Research Report 436

DECEMBER 2018

Asian Experiences with Global and Regional Value Chain Integration and Structural Change

Roman Stöllinger

The Vienna Institute for International Economic Studies
Wiener Institut für Internationale Wirtschaftsvergleiche

Asian Experiences with Global and Regional Value Chain Integration and Structural Change

ROMAN STÖLLINGER

Roman Stöllinger is Economist at the Vienna Institute for International Economic Studies (wiiw).

This is a background paper to the UNIDO – UIBE Report on: Global Value Chains and International Cooperation on Industrial Capacity with a Focus on China, South and South East Asian Countries.

The author would like to thank wiiw's Scientific Director Robert Stehrer, colleagues from the University of International Business and Economics (UIBE) and Alessandra Celani de Macedo from UNIDO for valuable feedback, suggestions and methodological support. Thanks also go to my colleagues Alexandra Bykova and Simona Jokubauskaitė from wiiw for valuable assistance with data collection and data processing.

Abstract

This research report investigates the relationship between the growing integration into global and regional value chains (VCs) and structural change in the South and South East Asian (SEA) region. The analysis includes a sample of 60 developed and developing countries covered in the OECD's Inter-Country Input-Output Tables. Focusing on the SEA region, we find the usual inverted U-shaped relationship between the manufacturing share and per capita income. With regards to the impact of growing VC integration, the econometric results suggest a small positive effect of the overall VC integration on the change in the manufacturing share at the global level. Very similar patterns are found for the South and South East Asian region, however, with a large degree of country heterogeneity. The main beneficiaries from VC integration in the region in terms of the relative importance of manufacturing in the economy include for example Korea and Thailand. Unexpectedly, no significant differences in the (manufacturing-related) structural impacts of regional and global VCs could be identified.

Keywords: global value chains, structural change, competitiveness, economic development

JEL classification: F15, F60, F63, O19, O25

CONTENTS

TABLES AND FIGURES

Appendix

1. Introduction

The economic success stories of several Asian countries and the continued dynamism in large parts of the continent – compared to other global regions – have raised expectations that the 21st century will be the 'Asian Century' (ADB, 2011). Prominent features of these economic successes which occurred mainly in South and South East Asia are a rapid industrialisation and consequent participation in the production and export of manufactures. In parallel, the ICT revolution made geographically dispersed production processes possible which led to fundamental changes in international trading patterns. At the heart of this 'second unbundling' (Baldwin, 2013) are international production networks and global supply chains which characterise '21st century trade' (Baldwin, 2011).

An interesting question in this context is whether there is a relation between the proclaimed Asian Century and the growth of '21st century trade'. In particular, the question will be whether the intensified participation in international value chains (VCs) on the one hand and structural change, especially regarding the manufacturing sector, in South and South East Asia on the other hand are interlinked. Investigating this relationship is warranted for at least two reasons. Firstly, regional value chains (RVCs) and global value chains (GVCs) bring about enormous opportunities, in particular for emerging economies, because moving into new industries or activities does not require a country to possess the full spectrum of capabilities required in a particular industry. Rather, countries can specialise in specific 'tasks' or segments of the value chain of an industry and use that as a point of entry into an industry. This facilitates manufacturing-related structural change, that is, the relative shift of resources into new or existing manufacturing industries. Moreover, the production-investment-services nexus (Baldwin, 2011) implicit in geographically dispersed production also means that countries participating in RVCs or GVCs as 'offshoring destinations' can benefit from new capital and technologies. This sort of capital and technology necessitates that these economies can link up with a 'hub country' that acts as a lead country and technology provider. Secondly, one may hypothesise that South East Asia was one of the regions that benefited most strongly from the growing importance of RVCs and GVCs because of its early experiences with regional production integration. The early vertical specialisation within emerging regional production networks associated with the flying geese model of development (Akamatsu, 1962; Ozawa, 2005) can be seen as a predecessor or the beginning of the global production networks that emerged in the late 1980s. The flying geese model has a form of regional production integration at its core with Japan acting as the lead nation, though the flying geese concept puts more emphasis on the hierarchies between involved partners (Kasahara, 2004) than do newer models of offshoring (e.g. Feenstra and Hanson, 1996, 1999; Grossman and Rossi-Hansberg, 2008). With the final opening-up of China, South East Asia was integrated into global production networks (Cheng, 2013). Arguably, China has emancipated itself from this role and is moving into more skill-intensive and technology-intensive tasks and stages of production, passing the lower value added activities on to countries such as Vietnam and Cambodia. While differences in the various measures for the integration in production networks may allow inferences on countries' positions within production networks to some extent, the hierarchical relationships that exist between the firms of different partner countries in an international VC will be hard to detect in the econometric models that will be employed in this paper.

The experiences with integration in international VCs appear to be more mixed in South Asia where the full potential of regional and global VCs to develop additional manufacturing capacity has not been fully reaped possibly due to (among other things) bottlenecks in logistics and infrastructure and/or a failure to move to higher value added market segments (Brunner, 2013). South Asia will be the second focus region in the analysis though it will have to be confined to the case of India to a large extent due to the lack of data for the remaining countries in the region. Unfortunately, these data constraints impede the comparative analysis of RVC and GVC integration for India.

Among the various measures and indicators for a country's integration in regional or global VCs, three indicators from the literature are employed. The extent of backward production integration, i.e. the extent to which a country's exports rely on foreign inputs, is captured by the foreign value added (FVA) measure as discussed in Wang et al. (2013). This measure contains the part of a reporting economy's exports (both final and intermediate) that represents value added originating from foreign sources. These foreign sources comprise both the country of destination that the reporting economy is exporting to and all other foreign countries. This measure is similar to the foreign value added in exports (FVAiE) (Hummels et al., 2001) but avoids the double counting inherent in the FVAiE measure[1]. The measure for forward production integration is the VS1 measure mentioned (though not defined) by Hummels et al. (2001). The VS1 measure is an indicator of vertical specialisation that comprises the value added embodied in a country's intermediate exports that cross borders at least twice. This implies that the direct export destination may ship the goods to some third country or back to the initial exporting country (see Koopmann et al., 2014). Hence, this measure comprises indirect value added exports (Koopman et al., 2014), domestic value added that is exported but returns home and domestic value added that is re-exported in the form of intermediate goods.[2]

Both indicators, FVA and VS1, can be calculated at the reporter-industry-partner level. As a third, more comprehensive indicator, a combined measure of forward and backward production integration referred to as comprehensive VC participation will be used. Combining forward and backward production integration indicators into such a comprehensive measure of a country's integration in international value chains is a common approach (e.g. OECD, 2013; UNCTAD, 2013). These VC indicators (*FVA*, *VS1* and *comprehensive VC participation)* will be related to changes in the value added share of manufacturing which serves as the indicator of manufacturing structural change. To this end, three different aggregates of the manufacturing sector will be used: the manufacturing sector as commonly defined, a set of advanced manufacturing industries as well as an enlarged manufacturing sector which in addition comprises business-related services. Moreover, the entire analysis is performed using an alternative set of backward, forward and comprehensive VC participation indicators recently introduced by Wang et al. (2016). In addition, the relationship between manufacturing-specific structural change and VC participation is also investigated at the industry level for a number of selected industries (textiles and wearing apparel, 'electronics' and motor vehicles).

The remainder of this paper is organised as follows. Section 2 briefly reviews the related literature. Section 3 provides a descriptive analysis of the structural developments regarding the manufacturing sector and the degree of VC participation in the South and South East Asian region as well as some other relevant indicators in this context such as unit value ratios. Section 4 presents the econometric specifications and the main results. Section 5 concludes with a short summary and some policy implications[3].

---

1 For details see Wang et al. (2013).

2 Indirect value added exports include only domestic value added that is re-exported in the form of final goods.

3 Additional information on data sources, the definition of variables, country groups and industry definition is provided in the Appendix.

2. Related literature

Two strands of the literature are central to the research question at hand: the literature on structural change and the comparatively newer and rapidly expanding literature on global value chains and trade in value added.

The value added shares of economic sectors and the changes therein have a long-standing tradition in the literature on structural change. The focus in this paper will be on the manufacturing sector and its relative expansion or shrinkage. One reason for the importance assigned to the manufacturing sector is that manufacturing acts as the main engine of growth because of the above-mentioned higher productivity growth (e.g. Baumol, 1967; Syrquin, 1988). Hence, as suggested by Baumol's disease, the reallocation of resources from the manufacturing to the services sector is expected to impose a 'structural change burden' (Szirmai and Verspagen, 2015) on the economy's growth prospects. The tight connection between economic growth and structural change motivates the choice of the value added share of manufacturing as a performance indicator.

The empirical approach in this paper is in the spirit of Chenery (1960) who links manufacturing value added per capita, i.e. manufacturing intensity, in several manufacturing industries to domestic supply and demand conditions which are proxied by income per capita. Chenery (1960) finds a positive relationship between manufacturing intensity and income per capita for all industries.[4] In subsequent work Chenery and Syrquin (1975) expand this analysis by including, among other factors, the square of income per capita to control for the fact that the income elasticity of manufacturing declines with rising income. Moreover, they replace the manufacturing intensity with the share of manufacturing value added in total GDP.

In open economies, international trade must be considered as an additional relevant factor influencing economic structures. According to standard trade models, comparative advantages drive specialisation and hence the trading economies' sector compositions. A country is predicted to specialise in the production of goods where it has a comparative advantage. These comparative advantages may be ruled by relative differences in productivity (in Ricardian models) or factor abundance (Heckscher-Ohlin models). The present paper, however, investigates the structural implications of a particular type of international trade which is trade in intermediates or 'tasks' that result from the international organisation of production and the resulting regional and global VCs.

The literature on global value chains itself can be divided into (at least) two main groups: theoretical models of offshoring (e.g. Feenstra and Hanson, 1996; Grossman and Rossi-Hansberg, 2008) and detailed case studies. Both strands of the offshoring literature provide predictions for the potential impacts of GVCs and RVCs on manufacturing structural change, though they will not be unambiguous in most cases. In the offshoring model by Grossman and Rossi-Hansberg (2008), for example, the impact of offshoring on the composition of output in the offshoring country depends on (i) which type of activities (or tasks) are offshored and (ii) whether manufacturing is the relatively more skill-intensive sector. This implies that GVC participation may have differentiated implications for manufacturing structural change

[4] Haraguchi and Rezonja (2011) use the conceptual framework of Chenery (1960) and repeat (and expand) their work with more recent data. They confirm the important role of income per capita.

in different countries. In particular, the effects do not only depend on whether a country is primarily engaged in active offshoring or whether it is mainly an offshoring destination, rather in both countries – the offshoring country and the offshoring destination – manufacturing may expand or shrink depending on the nature of the offshoring activities and the industries involved. In the offshoring destination the usual gains from trade will arise through an improvement in the allocation of resources. In the Grossman and Rossi-Hansberg (2008) model there will also be a direct productivity gain from the fact that (superior) foreign technology can be applied in the offshoring destination. In addition, one may note that offshoring and GVCs create new opportunities for fast technological learning and skill acquisition (see for example Sturgeon and Memedovic, 2011). However, despite the various opportunities brought about by GVCs, detailed analyses of the experiences of particular countries or industries do not lead to such a uniformly positive assessment of the impacts of GVCs. In this respect, the case study literature, while acknowledging the potential of GVC integration to bring about 'compressed development' (Whittaker et al., 2010), emphasises that "GVCs are not necessarily a panacea for development" (Sturgeon and Memedovic, 2011, p. 3). In particular, GVC integration entails the risk of creating barriers to learning and of uneven development (Kaplinsky, 2005) as well as lock-ins in low valued added activities (Kaplinsky and Farooki, 2010). Therefore the ultimate consequences for countries participating in GVCs depend on a variety of factors including the type of value chain (Gereffi et al., 2005)[5], the extent of rents sharing between firms forming the value chain (e.g. Chesbrough and Kusunoki, 2001) or the support by the lead firm and resulting knowledge transfers (Pietrobelli and Rabellotti, 2011).

In line with the theoretical developments a rich empirical literature measuring the extent of offshoring and intensification of GVCs has emerged (e.g. Hummels et al., 2001; Cattaneo et al., 2010; De Backer and Miroudot, 2012; Stehrer, 2012; Stehrer, 2013; Johnson and Noguera, 2012; Koopman et al., 2014).Empirical work on the economic impacts of GVCs has been undertaken employing different indicators for integration in production networks. Kummritz (2016) investigates the relationship between GVC participation and both domestic value added and labour productivity. Using a new and innovative instrumental variable, he finds that increases in both backward and forward GVC participation lead to higher domestic value added and to higher productivity with higher effects found for forward production integration. Kiyota et al. (2016) apply the approach by Timmer et al. (2013) to calculate the shares in world manufacturing GVC income for six Asian countries. Using this indicator as a measure of competitiveness, they find that the competitiveness of most Asian countries increased. Moreover, the growing manufacturing GVC income in Asia also coincides with increasing real income per worker, a result that contrasts with that in Timmer et al. (2013) for European countries.

Kummritz (2016) and Kiyota et al. (2016) both use the *levels* of the respective GVC measure which are, after all, a measure of a particular type of trade flows. Another approach is taken by Stöllinger (2016) who investigates the impacts of GVC integration on manufacturing structural change for EU Member States. In this application the GVC measures are set in relation to the corresponding gross export measure so that the explanatory variables reflect the GVC trade *intensity* rather than the *level* of GVC trade. The key result in Stöllinger (2016) is that GVC integration has differentiated effects on Member States. For a subset of EU Member States, coined the Central European Manufacturing Core, a positive impact of GVC integration on the manufacturing share is found while the opposite is true for the remaining EU Member States outside this group of core countries.

5 The literature on GVCs distinguishes between various types of GVCs which differ with regard to the complexity of the activities involved, the capabilities required by the participating partners and also the expected knowledge flows (see Gereffi et al., 2005).

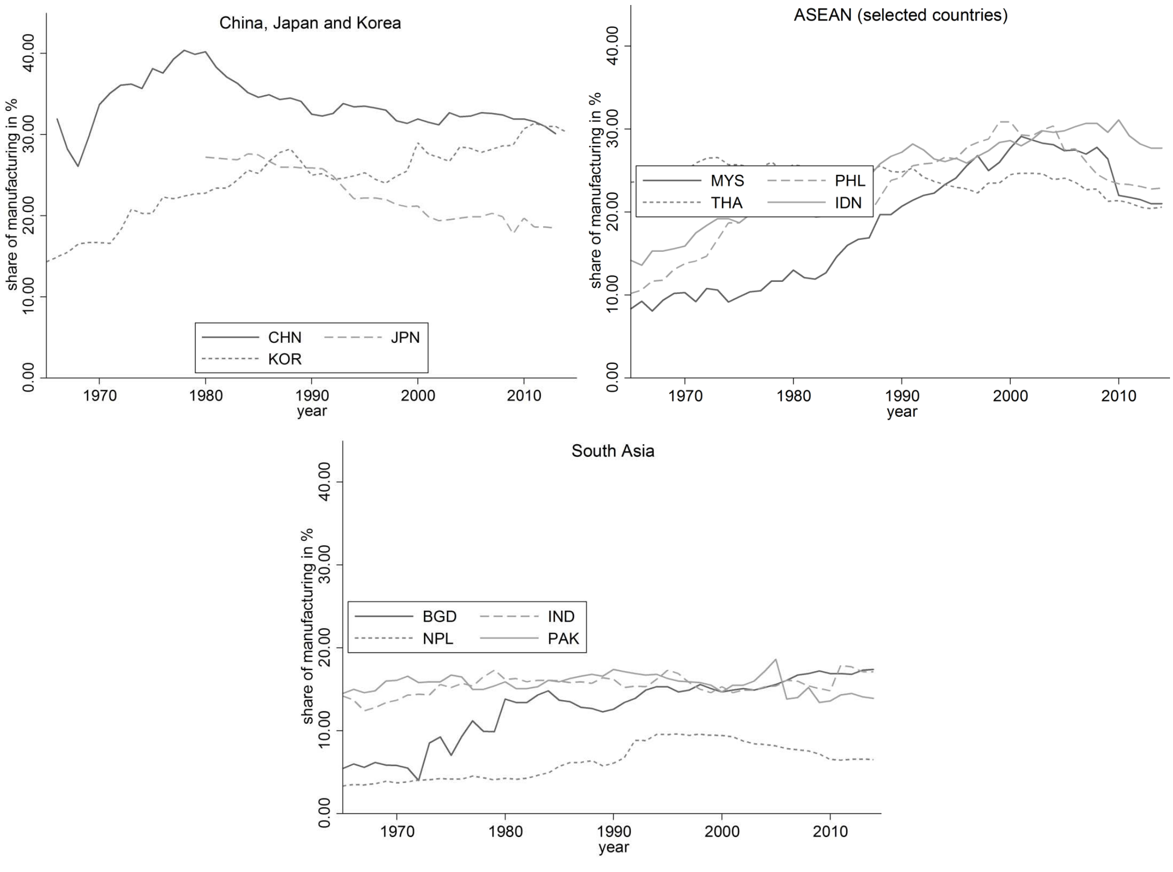
3. Descriptive analysis

3.1. MANUFACTURING SHARES AND MANUFACTURING STRUCTURAL CHANGE IN ASIAN ECONOMIES

The South and South East Asian countries have undergone significant structural changes over the past decades. With regards to the importance of the manufacturing sector in the economy, several countries in South East Asia are considered as success stories. This is discernible in the data by very high value added shares of manufacturing in several countries in the region.

Starting with a longer-term perspective (1970-2014), Figure 1 shows the share of manufacturing in the economy in the three largest economies in South East Asia (China, Japan and Korea, first panel), in all cases evolving at a high level. This is especially true for China where the value added share of manufacturing reached a peak of 40% in the late 1970s. Since then the manufacturing share in China has embarked on a downward trend and stood at 31% in 2013.

Figure 1 / Manufacturing shares in selected South and South East Asian economies, 1970-2014



Source: World Development Indicators.

This implies that during the period under investigation there was a slight structural shift away from manufacturing in the 'workbench of the world', as China is often referred to. In Japan and Korea, the manufacturing share developed quite differently, with a marked decline in the former and a considerable increase in the latter. As a result of these developments, the Korean manufacturing share surpassed that of China by 2011 while the value added share of the manufacturing sector in Japan went down by almost 9 percentage points after 1980.

Most of the ASEAN economies displayed in the second panel of Figure 1 – Malaysia, the Philippines and Indonesia – show a clear and strong upward tendency of the manufacturing sector in the longer term. An exception to this is Thailand which already had a comparatively high manufacturing share in the 1970s (around 25%). Over the past two decades, the high manufacturing shares of the ASEAN economies have declined again with the negative trend accelerating after the Great Recession of 2008 in most cases.

Less dynamics regarding the manufacturing sector is observable in South Asia. The most favourable development has occurred in Bangladesh with a rise of the value added share from less than 6% to more than 17%, which is about the same relative importance the manufacturing sector enjoys in India. In Nepal, the manufacturing sector appears to be less important than in the other countries in the region, despite a brief positive trend in the early 1990s. In general, the value added share of the manufacturing sector appears to be lower in the Indian economy than in the South East Asian region.

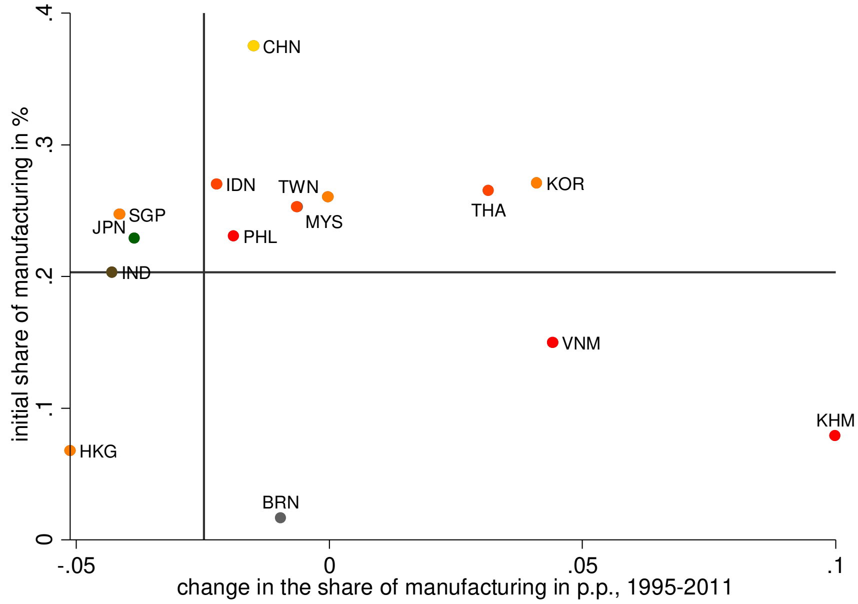
The remainder of this section will focus on data from the OECD's Inter-Country Input-Output (ICIO) database which will also be used in the econometric analysis. Unfortunately, not all countries in the South and South East Asian region are covered in the OECD ICIO database. Within South Asia, only data for India are available. The OECD ICIO data allow investigating different aggregates of manufacturing-related value added.

Focusing on the usual definition of the manufacturing sector[6], Figure 2 reveals that ten of the 14 Asian countries shown are positioned on the right side of the vertical line (which indicates the average global manufacturing-related structural change between 1995 and 2011). This implies that these ten countries experienced a decline in the value added share of manufacturing between 1995 and 2011. The horizontal line indicates the average manufacturing share at the global level back in 1995. Again, ten of the countries (though not the same ones) are above this global reference line. Seven countries, including China and Korea, combine both characteristics. Taken together, this illustrates that most of the South and South East Asian countries had already had a relatively high manufacturing share back in 1995 and that their manufacturing structural change was relatively mild. The only countries in the region which experienced a stronger than average structural decline related to manufacturing are the developed regions in South East Asia, i.e. Japan, Singapore and Hong Kong, as well as India, which is the only country in the sample from South Asia.

Remarkably high positive structural change has been experienced by Cambodia (starting from a very low level), Vietnam and Korea. In the latter case, the 4.1 percentage point increase in the value added share of manufacturing can at least partially also be attributed to a successful explicit industrial policy (see e.g. Amsden, 1989; Wade, 1990; Rodrik, 1995).

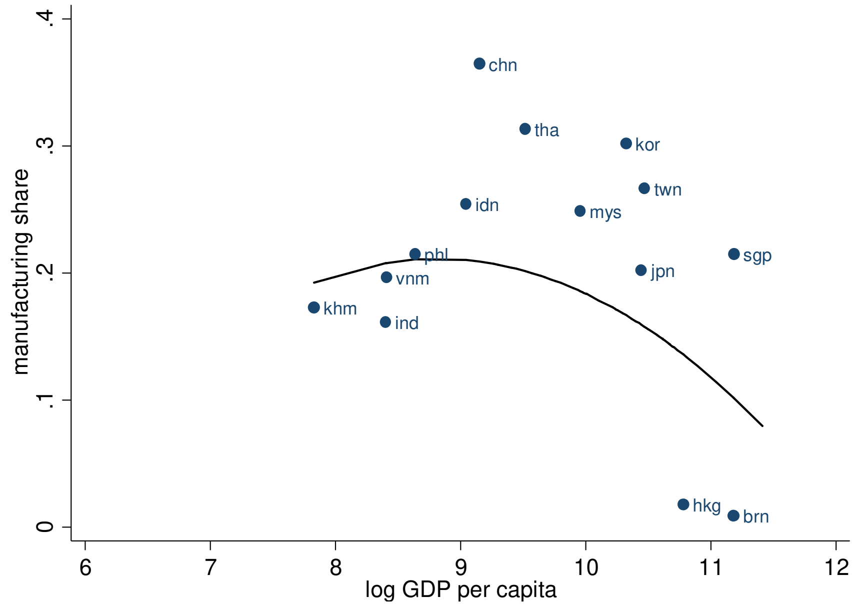
6 In the econometric analysis two other manufacturing aggregates will be considered: advanced manufacturing industries, on the one hand, and manufacturing industries plus business services, on the other hand.

Figure 2 / Value added shares of manufacturing and changes in shares, 1995-2011



Note: Colour codes: brown = South Asia (India), orange = SEA Tigers: Hong Kong, Singapore, Korea, Taiwan; dark orange = ASEAN wave 1: Indonesia, Malaysia, Thailand; red: ASEAN wave 2: Cambodia, Philippines, Vietnam; other: Brunei.
Source: OECD ICIO Database, wiiw calculations.

Figure 3 / Value added shares of manufacturing and GDP per capita, 2010



Note: The relationship is derived from a panel regression for the years 2000, 2005 and 2010 of the nominal value added share of manufacturing on the (log of) GDP per capita and the square of (log) GDP per capita controlling for time-fixed effects. The inverted U-shaped line represents the predicted values for the year 2010.
Source: OECD ICIO Database, wiiw estimations.

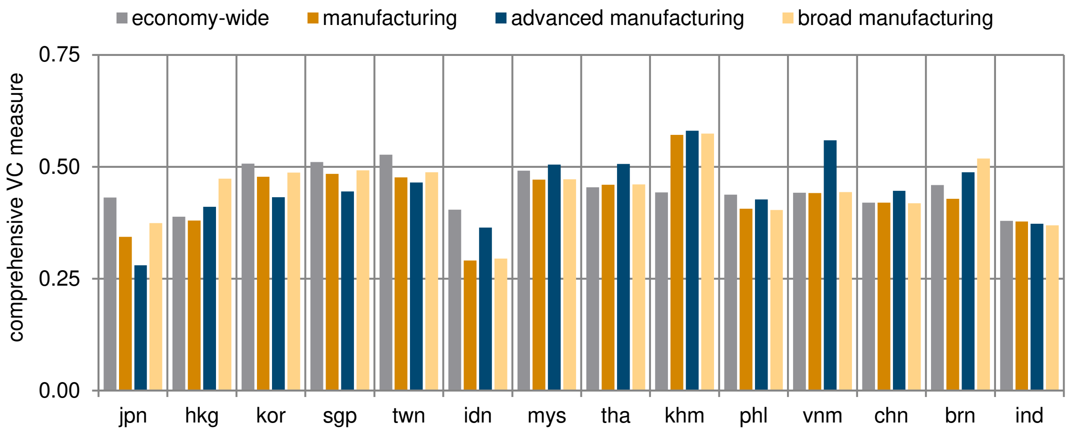
Most of the described changes in the value added shares of the manufacturing sector are as expected given the well-documented relationship between the relative size of the manufacturing sector and per capita income. To illustrate this, Figure 3 depicts the predicted manufacturing share given countries' GDP per capita following the approach in Rodrik (2016).[7] Within South East Asia, only Vietnam and Cambodia are still clearly below the level at which the manufacturing share can be expected to decline with raising GDP per capita, as is India. Japan, Singapore and Hong Kong have a GDP per capita where the manufacturing share is clearly expected to decline as the economies continue to become richer, which fits well with the actual developments.

Figure 3 also confirms the above assertion that most economies in the South East Asian region have a comparatively large manufacturing share which can be seen from the fact that for the grand majority of the countries in the region the actual manufacturing share is clearly above the predicted share given the respective economy's GDP per capita. The same, however, is not true for India which – given its per capita income – should have had a higher manufacturing share in 2010.

3.2. PATTERNS OF PARTICIPATION IN GLOBAL VALUE CHAINS

The general development of countries' participation in global value chains is well documented (e.g. OECD, 2013; UNCTAD, 2013) as are the developments of South and South East Asian economies in this respect (e.g. WTO-IDE JETRO, 2011; Cheng et al., 2015). This section therefore only provides a brief overview of countries' participation in international VCs. In line with the focus of the paper, the emphasis will be on the value added that is embodied in manufacturing gross exports. The difference between an economy-wide consideration of VC participation (comprehensive measure summing up the FVA and the VS1) and the manufacturing-specific perspective – taking into account the three definitions of the manufacturing sector – are exhibited in Figure 4 for 2011.

Figure 4 / Value chain (VC) participation in South East Asia and India, various aggregates, 2011



Note: Values are expressed in percentage of gross exports originating from all sectors (= economy-wide), from manufacturing gross exports, from advanced manufacturing industries' gross exports and manufacturing and business services industries' gross exports respectively.
Source: OECD ICIO Database (download of indicators via the UIBE data portal), wiiw calculations.

7 The relationship in Figure 3 is the result from a panel regression for the years 2000, 2005 and 2010 of the nominal value added share of manufacturing on the (log of) GDP per capita and the square of GDP per capita for the countries in the OECD's ICIO database (see Appendix for the country coverage).

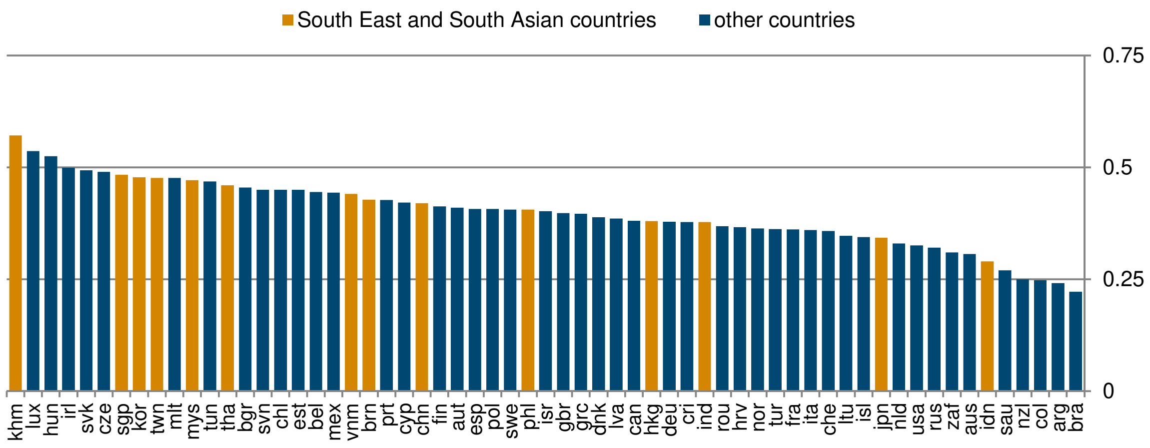
The VC participation rates (expressed in the corresponding gross exports) show the usual pattern in the sense that large economies tend to have lower VC participation rates than smaller economies. With regard to the differentiation between economy-wide value added and value added that enters international VCs via manufacturing gross exports only, one finds that for most countries the ratios are similar though differences obviously exist. There are larger differences for countries with rather small manufacturing sectors, such as Cambodia or Brunei, which have higher VC ratios in the manufacturing-specific version than in the economy-wide version of the indicator.

Another noticeable feature is that in countries such as Japan or Korea, which are home to a comparatively large number of lead firms that manage international supply chains, the VC participation rates are lower in the advanced manufacturing sector than in the entire economy and also in overall manufacturing. In contrast, countries such as Malaysia and Vietnam, and also China, which have all been successful in increasing their gross exports of advanced manufacturing products, capture comparatively little domestic value added in these activities and depend to a larger degree on imported inputs and potentially further downstream production activities. Hence, the difference in the degree of VC integration between the two groups of countries stems mainly from differences in the backward production integration indicator *(FVA)* which is higher in the latter group.

Comparing the South East Asian countries with India, which is the sole South Asian economy in the sample, suggests that VC participation may be slightly lower in India. This comparison, however, is difficult because of the influence of country size. When comparing India with China only, the difference in the manufacturing-specific VC rate between the two countries in 2011 amounted to 4.2 percentage points, which would to some extent support the above claim.

In the following the manufacturing-specific VC participation rates will be discussed in more detail[8], starting with an international comparison of the manufacturing-specific VC participation.

Figure 5 / Manufacturing-specific value chain (VC) participation, international comparison, 2011



Note: VC participation rate expressed in percentage of manufacturing gross exports.
Source: OECD ICIO Database (download of indicators via the UIBE data portal), wiiw calculations.

8 See Appendix for more details on all three VC indicators and aggregates for selected years.

Figure 5 ranks the 61 economies for which data are available by their comprehensive VC participation rate. This highlights the fact that several of the South East Asian economies are among those with the highest VC participation rates. In fact, the top 10 ranks are occupied solely by either small EU Member States or South East Asian economies. While this ranking is obviously influenced by country size, it equally suggests that regional trade integration such as the EU or ASEAN facilitates VC participation. At the lower spectrum of the graph, one finds mainly large economies and in particular large commodity exporting countries. Within the South East Asian region, Indonesia would fit this description.

Moving to the components of the comprehensive VC measure, Table 1 shows the extent of backward *(FVA)* and forward production integration (VS1) for the manufacturing sector. The table shows both the amounts (in million USD) of the three VC measures (Columns 1-3) and the intensities, i.e. the values expressed in percentage of manufacturing gross exports (Columns 5-7).

Table 1 / Participation in global value chains in the manufacturing sector, individual components, 2011

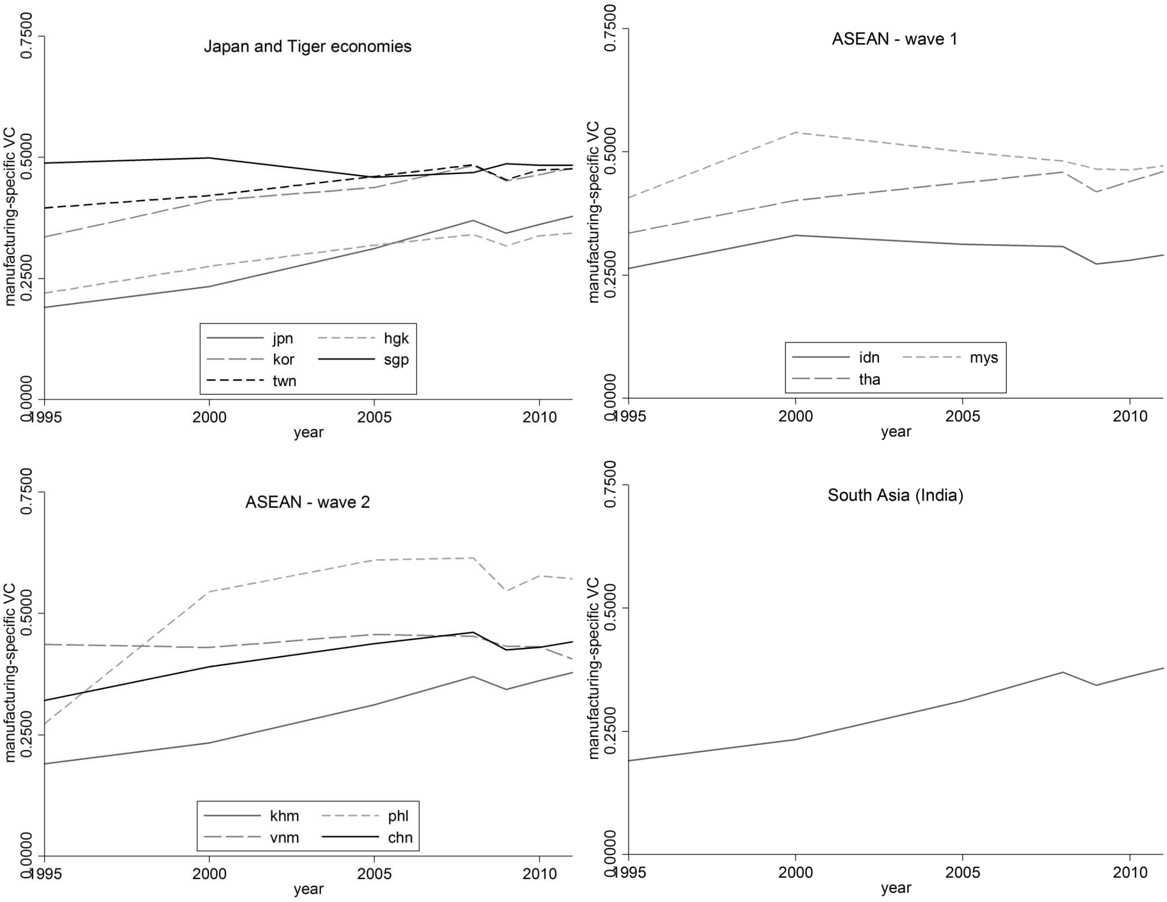
	production integration measures values (mn USD)			gross exports	production integration measures in % of exports		
	backward	***forward***	***comprehensive***		***backward***	***forward***	***comprehensive***
	FVA	**VS1**	**VC part.**		**FVA**	**VS1**	**VC part.**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
			(1) + (2)		**(1) / (4)**	**(2) / (4)**	**(5) + (6)**
jpn	75,819	137,659	213,478	621,663	0.1220	0.2214	0.3434
hkg	3,366	610	3,976	10,464	0.3217	0.0583	0.3800
kor	165,873	70,883	236,756	495,395	0.3348	0.1431	0.4779
sgp	46,113	16,954	63,067	130,331	0.3538	0.1301	0.4839
twn	84,462	38,658	123,120	258,455	0.3268	0.1496	0.4764
idn	13,488	15,321	28,809	99,205	0.1360	0.1544	0.2904
mys	61,445	17,637	79,082	167,716	0.3664	0.1052	0.4715
tha	60,672	16,089	76,761	166,823	0.3637	0.0964	0.4601
khm	1,605	189	1,794	3,140	0.5112	0.0602	0.5713
phl	7,215	8,002	15,218	37,485	0.1925	0.2135	0.406
vnm	20,876	3,622	24,498	55,531	0.3759	0.0652	0.4412
chn	474,558	153,664	628,223	1,495,440	0.3173	0.1028	0.4201
brn	35	17	52	121	0.2868	0.1413	0.4282
ind	64,697	21,606	86,303	228,392	0.2833	0.0946	0.3779

Note: Intensities (Columns 5-7) are expressed in percentage of manufacturing gross exports.
Source: OECD ICIO Database (download of indicators via the UIBE data portal), wiiw calculations.

The table shows that in the countries with the highest VC participation rates (e.g. Cambodia, Singapore or Taiwan), the high values are mainly due to a high degree of backward production integration. In general, the scores of the forward production integration measure are lower than the backward indicator with the notable exception of Japan where the VS1 ratio is almost double the FVA ratio. This reflects the particular role of Japan in global and regional production networks in the South East Asian region as the lead economy for the majority of value chains. For Japan the value added exported in the form of intermediate exports that are further exported to other countries or shipped back to Japan is higher than the amount of foreign value added in its exports. This in turn indicates that Japan is generating a lot of value added in the production of intermediates. In contrast, it relies comparatively little on foreign inputs for its own processing. A special case in this respect is also the Philippines where FVA and VS1 are similarly high. For all other countries, the comprehensive VC measure is driven primarily by the degree of backward production integration.

What is also interesting to note is that the degree of VC participation in the South East Asian Tiger economies, as well as the first and second wave of ASEAN countries, ranges mostly from about 42% to 48%. This means that by 2011, the difference in the timing of when countries were integrated in (at least regional) VCs does not strongly influence the measured VC participation as derived from international input-output data.

Figure 6 / Manufacturing-specific value chain (VC) participation, South and South East Asia, 1995-2011



Note: All values are expressed in percentage of value added exports originating from manufacturing industries.
Source: OECD ICIO Database (download of indicators via the UIBE data portal), wiiw calculations.

The development of VC integration over time is depicted in Figure 6 for the countries in the South and South East Asian region. The figure shows that for most countries the longer-term trend (1995-2011) is positive though not uniformly so. For example, in Japan, Korea, Hong Kong and Taiwan, VC participation was growing more or less continuously while the development was relatively flat in Singapore between 1995 and 2011. Among the ASEAN countries the general pattern seems to be an increase in VC participation until the year 2000 (except for Vietnam) followed by rather diverse developments thereafter. In the first wave of ASEAN countries, the VC participation rate has stagnated or even declined since the beginning of the new millennium (e.g. Malaysia or Indonesia). Countries with clear upward trends in the VC participation rate are Thailand, Cambodia and China which only suffered a short setback during the Great Recession of 2008/2009. A similar trend is observable for India, though at a somewhat lower level.

3.3. QUALITY UPGRADING WITHIN GLOBAL VALUE CHAINS

One of the most challenging issues in the analysis of international VCs concerns the quality dimension. The indicators for production integration discussed in the previous section are silent on the sophistication of the goods exported or imported in the context of internationally dispersed production. One possibility to approach the quality issue is to take recourse to unit value ratios (UVRs). The UVRs are derived from the implicit unit price of a particular good obtained from export values and export quantities of that good. This implicit unit export price of a good exported by a particular country is set in relation to the implicit unit export price of the same good exported by a reference group (Landesmann and Wörz, 2006)[9] which for this purpose is the world. Since UVRs are relative measures in logarithmic form, the values can be negative or positive, depending on whether the UVR of a country is below or above the global average. Higher UVRs indicate higher product quality. This is because one can assume that if a country is able to sell a product at a higher unit price than its competitors in international markets, this good is presumably of superior quality. Hence, with regards to the four types of upgrading within global value chains identified by the OECD (2013) – process upgrading, product upgrading, functional upgrading and chain upgrading – the UVRs capture the product upgrading dimension.

To distinguish a country's general quality upgrading of its exports from upgrading within international VCs, the UVRs are calculated for parts and components (according to the Broad Economic Category (BEC) classification) only. These are the type of intermediate goods that have the highest probability to be part of international production networks. Hence, an improvement in the UVRs of exported parts and components can be considered as a proxy for product upgrading within international value chains.[10] Figure 7 shows the UVRs for parts and components of the countries in the South and South East Asian region for the benchmark years 1995, 2000, 2005 and 2011.

Several aspects are worth noting here. First of all, the differences in UVRs of parts and components across countries are relatively large compared to the variances in UVRs of all goods.[11] Second, high-income economies tend to sell parts and components above the global average, while in many cases the opposite is true for emerging economies. Therefore Japan and Korea (as well as Brunei) are suggested to specialise in the high-quality segment of the goods they export. The same is true for the Philippines, though this is rather uncommon for a lower-middle-income country. This may also point to one of the limitations of the UVR as a quality indicator, which is that it is calculated based on gross exports. This implies that in the case of countries importing high-quality inputs that are subsequently processed or assembled, their gross exports contain the high quality of these (foreign-produced) inputs.

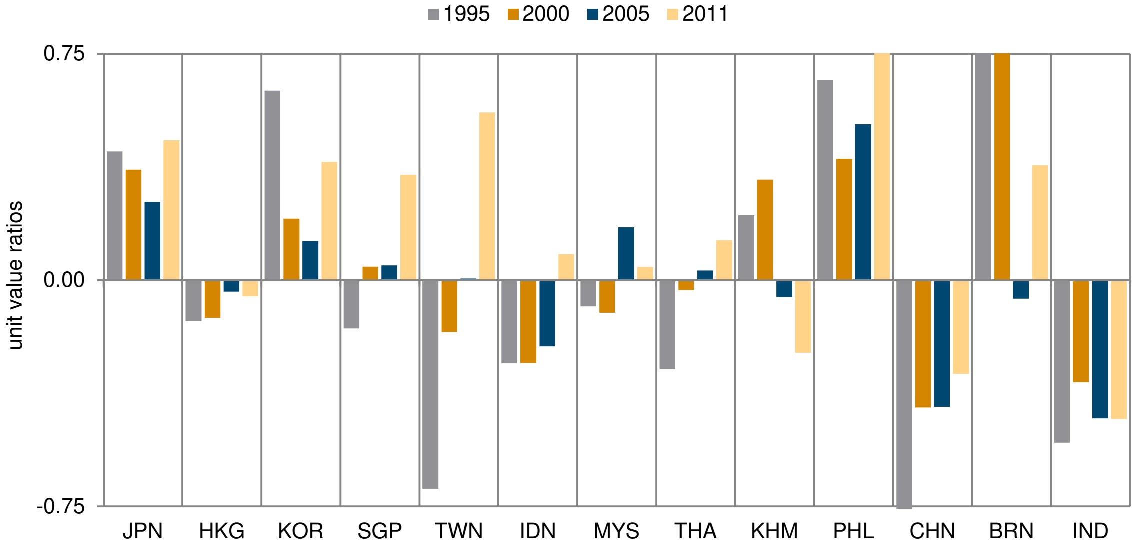
---

9 For details to calculate UVRs see Appendix.

10 Note that for this purpose the involvement in GVCs is proxied by the exports of parts and components instead of the input-output-based GVC indicators previously discussed.

11 The latter are not shown but results are available upon request.

Figure 7 / Unit value ratios, exports of parts and components, 1995-2011



Source: CEPII Database, wiiw calculations.

The reported UVRs fit the expected pattern better in the case of China and India, which are suggested to export mainly goods in the lower range of the quality spectrum. One reason why countries can remain at the lower-quality spectrum of exports for an extended period of time, despite otherwise positive economic development, is that during the catch-up process, countries typically move into the production and the export of new goods. When moving into new export products, however, countries typically start at the lower-quality or medium-quality range and only move up the quality ladder after having accumulated experience.

Third, several countries in the region managed to reduce – sometimes to a considerable extent – the negative margin at which they have to sell their goods (compared to the global average). This is the case, for example, for Taiwan which continuously improved its UVR for parts and components from a below-average UVR of about 0.7 in 1995 to a price premium of about 0.55 in 2011. This can be seen as evidence for the country's moving up the quality ladder *within* exported product lines. The trend in the UVR has also been positive for Hong Kong, Indonesia, Malaysia, Thailand and China. To a lesser extent this is also true for India which, however, exports parts and components still at prices that are considerably lower than the global average (UVR of -0.46 in 2011). Altogether five countries in the region (Taiwan, Singapore, Indonesia, Malaysia and Thailand) managed to move from below-average to above-average export quality of parts and components as measured by UVRs. In addition, Japan and the Philippines, starting from a much better initial position in 1995, could further enhance the premium at which they exported parts and components until 2011.

4. Econometric model and results

The econometric approach of this paper consists of relating the international VC indicators to manufacturing-specific structural change. Manufacturing structural change is defined as the change in the value added share of manufacturing. The sample comprises 61 countries[12] *(C=61)* which are observed over four periods of five-year intervals (1995, 2000, 2005, 2010). The fact that the dependent variable is defined in terms of changes implies that only three time periods remain *(T=3)* yielding a sample with 183 observations.

The main interest in all econometric models is with the respective VC integration measure which is tested on changes in the value added share of manufacturing (manufacturing-specific structural change), with three different manufacturing aggregates being employed. These are the manufacturing sector as commonly defined[13], a sub-category labelled advanced manufacturing[14] and an extended manufacturing sector which, as well as the value added of manufacturing industries, also comprises the value added of the business services sector[15].

4.1. REGRESSION MODEL FOR MANUFACTURING-RELATED STRUCTURAL CHANGE

The econometric model is similar to the one used in Stöllinger (2016) for the relationship between manufacturing structural change and GVC within the EU. The interest here is to investigate the relationship between global and regional VCs and structural change at the global scale, on the one hand, and for the countries in the South and South East Asian region, on the other hand. To this end a base version of the regression model is estimated which has the following form:[16]

$$(1) \qquad \Delta sh_{c,t}^{mf} = \alpha + \beta_1 \cdot VC_{c,t-1}^{mf} + X_{c,t} \cdot \varphi + \delta_t + \mu_c + \varepsilon_{c,t}$$

where $\Delta sh_{c,t}^{mf}$ is a measure for manufacturing-specific structural change of country *c* between period *t* and *t-1*. $VC_{c,t-1}^{mf}$ is a measure of global value chain integration (*comprehensive VC participation, backward production integration or forward production integration*) – specific to the respective manufacturing aggregate. A positive coefficient of the VC measure would indicate that increasing integration in global production networks fosters the development of the manufacturing sector relative to other sectors of the economy. In this regression framework, the degree of VC integration at the beginning of the period is used which is why it enters the equation with the time index *t-1*. For example,

12 See Appendix for list of countries.

13 This comprises the industries belonging to Section D in the NACE Rev. 1 classification.

14 Advanced manufacturing includes the chemical, the machinery and equipment, the electrical and the transport equipment industries according to the NACE Rev. 1 classification.

15 The business services sectors comprise Computer and related activities (NACE Division 72) as well as R&D and other business activities (NACE Divisions 73 and 74).

16 As a robustness check the regression will also be run with a limited sampled restricted to the 11 South and South East Asian countries.

in the first period, which has the change in the manufacturing sector from 1995 to 2000 on the left-hand side, the VC integration of the year 1995 is relevant.

Equation (1) is estimated for three VC measures from the literature. The first measure is the foreign value added *(FVA)* embodied in the production of a country's exports (see Wang et al., 2013). The *FVA* will be expressed in percentage of gross exports. Since the interest is with the manufacturing sector[17], the measure will be confined to manufacturing industries. Therefore the manufacturing-specific *FVA* of country *c* will embody all foreign value added necessary to produce the manufacturing exports of country *c*. The normalising export vector will be the gross exports by manufacturing industries of country *c*. *FVA* serves as the backward production integration measure.

The second VC indicator is the *VS1* measure introduced by Hummels et al. (2001) as defined by Koopman et al. (2014). *VS1* comprises the domestic value added that enters foreign countries' exports. The *VS1* measure is again expressed in percentage of gross exports. The same rules as above for delineating the manufacturing sector are used. That is, the value added that is exported by country *c*'s manufacturing industries and is subsequently embodied in foreign countries' exports makes up the manufacturing-specific *VS1* measure. Also in this case, the normalising export vector will be the gross exports by manufacturing industries of country *c. VS1* serves as the forward production integration measure.

A third indicator is created by combining the *FVA* and the *VS1* measure into a 'comprehensive *VC*' measure or 'comprehensive VC participation rate'. By combining the backward and forward indicators for the extent of participation in international value chains, a more complete picture may be obtained which is why such aggregate measures are commonly used (e.g. OECD, 2013; UNCTAD, 2013).

$X_{c,t}$ denotes the set of control variables comprising the initial share[18] of manufacturing, the initial GDP and changes in the real exchange rate.[19] The initial share of manufacturing is intended to control for potential level effects as countries with initially higher manufacturing shares may also be more prone to 'de-industrialise'. This type of convergence hypothesis, which Rodrik (2013) has shown to hold unconditionally for manufacturing industries at the global level, would suggest that the initial share of manufacturing is negatively correlated with the change in the manufacturing share. Put differently, countries with initially low shares of manufacturing in GDP should see the relative size of the sector increase by more (or decrease by less) than countries which initially had higher shares – if this convergence hypothesis holds true.

Following Chenery (1960), Chenery and Syrquin (1975) and more recently Haraguchi and Rezonja (2011), the initial GDP per capita is included as a control for general demand conditions. In their regression related to the production structure in which they explain changes in the industry share[20], Chenery and Syrquin (1975) find a positive coefficient for GDP per capita. This suggests that the higher demand associated with higher income supports structural change in favour of the industrial sector.

17 Three different aggregates of the manufacturing sector will be used: the manufacturing sector as commonly defined, a set of advanced manufacturing industries as well as an enlarged manufacturing sector which in addition comprises business-related services.

18 The initial share always refers to the value of a variable at the beginning of the period, e.g. 1995 in the period explaining manufacturing structural change between 1995 and 2000 and likewise for the other periods.

19 For the data sources of all data used in the regression models see Appendix.

20 Chenery and Syrquin (1975) use changes in the share of industry and not changes in the manufacturing sector as dependent variable (see their regression 5b in Table 5, p. 38).

The third control variable is the change in the real effective exchange rate (expressed in index form), $\Delta real\ FX_{c,t}$. The inclusion of the latter is in line with McMillan and Rodrik (2011) who also include a measure for the real exchange rate ($\Delta real\ FX$) in their regression explaining their measure of (economy-wide) structural upgrading. Since the manufacturing sector is the main tradables-producing sector for economies in the South and South East Asian region, a rising real exchange rate can be expected to hamper exports and to result in negative manufacturing structural change. Therefore a negative coefficient for the real exchange rate is expected.

The base model in Equation (1) is estimated both for the full sample and for the countries of the South and South East Asian region only.

In order to capture any country-specific effects of VC participation for the economies in the region, the model is adjusted to include interaction terms between the respective VC measure and the country dummies for the 14 South and South East Asian countries in the sample:

(2) $$\Delta sh_{c,t}^{mf} = \alpha + \beta_1 \cdot VC_{c,t-1}^{mf} + \sum_{i=1}^{14} \gamma_i \cdot \left(VC_{i,t-1}^{mf} \times \mu_i\right) + X_{c,t} \cdot \varphi + \delta_t + \mu_c + \varepsilon_{c,t}$$

As the descriptive analysis has shown, there is quite some heterogeneity in the VC developments even within the South and South East Asian region, which is why this more flexible regression set-up may be warranted. Positive signs for the γ_i's, i.e. the coefficients of the interaction terms between the respective VC measure and the country dummy, would indicate that the country in question benefits more than the average country from increasing participation in international VCs. These interaction terms are intended to pick up structural effects that are due to VC-related factors which are country-specific, such as the type of value chains the firms in the respective countries are part of.

Another differentiation to be made is between production integration with partners from the same region and extra-regional partners. To take this dimension into account, the basic model in Equation (1) is refined by splitting the *VC* measure (*FVA*, *VS1* and *comprehensive VC participation*) into an intra-regional and an extra-regional component.[21] The distinction between intra-regional and extra-regional is made with respect to the 'joint international production'. This means that in the case of backward production integration (*FVA*), for any exporting country *c*, the upstream partner countries (i.e. those providing value added for the export vector of country *c*) are relevant. If country *c* and the upstream partner country are from the same region, the *FVA* is assigned to the intra-regional FVA measure. If country *c* and the upstream partner country are from different regions, the FVA is assigned to the extra-regional FVA measure. Both the intra-regional and the extra-regional FVA measure will be normalised by country *c*'s gross exports.[22] Certainly, also in this case the manufacturing-specific measures will be used. The intra-regional VC participation will also be referred to as RVCs, while the extra-regional VC participation is synonymous to GVCs.[23]

---

21 For the definition of the regions see Appendix.

22 This implies that the intra and extra FVA intensities add up to the total FVA intensity, i.e. ($FVA^{intra}/exports^{total}$) + $FVA^{extra}/exports^{total}$) = FVA^{total}/exports^{total}. Note that by dividing the regional FVA components by overall gross exports the regional FVA measures become a mixed measure that captures both the value chain participation intensity (as does the overall *FVA* measure) and a measure for trade orientation. The latter is due to the fact that in case countries trade predominantly intra-regionally, the FVA^{intra} measure will be higher than the FVA^{extra} measure even if the FVA intensity of the two were the same.

23 This differentiation between RVCs and GVCs by the regional scope of joint production is also the reason why the overall indicators are referred to simply as VC measures or international VC measures instead of GVCs.

In the case of the forward production integration (*VS1)*, the extra-regional component of the *VS1* measure contains all domestic value added of the exporting economy *c* that is exported to extra-regional partner countries which in turn sell this value added on to other destinations, and likewise for the intra-regional component. As in the case of the FVA measure, the extra-regional and intra-regional VS1 measures are normalised by country *c*'s exports to all partners. Moreover, the confinement to the manufacturing sector holds as before. That is, only value added originating from country *c* that is exported via its manufacturing industries and subsequently embodied in partner countries' exports is included.

The regression equation then takes the form:

(3) $$\Delta sh_{c,t}^{mf} = \alpha + \beta_1 \cdot VC\_IR_{c,t-1}^{mf} + \beta_2 \cdot VC\_ER_{c,t-1}^{mf} + X_{c,t} \cdot \varphi + \delta_t + \mu_c + \varepsilon_{c,t}$$

where $VC\_IR_{c,t-1}^{mf}$ and $VC\_ER_{c,t-1}^{mf}$ are the manufacturing-specific intra-regional and extra-regional VC integration measures of country *c* at time *t-1*, respectively.

Finally, the basic model in Equation (1) is also extended in another respect by taking into account the impact of the product quality of exports involved in international VC trade. The proxy for the product quality involved in VC trade is represented by the unit value ratios (UVRs) for parts and components as classified in the Broad Economic Categories (BEC). As mentioned in the descriptive analysis, UVRs capture the product quality dimension of value chains. The hypothesis is that countries which specialise predominantly in the upper quality range of goods (and therefore have high UVRs) will benefit more from international production integration. This is because quality upgrading is a possibility for countries to evade losing value added activities due to a lack of price competitiveness. If that is the case, countries with higher UVRs should also benefit to a greater extent from internationally-organised production. This leads to the expectation of a positive coefficient for the interaction term between the respective value chain measure and the UVRs to be included in the augmented model:

(4) $$\Delta sh_{c,t}^{mf} = \alpha + \beta_1 \cdot VC_{c,t-1}^{mf} + \omega_1 \cdot \left(VC_{i,t-1}^{mf} \times UVR_{i,t-1}^{P\&C}\right) + \beta_2 \cdot UVR_{i,t-1}^{P\&C} + X_{c,t} \cdot \varphi + \delta_t + \mu_c + \varepsilon_{c,t}$$

where $UVR_{i,t-1}^{P\&C}$ refers to the unit value ratios of parts and components exported by country *c* at period *t-1*, i.e. at the beginning of period *t*.

4.2. RESULTS FOR MANUFACTURING-SPECIFIC STRUCTURAL CHANGE

The estimation results for the base model in Equation (1) are summarised in Table 2. Focusing first on the comprehensive measure for integration in value chains (GVC) and the manufacturing sector as commonly defined (Specification 1a), a positive global effect of value chain integration on manufacturing-specific structural change is found. The size of the coefficient, which is only significant at the 10% level though, suggests that a 1 percentage point increase in the VC participation rate would be associated with an increase in the share of manufacturing by 0.1 percentage points. While a modest effect, it is plausible that the global effect of international VC integration is relatively small given that any increase in global manufacturing production must also meet an increased global demand. A slight increase in global demand for manufacturing output seems plausible to the extent that the potential productivity effects of VC integration should result in lower prices and the price elasticity of manufactures is sufficiently large.

Qualitatively, the results are similar for the individual backward (*FVA*) and forward (*VS1*) production integration measures. However, the coefficients are imprecisely estimated. This constellation of coefficients across the three production integration measures might indicate either that the variation in the comprehensive VC measures is larger, leading to more significant estimates. Alternatively, it could signal that, in order to benefit from production integration, on average, countries need to be involved in both forward and backward production integration.

Turning to the alternative manufacturing aggregates, namely the advanced manufacturing industries only and the manufacturing cum business services sector, the results are qualitatively similar. In both cases a positive and mildly statistically significant coefficient of the comprehensive VC participation rate (Specifications 1a' and 1a'') is found.

In contrast, for the coefficients of the individual production integration measures, while still being positive, no statistically significant estimates are obtained.

It is worth mentioning that by and large the control variables all come out with the expected sign. This is particularly true for the initial share of manufacturing which turns out to be an important determinant of future changes in the manufacturing share: in countries with initially larger manufacturing shares, the sector's decline was more pronounced which supports the manufacturing convergence hypothesis. In contrast, the initial GDP per capita does turn out to be statistically significant, as predicted by Chenery and Syrquin (1975). The reason could be that in increasingly open economies domestic demand conditions have become less important. Moreover, according to Baumol's hypothesis, economies shift increasingly towards services as income grows which implies a negative relationship between GDP per capita and the value added share of manufacturing. Finally, a higher real exchange rate is expected to hamper the development of the manufacturing sector (or tradables sector in general) which is in line with the negative coefficient found in the regression (though it is only statistically significant in specifications for the manufacturing sector as commonly defined).

Given the regional focus of this analysis there is an interest in estimating the structural impacts of VC participation individually for the countries of the South and South East Asian region. To this end, two approaches are followed. Firstly, the base model in Equation (1) is estimated for a reduced sample confined to the 14 countries of the region. Secondly, using the full sample, the respective VC integration measure is interacted with the country-specific dummies. Both sets of results are reported in Table 3.The results of the former approach (Specifications 1a-1c in Table 3) yield few new insights. The estimates are qualitatively identical and quantitatively similar to those for the full sample in Table 2. Due to the reduced sample size and the limited number of observations, the coefficients of value chain participation rate are not statistically significant. Still, one may deduce from this result that the effect of VC participation on manufacturing structural change for the larger South and South East Asian region is similar to the global effects. Note, however, that this result is to some extent at odds with the existing and emerging literature that stresses the more than proportionate advantages that VCs have brought about for Asian countries (see e.g. Kiyota et al., 2016). The seeming contradiction is at least partly resolved if one takes into account that South East Asia was one of the regions where regional and global VC trade intensified most strongly. Hence, even if the marginal effect of VC intensities on manufacturing-specific structural change are similar across regions, those regions with strongly growing international VC trade should benefit the most.

Table 2 / VC integration and manufacturing-specific structural change, 1995-2010

Dependent variable:	Δsh_manuf			Δsh_manuf			Δsh_manuf		
Aggregate:	manufacturing (commonly defined)			advanced manufacturing			manufacturing and business services		
VC measure	a. VC part	b. FVA	c. VS1	a. VC part	b. FVA	c. VS1	a. VC part	b. FVA	c. VS1
sample:	full	full	full	full	full	full	full	full	full
	(1a)	(1b)	(1c)	(1a')	(1b')	(1c')	(1a'')	(1b'')	(1c'')
VC measure	0.1011*	0.0509	0.0877	0.0586*	0.0321	0.0160	0.1004**	0.0509	0.0575
	(0.0528)	(0.0402)	(0.1163)	(0.0328)	(0.0298)	(0.0625)	(0.0455)	(0.0342)	(0.0705)
sh manuf^{initial}	-0.8199***	-0.7760***	-0.7422***	-0.9423***	-0.9254***	-0.9372***	-1.0571***	-1.0247***	-0.9722***
	(0.1043)	(0.0990)	(0.0908)	(0.1453)	(0.1473)	(0.1466)	(0.0943)	(0.0930)	(0.0870)
GDP per capita^{initial}	0.0023	0.0018	0.0037	0.0067	0.0058	0.0072	0.0358**	0.0327*	0.0346**
	(0.0180)	(0.0177)	(0.0175)	(0.0125)	(0.0128)	(0.0127)	(0.0169)	(0.0166)	(0.0173)
Δreal FX	-0.0003**	-0.0003**	-0.0003**	-0.0001	-0.0001	-0.0001	-0.0002	-0.0002	-0.0002
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Obs.	183	183	183	183	183	183	183	183	183
R-sq.	0.6965	0.6903	0.6883	0.6601	0.6555	0.6515	0.7113	0.7044	0.7019
R-sq. - adj.	0.524	0.514	0.511	0.467	0.460	0.453	0.547	0.536	0.532
F-test	6.199	7.474	9.605	16.66	8.728	5.214	7.100	7.565	12.70

Note: Δsh_mf=5-year change in the manufacturing share. All specifications include country and time fixed effects. ***,** and * indicate statistical significance at the 1%, 5% and 10% level, respectively. Robust standard errors are in parentheses.

Table 3 / VC integration and manufacturing-specific structural change (individual effects for countries), 1995-2010

Dependent variable:						
Aggregate:						
VC measure						
sample:	**SEA only**	**full**	**SEA only**	**full**	**SEA only**	**full**
	(1a)	**(2a)**	**(1b)**	**(2b)**	**(1c)**	**(2c)**
VC measure	0.0991	0.1275	0.0467	0.1029	0.1313	-0.0236
	(0.0839)	(0.0799)	(0.0757)	(0.0644)	(0.2342)	(0.1884)
country specific GVC effects						
VC x jpn		0.0844		0.4220**		0.1806
		(0.1171)		(0.2055)		(0.2539)
VC x hkg		-0.1149		-0.0519		-0.1544
		(0.1797)		(0.1063)		(0.1917)
VC x sgp		0.5876***		0.1182		-0.2516
		(0.1798)		(0.1473)		(0.2668)
VC x twn		0.4895**		-3.4827***		0.4686*
		(0.2454)		(1.0234)		(0.2476)
VC x kor		0.2581**		0.5250*		0.6974***
		(0.1189)		(0.2852)		(0.2177)
VC x tha		0.5393***		0.7263***		2.0022**
		(0.1323)		(0.1498)		(0.7926)
VC x mys		-0.2251**		-0.2255**		1.4554***
		(0.1089)		(0.1001)		(0.5291)
VC x idn		0.1818*		0.5275		0.2597
		(0.1061)		(0.3498)		(0.2070)
VC x phl		0.0637		-0.4981**		0.2005
		(0.4228)		(0.2020)		(0.2230)
VC x vnm		0.1913		0.1991		2.2445*
		(0.1462)		(0.1586)		(1.1875)
VC x khm		-0.0798		-0.0700		0.0084
		(0.1012)		(0.0916)		(0.7752)
VC x chn		-0.8551		-1.0015**		1.9190***
		(0.9658)		(0.5011)		(0.6773)
VC x brn		0.0604		0.0454		0.5947**
		(0.1177)		(0.1361)		(0.2968)
VC x ind		-0.0351		-0.0252		0.4370**
		(0.0884)		(0.0945)		(0.2154)
sh manuf^{initial}	-1.1161***	-0.8268***	-1.0218***	-0.8013***	-0.8554***	-0.7684***
	(0.2390)	(0.1426)	(0.2349)	(0.1509)	(0.1463)	(0.1399)
GDP per capita^{initial}	0.0415	0.0007	0.0365	-0.0073	0.0356	-0.0063
	(0.0245)	(0.0223)	(0.0227)	(0.0221)	(0.0208)	(0.0222)
Δreal FX	-0.0000	-0.0004**	-0.0001	-0.0004***	-0.0001	-0.0004**
	(0.0004)	(0.0002)	(0.0004)	(0.0002)	(0.0004)	(0.0002)
Constant	-0.1340	0.1755	-0.0873	0.2335	-0.0933	0.2010
	(0.1679)	(0.2081)	(0.1501)	(0.2082)	(0.1428)	(0.2046)
Obs.	42	183	42	183	42	183
R-sq.	0.8445	0.7396	0.8379	0.7409	0.8382	0.7312
R-sq. - adj.	0.710	0.535	0.698	0.538	0.698	0.520
F-test	11.27	55.09	14.66	47.05	30.22	350.0

Note: Δsh_mf=5-year change in the manufacturing share. All specifications include country and time fixed effects. Specifications including interaction terms are estimated using centred values (with zero mean) of the variables forming the interaction terms. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses.

To capture any potential heterogeneity in the relationship between VC integration and changes in the manufacturing share, Specifications 2a-c include interaction terms between the VC integration measure and the countries in the region of interest as suggested in Equation (2). Focusing first on the comprehensive VC integration measure (Specification 2a), the additional flexibility suggests that for 4 out of the 13 South East Asian economies positive country-specific VC effects on manufacturing structural change exist. These are mainly higher-income economies, i.e. Singapore, Taiwan and Korea, as well as Thailand, a middle-income economy. There are also two surprising findings. Firstly, a negative effect of comprehensive VC participation on manufacturing-related structural change is found for Malaysia. In fact Malaysia's value added share in manufacturing only declined slightly between 1995 and 2010, from 25.3% to 24.9%, with an interim high in the year 2010. Its GVC participation rate is comparatively high (44% in 2010) but has declined steadily since 2000. One potential explanation, though somewhat speculative, is that Malaysia is not ideally positioned in global value chains given its capabilities. The second surprising result is that – according to the country-specific estimates – China should not have gained from the intensification of VC integration in terms of manufacturing structural change. If anything, the structural effect of comprehensive VC participation is negative. This is a surprising result for which it is difficult to find an explanation.

Importantly, the country-specific coefficients of production integration are not consistent across the three VC integration measures. In the case of backward production integration (*FVA*, Specification 2b), for example, the Japanese economy is found to have benefited from increasingly sourcing inputs from abroad. In contrast, for Taiwan the growing backward production integration is suggested to be associated with a decline in the manufacturing share. The same is true for the Philippines and China. In the latter case, the effect is even considerable. In contrast, China, along with a number of other low-to-medium-income countries (Thailand, Malaysia, Vietnam and India), received a positive impetus on the manufacturing share due to forward production integration (*VS1*, Specification 2c). The only countries to report consistently positive effects from production integration on manufacturing structural change throughout the three measures are Korea and Thailand.

Overall, the country-specific results for the South and South East Asian region suggest that the experiences of the region with growing VC integration with respect to manufacturing structural change are not too different from the rest of the world. Stronger than average effects could only be detected for a limited number of countries. One such example is Korea, for which this effect is also obtained consistently across the comprehensive, the backward and the forward production integration measures.

An alternative and interesting differentiation with regards to value chain participation is between regional value chains (RVCs) and global value chains (GVCs). Reflecting the model in Equation (3), Table 4 reports the effects of integration in intra-regional VCs (or RVC) and extra-regional VCs (or GVC) on the changes in the value added share of manufacturing. According to the results, the positive structural effects with regards to the manufacturing share come about uniquely through the GVC (i.e. the extra-regional) component of international VC participation. This inference can at least be drawn for the comprehensive VC measure (Specification 3a). In contrast, for the individual backward (Specification 3b) and forward (Specification 3c) production integration indicators, the RVC and the GVC indicators are estimated very imprecisely mirroring the result for the overall VC measures in Equation (1). This pattern is confirmed for the enlarged manufacturing sector that includes business services but not for the advanced manufacturing industries (see Appendix).

How can this result be interpreted, given that value chain trade is taking place mainly regionally, in a factory in Asia, a factory in Europe and a factory in North America (cf. Baldwin and Gonzalez, 2013)? One explanation could be that for quite a few countries in the sample, extra-regional VC trade is undertaken with relatively more high-income countries than is the case for intra-regional trade (an exception may be the EU-15 and NAFTA). Therefore technological spillovers could be higher in the context of extra-regional VCs, leading to a positive impact on manufacturing-specific structural change. Another explanation is that during the sample period, RVCs were already well established while the linking of RVCs into GVCs was only evolving.[24]

Table 4 / Global and regional VC integration and manufacturing-specific structural change, 1995-2010

Dependent variable:	**Δsh_manuf**		
Aggregate:	**manufacturing (commonly defined)**		
VC measure	**a. VC participation**	**b. FVA**	**c. VS1**
sample:	**full**	**full**	**full**
	(3a)	**(3b)**	**(3c)**
GVC measure - intra-regional	0.0565	0.0083	0.4084
	(0.0575)	(0.0538)	(0.3598)
GVC measure - extra-regional	0.1613**	0.0979	-0.0079
	(0.0751)	(0.0683)	(0.1991)
sh manuf^{initial}	-0.8021***	-0.7573***	-0.7501***
	(0.1070)	(0.1049)	(0.0912)
GDP per capita^{initial}	0.0060	0.0045	0.0029
	(0.0180)	(0.0174)	(0.0170)
Δreal FX	-0.0003**	-0.0003**	-0.0003**
	(0.0001)	(0.0001)	(0.0001)
Constant	0.0742	0.0955	0.1146
	(0.1646)	(0.1593)	(0.1570)
Obs.	183	183	183
R-sq.	0.7	0.693	0.691
R-sq. - adj.	0.525	0.514	0.511
F-test	8.032	9.070	9.705

Note: Δsh_mf=5-year change in the manufacturing share. All specifications include country and time fixed effects. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses. Regressions exclude India and South Africa as they are the sole countries in the wider region for which data are available. For the definitions of the regions see Appendix.

A final dimension of countries' value chain participation to be investigated is the quality of exports involved. To capture this aspect, the basic model is extended to include the unit value ratios, which are an indicator for the relative quality of a good exported by a country relative to that of the same good exported by other countries (see Equation 4). The estimation results of this UVR-augmented model are presented in Table 5.

First of all, it is reassuring that the main effect of the GVC measure remains largely unaffected by the inclusion of the UVR measure. This means that at least for the comprehensive VC measure (Specification 4a) a positive and statistically significant relationship between production integration and manufacturing-specific structural change is suggested. Since centred variables are used in the regression, the magnitude of the coefficient refers to the expected effect for a country with average values of the respective VC measure and the UVR measure. Second, the UVR measure itself has little influence on subsequent increases or decreases of the manufacturing share (i.e. the main effect of *UVR* is not statistically significant). Third, and most importantly, the interaction term between the VC measure and the UVR measure seems to affect the relationship between integration in international VCs and manufacturing-specific structural change. In the case of the comprehensive VC measure, the coefficient of this interaction term is positive, suggesting that countries with higher UVRs benefit relatively more

[24] A limiting factor of this analysis is that for several countries, the country coverage of regional partners is poor (e.g. Middle East and North Africa or Central and South America).

from production integration than countries exporting products in comparatively lower quality segments (as suggested by the *UVRs*).

Table 5 / VC integration, quality of exports and manufacturing-specific structural change, 1995-2010

Dependent variable:	**Δsh_manuf**		
Aggregate:	**manufacturing (commonly defined)**		
VC measure	**a. VC part**	**b. FVA**	**c. VS1**
sample:	**full**	**full**	**full**
	(4a)	**(4b)**	**(4c)**
VC measure	0.0985**	0.0486	0.0324
	(0.0447)	(0.0315)	(0.1117)
VC measure x UVR	0.1041**	0.1245***	-0.5907***
	(0.0519)	(0.0386)	(0.1935)
$UVR^{initial}$	0.0015	0.0000	-0.0091
	(0.0073)	(0.0070)	(0.0073)
sh $manuf^{initial}$	-0.8539***	-0.8251***	-0.7904***
	(0.1044)	(0.0992)	(0.0891)
GDP per $capita^{initial}$	0.0047	0.0058	0.0084
	(0.0199)	(0.0193)	(0.0179)
Δreal FX	-0.0003**	-0.0003*	-0.0003*
	(0.0001)	(0.0001)	(0.0002)
Constant	0.1369	0.1088	0.0747
	(0.1824)	(0.1760)	(0.1613)
Obs.	180	180	180
R-sq.	0.7063	0.7075	0.7125
R-sq. - adj.	0.531	0.533	0.541
F-test	6.890	10.52	13.60

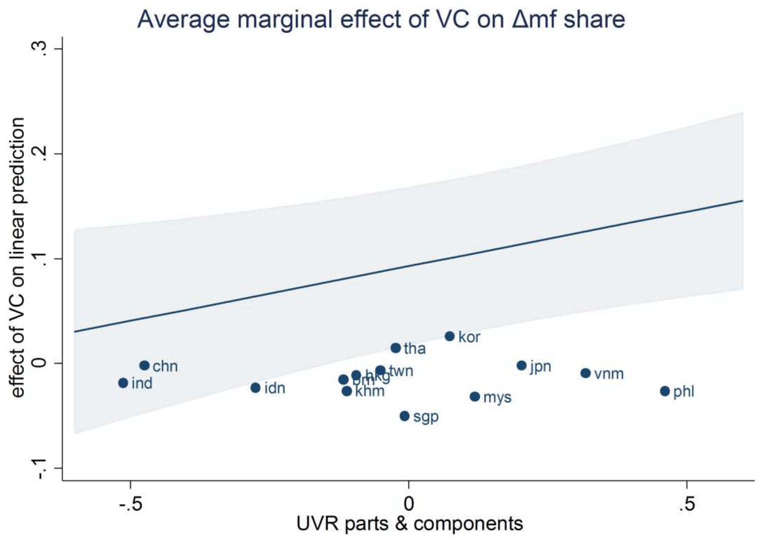
Note: Δsh_mf=5-year change in the manufacturing share. All specifications include country and time fixed effects. Specifications including interaction terms are estimated using centred values (with zero mean) of the variables forming the interaction terms. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses.

This relationship is visualised in Figure 8, which depicts the marginal effect of production integrated as measured by the comprehensive VC indicator on the change in the share of manufacturing (i.e. Specification 4a in Table 5). As suggested by the interaction term, the effect of comprehensive VC integration increases with the level of the initial UVR. Figure 8 also depicts the South and South East Asian economies' UVRs in 2005 (on the horizontal axis) along with their change in the manufacturing share between 2005 and 2010 (on the vertical axis). Given the UVR values, our results suggest that in the period 2005-2010, Japan, Vietnam and the Philippines benefited most from growing integration in production networks. In contrast, the gains, in terms of manufacturing-specific structural change, were more limited for India and China in that period. In fact, taking into account the range of the 90% confidence interval, the positive effects for those two countries as well as for Indonesia would not be statistically significantly different from zero.

The results are qualitatively similar for the backward production integration measure, FVA (Specification 4b in Table 5 and Figure 9).

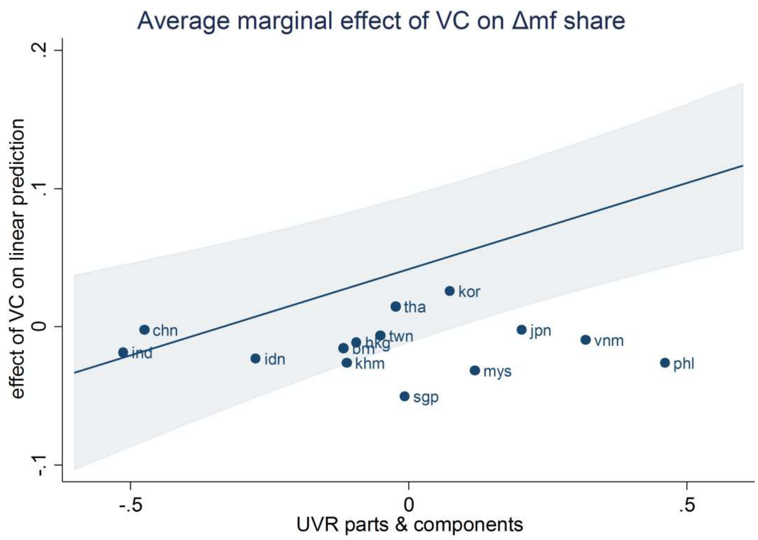
Very different results, however, are obtained for the forward production integration measure, VS1 (Specification 4c in Table 5). In the case of forward production integration, countries with higher UVRs tend to benefit less with regards to manufacturing structural change when production integration intensifies. The outcome for specific countries is visualised in Figure 10, showing again the countries' positions for the period 2005-2010 with respect to initial UVRs (horizontal axis) and the change in the manufacturing share (vertical axis). As can be seen, India and China are suggested to be the main beneficiaries from increasing forward production integration. Note also that the estimates are less precise in this case, suggesting that statistically significant estimates are only obtained for China, India and Indonesia for the period 2005-2010.

Figure 8 / Average marginal effect of VC on the change in the marginal share (countries' positions in 2010)



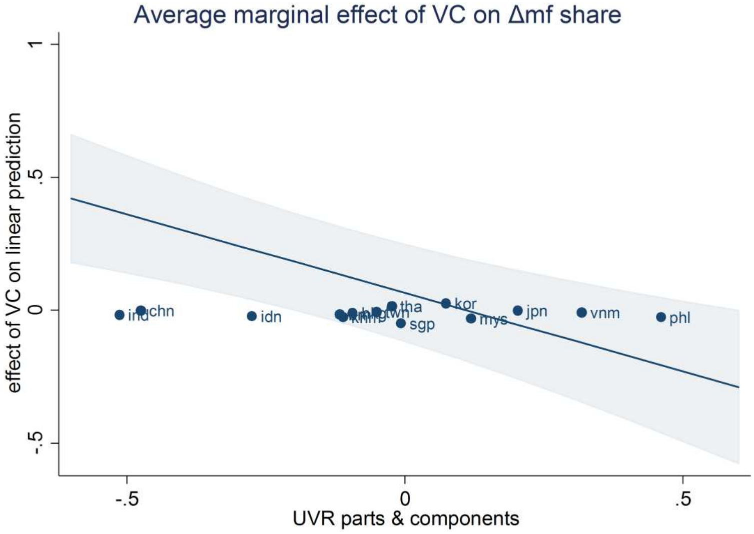
Note: The estimated line refers to the marginal effect of the VC measure on the change in the manufacturing share from the regression model in Equation (4). The grey area is the 90% confidence interval. The country labels indicate the 5-year change in the manufacturing share between 2005 and 2010 (vertical axis) and the UVR level in 2005 (horizontal axis).

Figure 9 / Average marginal effect of FVA on the change in the marginal share (countries' positions in 2010)



Note: The estimated line refers to the marginal effect of the VC measure on the change in the manufacturing share from the regression model in Equation (4). The grey area is the 90% confidence interval. The country labels indicate the 5-year change in the manufacturing share between 2005 and 2010 (vertical axis) and the UVR level in 2005 (horizontal axis).

Figure 10 / Average marginal effect of VS1 on the change in the marginal share (countries' positions in 2010)



Note: The estimated line refers to the marginal effect of the VC measure on the change in the manufacturing share from the regression model in Equation (4). The grey area is the 90% confidence interval. The country labels indicate the 5-year change in the manufacturing share between 2005 and 2010 (vertical axis) and the UVR level in 2005 (horizontal axis).

The overall outcome of the model that takes the quality level of exports of parts and components into account is that countries operating in the higher-quality segment tend to benefit more strongly from backward production integration in terms of manufacturing-specific structural change, whereas countries specialised in the production and export of goods in the lower-quality segment gain comparatively more from backward production integration. The result for the comprehensive VC measure would suggest larger benefits from production integration for the countries in the upper quality segment. How can these opposing results be interpreted? One possible interpretation is that backward production integration is strengthening the manufacturing sector's development for countries producing and exporting high-quality goods only because only these countries can benefit from efficiency gains associated with offshoring. Producing high quality implies high capabilities in an economy, which is why high-income countries tend to have higher UVRs. In such circumstances, moving value added activities abroad – which is by definition implied by backward production integration – frees domestic resources that can be shifted to other, higher value added activities in the manufacturing sector and at the same time benefit from cheaper inputs which can be sourced from low-wage economies. Low-income economies, in contrast, lack this flexibility and therefore shifting value added activities abroad may also reduce manufacturing activities and, as a consequence, the relative size of the manufacturing sector. Forward production integration, in contrast, captures domestic value added. In this context, countries producing lower quality benefit more than proportionally from integration in international value chains as it allows them to sell domestic value added on international markets. That would imply that the emergence of regional and global VCs particularly helped low-quality producers to get involved in international trade, potentially because it is easier to obtain the necessary capabilities to produce some specific inputs necessary in the production of a manufacturing good than to cover the entire spectrum of capabilities to produce an entire manufacturing good.

As discussed in the model with country-specific effects from VC integration, the fact that the results using the comprehensive VC measures come out more robust may again suggest that it requires both forward and backward production integration to reap the full benefits of participating in international value chains. The results of the UVR-augmented model just discussed may also be linked to the model with country-specific VC effects from above due to the fact that UVRs are positively correlated with per capita income levels. In the above model, it was argued that it is mainly high-income countries that benefit from comprehensive and backward production integration, while positive effects were found for forward production integration for lower-income countries, including China and India. While there is quite some variation in the precise countries for which significant effects of VC integration on manufacturing-specific structural change were found, this pattern is also discernible in the UVR-augmented model. Hence, one conclusion to be drawn is that forward production integration matters most for countries at a lower income level, whereas higher-income countries may also benefit from backward production integration, and for these, there are also potentially larger advantages from the combined involvement in backward and forward production integration.

4.3. ROBUSTNESS CHECK: ALTERNATIVE INDICATORS

This section repeats the analysis for the relationship between changes in the manufacturing share and countries' integration in VCs using alternative indicators. These indicators are also backward and forward production integration measures, as well as a comprehensive measure combining the two. The distinguishing feature of these alternative indicators suggested in Wang et al. (2016) is that the elements of the forward and backward indicators result from a decomposition of a country's value added and final goods production respectively instead of the country's gross exports. These decompositions, like those for the conventional indicators, can be done at the reporter-industry-partner level.

Considering first the forward production integration measure (*VC_part_f*)[25], it is derived from the decomposition of the value added of reporting country *s*. Hence, it includes the value added of country *s* that is *(i)* exported in the form of intermediates to a partner country *r* and consequently processed and absorbed there, *(ii)* exported in the form of intermediates to a partner country *r* and then sold further to a third country, and *(iii)* exported to country *r* and then returns home to country *s*. The first part is referred to as shallow cross-country production sharing because goods (or services) are crossing borders only once in this case. The two other parts are referred to as deep cross-country production sharing because goods (or services) are crossing borders at least twice. The first element is also new in the sense that it has no counterpart in the conventional forward production integration measure (*VS1*) used in Section 4.2. Hence, intuitively the *VC_part_f* measure is the 'domestic value added that relates to production activities outside the source country' (Wang et al., 2016, p. 7). As such it is the reporting country *s*' value added contribution to internationally-organised production. As in the case of the conventional indicators, the *VC_part_f* is expressed as an intensity by dividing it by the value added of country *s*.

The corresponding backward production integration measure *VC_part_b* is derived from the decomposition of the total final goods production of country *s*. The relevant elements in this decomposition are *(i)* the value added of foreign partner countries that is embodied in intermediate imports of country *s* and further processed in country *s* to produce final goods for domestic consumption, *(ii)* the domestic value added (previously exported) that is embodied in intermediate imports of country *s* and used for the production of final goods (which may be either re-exported or domestically consumed) and *(iii)* the value added of foreign partner countries that is embodied in intermediate imports of country *s* and used to produce final goods for export. The first element is considered to be a shallow form of international production as goods (or services) cross borders only once, while the two other elements

---

25 Wang et al. (2016) refer to the indicator as *GVC_part_f*. In order to avoid confusion it is labelled as VC_part_f here because the abbreviation GVC is used to refer to global value chains in the sense of extra-regional value chains (as opposed to intra-regional value chains, RVCs). The same applies to the backward production indicator.

constitute a deep form of internationally-organised production. Intuitively, *VC_part_b* represents the extent to which final goods production of country *s* is organised internationally. To arrive at an intensity measure, the *VC_part_b* is divided by the production of final goods of country *s*.

Finally, a comprehensive VC participation measure is derived by adding up the *VC_part_f* and the *VC_part_b* measures. This combined measure is labelled *VC_part_b+f*.

The results from the base model in Equation (1) using these alternative indicators are shown in Table 6. Importantly, the positive effect of comprehensive VC participation (*VC_part_b+f*) (Specification I.a) on manufacturing-specific structural change is confirmed with the alternative indicators.

For the version with alternative indicators, the estimated coefficient of the comprehensive VC measure is smaller in magnitude than for the conventional measures. This holds true throughout the three manufacturing aggregates (e.g. 0.07 for the alternative versus 0.10 for the conventional comprehensive VC measure in the case of manufacturing as commonly defined). In contrast, for the forward participation indicator, the alternative indicators deliver slightly larger coefficients and they are also statistically significant (Specification I.c). For the backward production indicator, the results are qualitatively and quantitatively very similar in both sets of results.

A first difference emerges when the base model is estimated for economies of the South and South East Asian region only (Table 7). In contrast to the estimation results derived from using the conventional VC measures, in the case of the alternative measures, statistically significant coefficients for the countries of the region are obtained for the comprehensive VC measure (Specification I.a) and the forward VC participation measure (Specification I.c). This is despite the rather low number of observations. Moreover, when the analysis is confined to the South and South East Asian countries, the coefficients of the VC measures are larger in the base model than those of the full sample results (cf. Specification I.a in Table 7 vs. Specification I.a in Table 6). This would suggest that the structural effects for the manufacturing sector were, on average, larger for the South and South East Asian region than for the world as a whole.

Turning to the regression model in Equation (2), the general pattern of the coefficients for the interaction terms which indicate the country-specific effects is very similar. For the comprehensive VC measure (Specification I.a in Table 7) the list of countries that benefit more than the average country from VC integration is exactly the same (Singapore, Taiwan, Korea and Thailand) as is the negative manufacturing-specific structural effect found for Malaysia. The only important difference is that, when using the alternative indictors, the surprisingly negative effect for China's integration in VCs disappears. With the alternative measures, the structural effect for VC integration even becomes positive and statistically significant.[26] The same is true for the result for the backward production indicator – not only in the case of China but also for Taiwan (Specification II.b). For the forward production indicator (Specification II.c) the results are – at least qualitatively – very similar.

[26] The most likely explanation for this difference is that the alternative measures normalise by value added while the conventional indicators are normalised by a gross export measure which contains value added from other sectors. The way the conventional measure was defined, it is normalised by value added generated in the entire economy embodied in manufacturing exports. Using the standard foreign value added in exports (FVAiE) measure (which contains some double counting but can be readily calculated at a bilateral industry level) and defining the normalising export vector as the value added originating from the manufacturing sector (of the backward partner) embodied in the reporting country's overall exports, one arrives at a value added-based measure for the export vector that is related to manufacturing value added. Using the FVAiE as a backward production indicator, the coefficient for China turns out to be positive and statistically significant.

Table 6 / VC integration and manufacturing-specific structural change, alternative VC indicators, 1995-2010

Dependent variable:	Δsh_manuf			Δsh_manuf			Δsh_manuf		
Aggregate:	manufacturing (commonly defined)			advanced manufacturing			manufacturing and business services		
VC measure	a. VC_part_b+f	b. VC_Part_b	c. VC_Part_f	a. VC_part_b+f	b. VC_Part_b	c. VC_Part_f	a. VC_part_b+f	b. VC_Part_b	c. VC_Part_f
sample:	full	full	full	full	full	full	full	full	full
	(I.a)	(I.b)	(I.c)	(I.a')	(I.b')	(I.c')	(I.a'')	(I.b'')	(I.c'')
VC measure	0.0676**	0.0496	0.0991**	0.0413***	0.0320	0.0557**	0.0837***	0.0551	0.1326**
	(0.0265)	(0.0387)	(0.0449)	(0.0136)	(0.0292)	(0.0256)	(0.0298)	(0.0376)	(0.0606)
sh manuf^{initial}	-0.7809***	-0.7732***	-0.7353***	-0.9621***	-0.9316***	-0.9720***	-1.0504***	-1.0228***	-0.9857***
	(0.0894)	(0.0993)	(0.0928)	(0.1438)	(0.1464)	(0.1420)	(0.0870)	(0.0937)	(0.0954)
GDP per capita^{initial}	-0.0029	-0.0003	0.0042	0.0064	0.0045	0.0123	0.0246	0.0287	0.0313*
	(0.0172)	(0.0186)	(0.0164)	(0.0129)	(0.0146)	(0.0125)	(0.0169)	(0.0181)	(0.0160)
Δreal FX	-0.0004***	-0.0003**	-0.0004**	-0.0001	-0.0001	-0.0001	-0.0002*	-0.0002	-0.0002*
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	0.1602	0.1435	0.0903	-0.0225	-0.0014	-0.0702	0.0077	-0.0248	-0.0655
	(0.1530)	(0.1690)	(0.1465)	(0.1143)	(0.1287)	(0.1121)	(0.1507)	(0.1633)	(0.1423)
Obs.	180	180	180	180	180	180	180	180	180
R-sq.	0.701	0.690	0.701	0.672	0.658	0.670	0.718	0.705	0.719
R-sq. - adj.	0.530	0.513	0.530	0.486	0.463	0.482	0.558	0.536	0.558
F-test	10.43	8.224	8.991	10.19	9.770	9.258	6.421	7.487	6.210

Note: Δsh_mf=5-year change in the manufacturing share. All specifications include country and time fixed effects. ***,** and * indicate statistical significance at the 1%, 5% and 10% level, respectively. Robust standard errors are in parentheses. Brunei is omitted.

Table 7 / VC integration and manufacturing-specific structural change (individual effects for countries), alternative VC indicators, 1995-2010

Dependent variable:	Δsh_manuf		Δsh_manuf		Δsh_manuf	
Aggregate:	manufacturing (commonly defined)		manufacturing (commonly defined)		manufacturing (commonly defined)	
VC measure	a. VC par_b+f		b. VC par_b		c. VC par_f	
sample:	SEA only	full	SEA only	full	SEA only	full
	(I.a)	(II.a)	(I.b)	(II.b)	(I.c)	(II.c)
VC measure	**0.1135****	**0.0502**	**0.0987**	**0.0313**	**0.1442****	**0.0902**
	(0.0531)	**(0.0304)**	**(0.0881)**	**(0.0488)**	**(0.0668)**	**(0.0611)**
country specific GVC effects						
VC x jpn		0.1015		0.2362*		0.1937
		(0.0623)		(0.1262)		(0.1290)
VC x hkg		-0.0517		0.0126		-0.4807***
		(0.0801)		(0.0945)		(0.1733)
VC x sgp		0.1286*		0.3154***		0.0198
		(0.0688)		(0.0942)		(0.1829)
VC x twn		0.1563*		0.3883*		0.2625*
		(0.0866)		(0.2069)		(0.1401)
VC x kor		0.1807***		0.3849***		0.3520***
		(0.0554)		(0.1278)		(0.1018)
VC x tha		0.2746***		0.5518***		0.4617**
		(0.0697)		(0.1003)		(0.2041)
VC x mys		-0.1153**		-0.1441**		-0.4142*
		(0.0510)		(0.0707)		(0.2156)
VC x idn		0.0840		0.2395		0.0960
		(0.0509)		(0.1522)		(0.0833)
VC x phl		0.0863		0.0915		0.1149
		(0.0532)		(0.1211)		(0.0905)
VC x vnm		0.1174		0.1532		0.5246**
		(0.0728)		(0.1053)		(0.2175)
VC x khm		0.0600		0.0050		-0.2357
		(0.1437)		(0.0880)		(0.1809)
VC x chn		0.1476**		0.2556**		0.4017**
		(0.0639)		(0.0984)		(0.1763)
VC x ind		0.0186		0.0390		0.1221
		(0.0527)		(0.0744)		(0.1444)
sh manuf^{initial}	-1.0159***	-0.8385***	-1.0968***	-0.8041***	-0.7803***	-0.8530***
	(0.1179)	(0.1503)	(0.1878)	(0.1517)	(0.1525)	(0.1532)
GDP per capita^{initial}	0.0254	-0.0118	0.0311	-0.0109	0.0387	-0.0098
	(0.0287)	(0.0222)	(0.0310)	(0.0228)	(0.0245)	(0.0211)
Δreal FX	-0.0002	-0.0004**	-0.0001	-0.0004**	-0.0002	-0.0004**
	(0.0003)	(0.0002)	(0.0004)	(0.0002)	(0.0003)	(0.0002)
Constant	-0.1229	0.2837	-0.1026	0.2560	-0.1527	0.2651
	(0.2575)	(0.2111)	(0.3080)	(0.2146)	(0.1512)	(0.2009)
Obs.	39	180	39	180	39	180
R-sq.	0.869	0.742	0.848	0.739	0.861	0.738
R-sq. - adj.	0.751	0.542	0.712	0.537	0.735	0.536
F-test	18.53	471.7	22.57	1467	12.59	288.2

Note: Δsh_mf=5-year change in the manufacturing share. All specifications include country and time fixed effects. Specifications including interaction terms are estimated using centred values (with zero mean) of the variables forming the interaction terms. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses. Brunei is omitted.

Overall, despite slight differences (with China being an important one though) in the country-specific structural impacts of international VC participation, the main conclusion may still be upheld: high-income countries in the region tend to benefit more from backward production integration (above all Japan) while the middle-income countries tend to benefit relatively more from forward production integration – which involves the export of domestic value added.

A puzzling result emerges when differentiating between RVCs and GVCs. As was shown in Table 4 above, the model in Equation (3) when using the conventional VC indicators suggested that – at least for the comprehensive VC measure – it is the extra-regional VC participation that has a strengthening effect on the change in the manufacturing share. Repeating this exercise with the alternative indicators leads basically to the opposite result: the intra-regional component of production participation is estimated to positively impact on the change in the manufacturing share – for the comprehensive and the forward VC participation measure (Table 8).

Table 8 / Global and regional VC integration and manufacturing-specific structural change, alternative VC indicators, 1995-2010

Dependent variable:	**Δsh_manuf**		
Aggregate:	**manufacturing (commonly defined)**		
VC measure	**a. VC part_b+f**	**b. VC part_b**	**c. VC part_f**
sample:	**full**	**full**	**full**
	(III.a)	**(III.b)**	**(III.c)**
GVC measure - intra-regional	0.1330**	0.0476	0.1263*
	(0.0622)	(0.0646)	(0.0657)
GVC measure - extra-regional	0.0369	0.0516	0.0791
	(0.0325)	(0.0644)	(0.0610)
sh manuf^{initial}	-0.8067***	-0.7724***	-0.7324***
	(0.0924)	(0.1070)	(0.0960)
GDP per capita^{initial}	-0.0056	-0.0002	0.0052
	(0.0172)	(0.0186)	(0.0160)
Δreal FX	-0.0004**	-0.0003**	-0.0004**
	(0.0001)	(0.0001)	(0.0001)
Constant	0.1909	0.1423	0.0818
	(0.1544)	(0.1704)	(0.1431)
Obs.	180	180	180
R-sq.	0.705	0.69	0.702
R-sq. - adj.	0.533	0.509	0.527
F-test	8.699	8.176	7.809

Note: Δsh_mf=5-year change in the manufacturing share. All specifications include country and time fixed effects. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses. Regressions exclude India and South Africa as they are the sole countries in the wider region for which data are available. Brunei is omitted. For the definitions of the regions see Appendix.

This is actually the result that one may have expected given that VC participation has been shown to be predominantly intra-regional in scope (Baldwin and Gonzalez, 2013). A possible – though speculative – explanation for these opposing results could be that the shallow form of production integration, which is captured by the alternative forward VC measure but not by the conventional indicators, is mainly intra-regional and highly relevant for manufacturing-specific structural change. In any case, the opposing results for the two sets of indicators demonstrate the difficulties in clearly disentangling the effects related to RVCs from those related to GVCs.

Finally, Table 9 contains the results for the UVR-augmented version of the model in Equation (4) using the alternative indicators. In this framework the new indicators turn out to work less well, in the sense that the coefficients of the interaction term between VC participation and UVRs of parts and components are estimated very imprecisely.

Table 9 / VC integration, quality of exports and manufacturing-specific structural change, alternative indicators, 1995-2010

Dependent variable:		**Δsh_manuf**	
Aggregate:		**manufacturing (commonly defined)**	
VC measure	**a. VC part_b+f**	**b. VC part_b**	**c. VC part_f**
sample:	**full**	**full**	**full**
	(4a)	**(4b)**	**(4c)**
VC measure	0.0718***	0.0595	0.0965*
	(0.0268)	(0.0374)	(0.0491)
VC measure x UVR	0.0263	0.0827	-0.0969
	(0.0515)	(0.0618)	(0.0837)
$UVR^{initial}$	-0.0003	0.0011	-0.0033
	(0.0096)	(0.0082)	(0.0108)
sh $manuf^{initial}$	-0.8023***	-0.8123***	-0.7311***
	(0.0892)	(0.1005)	(0.0908)
GDP per $capita^{initial}$	-0.0007	0.0029	0.0029
	(0.0194)	(0.0214)	(0.0176)
Δreal FX	-0.0004***	-0.0003**	-0.0004**
	(0.0001)	(0.0001)	(0.0001)
Constant	0.1832	0.1363	0.1307
	(0.1780)	(0.1984)	(0.1602)
Obs.	177	177	177
R-sq.	0.703	0.698	0.704
R-sq. - adj.	0.524	0.516	0.526
F-test	10.870	9.263	8.566

Note: Δsh_mf=5-year change in the manufacturing share. All specifications include country and time fixed effects. Specifications including interaction terms are estimated using centred values (with zero mean) of the variables forming the interaction terms. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses. Brunei is omitted.

While the main effects of the VC measure for the comprehensive (Specification IV.a) and for the forward VC measure (Specification IV.c) continue to be positive and statistically significant, no statistically significant coefficients for the interaction terms between VC integration and product quality (as measured by the UVRs) are obtained. Yet, while not significant at common levels of significance, it is still reassuring that the sign pattern of the coefficients across the three VC measures coincides for the conventional and the alternative measures – that means a positive coefficient of the interaction term in the case of comprehensive and backward production integration, but a negative coefficient for the forward production indicators. Moreover, the specification for the manufacturing sector including business services does, in fact, deliver a positive effect for the interaction term in the case of backward production integration (see Appendix 8, Table A8.6). Taken together, this robustness check provides mild support for the results on VC integration and product quality obtained for the conventional VC measures.

4.4. INDUSTRY-SPECIFIC RESULTS

In this section the relationship between structural change and VC integration is investigated at the industry level for selected industries: the textile and wearing apparel industry, the computer, electronics and optical equipment industry ('electronics industry' for short) and the motor vehicles industry. The industries were chosen based on the fact that VC trade is relatively important in these instances.

The econometric approach is similar to the sector-level analysis, except that the dependent variable is the change in the share of the respective industry's value added in total value added of the manufacturing sector (commonly defined). Of course, in this case the VC integration measures, which are the conventional ones, are also defined at the industry level.

For example, the FVA measure in the case of the electronics industry is the foreign value added (originating from all industries) embodied in the reporting economy's exports by the electronics industry.

As reported in Table 10, no structural impacts of VC integration are detectable at the industry level. Mirroring the outcome for the sector-level analysis, initial conditions play an important role at the industry level as well. In the case of the textile industry, the per capita income also seems to matter to some extent, indicating that higher-income countries tend to specialise less frequently in the production of textiles and wearing apparel. The three VC integration measures, however, do not capture any effect in any of the three industries under investigation.

The same is true if the analysis is restricted to the South and South East Asian region, which is done in Table 11 (Specification 1a). When allowing for country-specific effects of VC integration on the industry share in manufacturing for the economies of the South and South East Asian region, only a few coefficients of the interaction terms turn out to be statistically significant. In the case of the textile and wearing apparel industry and considering the comprehensive VC participation, a statistically significant effect of the VC measure is only obtained for Indonesia and Brunei and it is negative in both cases. More effects can be identified as concerns the motor vehicles industry, though these are positive only in two instances, for Korea and Thailand. In contrast, a negative structural impact of comprehensive VC participation on the change in the industry share is estimated for Malaysia, Thailand and Brunei.[27]

In summary, the industry-level estimations do not provide enough statistically significant results in order to derive any conclusions concerning the structural impact of VC integration at the industry level. This could suggest that for this more disaggregated investigation (compared to the manufacturing sector analysis) the international input-output data and the derived indicators are not precise enough to reveal their structural impacts. Given these inconclusive outcomes, it seems that case studies are a more appropriate and promising way to tackle these questions at the industry level.

---

27 The industry-level results for the backward integration measure (*FVA*) and the forward integration measure (*VS1*) are found in the Appendix.

Table 10 / Industry-specific structural change and VC integration in specific industries, 1995-2010

Dependent variable:	Δindustry share			Δindustry share			Δindustry share		
industry:	Textiles and wearing apparel			Electronics			Motor vehicles		
GVC measure	a. VC	b. FVA	c. VS1	a. VC	b. FVA	c. VS1	a. VC	b. FVA	c. VS1
sample:	full	full	full	full	full	full	full	full	full
	(1a)	(1b)	(1c)	(1a)	(1b)	(1c)	(1a)	(1b)	(1c)
GVC measure	-0.1589	-0.1653	-0.0331	0.0277	0.0097	0.0438	0.0000	0.0047	0.0000
	(0.1308)	(0.1361)	(0.1088)	(0.0411)	(0.0500)	(0.1090)	(0.0000)	(0.0159)	(0.0000)
industry share^{initial}	-0.8612***	-0.8456***	-0.9164***	-1.1070***	-1.1053***	-1.1115***	-0.5695***	-0.5679***	-0.5695***
	(0.1008)	(0.1154)	(0.0763)	(0.2049)	(0.2056)	(0.2035)	(0.1296)	(0.1298)	(0.1296)
GDP per capita^{initial}	-0.1029***	-0.1045***	-0.1078**	0.0244	0.0241	0.0239	0.0136	0.0134	0.0136
	(0.0341)	(0.0352)	(0.0412)	(0.0246)	(0.0246)	(0.0247)	(0.0087)	(0.0088)	(0.0087)
Δreal FX	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	1.0510***	1.0476***	1.0808***	-0.2033	-0.1946	-0.1938	-0.0980	-0.0965	-0.0980
	(0.3157)	(0.3140)	(0.3707)	(0.2199)	(0.2191)	(0.2238)	(0.0785)	(0.0789)	(0.0785)
Obs.	183	183	183	183	183	183	183	183	183
R-sq.	0.773	0.773	0.758	0.721	0.72	0.721	0.595	0.595	0.595
R-sq. - adj.	0.643	0.643	0.620	0.562	0.561	0.562	0.365	0.365	0.365
F-test	14.54	19.93	22.41	6.127	4.772	6.909	4.386	4.408	4.384

Note: Δindustry share =5-year change in the value added share of the respective industry in total manufacturing value added. All specifications include country and time fixed effects. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses.

Table 11 / Industry-specific structural change and VC integration in specific industries (individual effects for countries), 1995-2010

Dependent variable:	**Δindustry share**		**Δindustry share**		**Δindustry share**	
Aggregate:	**Textiles and wearing apparel**		**Electronics**		**Motor vehicles**	
VC measure	**a. VC participation**		**a. VC participation**		**a. VC participation**	
sample:	**SEA only**	**full**	**SEA only**	**full**	**SEA only**	**full**
	(1a)	**(2a)**	**(1a)**	**(2a)**	**(1a)**	**(2a)**
VC measure	**-0.3178**	**0.0457**	**-0.0803**	**0.0192**	**-0.0051**	**0.0000**
	(0.2153)	**(0.0534)**	**(0.1158)**	**(0.0432)**	**(0.0061)**	**(0.0000)**
country specific GVC effects						
VC x jpn		-0.0061		-0.1203**		0.2733
		(0.0749)		(0.0604)		(0.2403)
VC x hkg		-1.2333		0.1446		-0.1800
		(0.9963)		(0.0956)		(0.1820)
VC x sgp		-0.0944		1.4403		0.0165
		(0.2027)		(0.8984)		(0.0164)
VC x twn		0.1431		7.7892***		-0.1593*
		(0.2003)		(1.5557)		(0.0820)
VC x kor		-0.0711		0.1284		0.2114*
		(0.0760)		(0.0890)		(0.1087)
VC x tha		-0.3448		-0.2464		0.7043***
		(0.2701)		(0.1670)		(0.1895)
VC x mys		0.0308		-0.6569		-0.1506**
		(0.0547)		(0.4164)		(0.0661)
VC x idn		-0.3859**		0.8494		0.1628
		(0.1730)		(0.8023)		(0.1637)
VC x phl		-0.0658		0.3709		-0.0662*
		(0.0745)		(0.5536)		(0.0349)
VC x vnm		-0.0337		0.1518		0.0121
		(0.1423)		(0.3100)		(0.0116)
VC x khm		0.1284		0.0032		-0.0044
		(0.4590)		(0.0487)		(0.0033)
VC x chn		-0.1626		0.2859		0.0135
		(0.1756)		(0.2299)		(0.0389)
VC x brn		-1.4705***		-0.0216		-0.1070***
		(0.4651)		(0.1438)		(0.0373)
VC x ind		-0.0183		-0.0472		0.1480
		(0.1981)		(0.0591)		(0.1785)
sh manuf^{initial}	-0.7821***	-1.0290***	-0.4533***	-1.3447***	-1.1097***	-0.5188***
	(0.1949)	(0.2764)	(0.1444)	(0.1880)	(0.1816)	(0.1370)
GDP per capita^{initial}	-0.1909**	-0.0677***	0.0033	0.0144	-0.0043	0.0201*
	(0.0890)	(0.0247)	(0.0347)	(0.0261)	(0.0167)	(0.0111)
Δreal FX	-0.0006	-0.0000	0.0003	0.0000	0.0001	-0.0000
	(0.0005)	(0.0001)	(0.0003)	(0.0001)	(0.0002)	(0.0001)
Constant	1.9762***	0.7401***	0.0426	-0.1025	0.0311	-0.1577
	(0.6548)	(0.2367)	(0.2401)	(0.2349)	(0.1164)	(0.1000)
Obs.	42	183	42	183	42	183
R-sq.	0.830	0.874	0.720	0.806	0.789	0.647
R-sq. - adj.	0.684	0.775	0.477	0.654	0.606	0.370
F-test	6.665	13712	7.384		5.593	1156

Note: Δindustry share =5-year change in the value added share of the respective industry in total manufacturing value added. All specifications include country and time fixed effects. Specifications including interaction terms are estimated using centred values (with zero mean) of the variables forming the interaction terms. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses.

5. Conclusions

The South and South East Asian region has experienced marked structural changes over the past 50 years. Notably, both sub-regions industrialised, though to varying degrees, as evidenced by growing value added shares of the manufacturing sector in the economy. Importantly, in most South East Asian countries, this pronounced shift towards the production of manufactures occurred relatively early. In China, for example, the manufacturing share reached its maximum around 1980 and has been rather constant or even slightly declining since then. By and large, these structural developments follow the predicted pattern, insofar as there is an inverted U-shaped relationship between the manufacturing share and per capita income, and most countries embarked on a catch-up process. In is also true that the declines in the manufacturing share were relatively mild, compared to the global average over the period 1995-2011.

Regarding the intensification of VC integration, two broad groups of countries can be identified. A first group comprising, among others, Japan, Korea, Taiwan, China and Thailand, where comprehensive VC integration continued to increase between 1995 and 2011, and a second group comprising many ASEAN countries (Malaysia, Indonesia, Vietnam and the Philippines) where VC participation seems to have peaked between 2000 and 2005 – albeit in most cases at a very elevated level.

Linking the structural developments regarding the manufacturing sector with the degree of countries' integration in VCs in an econometric model reveals some interesting, though not uniform, results. First of all, the estimation results suggest a small positive effect of VC integration on manufacturing-related structural change at the global level which is robust across different definitions of the manufacturing sector. It is, however, not robust with respect to the VC integration measure. In fact, this positive relationship can only be established for the comprehensive VC participation rate but not for its individual components, i.e. the backward and the forward production integration measures. This finding is generally supported when alternative measures for comprehensive, backward and forward VC participations are used.

The results obtained for the structural change – VC integration nexus or the world as a whole seems to be very similar to those for the sample of South and South East Asian countries, though the number of observations in the latter case is too low to make strong inferences. This result refers to the baseline estimations using the conventional VC indicators. When using the alternative VC measures, a larger effect of the intensity of VC integration for the South and South East Asian region than for the global average is obtained.

Focusing further on this region and the country heterogeneity therein, a few countries emerge that benefit more than proportionately from integration in international VCs in terms of manufacturing-specific structural change (e.g. Korea and Thailand). Also in this case, the country-specific effects vary across the VC measures. China, for example, is suggested to strengthen its manufacturing sector via forward production integration while the opposite is true for backward production integration. For Japan, backward production integration seems to have contributed to a softening of the negative manufacturing-related structural change the country experienced between 1995 and 2010.

Taking into account the product quality dimension within value chains, proxied by unit value ratios (UVRs), does not affect the positive main effect of VC integration of manufacturing-related structural change. However, in the case of the comprehensive VC participation rate, countries specialising in the high-quality segment of exports benefit more strongly from VC integration than countries operating in the low-quality segment. The same is true for the backward production integration measure, while the opposite result is obtained for the forward production integration indicators. Given that high-income countries tend to have higher UVRs, this result can be linked to the country-specific results. That is, both sets of results suggest that countries with comparatively lower income and lower UVRs may benefit predominantly from forward production integration. In contrast, for higher-income countries it is the backward production integration in some instances that supports the growth of the manufacturing share. One interpretation of this finding is that outsourcing of previously domestically undertaken value added activities should not be encouraged in economies which lack the capabilities and flexibility to shift resources quickly to other productive uses. Moreover, it could signal that more domestic content (and hence a lower foreign content and lower backward production integration indicator) might be helpful in strengthening the manufacturing sector for some countries. Likewise, these countries are likely to particularly benefit from forward production integration, which implies the linking into international value chains with domestic value added.

The described pattern for both the country-specific results within the South and South East Asian region as well as the UVR-augmented results is by and large confirmed by the robustness check using the alternative VC indicators. One important difference emerges though which relates to the country-specific results for China. In the specifications with the alternative measures, China is suggested to benefit from all three types of VC participation (comprehensive, backward, forward) in terms of manufacturing-specific structural change. Otherwise the results are very similar as is the pattern of the coefficients across the UVR-augmented specifications, though in this case the variant with the alternative VC measures delivers less precisely estimated results.

The distinction between countries' involvement in regional value chains (RVCs), understood as international production sharing between partner countries within the same region, and in global value chains (GVCs), understood as international production sharing between partners belonging to different geographical regions, suggest that it is basically the latter that matters for manufacturing-specific structural change. This finding could be partly driven by the fact that only the most productive firms within countries engage in extra-regional trade and hence are also more likely to participate in GVCs. At the same time it is at odds with the empirical fact that international value chains are still mainly regional. Therefore, in interpreting this result, it must be taken into account that in the investigation period of this analysis, RVCs were already well established while GVCs were only gaining momentum. Moreover, it should be emphasised that this result is less robust than the other ones in the sense that it is not confirmed by the analysis using the alternative VC indicators. In fact, the specifications using the alternative indicators yield exactly the opposite result: it is the intra-regional VC participation that is estimated to positively affect manufacturing-specific structural change. This highlights the fact that maybe the delineation of global and regional value chains is not trivial and that the way the *intensity* of VC participation is defined seems to matter. Therefore, the relative importance of RVCs and GVCs for changes in the manufacturing share remains largely inconclusive.

Similar analyses were performed at the industry level for the textile and wearing apparel industry, the electronics industry and the motor vehicles industry. However, at this more disaggregated level, the VC indicators could not pick up strong structural effects so that the results are rather inconclusive. Hence, at the level of individual industries, case studies may be a more appropriate approach to analyse the effects of VC integration.

At a more general level, the main policy conclusion to be drawn from the heterogeneous outcomes is that international value chains provide enlarged opportunities for the build-up of manufacturing capacity. At the same time, policy-makers cannot take it for granted that participation in international VCs will automatically bring about economic benefits. Rather, the success not only hinges on the country-specific position within VCs but also within the product quality spectrum. In that respect, 21st century trade is presumably not all that different from classical trade relations and time will tell whether GVCs will help in making the 21st century the Asian century.

6. Literature

ADB – Asian Development Bank (2011), *Asia 2050. Realizing the Asian Century*, Manila, August.

Akamatsu, K. (1962), 'A historical pattern of economic growth in developing countries', *Journal of Developing Economies*, 1(1), pp. 3-25.

Amsden, A. (1989), *Asia's next Giant: South Korea and late Industrialization*, Oxford University Press, New York.

Baldwin, R. (2011), '21st Century Regionalism: Filling the gap between 21st century trade and 20th century trade rules', *CEPR Policy Insight*, No. 56.

Baldwin, R. (2013), 'Global supply chains: why they emerged, why they matter, and where they are going', in: D.K. Elms and P. Low (eds), *Global Value Chains in a Changing World*, WTO Publications, Geneva, pp. 13-59.

Baldwin, R. and J.L. Gonzalez (2013), 'Supply-chain trade: A portrait of global patterns and several testable hypotheses', *NBER Working Paper* 18957.

Baumol, W.J. (1967), 'Macroeconomics of unbalanced growth: the anatomy of urban crisis', *American Economic Review*, 57(3), pp. 415-426.

Brunner, H.-P. (2013), 'Can Global Value Chains Effectively Serve Regional Economic Development in Asia?', *ADB Working Paper Series on Regional Economic Integration*, No. 110, March.

Cattaneo, O., G. Gereffi and C. Staritz (2010), *Global Value Chains in a Postcrisis World. A Development Perspective*, The World Bank, Washington DC.

Chenery, H.B. (1960), 'Patterns of Industrial Growth', *American Economic Review*, 50(4), pp. 624-654.

Chenery, H.B. and M. Syrquin (1975), *Patterns of Development, 1957–1970*, Oxford University Press, London.

Cheng, K., S. Rehman, D. Seneviratne and S. Zhang (2015), 'Reaping the Benefits from Global Value Chains', *IMF Working Paper*, WP/15/204.

Cheng, X. (2013), 'Development of East Asia Regional Production Network and the Status of Participating of China', *International Business and Management*, 7(1), pp. 1-10.

Chesbrough, H. and K. Kusunoki (2001), 'The modularity trap: innovation, technology phase shifts, and the resulting limits of virtual organizations', in: L. Nonaka and D. Teece (eds), *Managing industrial knowledge*, Sage Press, London, pp. 202-230.

De Backer, K., Miroudot, S. (2012) Mapping Global Value Chains, OECD DSTI/INDWPGI(2012)4, Paris.

Feenstra, R.C. and G.H. Hanson (1996), 'Foreign Investment, Outsourcing and Relative Wages,' in: R.C. Feenstra, G.M. Grossman and D.A. Irwin (eds), *The Political Economy of Trade Policy: Papers in Honor of Jagdish Bhagwati*, MIT Press, pp. 89-127.

Feenstra, R.C. and G.H. Hanson (1999), 'The impact of outsourcing and high-technology capital on wages: Estimates for the United States, 1979-1990', *Quarterly Journal of Economics*, 114, pp. 907-941.

Gereffi, G., J. Humphrey and T. Sturgeon (2005), 'The governance of global value chains', *Review of International Political Economy*, 12(1), pp. 78-104.

Grossman, G.M. and E. Rossi-Hansberg (2008), 'Trading Tasks: A Simple Theory of Offshoring', *American Economic Review*, 98(5), pp. 1978-1997.

Haraguchi, N. and G. Rezonja (2011), 'Emerging patterns of manufacturing structural change', *UNIDO Working Paper* 4/2010, Vienna.

Hummels, D., J. Ishii and K.-M. Yi (2001), 'The nature and growth of vertical specialization in world trade', *Journal of International Economics*, 54(1), pp. 75-96.

Johnson, R.C. and G. Noguera (2012), 'Accounting for Intermediates: Production Sharing and Trade in Value Added', *Journal of International Economics*, 86(2), pp. 224-236.

Kaplinsky, R. (2005), *Globalization, Poverty and Inequality,* Polity Press, Cambridge.

Kaplinsky, R. and M. Farooki (2010), 'Global Value Chains, the Crisis, and the Shift of Markets from North to South', in: O. Cattaneo, G. Gereffi and C. Staritz (eds), *Global Value Chains in a Postcrisis World. A Development Perspective*, World Bank, Washington DC, pp. 125-153.

Kasahara, S. (2004), 'The flying geese paradigm: A critical study of its application to East Asian Regional Development', *UNCTAD Discussion Paper* No. 169, April.

Koopman, R., Z. Wang and S.-J. Wei (2014), 'Tracing Value-Added and Double Counting in Gross Exports', *American Economic Review*, 104(2), pp. 459-494.

Kummritz, V. (2016), 'Do Global Value Chains Cause Industrial Development?', *CTEI Working Paper* No. 2016-01, Graduate Institute of International and Development Studies.

Kiyota, K., K. Oikawa and K. Yoshioka (2016), 'Global value chain and the competitiveness of Asian countries', *RIETI Discussion Paper* 16-E-080, Research Institute of Economy, Trade and Industry.

Landesmann, M. and J. Wörz (2006), 'Competitiveness of the CEECs in a Global Context', *wiiw Research Report*, No. 327, The Vienna Institute for International Economic Studies (wiiw).

McMillan, M. and D. Rodrik (2011), 'Globalization, Structural Change and Productivity Growth', in: M. Bachetta and M. Jansen (eds), *Making Globalization Socially Sustainable*, International Labour Organization, Geneva.

OECD (2013), *Interconnected Economies: Benefiting from Global Value Chains*, OECD Publishing.

Ozawa, T. (2005), *Institutions, Industrial Upgrading, and Economic Performance in Japan – The 'Flying-Geese' Paradigm of Catch-up Growth*, Edward Elgar Publishing, Northampton, Massachusetts.

Pietrobelli, C. and R. Rabellotti (2011), 'Global Value Chains Meet Innovation Systems: Are There Learning Opportunities for Developing Countries?', *World Development*, 39(7), pp. 1261-1269.

Rodrik, D. (1995), 'Getting interventions right: how South Korea and Taiwan grew rich', *Economic Policy*, 20, pp. 53-97.

Rodrik, D. (2013), 'Unconditional convergence in manufacturing', *Quarterly Journal of Economics*, 128(1), pp. 165-204.

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

De Saint Vaulry, A. (2008), 'Base de données CHELEM – Commerce international du CEPII', *Document de travail du CEPII* 2008-09.

Stehrer, R. (2012), 'Trade in Value Added and Value Added in Trade', *wiiw Working Paper*, No. 81, The Vienna Institute for International Economic Studies (wiiw), June.

Stehrer, R. (2013), 'Accounting Relations in Bilateral Value Added in Trade', *wiiw Working Paper*, No. 101, The Vienna Institute for International Economic Studies (wiiw), May.

Stöllinger, R. (2016), 'Structural change and global value chains in the EU', *Empirica*, 43, pp. 801-829.

Sturgeon, T. and O. Memedovic (2011), 'Mapping Global Value Chains: Intermediate Goods Trade and Structural Change in the World Economy', *UNIDO Working Paper* 5/2010.

Syrquin, M. (1988), 'Patterns of structural change', in: H.B. Chenery and T.N. Srinivasan (eds), *Handbook of development economics*, North-Holland, Amsterdam, pp. 203-273.

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

Timmer, M.P., B. Los, R. Stehrer and G.J. de Vries (2013), 'Fragmentation, incomes and jobs: An analysis of European competitiveness', *Economic Policy*, 28(76), pp. 613-661.

Timmer, M.P., G.J. de Vries and K. de Vries (2014), 'Patterns of Structural Change in Developing Countries', *GGDC research memorandum* 149.

UNCTAD (2013), *Global Value Chains and Development. Investment and value added trade in the global economy*, UNCTAD/DIAE/2013/1.

Wade, R.H. (1990), *Governing the Market: Economic Theory and the Role of Government in East Asian Industrialization*, Princeton University Press, Princeton, NJ.

Wang, Z., S.-J. Wei and K. Zhu (2013), 'Quantifying International Production Sharing at the Bilateral and Sector Levels', *NBER Working Paper* 19677.

Wang, Z., S.-J. Wei, X. Yu and K. Zhu (2016), 'Characterising Global Value Chains', Mimeo, September.

Whittaker, D.H., T. Zhu, T. Sturgeon, M.H. Tsai and T. Okita (2010), 'Compressed Development', *Studies in Comparative International Development*, 45(4), pp. 439-467.

WTO-IDE JETRO (2011), *Trade patterns and global value chains in East Asia: From trade in goods to trade in tasks*, World Trade Organization and Institute of Development Economies – Japan External Trade Organization, Geneva.

7. Appendix

7.1. LIST OF COUNTRIES IN THE OECD ICIO DATABASE

ARG	Argentina	ITA	Italy
AUS	Australia	JPN	Japan
AUT	Austria	KHM	Cambodia
BEL	Belgium	KOR	Korea
BGR	Bulgaria	LTU	Lithuania
BRA	Brazil	LUX	Luxembourg
BRN	Brunei Darussalam	LVA	Latvia
CAN	Canada	MEX	Mexico
CHE	Switzerland	MLT	Malta
CHL	Chile	MYS	Malaysia
CHN	China	NLD	Netherlands
COL	Colombia	NOR	Norway
CRI	Costa Rica	NZL	New Zealand
CYP	Cyprus	PHL	Philippines
CZE	Czech Republic	POL	Poland
DEU	Germany	PRT	Portugal
DNK	Denmark	ROU	Romania
ESP	Spain	RUS	Russian Federation
EST	Estonia	SAU	Saudi Arabia
FIN	Finland	SGP	Singapore
FRA	France	SVK	Slovak Republic
GBR	United Kingdom	SVN	Slovenia
GRC	Greece	SWE	Sweden
HKG	Hong Kong SAR	THA	Thailand
HRV	Croatia	TUN	Tunisia
HUN	Hungary	TUR	Turkey
IDN	Indonesia	TWN	Chinese Taipei
IND	India	USA	United States
IRL	Ireland	VNM	Viet Nam
ISL	Iceland	ZAF	South Africa
ISR	Israel	RoW	Rest of the world

7.2. LIST OF INDUSTRIES IN THE OECD ICIO DATABASE

C01T05	Agriculture, hunting, forestry and fishing
C10T14	Mining and quarrying
C15T16	Food products, beverages and tobacco
C17T19	Textiles, textile products, leather and footwear GFCF
C20	Wood and products of wood and cork
C21T22	Pulp, paper, paper products, printing and publishing
C23	Coke, refined petroleum products and nuclear fuel
C24	Chemicals and chemical products
C25	Rubber and plastics products
C26	Other non-metallic mineral products
C27	Basic metals
C28	Fabricated metal products
C29	Machinery and equipment, nec
C30T33X	Computer, Electronic and optical equipment
C31	Electrical machinery and apparatus, nec
C34	Motor vehicles, trailers and semi-trailers
C35	Other transport equipment
C36T37	Manufacturing nec; recycling
C40T41	Electricity, gas and water supply
C45	Construction
C50T52	Wholesale and retail trade; repairs
C55	Hotels and restaurants
C60T63	Transport and storage
C64	Post and telecommunications
C65T67	Financial intermediation
C70	Real estate activities
C71	Renting of machinery and equipment
C72	Computer and related activities
C73T74	R&D and other business activities
C75	Public admin. and defence; compulsory social security
C80	Education
C85	Health and social work
C90T93	Other community, social and personal services
C95	Private households with employed persons

7.3. INDUSTRIES COMPRISED IN THE MANUFACTURING AGGREGATES

Manufacturing (common definition)

C15T16	Food products, beverages and tobacco
C17T19	Textiles, textile products, leather and footwear
C20	Wood and products of wood and cork
C21T22	Pulp, paper, paper products, printing and publishing
C23	Coke, refined petroleum products and nuclear fuel
C24	Chemicals and chemical products
C25	Rubber and plastics products
C26	Other non-metallic mineral products
C27	Basic metals
C28	Fabricated metal products
C29	Machinery and equipment, nec
C30T33X	Computer, Electronic and optical equipment
C31	Electrical machinery and apparatus, nec
C34	Motor vehicles, trailers and semi-trailers
C35	Other transport equipment
C36T37	Manufacturing nec; recycling

Advanced manufacturing

C24	Chemicals and chemical products
C29	Machinery and equipment, nec
C30T33X	Computer, Electronic and optical equipment
C31	Electrical machinery and apparatus, nec
C34	Motor vehicles, trailers and semi-trailers
C35	Other transport equipment

Manufacturing cum business services

C15T37	Manufacturing
C72	Computer and related activities
C73T74	R&D and other business activities

7.4. REGIONAL CLASSIFICATION OF COUNTRIES

South and South East Asia
BRN, CHN, HKG, IDN, JPN, KHM, KOR, MYS, PHL, SGP, THA, TWN, VNM, IND

NAFTA
CAN, MEX, USA

Central and South America
ARG, BRA, CHL, COL, CRI

EU-15 and EFTA
AUT, BEL, CHE, DEU, DNK, ESP, FIN, FRA, GBR, GRC, IRL, ISL, ITA, LUX, NLD, NOR, PRT, SWE

Eastern Europe and Central Asia
BGR, CYP, CZE, EST, HRV, HUN, LTU, LVA, POL, ROU, RUS, SVK, SVN, TUR, MLT

Oceania
AUS, NZL

Middle East and North Africa
ISR, MLT, SAU, TUN

Other
ZAF

7.5. ADDITIONAL DESCRIPTIVE DATA ON PARTICIPATION IN VALUE CHAINS

Table A5.1 / Details on GVC participation for South East Asian economies and India, 1995 and 2011

year: 1995	Economy-wide			Manufacturing			Advanced manufacturing			Manufacturing & business services		
	FVA	VS1	VC part.	FVA	VS1	VC part.	FVA	VS1	VC part.	FVA	VS1	VC part.
jpn	4.41%	24.02%	28.44%	5.54%	16.41%	21.96%	5.26%	12.57%	17.83%	5.46%	18.20%	23.66%
hkg	17.58%	15.90%	33.48%	28.36%	7.09%	35.46%	30.44%	7.76%	38.19%	26.43%	9.96%	36.39%
kor	18.00%	17.19%	35.19%	21.95%	11.61%	33.57%	22.33%	10.77%	33.09%	21.66%	12.63%	34.29%
sgp	34.09%	12.54%	46.63%	41.07%	7.78%	48.85%	39.83%	8.16%	48.00%	40.15%	8.79%	48.93%
twn	24.40%	15.99%	40.38%	29.63%	9.93%	39.56%	33.05%	8.50%	41.56%	29.39%	10.37%	39.75%
idn	10.40%	16.28%	26.68%	16.06%	10.29%	26.36%	25.99%	12.35%	38.34%	15.95%	10.74%	26.69%
mys	24.09%	15.77%	39.86%	29.94%	10.74%	40.68%	33.19%	11.77%	44.96%	28.93%	11.12%	40.06%
tha	19.98%	12.10%	32.08%	25.77%	7.77%	33.54%	36.81%	8.74%	45.54%	25.60%	7.95%	33.55%
khm	11.01%	17.98%	28.99%	19.08%	8.18%	27.27%	31.52%	11.19%	42.71%	19.07%	8.65%	27.72%
phl	24.36%	12.83%	37.19%	33.13%	10.50%	43.63%	38.51%	10.63%	49.15%	30.48%	10.77%	41.25%
vnm	17.91%	13.11%	31.02%	26.01%	6.08%	32.09%	38.20%	11.04%	49.23%	25.85%	6.40%	32.25%
chn	28.53%	9.71%	38.24%	41.08%	7.05%	48.13%	51.65%	7.54%	59.19%	40.54%	7.20%	47.75%
brn	6.36%	20.98%	27.34%	17.13%	11.82%	28.95%	21.18%	14.64%	35.82%	14.72%	15.23%	29.95%
ind	8.02%	13.57%	21.60%	10.76%	8.27%	19.03%	11.89%	15.96%	27.84%	10.33%	8.99%	19.32%

year: 2011	Economy-wide			Manufacturing			Advanced manufacturing			Manufacturing & business services		
	FVA	VS1	VC part.	FVA	VS1	VC part.	FVA	VS1	VC part.	FVA	VS1	VC part.
jpn	10.01%	33.12%	43.13%	12.20%	22.14%	34.34%	11.55%	16.40%	27.95%	12.00%	25.41%	37.41%
hkg	15.60%	23.24%	38.83%	32.17%	5.83%	38.00%	32.36%	8.66%	41.02%	25.16%	22.19%	47.35%
kor	29.85%	20.85%	50.70%	33.48%	14.31%	47.79%	29.78%	13.41%	43.19%	32.58%	16.13%	48.71%
sgp	31.06%	20.00%	51.07%	35.38%	13.01%	48.39%	28.99%	15.51%	44.50%	34.13%	15.10%	49.23%
twn	28.29%	24.40%	52.69%	32.68%	14.96%	47.64%	30.92%	15.55%	46.47%	32.27%	16.53%	48.80%
idn	8.77%	31.62%	40.39%	13.60%	15.44%	29.04%	18.05%	18.39%	36.44%	13.55%	15.91%	29.46%
mys	29.06%	20.07%	49.14%	36.64%	10.52%	47.15%	40.57%	9.89%	50.47%	35.58%	11.58%	47.17%
tha	29.88%	15.52%	45.40%	36.37%	9.64%	46.01%	41.33%	9.32%	50.65%	36.04%	10.02%	46.07%
khm	32.33%	11.93%	44.26%	51.12%	6.02%	57.13%	45.79%	12.28%	58.06%	50.59%	6.82%	57.40%
phl	16.32%	27.44%	43.76%	19.25%	21.35%	40.60%	20.10%	22.57%	42.67%	18.43%	21.90%	40.33%
vnm	28.14%	16.08%	44.21%	37.59%	6.52%	44.12%	49.10%	6.78%	55.88%	37.45%	6.87%	44.32%
chn	25.43%	16.56%	41.99%	31.73%	10.28%	42.01%	36.41%	8.22%	44.63%	30.88%	10.98%	41.86%
brn	3.28%	42.65%	45.93%	28.68%	14.13%	42.82%	21.68%	27.07%	48.75%	19.35%	32.50%	51.85%
ind	18.75%	19.15%	37.89%	28.33%	9.46%	37.79%	24.95%	12.31%	37.26%	24.59%	12.34%	36.93%

Note: All values are expressed in percentage of gross exports by economy-wide exports, manufacturing industries' exports, exports by advanced manufacturing industries and exports by manufacturing and business services industries respectively. VC part. = value chain participation rate.
Source: OECD ICIO, wiiw calculations.

7.6. DATA SOURCES

A large number of data sources have been used for the analysis in this paper. The most important one is the OECD'S Inter-Country Input-Output (ICIO) database[28]. The ICIO Database provides information on global inter-industry linkages along with final demand structures for 61 countries and the rest of the world for the years 1995, 2000, 2005 and 2008 to 2011. The industry structure is based on the ISIC industries comprising 34 industries[29]. Among the 61 countries there are 13 South East Asian countries and one South Asian country, which is India.

The ICIO database is the basis for the calculation of all measures of global and regional VC participation; the indicators are, however, not calculated from the original OECD ICIO database but downloaded from the UIBE data portal for GVC integration indicators[30] of the University of International Business and Economics. The structural indicators, i.e. for the value added shares of manufacturing (commonly defined, advanced and business services-expanded) and changes therein, are calculated based on original OECD ICIO data.

Data for GDP per capita are taken from the World Bank's World Development indicators (WDI). The same data source is used for the real exchange rate. The real exchange rate measure used is the change in the real effective exchange rate using 2010 as the base year for the index. For those countries for which these data are not available, recourse was taken to the Penn World Tables (version 8.1) which provide relative price levels of consumption as compared with the United States. These price levels have been rescaled to yield 100 for all countries and, as in the case of the effective real exchange rate data, changes have been calculated.

The unit value ratios (UVRs) have been calculated using CEPII's CHELEM trade database[31] (De Saint Vaulry, 2008) which is based on UN Comtrade data, but which has been adjusted to have balanced mirror trade flows.

---

28 Publicly available at: http://www.oecd.org/sti/ind/input-outputtablesedition2015accesstodata.htm

29 See Appendix 3 for details.

30 See: http://139.129.209.66:8000/d/daedafb854/.

31 See: http://www.cepii.fr/cepii/en/bdd_modele/presentation.asp?id=17

7.7. ADDITIONAL REGRESSION RESULTS – MANUFACTURING SECTOR

Table A7.1 / VC integration and advanced manufacturing-related structural change, 1995-2010

Dependent variable:	Δsh_manuf		Δsh_manuf		Δsh_manuf	
Aggregate:	advanced manufacturing		advanced manufacturing		advanced manufacturing	
VC measure	a. VC participation		b. FVA		c. VS1	
sample:	SEA only	full	SEA only	full	SEA only	full
	(1a')	(2a')	(1b')	(2b')	(1c')	(2c')
VC measure	-0.0246	0.0852**	-0.0233	0.0764**	0.0351	-0.0647
	(0.0776)	(0.0360)	(0.0782)	(0.0301)	(0.1465)	(0.0604)
country specific GVC effects						
VC x jpn		-0.0862*		-0.0371		-0.0104
		(0.0512)		(0.1064)		(0.1027)
VC x hkg		0.0653		-0.0056		-0.0756
		(0.0665)		(0.0369)		(0.0681)
VC x sgp		0.9278***		0.0805		-0.0971
		(0.1903)		(0.1363)		(0.1791)
VC x twn		1.1243***		-0.8282**		0.5060***
		(0.3582)		(0.3613)		(0.1854)
VC x kor		0.2925*		0.4085		0.7509***
		(0.1577)		(0.4384)		(0.2108)
VC x tha		1.1341***		1.7165***		3.3300***
		(0.1780)		(0.3452)		(0.6316)
VC x mys		-0.3042*		-0.2663**		1.3025**
		(0.1689)		(0.1315)		(0.6035)
VC x idn		0.0543		-0.4805**		0.2933*
		(0.5462)		(0.1849)		(0.1641)
VC x phl		-0.1567		-0.2253**		0.3759***
		(0.1620)		(0.1081)		(0.1157)
VC x vnm		0.2664***		0.2130*		-0.0018
		(0.0963)		(0.1141)		(0.3366)
VC x khm		-0.0097		-0.0108		-0.0546
		(0.0355)		(0.0316)		(0.1291)
VC x chn		-0.2779*		-0.2501		0.3340
		(0.1505)		(0.1549)		(1.6649)
VC x brn		-0.1695		0.2091		-0.0217
		(0.1357)		(0.1275)		(0.0798)
VC x ind		-0.1178		-0.1363***		0.1453*
		(0.0888)		(0.0503)		(0.0867)
sh manuf^{initial}	-0.7765**	-1.0052***	-0.7966**	-0.9952***	-0.8068**	-0.9963***
	(0.2839)	(0.1524)	(0.3094)	(0.1635)	(0.3348)	(0.1690)
GDP per capita^{initial}	0.0224	-0.0021	0.0232	0.0017	0.0220	0.0021
	(0.0220)	(0.0153)	(0.0238)	(0.0164)	(0.0216)	(0.0136)
Δreal FX	-0.0000	-0.0001	-0.0000	-0.0001*	-0.0000	-0.0001
	(0.0003)	(0.0001)	(0.0003)	(0.0001)	(0.0003)	(0.0001)
Constant	-0.1377	0.0820	-0.1459	0.0418	-0.1505	0.0249
	(0.1315)	(0.1393)	(0.1461)	(0.1492)	(0.1603)	(0.1227)
Obs.	42	183	42	183	42	183
R-sq.	0.6373	0.7575	0.6384	0.7447	0.6373	0.7416
R-sq. - adj.	0.324	0.567	0.326	0.545	0.324	0.539
F-test	6.605	201.6	7.036	821.9	6.387	43.22

Note: Δsh_mf=5-year change in the manufacturing share. Specifications including interaction terms are estimated using centred values (with zero mean) of the variables forming the interaction terms. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses.

Table A7.2 / VC integration and manufacturing and business services-related structural change, 1995-2010

Dependent variable:	Δsh_manuf		Δsh_manuf		Δsh_manuf	
Aggregate:	manufacturing and business services		manufacturing and business services		manufacturing and business services	
VC measure	a. VC participation		b. FVA		c. VS1	
sample:	SEA only	full	SEA only	full	SEA only	full
	(1a'')	(2a'')	(1b'')	(2b'')	(1c'')	(2c'')
VC measure	0.0660	0.1193	0.0065	0.0745	0.1335	0.0036
	(0.0841)	(0.0757)	(0.1040)	(0.0481)	(0.1248)	(0.1355)
country specific GVC effects						
VC x jpn		0.0728		0.3393**		0.1513
		(0.0755)		(0.1323)		(0.1367)
VC x hkg		0.0983		-0.0180		-0.0566
		(0.1627)		(0.0764)		(0.1173)
VC x sgp		0.5155***		0.1445		-0.2223
		(0.1433)		(0.1175)		(0.2044)
VC x twn		0.4196**		-3.2667***		0.4027**
		(0.1804)		(0.8198)		(0.1739)
VC x kor		0.2289**		0.4980		0.5354***
		(0.1020)		(0.3022)		(0.1535)
VC x tha		0.5349***		0.7251***		2.0141***
		(0.0959)		(0.1194)		(0.4621)
VC x mys		-0.2101*		-0.2019*		1.9032***
		(0.1144)		(0.1046)		(0.5336)
VC x idn		0.1338		0.5867***		0.1189
		(0.1024)		(0.2004)		(0.2081)
VC x phl		0.0618		-1.0202***		0.0439
		(0.2318)		(0.2952)		(0.1886)
VC x vnm		0.1367		0.1465		2.3196***
		(0.1270)		(0.1357)		(0.7359)
VC x khm		-0.0406		-0.0161		-0.5090
		(0.0945)		(0.0782)		(0.8324)
VC x chn		-0.5406		-0.6355		1.0955*
		(0.9889)		(0.4327)		(0.5654)
VC x brn		-0.0518		0.0645		0.0251
		(0.0704)		(0.2110)		(0.1244)
VC x ind		0.0285		0.0552		0.4062**
		(0.1065)		(0.1499)		(0.1878)
sh manuf^{initial}	-1.1125***	-1.0808***	-0.9713***	-1.0639***	-0.8827***	-1.0466***
	(0.2533)	(0.1237)	(0.3219)	(0.1283)	(0.1365)	(0.1178)
GDP per capita^{initial}	0.0602*	0.0318	0.0458*	0.0253	0.0575**	0.0236
	(0.0344)	(0.0216)	(0.0263)	(0.0219)	(0.0272)	(0.0224)
Δreal FX	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002
	(0.0003)	(0.0001)	(0.0003)	(0.0001)	(0.0003)	(0.0001)
Constant	-0.2416	-0.0091	-0.1356	0.0319	-0.2358	0.0322
	(0.2369)	(0.2012)	(0.1712)	(0.2042)	(0.1909)	(0.2036)
Obs.	42	183	42	183	42	183
R-sq.	0.8317	0.7498	0.8272	0.7474	0.8354	0.7467
R-sq. - adj.	0.686	0.554	0.678	0.549	0.693	0.548
F-test	14.96	262.1	21.72	302.4	18.60	19.49

Note: Δsh_mf=5-year change in manufacturing share. Specifications including interaction terms are estimated using centred values (with zero mean) of the variables forming the interaction terms. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses.

Table A7.3 / Global and regional VC integration and advanced manufacturing-specific structural change, 1995-2010

Dependent variable:	**Δsh_manuf**		
Aggregate:	**advanced manufacturing**		
VC measure	**a. VC participation**	**b. FVA**	**c. VS1**
sample:	**full**	**full**	**full**
	(3a')	**(3b')**	**(3c')**
GVC measure - intra-regional	0.0597	0.0169	0.3838
	(0.0575)	(0.0581)	(0.2462)
GVC measure - extra-regional	0.0580	0.0411	-0.1132
	(0.0409)	(0.0372)	(0.0937)
sh manuf^{initial}	-0.9424***	-0.9227***	-0.9586***
	(0.1456)	(0.1468)	(0.1427)
GDP per capita^{initial}	0.0066	0.0063	0.0057
	(0.0126)	(0.0125)	(0.0123)
Δreal FX	-0.0001	-0.0001	-0.0001
	(0.0001)	(0.0001)	(0.0001)
Constant	-0.0275	-0.0178	-0.0005
	(0.1118)	(0.1112)	(0.1139)
Obs.	183	183	183
R-sq.	0.66	0.656	0.663
R-sq. - adj.	0.462	0.456	0.466
F-test	16.39	8.388	5.773

Table A7.4 / Global and regional VC integration and advanced manufacturing-specific structural change, 1995-2010

Dependent variable:	**Δsh_manuf**		
Aggregate:	**manufacturing and business services**		
VC measure	**a. VC participation**	**b. FVA**	**c. VS1**
sample:	**full**	**full**	**full**
	(3a'')	**(3b'')**	**(3c'')**
GVC measure - intra-regional	0.0904	0.0670	-0.0825
	(0.0583)	(0.0538)	(0.2666)
GVC measure - extra-regional	0.1129*	0.0335	0.0903
	(0.0669)	(0.0557)	(0.1127)
sh manuf^{initial}	-1.0519***	-1.0319***	-0.9716***
	(0.0977)	(0.0969)	(0.0873)
GDP per capita^{initial}	0.0367**	0.0318*	0.0350**
	(0.0171)	(0.0165)	(0.0176)
Δreal FX	-0.0002	-0.0002	-0.0002
	(0.0001)	(0.0001)	(0.0001)
Constant	-0.1040	-0.0502	-0.0962
	(0.1548)	(0.1485)	(0.1598)
Obs.	183	183	183
R-sq.	0.712	0.705	0.703
R-sq. - adj.	0.543	0.533	0.529
F-test	7.467	7.350	19.66

Note: Δsh_mf=5-year change in the manufacturing share. All specifications include country and time fixed effects. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses. Regressions exclude India and South Africa as they are the sole countries in the wider region for which data is available. For the definitions of the regions see Appendix.

Table A7.5 / VC integration, quality of exports and advanced-manufacturing-specific structural change, 1995-2010

Dependent variable:	**Δsh_manuf**		
Aggregate:	**advanced manufacturing(commonly defined)**		
VC measure	**a. VC part**	**b. FVA**	**c. VS1**
sample:	**full**	**full**	**full**
	(4a')	**(4b')**	**(4c')**
VC measure	0.0576*	0.0271	0.0159
	(0.0326)	(0.0294)	(0.0655)
VC measure x UVR	0.0523*	0.0550**	-0.1221
	(0.0303)	(0.0272)	(0.1049)
$UVR^{initial}$	-0.0035	-0.0024	-0.0016
	(0.0060)	(0.0058)	(0.0063)
sh $manuf^{initial}$	-0.9533***	-0.9473***	-0.9498***
	(0.1450)	(0.1459)	(0.1466)
GDP per $capita^{initial}$	0.0102	0.0090	0.0092
	(0.0150)	(0.0153)	(0.0157)
Δreal FX	-0.0001	-0.0001	-0.0001
	(0.0001)	(0.0001)	(0.0001)
Constant	-0.0377	-0.0335	-0.0371
	(0.1356)	(0.1383)	(0.1406)
Obs.	180	180	180
R-sq.	0.668	0.665	0.656
R-sq. - adj.	0.469	0.465	0.451
F-test	8.506	7.628	5.283

Note: Δsh_mf=5-year change in the manufacturing share. All specifications include country and time fixed effects. Specifications including interaction terms are estimated using centred values (with zero mean) of the variables forming the interaction terms. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses.

Table A7.6 / VC integration, quality of exports and manufacturing and business services-specific structural change, 1995-2010

Dependent variable:	**Δsh_manuf**		
Aggregate:	**manufacturing and business services**		
VC measure	**a. VC part**	**b. FVA**	**c. VS1**
sample:	**full**	**full**	**full**
	(4a'')	**(4b'')**	**(4c'')**
VC measure	0.0986**	0.0497*	0.0442
	(0.0432)	(0.0300)	(0.0795)
VC measure x UVR	0.0058	0.0024	-0.0004
	(0.0058)	(0.0056)	(0.0072)
$UVR^{initial}$	0.0906**	0.1239***	-0.1824
	(0.0419)	(0.0305)	(0.1178)
sh $manuf^{initial}$	-1.0805***	-1.0627***	-0.9798***
	(0.0926)	(0.0907)	(0.0867)
GDP per $capita^{initial}$	0.0351*	0.0352**	0.0323*
	(0.0179)	(0.0172)	(0.0177)
Δreal FX	-0.0001	-0.0001	-0.0002
	(0.0001)	(0.0001)	(0.0001)
Constant	-0.0450	-0.0639	-0.0588
	(0.1634)	(0.1572)	(0.1581)
Obs.	180	180	180
R-sq.	0.721	0.722	0.71
R-sq. - adj.	0.553	0.556	0.537
F-test	7.635	9.517	20.56

Note: Δsh_mf=5-year change in the manufacturing share. All specifications include country and time fixed effects. Specifications including interaction terms are estimated using centred values (with zero mean) of the variables forming the interaction terms. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses.

7.8. ADDITIONAL REGRESSION RESULTS – MANUFACTURING SECTOR, ALTERNATIVE INDICATORS

Table A8.1 / VC integration and advanced manufacturing-related structural change, alternative indicators, 1995-2010

Dependent variable:	**Δsh_manuf**		**Δsh_manuf**		**Δsh_manuf**	
Aggregate:	**advanced manufacturing**		**advanced manufacturing**		**advanced manufacturing**	
VC measure	**a. VC par_b+f**		**b. VC par_b**		**c. VC par_f**	
sample:	**SEA only**	**full**	**SEA only**	**full**	**SEA only**	**full**
	(I.a')	**(II.a')**	**(I.b')**	**(II.b')**	**(I.c')**	**(II.c')**
VC measure	0.0340	0.0385***	-0.0267	0.0496**	0.0677	0.0672**
	(0.0526)	(0.0133)	(0.0941)	(0.0227)	(0.0513)	(0.0277)
country specific GVC effects						
VC x jpn		-0.0253		-0.0359		-0.0469
		(0.0286)		(0.0728)		(0.0462)
VC x hkg		0.0056		0.0144		-0.1121***
		(0.0300)		(0.0294)		(0.0401)
VC x sgp		0.1783***		0.1618**		0.1780
		(0.0238)		(0.0789)		(0.2128)
VC x twn		0.2905**		1.2930**		0.4180**
		(0.1382)		(0.5468)		(0.1886)
VC x kor		0.1276***		0.3644**		0.2087***
		(0.0375)		(0.1402)		(0.0481)
VC x tha		0.2109***		0.6642***		0.3338***
		(0.0436)		(0.1102)		(0.0885)
VC x mys		-0.1645*		-0.1999**		1.0618**
		(0.0870)		(0.0792)		(0.5331)
VC x idn		-0.0351		-0.5897***		0.0406
		(0.1135)		(0.2113)		(0.1285)
VC x phl		0.0686***		0.1102		0.0425
		(0.0255)		(0.1123)		(0.0472)
VC x vnm		0.1462**		0.1877*		0.3593***
		(0.0574)		(0.1088)		(0.1327)
VC x khm		-0.2178**		0.0132		-0.1139***
		(0.1000)		(0.0257)		(0.0377)
VC x chn		0.0133		0.0312		0.0589
		(0.0302)		(0.0472)		(0.0889)
VC x ind		-0.0533**		-0.0810*		-0.1581**
		(0.0258)		(0.0412)		(0.0650)
sh manuf^{initial}	-0.7887**	-1.0132***	-0.7727**	-1.0072***	-0.8410***	-1.1485***
	(0.2848)	(0.1512)	(0.2866)	(0.1610)	(0.2881)	(0.1465)
GDP per capita^{initial}	0.0257	-0.0002	0.0363	-0.0026	0.0422	0.0063
	(0.0268)	(0.0155)	(0.0422)	(0.0166)	(0.0304)	(0.0149)
Δreal FX	-0.0000	-0.0001	-0.0000	-0.0001*	0.0001	-0.0001
	(0.0003)	(0.0001)	(0.0004)	(0.0001)	(0.0003)	(0.0001)
Constant	-0.1511	0.0660	-0.2245	0.0814	-0.3008	0.0126
	(0.2485)	(0.1431)	(0.3882)	(0.1525)	(0.2194)	(0.1358)
Obs.	39	180	39	180	39	180
R-sq.	0.651	0.760	0.645	0.760	0.672	0.749
R-sq. - adj.	0.337	0.574	0.325	0.575	0.376	0.555
F-test	5.475	1739	9.371	150.7	5.765	49.57

Note: Δsh_mf=5-year change in the manufacturing share. Specifications including interaction terms are estimated using centred values (with zero mean) of the variables forming the interaction terms. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses.

Table A8.2 / VC integration and manufacturing and business services-related structural change, alternative indicators, 1995-2010

Dependent variable:	**Δsh_manuf**		**Δsh_manuf**		**Δsh_manuf**	
Aggregate:	**manufacturing and business services**		**manufacturing and business services**		**manufacturing and business services**	
VC measure	**a. VC par_b+f**		**b. VC par_b**		**c. VC par_f**	
sample:	**SEA only**	**full**	**SEA only**	**full**	**SEA only**	**full**
	(I.a")	**(II.a")**	**(I.b")**	**(II.b")**	**(I.c")**	**(II.c")**
VC measure	0.0834	0.0775**	0.0314	0.0480	0.1490*	0.1552**
	(0.0725)	(0.0347)	(0.1286)	(0.0424)	(0.0816)	(0.0779)
country specific GVC effects						
VC x jpn		0.0981*		0.2030**		0.2244**
		(0.0499)		(0.0928)		(0.1048)
VC x hkg		-0.0550		-0.0042		0.0112
		(0.0747)		(0.0746)		(0.5635)
VC x sgp		0.0791		0.2682***		-0.1471
		(0.0859)		(0.0837)		(0.1611)
VC x twn		0.1552*		0.4077**		0.2426*
		(0.0817)		(0.1934)		(0.1333)
VC x kor		0.1601***		0.3637**		0.2993***
		(0.0538)		(0.1388)		(0.0947)
VC x tha		0.2585***		0.5046***		0.4664***
		(0.0486)		(0.1040)		(0.1495)
VC x mys		-0.1423***		-0.1648**		-0.4622**
		(0.0494)		(0.0671)		(0.1890)
VC x idn		0.0289		0.0529		0.0217
		(0.0514)		(0.1754)		(0.0807)
VC x phl		0.0457		-0.0236		0.2202**
		(0.0756)		(0.1247)		(0.0910)
VC x vnm		0.0636		0.0927		0.3849**
		(0.0651)		(0.0906)		(0.1758)
VC x khm		0.0612		0.0193		-0.5092**
		(0.1121)		(0.0779)		(0.2192)
VC x chn		0.0866		0.1783*		0.2241
		(0.0695)		(0.1052)		(0.1854)
VC x ind		0.0158		0.0711		0.0486
		(0.0663)		(0.1141)		(0.1391)
sh $manuf^{initial}$	-1.0833***	-1.0994***	-1.0269***	-1.0616***	-0.8405***	-1.1327***
	(0.1481)	(0.1261)	(0.3072)	(0.1276)	(0.1621)	(0.1203)
GDP per $capita^{initial}$	0.0395	0.0180	0.0466	0.0192	0.0415	0.0227
	(0.0300)	(0.0222)	(0.0293)	(0.0229)	(0.0265)	(0.0206)
Δreal FX	-0.0003	-0.0002*	-0.0002	-0.0002	-0.0003	-0.0002*
	(0.0003)	(0.0001)	(0.0003)	(0.0001)	(0.0003)	(0.0001)
Constant	-0.1605	0.1226	-0.1902	0.0841	-0.1551	0.0861
	(0.2707)	(0.2093)	(0.3055)	(0.2146)	(0.1618)	(0.1942)
Obs.	39	180	39	180	39	180
R-sq.	0.838	0.755	0.825	0.746	0.844	0.761
R-sq. - adj.	0.692	0.566	0.668	0.549	0.704	0.576
F-test	33.57	386.2	22.16	9084	18.66	407.4

Note: Δsh_mf=5-year change in manufacturing share. Specifications including interaction terms are estimated using centred values (with zero mean) of the variables forming the interaction terms. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses.

Table A8.3 / Global and regional VC integration and advanced manufacturing-specific structural change, alternative indicators, 1995-2010

Dependent variable:		**Δsh_manuf**	
Aggregate:		**advanced manufacturing**	
VC measure	**a. VC part_b+f**	**b. VC part_b**	**c. VC part_f**
sample:	**full**	**full**	**full**
	(III.a')	**(III.b')**	**(III.c')**
GVC measure - intra-regional	0.0781*	0.0298	0.1044*
	(0.0404)	(0.0563)	(0.0599)
GVC measure - extra-regional	0.0279*	0.0333	0.0316
	(0.0141)	(0.0319)	(0.0338)
sh manuf^{initial}	-1.0033***	-0.9308***	-1.0122***
	(0.1414)	(0.1460)	(0.1456)
GDP per capita^{initial}	0.0069	0.0046	0.0144
	(0.0127)	(0.0146)	(0.0115)
Δreal FX	-0.0001	-0.0001	-0.0001
	(0.0001)	(0.0001)	(0.0001)
Constant	-0.0255	-0.0019	-0.0883
	(0.1127)	(0.1279)	(0.1032)
Obs.	180	180	180
R-sq.	0.678	0.658	0.676
R-sq. - adj.	0.491	0.458	0.487
F-test	6.081	9.419	9.789

Table A8.4 / Global and regional VC integration and advanced manufacturing-specific structural change, alternative indicators, 1995-2010

Dependent variable:		**Δsh_manuf**	
Aggregate:		**manufacturing and business services**	
VC measure	**a. VC part_b+f**	**b. VC part_b**	**c. VC part_f**
sample:	**full**	**full**	**full**
	(III.a')	**(III.b')**	**(III.c')**
GVC measure - intra-regional	0.1458**	0.0912	0.1242
	(0.0611)	(0.0583)	(0.0855)
GVC measure - extra-regional	0.0523	0.0160	0.1390*
	(0.0345)	(0.0580)	(0.0759)
sh manuf^{initial}	-1.0663***	-1.0399***	-0.9888***
	(0.0895)	(0.0981)	(0.0920)
GDP per capita^{initial}	0.0215	0.0270	0.0312*
	(0.0171)	(0.0180)	(0.0161)
Δreal FX	-0.0002*	-0.0002	-0.0002*
	(0.0001)	(0.0001)	(0.0001)
Constant	0.0401	-0.0042	-0.0640
	(0.1526)	(0.1626)	(0.1433)
Obs.	180	180	180
R-sq.	0.722	0.706	0.719
R-sq. - adj.	0.560	0.534	0.554
F-test	6.485	7.121	6.416

Note: Δsh_mf=5-year change in the manufacturing share. All specifications include country and time fixed effects. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses. Regressions exclude India and South Africa as they are the sole countries in the wider region for which data is available. For the definitions of the regions see Appendix.

Table A8.5 / VC integration, quality of exports and advanced-manufacturing-specific structural change, alternative indicators, 1995-2010

Dependent variable:	**Δsh_manuf**		
Aggregate:	**advanced manufacturing (commonly defined)**		
VC measure	**a. VC part_b+f**	**b. VC part_b**	**c. VC part_f**
sample:	**full**	**full**	**full**
	(4a')	**(4b')**	**(4c')**
VC measure	0.0436***	0.0332	0.0536**
	(0.0138)	(0.0302)	(0.0258)
VC measure x UVR	0.0089	0.0342	-0.0489
	(0.0260)	(0.0279)	(0.0665)
$UVR^{initial}$	-0.0029	-0.0028	-0.0022
	(0.0065)	(0.0065)	(0.0075)
sh $manuf^{initial}$	-0.9677***	-0.9423***	-0.9403***
	(0.1436)	(0.1454)	(0.1328)
GDP per $capita^{initial}$	0.0090	0.0086	0.0120
	(0.0148)	(0.0170)	(0.0144)
Δreal FX	-0.0001	-0.0001	-0.0001
	(0.0001)	(0.0001)	(0.0001)
Constant	-0.0177	-0.0278	-0.0503
	(0.1360)	(0.1563)	(0.1310)
Obs.	177	177	177
R-sq.	0.674	0.663	0.675
R-sq. - adj.	0.478	0.461	0.479
F-test	7.303	8.293	6.534

Note: Δsh_mf=5-year change in the manufacturing share. All specifications include country and time fixed effects. Specifications including interaction terms are estimated using centred values (with zero mean) of the variables forming the interaction terms. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses.

Table A8.6 / VC integration, quality of exports and manufacturing and business services-specific structural change, alternative indicators, 1995-2010

Dependent variable:	**Δsh_manuf**		
Aggregate:	**manufacturing and business services**		
VC measure	**a. VC part_b+f**	**b. VC part_b**	**c. VC part_f**
sample:	**full**	**full**	**full**
	(4a'')	**(4b'')**	**(4c'')**
VC measure	0.0882***	0.0629	0.1293**
	(0.0308)	(0.0381)	(0.0636)
VC measure x UVR	0.0337	0.0879**	-0.0529
	(0.0354)	(0.0428)	(0.0920)
$UVR^{initial}$	0.0011	0.0023	0.0004
	(0.0070)	(0.0065)	(0.0085)
sh $manuf^{initial}$	-1.0700***	-1.0585***	-0.9822***
	(0.0869)	(0.0924)	(0.0950)
GDP per $capita^{initial}$	0.0261	0.0316	0.0296*
	(0.0185)	(0.0197)	(0.0174)
Δreal FX	-0.0002*	-0.0002	-0.0002*
	(0.0001)	(0.0001)	(0.0001)
Constant	0.0441	-0.0285	-0.0139
	(0.1725)	(0.1848)	(0.1567)
Obs.	177	177	177
R-sq.	0.722	0.714	0.719
R-sq. - adj.	0.555	0.542	0.551
F-test	6.224	8.178	6.148

Note: Δsh_mf=5-year change in the manufacturing share. All specifications include country and time fixed effects. Specifications including interaction terms are estimated using centred values (with zero mean) of the variables forming the interaction terms. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses.

7.9. ADDITIONAL REGRESSION RESULTS – INDUSTRY LEVEL

Table A9.1 / Industry-specific structural change and backward VC integration, specific industries (country-specific effects), 1995-2010

Dependent variable:	**Δindustry share**		**Δindustry share**		**Δindustry share**	
Aggregate:	**Textiles and wearing apparel**		**Electronics**		**Motor vehicles**	
VC measure	**b. FVA**		**b. FVA**		**b. FVA**	
sample:	**SEA only**	**full**	**SEA only**	**full**	**SEA only**	**full**
	(1b)	**(2b)**	**(1b)**	**(2b)**	**(1b)**	**(2b)**
VC measure	-0.3178	0.0457	-0.0803	0.0192	-0.0051	0.0000
	(0.2153)	(0.0534)	(0.1158)	(0.0432)	(0.0061)	(0.0000)
country specific GVC effects						
VC x jpn		0.0687		-0.2960		0.1905
		(0.1216)		(0.2050)		(0.3469)
VC x hkg		-0.4815		0.1221*		0.2269
		(0.7296)		(0.0673)		(0.1509)
VC x sgp		-0.2143		0.7260***		-0.0044
		(0.1462)		(0.2187)		(0.0245)
VC x twn		0.2078		-1.3951***		-0.1096
		(0.2419)		(0.4997)		(0.0868)
VC x kor		-8.3811		0.0561		0.2279
		(6.3119)		(0.1813)		(0.1374)
VC x tha		-0.6535		-0.1636*		0.4979***
		(0.4820)		(0.0920)		(0.1734)
VC x mys		0.0631		-0.5245*		-0.1349***
		(0.0820)		(0.2973)		(0.0405)
VC x idn		-0.3016		-0.4556***		-0.2744
		(0.3044)		(0.1684)		(0.1818)
VC x phl		-0.0510		-0.3251		-0.1231**
		(0.0803)		(0.4788)		(0.0557)
VC x vnm		-0.0430		0.0216		-0.0109
		(0.1564)		(0.2406)		(0.0270)
VC x khm		0.1958		-0.0283		-0.0289
		(0.4697)		(0.0560)		(0.0226)
VC x chn		-0.1147		0.3879		-0.0054
		(0.1609)		(0.2604)		(0.0511)
VC x brn		-1.5111***		0.2993		-0.2228***
		(0.4456)		(0.1958)		(0.0789)
VC x ind		0.0574		-0.0574		0.1327
		(0.1965)		(0.0742)		(0.2180)
sh manuf^{initial}	-0.7654***	-1.0777***	-0.4764***	-1.3255***	-1.0940***	-0.5312***
	(0.2348)	(0.3053)	(0.1519)	(0.1859)	(0.1782)	(0.1403)
GDP per capita^{initial}	-0.2002*	-0.0669**	0.0078	0.0285	-0.0061	0.0181
	(0.0975)	(0.0256)	(0.0389)	(0.0275)	(0.0163)	(0.0111)
Δreal FX	-0.0006	-0.0001	0.0004	0.0000	0.0001	-0.0001
	(0.0005)	(0.0001)	(0.0003)	(0.0001)	(0.0002)	(0.0001)
Constant	2.0054***	0.7351***	0.0046	-0.2299	0.0415	-0.1375
	(0.7007)	(0.2484)	(0.2575)	(0.2467)	(0.1153)	(0.1000)
Obs.	42	183	42	183	42	183
R-sq.	0.822	0.873	0.724	0.810	0.786	0.642
R-sq. - adj.	0.669	0.773	0.485	0.660	0.602	0.361
F-test	6.962	114.4	7.603	90.59	5.161	42.03

Note: Δindustry share =5-year change in the value added share of the respective industry in total manufacturing value added. All specifications include country and time fixed effects. Specifications including interaction terms are estimated using centred values (with zero mean) of the variables forming the interaction terms. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses.

Table A9.2 / Industry-specific structural change and forward VC integration, specific industries (country-specific effects), 1995-2010

Dependent variable:	Δindustry share		Δindustry share		Δindustry share	
Aggregate:	Textiles and wearing apparel		Electronics		Motor vehicles	
VC measure	c. VS1		c. VS1		c. VS1	
sample:	SEA only	full	SEA only	full	SEA only	full
	(1c)	(2c)	(1c)	(2c)	(1c)	(2c)
VC measure	-0.3178	0.0457	-0.0803	0.0192	-0.0051	0.0000
	(0.2153)	(0.0534)	(0.1158)	(0.0432)	(0.0061)	(0.0000)
country specific GVC effects						
VC x jpn		-0.3396		-0.0887		1.3285***
		(0.2560)		(0.1199)		(0.2827)
VC x hkg		-1.0793		-0.4040		-0.1322
		(2.2479)		(0.2498)		(0.0869)
VC x sgp		0.3429*		-1.1703***		-0.0468
		(0.1809)		(0.1902)		(0.0498)
VC x twn		0.1648		1.3045***		-0.3335
		(0.2669)		(0.3821)		(0.3179)
VC x kor		-0.0195		0.1975*		1.5427***
		(0.1591)		(0.1035)		(0.3713)
VC x tha		-0.9542		0.4985**		-1.3767
		(0.8412)		(0.2478)		(1.0249)
VC x mys		-0.2599		2.1288**		0.2255**
		(0.3934)		(1.0237)		(0.0960)
VC x idn		-1.4661**		0.4391***		0.3150***
		(0.6848)		(0.1540)		(0.0645)
VC x phl		-0.9709		1.4308***		-0.1102
		(0.8786)		(0.2667)		(0.0847)
VC x vnm		1.9535***		0.8529		0.0083
		(0.4278)		(1.3452)		(0.0100)
VC x khm		-0.1950		0.0201		-0.0049
		(4.2755)		(0.1551)		(0.0038)
VC x chn		1.5226		1.6650		-0.1115
		(1.2437)		(3.3027)		(0.0885)
VC x brn		7.2446		-0.0738		-0.1560*
		(18.8441)		(0.1661)		(0.0795)
VC x ind		-1.4693***		-0.0377		1.3807**
		(0.5471)		(0.0828)		(0.6354)
sh manuf^{initial}	-1.0345***	-0.9190***	-0.5055**	-1.3390***	-1.1145***	-0.5560***
	(0.1657)	(0.3402)	(0.1982)	(0.1736)	(0.1854)	(0.1384)
GDP per capita^{initial}	-0.2208	-0.1276**	0.0070	0.0202	-0.0038	0.0190*
	(0.1308)	(0.0519)	(0.0400)	(0.0260)	(0.0169)	(0.0098)
Δreal FX	-0.0009	0.0001	0.0004	-0.0000	0.0001	-0.0000
	(0.0007)	(0.0001)	(0.0003)	(0.0001)	(0.0002)	(0.0001)
Constant	2.1698**	1.2564***	-0.0349	-0.1601	0.0264	-0.1465*
	(0.9183)	(0.4649)	(0.2979)	(0.2342)	(0.1191)	(0.0878)
Obs.	42	183	42	183	42	183
R-sq.	0.817	0.773	0.718	0.830	0.789	0.640
R-sq. - adj.	0.658	0.595	0.474	0.696	0.607	0.358
F-test	14.46	2120	6.452	300.7	5.471	

Note: Δindustry share =5-year change in the value added share of the respective industry in total manufacturing value added. All specifications include country and time fixed effects. Specifications including interaction terms are estimated using centred values (with zero mean) of the variables forming the interaction terms. ***,** and * indicate statistical significance at the 1%, 5% and 10% levels respectively. Robust standard errors are in parentheses.

7.10. CALCULATION OF UNIT VALUE RATIOS (UVR)

The calculation of relative unit values of traded products is based on the CEPII's trade database. The calculation of unit values is done at the 6-digit product level following the approach in Landesmann and Wörz (2006).

Notation:

i......... commodity index
c........ country index
t......... index for year
j......... industry index
$v_{i,t}^{c}$ ..... *nominal value of exports of product i by country c to all partners in the world at time t*
$x_{i,t}^{c}$ ..... *quantity of exports of product i by country c to all partners in the world at time t*

Definition of export unit value

Given these definitions of the export unit value, $u_{i,t}^{c}$, is defined as:

$$u_{i,t}^{c} = {v_{i,t}^{c}}/{x_{i,t}^{c}}$$

Calculation of export unit ratios

These export unit values are normalised by putting them in relation to a reference group which will be the world. Hence the reference group is total product-level exports of the world.

$$u_{i,t}^{world} = {v_{i,t}^{world}}/{x_{i,t}^{world}}$$

The product-country-time-specific unit value ratios, $r_{i,t}^{c}$, can then be calculated as:

$$r_{i,t}^{c} = \ln\left({u_{i,t}^{c}}/{u_{i,t}^{world}}\right)$$

Taking the logarithm of ${u_{i,t}^{c}}/{u_{i,t}^{world}}$ ensures a symmetric aggregation across products for ratios larger and smaller than 1. In logs, the ratio is thus larger (smaller) than zero if the export unit value of country c is larger (smaller) than the export unit value of total world exports

Aggregation to industry level

To present the information in a meaningful way, the product-level results are aggregated to the level of industries in the OECD ICIO database. Furthermore, the results are also aggregated to the country level.

The aggregation is done by constructing a weighted sum of the commodity-level unit value ratios $r_{i,t}^{c}$ across the products belonging to a particular industry division (indexed by *j*). The weight used for a particular commodity i in such an aggregation is the share of its export value in the industry's exports of country c. The set of commodities *i* belonging to an aggregate *j* (industry or aggregate country level) is denoted by $i \in j$. The weights are thus

$$w_{i,t}^{c} = \left(v_{i,t}^{c} \Big/ \textstyle\sum_{i \in j} v_{i,t}^{c} \right)$$

The unit value ratio for a particular industry or the country aggregate is then

$$r_{j,t}^{c} = \sum_{i \in j} r_{i,t}^{c} \cdot w_{i,t}^{c}$$

Importantly, these ratios at the industry level will be calculated, *(i)* for the sum over all products within an industry and *(ii)* only for the sum over all products belonging to the BEC category parts and components (*pc*).

$$r(pc)_{j,t}^{c} = \sum_{i \in j} r(pc)_{i,t}^{c} \cdot w(pc)_{i,t}^{c}$$

The parts and components specific unit value ratios would be an export quality indicator that is more closely related to global value chains.

In the course of the aggregation process, in order to avoid distortions due to erroneous entries in the trade statistics, outliers were identified and excluded from the data set using a two-step procedure. Firstly, products that had UVRs bigger than 4 in more than 10 countries were completely removed from the data set. Secondly, products that had UVRs bigger than 4 for each country were dropped.[32]

---

[32] While thresholds like this are necessarily arbitrary, they are necessary in order to avoid distortions in the aggregated UVRs due to very high values obtained in small (and often unreliable) product categories.

SHORT LIST OF THE MOST RECENT WIIW PUBLICATIONS
(AS OF DECEMBER 2018)

For current updates and summaries see also wiiw's website at **www.wiiw.ac.at**

ASIAN EXPERIENCES WITH GLOBAL AND REGIONAL VALUE CHAIN INTEGRATION AND STRUCTURAL CHANGE
by Roman Stöllinger

wiiw Research Reports, No. 436, December 2018
61 pages including 26 Tables and 10 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

MEASURING ECONOMIC OPENNESS: A REVIEW OF EXISTING MEASURES AND EMPIRICAL PRACTICES
by Claudius Gräbner, Philipp Heimberger, Jakob Kapeller and Florian Springholz

wiiw Working Papers, No. 157, November 2018
27 pages including 9 Tables and 5 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

wiiw Working Papers – Online Annex, to No. 157, November 2018
33 pages including 8 Tables and 6 Figures
PDF only free download from wiiw's website

INVESTMENT IN THE WESTERN BALKANS: NEW DIRECTIONS AND FINANCIAL CONSTRAINTS IN INFRASTRUCTURE INVESTMENT
by Mario Holzner (coordinator) and Richard Grieveson

wiiw Policy Notes and Reports, No. 27, November 2018
41 pages including 3 Tables and 37 Figures
PDF only: free download from wiiw's website

IMMIGRATION AND OFFSHORING: TWO FORCES OF 'GLOBALISATION' AND THEIR IMPACT ON LABOUR MARKETS IN WESTERN EUROPE: 2005-2014
by Michael Landesmann and Sandra M. Leitner

wiiw Working Papers, No. 156, November 2018
39 pages including 11 Tables and 5 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

WIIW MONTHLY REPORT 2018/11

ed. by Vasily Astrov and Sándor Richter

- Graph of the month: Immigration into the EU: Top five destination countries, 2008-2017
- Opinion corner: Global Compact for Migration: 'Eppur si muove'
- The Luddite rebellion: Past and present
- Internet *avant la lettre*: the Telegraph Revolution and its impact on economic growth in 1870-1913
- Can economic factors explain why Central Europe became so good at football in the 1930s?
- Monthly and quarterly statistics for Central, East and Southeast Europe

wiiw Monthly Reports, No. 11, November 2018
49 pages including 16 Figures
exclusively for wiiw Members

FACTORS DRIVING WEALTH INEQUALITY IN EUROPEAN COUNTRIES

by Sebastian Leitner

wiiw Working Papers, No. 155, November 2018
29 pages including 5 Tables and 7 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

THE RELATIVE IMPACT OF DIFFERENT FORCES OF GLOBALISATION ON WAGE INEQUALITY: A FRESH LOOK AT THE EU EXPERIENCE

by Stefan Jestl, Sandra M. Leitner and Sebastian Leitner

wiiw Working Papers, No. 154, November 2018
39 pages including 6 Tables and 6 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

AVOIDING AND ESCAPING THE 'COMMODITY TRAP' IN DEVELOPMENT

by Mahdi Ghodsi and Robert Stehrer

wiiw Working Papers, No. 153, November 2018
33 pages including 3 Tables and 6 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

INHERITANCE TAX REGIMES: A COMPARISON

by Stefan Jestl

wiiw Working Papers, No. 152, November 2018
17 pages including 5 Tables and 3 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

HOW MUCH DO TRADING PARTNERS MATTER FOR AUSTRIA'S COMPETITIVENESS AND EXPORT PERFORMANCE?
by Philipp Heimberger

wiiw Research Reports, No. 435, November 2018
27 pages including 5 Tables and 6 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

THE EU-JAPAN ECONOMIC PARTNERSHIP AGREEMENT AND ITS RELEVANCE FOR THE AUSTRIAN ECONOMY
by Julia Grübler, Oliver Reiter and Robert Stehrer

wiiw Research Reports, No. 434, November 2018
39 pages including 5 Tables and 14 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

STRONG GROWTH AMID INCREASED NEGATIVE RISKS
by Olga Pindyuk (lead author), Amat Adarov, Alexandra Bykova, Richard Grieveson, Julia Grübler, Peter Havlik, Philipp Heimberger, Mario Holzner, Gabor Hunya, Michael Landesmann, Leon Podkaminer, Hermine Vidovic, et al.

wiiw Forecast Report. Economic Analysis and Outlook for Central, East and Southeast Europe, Autumn 2018
wiiw, November 2018
181 pages including 37 Tables, 59 Figures and 1 Box
hardcopy: EUR 80.00 (PDF: EUR 65.00)
ISBN- 978-3-85209-063-4

IS AUSTRIA'S ECONOMY LOCKED-IN TO THE CESEE REGION? A MESOECONOMIC ANALYSIS
by Doris Hanzl-Weiss, Philipp Heimberger, Mario Holzner, Olga Pindyuk and Roman Stöllinger

wiiw Research Reports, No. 433, October 2018
61 pages including 18 Tables and 26 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

AUSTRIA'S ECONOMIC COMPETITIVENESS IN A NEIGHBOURHOOD CONTEXT
IS AUSTRIA'S ECONOMY LOCKED-IN TO THE CESEE REGION?
by Mario Holzner (coordinator), Mahdi Ghodsi, Doris Hanzl-Weiss, Philipp Heimberger, Olga Pindyuk and Roman Stöllinger

wiiw Policy Notes and Reports, No. 26, October 2018
21 pages including 11 Figures
PDF only: free download from wiiw's website

IMPRESSUM

Herausgeber, Verleger, Eigentümer und Hersteller:
Verein „Wiener Institut für Internationale Wirtschaftsvergleiche“ (wiiw),
Wien 6, Rahlgasse 3

ZVR-Zahl: 329995655

Postanschrift: A 1060 Wien, Rahlgasse 3, Tel: [+431] 533 66 10, Telefax: [+431] 533 66 10 50
Internet Homepage: www.wiiw.ac.at

Offenlegung nach § 25 Mediengesetz: Medieninhaber (Verleger): Verein "Wiener Institut für Internationale Wirtschaftsvergleiche", A 1060 Wien, Rahlgasse 3. Vereinszweck: Analyse der wirtschaftlichen Entwicklung der zentral- und osteuropäischen Länder sowie anderer Transformationswirtschaften sowohl mittels empirischer als auch theoretischer Studien und ihre Veröffentlichung; Erbringung von Beratungsleistungen für Regierungs- und Verwaltungsstellen, Firmen und Institutionen.

wiiw.ac.at