exports to the world, to developed countries and to developing countries respectively. P values are in parentheses.

TABLE 7
MOROCCO - SAMPLE 2000-2004 – 91 INDUSTRIES

$$y_{it} = \alpha + \beta\ XD_{it} + \delta\, l_{it} + e_{it}\ ;$$

	World					Developed					Developing				
			Quantile[1]					Quantile					Quantile		
	EGLS [2]	Fixed EGLS [3]	0.1	0.5	0.9	EGLS	Fixed EGLS	0.1	0.5	0.9	EGLS	Fixed EGLS	0.1	0.5	0.9
XD_{it}^{w}	0.53 (0.000)	0.24 (0.0148)	0.52 (0.0005)	0.51 (0.0156)	0.16 (0.5194)	--	--	--	--	--	--	--	--	--	--
XD_{it}^{d}	--	--	--	--	--	0.40 (0.000)	0.09 (0.1223)	0.47 (0.0017)	0.39 (0.0295)	0.02 (0.9226)	--	--	--	--	--
XD_{it}^{g}	--	--	--	--	--	--	--	--	--	--	0.50 (0.0000)	0.15 (0.0075)	0.53 (0.0001)	0.48 (0.0126)	0.07 (0.7234)
l_{it}	0.08 (0.000)	-0.14 (0.0009)	0.08 (0.0138)	0.03 (0.5005)	0.23 (0.0009)	0.09 (0.000)	-0.13 (0.0020)	0.08 (0.0083)	0.05 (0.1752)	0.26 (0.0000)	0.07 (0.0000)	-0.15 (0.0003)	0.07 (0.0176)	0.02 (0.5559)	0.26 (0.0000)
σ	0.82	0.28	1.26	0.85	1.38		0.28	1.26	0.85	1.35	0.82	0.28	1.26	0.85	1.36
4	62.5	46.7	61.8	61.2	--	54.8	40.0	58.8	54.3	--	60.0	42.7	62.5	59.4	--

y_{it} is log real output per worker. XD is a dummy variable takes a value of 1 in industry exports in year t and zero elsewhere. The superscripts w, d and g denote exports to the world, to developed countries and to developing countries respectively. l_{it} is log employees as a control for scale.

1 Huber Sandwich standard errors & covariance; Sparsity method is with Kernel (Epanechnikov) using residuals; Bandwidth method is Hall and Sheather, bw=0.061054. The estimation successfully identifies a unique optimal solution.
2 EGLS method. Linear regression after one-step weighting matrix. White diagonal standard errors & covariance degree-of-freedom adjusted.
3 EGLS with cross-section fixed effect. Linear regression after one-step weighting matrix. White diagonal standard errors & covariance degree-of-freedom adjusted.
4 The exports premia is $100(e^{\beta} - 1)$.
P values are in parentheses.

TABLE 8
MOROCCO - SAMPLE 2000-2004 – 91 INDUSTRIES

$$y_{it} = \alpha + \beta_1 Start + \beta_2 Cont + \beta_3 Stop + \delta l_{it} + e_{it};$$

	Exports to the World (x_{it}^{w})					Exports to Developed Countries (x_{it}^{d})					Exports to Developing Countries (x_{it}^{g})				
			Quantile [iii]					Quantile					Quantile		
	EGLS [i]	Fixed [ii]	0.1	0.5	0.9	EGLS	Fixed	0.1	0.5	0.9	EGLS	Fixed	0.1	0.5	0.9
β_1	0.18 (0.4650)	0.24 (0.0278)	0.08 (0.6870)	-0.05 (0.8963)	-0.12 (0.6950)	0.19 (0.4703)	0.07 (0.3069)	0.08 (0.6848)	0.04 (0.9206)	0.66 (0.1237)	0.24 (0.3157)	0.15 (0.0395)	0.08 (0.7032)	0.43 (0.2166)	0.34 (0.5380)
β_2	0.50 (0.0007)	0.38 (0.0006)	0.45 (0.0007)	0.51 (0.0269)	0.38 (0.1170)	0.40 (0.0065)	0.19 (0.0018)	0.45 (0.0013)	0.51 (0.0137)	0.04 (0.8513)	0.47 (0.0016)	0.31 (0.0001)	0.47 (0.0003)	0.58 (0.0158)	0.08 (0.7406)
β_3	-0.08 (0.8116)	0.03 (0.4963)	-0.73 (0.0544)	-0.07 (0.8120)	0.60 (0.1616)	0.02 (0.9562)	0.05 (0.3311)	-0.72 (0.0742)	0.04 (0.8782)	0.74 (0.0758)	0.04 (0.8960)	0.05 (0.2602)	-0.72 (0.0820)	0.24 (0.3908)	0.38 (0.3253)
δ	0.12 (0.0000)	-0.13 (0.0018)	0.09 (0.0039)	0.03 (0.4894)	0.20 (0.0039)	0.13 (0.0000)	-0.11 (0.0075)	0.09 (0.0040)	0.03 (0.4655)	0.26 (0.0000)	0.12 (0.0001)	-0.15 (0.0003)	0.08 (0.0050)	0.01 (0.7814)	0.29 (0.0001)
$(e^{\beta_2 - 1}) * 100$	60	53.7	57.7	61.2	53.7	54.8	44.5	57.7	61.2	-	58.8	50.1	58.8	65.6	-
σ	0.83	0.28	1.26	0.85	1.40	0.84	0.96	1.28	0.86	1.40	0.83	0.28	1.28	0.85	1.40

y_{it} is log real output per worker. *Start* is a dummy variable takes a value of 1 if $x_{i0} = 0$ and a value of 1 if $x_{it} = 1$, where x is exports, the subscript i denotes the industry and 0 is the base year(2000); *Stop* is a dummy that takes a value of 1 if $x_{i0} = 1$ and $x_{it} = 0$; and *Cont* refers to industries that have been exporting continuously, it is a dummy variable that takes a value of 1 if $x_{i0} = 1$ and $x_{it} = 1$. Non-exporting in both years is the reference category. l_{it} is the log of the number of employees to control for scale effect.

i EGLS method. Linear regression after one-step weighting matrix. White diagonal standard errors & covariance degree-of-freedom adjusted.

ii EGLS with cross-section fixed effect. Linear regression after one-step weighting matrix. White diagonal standard errors & covariance degree-of-freedom adjusted.

iii Huber Sandwich standard errors & covariance; Sparsity method is with Kernel (Epanechnikov) using residuals; Bandwidth method is Hall and Sheather, bw=0.061054. The estimation successfully identifies a unique optimal solution.

P values are in parentheses.

TABLE 9
MOROCCO – EGLS REGRESSIONS WITH CROSS-SECTION WEIGHTS, WHITE DIAGONAL STANDARD ERRORS & COVARIANCE WITH DEGREE-OF-FREEDOM CORRECTIONS. SAMPLE IS 2000-2004,91 INDUSTRIES

$$y_{it-3} = \alpha + \beta\, XD_{it} + \delta\, l_{it-3} + u_{it}$$

	Exports to World XD^w				Exports to Developed Countries XD^d				Exports to Developing Countries XD^g			
		Quantiles[2]				Quantiles				Quantiles		
	EGLS[1]	0.1	0.5	0.9	EGLS	0.1	0.5	0.9	EGLS	0.1	0.5	0.9
β	0.16	0.28	0.34	-0.10	0.08	0.28	0.35	-0.33	0.26	0.28	0.48	-0.10
	0.0340)	0.2578)	(0.1801)	(0.6832)	(0.2732)	(0.2684)	(0.1906)	(0.2278)	(0.0009)	(0.2338)	(0.0444)	(0.6924)
δ	0.12	0.10	0.06	0.28	0.13	0.10	0.06	0.28	0.10	0.09	0.03	0.28
	(0.0000)	(0.0614)	(0.03498)	(0.0000)	(0.0000)	(0.0624)	(0.3541)	(0.0000)	(0.0000)	(0.0782)	(0.6072)	(0.0000)

y_{it} is log real output per worker. XD is a dummy variable takes a value of 1 in industry exports in year t and zero elsewhere. The superscripts w, d and g denote exports to the world, to developed countries and to developing countries respectively. l_{it} is log employees, as a control for scale.

1 Huber Sandwich standard errors & covariance; Sparsity method is with Kernel (Epanechnikov) using residuals; Bandwidth method is Hall and Sheather, bw=0.061054. The estimation successfully identifies a unique optimal solution.

2 EGLS method. Linear regression with cross-section weights, and one-step weighting matrix.
White diagonal standard errors & covariance degree-of-freedom adjusted.
P values are in parentheses.

TABLE 10
MOROCCO - SAMPLE IS 2000-2004, 91 INDUSTRIES

$$y_{it} - y_{i,t-3} = \alpha + \beta\, XD_{it} + \delta\, l_{i0} + \eta_{it}$$

	Exports to the World XD^w				Exports to Developed Countries XD^d				Exports to Developing Countries XD^g			
		Quantiles[1]				Quantiles				Quantiles		
	EGLS[2]	0.1	0.5	0.9	EGLS	0.1	0.5	0.9	EGLS	0.1	0.5	0.9
β	0.20	0.24	0.15	0.12	0.22	0.24	0.15	0.12	0.19	0.23	0.10	-0.11
	(0.0000)	(0.4409)	(0.1413)	(0.4351)	(0.0000)	(0.4500)	(0.1564)	(0.3320)	(0.0000)	(0.4869)	(0.2828)	(0.6535)
δ	0.003	0.03	0.008	-0.003	0.004	0.03	0.008	-0.003	0.004	0.03	0.008	-0.003
	(0.0901)	(0.0000)	(0.3354)	(0.6327)	(0.0723)	(0.0000)	(0.3095)	(0.6339)	(0.0538)	(0.0000)	(0.3377)	(0.6366)

y_{it} is log real output per worker. XD is a dummy variable takes a value of 1 in industry exports in year t and zero elsewhere. The superscripts w, d and g denote exports to the world, to developed countries and to developing countries respectively. l_{i0} is log employees in the year 2000 as a control for scale.

1 Huber Sandwich standard errors & covariance; Sparsity method is with Kernel (Epanechnikov) using residuals; Bandwidth method is Hall and Sheather, bw=0.061054. The estimation successfully identifies a unique optimal solution.

2 Linear estimation after one-step weighting matrix. White diagonal standard errors & covariance with degrees-of-freedom-corrections.
P values are in parentheses

TABLE 11

MOROCCO – NO FIXED EFFECT REGRESSIONS. DEPENDENT VARIABLE y_{it} I

	1	2	3	4	5	6	7	8	9	10	11	12
	GLS [ii]	GMM [iii]	GLS	GMM	GLS	GMM	GLS	GMM	GLS	GMM	GLS	GMM
y_{it-1}	---	-0.27 (0.2231)	---	-0.11 (0.3386)	---	0.01 (0.9198)	---	-0.05 (0.6814)	---	-0.11 (0.2381)	---	-0.15 0.0564)
l_{it}	0.05 (0.0406)	1.40 (0.0794)	0.04 (0.0289)	0.88 (0.0278)	0.03 (0.0240)	1.90 (0.0082)	0.00 (0.9516)	0.56 (0.3295)	0.02 (0.2143)	0.53 (0.0834)	-0.009 (0.5736)	-0.20 (0.6844)
dk_{it}	0.35 (0.0000)	0.04 (0.1610)	0.40 (0.0000)	0.07 (0.0520)	0.34 (0.0000)	0.22 (0.0096)	0.38 (0.0000)	0.06 (0.2629)	0.41 (0.0000)	0.06 (0.0273)	0.39 (0.0000)	0.02 (0.6446)
x_{it}^{w}	0.08 (0.0000)	0.60 (0.0385)	---	---	---	---	---	---	---	---	---	---
x_{it}^{d}	---	---	0.02 (0.0274)	0.32 (0.0003)	---	---	---	---	---	---	---	---
x_{it}^{g}	---	---	---	---	0.13 (0.0000)	-0.07 (0.6937)	---	---	---	---	---	---
$x_{it}^{w} + m_{it}^{w}$	---	---	---	---	---	---	0.06 (0.0000)	0.19 (0.0003)	---	---	---	---
$x_{it}^{d} + m_{it}^{d}$	---	---	---	---	---	---	---	---	0.04 (0.0000)	0.18 (0.0001)	---	---
$x_{it}^{g} + m_{it}^{g}$	---	---	---	---	---	---	---	---	---	---	0.05 (0.0000)	0.20 (0.0002)
$\overline{R}^{2}$	0.32	---	0.64	---	0.70	---	0.69	---	0.65	---	0.65	---
DW [iv]	0.42	---	0.60	---	0.70	---	0.65	---	0.63	---	0.66	---
σ [v]	0.72	0.85	0.73	0.54	0.70	0.75	0.70	0.51	0.72	0.52	0.71	0.43
J [vi]	---	0.6768	---	0.0622	---	0.0078	---	0.1181	---	0.3695	---	0.0117

i: output per employee; **ii**: EGLS with cross section weights, white cross section standard errors and covariance, degree-of-freedom corrections. The constant term not reported. **iii** GMM is dynamic GMM (Arellano Bond, 1991) with lags of the levels and the differences of the RHS variables, EU real interest rate, and EU real GDP per person used as instruments. Period fixed dummies are included. Standard errors are white cross section and corrected for degrees-of-freedom. l_{it} is the number of employee; dk_{it} is gross fixed capital formation per employee; x_{it}^{w} is total exports to the world per employee; m_{it}^{w} is total imports from the world per employee. x_{it}^{d} is exports to developed countries employee; m_{it}^{d} is imports from the developed countries employee; x_{it}^{g} is exports to developing countries per employee; m_{it}^{g} is imports from developing countries per employee. All variables are measured in US dollar and all (except labor) are deflated by the US CPI. All variables are in log (except EU real interest rate). P values are in Parentheses. **iv:** the Durbin-Watson statistic; **v** the standard errors of the regression; **vi** : the P values of the Sargan statistic for instruments over-identification distributed $\chi^{2}(p-k)$, where p is the number of instruments and k is the number of coefficient estimates. The panel includes 91 industries at 4-digit level from 2000-2004.

TABLE 12

MOROCCO – FIXED EFFECT REGRESSIONS. DEPENDENT VARIABLE y_{it} I

	1	2	3	4	5	6	7	8	9	10	11	12
	GLS [ii]	GMM [iii]	GLS	GMM	GLS	GMM	GLS	GMM	GLS	GMM	GLS	GMM
y_{it-1}	---	-0.16 (0.2948)	---	-0.21 (0.1627)	---	-0.06 (0.5184)	---	-0.14 (0.2968)	---	-0.10 (0.3172)	---	-0.19 (0.0505)
l_{it}	-0.11 (0.0141)	0.56 (0.3685)	-0.08 (0.0594)	0.59 (0.1278)	-0.09 (0.0248)	-1.05 (0.0417)	-0.13 (0.0005)	0.57 (0.4274)	-0.12 (0.0007)	-0.29 (0.0172)	-0.12 (0.0013)	-0.71 (0.1571)
dk_{it}	0.04 (0.0007)	0.10 (0.1106)	0.04 (0.0000)	0.10 (0.0140)	0.03 (0.0069)	0.12 (0.0770)	0.04 (0.0000)	0.09 (0.1420)	0.05 (0.0000)	0.06 (0.1317)	0.04 (0.0001)	0.03 (0.5730)
x_{it}^{w}	0.07 (0.0001)	0.45 (0.0364)	---	---	---	---	---	---	---	---	---	---
x_{it}^{d}	---	---	0.08 (0.0000)	0.34 (0.0281)	---	---	---	---	---	---	---	---
x_{it}^{g}	---	---	---	---	0.05 (0.0000)	0.02 (0.8363)	---	---	---	---	---	---
$x_{it}^{w} + m_{it}^{w}$	---	---	---	---	---	---	0.07 (0.0000)	0.21 (0.0214)	---	---	---	---
$x_{it}^{d} + m_{it}^{d}$	---	---	---	---	---	---	---	---	0.05 (0.0000)	0.19 (0.0266)	---	---
$x_{it}^{g} + m_{it}^{g}$	---	---	---	---	---	---	---	---	---	---	0.05 (0.0000)	0.21 (0.0349)
$\overline{R}^{2}$	0.96	---	0.97	---	0.97	---	0.97	---	0.97	---	0.97	---
DW [iv]	1.60	---	1.66	-	1.54	---	1.66	---	1.66	---	1.78	---
σ [v]	0.28	0.55	0.28	0.50	0.29	0.44	0.28	0.53	0.28	0.46	0.28	0.45
J [vi]	---	0.2725	---	0.2578	---	0.1385	---	0.5832	---	0.3926	---	0.1307

i: output per employee; **ii**: EGLS with cross section weights, white cross section standard errors and covariance, degree-of-freedom corrections. The constant term not reported. **iii** GMM is dynamic GMM (Arellano-Bond, 1991) with lags of the levels and the differences of the RHS variables, EU real interest rate, and EU real GDP per person used as instruments. Period fixed dummies are included. Standard errors are white cross section and corrected for degrees-of-freedom. l_{it} is the number of employee; dk_{it} is gross fixed capital formation per employee; x_{it}^{w} is total exports to the world per employee; m_{it}^{w} is total imports from the world per employee. x_{it}^{d} is exports to developed countries employee; m_{it}^{d} is imports from the developed countries employee; x_{it}^{g} is exports to developing countries per employee; m_{it}^{g} is imports from developing countries per employee. All variables are measured in US dollar and all (except labor) are deflated by the US CPI. All variables are in log (except EU real interest rate). P values are in Parentheses. **iv:** the Durbin-Watson statistic; **v** the standard errors of the regression; **vi** : the P values of the Sargan statistic for instruments over-identification distributed $\chi^{2}(p-k)$, where p is the number of instruments and k is the number of coefficient estimates. The panel includes 91 industries at 4-digit level from 2000-2004.

TABLE 13

MOROCCO – FIXED EFFECT REGRESSIONS. DEPENDENT VARIABLE $\Delta \ln Y_{it}$ I

	1	2	3	4	5	6	7	8	9	10	11	12
	EGLS [ii]	GMM [iii]	EGLS	GMM	EGLS	GMM	EGLS	GMM	EGLS	GMM	EGLS	GMM
$\Delta \ln Y_{it-1}$	---	-0.35 (0.0000)	---	-0.36 (0.0000)	---	-0.31 (0.0000)	---	-0.38 (0.0000)	---	-0.40 (0.0000)	---	-0.49 (0.0000)
$\Delta \ln L_{it}$	0.62 (0.0000)	0.21 (0.1203)	0.63 (0.0000)	0.15 (0.2653)	0.65 (0.0000)	0.20 (0.2039)	0.62 (0.0000)	0.18 (0.1839)	0.62 (0.0000)	0.15 (0.0933)	0.62 (0.0000)	0.39 (0.0445)
$\ln dK_{it} - \ln Y_{i,t-1}$	0.10 (0.0000)	0.22 (0.0009)	0.10 (0.0000)	0.25 (0.0006)	0.09 (0.0000)	0.22 (0.0034)	0.10 (0.0000)	0.20 (0.0039)	0.10 (0.0000)	0.22 (0.0000)	0.09 (0.0000)	-0.01 (0.8717)
$\ln X_{it}^{w} - \ln Y_{i,t-1}$	0.056 (0.0000)	0.12 (0.0239)			---	---	---	---	---	---	---	---
$\ln X_{it}^{d} - \ln Y_{i,t-1}$	---	---	0.045 (0.0000)	0.13 (0.0189)	---	---	---	---	---	---	---	---
$\ln X_{it}^{g} - \ln Y_{i,t-1}$	---	---	---	---	0.07 (0.0000)	0.13 (0.0398)	---	---	---	---	---	---
$(\ln X_{it}^{w} + \ln M_{it}^{w}) - \ln Y_{i,t-1}$	---	---	---	---	---	---	0.08 (0.0000)	0.13 (0.0187)	---	---	---	---
$(\ln X_{it}^{d} + \ln M_{it}^{d}) - \ln Y_{i,t-1}$	---	---	---	---	---	---	---	---	0.06 (0.0000)	0.15 (0.0003)	---	---
$(\ln X_{it}^{g} + \ln M_{it}^{g}) - \ln Y_{i,t-1}$	---	---	---	---	---	---	---	---	---	---	0.05 (0.0000)	0.34 (0.0001)
$\overline{R}^{2}$	0.67	---	0.67	---	0.77	---	0.75	---	0.67	---	0.65	---
DW [iv]	2.5	---	2.6	---	2.5	---	2.6	---	2.6	---	2.6	---
σ [v]	0.31	0.47	0.31	0.50	0.31	0.50	0.30	0.47	0.31	0.49	0.31	0.62
J [vi]	---	0.0858	---	0.0896	---	0.07189	---	0. 07616	---	0.1819	---	0.1022

i: output per employee; **ii**: EGLS with cross section weights, white cross section standard errors and covariance, degree-of-freedom corrections. The constant term not reported. **iii** GMM is dynamic GMM (Arellano-Bond, 1991) with lags of the levels and the differences of the RHS variables, EU real interest rate, and EU real GDP per person used as instruments. Period fixed dummies are included. Standard errors are white cross section and corrected for degrees-of-freedom. L_{it} is the number of employee; dK_{it} is gross fixed capital formation per employee; X_{it}^{w} is total exports to the world per employee; M_{it}^{w} is total imports from the world per employee. X_{it}^{d} is exports to developed countries employee; M_{it}^{d} is imports from the developed countries employee; X_{it}^{g} is exports to developing countries per employee; M_{it}^{g} is imports from developing countries per employee. All variables are measured in US dollar and all (except labor) are deflated by the US CPI. All variables are in log (except EU real interest rate). P values are in Parentheses. **iv:** the Durbin-Watson statistic; **v** the standard errors of the regression; **vi** : the P values of the Sargan statistic for instruments over-identification distributed $\chi^{2}(p-k)$, where p is the number of instruments and k is the number of coefficient estimates. The panel includes 91 industries at 4-digit level from 2000-2004.

TABLE 14

TESTING FOR FIRST-ORDER STOCHASTIC DOMINANCE - y_{it}^{X} VERSUS y_{it}^{nonX} I . MOROCCO

Year	Wilcoxon Rank Sum Test P Value		Kolmogorov-Smirnov Exact P value [iv]
2000	P > |Z| [ii]	P [iii]	
Total Exports	0.0089	0.744	0.015
Exports to Developing Countries	0.0333	0.675	0.110
Exports to Developed Countries	0.0449	0.68	0.042
2001			
Total Exports	0.0347	0.69	0.083
Exports to Developing Countries	0.0066	0.723	0.009
Exports to Developed Countries	0.0240	0.696	0.037
2002			
Total Exports	0.0008	0.791	0.005
Exports to Developing Countries	0.0113	0.703	0.013
Exports to Developed Countries	0.0050	0.737	0.012
2003			
Total Exports	0.0240	0.696	0.094
Exports to Developing Countries	0.0197	0.697	0.047
Exports to Developed Countries	0.0712	0.652	0.166
2004			
Total Exports	0.0154	0.726	0.056
Exports to Developing Countries	0.0078	0.739	0.022
Exports to Developed Countries	0.0690	0.664	0.091

Egypt

Year	Wilcoxon Rank Sum Test P Value		Kolmogorov-Smirnov Exact P value [iv]
1997	P > |Z| [ii]	P [iii]	
Total Exports	0.0278	0.826	0.011
Exports to Developing Countries	0.0101	0.815	0.017
Exports to Developed Countries	0.0073	0.773	0.008
1998			
Total Exports	0.0579	0.781	0.112
Exports to Developing Countries	0.0205	0.808	0.025
Exports to Developed Countries	0.0150	0.725	0.045
2002			
Total Exports	0.1923	0.880	0.258

Exports to Developing Countries	0.1029	0.778	0.133
Exports to Developed Countries	0.3983	0.596	0.426

Oman

Year	Wilcoxon Rank Sum Test P Value		Kolmogorov-Smirnov Exact P value [iv]
1993	P > |Z| [ii]	P [iii]	
Total Exports	0.1914	0.700	0.305
Exports to Developing Countries	0.1914	0.700	0.305
Exports to Developed Countries	0.8786	0.513	0.795
1994			
Total Exports	0.1707	0.905	0.186
Exports to Developing Countries	0.1707	0.905	0.186
Exports to Developed Countries	0.7155	0.532	0.721
1995			
Total Exports	0.1511	0.72	0.273
Exports to Developing Countries	0.1511	0.72	0.273
Exports to Developed Countries	0.8348	0.481	0.418

Qatar

Year	Wilcoxon Rank Sum Test P Value		Kolmogorov-Smirnov Exact P value [iv]
2001	P > |Z| [ii]	P [iii]	
Total Exports	0.0626	0.833	0.183
Exports to Developing Countries	0.1290	0.740	0.259
Exports to Developed Countries	0.8717	0.522	0.803

i y_{it} is log real output per worker, the superscript X denotes exporting industries and $nonX$ is non-exporting industries.

ii $H0$: the distribution of output per worker for exporting industries is equal to the distribution for non-exporting industries.

iii The probability that the distribution of output per worker for exporting industries > distribution for non-exporting industries.

iv $H0$: The distribution of output per worker for exporting industries is equal to that of non-exporting industries vs.

$H1$: The distribution of exporters dominates.

Data Appendix

Data Source and Definitions

Statistics Section, (2007) Industrial Statistics Database at the 4-digit level of ISIC (Rev. 3), United Nations Industrial Development Organization.
Statistics Section, (2007) Industrial Statistics Database at the 4-digit level of IDSB (ISIC Rev.3), United Nations Industrial Development Organization.
The database contains annual time-series data (all in 1000 US dollars) on the following eight items:

(1) Output
(2) Total imports
(3) Total exports
(4) Consumption
(5) Imports from developing countries
(6) Imports from developed countries
(7) Exports to developing countries
(8) Exports to developed countries
(9) Number of employees

These data pertain to manufacturing industries classified at the level of ISIC (Revision 3) and are presented by Country, Industry and Year.

Number of employees

The number of persons engaged is defined as the total number of persons who worked in or for the establishment during the reference year. However, home workers are excluded. The concept covers working proprietors, active business partners and unpaid family workers as well as employees. The figures reported refer normally to the average number of persons engaged during the reference year, obtained as the sum of the "average number of employees" during the year and the total number of other persons engaged measured for a single period of the year. The **number of employees** includes all persons engaged other than working proprietors, active business partners and unpaid family workers.

Wages and salaries include all payments in cash or in kind paid to "employees" during the reference year in relation to work done for the establishment. Payments include: (a) direct wages and salaries; (b) remuneration for time not worked; (c) bonuses and gratuities; (d) housing allowances and family allowances paid directly by the employer; and (e) payments in kind. Excluded are employers' contributions in respect of their employees paid to social security, pension and insurance schemes, as well as the benefits received by employees under these schemes and severance and termination pay.

The measure of **value added** normally reported is the census concept, which is defined as the value of census output less the value of census input, which covers: (a) value of materials and supplies for production (including cost of all fuel and purchased electricity); and (b) cost of industrial services received (mainly payments for contract and commission work and repair and maintenance work). If input estimates are compiled on a "received" rather than on a "consumed" basis, the result needs to be adjusted for the net change between the beginning and the end of the period in the value of stocks of materials, fuel and other supplies. Total value added is the national accounting concept. It is ideally represented by the contribution of the establishments in

each branch of activity to the gross domestic product. For the measure of total value added, the cost of non-industrial services is deducted from and the receipts for non-industrial services are added to census value added. The estimates, whether in terms of census value added or total value added, may be gross of depreciation and other provisions for capital consumption. The valuation may be in factor cost or in producers' prices, depending on the treatment of indirect taxes and subsidies.

Gross fixed capital formation

It refers to the value of purchases and own-account construction of fixed assets during the reference year less the value of corresponding sales. The fixed assets covered are those (whether new or used) with a productive life of one year or more. These assets, which are intended for the use of the establishment include fixed assets made by the establishment's own labor force for its own use. Major additions, alterations and improvements to existing assets which extend their normal economic life or raise their productivity are also included.

New fixed assets include all those that have not been previously used in the country. Thus, newly imported fixed assets are considered new whether or not used before they were imported. Used fixed assets include all those that have been previously used within the country. Transactions in fixed assets include: (a) land; (b) buildings, other construction and land improvements; (c) transport equipment; and (d) machinery and other equipment. 42 Assets acquired from others are valued at purchasers' prices, which cover all costs directly connected with the acquisition and installation of the items for use. In principle, assets produced on own account are also valued in this manner. However, it may frequently be necessary to value such own-account production at explicit cost, including any imputations that may be required in respect of the employed own account labor. Assets produced by one establishment of a multi-establishment enterprise for the use of another establishment of the same enterprise should be valued by the receiving establishment as though purchased from outside the enterprise. Sales of assets should be valued at the actual amounts realized rather than at book values.

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[1] The World Bank consistently argued for more openness and export-oriented growth policies as key to successful development strategy. Some have argued that reducing trade barriers promotes higher domestic growth. Razzak (2007) shows that although New Zealand is more open than Australia and Canada is more open than the USA in terms of export plus imports as percents of GDP, productivity growth in New Zealand relative to Australia is low, and so is the case for Canada relative to the USA. However, time series and cross sectional regressions have been known for their failure to produce evidence in favor of a positive effect of trade on growth.

[2] The survey cites a number of macro and micro-level studies. On the macro level the survey cited 11 paper (table 1 p.628), where positive relationship between trade and growth is found, but disappeared when trade and institutions are instrumented and when a measure of geography is included. Also cited were five case studies. At the micro level, however, the survey cited 16 papers, where self-selection and learning-by-exporting hypotheses were tested. Most of the studies find support for both hypotheses, except 3, where support for self-selection only is found.

[3] Review the Ricardian model, The Heckscher – Ohlin model, Harrod (1939), Domar (1946), Solow (1956) among other papers, Cass (1965), Krugman (1979), Srinivasan and Bhagwati (1980), Baldwin (1992), Srinivasan (1999) openness to affect the long-run growth rate of output. For endogenous growth models and trade see Young (1991), Pack (1994), Grossman and Helpman (1991) and Rivera-Batiz and Romer (1991).

[4] NBER published 11 volumes in 1978 the title of which was “Foreign Trade Regimes and Economic Development.”

[5] World bank published 7 volumes in 1991 the title of which was "Liberalizing Foreign Trade."

[6] Qatar real GDP per person just hit 80000 US dollar this year.

[7] We re-estimated this equation using the rate of growth of output per worker between the base year 2000 and $t = T$. Fixed effect regressions could not be fit to the data. We fit non-fixed effect and random effect regressions. We find that β_1 insignificant, β_2 is significant all the time, and β_3 negative, but insignificant.

[8] These are not dummy variables. These are the real exports values.

[9] We used the panel data version of the ADF, Im-Pesaran-Shin (1997), and Levin-Lin-Chu (2002), the Sarno-Taylor (1998) and Taylor-Sarno (1998). We reject the null hypothesis that the ALL the variables used in the regressions (whether ratios to labor or ratios to output) have unit roots.

[10] Arrelano and Bover (1995) orthogonalization technique is also used without a significant change in the estimates of the standard errors.

[11] Rank-Sum tests the hypothesis that two independent samples (i.e., unmatched data) are from populations with the same distribution using the Wilcoxon rank-sum test, which is also known as the Mann-Whitney two-sample statistic. K-Smirnov performs one- and two-sample Kolmogorov-Smirnov tests of the equality of distributions.

[12] EGLS regressions reported in tables 12 for example can be used for forecasting while GMM regressions are more challenging. There is evidence (not reported) that EGLS regressions seem to produce one year-ahead out-of-sample forecasts that are reasonable. The Theil Inequality statistic is closer to zero, which is good. This exercise should be considered in future research when more data are available.

[13] It says that there is a strong statistical relationship between manufacturing *output* and labor productivity and that causality runs from the former to the latter. This is usually interpreted as evidence of increasing returns to scale. Arrow cited the Verdoorn's Law in his learning-by-doing classic paper in 1964, and recently, McCombie *et al* (2002) provides a collection of articles on this relationship. See Lobanio's book review in the Economic Journal (2005).