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Productivity and Trade Growth in Services: How Services Helped Power Factory Asia

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Abstract: This paper uses a theory-based measure of productivity-based comparative advantage to examine the trade performance of developing Asian countries in manufacturing and services over the 1995-2011 period. We find that growth in services exports has been nearly as rapid as in the case of manufacturing over this period—a fact that is little appreciated. Services are therefore an integral part of "Factory Asia". Moreover, results from a quantitative model of trade show that revealed productivity measures are often comparable between manufacturing and services at a disaggregated level, although results differ markedly across sectors and countries. We also find evidence of rapid growth in revealed productivity in some services subsectors, comparable to what was seen in manufacturing. Our findings suggest that oversimplifying the relationship between patterns of specialization and subsequent economic transformation and growth patterns misses important elements of reality.

JEL Codes: F14; F15; L80.

Keywords: Services; Trade; Comparative Advantage; Productivity; Asia.

1 INTRODUCTION

One key aspect of the "premature deindustrialization" argument is the hypothesis that services are low productivity relative to manufacturing, and that prospects for rapid and sustained productivity growth, which are the primary source of gains in per capita income, are greater in manufacturing than in services. For instance, Rodrik (2016) argues that manufacturing has a special role in development and growth as it is technologically dynamic and tradeable (i.e., not constrained by small domestic markets). Measuring productivity in services sectors is fraught with difficulties. This paper take a different approach, focused on trade data. Productivity differences are a key driver of trade flows between countries according to Ricardian logic. If the relative productivity hypothesis behind the premature deindustrialization argument is true, we would expect to see it reflected in trade data. Specifically, we would expect countries to experience different patterns of revealed productivity growth between manufacturing and services.

Until recently, analysts have commonly used the Balassa measure of Revealed Comparative Advantage (RCA) to draw inferences about the pattern of comparative advantage across sectors and countries. Although the measure is intuitively appealing, it lacks theoretical foundation, and imposes an arbitrary threshold for "comparative advantage" and "comparative disadvantage" based on a comparison between a country's sectoral trade patterns and those of the world as a whole. Such an approach could not be informative in the present case, as considerably more nuance is required.

We therefore make use of a recently developed Ricardian model of trade due to Costinot et al. (2012). Under Ricardo's logic, the productivity driver for trade is not absolute differences in productivity, but relative differences. In other words, we are interested in whether China or Singapore is the country relatively better at producing financial services relative to electronics. A by-product of their model is a simple and intuitive methodology for estimating a theory-consistent measure of RCA using a standard gravity model. They take their insight to the data using trade in goods only, and their work has been extended to a more disaggregated level by Lemain and Orefice (2013). To our knowledge, the present paper is the first to apply the same methodology to services, and in particular to allow for patterns of comparative advantage across goods and services sectors.

Traditionally, economists often subsumed services under the heading of the "non-tradeable" economy. That approach no longer holds water given regulatory and technological changes over recent decades (van der Marel and Shepherd, 2013). First, under the WTO General Agreement on Trade in Services, potentially any service is tradeable once the four modes of supply are accounted for. True, some services remain rarely traded, but this is due to high trade costs, not physical or legal impossibility. For instance, the textbook example of a "non-tradeable" service is a haircut. But every year for Fashion Week in New York or Paris, hairstylists move from country to country to supply such services under GATS Mode 4 (movement of service providers). Capturing statistics on such trade is challenging, and it only represents a small segment of the market. But it exists nonetheless. Similarly, in other sectors pure cross-border trade (GATS Mode 1) has become possible thanks to innovations in information and communication technologies (ICTs). Absent regulatory impediments, a lawyer in Shanghai can advise a client in Bangkok by phone, VoIP, or email, and the resulting payment of her fee is an export of services from China to Thailand. This kind of trade in services is quantitatively important in many sectors, and continues to grow as internet penetration rates increase and the digital economy extends its reach.

As a result of these two dynamics—changes in regulation and changes in technology—we can no longer consider services to be "non-tradeable". As such, it makes sense to include them in models of comparative advantage just as we do for goods. Economic actors choose to allocate resources across

goods and services sectors based on similar considerations, so there is no a priori barrier to including them in the same model, provided that appropriate account is taken of the possibility of cross-sectoral heterogeneity, as is already done in disaggregated models of goods trade.

The key constraint in implementing this approach is the availability of bilateral services trade data disaggregated by sub-sector. We elaborate on this issue in the next section, but in essence, we use a database of gross exports of goods and services by ISIC sector developed as part of the OECD-WTO Trade in Value Added (TiVA) project. To be clear, we are not using estimates of value added trade-they would not fit with our chosen theory—but carefully cleaned, harmonized, and estimated values for trade in goods and services in gross shipments terms developed as an input into the value added exercise.

The paper proceeds as follows. The next section discusses data issues in more detail, and presents some descriptive statistics based on observed patterns of export growth in developing Asia. The key insight of the descriptive analysis is that it is utterly artificial to separate trade growth in goods and services markets: they go together in a profound sense, even in "Factory Asia" where manufacturing has been paramount over recent decades. Section 3 discusses our model and estimation, and presents results. Our focus in the discussion of results is to show that productivity differences, and growth potential, vary at least as much within manufacturing and services aggregates as they do between them. In other words, sectoral specialization at a micro level is what matters for growth and development potential, not the aggregate level of goods or services production in an economy. Section 4 concludes and presents policy implications.

2 Data and Descriptive Statistics

Data on trade in services are notoriously incomplete. Recent efforts to compile global databases have focused on trade with the world as an aggregate partner (e.g., Loungani et al., 2017). While informative for descriptive purposes, these databases are largely not helpful for empirical work because they do not disaggregate by partner country. As a result, they cannot be used with standard trade models like gravity.

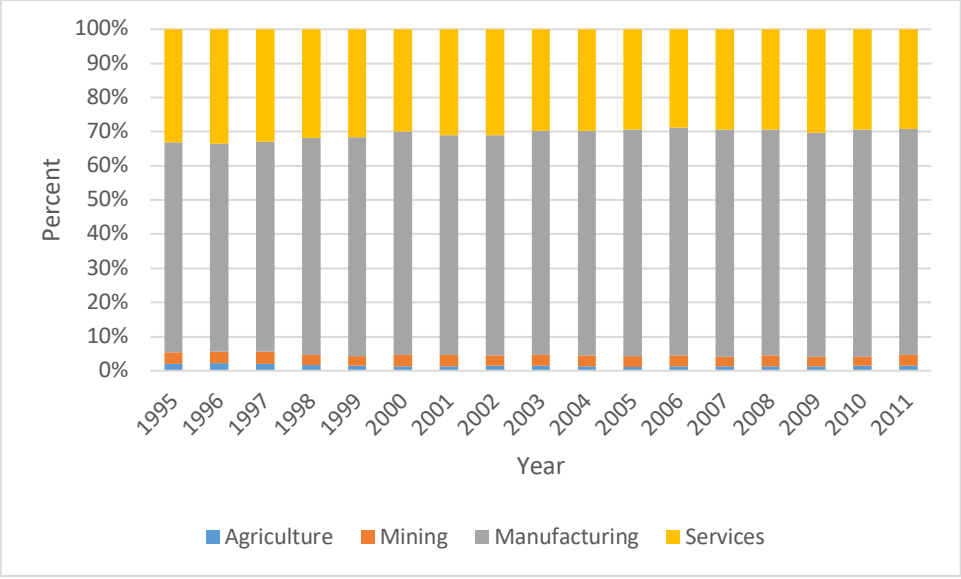
The difficulty with constructing a database of bilateral trade in services is that many countries simply do not record the relevant data within their balance of payments statistics. Estimates can be constructed by modeling, but that subsequently creates problems when synthetic observations are used in regressions that take a similar form to the model used to fill in the missing cells in the trade matrix. A recent effort that goes in this direction is the WTO's experimental BATIS dataset; however, it is still being tested and developed and so we do not use it here. Experience with it suggests that most bilateral data for developing Asian countries are modeled not directly observed, in particular once a sectoral disaggregation is applied.

A database that strikes an appropriate balance among these competing concerns is the OECD-WTO TiVA database. The database does not only contain information on trade in value added, but also the components needed to produce those estimates, which include gross trade flows in goods and services. The database harmonizes all reported data using the ISIC classification, balances reported exports and imports, and fills in missing cells in the trade matrix using an econometric model when necessary. The database includes 12 non-OECD members from East, Southeast, and South Asia. The advantage of this dataset for the present paper is that it presents harmonized data on goods and services trade, which makes it possible to analyze comparative advantage across sectors. We therefore use gross exports data from TiVA as our primary data source for all analysis.

Before moving to a fully-developed model in the next section, we can present some simple descriptive statistics. Intuitively, as policy distortions fall as they largely have over recent decades, comparative advantage sectors should experience faster trade growth than comparative disadvantage sectors. It is therefore useful to compare aggregate trade growth (with the rest of the world) across major sectors. We take the full period for which TiVA data are available, namely 1995-2011 annually. We decompose total trade into the following macro-sectors: agriculture, mining, manufacturing, and services. For services, we only consider business sector services (not government services). In the case of services, we are only considering that portion of the total that is recorded in the balance of payments, namely Mode 1 and some Mode 2 trade. No internationally comparable data on Mode 3 trade are available outside the OECD, and no comparable data on Mode 4 trade are available at all. An experimental effort is underway to produce a modal breakdown of services trade data at the WTO, but it is based on significant simplifications of existing data rather than direct collection, and in any event is not yet available for researchers.

Figure 1 shows a breakdown of total exports, i.e. summing across macro-sectors, for the full sample period. In this and the following figures, we limit consideration to what we will call "developing Asia", namely East, Southeast, and South Asian countries in the TiVA dataset with the exception of OECD member countries. It is important to keep in mind that this period represented, for the most part, a period of rapid growth in manufacturing exports from developing Asia. It is therefore remarkable that the share of manufacturing in the total only grew by five percentage points over the nearly two decades represented in the figure. Mining remained essentially constant in proportional terms over time, but agriculture lost ground, as did services: the latter macro-sector accounted for 33% of total exports in 1995, but 29% in 2011. Nonetheless, this loss of relative ground belies what was in fact a very strong growth performance over time, only slightly less rapid than the explosive growth seen in manufactured goods exports.

Figure 1: Breakdown of exports by macro-sector, developing Asia, 1995-2011, percent.

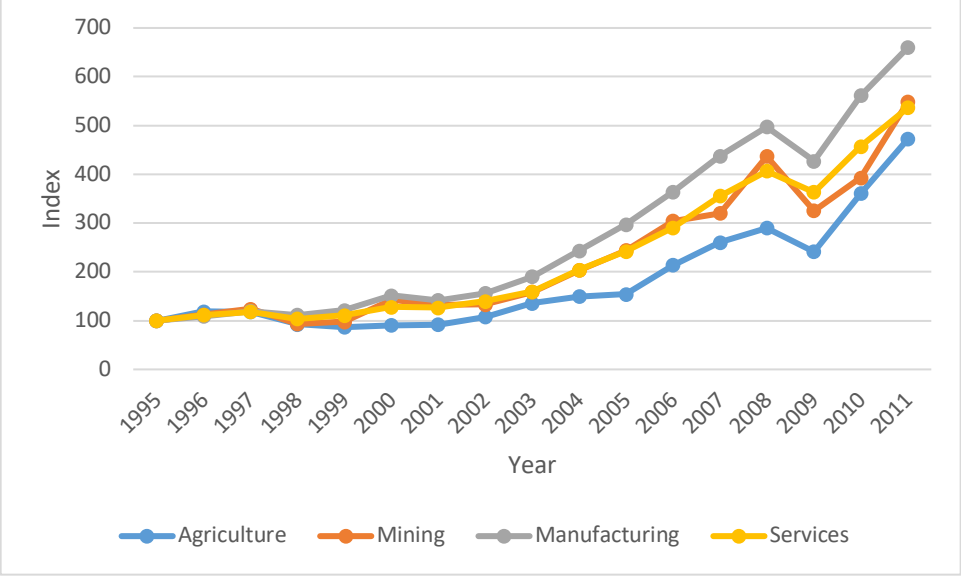


Source: OECD-WTO TiVA Database; and author's calculations.

To see this more clearly, Figure 2 shows growth in nominal gross exports over time, with all sectors re-based to equal 100 at the beginning of the sample, so that changes can be interpreted in percentage terms. Although growth in manufactured goods exports outstripped that of other sectors in the golden

age of development of "Factory Asia", services in fact also enjoyed explosive export growth over time. The significant difference between manufacturing and services by 2011 is due to compounding over time. In fact, average annualized growth rates were very close: 12.5% per annum for manufacturing, and 11.1% per annum per services. In any other environment, such a growth rate of services exports would be considered to be evidence of rapid and successful development of the services sector. Comparing rates of growth across macro-sectors suggests that although developing Asia enjoys comparative advantage in manufacturing relative to all other sectors, there is nonetheless evidence of comparative advantage in services relative to agriculture and, arguably, mining: in other words, the secondary and tertiary sectors are both sources of comparative advantage relative to the primary sector. From a development standpoint, this suggestive finding is important, as it suggests that movement out of low productivity agriculture is benefiting both the manufacturing and services sectors. Secondly, these data do not support the assertions either that manufactured goods are tradeable in a way that services are not, or that they have prospects for dynamic growth that services do not.

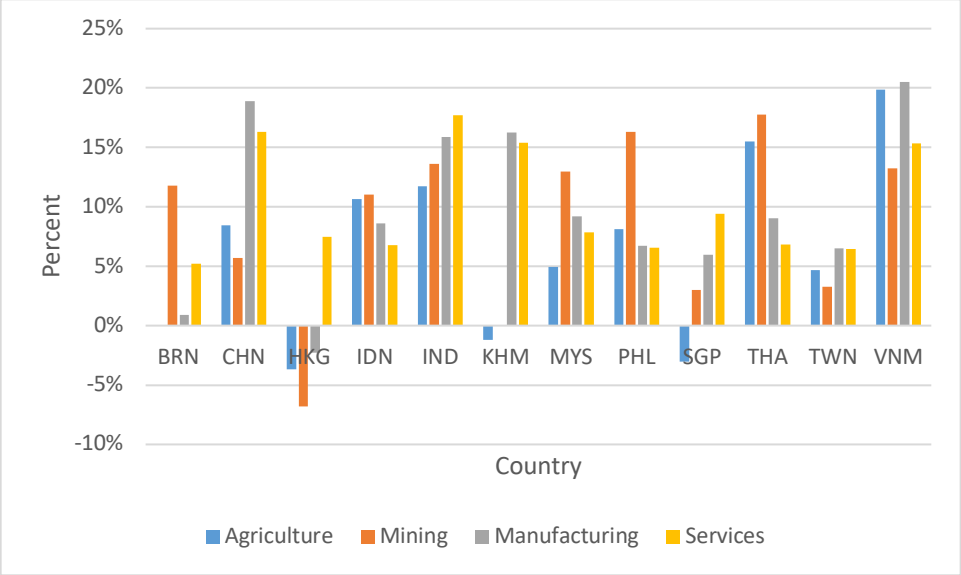
Figure 2: Exports by macro-sector, developing Asia, 1995=100.



Source: OECD-WTO TiVA Database; and author's calculations.

Of course, even the relatively small sample of countries used in this analysis displays significant heterogeneity. To make this clear, Figure 3 shows average annualized growth rates of exports in each macro-sector for the individual countries that constitute developing Asia in our sample. In Brunei, Hong Kong, India, Cambodia, the Philippines, Singapore, and Taiwan, the growth rate of services exports is either higher than the growth rate of manufacturing exports, or is very close to it. Even in a manufacturing powerhouse like China, the two rates are surprisingly close, as they are again in Malaysia, a country that is relying heavily on manufacturing in its effort to move from middle- to high-income status. The overall conclusion from Figure 3 is that there is a broad basis for arguing that services are a vital component of total trade growth in developing Asia; to the extent that that conclusion does not emerge as strongly from Figures 1 and 2, it can be seen to be due largely to China, which is responsible for a large share of total manufacturing exports, and where there is a small but—when compounded—important differential in growth rates between exports of manufactures and services.

Figure 3: Average annualized growth rates of exports by macro-sector, 1995-2011, developing Asia, percent.



Source: OECD-WTO TiVA Database; and author's calculations.

Thus far, we have only examined trade performance by macro-sector. But comparative advantage is a force that operates at a much more disaggregated level than that. It is therefore important to look within the services sector, by country, to examine sub-sectors where trade growth has been particularly sustained and rapid. It is also important to take account of the special role of transport services, which are to some extent subject to derived demand from manufacturing: goods exports need transport services in order to move from the factory gate to the final consumer, or the next user.

Table 1 presents results, again taking the full sample period. Entries in bold represent average annualized growth rates of exports of 10% or greater over this nearly two decade period. Three facts stand out. First, known high performers in trade, like China, have seen rapid export growth in all services sub-sectors, not just transport. The same is true of known services specialists, like India. The second major finding is that even in other countries, there is typically evidence of rapid trade growth in some services sub-sectors, which suggests that at a disaggregated level, some services sub-sectors may exhibit comparative advantage relative to other sub-sectors in the economy, either in the primary or secondary sector. Finally, the pattern of sectoral specialization in exports, as evidenced by growth patterns, is quite different across countries. Business services stand out in some economies, as do computer services in India, and also finance in some cases, as well as construction. The sectoral pattern of specialization is important because different levels of productivity and patterns of productivity growth are associated with different services sub-sectors. Intuitively, we would expect to see strong productivity growth associated with specialization in business or computer services, but significantly less with hotels and restaurants or construction. When thinking about the development trajectories of the countries in the table, the relative pattern of export growth is important from this point of view.

Of course, it is not possible to draw strong conclusions about patterns of comparative advantage from descriptive statistics alone. The next section presents a modeling framework with a strong theoretical basis that makes it possible to develop more nuanced and detailed insights.

Table 1: Average annualized growth rate of exports by services sub-sector, 1995-2011, developing Asia, percent.

Country	Construction	Wholesale & Retail	Hotels & Restaurants	Transport	Telecom	Finance	Real Estate	Renting	Computer	Business Services
BRN	4.18%	8.91%	6.83%	4.76%	4.34%	4.38%	9.98%	4.29%	2.40%	3.91%
CHN	**15.77%**	**16.25%**	**11.55%**	**14.35%**	**17.44%**	**11.37%**	**12.57%**	**19.41%**	**19.25%**	**28.97%**
HKG	8.66%	5.46%	8.81%	7.39%	8.65%	8.65%	7.03%	9.44%	8.66%	8.65%
IDN	6.59%	8.80%	2.51%	5.20%	4.03%	4.03%	2.69%	7.48%	4.03%	4.03%
IND	**20.67%**	**13.37%**	**13.23%**	**20.11%**	**22.98%**	**22.99%**	**11.59%**	**14.65%**	**22.99%**	**22.99%**
KHM	**24.25%**	**14.72%**	**24.76%**	**14.99%**	**17.50%**	**21.02%**	**14.11%**	**25.18%**	8.14%	**36.23%**
MYS	9.26%	8.87%	7.57%	5.77%	**11.54%**	7.83%	7.05%	6.86%	**22.77%**	5.74%
PHL	-4.06%	5.84%	6.77%	7.31%	4.68%	9.45%	6.25%	7.02%	8.67%	6.67%
SGP	**19.20%**	6.30%	5.94%	9.79%	**10.02%**	**12.46%**	**10.87%**	7.52%	9.66%	**11.82%**
THA	**33.10%**	6.86%	7.50%	6.02%	5.70%	9.14%	5.86%	9.68%	-1.41%	**12.61%**
TWN	**10.33%**	5.50%	8.14%	8.04%	3.45%	9.21%	7.77%	9.63%	7.59%	8.89%
VNM	9.26%	**16.23%**	**15.52%**	**19.84%**	5.33%	-1.88%	**21.02%**	**15.78%**	**12.96%**	**13.21%**

Source: OECD-WTO TiVA Database; and author's calculations.

3 MODEL AND RESULTS

Costinot et al. (2012) develop a Ricardian model of trade, extending the work of Eaton and Kortum (2002). Their objective is to quantify the importance of productivity differences as a driver of trade. But as a by-product of their investigation, they develop a simple method for analyzing patterns of comparative advantage that is fully consistent with their theoretical setup. Like many models of trade, theirs can be reduced to a gravity-like relation. Specifically, their theory predicts that bilateral trade flows by sector should satisfy the following relation:

$$(1)\ \ln x_{ij}^{k} = d_{ij} + d_{j}^{k} + \theta \ln z_{i}^{k} + e_{ij}^{k}$$

Where: x_{ij}^{k} is exports from country i to country j in sector k; d_{ij} is a country pair fixed effect capturing structural features of the model, such as trade costs; θ is a parameter from the theory capturing intra-industry heterogeneity in productivity; z_{i}^{k} is the fundamental productivity of country i in sector k, taking account of factors like climate, infrastructure, and institutions that affect all producers within a country; and e_{ij}^{k} is an error term satisfying standard assumptions. As suggested by the use of a parameter like this, the objective of the exercise is to quantify comparative advantage, not to uncover its sources as in models like Chor (2010), applied to services by van der Marel (2011).

Costinot et al. (2012) initially estimate (1) directly, using productivity estimates drawn from available data. However, such an approach is not practical for application to a wide range of countries, particularly developing ones, as such estimates are not readily available on a comparable basis. As the authors note, they are also subject to significant concerns regarding measurement error.

An alternative approach is therefore to replace the productivity variable with an exporter-sector fixed effect:

$$(2)\ \ln x_{ij}^{k} = d_{ij} + d_{j}^{k} + d_{i}^{k} + e_{ij}^{k}$$

The standard OLS estimate will produce consistent estimates of the exporter-sector fixed effects. Once the estimates have been obtained, a value of θ from the literature can be used to construct revealed productivity measures by exponentiation, i.e. $z_{i}^{k} = \exp\left(d/\theta\right)$. There are important advantages to proceeding in this way. First, the only limit on application is the availability of trade data. There is no a priori reason why the method could not be applied to services trade as well as goods trade, even though productivity data are subject to even greater concerns in services sectors than is the case for goods. Second, the revealed productivity measure can be interpreted, as the authors do, in terms of a theoretical RCA measure. Following the original paper, we express all estimates relative to the revealed productivity level in agriculture in each country.

To implement the model empirically, we use data on trade flows in goods and services covering 27 ISIC sectors contained in the TiVA database. We use trade data in gross shipments, not value added, terms. The estimation sample includes 62 exporting and importing countries. We discard observations where trade is equal to zero, as the estimation procedure is in logarithms. We then estimate separately for each year, pooling across sectors. To convert the estimated fixed effects to theory-consistent RCA measures, we use the same estimate of θ as Costinot et al. (2012), namely 6.53.

Tables 2 and 3 present results for manufacturing and services sectors respectively. Although estimates are available for all years in the sample, we limit consideration initially to the last year in the sample, 2011. Unsurprisingly, Table 2 shows that developing Asian countries typically have comparative

advantage in manufacturing sectors relative to agriculture. But the most important point is that the degree of advantage varies considerably across countries within sectors, and across sectors within countries. Countries like China, Singapore, and Taiwan have strong comparative advantage in the electronics sector, for example. By contrast, Indonesia's comparative advantage in manufacturing is much more modest, and focused on the chemicals sector. Interpreting these results in terms of relative productivity levels confirms that most developing Asian countries have manufacturing sectors that are more productive than their own agricultural sectors, although the degree of the productivity differential is highly variable. Interestingly, a country like Viet Nam, which has been emphasizing development of its manufacturing sector in recent years, only exhibits a relatively limited degree of comparative advantage in manufacturing sub-sectors relative to a more established manufacturer like China. Of course, these data are for 2011, and there have likely been substantial changes in the intervening seven years.

Comparing Table 2 with results in Table 3 suggests that there is no simple conclusion to be drawn about relative patterns of comparative advantage in goods and services in developing Asia. Results are highly variable across countries and sectors, but there are many instances in which developing Asian countries have comparative advantage in services subsectors relative to agriculture, and by comparing the two tables, in certain services subsectors relative to some manufacturing subsectors. In China, for example, the extent of comparative advantage in wholesale and retail trade relative to agriculture is comparable to the figure for textiles and clothing or machinery in manufacturing. Similarly, the Philippines' degree of comparative advantage in transport services relative to agriculture is stronger than what is observed in all manufacturing sectors except for electronics. While it is true that it is typically higher income countries that have stronger comparative advantage in services subsectors—Singapore and Hong Kong stand out—there are important instances of middle income countries with significant revealed productivity advantages in services subsectors. In addition to those already listed, Viet Nam's comparative advantage in wholesale and retail trade relative to agriculture is identical to that in electronics and only slightly lower than in food products, while transport is nearly as strong. There are numerous instances of this type. The objective here is not to catalogue them all but simply to highlight that even in "Factory Asia", patterns of revealed productivity cannot be reduced to a simple dichotomy between relatively high productivity manufacturing and relatively low productivity services. The reality is much more complicated and nuanced, which suggests that simple narratives based on the observed prevalence of services relative to manufacturing are likely missing important parts of reality. This finding sits well with the descriptive statistics presented above, where we showed that even in a region like developing Asia, where most analysis has focused on rapid growth in manufacturing exports over recent years, observed patterns of services trade have actually been strikingly similar.

Table 2: Revealed productivity in selected manufacturing sectors, developing Asia, 2011.

Country	Food Products	Textiles & Clothing	Chemicals	Plastics	Metal Products	Machinery	Electronics	Vehicles
CHN	1.28	1.71	1.64	1.47	1.48	1.87	2.11	1.40
HKG	1.39	1.83	1.63	1.42	1.40	1.84	1.27	1.17
IDN	1.11	1.08	1.11	0.97	0.73	1.02	1.10	0.86
IND	1.19	1.32	1.53	1.17	1.06	1.28	1.22	1.25
KHM	1.09	1.51	0.77	0.85	0.88	0.77	0.73	0.71
MYS	1.31	1.02	1.34	1.29	1.01	1.29	1.59	0.93
PHL	1.33	1.14	1.28	1.12	1.00	1.15	1.65	1.17
SGP	1.85	1.53	2.61	1.71	1.86	2.47	3.05	1.42
THA	1.35	1.10	1.29	1.25	1.05	1.47	1.39	1.36
TWN	1.26	1.61	2.03	1.79	1.88	2.15	2.43	1.68
VNM	1.19	1.13	0.92	1.00	0.91	0.97	1.18	0.75

Source: Author's calculations. Note: All estimates are relative to agriculture (1.00). Brunei is dropped from the sample as estimates are typically not available in the baseline sector.

Table 3: Revealed productivity in selected services sectors, developing Asia, 2011.

Country	Construction	Wholesale & Retail	Hotels & Restaurants	Transport	Telecom	Finance	Computer Services	Other Business Services
CHN	0.85	1.79	1.31	1.59	0.90	0.46	0.73	1.02
HKG	1.56	2.05	2.24	3.06	1.78	1.70	0.78	1.39
IDN	0.51	1.24	0.85	1.01	0.63	0.36	0.38	0.41
IND	0.74	1.47	1.04	1.41	0.86	0.52	0.98	0.96
KHM	0.73	1.39	0.99	1.31	0.93	0.73	0.59	0.65
MYS	0.87	1.43	1.14	1.29	0.91	0.64	0.67	0.74
PHL	0.78	1.44	1.15	1.53	1.18	0.63	0.76	0.98
SGP	1.76	2.46	2.43	2.95	1.48	2.03	1.66	1.77
THA	0.64	1.41	1.23	1.32	0.76	0.51	0.35	0.63
TWN	0.84	2.02	1.30	1.76	1.07	0.77	0.66	0.93
VNM	0.53	1.18	0.82	1.14	0.48	0.37	0.37	0.39

Source: Author's calculations. Note: All estimates are relative to agriculture (1.00). Brunei is dropped from the sample as estimates are typically not available in the baseline sector.

Given that we have estimated the model over a long time period, it is informative to look at changes in revealed productivity in manufacturing and services. This point is important in light of the argument in the premature deindustrialization literature that manufacturing has unique prospects for technological change over time, and thus for sustained productivity growth.

Tables 4 and 5 consider the absolute change in our theory-consistent RCA measures between 1995 and 2011. We use the full period because it represents the spread of manufacturing activity from the tiger economies to other parts of Asia, and has witnessed explosive export growth in countries like China and Viet Nam, as well as others. We would expect to see evidence of deepening comparative advantage in manufacturing sectors over that time.

That is indeed what we observe in Table 4. Entries in the table are typically positive, which means that revealed productivity relative to agriculture has increased over time in most cases. Unsurprisingly, China stands out as having had significant revealed productivity gains in all manufacturing sub-sectors. But the phenomenon is by no means limited to China: the data are consistent with a general increase in revealed productivity of manufacturing activities relative to agriculture all across Asia, from lower income countries like Cambodia to higher income ones like Singapore.

Comparing Table 4 (manufacturing) with Table 5 (services), however, shows that productivity gains were also strong in the latter case. In China, for example, the absolute increase in the revealed productivity of the other business services sector relative to agriculture was comparable to what was observed for motor vehicles, and larger than was the case for manufacturing sectors like textiles and clothing. The contrast is even stronger for transport services. Putting China aside, the higher income countries in the region again stand out as having particularly strong gains in revealed productivity in services, but it is important to stress that the phenomenon is by no means limited to them. Cambodia's second largest absolute gain in revealed productivity was in transport services: it outstripped absolute gains in all manufacturing sectors except textiles and clothing, which is well-known to be a success story in terms of industrial development. Similarly, Malaysia's absolute gain in revealed productivity in computer services was equal to what was seen in plastics, and only slightly below gains in the electronics and chemicals sectors. Again, there is no easy way of classifying the patterns in Tables 4 and 5 according to a supposed dichotomy between manufactured goods and services. The data do not support the proposition that productivity gains in manufacturing are systematically stronger in a dynamic sense than in services. Rather what we see is a complex set of results that varies across countries and sectors. So again, precise patterns of specialization are relevant to an economy's growth path, not gross patterns (manufacturing versus services). As above, however, we stress that even in manufacturing success stories like China and Viet Nam, there is evidence of revealed productivity gains in services that are quantitatively significant, and in some cases of comparable magnitude.

Table 4: Change in revealed productivity in selected manufacturing sectors, developing Asia, 1995-2011.

Country	Food Products	Textiles & Clothing	Chemicals	Plastics	Metal Products	Machinery	Electronics	Vehicles
CHN	0.15	0.32	0.25	0.38	0.34	0.56	0.74	0.47
HKG	0.07	0.23	0.25	0.06	0.12	0.20	-0.39	0.17
IDN	0.12	-0.05	0.13	0.08	-0.10	0.15	0.19	0.23
IND	0.16	0.13	0.31	0.20	0.15	0.31	0.35	0.39
KHM	0.38	0.60	0.08	0.13	0.21	0.13	0.06	0.20
MYS	0.25	0.15	0.31	0.29	0.21	0.23	0.30	0.20
PHL	0.10	0.00	0.16	0.19	0.04	0.07	0.14	0.22
SGP	0.47	0.37	1.06	0.40	0.61	0.82	0.88	0.45
THA	-0.11	-0.27	0.05	-0.17	-0.02	0.11	-0.04	0.29
TWN	-0.02	-0.22	0.13	0.00	0.11	0.09	0.03	0.14
VNM	0.16	0.04	0.06	0.18	0.19	0.13	0.23	0.09

Source: Author's calculations. Note: All estimates are relative to agriculture (1.00). Brunei is dropped from the sample as estimates are typically not available in the baseline sector.

Table 5: Change in revealed productivity in selected services sectors, developing Asia, 1995-2011.

Country	Construction	Wholesale & Retail	Hotels & Restaurants	Transport	Telecom	Finance	Computer Services	Other Business Services
CHN	0.22	0.39	0.53	0.46	0.22	-0.33	0.21	0.45
HKG	0.66	0.32	0.59	1.17	0.67	-0.21	0.17	0.46
IDN	0.08	0.10	-0.08	0.08	-0.06	-0.37	0.00	-0.01
IND	0.07	0.22	0.23	0.36	0.19	-0.32	0.33	0.29
KHM	0.23	0.45	0.33	0.55	0.23	0.01	0.04	0.24
MYS	0.24	0.27	0.22	0.22	0.12	-0.42	0.29	0.08
PHL	-0.14	0.13	0.07	0.14	0.03	-0.47	0.08	-0.03
SGP	1.02	0.76	0.91	1.24	0.61	0.11	0.73	0.79
THA	0.07	-0.09	-0.13	-0.14	-0.17	-0.42	-0.15	0.06
TWN	0.22	-0.01	0.13	0.15	-0.02	-0.55	0.08	0.08
VNM	-0.10	0.02	-0.04	0.21	-0.30	-0.83	-0.02	-0.06

Source: Author's calculations. Note: All estimates are relative to agriculture (1.00). Brunei is dropped from the sample as estimates are typically not available in the baseline sector.

4 Conclusion and Policy Implications

We have reviewed the recent evidence on trade growth in goods and services, focusing on developing (non-OECD) Asia. The 1990s and 2000s are widely considered to be the golden age of manufacturing in developing Asia, with movement of industrial activity from the tiger economies of the 1970s and 1980s to China, and subsequently to other parts of the region. Consistent with this view, we find that developing Asia as a whole indeed experienced very rapid growth in manufacturing exports over that period. Moreover, our modeling suggests that this export growth was driven by increases in revealed productivity, or theoretical RCA. Thus far, our findings would be consistent with the intuition that development of the manufacturing sector, in particular through outward orientation, is the surest way to promote productivity upgrading and economic transformation.

But this story—which is widely accepted—is only half of what actually happened in developing Asia. We show that export growth in commercial services was nearly as spectacular as what was observed in manufacturing. This fact is not widely known. Even less appreciated is that this increase in trade was similarly driven by significant increases in revealed productivity in services sub-sectors. In other words, in developing Asia manufacturing and services have tended to grow together in terms of trade integration. There is no simple pattern of changes in revealed productivity over time as between goods and services. We certainly do not observe in the data that only manufacturing sectors enjoy high levels of revealed productivity, are tradeable, or enjoy rapid and sustained productivity growth. Rather, we see a complex pattern of results at the level of individual subsectors and countries, as would be expected if the relationship between specialization and productivity growth depended in a complex way on resources, institutions, and firm-level behavior. In other words, what we observe is the full complexity of trade growth in a context where comparative advantage matters in a quantitative and qualitative sense.

With this insight in mind, the key conclusion is that policymakers should be wary of oversimplifying the relationship between manufacturing and services. On the one hand, the servicification of economies all around the world (e.g., Bamber et al., 2017), including in Asia, means that it is now quite impossible to talk about trade or productivity growth in manufacturing without considering services inputs. But we have also shown that the experience of developing Asia has not been that countries choose "manufacturing" or "services" in an aggregate sense, potentially at the expense of the other, but that the two interact in complex ways. Similarly, our results suggest that "services pessimism" in developing Asia—the idea that only manufacturing can produce rapid and sustained productivity growth—is not warranted as a general proposition. Rather, we see that in individual countries, particular services subsectors have exhibited rates of revealed productivity growth that are absolutely comparable to what has been seen during the golden age of Factory Asia. In other words, it is important to look at the realities of performance at a disaggregated level before drawing strong conclusions about the development potential of particular sectors.

The premature deindustrialization story has a certain intuitive appeal, especially in classroom settings where highly stylized and simplified models can nonetheless be of great expositional value. But as a guide to policy, it is far too simple to be useful. In a servicified economy, the distinction between "manufactured goods" and "services" is increasingly blurred: many firms produce and use both, and a substantial proportion of gross exports of manufactures, 32% in ASEAN and East Asia, is in fact embodied services value added (OECD-WTO TiVA database). In addition, as we have shown in this paper, it is not empirically true that "manufacturing" as an aggregate systematically offers levels and growth potential of revealed productivity, or degrees of tradability, that are not available in the services sector. There is at least as much variation within manufacturing and services as there is between them.

From a policy point of view, therefore, it is important to pay attention to sectoral specificities at a micro level, rather than being guided by overly simplified and outdated models that only consider large aggregates. Patterns of specialization of course matter for an economy's growth path, but the level of disaggregation should be as fine as possible. That is a challenging task with services, given the state of the international data, but one that analysts and policymakers need to turn to.

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