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PREMATURE DEINDUSTRIALISATION: THE INTERNATIONAL EVIDENCE

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ABSTRACT

We investigate patterns and globalisation-related causes of premature deindustrialisation (PD) using a large panel of advanced (AE), emerging (EME) and developing (DE) economies. We find that, PD tends to be the case for all EME and DE, except E. Asian countries. African countries appear to be hit worst by PD. Globalisation-related determinants of PD vary across country groups. Higher trade openness leads to deindustrialisation in DE. Trade openness, however, enhances dependent industrialisation in Latin American countries and the 'factory economies' of E. Asia, which have stronger linkages to global value chains. It is our contention that development possibilities can be expanded by aiming at higher technology activities and more intense forward-linkages to global value chains. Our findings suggest that such strategic industrial policies at the levels of EME and DE have the potential to generate growth convergence at international level. It is our contention that development possibilities can be expanded by aiming at more intense linkages to global value chains, but proactive industrial policies at the levels of EME and DE are required to achieve such expansion.

Key words: Developing Economies; Emerging Market Economies; Global Value Chains, Growth, Industrial Policy; Premature Deindustrialisation.

JEL Classifications: L60, O10, O14.

I. INTRODUCTION

The adjectives 'developed' and 'industrialised' were often used synonymously during especially at the earlier decades of the development literature. This prevalent convention was based on the observation that developed countries were generally characterized by more 'advanced' degrees of industrialisation, relative to the 'backward' economies of the less-developed countries. As compared to agriculture and services, manufacturing industry was considered the most dynamic sector in terms of generating new technologies and employment, along with its tradable products that could promote the growth of wider and stronger networks of 'backward and forward linkages'. It was Albert O. Hirschman who first drew attention to the centrality of such industrial linkages in development processes (Hirschman, 1958, 1992). In general, 'industrialisation' has been understood as one of the most decisive factors of economic development for both the advanced (AE), developing (DE) and emerging market (EME) economies. This is, indeed, consistent with the pioneering contributions by Nicholas Kaldor, who argued that "manufacturing is the engine of growth" both in advanced (Kaldor, 1966) and developing (Kaldor, 1967) countries.

It has been often postulated that there is a 'hump-shaped' (i.e., inverted-U) relationship between 'real GDP per capita' (RGDP_pc, measured on the horizontal axis) and 'manufacturing value-added share in GDP' (MVA, measured on the vertical axis). The share of manufacturing industry in the economy tends to rise at earlier stages of economic development and fall at later stages. In accordance with this hypothesis, the MVA declined steadily in the bulk of advanced economies (AE) during their later stages of development. This stylised fact, which is often called 'deindustrialisation', is consistent with the earlier contributions of Kaldor (1963) and Kuznets (1971), who suggested that the largest weights of output and employment shift first from agriculture to industry, and then from industry to services during the course of economic development. Such shifts are also suggested by more recent studies on AE (Rowthorn and Coutts, 2013; Jorgenson and Timmer, 2011). According to this historical developmental dynamics, there had been a two-step structural-change tendency in the developmental paths of the AE, which experienced deindustrialisation after a certain period of industrialisation. Findings of recent studies indicate that the same developmental dynamics applies also to developing and emerging market

economies (DE and EME), yet with an important difference: Deindustrialisation in DE and EME tends to start at much lower levels of real per-capita income than the ones that were previously observed in the AE. Consequently, the cases of DE and EME have been defined as 'premature' deindustrialisation (Palma, 2005; Dasgupta and Singh, 2006), as contrasted to the more 'mature' experiences of the AE, whose deindustrialisation had started after reaching much higher levels of real per-capita income. Indeed, recent empirical studies have demonstrated that the per-capita income levels at the turning point of the manufacturing employment shares (UNIDO, 2013; Rodrik, 2016), value-added shares (Timmer, et al. 2015) or both (Haraguchi *et al*. 2017) are much lower in the case of DE and/or EME, as compared to the earlier experiences of the AE. If the manufacturing industry is the engine of growth *à la* Kaldor, 'premature deindustrialisation' (PD) can potentially lead to 'divergence' of incomes between DE/EME and AE, as opposed to the 'convergence' thesis of the conventional growth literature.

The growing literature on PD in DE and EME often considers the rising per-capita real income as the main driver of PD. However, studies that focus specifically on the other empirical determinants of PD in DE and EME are relatively few. For instance, economic globalization, as indicated by the increasing degrees of 'trade openness' and 'financial openness', can be a major cause of this process (Rodrik, 2016). In the same vein, Palma (2005 and 2014) argue that a variant of the 'Dutch disease', which arises from higher financial openness leading to massive foreign capital inflows, is also an important determinant of PD.

This article contributes to the literature by addressing two main research questions. Which country groups exhibit premature deindustrialisation (PD)? How does economic globalisation affect deindustrialisation across country groups? Therefore, the article has a compact focus on: i) the inverted-U shaped relationship between real GDP per capita and the share of manufacturing value-added in GDP, and ii) the effects of globalisation-related variables (i.e., trade openness and financial integration) on the manufacturing industry. The theme of the article is extended by also discussing the roles of global value chains (GVC) and the 'financial version' of the Dutch disease.

The plan of the rest of paper is as follows. Section II provides a brief review of the related literature. In section III, we present some stylised facts of deindustrialisation in different country groups. This section provides also estimates of real GDP per capita (RGDP_pc) at the peak 'manufacturing value-added shares in GDP (MVA) in terms of the most recent data. Section IV presents our estimation results for the determinants of PD in different country groups. Policy implications of the findings and connections with the literature are discussed within the context of concluding remarks in Section IV.

II. A BRIEF REVIEW OF THE LITERATURE

The crucial importance of 'industrialisation' and manufacturing industry for growth is convincingly stated by the pioneering studies by Kaldor (1966, 1967). An excellent review of Kaldor's contributions to development economics is provided by Targetti (2005). More recent studies, such as Szirmai (2012), Szirmai and Verspagen (2015), Tregenna (2015), Haraguchi *et al*. (2017) and Hauge and Chang (2019) support the above-mentioned Kaldorian argument, which is sometimes referred to as Kaldor's first law of growth. Similarly, Foster-McGregor *et al*. (2015) argue that the capability of countries to sustain high growth depends critically on the share of manufacturing in GDP, along with the sectoral diversification of production. Manufacturing industry has also been analysed as the main 'escalator' for developing economies, as it is a technologically dynamic sector with tradable products that exhibit unconditional labour-productivity convergence (Rodrik, 2013). According to Felipe et al. (2019), the unconditional convergence involves both technological changes at the national level and globalisation induced by ınternationalisation of supply chains. Manufacturing, not only remains the driver of innovation, technological development and productivity growth but also the main source of the productivity of many services through imported technology from the manufacturing sector (Hauge and Chang, 2019). In a similar vein, manufacturing "which is subject to increasing returns to scale (Kaldor –Verdoorn Law), and continuously upgrades from low to medium to high tech activities, continues to grow both in size and productivity driving the catch-up dynamics in other sectors raising overall productivity and hence growth in the economy" (Aggarwal, 2019, p.4). Furthermore,

development of the manufacturing industry fosters economic growth along with democratisation (Rodrik, 2016).

Recent empirical studies have demonstrated that the per-capita income levels at the turning point of the manufacturing employment shares (UNIDO, 2013; Rodrik, 2016; Felipe et al. 2019), value-added shares (Timmer, et al. 2015) or both (Haraguchi *et al*. 2017; van Neus, 2018) are much lower in the case of DE and/or EME, as compared to the earlier experiences of the AE. If the manufacturing industry is the engine of growth *à la* Kaldor, 'premature deindustrialisation' (PD) can potentially lead to 'divergence' of incomes between DE/EME and AE, as opposed to the 'convergence' thesis of the conventional growth literature.

There is a vast and growing literature on PD in DE and EME. However, studies that explicitly focus specifically on the empirical determinants of PD are relatively few. The bulk of the literature considers the per-capita real income as the main driver of PD. Economic globalization, for instance, as indicated by the increasing degrees of trade and financial openness, can be a major cause of this process (Rodrik, 2016). Financialisation and real exchange rate appreciation (Tregenna, 2015) can also be considered potentially important determinants. In the same vein, Palma (2005, 2014) argue that, a variant of the 'Dutch disease', which arises from higher financial openness leading to massive foreign capital inflows, is also an important determinant of PD[1]. The recent results by Benigno et al. (2015) and Teimouri and Zietz (2018), suggesting that capital and labour shifts out of the manufacturing sector during episodes of large capital inflows, provide a strong support to Palma (2005, 2014).

Alongside the tendencies for PD in the developing world in recent decades, the world economy has also witnessed increasingly higher degrees of globalisation of production and trade. Production of final products has been sliced up into different stages and productive tasks have been distributed among different countries. This process, which is often called 'global value chains' (GVC), leads countries to become

[1] Palma (2005, 2014) argue that the 'Dutch disease' may better be interpreted, not only in the conventional 'resource curse' context, but also in a broader framework that contains the effects of trade liberalisation and financialisation. This broader interpretation of the 'Dutch disease' may be considered as complementary to Tregenna (2015), who also argues that liberalisation in trade and finance has been a cause of PD. In a similar vein, the resource curse by Benigno and Fornaro (2014) does not arise from the discovery of natural resources or due to an exogenous transfer from abroad, but rather because of a period of abundant access to foreign capital.

more dependent on imported inputs for domestic production and exports (Baldwin and Lopez-Gonzalez, 2014; Johnson, 2015; Ponte et al., 2019; World Bank, 2020). The articles contained in the recent special issue of *International Journal of Emerging Markets* provide important conceptual and empirical insights into the evolution of GVC (Arora and Hartley, 2020). In the context of the GVC process, the international production network has been mainly divided into two: "Headquarter Economies" and "Factory Economies" (Baldwin and Lopez-Gonzalez, 2014). Headquarter economies (AE) produce key components, arrange production networks and offshore labour intensive manufacturing stages to factory economies (EME or DE). Consequently, factory economies (periphery) can industrialise by joining the GVC, but specialise at sectors or production stages determined mainly by the headquarter AE (centre).

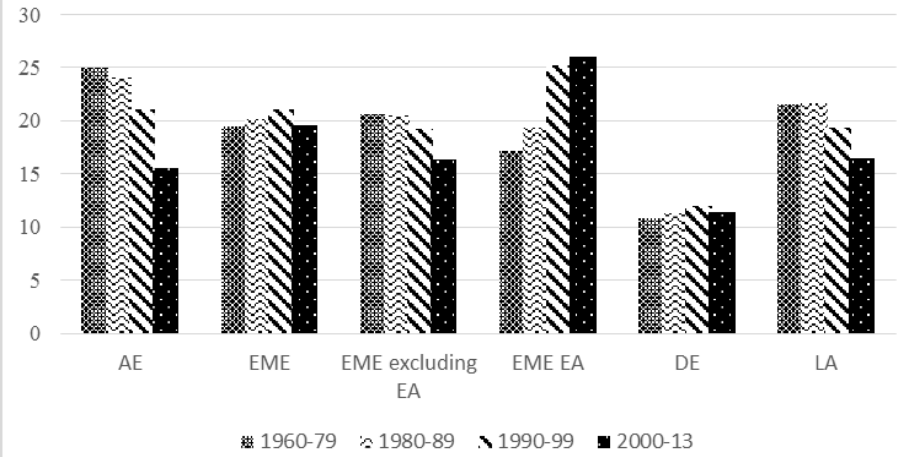
III. PREMATURE DEINDUSTRIALISATION: SOME STYLISED FACTS

The average 'manufacturing industry value added share' (MVA, as percentage of GDP) in country groups[2] are plotted in Figure 1 for different time periods[3]. The MVA shows a sharp decline in AE (from 25% in 1960-1979 to 15% in 2000-2013). In contrast to the AE case, MVA increases from around 17% in 1960-1979 to about 25% during the recent decades in the East Asian EME (EME EA). The EME excluding East Asia, however, has experienced a decline (from around 20% to 16%). Latin American countries (LA) have exhibited a similar pattern. Developing economies (DE), most of which are African countries, have tended to stay at very low levels of industrialisation during the four sub-periods, slightly above 10%.

[2] Table A1 in the Appendix provides the full list of countries and their groups, along with the levels and years of peak MVA (based on 3-year moving averages) and real GDP per capita at the peak for individual countries. Following recent studies, emerging market economies (EME) and advanced economies (AE) are categorized based on the classification by Morgan Stanley Capital International (MSCI). All the other countries are classified as developing economies (DE).

[3] The sub-periods are constructed to reflect roughly the dominant trade and financial policies adopted especially by EME and DE: Import-substituting industrialization, trade protectionism, and significant control of international capital flows (1960s and 1970s); the following post-1980 periods that were more or less characterized by trade and financial liberalisation; and the further expansion of international trade and capital movements during the 2000s.

Figure 1. Manufacturing Value Added (% of GDP)



Data source: World Development Indicators (WDI), The World Bank.
AE: Advanced economies; EME: Emerging market economies; EA: East Asian countries; DE: Developing economies; LA: Latin American countries.

In Table 1, average peak manufacturing value added shares (MVA, as percentage of GDP) and per-capita real GDPs (RGDP_pc, constant at 2005 USD)[4] at the time of the peak are presented for the country groups[5]. To reduce the impact of temporary fluctuations, we use three-year moving average values of MVA in computing the peak MVA in the Table. The peak MVA does not substantially differ among AE, EME and LA (around 25-27%). The average peak MVA is, however, substantially low for developing African economies (14.5%). Moreover, RGDP per capita (RGDP_pc) at the peak MVA differs substantially across country groups. This level is around 9000 USD for AE and 1200 USD for the others (EME or DE). For EME and LA, the income level is around 1800 USD. The deindustrialisation process for the developing African countries begins at a very low income level (below 500 USD).

Table 1. Peak Manufacturing Value Added Shares (MVA) and per capita RGDP						
			Proportion (%) of Peak RGDP to		Peak RGDP in terms of 2014 Values of	
	Peak MVA	RGDP_pc at the peak	RGDP_pc World	RGDP_pc High Income	RGDP_pc World	RGDP_pc High Income

[4] Unless stated otherwise, all per-capita real GDP figures are constant at 2005 USD.
[5] Our sample does not contain Eastern European countries due to the lack of adequate time-series data to investigate deindustrialisation.

AE (23)	26.9	9015	181.1	50.0	15726	14510
EME or DE (57)	19.3	1225	18.4	4.8	1724	1688
DE (35)	16.3	807	9.0	2.4	1079	1075
DE* (7)	22.8	1534	27.4	7.0	2163	2169
EME (22)	25.0	1890	33.6	8.7	2471	2643
LA (14)	25.3	1708	32.5	8.6	2672	2576
DE Africa (28)	14.5	470	7.9	2.0	627	623
Notes: All Real GDP per capita (RGDP_pc) values are in 2005 constant USD prices. The values in parentheses are the number of countries. DE* excludes African countries. EME: Emerging Economies, DE: Developing Economies.						

Data source: WDI, The World Bank; United Nations Statistics Division (UNSTAT). Authors' own calculations.
AE: Advanced economies; EME: Emerging market economies; DE: Developing economies; LA: Latin American countries.

The time of the beginning of deindustrialisation substantially differs amongst countries and country groups[6]. Consequently, real income levels, even in constant USD, may not be very informative to assess whether a deindustrialisation process is premature. To obtain more comparable measures, we first compute the proportion of RGDP_pc to the RGDP_pc of world or high income countries at the year of the threshold MVA. According to Table 1, for the AE, the RGDP_pc is around, respectively, 181.1% and 50% of world and high income RGDP_pc. The deindustrialisation process for EME or DE, on the other hand, occurs only at 18.4% and 4.8% of the world and high income RGDP_pc. The evidence is much more striking for developing African countries such that their deindustrialisation process begins at the RGDP_pc levels which are only 7.9% (2%) of the world (high income) RGDP_pc.

As already noted, comparing an RGDP_pc level at the early 1970s, for instance, to the level at the late 2000s, may be a misleading indicator for assessing 'premature deindustrialisation'. To obtain an alternative measure, we consider adjusted RGDP_pc (RGDP_pc*), which is computed as follows:

$$\text{RGDP\_pc}^* = (\text{RGDP\_pc at } t^T / \text{World RGDP\_pc at } t^T)^* \text{ World RGDP\_pc}_{2014}$$

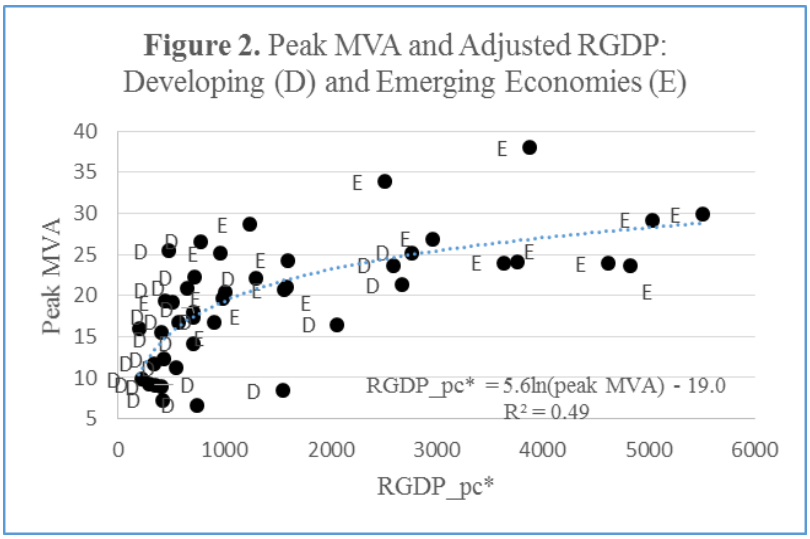
[6] For our sample, the average peak MVA dates for AE, EME and DE, respectively, are 1977, 1990 and 1989. Comparing income levels across such distinct time periods ignores economic growth and should thus be interpreted with a caution. It is worth noting that the country classifications by the World Bank also maintain income thresholds constant in real terms and may be criticized in a similar vein.

where t^T is the time of the threshold MVA and World $RGDP\_pc_{2014}$ is world RGDP_pc in 2014. This measure is computed also using the RGDP_pc of high income countries. It might be a better measure[7] in terms of the recent RGDP_pc figures. According to Table 1, the peak adjusted per capita income level is 15726 USD (2005 constant prices) for AE. Strongly supporting the PD hypothesis, the peak income level is substantially lower (around only 15% of the AE) for the EME and LA[8]. For the African DE, the PD level is extremely low around only 600 USD. Following Tregenna (2015), the African case may be characterised as "pre-industrialisation deindustrialisation". According to Table 1, the peak adjusted per capita income level is 15726 USD (2005 constant prices) for AE. Strongly supporting the PD hypothesis, the peak income level is substantially lower (around only 15% of the AE) for the EME and LA[9]. For the African DE, the PD level is extremely low around only 600 USD. Following Tregenna (2015), the African case may be characterised as "pre-industrialisation deindustrialisation".

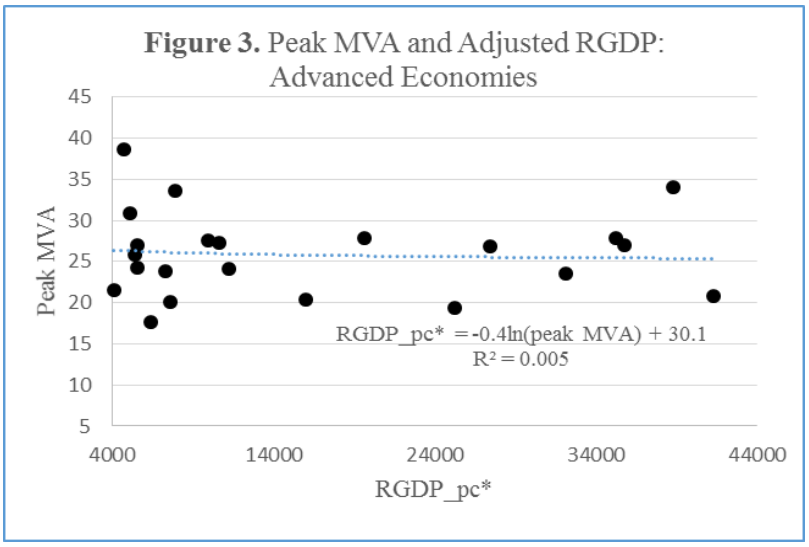
Figures 2 and 3 plot the peak MVA (based on 3-year moving averages) and the adjusted RGDP_pc (RGDP_pc*) for the samples of AE, DE and EME. The figures clearly show that, supporting the premature deindustrialisation hypothesis, at the peak MVA, per capita RGDP is much higher in all of the AE than the EME or DE. Furthermore, on average, peak MVA is substantially higher in AE. For the AE, consistent with their 'servisification' (i.e. increasing value added shares of services in manufacturing and aggregate real output) after mature deindustrialisation, manufacturing appears to be no longer the engine of growth (Figure 3). In Figure 2, per capita RGDP at the peak MVA appears to be generally lower in DE than EME. According to the simple regression presented by Figure 2, there is a positive (and non-linear) relationship between the MVA share and RGDP. Consistent with the inverted-U hypothesis, this relationship is more prominent at lower income levels and for DE. This relationship, however, appears to be statistically insignificant for the AE sample.

[7] However this measure maintains that the growth differentials do not change substantially over time. Under the income-convergence hypothesis, it may underestimate the RGDP at the peak for EME or AE.

[8] Table A1 of the Appendix provides the full list of countries and individual country level data that were used for computing the figures in Table 1.



Data source: World Development Indicators (WDI) and authors' own calculations.



Data source: World Development Indicators (WDI) and authors' own calculations.

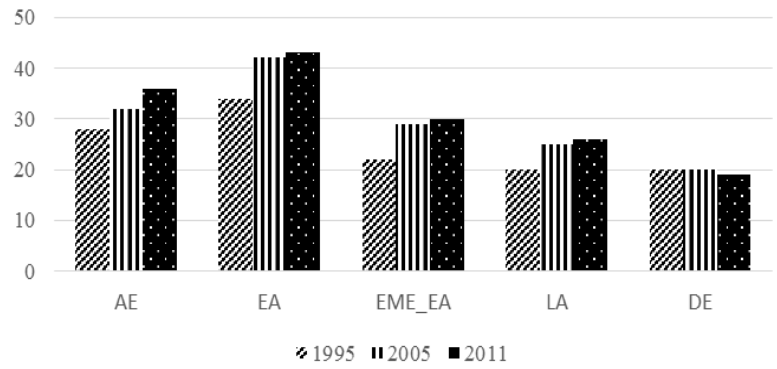
Foreign value added (FVA) share of gross exports reported in the recent trade-in–value-added (TIVA) statistics[10] provides important information about participation in GVC. Figure 4 plots the FVA share of gross exports (%) of manufacturing industry for different country groups in 1995, 2005 and 2011. The FVA shares in exports tend

[9] Table A1 of the Appendix provides the full list of countries and individual country level data that are used for computing the figures in Table 1.

[10] Due to the increasing importance of GVC, OECD and WTO have recently published trade-in-value-added (TIVA) statistics based on harmonised OECD input-output tables. See Koopman, Wang and Wei (2014) for the details of the TIVA database. The most recent World Development Report (World Bank, 2020) is entirely devoted to investigation of patterns, causes and consequences of GVC.

to increase in all country groups except DE[11] during the recent decade. The increase in AE is consistent with the argument that these countries have increasingly transferred some production stages in their manufacturing industries to EME or DE. E. Asian EME (EA) have consistently the highest FVA share in their exports. EME excluding E. Asia (EME_EA) and L. American (LA) countries have relatively lower FVA in their exports. The lowest FVA shares are observed in the case of DE. From Figure 4, it may be inferred that the E. Asian industrialisation is consistent with their higher integration to the GVC. They seem to have adjusted to the new international division of labour as "factory economies", under the rules of participation basically set by the "headquarter" economies. EME_EA and LA have considerably lower participation in the GVC. Their case of lower participation in the GVC may be among the relevant explanations of their recent deindustrialisation[12].

Figure 4. Foreign Value Added Share of Gross Exports (%)



[11] The TIVA data do not have a DE classification. However, as noted by Banga (2014) the category 'rest of the world' comprises all developing and under-developed countries. Therefore, DE in the figure corresponds to the 'rest of the world' classification of TIVA.

[12] As suggested by Hirschman (1958), linkage effects, which are particularly strong in manufacturing, are crucially important for growth. Consistently, in terms of linking to the GVC, the TIVA data distinguish between backward participation (BP, the use of foreign inputs in exports) and forward participation (FP, the use of domestic intermediates in third country exports). According the TIVA figures, AE increased their FP/BP ratio for the manufacturing industry from 1.07 in 1995 to 1.26 in 2011. The increase in the EME_EA was from 0.78 to 1.04. These figures suggest that both AE and EME_EA benefited from higher participation, as FP>BP. The FP/BP ratio, however, should be interpreted with a caution for resource-intensive economies, because a higher FP/BP ratio may reflect an increase in their resource-based or low-technology exports. LA, for instance, increased its FP/BP ratio from 1.6 to 2.0, whilst DE increased it from 1.8 to 4.5 during the period. Considering their deindustrialisation process, this increase may be reflecting basically increases in resource-based exports, such as metals or low-technology exports.

Source: OECD TIVA.

IV. PREMATURE DEINDUSTRIALISATION: EMPIRICAL RESULTS

To investigate the process of premature deindustrialisation, we estimate the following equations for different country groups.

$$Man\_va_{it} = \beta_1 y_{it} + \beta_2 y_{it}^2 + \beta_3 Trade_{it} + \beta_4 Finance_{it} + u_{it} \quad (1)$$

In (1), Man_va is the manufacturing value added (% of GDP) and y is the natural logarithm of per-capita real GDP (constant 2005 USD prices). The equation contains also the quadratic term (y^2) to investigate the validity of the inverse U-shaped relationship. According to Rodrik (2016), trade openness and financial globalisation are the potential sources of deindustrialisation. Therefore, equation (1) contains also measures for trade openness (Trade) and international financial integration (Finance). Trade openness is expressed as the sum of exports and imports over GDP (%). Following Lane and Milesi-Ferretti (2007), we consider gross international investment position [(Gross assets + Gross liabilities)/GDP, %] as a measure of international financial integration. We use an annual panel data for 80 countries (23 AE, 22 EME and 35 DE) over 1970-2011. The sample choice is dictated by data availability[13].

Under the Kaldorian proposition that manufacturing is the engine of growth, the real per-capita income variable (y) in the equation is endogenous. Considering the potential endogeneity of this variable for the long-run evolution of manufacturing share, we estimate the equations by employing the fully-modified OLS (FM-OLS) procedure developed by Phillips and Hansen (1990) and Pedroni (2004). The FM-OLS procedure takes into account the potential heterogeneity in the long-run relationships along with endogeneity and serial correlation (Pedroni, 2004).

Trade openness and financial globalisation may cause deindustrialisation through two main channels, according to Rodrik (2016). Higher trade openness may lead EME or DE "without a strong comparative advantage to become net importers of

[13] The data for real GDP, trade and manufacturing share are from the World Bank's World Development Indicators and United Nations Statistics Division (UNSTAT). The data for international financial integration (finance) are from the updated data-base constructed by Lane and Milesi-Ferretti (2007). Although we have data for MVA, RGDP_pc and trade for the most recent period for most of the countries, the effective sample is determined by the

manufacturing, reversing a long process of import-substitution" (Rodrik, 2016, p.4). Higher trade openness also leads EME and DE, which are often price takers in international manufacturing markets, to become much more exposed to relative price changes in AE. Consequently, a decline in the relative price of manufacturing in AE, due to, for instance, productivity improvements, may lead to "imported deindustrialisation" (Rodrik, 2016, p.4) in other countries.

The conventional literature suggests that trade openness facilitates diffusion of knowledge and technology through high technology imports and better resource allocation (Baldwin and Lopez-Gonzalez, 2014). According to Rowthorn and Coutts (2013), on the other hand, greater openness to international trade in AE leads to higher relative labour productivity, and hence lower manufacturing employment. However, trade openness may not enhance growth if it leads economies to specialise in sectors with comparative disadvantage (Redding, 1999). Dowrick and Golley (2004) find that trade openness promotes growth basically through productivity increases, but such effects vary by the level of development and trade specialisation. This effect is substantially higher for the more advanced countries, and becomes negative or negligible for the developing countries specialising in the export of primary products.

According to the conventional literature, international financial integration allows countries (with stronger institutional and macroeconomic structure) to finance their investments also by foreign savings, and thus stimulates the manufacturing industry. However, the countries lacking adequate financial development and sound macroeconomic policies may turn out to be more vulnerable to sudden stops of capital flows, and hence more prone to financial crises (Kose, et al. 2009). According to Palma (2005, 2014), "Dutch disease" caused by higher financial integration and the consequent massive inflows of foreign capital can lead to deindustrialisation through manufacturing export bias towards primary goods.

Table 2 reports the pooled FM-OLS results for the whole sample and different country groups. The signs and statistical significance of y and y^2 suggest the validity of an inverted-U shaped relationship between MVA and per capita RGDP for all the country groups, as well as for the whole sample. Figure 5 plots the simulated relationship between RGDP_pc and MVA share using the estimated parameters

availability of finance data only for the 1970-2010. Table A1 of the Appendix provides also

presented in Table 1. The figures plot also the estimated per-capita real GDP (constant 2005 USD prices) at the peak manufacturing share ($Y^*=\exp(y^*)$, where $y^*= \left| \beta_1/2\beta_2 \right|$).

Table 2. Manufacturing Value Added (% of GDP): FM-OLS Estimations

Sample	y	y^2	Finance	Trade	Statistics
All	9.063 (0.378)**	-0.676 (0.023)**	-0.0001 (0.0001)	0.0232 (0.0028)**	R^2=0.828, LRV = 5.1, N=80, NT=3147
Advanced	11.037 (1.250)**	-0.786 (0.066)**	-0.0002 (0.0001)**	0.0364 (0.0044)**	R^2=0.819, LRV = 2.5, N=23, NT=909
Emerging or Developing	8.458 (0.648)**	-0.637 (0.045)**	0.0060 (0.0012)**	0.0015 (0.0036)	R^2=0.811, LRV = 6.2, N=57, NT=2238
Developing	6.124 (0.996)**	-0.481 (0.074)**	0.0071 (0.0012)**	-0.0171 (0.0043)**	R^2=0.778, LRV = 5.7, N=35, NT=1356
Developing (Africa)	6.317 (1.312)**	-0.527 (0.091)**	0.0078 (0.0013)**	-0.0370 (0.0049)**	R^2=0.741, LRV = 5.6, N=26, NT=1026
E. Asia	8.106 (0.848)**	-0.499 (0.055)**	-0.0011** (0.0006)	0.0647 (0.0048)**	R^2=0.733, LRV = 4.0, N=10, NT=397
Emerging (Excluding E. Asia)	12.852 (1.697)**	-1.008 (0.109)**	0.0034 (0.0036)	-0.0557 (0.0129)**	R^2=0.638, LRV = 8.7, N=15, NT=608
L. America	32.929 (2.786)**	-2.374 (0.180)**	-0.0169 (0.0044)**	0.0458 (0.0135)**	R^2=0.727, LRV = 10.7, N=13, NT=515

Notes: LRV denotes long-run variance. The values in parentheses are the standard errors. * and ** denote the significance at 5 and 1 %, respectively. N and NT are, respectively, the numbers of countries and observations.

As the pooled FM-OLS uses 'demeaned' (i.e., deviations from the deterministic components including means) variables, the estimated Y* is not directly comparable to the evidence presented in Table 1 and Figure 2. However, the figures provide some important information about the relative deindustrialisation patterns in different country groups. The lowest peak MVA and income are observed in developing and developing African (DE AFR) countries. As indicated by the higher downward slope of MVA after the peak, deindustrialisation process appears to be much faster for these countries. For the E. Asian countries (Figure 5.1.g), the data do not provide a clear evidence for deindustrialization. Also, the figures show that, at the peak MVA, per-capita RGDP is much higher in AE and E. Asian countries than DE and EME. The evidence for LA, on the other hand, appears not to be substantially different from the AE.

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the full list of countries along with their income classifications.

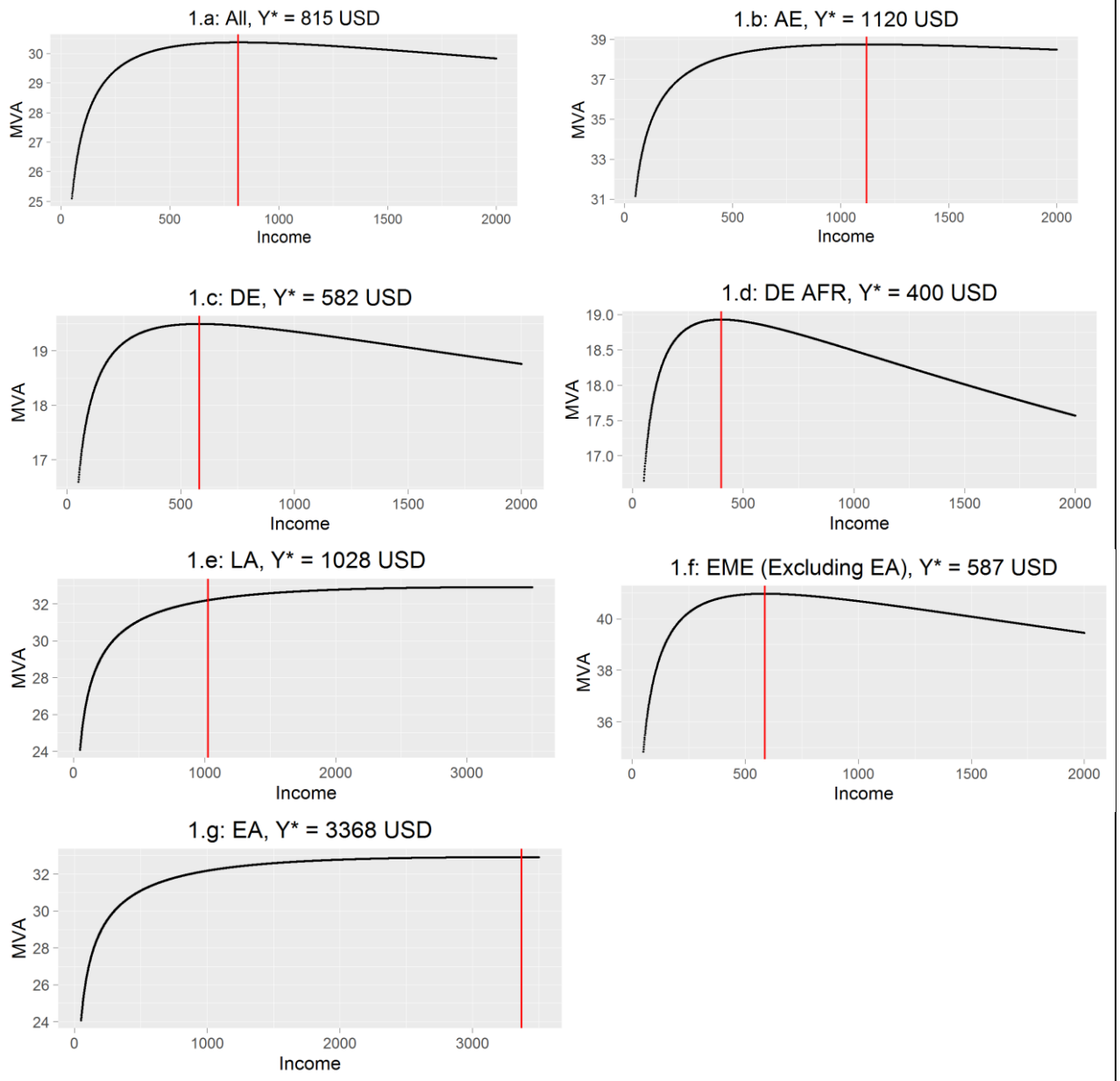
The results by Table 2 suggest that the effects of trade openness and financial globalisation tend to substantially differ across country groups. Trade openness leads to higher manufacturing value added shares for the whole sample and AE. Higher trade openness and the consequent reallocation of investment and production with higher linkages to the GVC tend to enhance industrialisation in the "headquarter" economies (AE). Consistent with their higher and increasing linkages to the GVC, higher openness to international trade leads to higher manufacturing share in E. Asian and L. American countries. Higher trade openness, on the other hand, leads to deindustrialisation in DE and African countries, which presumably have the weakest linkages to the GVC. Therefore, trade openness leads to "imported deindustrialisation" (Rodrik, 2016) in DE and African countries.

The coefficient of the 'financial openness' variable is negative and significant for the AE. This result is consistent with the argument that higher financial globalisation encourages servisification in the AE (Palma, 2005). However, the estimated coefficient appears to be tiny albeit being significant. Interestingly, higher international financial integration enhances industrialisation in DE and African economies but leads to deindustrialisation in East Asia and Latin America. This contrasting evidence may be plausibly explained by the different effective finance constraints of these country groups. The DE and African economies, characterized typically by higher domestic finance constraints, have been heavily depending on foreign savings for investment and growth. Higher international financial integration allows these countries, especially the ones with stronger macroeconomic and institutional structures, to finance manufacturing investments by also foreign savings. Higher financial openness, on the other hand, enhances deindustrialisation in countries that already have a relatively well-developed industrial base, such as in E. Asian and L. American countries. This result is consistent with Teimouri and Zietz (2018) finding that net capital inflow surges tend to exacerbate deindustrialization in both output and employment in middle income Asian and L. American countries[14]. In a similar vein, the results by Benigno et al. (2015)

[14] These results may also be interpreted in the context of the broader interpretation of the "resource curse" or "Dutch disease" by Palma (2005, 2011 and 2014) which considers also the impact of international financialisation. Our results, along with Benigno et al. (2015 and Teimouri and Zietz (2018) provide a support to Palma (2005, 2014).

suggest that, during episodes of large capital inflows (surges) capital and labour shifts out of the manufacturing sector in a sample of 70 middle- and high-income countries.

Figure 5. Manufacturing Value Added Share (%) and Income



AE: Advanced economies; DE: Developing economies; DE AFR: African (developing) countries; LA: Latin American countries; EME: Emerging market economies; EA: East Asian countries.

V. CONCLUDING REMARKS

Manufacturing industry, as a technologically dynamic tradable sector with the strongest backward and forward linkages, has often been considered as the engine of growth in AE, DE and EME. The crucial importance of manufacturing industry, which was indeed amongst the major concerns of the pioneering contributions by the earlier development economists, now appears to be recognized by the growing number of studies in the literature (Storm, 2015). The hump-shaped relationship between the manufacturing value-added share (MVA) and real per-capita GDP during the economic growth process, however, has shifted downwards and towards the origin, respectively, corresponding to much lower levels of peak MVA and real per-capita GDP at this peak for EME and DE, except East Asia. This study investigated this pattern, which is often called 'premature deindustrialisation' (PD) in the recent literature.

Our results suggest that PD has been the case in DE and EME, excluding East Asia. The East Asian countries, owing to their strategic and pro-active industrial, trade and financial policies leading them to create internationally competitive and technologically upgraded industrial bases without obeying their static comparative advantage positions, appear to have achieved much stronger linkages to the global value chains (GVC) which allowed them to avoid PD. Following Storm (2017), the East Asian success may be interpreted as the result of effective capital and foreign exchange controls and interventionist industrial policies to increase domestic savings and selectively channelling these funds into strategically important industries. The DE, specifically the African DE, on the other hand, have been much more severely hit by PD even before achieving a considerable industrial base (Kanbur et al, 2019). Such a process of deindustrialisation, may be interpreted as "pre-industrialisation deindustrialisation" (Tregenna, 2015).

The causes of PD appear not to be the same for different country groups. Higher trade openness leads to deindustrialisation in DE and African DE, which generally lack a considerable industrial base and suffer from the lack of strategic development policies to overcome their static comparative disadvantage in manufacturing. Consequently, consistent with Palma (2011, 2014) and Rodrik (2016), higher trade openness appears to lead to imported deindustrialisation for these relatively backward economies. PD, even before some considerable degree of industrialisation, may thus be taken as a major

obstacle to growth for such countries. These countries, on the other hand, often lack sufficient domestic resources to finance their investments. Higher financial integration, in this context, seems to serve as a remedy, and leads to higher MVA in DE and African DE, thereby mitigating the process of deindustrialisation.

The E. Asian countries, characterized by much stronger and increasing linkages to the GVC, benefit from higher international trade integration in terms of the persistence of their industrialisation process. This is consistent with the argument that these countries have become "factory Asia" during the recent periods, along with their much more intense participation in the GVC (Baldwin and Lopez-Gonzalez, 2014). However, higher international financial integration leads to deindustrialisation in the E. Asian countries. This result may be consistent with the broader interpretation of the "Dutch disease" (Palma, 2005, 2014) (and with the argument that manufacturing industry competitiveness worsens due to real exchange rate appreciation resulting from capital inflows). Nevertheless, the story may not be exactly like this for these countries. Given the fact that many East Asian countries have very high saving rates and positive net international investment positions; higher financial integration, indeed, leads their domestic savings to finance more investments abroad. Consequently, in the case of E. Asian countries, higher international financial integration does not necessarily mean higher resources to finance domestic investments, but potentially the reverse; and thus it generates an adverse impact on industrialisation. On the other hand, the negative effect of real exchange rate appreciations on the international competitiveness of the manufacturing industry appears to be valid in L. American countries. Higher trade openness, potentially leading them to increase their participation in the GVC, tends to have a positive impact on industrialisation in L. America.

The East Asian case, characterized by higher participation in the GVC and the consequent avoidance of premature deindustrialisation, however, should be interpreted with a caution. This aspect of the East Asian case does not necessarily mean that these countries have passively adjusted to the new international division of labour, the rules of which are basically determined by "headquarter economies" (i.e. AE). The forward participation ratios of E. Asian economies (i.e. the use of domestic intermediates in the third country exports) have been higher than their backward participation ratios (i.e., the use of foreign inputs in exports). Consequently, it may be argued that, not

necessarily the higher participation in the GVC *per se*, but the structural and institutional conditions of such participation may better be interpreted as the main determinant of industrialisation. Such favourable conditions emerge and develop as the outcome of active and well-designed industrial and trade policies, including real exchange rate policies conducive to growth (Rodrik, 2008; Storm, 2017 and Guzman et al. 2018, Hauge, 2020). In a similar context, countries need to implement "a well-defined manufacturing strategy with a focus on upgrading the existing industrial structure" to achieve sustainable higher growth (Aggarwal, 2019: p.28)

Premature deindustrialisation has been the case in EME and DE excluding E. Asian countries. The causes of premature deindustrialisation are not the same for all country groups. Countries with higher participation to GVC tend to continue to industrialise, but mainly within the context of an international division of labour, which is determined dominantly by AE (headquarter or centre economies). However, strategic trade, finance, industrial and technology policies, regardless of their static comparative advantage positions may be important in achieving higher forward participation relative to backward participation to GVC. The seminal contribution by Hirschman (1958) shows that manufacturing industry is growth-enhancing as it has much stronger linkage effects in the economy. The recent studies, including Baldwin and Venables (2015), stressing the importance of backward and forward linkages in the international division of production appear to be consistent with the insights of Hirschman (1958). Aggarwal (2019), on the other hand, argues that globalisation may distort the forward and backward linkages within and across manufacturing industry sectors as it affects different sectors asymmetrically.

All in all, this article analyses the effects of economic globalization on the process of deindustrialisation with an eye to the inverted-U shaped relationship between per-capita-real-income and the manufacturing value-added share for different country groups. The first message of the article is that PD has been observed widely in the developing world, and it may tend to persist as quite a 'global' development issue unless it is addressed domestically. The second message is that there seems to be no 'standard recipe' to deal with PD in the face of economic globalization, because, as revealed and discussed throughout the article, trade openness and financial integration tend to have different effects in different country contexts. Globalization-oriented

standard policy prescriptions (higher trade openness and financial integration) need to be considered cautiously by taking into account specific domestic circumstances in order to design context-conscious, promising and fruitful industrial policies. Without such policies in the first place, many less-developed countries are unlikely to integrate their economies to the GVC. Reaping the potential developmental benefits from the GVC is a matter of conscious and active industrial policy, as has been depicted by the case of East Asian countries. Indeed, there has been a recent revival of studies that draw attention to the need for a major mentality change in scholarly and policy-making attitudes towards the developmental role of industrialisation (Noman and Stiglitz, 2016; Storm, 2017; Rodrik, 2018; Aggarwal, 2019; Hauge and Chang, 2019; Chang and Andreoni, 2020). In this line of developmental thought, neither free-market policies nor the GVC are treated as ready-made panacea for developmental problems. This article, we hope, provides useful empirical support to and encourages further research in the pro-industrialisation segment of the development literature. Last but not the least, the third message is that the indispensable role of industrial policy in connecting domestic economies to the GVC should be prioritized and accentuated, rather than merely reciting the potential benefits of the GVC.

REFERENCES

Aggarwal, A. (2019) How has globalisation affected the economic growth, structural change and poverty reduction linkages? Insights from international comparisons, UNU-MERIT Working Papers No. 2019-15.

Arora, A.S. and Hartley, N. (2020) "Guest editorial", *International Journal of Emerging Markets*, 1-3.

Baldwin, R. and Lopez-Gonzalez, J. (2014) 'Supply-chain trade: A portrait of global patterns and several testable hypotheses', *The World Economy*, 1-40.

Baldwin, R. and Venables, A.J. (2015) 'Trade policy and industrialisation when backward and forward linkages matter', *Research in Economics*, 69 (2), 123-131.

Banga, R. (2014) 'Linking into global value chains is not sufficient: Do you export domestic value added contents?', *Journal of Economic Integration*, 29 (2), 267-297.

Benigno, G., Converse, N. and Fornaro, L. (2015) "Large capital inflows, sectoral allocation, and economic performance, *Journal of International Money and Finance*, 55, 60–87.

Benigno, G. and Fornaro, L. (2014) The financial resource curse, *Scandinavian Journal of Economics*, 116 (1), 58-86.

Chang, H-J, and Andreoni, A. (2020) 'Industrial Policy in the 21st Century', Development and Change, Focus issue, January, pp.1-28.

Dasgupta, S. and Singh, A. (2006) 'Manufacturing, services and premature deindustrialization in developing countries: A Kaldorian analysis', UNU-WIDER, United Nations University Research Paper, No. 2006/49.

Dowrick, S. and Golley, J. (2004) 'Trade openness and growth: Who benefits?' *Oxford Review of Economic Policy*, 20 (1), 38-56.

Felipe, J., Mehta, A. and Rhee, C. (2019) 'Manufacturing matters … but it's the jobs that count', *Cambridge Journal of Economics*, 43, 139-168.

Foster-McGregor, N., Kaba, İ. and Szirmai, A. (2015) 'Structural change and the ability to sustain growth', UNIDO/UNU-MERIT background papers for the UNIDO, Industrial Development Report 2016 (IDR 2016 WP 11).

Guzman, M., Ocampo, J. A. and Stiglitz, J. (2018) 'Real exchange rate policies for economic development', *World Development* (110), 51-62.

Hauge, J. and Chang, H. J. (2019) 'The role of manufacturing versus services in economic development,' in Bianchi, P., Duran, C. R. and Labory, S. (eds.), Ch. 1, pp. 12-36, *Transforming Industrial Policy for the Digital Age*. Edward Elgar Publishing.

Haraguchi, N., Cheng, C. F. C., Smeets, E. (2017) 'The importance of manufacturing in economic development: Has this changed?', *World Development* (93), 293-315.

Hirschman, A. O. (1958) *The Strategy of Economic Development*. New Haven, CT: Yale University Press.

Hirschman, A. O. (1992) [1986] 'Linkages in Economic Development', in A. O. Hirschman, *Rival Views of Market Society and Other Essays*, pp. 56–76. Cambridge, MA: Harvard University Press.

Johnson, R. C. (2015) 'Five facts about value-added exports and implications for macroeconomics and trade research', *The Journal of Economic Perspectives*, 28 (2), 119-142.

Jorgenson, D. W. and Timmer, M. P. (2011) 'Structural change in advanced nations: A new set of stylised facts', *Scandinavian Journal of Economics*, 113 (1), 1-29.

Kaldor, N. (1963) 'Capital accumulation and economic growth', in F. A. Lutz and Hague, D.C. (eds.), Proceedings of a Conference Held by the International Economics Association, Macmillan, London, 177–222.

Kaldor, N. (1966) *Causes of the Slow Rate of Economic Growth of the United Kingdom*, Cambridge University Press: Cambridge.

Kaldor, N. (1967) *Strategic Factors in Economic Development*, New York State School of Industrial and Labour Relations, Cornell University: Ithaca NY.

Kanbur, R., Noman, A. and Stiglitz, J. (eds.) (2019) *The Quality of Growth in Africa*. NewYork: Columbia University Press.

Koopman, R., Wang, Z. and Wei, S-J. (2014) 'Tracing value added and double counting in gross exports', *The American Economic Review*, 104 (2), 459-494.

Kose, M. A., Prasad, E., Rogoff, K. and Wei, S-J. (2009) 'Financial globalization: A reappraisal', *IMF Staff Papers*, 56 (1), 8-62.

Kuznets, S. (1971), *Economic Growth of Nations: Total Output and Production Structure*, Harvard University Press, Cambridge, MA.

Lane, P. R. and Milesi-Ferretti, G. M. (2007) 'The external wealth of nations mark II: Revised and extended estimates of foreign assets and liabilities, 1970–2004', *Journal of International Economics* (73), 223-250.

Maddison, A. 1980. 'Economic growth and structural change in advanced countries', in Levenson, I. and Wheeler, J. (eds.), *Western Economies in Transition: Structural Change and Adjustment Policies in Industrial Countries*, Westview Press, Boulder, CO, 41–60.

Noman, A. and Stiglitz, J. (eds) (2016) *Efficiency, Finance and Varieties of Industrial Policy*. New York: Columbia University Press.

Palma, G. J. (2005) 'Four sources of "de-industrialisation" and a new concept of the "Dutch disease"', in Ocampo, J. (ed.), *Beyond Reforms: Structural Dynamics and Macroeconomic Vulnerability*, New York: Stanford University Press and World Bank.

Palma, G. J. (2014) 'De-Industrialisation, "premature" de-industrialisation and the Dutch-disease', *Revista NECAT - Ano 3, nº5 Jan-Jun.*

Pedroni, P. (2004) 'Panel cointegration: Asymptotic and finite sample properties of pooled time series tests with an application to the purchasing power parity hypothesis', *Econometric Theory* (20), 597-625.

Phillips, P., and Hansen, B. (1990) 'Statistical inference in instrumental variables regression with I(1) processes', *Review of Economic Studies* (57), 99–125.

Ponte, S., Gereffi, G., Raj-Reichert, G., eds. (2019) *Handbook on Global Value Chains*, Cheltenham, UK & Northampton, US: Edward Elgar Publishing.

Redding, S. (1999) 'Dynamic comparative advantage and the welfare effects of trade', *Oxford Economic Papers*, 51 (1), 15–39.

Rodrik, D. (2008) 'The real exchange rate and economic growth', *Brookings Papers on Economic Activity* (Fall), 365-412.

Rodrik, D. (2013) 'Unconditional convergence in manufacturing', *Quarterly Journal of Economics* (128), 165–204.

Rodrik, D. (2016) 'Premature deindustrialization', *Journal of Economic Growth* (21), 1-33.

Rodrik, D. (2018) 'New Technologies, Global Value Chains, and Developing Economies', NBER Working Paper No. 25164.

Rowthorn, R., and Coutts, K. (2004) 'De-industrialisation and the balance of payments in advanced economies', *Cambridge Journal of Economics*, 28 (5), 767-790.

Rowthorn, R. and Coutts, K. (2013) 'De-industrialisation and the balance of payments in advanced economies', Centre for Business Research, University of Cambridge, Working Paper 453.

Storm, S. (2017) 'The political economy of industrialization: Introduction to Development and Change, virtual Issue, 1-19.

Szirmai, A. (2012) 'Industrialisation as an engine of growth in developing countries, 1950-2005', *Structural Change and Economic Dynamics*, 23 (4), 406-20.

Szirmai, A. and Verspagen, B. (2015) 'Manufacturing and economic growth in developing countries, 1950–2005', *Structural Change and Economic Dynamics*, 34, 46–59.

Targetti, F. (2005) 'Nicholas Kaldor: Key Contributions to Development Economics', *Development and Change*, 36 (6), 1185–99.

Teimouri, S. and Zietz, J. (2018) "The impact of surges in net private capital inflows on manufacturing, investment, and unemployment, *Journal of International Money and Finance*, 88, 158-170.

Timmer, M., de Vries, G., and de Vries, K. (2015) 'Patterns of Structural Change in Developing Countries'. In J. Weiss, and M. Tribe (eds), *Routledge Handbook of Industry and Development*, pp. 65-83, London: Routledge

Tregenna, F. (2015) Deindustrialisation, structural change and sustainable economic growth, UNIDO/UNU-MERIT background papers for the UNIDO, *Industrial Development Report 2016* (IDR 2016 WP 4).

UNIDO (2013) *Industrial Development Report 2013 – Sustaining Employment Growth: The Role of Manufacturing and Structural Change*, Vienna: UNIDO.

Van Neus, L. (2018) The Drivers of Structural Change, *Journal of Economic Surveys*, 33(1), 309-349.

World Bank (2020) *World Development Report 2020 - Trading for Development in the Age of Global Value Chains*, World Bank.

APPENDIX: Table A1. Peak Manufacturing VA and per capita RGDP

Country (Classification)	Peak MVA	RGDP at the peak	Year	RGDP_pc*	Country (Classification)	Peak MVA	RGDP at the peak	Year	RGDP_pc*
B. Faso (D)	15.9	85	1969	198	***Costa Rica (D)***	25.2	1695	1985	2768
Burundi (D)	9.8	98	1975	226	***Chile (E)***	26.9	1432	1974	2964
Malawi (D)	21.1	184	1992	240	***Jordan (D)***	21.2	3022	2007	3203
Uganda (D)	9.2	276	1999	294	***Mexico (E)***	24.1	2197	1989	3640
Benin (D)	11.7	157	1974	341	***Uruguay (D)***	24.1	2608	1989	3760
Sierra Leone (D)	9.1	166	1971	351	***Argentina (E)***	38.2	2112	1977	3879
Sudan (D)	8.9	336	1998	409	***Japan (A)***	33.5	2234	1971	4084
Rwanda (D)	15.5	313	1992	412	***Portugal (A)***	21.6	2101	1976	4116
Niger (D)	7.3	238	1986	420	***Turkey (E)***	23.9	3850	1999	4619
Zambia (D)	12.3	409	1998	438	***UK (A)***	38.6	1449	1962	4716
Mali (D)	19.3	372	2004	439	***S. Africa (E)***	23.7	2910	1983	4825
Sri Lanka (D)	25.4	271	1977	481	***Venezuela (E)***	29.2	3324	1986	5036
India (E)	19.2	383	1996	510	***Australia (A)***	30.9	2085	1971	5133
Togo (D)	11.2	403	1991	553	***Spain (A)***	25.8	2240	1974	5405
Ghana (D)	16.8	292	1977	575	***Malaysia (E)***	29.9	4492	2004	5517
C. African R. (D)	12.1	462	1991	640	***France (A)***	24.3	1908	1965	5594
Cameroon (D)	20.9	616	2001	649	***Netherlands (A)***	27.1	2208	1969	5594
Pakistan (E)	17.3	624	2005	707	***Gabon (D)***	9.3	4011	1986	5925
Guyana (D)	14.2	587	1987	710	***Cyprus (E)***	17.6	4033	1981	6406
Senegal (D)	17.9	569	1995	711	***Greece (A)***	17.6	3136	1976	6445
Côte d'Ivoire (D)	22.2	756	2000	718	***Austria (A)***	23.8	3001	1970	7332
Lesotho (D)	21.8	645	2004	720	***Denmark (A)***	20.1	3068	1970	7607
Nigeria (D)	6.7	637	1983	741	***Belgium (A)***	33.6	3239	1972	7953
Zimbabwe (D)	26.6	668	1993	774	***Israel (E)***	20.9	6215	1985	8876
Kenya (D)	14.5	846	2007	880	***Italy (A)***	27.6	4735	1978	9932
Algeria (D)	16.8	436	1972	901	***Luxemburg (A)***	41.5	3771	1970	9956
Philippines (E)	25.1	642	1989	970	***N. Zealand (A)***	27.3	7243	1984	10667
Morocco (E)	19.6	670	1985	991	***USA (A)***	24.1	4393	1968	11231
Bolivia (E)	20.4	679	1988	1008	***Barbados (D)***	12.7	4521	1981	11232
Indonesia (E)	28.7	914	2003	1242	***Norway (A)***	20.4	6837	1975	16032
Honduras (D)	22.1	1175	2002	1304	***Sweden (A)***	27.8	8383	1975	19678
Congo R. (D)	8.4	1152	1992	1551	***Iceland (A)***	19.4	13731	1986	25238
Egypt (E)	20.7	1219	1998	1568	***Finland (A)***	26.9	25115	2001	27428
Peru (E)	21.0	976	1990	1591	***Switzerland (A)***	23.6	18785	1980	32162
Colombia (E)	24.3	768	1978	1606	***Ireland (A)***	27.9	28836	2002	35243
Botswana (D)	9.0	1057	1983	1681	***Singapore (E)***	27	30284	2006	35776
Jamaica (D)	16.5	1162	1987	2069	***Germany (A)***	34.1	17463	1970	38822
Ecuador (D)	24.3	1707	1992	2322	***Canada (A)***	20.8	20113	1973	41288
Brazil (E)	33.9	1778	1984	2516	**NOTES:**				
Fiji (D)	15.0	2069	1998	2562	D: Developing economies,				
El Salvador (E)	23.7	2298	2002	2594	E: Emerging economies,				
Tunisia (E)	21.3	1980	1996	2676	A: Advanced economies.				