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PRODUCTIVITY AND TRADE GROWTH IN SERVICES: HOW SERVICES HELPED POWER FACTORY ASIA

Ben Shepherd

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Ben Shepherd is the principal of Developing Trade Consultants.

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Please contact the authors for information about this paper.

Email: ben@developing-trade.com

Asian Development Bank Institute
Kasumigaseki Building, 8th Floor
3-2-5 Kasumigaseki, Chiyoda-ku
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500
Fax: +81-3-3593-5571
URL: www.adbi.org
E-mail: info@adbi.org

Abstract

This paper uses a theory-based measure of productivity-based comparative advantage to examine the trade performance of developing Asian economies in manufacturing and services over the 1995–2011 period. We find that the growth in service exports was nearly as rapid as that in manufacturing over this period—a little-appreciated fact. Services are therefore an integral part of "Factory Asia." Moreover, the results from a quantitative model of trade show that revealed productivity measures are often comparable between manufacturing and services at a disaggregated level, although the results differ markedly across sectors and economies. We also find evidence of rapid growth in revealed productivity in some service subsectors, comparable to that 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.

Keywords: services, trade, comparative advantage, productivity, Asia

JEL Classification: F14, F15, L80

Contents

1. INTRODUCTION

One key aspect of the "premature deindustrialization" argument is the hypothesis that services are low in productivity relative to manufacturing and that the 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) argued 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 service sectors is fraught with difficulties. This paper takes a different approach, focusing on trade data. Productivity differences are a key driver of trade flows between economies according to Ricardian logic. If the relative productivity hypothesis behind the premature deindustrialization argument is true, we would expect the trade data to reflect it. Specifically, we would expect economies to experience different patterns of revealed productivity growth between manufacturing and services.

Until recently, analysts commonly used the Balassa measure of revealed comparative advantage (RCA) to draw inferences about the patterns of comparative advantage across sectors and economies. Although the measure is intuitively appealing, it lacks theoretical foundation and imposes an arbitrary threshold for a "comparative advantage" and a "comparative disadvantage" based on a comparison between an economy'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 necessary.

We therefore make use of Costinot, Donaldson, and Komunjer's (2012) recently developed Ricardian model of trade. Under Ricardo's logic, the productivity driver for trade is not absolute differences but relative differences in productivity. In other words, we are interested in whether the People's Republic of China (PRC) or Singapore is 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 applied their insight to the data using trade in goods only, and Lemain and Orefice (2013) extended their work to a more disaggregated level. 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 service sectors.

Traditionally, economists often subsumed services under the heading of the "non-tradeable" economy. That approach no longer applies given the 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, having accounted for the four modes of supply. It is true that 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. However, 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 for such trade is challenging, and it only represents a small segment of the market. Nonetheless, it exists. Similarly, in other sectors, pure cross-border trade (GATS Mode 1) has become possible thanks to innovations in information and communication technologies (ICTs). Lacking 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 the PRC to Thailand. This kind of trade in services is quantitatively important in many sectors and

continues to grow as the 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 like goods. Economic actors choose to allocate resources across goods and service sectors based on similar considerations, so there is no a priori barrier to including them in the same model, provided that we take appropriate account of the possibility of cross-sectoral heterogeneity, as is already the case for disaggregated models of goods trade.

The key constraint in implementing this approach is the availability of bilateral service trade data disaggregated by subsector. 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 that the OECD–WTO Trade in Value Added (TiVA) project developed. To be clear, we do not use 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 as an input into the value-added exercise.

The paper proceeds as follows. The next section discusses the data issues in more detail and presents some descriptive statistics based on the 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 service markets: they belong 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 the results. Our focus in the discussion of the results is on showing that productivity differences and growth potential vary at least as much within manufacturing and service aggregates as they do between them. In other words, sectoral specialization at the micro-level matters for growth and development potential, not the aggregate level of goods or service production in an economy. Section 4 concludes and presents policy implications.

2. DATA AND DESCRIPTIVE STATISTICS

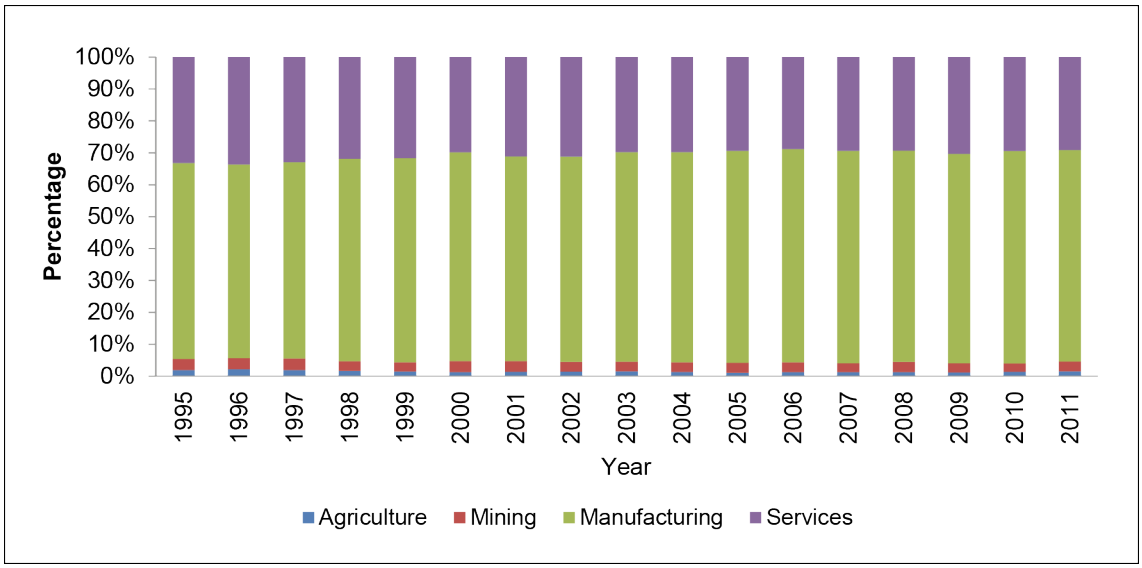
Data on trade in services are notoriously incomplete. Recent efforts to compile global databases have focused on trade with the world as an aggregate partner (e.g., Loungani et al. 2017). While informative for descriptive purposes, these databases are largely not helpful for empirical work, because they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

The difficulty with constructing a database of bilateral trade in services is that many economies simply do not record the relevant data within their balance of payments statistics. It is possible to construct estimates by modeling, but that subsequently creates problems when using synthetic observations in regressions that take a similar form to the model used to fill in the missing cells in the trade matrix. A recent effort in this direction was the WTO's experimental BATIS dataset; however, it is still undergoing testing and development, so we do not use it here. Experience with it suggests that it models rather than directly observing most bilateral data for developing Asian economies, particularly when applying sectoral disaggregation.

A database that strikes an appropriate balance among these competing concerns is the OECD–WTO TiVA database. The database contains not only information on trade in value added but also the components necessary to produce those estimates that include gross trade flows in goods and services. The database harmonizes all the reported data using the ISIC classification, balances the 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 service trade, which makes it possible to analyze comparative advantages across sectors. We therefore use gross export data from TiVA as our primary data source for all the analyses.

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 the 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 only consider that portion of the total that economies record 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. The WTO is undertaking an experimental effort to produce a modal breakdown of service trade data, but it is basing it on significant simplifications of existing data rather than direct collection, and in any event it is not yet available to researchers.

Figure 1: Breakdown of Exports by Macro-sector, Developing Asia, 1995–2011



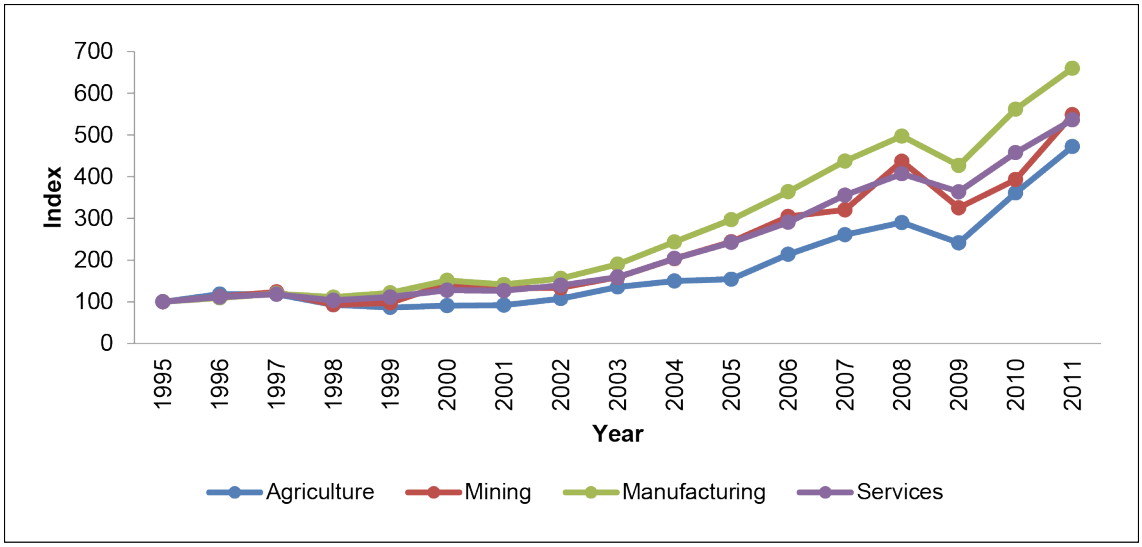
Source: OECD–WTO TiVA database and author's calculations.

Figure 1 shows a breakdown of total exports, that is, summing across macro-sectors, for the full sample period. In this and the following figures, we limit our consideration to what we call "developing Asia," namely East, Southeast, and South Asian economies, in the TiVA dataset, with the exception of OECD member economies. It is important

to keep in mind that this period, for the most part, represented 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 5 percentage points over the nearly 2 decades that the figure represents. Mining remained essentially constant in proportional terms over time, but agriculture lost ground, as did services: the latter macro-sector accounted for 33% of the 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 occurring in manufactured goods exports.

To show this more clearly, Figure 2 presents growth in nominal gross exports over time, rebasing all the sectors to equal 100 at the beginning of the sample so that it is possible to interpret the changes in percentage terms. Although the growth in manufactured goods exports outstripped that in 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, the average annualized growth rates were very close: 12.5% per annum for manufacturing and 11.1% per annum per services. In any other environment, researchers would consider such a growth rate of service exports to be evidence of rapid and successful development of the service sector. Comparing rates of growth across macro-sectors suggests that, although developing Asia enjoys a comparative advantage in manufacturing relative to all other sectors, there is nonetheless evidence of a comparative advantage in services relative to agriculture and, arguably, mining; in other words, the secondary and tertiary sectors are both sources of a 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 benefits both the manufacturing and the service sector. Secondly, these data do not support the assertion 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.

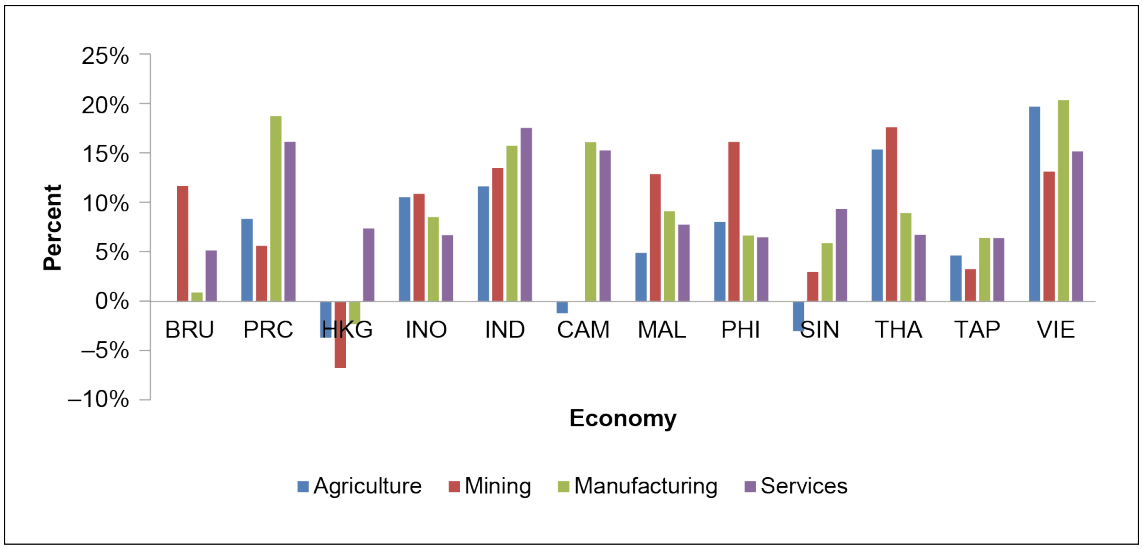
Figure 2: Exports by Macro-sector, Developing Asia, 1995=100



Source: OECD–WTO TiVA database and author's calculations.

Of course, even the relatively small sample of economies that this analysis uses displays significant heterogeneity. To make this clear, Figure 3 shows the average annualized growth rates of exports in each macro-sector for the individual economies that constitute developing Asia in our sample. In Brunei Darussalam; Hong Kong, China; India; Cambodia; the Philippines; Singapore; and Taipei,China, the growth rate of service exports is either higher than the growth rate of manufacturing exports or very close to it. Even in a manufacturing powerhouse like the PRC, the two rates are surprisingly close, as they are again in Malaysia, a country that relies 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 the total trade growth in developing Asia; to the extent that this conclusion does not emerge as strongly from Figures 1 and 2, it is apparently due largely to the PRC, which is responsible for a large share of the total manufacturing exports and which has a small but—when compounded—important differential in growth rates between exports of manufacturing and exports of services.

Figure 3: Average Annualized Growth Rates of Exports by Macro-sector, 1995–2011, Developing Asia



Source: OECD–WTO TiVA database and author's calculations.

Thus far, we have only examined trade performance by macro-sector. However, comparative advantage is a force that operates at a much more disaggregated level. It is therefore important to look within the service sector, by economy, to examine the subsectors in which 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 demand derived from manufacturing: goods exports need transport services to move from the factory gate to the final consumer or the next user.

Table 1 presents the results, again for the full sample period. The entries in bold represent the average annualized growth rates of exports of 10% or more over this period of nearly two decades. Three facts stand out. First, known high performers in trade, like the PRC, have experienced rapid export growth in all the service subsectors, not just transport. The same is true of known service specialists, like India. The second major finding is that, even in other economies, there is typically evidence of rapid trade growth in some service subsectors, which suggests that, at a disaggregated level, some service subsectors may exhibit a comparative advantage relative to other

subsectors in the economy, either in the primary or in the secondary sector. Finally, the pattern of sectoral specialization in exports, as evidenced by growth patterns, is quite different across economies. Business services stand out in some economies, as do computer services in India and 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 service subsectors. Intuitively, we would expect to see strong productivity growth associated with specialization in business or computer services but significantly less associated with hotels and restaurants or construction. When thinking about the development trajectories of the economies 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 Service Subsector, 1995–2011, Developing Asia

Economy	Construction	Wholesale and Retail	Hotels and Restaurants	Transport	Telecom
BRU	4.18%	8.91%	6.83%	4.76%	4.34%
PRC	15.77%	16.25%	11.55%	14.35%	17.44%
HKG	8.66%	5.46%	8.81%	7.39%	8.65%
INO	6.59%	8.80%	2.51%	5.20%	4.03%
IND	20.67%	13.37%	13.23%	20.11%	22.98%
CAM	24.25%	14.72%	24.76%	14.99%	17.50%
MAL	9.26%	8.87%	7.57%	5.77%	11.54%
PHI	–4.06%	5.84%	6.77%	7.31%	4.68%
SIN	19.20%	6.30%	5.94%	9.79%	10.02%
THA	33.10%	6.86%	7.50%	6.02%	5.70%
TAP	10.33%	5.50%	8.14%	8.04%	3.45%
VIE	9.26%	16.23%	15.52%	19.84%	5.33%

Economy	Finance	Real Estate	Renting	Computer	Business Services
BRU	4.38%	9.98%	4.29%	2.40%	3.91%
PRC	11.37%	12.57%	19.41%	19.25%	28.97%
HKG	8.65%	7.03%	9.44%	8.66%	8.65%
INO	4.03%	2.69%	7.48%	4.03%	4.03%
IND	22.99%	11.59%	14.65%	22.99%	22.99%
CAM	21.02%	14.11%	25.18%	8.14%	36.23%
MAL	7.83%	7.05%	6.86%	22.77%	5.74%
PHI	9.45%	6.25%	7.02%	8.67%	6.67%
SIN	12.46%	10.87%	7.52%	9.66%	11.82%
THA	9.14%	5.86%	9.68%	–1.41%	12.61%
TAP	9.21%	7.77%	9.63%	7.59%	8.89%
VIE	–1.88%	21.02%	15.78%	12.96%	13.21%

Source: OECD–WTO TiVA database and author's calculations.

3. MODEL AND RESULTS

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

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

where: x_{ij}^{k} is exports from country i to country j in sector k; d_{ij} is a country pair fixed effect capturing the 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 the producers within a country; and e_{ij}^{k} is an error term satisfying the standard assumptions. As the use of a parameter like this suggests, the objective of the exercise is to quantify a comparative advantage rather than to uncover its sources, as in models like that of Chor (2010), which van der Marel (2011) applied to services.

Costinot, Donaldson, and Komunjer (2012) initially estimated (1) directly, using productivity estimates that they drew from the 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 noted, they also suffer from significant concerns regarding measurement error.

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

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

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

To implement the model empirically, we use data on trade flows in goods and services covering the 27 ISIC sectors that the TiVA database contains. We use trade data in gross shipments, not value added, terms. The estimation sample includes 62 exporting and importing economies. We discard observations for which trade is equal to 0, as the estimation procedure is in logarithms. We then estimate separately for each year,

pooling across sectors. To convert the estimated fixed effects into theory-consistent RCA measures, we use the same estimate of θ as Costinot, Donaldson, and Komunjer (2012), namely 6.53.

Tables 2 and 3 present the results for the manufacturing and service sectors, respectively. Although the estimates are available for all the years in the sample, we limit our consideration initially to the last year in the sample, 2011. Unsurprisingly, Table 2 shows that developing Asian economies typically have a comparative advantage in manufacturing sectors relative to agriculture. However, the most important point is that the degree of advantage varies considerably across economies within sectors and across sectors within economies. Economies like the PRC; Singapore; and Taipei,China have a strong comparative advantage in the electronics sector, for example. By contrast, Indonesia's comparative advantage in manufacturing is much more modest and focuses on the chemicals sector. Interpreting these results in terms of relative productivity levels confirms that most developing Asian economies 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 emphasized the development of its manufacturing sector in recent years, only exhibits a relatively limited degree of comparative advantage in manufacturing subsectors relative to a more established manufacturer like the PRC. Of course, these data are for 2011, and substantial changes are likely to have taken place in the intervening seven years.

Table 2: Revealed Productivity in Selected Manufacturing Sectors, Developing Asia, 2011

Economy	Food Products	Textiles and Clothing	Chemicals	Plastics
PRC	1.28	1.71	1.64	1.47
HKG	1.39	1.83	1.63	1.42
INO	1.11	1.08	1.11	0.97
IND	1.19	1.32	1.53	1.17
CAM	1.09	1.51	0.77	0.85
MAL	1.31	1.02	1.34	1.29
PHI	1.33	1.14	1.28	1.12
SIN	1.85	1.53	2.61	1.71
THA	1.35	1.10	1.29	1.25
TAP	1.26	1.61	2.03	1.79
VIE	1.19	1.13	0.92	1.00
Economy	**Metal Products**	**Machinery**	**Electronics**	**Vehicles**
PRC	1.48	1.87	2.11	1.40
HKG	1.40	1.84	1.27	1.17
INO	0.73	1.02	1.10	0.86
IND	1.06	1.28	1.22	1.25
CAM	0.88	0.77	0.73	0.71
MAL	1.01	1.29	1.59	0.93
PHI	1.00	1.15	1.65	1.17
SIN	1.86	2.47	3.05	1.42
THA	1.05	1.47	1.39	1.36
TAP	1.88	2.15	2.43	1.68
VIE	0.91	0.97	1.18	0.75

Note: All the estimates are relative to agriculture (1.00). We drop Brunei Darussalam from the sample, as estimates are typically not available in the baseline sector.

Source: Author's calculations.

Table 3: Revealed Productivity in Selected Service Sectors, Developing Asia, 2011

Economy	Construction	Wholesale and Retail	Hotels and Restaurants	Transport
PRC	0.85	1.79	1.31	1.59
HKG	1.56	2.05	2.24	3.06
INO	0.51	1.24	0.85	1.01
IND	0.74	1.47	1.04	1.41
CAM	0.73	1.39	0.99	1.31
MAL	0.87	1.43	1.14	1.29
PHI	0.78	1.44	1.15	1.53
SIN	1.76	2.46	2.43	2.95
THA	0.64	1.41	1.23	1.32
TAP	0.84	2.02	1.30	1.76
VIE	0.53	1.18	0.82	1.14

Economy	Telecom	Finance	Computer Services	Other Business Services
PRC	0.90	0.46	0.73	1.02
HKG	1.78	1.70	0.78	1.39
INO	0.63	0.36	0.38	0.41
IND	0.86	0.52	0.98	0.96
CAM	0.93	0.73	0.59	0.65
MAL	0.91	0.64	0.67	0.74
PHI	1.18	0.63	0.76	0.98
SIN	1.48	2.03	1.66	1.77
THA	0.76	0.51	0.35	0.63
TAP	1.07	0.77	0.66	0.93
VIE	0.48	0.37	0.37	0.39

Note: All the estimates are relative to agriculture (1.00). We drop Brunei Darussalam from the sample, as estimates are typically not available in the baseline sector.

Source: Author's calculations.

Comparing the results in Table 2 with those in Table 3 suggests that we cannot draw a simple conclusion about the relative patterns of comparative advantage in goods and services in developing Asia. The results are highly variable across economies and sectors, but there are many instances in which developing Asian economies have a comparative advantage in service subsectors relative to agriculture and, by comparing the two tables, in certain service subsectors relative to some manufacturing subsectors. In the PRC, 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 degree of comparative advantage in transport services in the Philippines relative to agriculture is stronger than we can observe in all the manufacturing sectors except for electronics. While it is true that typically higher-income economies have a stronger comparative advantage in service subsectors—Singapore and Hong Kong, China stand out—there are important instances of middle-income economies with significant revealed productivity advantages in service 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 that in food products, while that in 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," we cannot reduce patterns of revealed productivity 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 to miss important parts of reality. This finding sits well with the descriptive statistics presented above, in which we showed that, even in a region like developing Asia, where most analyses have focused on rapid growth in manufacturing exports over recent years, the observed patterns of service trade have actually been strikingly similar.

Given that we have estimated the model over a long time period, it is informative to look at the 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.

Table 4: Change in Revealed Productivity in Selected Manufacturing Sectors, Developing Asia, 1995–2011

Economy	Food Products	Textiles and Clothing	Chemicals	Plastics
PRC	0.15	0.32	0.25	0.38
HKG	0.07	0.23	0.25	0.06
INO	0.12	-0.05	0.13	0.08
IND	0.16	0.13	0.31	0.20
CAM	0.38	0.60	0.08	0.13
MAL	0.25	0.15	0.31	0.29
PHI	0.10	0.00	0.16	0.19
SIN	0.47	0.37	1.06	0.40
THA	–0.11	–0.27	0.05	–0.17
TAP	–0.02	–0.22	0.13	0.00
VIE	0.16	0.04	0.06	0.18
Economy	**Metal Products**	**Machinery**	**Electronics**	**Vehicles**
PRC	0.34	0.56	0.74	0.47
HKG	0.12	0.20	–0.39	0.17
INO	–0.10	0.15	0.19	0.23
IND	0.15	0.31	0.35	0.39
CAM	0.21	0.13	0.06	0.20
MAL	0.21	0.23	0.30	0.20
PHI	0.04	0.07	0.14	0.22
SIN	0.61	0.82	0.88	0.45
THA	–0.02	0.11	–0.04	0.29
TAP	0.11	0.09	0.03	0.14
VIE	0.19	0.13	0.23	0.09

Note: All the estimates are relative to agriculture (1.00). We drop Brunei Darussalam from the sample, as estimates are typically not available in the baseline sector.

Source: Author's calculations.

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 economies like the PRC and Viet Nam, as well as others. We would expect to see evidence of a deepening comparative advantage in manufacturing sectors over that time.

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

Table 5: Change in Revealed Productivity in Selected Service Sectors, Developing Asia, 1995–2011

Economy	Construction	Wholesale and Retail	Hotels and Restaurants	Transport
PRC	0.22	0.39	0.53	0.46
HKG	0.66	0.32	0.59	1.17
INO	0.08	0.10	–0.08	0.08
IND	0.07	0.22	0.23	0.36
CAM	0.23	0.45	0.33	0.55
MAL	0.24	0.27	0.22	0.22
PHI	–0.14	0.13	0.07	0.14
SIN	1.02	0.76	0.91	1.24
THA	0.07	–0.09	–0.13	–0.14
TAP	0.22	–0.01	0.13	0.15
VIE	–0.10	0.02	–0.04	0.21

Economy	Telecom	Finance	Computer Services	Other Business Services
PRC	0.22	–0.33	0.21	0.45
HKG	0.67	–0.21	0.17	0.46
INO	–0.06	–0.37	0.00	–0.01
IND	0.19	–0.32	0.33	0.29
CAM	0.23	0.01	0.04	0.24
MAL	0.12	–0.42	0.29	0.08
PHI	0.03	–0.47	0.08	–0.03
SIN	0.61	0.11	0.73	0.79
THA	–0.17	–0.42	–0.15	0.06
TAP	–0.02	–0.55	0.08	0.08
VIE	–0.30	–0.83	–0.02	–0.06

Note: All the estimates are relative to agriculture (1.00). We drop Brunei Darussalam from the sample, as estimates are typically not available in the baseline sector.

Source: Author's calculations.

Comparing Table 4 (manufacturing) with Table 5 (services), however, shows that productivity gains were also strong in the latter case. In the PRC, for example, the absolute increase in the revealed productivity of the other business service sector relative to agriculture was comparable to that 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 the PRC aside, the higher-income economies 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 the absolute gains in all the manufacturing sectors except textiles and clothing, being a well-known success story in terms of industrial development. Similarly, Malaysia's absolute gain in revealed productivity in computer services was equal to that in plastics and only slightly below the gains in the electronics and chemicals sectors. Again, there is no easy way to classify 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 the productivity gains in manufacturing are systematically stronger in a dynamic sense than those in services. Rather, what we see is a complex set of results that varies across economies and sectors. Again, therefore, precise patterns of specialization, not gross patterns (manufacturing versus services), are relevant to an economy's growth path. As above, however, we stress that, even in manufacturing success stories like the PRC and Viet Nam, there is evidence of revealed productivity gains in services that are quantitatively significant and in some cases of comparable magnitude.

4. CONCLUSION AND POLICY IMPLICATIONS

We have reviewed the recent evidence on trade growth in goods and services, focusing on developing (non-OECD) Asia. Researchers widely consider the 1990s and 2000s 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 the PRC 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 increases in revealed productivity or theoretical RCA drove this export growth. Thus far, our findings are 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.

However, this widely accepted story is only half of what actually happened in developing Asia. We show that the export growth in commercial services was nearly as spectacular as that in manufacturing. This is not a well-known fact. Even less appreciated is the fact that the significant increase in revealed productivity in service subsectors similarly drove this increase in trade. 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 there is 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 economies, as we would expect 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 in which comparative advantages matter in a quantitative and a qualitative sense.

Bearing this insight in mind, the key conclusion is that policy makers 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 impossible to talk about trade or productivity growth in manufacturing without considering service inputs. However, we have also shown that the experience of developing Asia has not been that economies 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 we cannot justify "service pessimism" in developing Asia—the idea that only manufacturing can produce rapid and sustained productivity growth—as a general proposition. Rather, we see that, in individual economies, particular service subsectors have exhibited rates of revealed productivity growth that are absolutely comparable to those apparent during the golden age of Factory Asia. In other words, it is important to consider 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 in which highly stylized and simplified models can nonetheless be of great expositional value. However, 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 manufacturing, 32% in the ASEAN and East Asia, is in fact embodied service 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 service 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 the micro-level rather than allowing overly simplified and outdated models that only consider large aggregates to guide decision making. 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 demands analysts' and policy makers' attention.

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