Participation in Global Value Chains: macro and micro evidence for North Africa

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Abstract

This paper investigates to what extent North African countries participate to international production networks and how this relates to performance of firms. To this aim we start with a macro input-output based analysis of GVC participation and positioning, exploiting the Eora GVC Database. North African countries have not been able so far to enter massively into GVCs and play a relevant role at the world level. However, large part of its trade is due to value added and the importance of international linkages is increasing over time. We then perform a micro, firm level analysis, based on World Bank Enterprise Survey data for Egypt, Morocco and Algeria. Our findings show that the performance of firms, measured by several indicators, is positively associated with internationalization and GVC participation. The results of the micro analysis confirm those of the sectoral analyses as well as the existing anecdotal evidence. Enhancing GVC participation of North African countries may benefits the area; however, the ability to retain such possible benefits relies on many factors including human capital, logistics, existence of tariffs and non-tariff barriers, thus leaving room for policy intervention, discussed in the conclusions.

Keywords: global value chains, firms' heterogeneity, North Africa.

JEL codes: F14, F15, L23, L25, 055.

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1 INTRODUCTION

In the last two decades technological progress and a decrease in trade barriers and costs have changed the way goods and services are produced. The increase of trade in intermediates is rooted in the "unbundling" of different stages of production that previously were performed in close proximity, over several countries (Johnson and Noguera, 2012). The analysis of international trade is now usually taking place in the context of Global Value Chains (GVCs), a concept that encompasses the full range of activities required to bring a good or service to the final consumer, from the product design to the distribution (Cattaneo et al., 2010).

GVCs entail a vertical fragmentation of production process: parts and components are produced in different countries and then are assembled either sequentially along the chain or in a final location. The networks of involved firms are highly complex, spanning from manufacturing activities to logistics and transportation, as well as customs agents and other services (Baldwin and Venables, 2013).

Against this background, countries are no longer the single frame of analysis. In order to assess a country's degree of competitiveness and the impact of economic policies, it is crucial to take into account also the firm-level cross-border dimension of production processes. Firms no longer need to have the domestic capacity to perform all major steps and the expertise to export, they can simply support the value chain as suppliers of intermediate inputs and act as subcontractors, even several levels down from the ultimate buyer (Humphrey and Schmitz, 2002).

Participation in a supply chain and cooperation within a network of upstream and downstream partners can enhance a firm's information flows and learning possibilities, introduce new business practices and more advanced technology, in turn enhancing growth. The reallocation of resources from less productive activities to new and more connected ones is crucial. In order to share the gains deriving from this process, it is very important also to link economic upgrading to social upgrading, i.e. tackling unemployment and improving job conditions of the local workers in a given stage of the chain.

Contrary to Asia, and China in particular, North Africa (NA) has not been able so far to intercept the main changes in trade patterns nor enter massively into production networks. For instance, China has integrated into GVCs by firstly specializing in the activities of final good assembly and was then capable of upgrading its participation by building a competitive supply base of intermediate goods and by enhancing the quality of its exports. But as China moves up the value chain, NA can become the next hub of labor intensive productions and expand its technological sectors. Despite a relatively good geographic and logistic positioning, most North African firms, especially the small ones, have mainly remained "local", producing at home and for the domestic market. Their involvement in GVCs is still limited and mostly on low value added phases and NA share of world trade remained very low, at the levels of 90s.

The paper describes to what extent North African countries, both at a macro (Section 2) and micro (Section 3) perspective, have been able to enter global value chains. Then it assesses what can be done to increase their participation (Section 4), and what are the impli-

cations for their competitiveness (Conclusion).

2 Macro perspective - value added trade patterns

As different stages of the same production process are now allocated to different countries, intermediate inputs cross borders multiple times and are then counted each time. As a result, conventional trade statistics become increasingly less reliable as a gauge of value contributed by any particular country (Koopman et al., 2014). However, recent improvements in Input-Output metrics allow to measure trade in value-added terms, also separating foreign and domestic value added content of exports.

In this section, exploiting the UNCTAD-Eora GVC Database, which uses I-O tables to estimate the import-content ratio in exportable products and value added trade, we analyze the GVC participation and position of NA countries. We derive North Africa value added trade data from the Eora global multi-region I-O (MRIO) table, that brings together a variety of primary data sources including national I-O tables and main aggregates data from national statistical offices and combines these primary data sources into a balanced global MRIO, using interpolation and estimation in some places to provide a contiguous, continuous dataset for the period 1970-2010 (Lenzen et al., 2012, 2013).

In Koopman et al. (2011) decomposition the foreign value added share (FVA) indicates the share of a country's exports that consist of inputs produced in other countries and thus do not add to the GDP of the country of interest. It captures the extent of GVC participation for downstream firms and industries. Their approach also allows one to calculate the 'indirect value added exports' (DVX), i.e. the share of a country's value added exports embodied as intermediate inputs in other countries' exports, which captures the contribution of the domestic sector to the exports of other countries, thus indicating the extent of GVC participation for relatively upstream sectors. Summing the FVA and the DVX of a single country/area, we can get a comprehensive description of GVC participation.

Thanks to this information, we can translate the MRIO table for multiple countries and industries into a standard I–O matrix form:

$$x = T + y$$
$$x = Ax + y$$
$$(I-A)x = y$$
$$x = (I-A)^{-1}y = Ly$$

where x represents gross output, T the intermediate demand, y final demand, I the identity matrix, A is the technological coefficient matrix and L is the Leontief inverse matrix. To calculate value added trade we start with a row vector v with each element representing the share of value added per unit of output by country (i.e. $v^1 = V^1/X^1$), combined with the Leontief inverse matrix and a vector e summarizing aggregate exports by country as retrieved by the sum of the intermediate inputs exported abroad and exports of final goods. The value added trade matrix can then be written as:

$$\begin{pmatrix} T_v^{11} & \cdots & T_v^{1n} \\ \vdots & \ddots & \vdots \\ T_v^{n1} & \cdots & T_v^{nn} \end{pmatrix} = \begin{pmatrix} v^1 & 0 & 0 \\ 0 & \ddots & 0 \\ 0 & 0 & v^n \end{pmatrix} \begin{pmatrix} L^{11} & \cdots & L^{1n} \\ \vdots & \ddots & \vdots \\ L^{n1} & \cdots & L^{nn} \end{pmatrix} \begin{pmatrix} e^1 & 0 & 0 \\ 0 & \ddots & 0 \\ 0 & 0 & e^n \end{pmatrix}$$

where the LHS matrix T describes how the value added contained in the exports of each country (and industry) is generated (by column) and distributed (by row) across countries. The first column of the matrix represents the value added contained in the export of country 1, which is then composed of two parts: the term T_v^{11} denotes the Domestic Value Added (DVA) content of exports of country 1; the generic term T_v^{k1} denotes instead the Foreign Value Added (FVA) content of exports of country 1 generated by country k (with k$\neq$ 1). The (column) sum of Domestic and Foreign Value Added, by construction, will yield the total exports of country 1. An analogous interpretation holds for all other columns.

We can also use this T matrix to obtain information on how much of each country's domestic value added enters as an intermediate input in the value added exported by other countries. The term $T_v^{12} = v^1 L^{12} e2$ represents the share of exports of country 2 (e^2) that depends on the value added sourced by country 1 ($v^1 L^{12}$). Hence, by reading the matrix along the row, rather than along the column (and excluding the diagonal term), we would have an indication of the "indirect value added exports" (DVX).

Finally, to capture the overall participation of countries and industries in GVCs we combine the FVA and DVX measures, by summing up the foreign value-added used in a country's own exports and the value added supplied to other countries' exports, and taking the sum as a ratio to gross exports, i.e. GVC = FVA + DVX.

2.1 GVC ANALYSIS

This decomposition leads to the Figure 1a, where we plot the overall GVC participation for some main countries/areas and North African countries (Figure 1b). The left figure indicates that GVC participation has been increasing in most regions, from around 50 % in 1995 to 54% 2007 worldwide. The fact that advanced countries[1] are heavily integrated in GVCs is hardly surprising, while the evidence of intensive GVC participation of ASEAN countries is also expcted. Interestingly and following the results of Foster-McGregor et al. (2015), we find that North Africa has some of the highest rates of GVC participation, matching the levels found in Europe (65% in 2007). The growth rate of GVC participation in NA has also been almost the double to that for all countries, with GVC participation increasing by 14% for North Africa and 8% for all countries over the period 1995-2010 (Figure 1a).

Disaggregating the data by countries, we find that Algeria presents the highest GVC participation rate, followed by Libya and Tunisia, respectively with 74%, 67% and 61% rate. Again Figure 1b, reveals that between 1995 and 2007, Libya GVC participation grew by 17%, while that of Algeria and Morocco by 14%.

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[1]Note that we consider the individual countries separately, meaning that the measures reported include intermediate flows between countries of the same region. This is likely to inflate the extent of GVC participation of the EU27 relative to other large single countries, such as the China and India.

Figure 1: GVC Participation
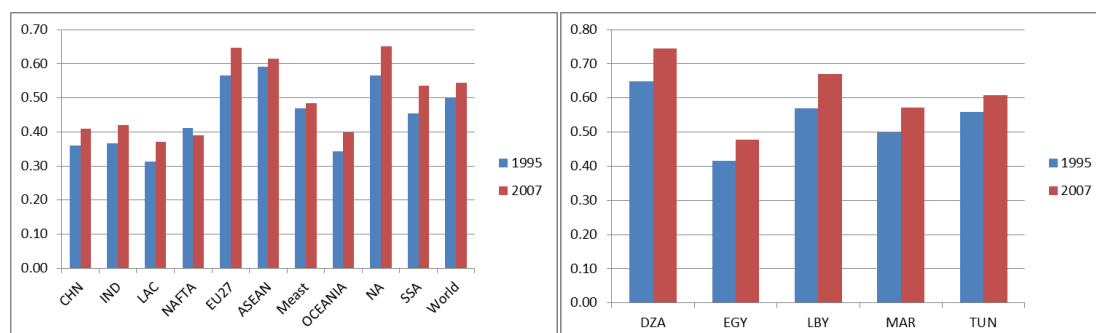
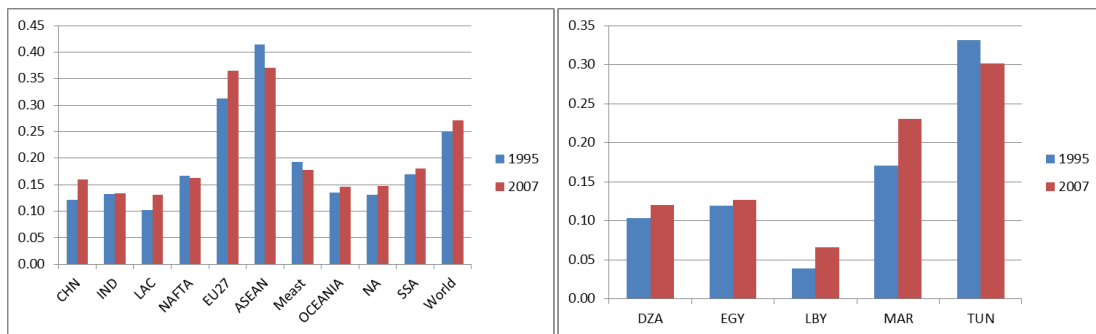*Source: Authors' elaboration based on UNCTAD/EORA GVC Database.*

Following Koopman et al. (2011) approach, in figures 2 and 3 we split up total GVC participation into the FVA and DVX components. As above stated, the former measure indicates the extent to which a country's exports are dependent on imported content (i.e. backward integration) and accordingly is likely to be higher if a country or sector is involved in downstream production. Conversely, the DVX measure is likely to be higher for countries and sectors involved in upstream production, with output and exports of that country feeding into the production and exports of downstream producers (i.e. forward integration). The analysis of these two metrics can provide hints on where within a GVC a particular country is. While upstream stages are associated with the production of knowledge assets at the beginning of the value chain, in a developing country context where rates of innovation are low it is more likely associated with the production of raw materials and other basic inputs, which may have little scope for upgrading.

At the global level, the average FVA is approximately 30% in 2007. That means, roughly, that around 5 trillion of the 17 trillion in 2007 world exports of goods and services has been contributed by foreign countries for further exports and is thus "double counted" in global trade. The remaining 12 trillion is the actual value added contribution of trade to the global economy. FVA has tended to rise over time for all countries, though the increase has been largely driven by the advanced countries. Overall, foreign value added increased by around 10% between 1995 and 2007 with large increases occurring in EU27 19% and China 33%. For other developing regions a decline in FVA was observed between 1995 and 2007 with the largest declines occured for the ASEAN (by 10%) and Middle East (5%) regions.

In 1995 foreign value added in NA was 13% while 15% in 2007, resulting in a 15% growth rate (Figure 2a). At a more detail, Tunisia (30%) and Morocco (23%) present the highest FVA in the region (Figure 2b). However these results suggest that along with other developing regions, North Africa have struggled to become increasingly engaged in downstream production within GVCs.

Figure 3 reports similar figures for the DVX metrics. This suggests that all regions observed an increase in the indirect value added exports between 1995 and 2007. In terms of the 2007, we observe that North Africa has the highest DVX share (50%). The region also shows

Figure 2: Foreign Value Added in exports (FVA)

Source: Authors' elaboration based on UNCTAD/EORA GVC Database.

the largest increase in the DVX measure between 1995 and 2007, with an increasing by 16% between those two years. Large growth rates also occurred in SSA countries (21%) and ASEAN (33%) countries. Not surprisingly, increases were much larger for developing countries than for advanced countries.

Figure 3: Indirect Value Added in exports (DVX)
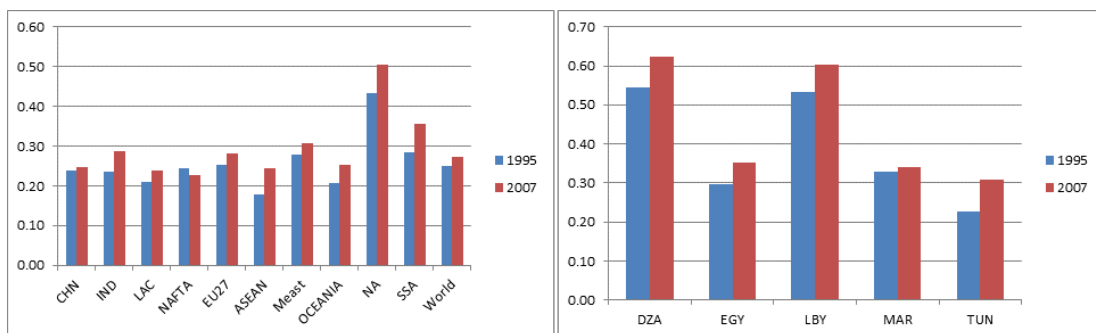
Source: Authors' elaboration based on UNCTAD/EORA GVC Database.

The large values for the DVX variable combined with the relatively small values for the FVA variable in the case of NA further reinforces the view that it has struggled in breaking into downstream production and that much of its involvement in GVCs is in upstream production. Indeed if we consider the share of total GVC participation that is due to the DVX measure we find that it accounts for 77% in 2007, highlighting the importance of upstream production (natural resource and simple manufacturing) in the region. However there is evidence of some country heterogeneity. While Algeria and Libya follow this pattern, Morocco and Tunisia show a greater share of FVA in total GVC participation (40% and 49% share respectively), suggesting a relatively downstream position (Figure 4a,b).

Nevertheless these measures do not allow us to say anything about the actual volume of trade. Figure 4a reports also countries' export values. As expected North Africa plays a very

marginal role in world trade, with a share less than 1% of total export. On the other side, the bulk of trade is concentrated among developed countries (EU 42%, NAFTA 19% and China 7%). The importance of natural resources exports is confirmed looking at Figure 4b, where Algeria exports about 45 bln of US dollars.

Figure 4: FVA, DVX and Exports in 2007
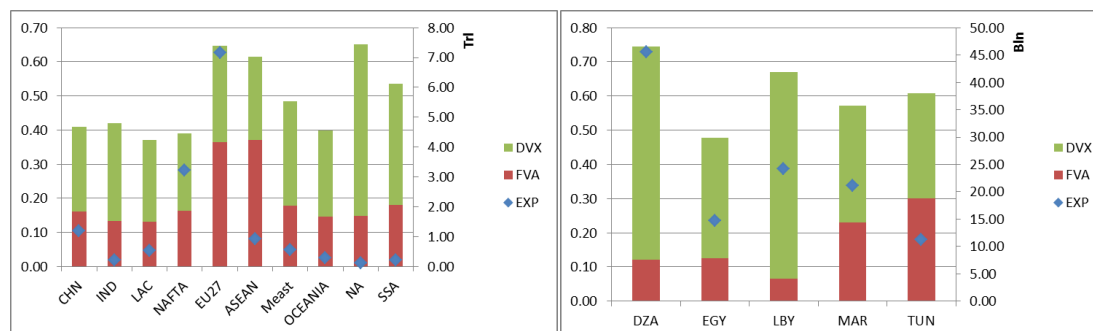
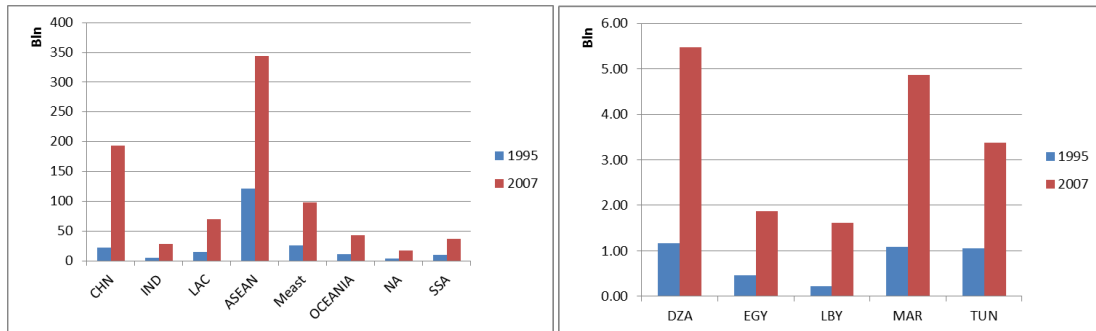*Source: Authors' elaboration based on UNCTAD/EORA GVC Database.*

To shed more light on this, we report in figures 5 and 6 the value of foreign value added and the value of exports of intermediates in value added exports of other countries respectively for each of our regions and for the years 1995 and 2007. We decided to concentrate on developing areas and therefore we did not included in the graph EU27 and NAFTA (complete graphs are in the Appendix) in order to have a better idea of the different scales of involvement (which were compressed when developed countries were included). Both figures suggest that in terms of value, North Africa's role in GVCs is very small, making up about 1% of foreign value added and exports of other countries' value added exports. It should be kept in mind therefore that while the GVC ratios for Africa, reported above, tend to be relatively high, by considering the ratio of GVC involvement to total exports they may overemphasize Africa's involvement in GVCs. Turning to the individual NA countries, Algeria and Morocco present the highest foreign value added values (Figure 5b) while Algeria and Libya, as expected given the composition of their production and exports, biased towards energy, the highest values of exports of other countries' value added exports (Figure 6b).

To sum up, the importance of GVCs has been overall steadily increasing in the last decades. As of today about 60% of global trade consists of intermediates and services, incorporated at different stages of production (UNCTAD, 2013). NA trade in intermediates was about 50% in 2012, with Egypt showing the highest intermediates export share (57%) followed by Morocco (53%). Tunisia, on the other hand, shows the highest intermediate share for imports (59%) (Figure 7a).

2.2 NORTH AFRICA AND GVCS: SOME EXAMPLES

North African countries are fairly heterogeneous in their involvement in GVCs. This depends on the productive structure of the different economies, their endowments as well as

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Figure 5: Foreign Value Added volume (excluding EU27 and NAFTA)

Source: Authors' elaboration based on UNCTAD/EORA GVC Database.

Figure 6: Indirect Value Added volume (excluding EU27 and NAFTA)
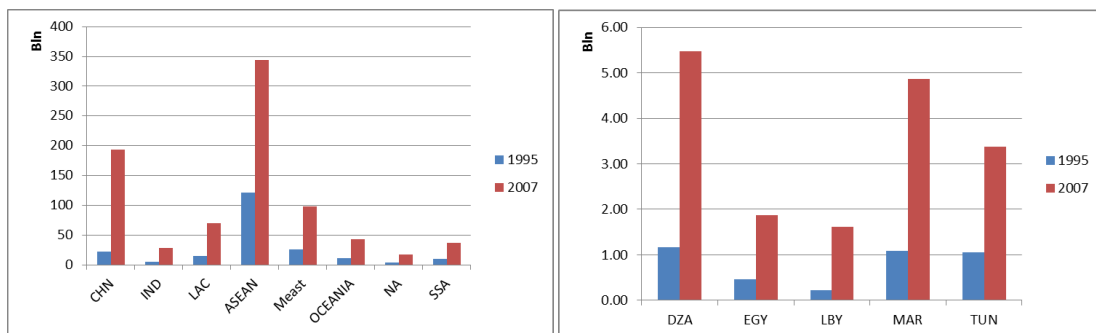
Source: Authors' elaboration based on UNCTAD/EORA GVC Database.

some characteristics such as education level of the population, presence of tax benefits, technological parks etc. In the whole region, the olive oil sector is for instance a good example for opportunities to integrate the rural world with the rest of the economy through GVCs. But otherwise countries are different (AfDB et al., 2014).

Consider, for instance, Morocco: it has about 70 industrial zones (roughly half operational), two operational free trade zones, and seven technological parks, one of which specialized in ICT (the Casablanca park, 2001). Some problems, such as having only 11.8% of the population with completed tertiary education - levels well below those in Egypt and Tunisia - and very high minimum wage (2,110 MAD per month (210 EUR) or 10.64 MAD per hour, according to ILO) seem to affect some firms in specific sectors, and not in others, where the problems are offset by benefits of being a regional transport logistics hub, with good quality of transport and trade logistics.

It helps at this stage to introduce some practical examples of GVC participation in North Africa, and link them with the data of the above figures.

For instance the Moroccan garment industry is a key supplier for fast fashion supply chains, such as Zara, thanks to its proximity to the EU market. The latter is a crucial driver of fast supply chains because of the speed and responsiveness of suppliers to meet changes in demand effectively. Furthermore, the Moroccan textile industry association has been able to create over time a sector-led code of conduct and social label called Fibre Citoyenne, which the fashion retailers found attractive, leading to a successful upgrade into global fashion value chains. Their workers shared in the gains from economic upgrading, improving skills and benefiting from measurably improved standards (AfDB et al., 2014). This anecdotic evidence is supported by our data As Figure 7b shows, in the textile sector Morocco mainly imports intermediate goods and once processed, it exports final goods.

Further, the country is also "a rear base for of the French aerospace industry". All Airbus delivered worldwide fly with parts manufactured by the Moroccan aeronautics industry, which employs 10,000 people and plans to double the number of companies in the sector by 2020 with 20,000 jobs into the bargain. Then, in this sector Morocco imports intermediates and exports components of the aircraft (Figure 7b). The development of the aeronautics sector is a very promising global value chain, which relies on a pool of skilled human resources. With 100% of its production aimed at exports, the Moroccan aeronautics sector comprises nearly 100 companies of international scope involved in activities covering production, services and engineering, which are the main components of the global value chain for aeronautics. EADS, Boeing, Safran, Ratier Figeac and, more recently, Eaton and Hexcel, are all present in Morocco.

The automotive sector too has been able to enter the Renault-Nissan value chain in Tangiers in 2012, with an annual production capacity of 340 000 vehicles, 90% of which are intended for export, in particular to Europe. The automotive chain is interesting since it started with a large investment of the Renault group which then resulted in a policy of local integration aimed at increasing the number of components that are locally sourced, thanks to savings achieved through lower logistics costs. The phosphate industry in Morocco has finally positioned itself in all parts of the value chain from the production of fertilizer to that of phosphoric acid as well as derivative products.

Figure 7: Trade in intermediates in NA countries and Morocco
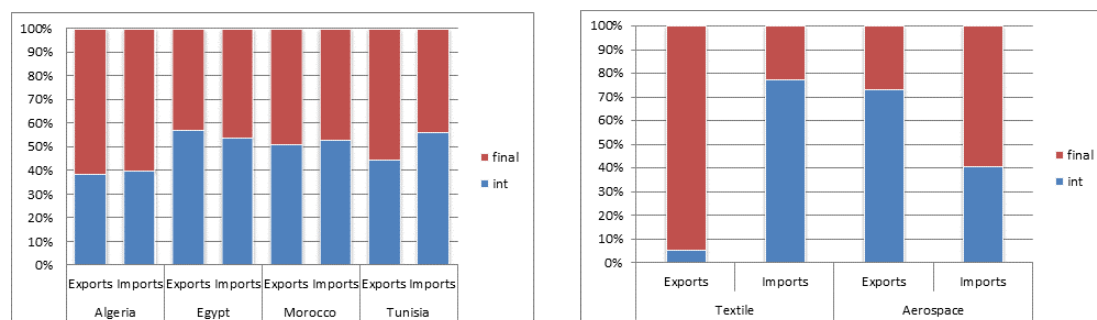
Source: Authors' elaboration based on STAN Bilateral Trade in Goods by Industry and End-use (BTDIxE), ISIC Rev.4.

If Morocco is at the forefront, also Egypt and Tunisia have interesting situations, for instance Egypt is the destination of outsourcing from Microsoft, which gets some services that complement its products but there are some small firms that serve Microsoft directly. Services, classified into traditional IT Services (ITS), such as software installation and testing and IT Enabled Services (ITES), such as call centers, are by far the largest contribution of SMEs and not just packaged software and hardware. The call centers development in Egypt covers from very simple to complex operations, such as marketing and sales, and business and information technology (IT) consulting.

As far as Tunisia is concerned, Elghazala Technopark is for instance home to more than 200 companies including subsidiaries of international ICT companies such as Microsoft and Google.

3 MICRO PERSPECTIVE - FIRMS IN GVCs

GVCs have mainly shifted the target of the economic analysis from countries to firms. Thanks to the international fragmentation of production into single tasks, firms can now specialize in a particular stage of the chain and also as a internationalized.

There is a growing debate on the role and the upgrading processes of the intermediate firms (Gereffi, 1994; Alcacer and Oxley, 2014). The improvement of performance of firms participating in a GVC is likely to require changes in the nature and mix of activities carried out in each stage along the chain and in the relationships among them. Thus, firms' technical and relational abilities can be crucial determinants of suppliers' performance. In this respect, both Agostino et al. (2014) and Giovannetti et al. (2015) argue that joining the supply chain may be decisive even for small and less productive firms, by providing incentives and opportunities to upgrade their technical capabilities.

For the purpose of our firm-level analysis, we exploit a subset of the original World Bank Enterprise Survey database specifically focused on NA countries' firms. It provides information on the characteristics of firms across various dimensions, including size, ownership,

trading status, and performance, and collects data for 1,885 firms and three NA countries for which data are available in 2007, namely Algeria, Egypt and Morocco. Table 1 provides the main descriptive statistics for the variables employed in the empirical analysis. The analysis is focused on manufacturing firms only.

Table 1: Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ln_sales	1763	13.20	2.24	5.83	21.95
ln_va	1632	12.71	2.26	2.87	21.95
ln_salesemp	1762	9.21	1.71	0.63	16.64
ln_vaemp	1631	8.69	1.66	-2.17	16.64
ln_tfp_va	1492	7.03	1.77	-1.40	14.43
trader	1885	0.48	0.50	0.00	1.00
indtrader	1885	0.11	0.31	0.00	1.00
exp	1885	0.05	0.22	0.00	1.00
imp	1885	0.26	0.44	0.00	1.00
twoway	1885	0.17	0.37	0.00	1.00
indexp	1885	0.03	0.16	0.00	1.00
indimp	1885	0.08	0.27	0.00	1.00
indtwoway	1885	0.00	0.05	0.00	1.00
totexpinte y	1885	0.16	0.32	0.00	1.00
forinput	1885	0.36	0.39	0.00	1.00
inwfdi	1885	0.08	0.27	0.00	1.00
cert	1818	0.17	0.37	0.00	1.00
ln_size	1883	3.96	1.50	1.10	9.68
hc	1866	0.59	0.28	0.00	1.00
capitalint y	1614	4.40	3.91	-7.14	14.37

Firms in the sample are characterized by different modes of internationalization, depending on the complexity of their links with other domestic or foreign firms. As summarized in Figure 8, we observe direct and indirect trade (i.e. through intermediaries). About 48% of firms in the area, and with differences between the different countries considered, are direct traders, while indirect traders are 11%. In both cases, the most frequent internationalization mode regards import, either direct (26%) or indirect (8%). Interestingly and possibly related to GVCs, the share of twoway traders (17%) is larger than that of pure exporters (only 5%).

As expected, the share of traders tends to increase with firm's size, as shown in Figure 9. This confirms a typical finding of the heterogeneous firms literature, showing that internationalized firms perform better according a several indicators. Regarding to GVCs, one possibly relevant indicator is the presence of international quality certifications, a proxy for the ability of the firm to meet international standards typically required in vertically fragmented production processes. Figure 9 shows that, not surprisingly, larger firms also have a higher probability of having international quality certifications as well as of being foreign owned.

Figure 8: Shares of traders and domestic firms.
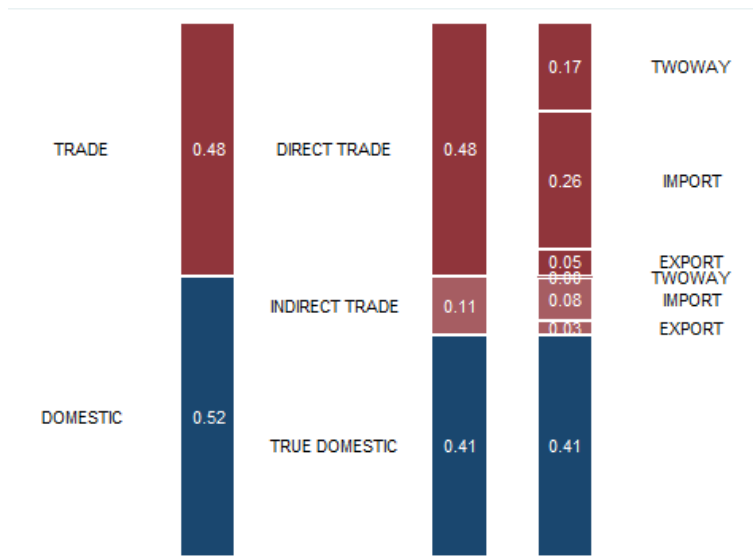
Source: Authors' elaboration based on WB Enterprise Surveys.

Figure 9: Shares of traders, certified firms and foreign owned firm by size class.
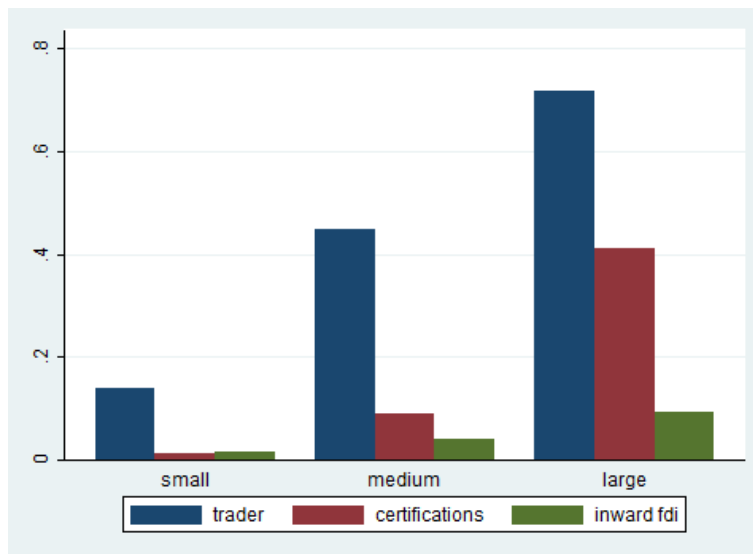
Source: Authors' elaboration based on WB Enterprise Surveys.

Trading in the international market, having international certifications and being foreign owned are the three main indicators available in our dataset in order to proxy GVC participation of firms. Since the main effect of vertical fragmentation, production networks and

GVCs on international trade is trade in intermediate goods, we also separate intermediate and consumption goods (we refer to the BEC classification to this end).

The relation between the variables discussed is summarized in Figure 10. The probability of having certifications and being foreign owned both increase moving from domestic to indirect and direct traders, being highest for twoway traders. Intermediate firms are more likely to hold certifications with respect to producers of consumption goods, given the internationalization mode. Similarly, foreign owned firms are slightly more likely among intermediate firms, with twoway traders and importers having the highest shares.

Figure 10: Shares of certified firms and foreign owned firm by internationalization mode and product type.
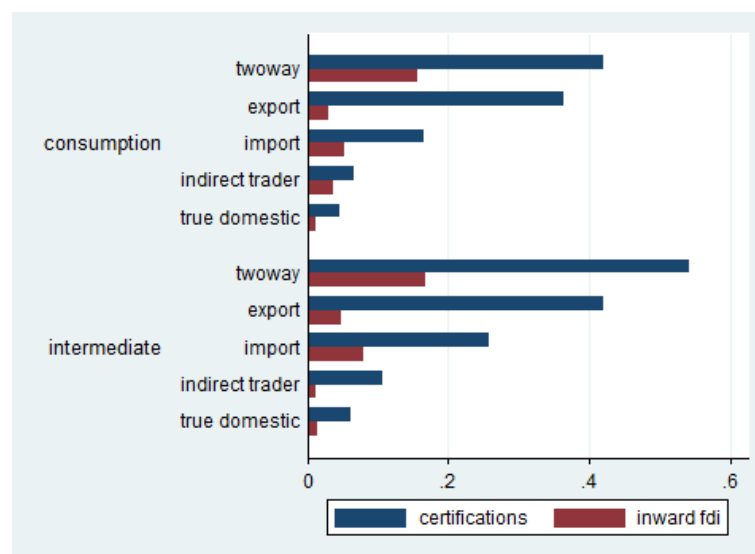
Source: Authors' elaboration based on WB Enterprise Surveys.

In what follows, we employ the above indicators to gauge the relation between internationalization, GVCs and firm's performance. We employ several performance measures, some related to production, namely sales and value added, and others related to productivity, namely sales per employee, value added per employee and total factor productivity (TFP). Sales and value added measures can be recovered from our data, while TFP is estimated. Our TFP estimates assume Cobb-Douglas production function in which value added is the output variable. Due to data constraints, the estimation is performed at the country level with 2-digit sector fixed effects. Estimated TFP is positively correlated with our other productivity measures as showed in Figure 11.

3.1 Empirical Analysis

In our baseline equation we regress performance indicators on our different measures of GVCs involvement and other firm characteristics as follows:

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Figure 11: Total factor productivity and other productivity measures.
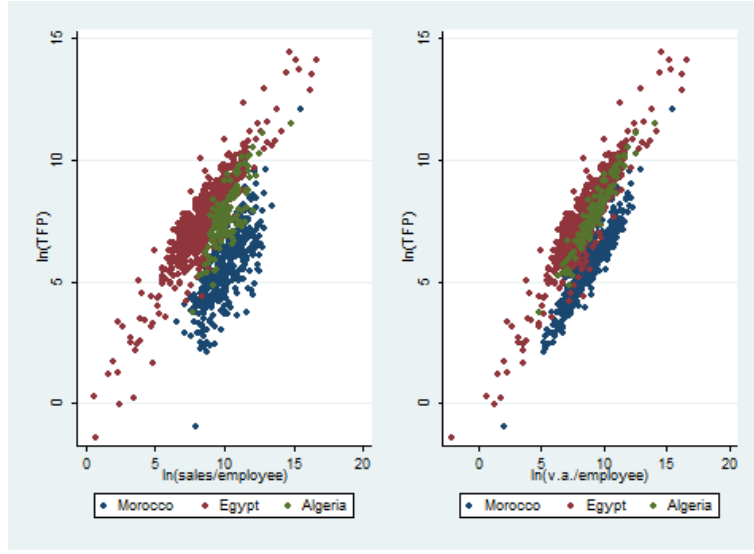
Source: Authors' elaboration based on WB Enterprise Surveys.

$$Y_{iac} = \beta_0 + \beta_1 X_i + \beta_2 cert_i + + \beta_3 Z_{iac} + \lambda_{ac} + \varepsilon_{iac} \qquad (1)$$

where Y is performance (alternatively sales per worker, value added per worker or TFP) of firm i active in core industry a in country c; X_i is the firm's internationalization mode (either direct or indirect importer, exporter and two-way trader, or export/import intensity), *cert* (1 if the firm has an internationally-recognized quality certification) is our proxy of GVCs involvement other than internationalization mode and $Z_{i(j)ac}$ represents firm-level control measures, namely capital intensity, human capital, size, age and a foreign ownership dummy variable (if i is foreign owned). In addition we make use of λ_{ac} a full set of (country and industry) fixed effects, in order to take into account all possible differences in institutional environments combined with industrial composition recorded at the 2 digit level of disaggregation.

In Table 2 we report OLS estimates for the direct and indirect trader specification. We complement this analysis by adding firm-level control variables and distinguishing between final and intermediate firms (i.e. those who present as a main product an intermediate good) (Table Appendix).

As expected, Table 2 shows the positive relation between international linkages and firm performance, as both direct and indirect traders have positive and significant coefficients for the whole set of performance indicators. These findings are in line with the theoretical predictions that only the most productive firms are able to sustain the higher sunk costs of internationalization (Antràs and Helpman, 2004). Further, there is evidence of a "pecking order", as firms active in multiple globalization modes and direct importers tend to have

Table 2: OLS on direct/indirect trader

	SALES	VA	SALESEMP	VAEMP	TFP
	(1)	(2)	(3)	(4)	(5)
only exp	0.368**	0.345*	0.368**	0.345*	0.096
	(0.170)	(0.181)	(0.170)	(0.181)	(0.174)
only imp	0.776***	0.837***	0.776***	0.837***	0.631***
	(0.110)	(0.123)	(0.110)	(0.123)	(0.123)
twoway	0.497***	0.659***	0.497***	0.659***	0.381**
	(0.149)	(0.164)	(0.149)	(0.164)	(0.158)
only indexp	0.580***	0.507**	0.580***	0.507**	0.401*
	(0.220)	(0.235)	(0.220)	(0.235)	(0.226)
only indimp	0.251	0.336*	0.251	0.336*	0.351
	(0.164)	(0.194)	(0.164)	(0.194)	(0.230)
indtwoway	-0.052	-0.283	-0.052	-0.283	-0.264
	(0.661)	(0.699)	(0.661)	(0.699)	(0.743)
ln_size	1.176***	1.267***	0.176	0.267*	0.213
	(0.132)	(0.145)	(0.132)	(0.145)	(0.149)
ln_size2	-0.032**	-0.044***	-0.032**	-0.044***	-0.039**
	(0.014)	(0.015)	(0.014)	(0.015)	(0.016)
inwfdi	0.346**	0.429***	0.346**	0.429***	0.282*
	(0.140)	(0.154)	(0.140)	(0.154)	(0.147)
cert	0.465***	0.593***	0.465***	0.593***	0.404***
	(0.131)	(0.143)	(0.131)	(0.143)	(0.138)
certXtwoway	0.180	-0.030	0.180	-0.030	0.189
	(0.222)	(0.240)	(0.222)	(0.240)	(0.231)
age	-0.003	-0.004	-0.003	-0.004	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
_cons	2.992**	1.901	2.992**	1.901	2.374
	(1.486)	(1.573)	(1.486)	(1.573)	(1.505)
R-squared	0.586	0.551	0.287	0.158	0.328
N	1700	1572	1700	1572	1439

* $p<0.1$, **$p<0.05$,***$p<0.01$

a higher performance than direct exporters, indirect traders and domestic firms (Tomiura, 2007; Kohler and Smolka, 2012).

Interestingly we find that firms with an internationally recognized quality certification perform relatively better than non-recognized firms. Quality certifications are a crucial requirement to enter GVCs and particularly in developing countries, where standards are difficult to meet. Further, foreign ownership is positively related to our dependent variables, which reveals that firms in a multinational group have a higher performance respect their

domestic owned counterparts (Blomström and Sjöholm, 1999), while size follows a quadratic approximation, for which economies of scale and coordination costs are counterbalanced.

In Table 4 and Table 5 (Table Appendix) we add to our baseline respectively human capital and capital intensity. The former presents some non-linearities, as both firms endowed with relatively unskilled and skilled employment tend to have a lower performance. Overall, capital intensive firms are more productive. Finally Table 6 reports estimates for the intermediate firms sample. Following previous results, internationalization is related to higher performance, while certification is no longer significant, probably capturing some differences between final and intermediate firms.

Table 3 shows OLS estimates for the export/import intensity. The higher the foreign input intensity the better performance is. We can argue that this is due to some knowledge spillovers, as forinput is always positive and significant.

Again quality certifications results in a performance premium, and size and foreign ownership are in line with previous findings. In Table Appendix we report further specifications, still coherent with the above results.

Table 3: OLS on export/import intensity

	SALES	VA	SALESEMP	VAEMP	TFP
	(1)	(2)	(3)	(4)	(5)
totexpintensity	-0.123	-0.056	-0.123	-0.056	-0.121
	-0.144	-0.156	-0.144	-0.156	-0.15
forinput	0.487***	0.564***	0.487***	0.564***	0.482***
	-0.11	-0.123	-0.11	-0.123	-0.123
ln_size	1.331***	1.441***	0.331**	0.441***	0.304**
	-0.13	-0.142	-0.13	-0.142	-0.145
ln_size2	-0.043***	-0.056***	-0.043***	-0.056***	-0.045***
	-0.014	-0.015	-0.014	-0.015	-0.015
inwfdi	0.361**	0.438***	0.361**	0.438***	0.288**
	-0.141	-0.154	-0.141	-0.154	-0.147
cert	0.580***	0.648***	0.580***	0.648***	0.499***
	-0.112	-0.121	-0.112	-0.121	-0.116
age	-0.003	-0.003	-0.003	-0.003	-0.002
	-0.002	-0.003	-0.002	-0.003	-0.002
_cons	2.910*	1.766	2.910*	1.766	2.302
	-1.494	-1.58	-1.494	-1.58	-1.505
R-squared	0.579	0.544	0.274	0.145	0.324
N	1700	1572	1700	1572	1439

* p<0.1, **p<0.05,***p<0.01

4 CONCLUSIONS

This contribution is a first attempt to study to what extent North African countries enter into GVCs, from both a macro and micro perspective exploiting different datasets. Our results show that North Africa has not been able so far to enter massively into global production networks. However different countries are integrated in different ways, with very few successful examples of beneficial participation in a value chain, with the risk of being locked into low value added stages. GVCs are an important mean for linking developing countries to global production and trade, potentially supporting export propensity for SMEs.

Regardless of a firm's position in the value chain, minimum quality, cost, and reliability requirements must be met. The buyers' sourcing strategies are constantly revised to improve these elements of their supply chains. The complexity and heterogeneity of quality standards has become a large barrier, in particular for SMEs, adding a significant cost. Upstream firms supplying intermediate inputs to several destinations may have to duplicate production processes to comply with conflicting standards, or to incur burdensome certification procedures multiple times for the same product. On this, international regulatory cooperation (convergence of standards, certification requirements and mutual recognition agreements) can alleviate the burden of compliance and enhance competitiveness.

The effects of policies depend crucially on whether the latter are targeted at appropriate stages of production. Backward and forward linkages create multiplier effects so, for example, support for final goods producers can increase the range of parts produced, broadening the industrial base and attracting entry of further final goods producers. Policies that expand the range of parts on the margin are likely to spark more industrialization than policies that promote parts production within the margin (parts that are already produced domestically), or parts far beyond the margin (highly sophisticated parts not used in locally produced final goods) (Baldwin and Venables, 2015).

Above all, for GVCs to have a positive impact, an adequate preparation is required. Human capital development can be tailored to the needs of particular segments of the value chain; specialized skills are a prerequisite for involvement in high value added stages of the chains associated with industries such as information technology, electronics and pharmaceuticals. Hence policies designed to support education and technical training represent an important tool to increase the gains of global production.

A TABLE APPENDIX

Table 4: baseline + human capital

	SALES	VA	SALESEMP	VAEMP	TFP
	(1)	(2)	(3)	(4)	(5)
only exp	0.377**	0.356**	0.377**	0.356**	0.109
	(0.171)	(0.182)	(0.171)	(0.182)	(0.174)
only imp	0.783***	0.851***	0.783***	0.851***	0.652***
	(0.110)	(0.124)	(0.110)	(0.124)	(0.123)
twoway	0.523***	0.701***	0.523***	0.701***	0.421***
	(0.150)	(0.165)	(0.150)	(0.165)	(0.159)
only indexp	0.589***	0.522**	0.589***	0.522**	0.420*
	(0.220)	(0.235)	(0.220)	(0.235)	(0.225)
only indimp	0.243	0.312	0.243	0.312	0.310
	(0.165)	(0.195)	(0.165)	(0.195)	(0.232)
indtwoway	-0.106	-0.363	-0.106	-0.363	-0.351
	(0.662)	(0.701)	(0.662)	(0.701)	(0.742)
ln_size	1.189***	1.263***	0.189	0.263*	0.200
	(0.134)	(0.146)	(0.134)	(0.146)	(0.149)
ln_size2	-0.034**	-0.044***	-0.034**	-0.044***	-0.038**
	(0.014)	(0.015)	(0.014)	(0.015)	(0.016)
inwfdi	0.331**	0.413***	0.331**	0.413***	0.279*
	(0.142)	(0.155)	(0.142)	(0.155)	(0.148)
cert	0.449***	0.589***	0.449***	0.589***	0.393***
	(0.133)	(0.144)	(0.133)	(0.144)	(0.139)
certXtwoway	0.171	-0.064	0.171	-0.064	0.138
	(0.224)	(0.242)	(0.224)	(0.242)	(0.231)
age	-0.003	-0.003	-0.003	-0.003	-0.002
	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)
hc	1.122**	1.492**	1.122**	1.492**	1.466**
	(0.570)	(0.636)	(0.570)	(0.636)	(0.622)
hc2	-0.903*	-1.160**	-0.903*	-1.160**	-1.128**
	(0.487)	(0.541)	(0.487)	(0.541)	(0.532)
_cons	2.776*	1.631	2.776*	1.631	2.163
	(1.496)	(1.583)	(1.496)	(1.583)	(1.508)
R-squared	0.585	0.550	0.285	0.158	0.333
N	1685	1558	1685	1558	1426

* p<0.1, **p<0.05,***p<0.01

Table 5: baseline + human capital + capital intensity

	SALES	VA	SALESEMP	VAEMP	TFP
	(1)	(2)	(3)	(4)	(5)
only exp	0.154	0.137	0.154	0.137	0.123
	(0.165)	(0.175)	(0.165)	(0.175)	(0.175)
only imp	0.596***	0.660***	0.596***	0.660***	0.667***
	(0.114)	(0.125)	(0.114)	(0.125)	(0.124)
twoway	0.304**	0.475***	0.304**	0.475***	0.438***
	(0.147)	(0.160)	(0.147)	(0.160)	(0.160)
only indexp	0.490**	0.429*	0.490**	0.429*	0.429*
	(0.212)	(0.226)	(0.212)	(0.226)	(0.226)
only indimp	0.329	0.313	0.329	0.313	0.322
	(0.200)	(0.232)	(0.200)	(0.232)	(0.232)
indtwoway	0.113	-0.294	0.113	-0.294	-0.353
	(0.705)	(0.743)	(0.705)	(0.743)	(0.742)
ln_size	1.264***	1.279***	0.264*	0.279*	0.204
	(0.138)	(0.150)	(0.138)	(0.150)	(0.149)
ln_size2	-0.034**	-0.037**	-0.034**	-0.037**	-0.039**
	(0.015)	(0.016)	(0.015)	(0.016)	(0.016)
inwfdi	0.234*	0.292**	0.234*	0.292**	0.288*
	(0.136)	(0.148)	(0.136)	(0.148)	(0.148)
cert	0.328**	0.411***	0.328**	0.411***	0.403***
	(0.130)	(0.139)	(0.130)	(0.139)	(0.139)
certXtwoway	0.289	0.101	0.289	0.101	0.129
	(0.216)	(0.232)	(0.216)	(0.232)	(0.231)
age	-0.002	-0.002	-0.002	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
hc	0.867	1.404**	0.867	1.404**	1.457**
	(0.569)	(0.624)	(0.569)	(0.624)	(0.623)
hc2	-0.674	-1.059**	-0.674	-1.059**	-1.123**
	(0.489)	(0.533)	(0.489)	(0.533)	(0.532)
capitalintensity	0.278***	0.302***	0.278***	0.302***	-0.020
	(0.020)	(0.022)	(0.020)	(0.022)	(0.022)
_cons	1.659	0.526	1.659	0.526	2.227
	(1.434)	(1.513)	(1.434)	(1.513)	(1.510)
R-squared	0.640	0.604	0.367	0.260	0.332
N	1508	1426	1508	1426	1426

* $p<0.1$, **$p<0.05$,***$p<0.01$

Table 6: baseline + human capital + capital intensity OLNY INTERMEDIATE

	SALES (1)	VA (2)	SALESEMP (3)	VAEMP (4)	TFP (5)
only exp	0.789***	0.795***	0.789***	0.795***	0.773***
	(0.277)	(0.287)	(0.277)	(0.287)	(0.286)
only imp	0.711***	0.776***	0.711***	0.776***	0.776***
	(0.184)	(0.198)	(0.184)	(0.198)	(0.197)
twoway	0.927***	0.983***	0.927***	0.983***	0.963***
	(0.307)	(0.320)	(0.307)	(0.320)	(0.319)
only indexp	0.559*	0.539*	0.559*	0.539*	0.552*
	(0.307)	(0.323)	(0.307)	(0.323)	(0.321)
only indimp	-0.211	-0.090	-0.211	-0.090	-0.178
	(0.424)	(0.523)	(0.424)	(0.523)	(0.521)
ln_size	1.386***	1.397***	0.386*	0.397*	0.345
	(0.218)	(0.229)	(0.218)	(0.229)	(0.228)
ln_size2	-0.050**	-0.054**	-0.050**	-0.054**	-0.058**
	(0.023)	(0.024)	(0.023)	(0.024)	(0.024)
inwfdi	0.534*	0.633**	0.534*	0.633**	0.638**
	(0.281)	(0.295)	(0.281)	(0.295)	(0.293)
cert	0.144	0.151	0.144	0.151	0.142
	(0.208)	(0.219)	(0.208)	(0.219)	(0.218)
certXtwoway	-0.123	-0.110	-0.123	-0.110	-0.105
	(0.401)	(0.419)	(0.401)	(0.419)	(0.417)
age	-0.009**	-0.008*	-0.009**	-0.008*	-0.008*
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
hc	-0.203	0.149	-0.203	0.149	0.278
	(1.045)	(1.100)	(1.045)	(1.100)	(1.096)
hc2	0.197	0.026	0.197	0.026	-0.083
	(0.877)	(0.923)	(0.877)	(0.923)	(0.919)
capitalintensity	0.303***	0.292***	0.303***	0.292***	-0.039
	(0.033)	(0.035)	(0.033)	(0.035)	(0.035)
_cons	1.360	0.366	1.360	0.366	1.966
	(1.579)	(1.638)	(1.579)	(1.638)	(1.631)
R-squared	0.633	0.605	0.348	0.228	0.146
N	590	566	590	566	566

* p<0.1, **p<0.05,***p<0.01

Table 7: baseline + human capital on intensity

	SALES (1)	VA (2)	SALESEMP (3)	VAEMP (4)	TFP (5)
totexpintensity	-0.1	-0.024	-0.1	-0.024	-0.088
	-0.145	-0.158	-0.145	-0.158	-0.15
forinput	0.496***	0.577***	0.496***	0.577***	0.498***
	-0.11	-0.123	-0.11	-0.123	-0.123
ln_size	1.347***	1.444***	0.347***	0.444***	0.299**
	-0.131	-0.143	-0.131	-0.143	-0.145
ln_size2	-0.044***	-0.056***	-0.044***	-0.056***	-0.045***
	-0.014	-0.015	-0.014	-0.015	-0.015
inwfdi	0.345**	0.421***	0.345**	0.421***	0.286*
	-0.142	-0.156	-0.142	-0.156	-0.147
cert	0.563***	0.636***	0.563***	0.636***	0.475***
	-0.113	-0.123	-0.113	-0.123	-0.117
age	-0.003	-0.003	-0.003	-0.003	-0.002
	-0.002	-0.003	-0.002	-0.003	-0.002
hc	1.140**	1.454**	1.140**	1.454**	1.447**
	-0.574	-0.64	-0.574	-0.64	-0.622
hc2	-0.928*	-1.150**	-0.928*	-1.150**	-1.140**
	-0.491	-0.545	-0.491	-0.545	-0.533
_cons	2.670*	1.479	2.670*	1.479	2.08
	-1.505	-1.592	-1.505	-1.592	-1.51
R-squared	0.578	0.543	0.272	0.144	0.327
N	1685	1558	1685	1558	1426

* $p<0.1$, **$p<0.05$,***$p<0.01$

Table 8: baseline + human capital + capital intensity on intensity

	SALES	VA	SALESEMP	VAEMP	TFP
	(1)	(2)	(3)	(4)	(5)
totexpintensity	-0.149	-0.051	-0.149	-0.051	-0.087
	(0.139)	(0.151)	(0.139)	(0.151)	(0.151)
forinput	0.502***	0.518***	0.502***	0.518***	0.503***
	(0.112)	(0.124)	(0.112)	(0.124)	(0.123)
ln_size	1.338***	1.379***	0.338**	0.379***	0.304**
	(0.134)	(0.146)	(0.134)	(0.146)	(0.146)
ln_size2	-0.038***	-0.044***	-0.038***	-0.044***	-0.046***
	(0.014)	(0.016)	(0.014)	(0.016)	(0.016)
inwfdi	0.229*	0.293**	0.229*	0.293**	0.290**
	(0.136)	(0.148)	(0.136)	(0.148)	(0.148)
cert	0.453***	0.479***	0.453***	0.479***	0.480***
	(0.110)	(0.118)	(0.110)	(0.118)	(0.117)
age	-0.001	-0.002	-0.001	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
hc	0.931	1.388**	0.931	1.388**	1.442**
	(0.567)	(0.623)	(0.567)	(0.623)	(0.622)
hc2	-0.746	-1.074**	-0.746	-1.074**	-1.137**
	(0.488)	(0.534)	(0.488)	(0.534)	(0.533)
capitalintensity	0.287***	0.311***	0.287***	0.311***	-0.011
	(0.020)	(0.022)	(0.020)	(0.022)	(0.022)
_cons	1.630	0.396	1.630	0.396	2.117
	(1.433)	(1.515)	(1.433)	(1.515)	(1.512)
R-squared	0.639	0.601	0.364	0.255	0.327
N	1508	1426	1508	1426	1426

* $p<0.1$, **$p<0.05$,***$p<0.01$

Table 9: baseline + human capital + capital intensity on intensity OLNY INTERMEDIATE

	SALES	VA	SALESEMP	VAEMP	TFP
	(1)	(2)	(3)	(4)	(5)
totexpintensity	0.825***	0.822***	0.825***	0.822***	0.789**
	(0.304)	(0.316)	(0.304)	(0.316)	(0.315)
forinput	0.735***	0.720***	0.735***	0.720***	0.720***
	(0.192)	(0.204)	(0.192)	(0.204)	(0.203)
ln_size	1.521***	1.532***	0.521**	0.532**	0.482**
	(0.212)	(0.224)	(0.212)	(0.224)	(0.223)
ln_size2	-0.058***	-0.061**	-0.058***	-0.061**	-0.065***
	(0.022)	(0.024)	(0.022)	(0.024)	(0.024)
inwfdi	0.530*	0.633**	0.530*	0.633**	0.638**
	(0.278)	(0.293)	(0.278)	(0.293)	(0.292)
cert	0.132	0.147	0.132	0.147	0.139
	(0.183)	(0.191)	(0.183)	(0.191)	(0.191)
age	-0.009**	-0.008*	-0.009**	-0.008*	-0.008**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
hc	-0.533	-0.162	-0.533	-0.162	-0.045
	(1.040)	(1.099)	(1.040)	(1.099)	(1.095)
hc2	0.426	0.240	0.426	0.240	0.139
	(0.873)	(0.922)	(0.873)	(0.922)	(0.918)
capitalintensity	0.319***	0.307***	0.319***	0.307***	-0.023
	(0.033)	(0.035)	(0.033)	(0.035)	(0.035)
_cons	0.839	-0.083	0.839	-0.083	1.511
	(1.570)	(1.633)	(1.570)	(1.633)	(1.627)
R-squared	0.634	0.605	0.350	0.227	0.145
N	590	566	590	566	566

* $p<0.1$, **$p<0.05$,***$p<0.01$

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