The nature of industrial development and the speed of structural change*

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Abstract

This paper investigates the relation between the inter and intra-sectoral structural changes and the process of industrial development. By comparing the patterns of both emerging and advanced economies during the last three decades, we document how the shape of the relation differs significantly depending on the timing in the advent of industrialization. The later the process started the more unbalanced is the sectoral adjustment. Thus, countries that industrialized as a result of the globalization of production have rapidly become "industrial economies", producing in newly established manufacturing industries. However, these same countries are already facing symptoms of an early deindustrialization.

Keywords: Structural Change, Industrial Development, Globalization

JEL classification: F15, O11, O14, O25

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1 Introduction

Understanding how the sectoral composition of a country's production system shifts in the course of the development process, affecting the pattern of growth of the economy, has been at the core of economic thinking for decades. The attention, in particular, has been focused on the process of industrialization as the development of the manufacturing sector has driven the advent of modern economies not only in Europe and North-America, but also more recently in East Asia and (to a lesser extent) in Latin America. This is consistent with the idea, set forth in important theoretical contributions in the Sixties (see Kaldor 1966 and Baumol 1967), of relatively higher growth rates of productivity in manufacturing compared to the rest of the economy.

Following the works of Fisher (1939), Clark (1940), Fuchs (1968) and Kuznets (1973), structural change has been traditionally studied at the level of the distribution of output and factors of production *across* sectors. The typical pattern identified by the literature corresponds to a hump-shaped relationship between the industrialization rate (share of manufacturing output on gross domestic output) and the level of economic development: as the economy grows, the manufacturing output share rises at the expenses of agriculture, up to a given point beyond which it starts shrinking owing to the (lagged) expansion of service activities[1].

However, the recent contributions by Imbs and Wacziarg (2003, 2014) have shown that a structural transformation also takes place *within* the manufacturing sector. Specifically, the degree of sectoral concentration of industrial output has been found to follow a U-shaped pattern as the economy expands: sectoral concentration appears to be higher in countries characterized by relatively low and relatively high levels of economic development.

We argue in the paper that these two empirical regularities have to be envisaged in the very same perspective, as both the inter and intra-sectoral output shifts reflect the nature of the underlying process of industrial development. This is especially true whenever the analysis is focussed on the effects of the advent of global productions, occurred after the mid-Eighties[2]. As stressed by Rodrik (2006), Matsuyama (2009) and Uya et al. (2013), the greater demand for manufacturing products in the face of increased competition across countries has more and more modeled the industrial structure according to the rule of comparative advantages. In this sense, not only has openness shaped the relative weight of the - tradable - manufacturing sector

[1] See Herrendorf et al. (2014) for a recent theoretical and empirical review.

[2] On the timing and the nature of globalization, see for example Amatori and Colli (2011).

in the economy, but it has affected the degree of concentration of industrial output as well, raising the weight of those manufacturing activities that have successfully competed in the international markets.

However, not only the degree of economic integration but likewise the heterogeneity in the process of industrial development across countries has to be considered as a key variable to explain the patterns of structural change observed in the last decades. Indeed, as stressed by Amsden (2001), the stock of manufacturing experience required to build a domestic industrial sector differed dramatically before the advent of globalization, not only between advanced and developing countries, but also among backward economies themselves.

Some of the latecomers, especially in East Asia, already detained enough productive knowledge (as recently defined by Hausmann et al. 2011) and capabilities to compete successfully in international markets - in low-technology manufacturing productions but, often, also in more advanced ones; some others, instead, have had to wait the advent of global value chains and the surge of off-shored productions to establish modern manufacturing industries. Insofar as the growth of international trade in manufacturing products has been more and more pulled by the rise of trade in intermediate goods (Baldwin 2006, 2011, UNIDO 2009, Sturgeon and Memedovic 2010), fed by the cross-country vertical fragmentation of manufacturing value chains and their spreading at the global level, the demand for low-cost manufacturing inputs coming from advanced economies has offered emerging countries an unprecedented opportunity to establish local industries and acquire manufacturing know-how.

A key role in such respect has been played by institutions, as they have fostered (or hindered) - through active industrial policies - the building and consolidation of comparative advantages in manufacturing (Cimoli et al. 2009, Romano and Traù 2014). It follows that different countries have been facing the demand shock represented by the advent of globalization hinging upon different structures of the manufacturing industry, reflecting the heterogeneity of their industrial development process. However, the literature so far has largely neglected the impact that such differences could play on the inter and intra-sectoral transformations of an economic system.

We fill this gap in the paper, showing how the timing in the advent of the industrialization process - the knowledge endowments accumulated by each country, as a result of their specific path of industrialization - has affected the intensity with which structural change has occurred in the last thirty years. We use a sample of 63 countries from all around the world, including both early and late industrialisers,

covering the period 1980-2011. Two different measures of structural change are employed: the traditional share of manufacturing value added on the total economy (recently used by Buera and Kaboski 2012) and the sectoral distribution of the manufacturing value added. We document how in both cases the slope of the relation between structural change and industrial development gets steeper the later the countries embrace the industrialization process.

In particular, we show that a declining trend in the manufacturing share on the total economy as well as an increasing trend in the sectoral concentration of manufacturing activities - both associated with increases in the manufacturing value added per capita - do characterize early industrialized countries as well as emerging economies whose industrial development is still at an early stage. Put in other words, in the course of the industrialization process both the inter-sectoral and intra-industry structural adjustment of late industrializers (mainly concentrated in East Asia and Latin America) has been significantly more unbalanced than that observed in Western countries or in those nations (like the Asian Tigers and the East European countries) that built their manufacturing base more recently - albeit before the advent of globalization.

These results are consistent with late development being a story of "compressed development" as defined by Whittaker et al. (2010), to the extent where some countries have undergone within a short time span both a stage of late industrialization and one of early deindustrialization. Our interpretation is that as far as early openness to international competition has demanded laggard economies to search for comparative advantages since the very beginning of their industrialization process, then the limited range of manufacturing know-how detained by these countries can have undermined their potential for production diversification - causing an early sectoral concentration - that in turn has slowed down the rate of growth of the manufacturing industry as a whole - causing a early specialization of the economy away from manufacturing. Consistent with that, we also find that the sectoral distribution of the manufacturing value added is significantly more sensitive to changes in the structure of manufacturing exports for the group of late industrializers compared to the others.

In such respect, the paper sheds new light on the very nature of structural change, underlying in particular the necessity to reconsider the "one size fits all" approach typically followed in most contributions. Neither countries do progress in a linear fashion along their path of industrial development, nor they follow the same path. Knowledge of countries' economic history and institutional settings are fundamental assets to understand and possibly predict their patterns of development,

as suggested, in a wider perspective, by Chang (2002). This conclusion has clear policy implications, as it confirms that "*today's developing countries will have to travel different, as yet unknown, and possibly bumpier paths to democracy and good governance.*"[3].

The reminder of the paper is organized as follows: section 2 describes the data used in the empirical analysis; section 3 shows the identification strategy; section 4 presents and discusses the results; section 5 concludes.

2 Data and sample construction

To conduct our empirical analysis we exploit the information collected by Global Insight, a leading provider of comprehensive economic and financial information on countries and industries. Data include, over the 1980-2011 period, gross domestic product, manufacturing value added, manufacturing exports and population, for 75 countries. Figures about the manufacturing industry can be further broken down, on the basis of the ISIC Rev. 3 classification, into 62 sectors at the 4-digit level. This is the level of disaggregation used to construct the Gini coefficient for the sectoral concentration of the manufacturing value added, but we also replicate the same analysis using the 2-digit disaggregation (22 sectors) as robustness check (see Appendix 6). Table 1 shows the industrial sub-sectors considered in the analysis.

Insert Table 1 here

We employ data expressed in real terms, as $ in the year 2005. Real values are required in order to increase the comparability of the trends across countries, as they are less sensitive to fluctuations in the exchange rate, a primary concern especially for the analysis of emerging economies; moreover, they allow to control for the nominal impact of changes in relative prices on the structure of production - being the increase in manufacturing prices typically lower than that observed in the rest of the economy, both because of productivity differences and because of asymmetric competitive pressure coming from abroad[4].

From the original sample, we have omitted the city-state of Hong Kong and those economies that are highly oil dependent, as their process of structural change

[3]Sentence quoted from Rodrik's blog article "The Perils of Premature Deindustrialization", October 2013.

[4]Instead, when comparing levels of industrial development in a given period, as in section 3, we use nominal values of value added. The reason is that a ranking computed starting from real values would not be constant with changes in the base year.

is, by their very nature, country-specific. In particular, based on the World Bank statistics about oil rents[5], we did not consider in the analysis Bahrain, Kuwait, Nigeria, Quatar, Saudi Arabia, Venezuela and United Arab Emirates, whose oil rents exceeded 30% of domestic GDP in the period 1980-1985. Iran has been omitted because of the war against Iraq, started in 1980 and ended in 1988.

Finally, we have dropped Russia and Ukraine because the corresponding values of the nominal manufacturing value added and GDP per capita seem abnormally low compared to the corresponding values of the other East European economies included in our sample. For instance, the manufacturing value added per capita of Russia for the period 1980-1985 is only 7% of that of Bulgaria and around 5% of those of Czechoslovakia and Hungary. There is no evidence in the literature of such discrepancies in the economic development within the Communist block, as also shown by Maddison (1991).

3 Identification strategy

3.1 Defining the groups of countries

To test our hypothesis that the stock of manufacturing experience detained before the advent of globalization shaped the subsequent process of structural change, we need a measure of the degree of industrial development for each economy.

Ideally, such metrics should vary continuously to reflect the different levels of sophistication in the production knowledge that pre-existed the globalization era. In practice, especially because we are trying to measure technological capabilities whose attributes are often intangible, we use as a proxy variable the manufacturing value added per capita at the beginning of the Eighties: countries with very large differences in their level of industrial production are supposed to be at different stages of their industrialization process. However, without further specification on the nature of the industrialization process, the use of this variable *alone* can be seriously misleading: similar levels of industrial production (or similar sectoral specializations) can characterize countries with very different manufacturing industries, as a result of specific institutional settings, historical legacies or trade relations.

Hence, our identification strategy rests on grouping the countries reported by Global Insight following a two-steps procedure. First, we sort them according to the 1980-1983 average of their manufacturing value added per capita. By doing so we find that the top ranking countries are Western economies concentrated in Europe,

[5]http://data.worldbank.org/indicator/NY.GDP.PETR.RT.ZS

North America and Oceania (plus Japan), while at the bottom of the ranking are countries still nowadays classified as developing economies by the World Bank[6]. Accordingly, we define the groups of the most industrialized countries as those that have joined the OECD before the 80s (plus Israel), and the least industrialised as those with a 1980-1983 average of the manufacturing per capita value added (at current prices) lower than that of the least industrialized economy at the end of the period (2009-2011 average) - that is below the level corresponding to Zimbabwe.

In the middle is a large and heterogeneous group of countries whose level of industrialization ranges from 1540$ of Singapore to 282$ of Ecuador - with most countries ranging between 300$ and 600$ at current prices. Following the literature on industrial development, we isolate those countries that after World War II adopted inward-looking import-substitution strategies, instead of encouraging manufacturing exports. In particular, we define this group ("ISI countries") as being composed of Latin American countries, Turkey and South Africa[7]. The remaining countries are the Asian Tigers (plus Malaysia), characterized by strong export-oriented development policies[8], and the East European republics formerly incorporated in the USSR. These European economies reached, at the beginning of the Eighties, a level of industrial development that was relatively high compared to the average of the non-Western economies[9]; this was especially true for Hungary and Czechoslovakia, whose manufacturing know-how was rooted in the strategic role, as industrial belts, played during the Austro-Hungarian Empire.

The list of countries, together with the 1980-1983 average of their manufacturing value added per capita, is reported in table 2.

Insert Table 2 here

3.2 Estimation strategy

To test the relation between structural change and industrial development, we start by estimating, for each group of countries, g, the following equations, using country fixed effects:

$$Man.Share_{itg} = \beta_0 + \beta_{1g} Man_{itg} + \beta_{2g} Man_{itg}^2 + f_i + \epsilon_{itg} \quad (1)$$

[6]See: http://data.worldbank.org/about/country-classifications
[7]See Baer (1972, 2002), Edwards and Lawrence (2008) and Celâsum and Rodrik (1989).
[8]See the volume edited by Bradford and Branson (1987).
[9]See Turock (2006).

$$Sect.Conc_{itg} = \beta_0 + \beta_{1g} Man_{itg} + \beta_{2g} Man^2_{itg} + f_i + \epsilon_{itg} \quad (2)$$

where $Man.Share_{itg}$ is the share of manufacturing value added on the total economy of country i, observed at time t, $Sect.Conc_{itg}$ is the Gini coefficient of manufacturing sectoral concentration, Man_{itg} is the manufacturing value added per capita, and f_i is the country fixed effect. Thus, by estimating equations 1 and 2, we can test whether the non-linear relations between the two measures of structural change and the level of industrialization hold true *within* each of the four groups of countries previously specified. In order to control for serial correlation in the error term, which is related to the panel structure of the data, we estimate robust standard errors clustered at the country level.

Then, in order to test for structural differences in the above relations *between* groups of countries, we also estimate:

$$Y_{itg} = \beta_0 + \sum_g \beta_{1g} G_{ig} Man_{itg} + \sum_g \beta_{2g} G_{ig} Man^2_{itg} + f_i + \epsilon_{itg} \quad (3)$$

where Y_{itg} is either $Man.Share_{itg}$ or $Sect.Conc_{itg}$ and G_{ig} are three dummies that identify the groups of "Asian Tigers and East European countries", "ISI countries" and "Late Industrializers". Estimates of β_{1g} and β_{2g} different from zero will indicate the existence of group-specific trends in the patterns of structural change, consistently with our research hypothesis.

Note that the independent variable in our models, represented by the level of industrialization, can be rewritten in the following way:

$$Man_{itg} = \frac{ManVA_{itg}}{N_{itg}} = Man.Share_{itg} * \frac{GDP_{itg}}{N_{itg}} \quad (4)$$

where $ManVA_{itg}$ represents the manufacturing value added in the economy, while N_{itg} is the country's population. Equation 4 shows that a country can industrialize in two ways: either because of an inter-sectoral recomposition of output towards manufacturing (an increase of $Man.Share_{itg}$) - the economy is increasingly specialized in producing industrial goods - and/or because of an increase in output that affects horizontally the entire economy (an increase of $GDP_{itg} : N_{itg}$). This implies that the relation between the share of manufacturing value added on the total economy and the manufacturing value added per capita - the estimate of β_{1g} in equation 1 - is positive if and only if the economy becomes increasingly manufacturing-oriented, that is if industrial output grows faster than total output. Conversely, the relation is negative if and only if the rest of the economy (typically the service sector) grows

faster than the manufacturing sector. As the analysis of section 4 will demonstrate, the relative growth in manufacturing varies significantly both *within* and *across* countries, depending on the stage of industrial development and on the nature of the industrialization process.

4 Results

4.1 Inter-sectoral change

The first set of results refers to the change in the relevance of manufacturing activities along the industrialization process. In particular, figure 1 plots the relation between the share of manufacturing value added on the total economy and the manufacturing value added per capita, together with the fitted values obtained from equation 1 (marked with darker dots). The top of the figure refers to the entire sample of countries, while in the lower part different groups are associated with different colors and different fitted lines.

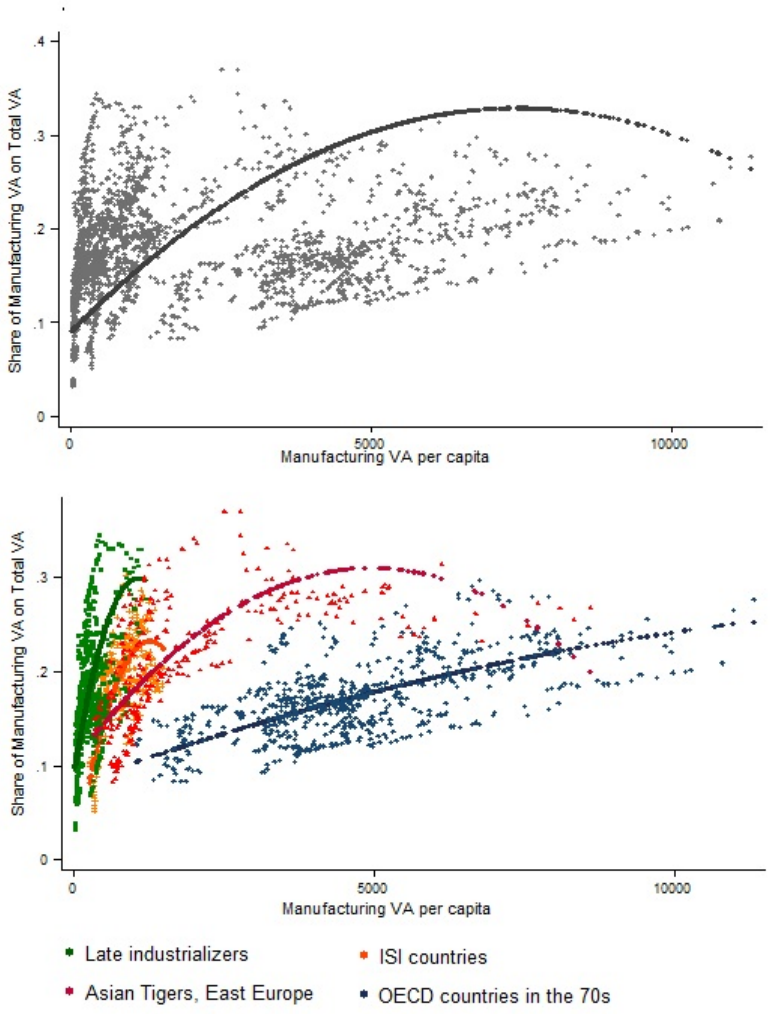
First of all, the figure shows that there is a hump-shaped relation between the level of industrialization and the degree of industrialization of the overall economy. In the early stages of industrial development, the economic system is increasingly specialized in the supply of manufacturing output, which also implies that an increasing share of inputs is employed in this sector. However, as the process continues the relative importance of manufacturing in the economy declines. In other words, after a certain level of manufacturing value added per capita, the industrialization process is increasingly dominated by the development of the rest of the economy.

Moreover, it emerges that the slope of the curve is steeper the bigger the lag in the industrialization process: starting from the same level of industrial development, the process of inter-sectoral output shift towards manufacturing reaches its maximum in the group of late industrializers and former ISI countries first (at around 1200$ at constant prices), then in the intermediate group represented by the Asian Tigers and the East European countries (at around 4800 $), while for the group of old industrialized countries the maximum is not observed yet.

Thus, while for OECD countries industrialization took place over a long period of time, largely as an endogenous process occurring in a world of segmented markets where the opportunities for trade and specialization where limited, at the other extreme late industrializers experienced an export-led growth that, in the few decades under our scrutiny, increased the scale of the market for manufacturing productions of a different order of magnitude compared to the other sectors of the economy.

Figure 1: Inter-sectoral structural change and industrial development

(1980-2011,$,real values)



The Asian Tigers and the East European countries represent an intermediate case between these two extremes, because their industrialization process is rooted, for different historical reasons, in a pre-globalized world; consistently, the slope of the relation between structural change and industrial development is steeper than that observed for old industrial countries but flatter than the one characterizing late industrializers. It is also interesting to notice that the two curves referred to late industrializers and to former ISI countries are almost identical, despite the fact that the latter group experienced industrialization well before the globalization process, simultaneously to that occurring in East Asia. This last piece of evidence strongly supports the idea[10] that inward-oriented import-substitution strategies have mostly

[10]See for instance Rapley (2007).

been an unsuccessful story of industrialization, that did not survive international competition.

The graphical inspection is confirmed by the regression analysis reported in table 3, where the estimates of the coefficients are reported together with their statistical significance. Columns (1) to (4) refer to each group of countries individually (equation 1), while column (5) refers to the entire sample (equation 3).

Insert Table 3 here

The hump-shaped relation between structural change and industrial development is found for each subset of countries, except for the old industrialized ones (OECD members in the 70s), where the relation appears to be linear instead. Moreover, compared to late industrializers the relation is statistically different for the group of Asian Tigers and East European countries, and for the old industrializers, while there is no significant difference with respect to the group of former ISI countries.

4.2 Intra-sectoral change

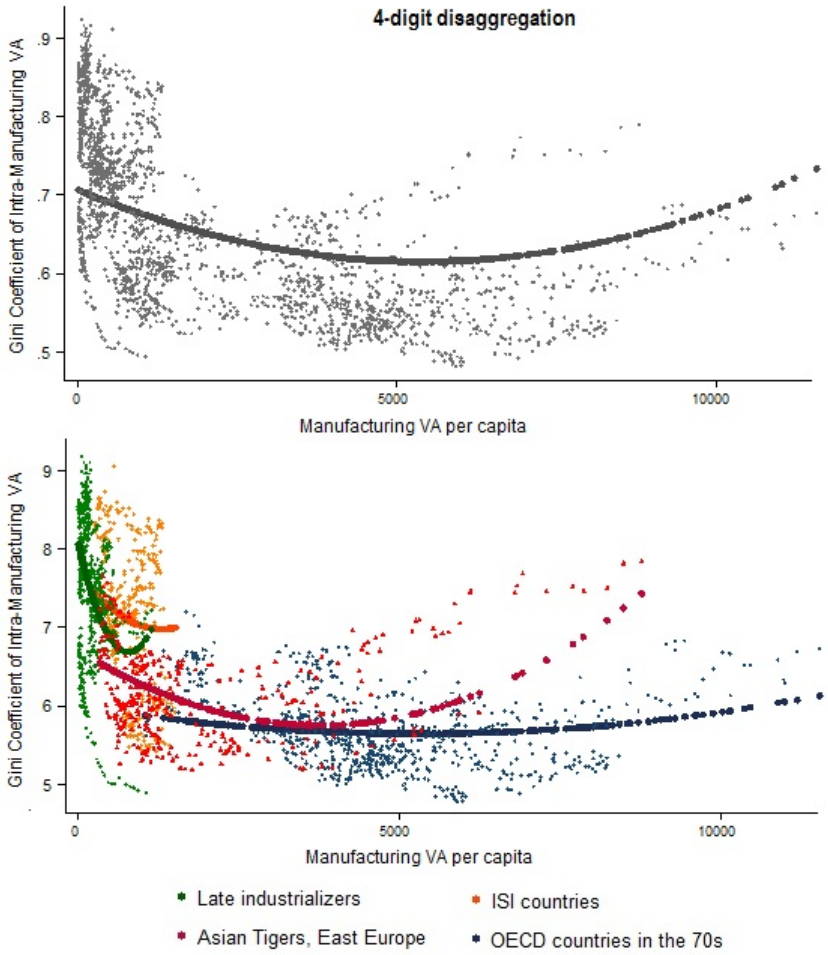
Other then the effects on the inter-sectoral allocation of resources, globalization is also expected to affect the intra-industry sectoral specialization of a country. In fact, the process of sectoral diversification is reversed along the development path as a consequence of ricardian specialization in those economic activities with comparative advantage. According to Cadot et al. (2011), the high diversification in the middle stage of structural change can be viewed essentially as a transitory phenomenon between two steady states in terms of industrial specialization, as new sectors become competitive in the international markets while old ones take time to die. Following Imbs and Wacziarg (2014), instead, sectoral concentration at the national level is the outcome of regional convergence in productivity and factor endowments within the country, as regions produce increasingly similar goods for international markets other than the domestic one.

Figure 2 plots the relation between the Gini coefficient of the intra-manufacturing value added and the manufacturing value added per capita; similarly to the previous graph, the estimates (marked with darkers dots) are presented both for the entire sample of countries and for each of the four groups.

Our results are in line with the existing evidence. In particular, the top of the figure shows, for the entire sample, a clear pattern of intra-manufacturing specialization along the process of industrial development, with a turning point in the Gini coefficient occurring at around 5000 $ of the manufacturing value added per capita.

Figure 2: Intra-sectoral structural change and industrial development

(1980-2011,$,real values)



The same figure also documents, in sharp contrast with the homogeneity assumption underlying the existing literature, how the shape of the relation varies significantly with the timing in the advent of the industrialization process.

Again, consistently with the previous discussion (section 4.1), it emerges that the later the industrialization process started the faster has been the sectoral concentration of manufacturing value added. In other words, relative to the old industrialized countries, whose industrial development did not alter significantly the composition of the manufacturing sector and involved a relatively large number of activies (the Gini coefficient is relatively stable and low along the entire period), for all the other groups the sectoral distribution started concentrating (again) much earlier: for late industrializers and former ISI countries this occurred at around 1000 $ at constant prices, for Asian Tigers and East European countries between 2000 and 3000 $. The

differentiated pattern of structural change is consistent with the idea that those manufacturing sectors that entered global value chains and had access to international markets could grow at a faster rate than the rest of the industry. Provided they have gained some comparative advantage, the speed can be seen as a function of the overall degree of industrial development.

Table 4 reports the estimates of the corresponding regression analyses. As for table 3, columns (1) to (4) refer to each group of countries individually, equation (2), while column (5) refers to the entire sample, equation (3).

Insert Table 4 here

The results reported in table 4 indicate that the relation is found to be not statistically different from a constant for the group of former ISI countries. Instead, the U-shaped relation is confirmed by the statistical analysis for the late industrializers, the group formed by the Asian Tigers and the East European countries, and also for the old industrializers (in this latter case the relation is weakly statistically significant). Moreover, compared to late industrializers the relation is statistically different for all the remaining groups of countries, confirming our initial hypothesis that the process of sectoral concentration was highly heterogeneous also along this dimension.

If the globalization of production has been the driver of industrialization in the last decades - what we have suggested so far - then we should also observe in the data a positive relation between the composition of manufacturing exports and the sectoral distribution of manufacturing output, especially for those laggard economies whose industrial development occurred largely because of the globalization itself. This is confirmed by our analysis.

In particular, table 5 reports, for each group of countries, the elasticity of the Gini coefficient of manufacturing production to a change in the Gini coefficient of manufacturing export, together with the statistical significance.

Insert Table 5 here

First of all, the results indicate that, in general, the sectoral concentration of the manufacturing value added is positively correlated to the sectoral concentration of the manufacturing export: a change in the composition of a country's export basket is reflected in a change in width of its production specialization. The only exception to this rule is the behavior of the group of ISI countries where the correlation between the two variables is even negative but not statistically different from zero; this

last piece of evidence suggests that countries that have adopted inward-oriented industrialization policies before the Eighties have struggled to move to a different path of structural change afterwards, despite the surge of globalization.

Moreover, in line with our previous discussion, compared to the group of old industrialized economies the estimate of the elasticity of the Gini of manufacturing production is significantly higher for the group of late industrializers: the correlation with the Gini of manufacturing export is twice as large. Instead, for the the Asian Tigers and East European countries as well as for the group of ISI countries the estimates are not statistically different from the one corresponding to the OECD countries.

5 Conclusions

Industrial development is accompanied by shifts of economic activities both across and within sectors, determining the overall specialization of the economy and ultimately the country's relative competitiveness. Globalization has played a crucial role in shaping this process. Sectors with a comparative advantage could expand at unprecedented pace, joining international markets, attracting labor and capital from the rest of the economy.

The intensity and the speed of this change differed dramatically across countries, depending on how far they have been integrating into the global economy, due in particular to the timing of the industrialization process. The effect was moderate for those economies in which the advent of the industrialization process came before international integration and that were able to build their industrial system mostly on endogenous bases. At the opposite, the effect was maximum for those developing countries that industrialized at the same time as globalization took place, by joining international value chains and becoming prominent destinations for production offshoring. In a few years (and at a still very low level of industrial development) they became industrial economies and acquired competencies and technologies in newly-established manufacturing industries. Yet, these same countries are already facing symptoms of what can be considered an early de-industrialization, as their share of manufacturing activity on the total economy has already begun to fall and their manufacturing output has remained concentrated to a few sectors.

If manufacturing industries are truly "escalator industries" for development (as suggested by Rodrik 2013) and the acquisition of production capabilities in an increasing range of goods (that is the opposite of the sectoral concentration we have documented) is crucial for a sustainable growth (as implied by Hidalgo et al. 2007),

then our results indicate that the catching-up process observed in the South of the world might slow-down in the next future, well before what standard economic theory would suggest.

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6 Appendix

In this appendix we show the analog of table 4 using the 2-digit level of classification for the manufacturing activities instead of the 4-digit disaggregation presented in the paper. Compared to a finer disaggregation, this is more robust to changes in the classification and in the number of economic activities that may have occurred in the three decades considered. However, the 2-digit level of classification hides intra-sectoral changes occurring at higher levels of disaggregation, thus lowering the probability of observing structural transformations in the composition of the manufacturing sector.

Insert Table 6 here

The significant results shown in Table 5, obtained at this low level of disaggregation, virtually identical to those already discussed in section 4.2, have to be considered as strong validation of the existence of heterogeneous patterns of change in the industrial system.

7 Tables

Table 1: *Sectoral coverage*

ISIC code	Industrial sector	ISIC code	Industrial sector
D155	Beverages	D27B	Non-ferrous metals
D15O	Food products	D281	Structural metal products
D16	Tobacco products	D289	Metal coatings, related services
D17	Textiles	D2911	Engines and turbines
D18	Wearing apparel	D2915	Lifting and handling equipmenty
D19	Leather footwear	D291O	Other general industry machinery
D20	Wood products (exclude furniture)	D2921	Agricultural machinery
D21	Paper and pulp	D2922	Machine-tools
D2213	Publishing of recorded media	D2923	Metallurgy machinery and casting
D221O	Other publishing	D2924	Machinery for mining and construction
D222	Printing and related services	D292O	Other special industry machinery
D223	Reproduction of recorded media	D293	Domestic appliances
D231	Manufacture of coke oven products	D30	Computers and office machinery
D232	Refined petroleum products	D311	Electrical motors, generators
D233	Nuclear fuel processing	D312	Electricity distribution and control
D2411	Basic chemical products	D31O	Wire, cables, batteries
D2412	Fertilizers	D321	Semiconductors, circuit boards, LCD
D2413	Synthetic resins	D322	Transmitters and routers
D2421	Pesticides, agro-chemicals	D323	TV radio equipment
D2422	Paints and varnishes	D331	Medical and measurement equipment
D2423	Pharma: drugs and medicines	D332	Optical and photographic equipment
D2424	Soap, cleaning and cosmetics	D333	Watches and clocks
D2429	Other speciality chemicals	D343	Part and accessories for motor vehicles
D243	Synthetic fibers	D34O	Motor vehicles
D251	Rubber products	D351	Shipbuilding
D252	Plastic products	D352	Railway and equipment
D261	Glass and glass products	D353	Aircraft and spacecraft
D2691	Non-refractory ceramic ware	D359	Other transportation equipment
D269C	Cement, concrete, lime	D361	Furniture
D269O	Other mineral products	D369	Jewelry, toys, musical, sporting goods, other
D27A	Iron and steel	D37	Recycling

The manufacturing sector is disaggregated using the Isic Rev.3 classification. *Source*: Global Insight.

Table 2: *List of countries*

Country	Man. VA per capita ($)	Country	Man. VA per capita ($)
OECD countries in the '70s*		**ISI countries**	
Australia	2130.5	Argentina	1027.2
Austria	1972.3	Brazil	541.2
Belgium	2070.1	Colombia	335.5
Canada	1982.6	Chile	348.5
Denmark	1915.4	Costa Rica	358.8
Finland	2535.1	Ecuador	282.2
France	2050.3	Mexico	610.2
Germany	4091.3	Panama	327.3
Greece	902.8	Turkey	458.4
Ireland	1158.5	South Africa	563.8
Israel	1195.4		
Italy	1946.3	**Late industrializers**	
Japan	2671.1	Bangladesh	33.5
Netherlands	1766.3	Bolivia	128.9
New Zealand	1700.8	Cameroon	142.8
Norway	1952.0	China	110.7
Portugal	575.9	Egypt	109.1
Spain	1262.5	Honduras	142.3
Sweden	2578.3	India	42.0
Switzerland	3705.6	Indonesia	88.9
United Kingdom	2078.6	Jamaica	237.4
United States	2698.8	Jordan	221.6
		Kenya	68.7
Asian Tigers, East Europe**		Morocco	142.2
Bulgaria	460.8	Pakistan	39.6
Czech Republic	665.2	Peru	130.5
Hungary	592.7	Philippines	209.5
Malaysia	401.8	Senegal	58.6
Poland	584.9	Sri Lanka	44.3
Romania	750.8	Thailand	166.9
South Korea	436.1	Tunisia	159.6
Singapore	1540.2	Vietnam	23.0
Slovakia	647.6	Zimbabwe	248.5
Taiwan	889.0		

Groups according to the classification discussed in section 3. *: It includes Israel that joined the OECD only in 2000. ** It includes Malaysia. *Man. VA per capita* refers to the 1980-1983 average at current prices. *Source*: Global Insight.

Table 3: *Regression analysis of inter-sectoral structural change*

	Late industrializers	ISI countries	Asian Tigers and E.E.	OECD countries	
	(1)	(2)	(3)	(4)	(5)
Man_{itg}	0.462***	0.375**	0.084***	0.022***	0.462***
	(0.079)	*(0.125)*	*(0.018)*	*(0.006)*	*(0.077)*
Man^2_{itg}	-0.263**	-0.148**	-0.008***	-0.001	-0.263***
	(0.097)	*(0.066)*	*(0.002)*	*(0.001)*	*(0.096)*
$Man_{itg} \cdot ISI$					-0.087
					(0.143)
$Man^2_{itg} \cdot ISI$					0.114
					(0.115)
$Man_{itg}\cdot$ (AsianTigers and E.E.)					-0.378***
					(0.079)
$Man^2_{itg}\cdot$ (AsianTigers and E.E.)					0.254**
					(0.095)
$Man_{itg} \cdot OECDs$					-0.440***
					(0.077)
$Man^2_{itg} \cdot OECDs$					0.262***
					(0.096)
Constant	0.088***	-0.005	0.107***	0.081***	0.072***
	(0.011)	*(0.055)*	*(0.023)*	*(0.018)*	*(0.012)*
Observations	672	352	320	704	2048
Within-R^2	0.58	0.46	0.55	0.43	0.50

Robust standard errors in parentheses, clustered at the country level. The dependent variable is the share of manufacturing value added on total value added. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. ISI, $AsianTigersandE.E.$ and $OECDs$ are group dummies referred to ISI countries, Asian Tigers and East European countries, and OECD countries in the 70s respectively. The group classification is made according to the discussion of section 3. Regressions include country fixed effects. To ease reading the table, the manufacturing value added per capita has been expressed in 1000 dollars instead of in unit dollars.

Table 4: *Regression analysis of intra-sectoral structural change*

	Late industrializers	ISI countries	Asian Tigers and E.E.	OECD countries	
	(1)	(2)	(3)	(4)	(5)
Man_{itg}	-0.373***	-0.115	-0.052***	-0.014*	-0.373***
	(0.068)	*(0.097)*	*(0.002)*	*(0.007)*	*(0.068)*
Man^2_{itg}	0.239***	0.045	0.007***	-0.001**	0.240***
	(0.053)	*(0.059)*	*(0.003)*	*(0.000)*	*(0.052)*
$Man_{itg} \cdot ISI$					0.258**
					(0.115)
$Man^2_{itg} \cdot ISI$					-0.195**
					(-0.077)
$Man_{itg}\cdot$ (AsianTigers and E.E.)					0.321***
					(0.069)
$Man^2_{itg}\cdot$ (AsianTigers and E.E.)					-0.233***
					(0.052)
$Man_{itg} \cdot OECDs$					0.36***
					(0.068)
$Man^2_{itg} \cdot OECDs$					-0.239***
					(0.052)
Constant	0.817***	0.776***	0.676***	0.603***	0.715***
	(0.010)	*(0.040)*	*(0.021)*	*(0.020)*	*(0.011)*
Observations	672	352	320	704	2048
Within-R^2	0.36	0.05	0.29	0.05	0.25

Robust standard errors in parentheses, clustered at the country level. The dependent variable is the Gini coefficient of intra-manufacturing value added. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. ISI, $AsianTigersandE.E.$ and $OECDs$ are group dummies referred to ISI countries, Asian Tigers and East European countries, and OECD countries in the 70s respectively. The group classification is made according to the discussion of section 3. Regressions include country fixed effects. To ease reading the table, the manufacturing value added per capita has been expressed in 1000 dollars instead of in unit dollars.

Table 5: *Composition of the manufacturing production and of the export basket*

	OECD countries	ISI countries	Asian Tigers and E.E.	Late industrializers
	(1)	(2)	(3)	(4)
Elasticity of the Gini of production	0.134**	-0.090	0.229**	0.393***
to changes in the Gini of exports	(0.057)	(0.146)	(0.081)	(0.066)
Difference w.r.to (1)		-0.223	0.096	0.259***
		(0.151)	(0.095)	(0.086)

The manufacturing sector is disaggregated using the Isic Rev.3 classification. The estimates are obtained regressing the Gini index of manufacturing value added on the Gini index of manufacturing export, including country fixed effects. Robust standard errors in parentheses, clustered at the country level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The group classification is made according to the discussion of section 3.*Source*: Global Insight.

Table 6: *Appendix - Intra-sectoral structural change using the 2-digit disaggregation*

	Late industrializers	ISI countries	Asian Tigers and E.E.	OECD countries	
	(1)	(2)	(3)	(4)	(5)
Man_{itg}	-0.421***	-0.099	-0.034	-0.014	-0.420***
	(0.089)	*(0.183)*	*(0.024)*	*(0.019)*	*(0.088)*
Man^2_{itg}	0.290***	0.052	0.009**	-0.002*	0.290***
	(0.066)	*(0.089)*	*(0.003)*	*(0.001)*	*(0.065)*
$Man_{itg} \cdot ISI$					0.322
					(0.196)
$Man^2_{itg} \cdot ISI$					-0.238**
					(-0.107)
$Man_{itg}\cdot$ (AsianTigers and E.E.)					0.386***
					(0.091)
$Man^2_{itg}\cdot$ (AsianTigers and E.E.)					-0.281***
					(0.065)
$Man_{itg} \cdot OECDs$					0.406***
					(0.090)
$Man^2_{itg} \cdot OECDs$					-0.288***
					(0.065)
Constant	0.724***	0.673***	0.529***	0.497***	0.608***
	(0.014)	*(0.084)*	*(0.029)*	*(0.060)*	*(0.025)*
Observations	672	352	320	704	2048
Within-R^2	0.25	0.01	0.37	0.23	0.25

Robust standard errors in parentheses, clustered at the country level. The depedent variable is the Gini coefficient of intra-manufacturing value added. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. ISI, $AsianTigersandE.E.$ and $OECDs$ are group dummies referred to ISI countries, Asian Tigers and East European countries, and OECD countries in the 70s respectively. The group classification is made according to the discussion of section 3. Regressions include country fixed effects. To ease reading the table, the manufacturing value added per capita has been expressed in 1000 dollars instead of in unit dollars.