5. Export-led growth

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The Washington Consensus dismissed exports as an important focus of economic growth strategies. According to its principles, if countries unified exchange rates, reduced barriers to trade, and brought inflation under control, exports would adjust to their efficient level. Today, many countries have followed these precepts, and yet, the median country has not narrowed its income gap with the United States. Export performance matters for growth, with countries that grow exhibiting more than proportional export growth. In many developing and emerging economies, growth is highly correlated with exogenous movements in their export prices and on fluctuations in international capital flows. Moreover, sustained fast-growing economies change the composition of their export basket substantially towards new, more complex products. This chapter argues that a focus on exports, both at the intensive margin, but especially at the extensive margin, can help countries figure out what policies to adopt in order to achieve sustained growth. It highlights the critical role that technology adoption plays for long-term growth, but also the market failures that make the proverbial invisible hand of the market inefficient. The implication of this analysis is not a new list of fixed policies that all countries should adopt, as the way Washington Consensus intended. Instead, it is an organised and costly search process for growth opportunities, both at the intensive and extensive margins of production.

I. Introduction: exports and the Washington Consensus

Should exports be an important focus of economic growth strategies? The Washington Consensus, summarised by John Williamson some 35 years ago, would have answered in the negative. In the 1980s, when the consensus was

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forged, many countries had highly protective trade regimes, multiple exchange rates with large black-market premia, interest rate controls, and high inflation. The consensus was that if countries unified exchange rates, reduced barriers to trade and brought inflation under control, exports would follow naturally. According to the Lerner symmetry theorem, import tariffs are equivalent to a tax on exports. Exchange controls act as an additional tax by forcing exporters to sell their earnings at an artificially appreciated exchange rate. If such policy-induced distortions were eliminated, the Washington Consensus suggested, exports would naturally reach their efficient level.

Today, many countries have unified their exchange rates, eliminated exchange controls, brought inflation to single digits, reduced trade barriers, and signed free trade agreements with many of their main trade partners, and yet, the median country has not narrowed its income gap with the US. Export performance matters for growth, with countries that grow exhibiting more than proportional export growth. In many developing and emerging economies, growth is highly correlated with exogenous movements in their export prices and on fluctuations in international capital flows. Moreover, sustained fast-growing economies change the composition of their export basket substantially towards new, more complex products.

Regional differences in growth and export trajectories confirm these observations. Countries in East Asia – including China – have managed rapid changes to their export baskets, increased their global export shares in new industries, and achieved fast growth. In Latin America, by contrast, even good performers like Chile, Colombia, and Peru stabilised inflation, opened their economies to international trade (tariffs are negligible and they have signed numerous free trade agreements), and capital flows. Yet, they have been unable to diversify their export baskets and achieve sustained growth. The experiences of many nations in Africa and the Middle East resemble those of Latin America.

Export-led growth has been a topic of discussion at least since the 1980s when East Asian economies were undergoing growth miracles that contrasted with the dire performance of debt-stricken Latin America. A central question was whether the growth miracles in the East were associated with their so-called export-led industrialisation (ELI), which was different from the import-substitution industrialisation strategy adopted in Latin America since the 1950s. Clearly, something was amiss in Latin America, but what exactly had worked well in East Asia was less clear. For some, like Balassa,[1] Krueger,[2] Bhagwati,[3] and Talvi et al.,[4] the invisible hand of the market and its discipline had done most of the miracle in the East. For others, like Amsden,[5] the visible hand of activist industrial policies did the trick.

More recently, Dani Rodrik has argued that the success of ELI may no longer be replicable. In the past, manufacturing was low-skill labour intensive, which allowed it to absorb large numbers of workers who were leaving agriculture. Today, manufacturing is much less labour intensive, leading to premature de-industrialisation (measured as declining employment shares) and, hence, will not have the aggregate reallocation benefits of the past.

Acemoglu et al.[6] and Rodrik et al.[7] also ask us to look deeper than the so-called proximate causes of growth – like exports and technology – towards more fundamental determinants of growth such as the quality of institutions. They argue countries do not adopt technology because their institutions do not generate the right incentives. For other scholars like Galor[8] and Weil,[9] the demographic transition, as countries shift from high birth and death rates to low birth and death rates, comes along with improvements in life expectancy, reductions in fertility rates, improvements in education, declines in dependency ratios (the average number of children and elderly per 100 working-age population), and increases in female labour force participation and urbanisation, which all facilitate human capital accumulation, the adoption of technology, and economic growth. The implicit message of this literature is that growth policies should focus on either institutions, demography, or education.

In this chapter, I argue that a focus on exports, both at the intensive margin (where existing products increase their volume), but especially at the extensive margin (where new products start being exported), can help countries figure out what policies to adopt in order to achieve sustained growth. I present six stylised facts about growth and its trends in the decades that followed the Washington Consensus. The first stylised fact relates to convergence. Since 1990, there has been massive convergence in all the factors associated with the demographic transition: life expectancy, fertility, employment per capita, and female labour force participation. There has even been massive convergence in workers per capita, capital per worker, education, and urbanisation. According to the Solow framework, these trends should have generated convergence in income if technological gaps had remained constant, while according to Galor and Weil, these trends should have generated technological convergence. Both logics should have delivered massive income convergence.

But that has not happened. The median country has not narrowed its income gap. The only way to make sense of this result is that there has been widespread technological divergence, despite the demographic transition, urbanisation, and impressive narrowing of education gaps. This calls into question the idea that technology adoption will just naturally follow if we address certain deeper underlying causes. Instead, countries seem to have institutions that can sustain all the dimensions of the demographic transition, including a massive improvement in education, health, and female labour force participation, but apparently cannot sustain technology adoption. What is missing?

The second stylised fact is that poor countries are cheap, meaning that a dollar buys more in poor countries than in rich ones. I show that this is not only true across countries, but also within countries: as countries get richer, they become more expensive. This is known as the Balassa–Samuelson effect and can be explained not only by the fact that poor countries are less productive – that is why they are poor – but that this productivity gap is much more pronounced in tradable industries (e.g., agriculture, manufacturing,

mining, and tourism) than in non-tradable industries (e.g., construction, retail trade, and social services). Countries that grow consistently see faster improvements in productivity in tradables than in non-tradables, which is why they become more expensive. This implies that whatever is difficult about technology adoption seems to matter more for tradables; and countries that grow consistently also improve the relative productivity of tradables.

The third fact is that the elasticity of exports to gross domestic product (GDP) per capita is greater than 1, both between and within countries, meaning sustained growth is associated with a more than proportional growth of exports, at least since World War II.

The fourth fact is that countries differ radically in the basket of tradable goods they can produce. Poor countries can usually only produce a few ubiquitous products, while rich countries are able to make those same products, but also make many additional products that are less ubiquitous.

The fifth fact is that, at least in the 1980s, only about 20% of the countries that grew substantially also changed significantly their export basket in the direction of more complex, less ubiquitous products.

I interpret these last two facts considering the theory of technology that underpins the economic complexity approach. According to this theory, technology is really about productive knowledge, but the implementation of this knowledge requires not just the codification of knowledge into shareable codes, recipes, formulas, algorithms, and how-to-do manuals, or the embodiment of that knowledge into tools and materials, it requires tacit knowledge or know-how in brains. However, the know-how that is missing does not reside in a single brain that, if brought into the country, could ensure technology adoption. Individual brains have a limited capacity to acquire know-how, so we put different bits of knowledge in different heads. The required know-how resides in teams of brains spread out between the employees of every firm and that of its suppliers, including institutions that provide public goods.

This makes technology adoption concrete, and not just an abstract parameter that changes the productivity of general factors of production. Technology adoption is rife with market failures arising, like coordination failures, knowledge spillovers, and externalities associated with public goods. These issues are more severe and impactful for tradables than for non-tradables, and more serious at the extensive margin than at the intensive margin. Complementarities among technologies mean that problems in the adoption of one technology, say electricity, will make it more difficult to adopt other technologies that rely on the availability of electricity. This can help explain widening technological gaps in most countries.

I then explore the policy implications of this theory. The Washington Consensus prescribed that market failures were the exception rather than the rule. The bulk of the attention was put on policy-induced distortions that could be addressed through liberalisation of trade, labour markets, investment, and finance. Our alternative approach starts from the presumption that market

failures are rife, they come in many different types, they are highly interactive, and are hard to predict or address without contextual information, which must be revealed to policymakers by engaging with the real world.

Since productivity problems are more important for tradables than for non-tradables and more difficult to address at the extensive than at the intensive margin, a focus on the competitiveness of exports with a special attention to its extensive margin is appropriate.

Economic growth requires a search process into the opportunities and obstacles faced by existing industries and into the 'adjacent possible': i.e., industries that do not yet exist and that are promising in terms of their feasibility and attractiveness but remain undeveloped.[10] The policy question becomes how to organise these two search processes at the intensive and extensive margins, given the institutional and corporate structures with which history has bequeathed each country. Policy tools, such as industrial zones, special economic zones, research and development (R&D) subsidies, training subsidies, development banks, investment promotion agencies, and business associations, are no panacea but can usefully be adapted to solve the challenges that the search process faces.

This chapter will proceed as follows. Section II presents the six stylised facts. Section III provides an interpretation of these facts. Section IV discusses what this means for policy. Section V concludes.

II. Six stylised facts

1. *Convergence in fundamentals, but not in income*

The literature has emphasised several channels through which growth and development happens. Richer societies possess more physical capital: installations and machines that make human effort more productive. They also have better health outcomes in terms of life expectancy and have fewer children on whose education they can afford to invest more, leading the next generation to have more human capital. Fewer children also imply lower dependency ratios, hence, more working age population per capita capable of providing potential labour effort. With fewer children and more education, women can participate more fully in employment, giving the economy more human resources to expand production. Finally, a more educated labour force should make it easier to adopt technology. Developed societies are more urbanised, enabling them to sustain a deeper division of labour, greater human interaction, and more accessible markets. So, investment, health, demographic change, education, and urbanisation are key to development because they increase the availability of physical and human factors of production, and because they facilitate technology adoption.

If we focus on fundamental aspects of development, paraphrasing the Washington Consensus, exports will naturally rise to their efficient level. By contrast, without progress in these more fundamental areas, exports alone cannot make a difference.

To show what happened in the world since the advent of the Washington Consensus, I borrow the idea of measuring gaps with respect to the US from Hall and Jones.[11] I ask myself whether countries have widened or narrowed the gap vis-à-vis the US in all these aspects of development. Table 5.1 shows the degree to which countries that started below the US in 1990 narrowed their gaps with the US in the subsequent three decades. It also measures the degree and speed of absolute convergence in each selected development indicator, showing how much of the change in the gap is explained by the initial size of the gap.

The results are puzzling, reporting massive convergence in many aspects of development seen as fundamental. The capital to output ratio has narrowed in 83% of the 83 countries that started below the US in 1990 and the speed of convergence has been massive. Regarding life expectancy, the gap narrowed in 93% of the countries that started below the US, with the convergence term alone explaining 68% of the variance. The gap in fertility rates declined in 91% of the 120 countries that started above the US. With lower fertility gaps, female labour force participation gaps narrowed in 74% of the 117 countries that started below the US. Employment per capita gaps narrowed in 80% of the cases. The gap in urbanisation narrowed in 59% of the cases.

Regarding education, the convergence has been even more impressive. Whether you look at years of schooling of the labour force, tertiary enrolment or the Penn World Table's measure of human capital (see Table 5.1), the gap narrowed between 1990 and 2020 in 97%, 92%, and 95% of the 132 cases considered, with a high convergence speed and a significant correlation between the initial gap and subsequent progress.

With so much progress in all these dimensions of development, it makes sense to expect massive convergence in incomes. Yet, we do not observe this. Instead, barely 55% of the countries narrowed the income gap post 1990. The estimated absolute convergence term is almost zero and not statistically significant.

To make sense of this, standard growth accounting requires a divergent total factor productivity (TFP) gap, with 56% of countries diverging, rather than converging. Economists usually refer to TFP as 'technology': a shift parameter that makes other factors more productive.

So, what does this mean? Countries have been massively converging in all the dimensions we associate with development – except income. This can only be explained by a widening technological gap, which is unrelated to standard measures of human capital, such as education and health, on which there has been massive convergence.

One popular explanation for income differences between countries is the institutional approach associated with Douglass North, Daron Acemoglu, and James Robinson.[12] This approach accepts that income differences are mainly due to differences in technology but argues that institutions create the incentive structure that determines whether technologies get adopted. But this begs the question of how can it be that institutions are good enough to

Table 5.1: The evolution of development gaps vis-à-vis the United States since 1990

	N	N(¡US)	Sh_conv (¡US)	Beta_conv	R2	75pctl/25pctl
K/GDP_(kd	146	83	.83	-.38	.34	1.75
Life_Expectancy	155	135	.93	-.45	.68	1.19
Fertility_Rate	155	120	.91	-.2	.2	2.29
Fem_Laborforce_Part	155	117	.741	-.18	.15	1.46
Urbanization_Rate	121	108	.59	-.18	.22	2.29
Employment/cap	146	123	.8	-.27	.16	1.37
Yrs_of_Schooling_BL	132	132	.97	-.39	.76	1.67
Tert_Enrollment_BL	132	132	.92	-.26	.27	4.19
Human_Capital_(PW)	133	132	.95	-.19	.25	1.59
GDP/cap_(kd)	134	130	.55	-.05	.02	9.51
TFP	95	86	.44	-.23	.06	1.83

Sources: World Development Indicators, Barro-Lee, Penn World Tables.

achieve convergence in demography, health, education, female participation and urbanisation, but not in income and technology? Moreover, there are huge technological and income differences between regions of a country. How can we account for this within-country variance, given that many institutional aspects are national? Another popular explanation emphasises issues of education quality. But what do we need to assume about divergent education quality to overwhelm the fact that education quantities, including in higher education, have been converging so strongly?

2. *Poor countries are cheap*

It is commonly known that a dollar tends to buy more in poor countries than in rich ones (see Figure 5.1). The graph shows the relationship between income per capita relative to the US for 2021 measured at purchasing power parity (PPP), and the PPP adjustment factor. Low-income countries have a PPP of 3, and middle-income regions are at around 2, meaning that a dollar buys, respectively, 3 and 2 times more in those countries than in the US.

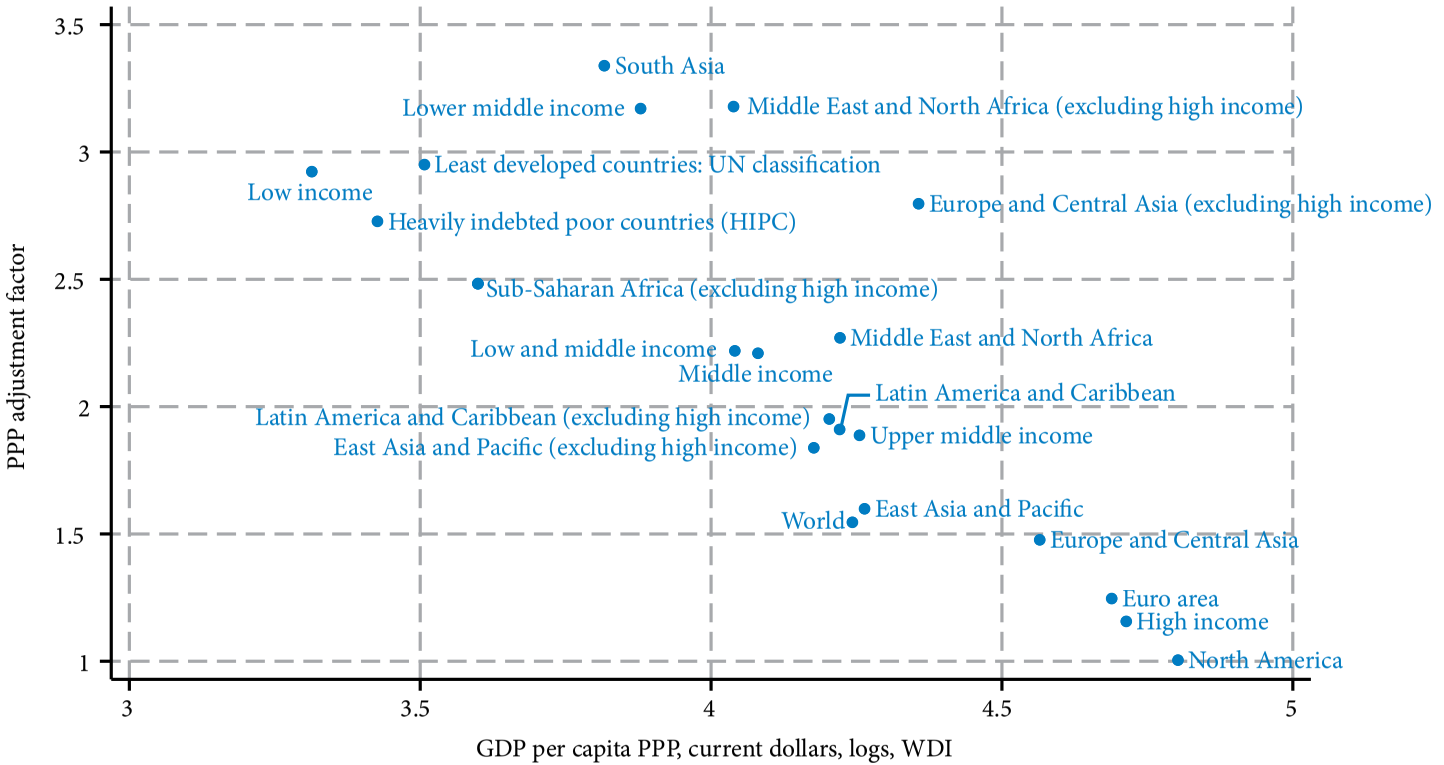
Intuitively speaking, poor countries are less productive, hence, they should face higher costs. But because poor countries are less productive, they pay lower wages, hence, they should be cheaper. Combine the first and second intuition and you may think that poor countries should be just as expensive as rich ones with their lower productivity compensated by lower wages. So why are low-income countries three times cheaper?

Balassa[13] and Samuelson[14] ask us to consider splitting the economy into two types of products, according to their international tradability. Tradable goods, like scissors, are those that are relatively easy to ship. Non-tradable services, like haircuts, tend to be sold domestically only. Tradable goods tend to be subject to the 'Law of One Price', meaning that international consumers will not be willing to pay more for a pair of scissors if they can get a similar one from somewhere else, thus, disciplining the price. Non-tradable goods are not subject to this arbitrage, so their prices vary much more.

To square the puzzle, we need to accept that poor countries are *absolutely* less productive than rich countries – that is why they are poor – but *relatively* much less productive in tradable goods than in non-tradable activities. Whatever explains the difference in productivity between rich and poor countries is particularly concentrated in the productivity of tradable (hence, exportable) products.

The negative relationship between the PPP adjustment factor and GDP per capita is not just a characteristic of the cross-country variation: countries that grow become more expensive.[15] This means that when countries grow, they tend to improve their relative productivity of the tradable sector more than the non-tradable sector.

Figure 5.1: Purchasing power parity adjustment factor and GDP per capita at PPP, 2021



Source: author's calculations based on World Development Indicators (https://databank.worldbank.org/source/world-development-indicators).

3. *The elasticity of exports to GDP is higher than 1 both between and within countries*

Rich countries tend to export proportionally more than poor countries. To show this, we first look at the cross section, plotting the log exports per capita to the log of GDP per capita for a sample of 171 countries in 2019 (Figure 5.2). The slope of this curve implies an elasticity of 1.53 with a standard error of 0.09. This means that the gap in export per capita grows more than proportionally with income per capita.

This high export elasticity is not just a feature of the comparison between countries. Within countries, a dynamic estimation of this slope over time delivers an elasticity of 1.37 with a standard error of 0.06,[16] meaning that as countries grow, their exports tend to grow faster than GDP. Empirically, growth is 'export-led' in the sense that exports grow more rapidly than GDP.

4. *Growth in many developing countries is strongly dependent on external conditions, such as terms of trade and access to finance*

In a paper on growth accelerations with Lant Pritchett and Dani Rodrik, we found that improvements in the terms of trade of countries tend to generate growth accelerations that eventually peter out.[17] By contrast, sustained growth accelerations require more substantial changes. Extending this work, Gruss, Nabar, and Poplawski Ribeiro show the great sensitivity of country-specific external demand, terms of trade, and particularly external financial conditions in triggering growth accelerations and preventing reversals.[18]

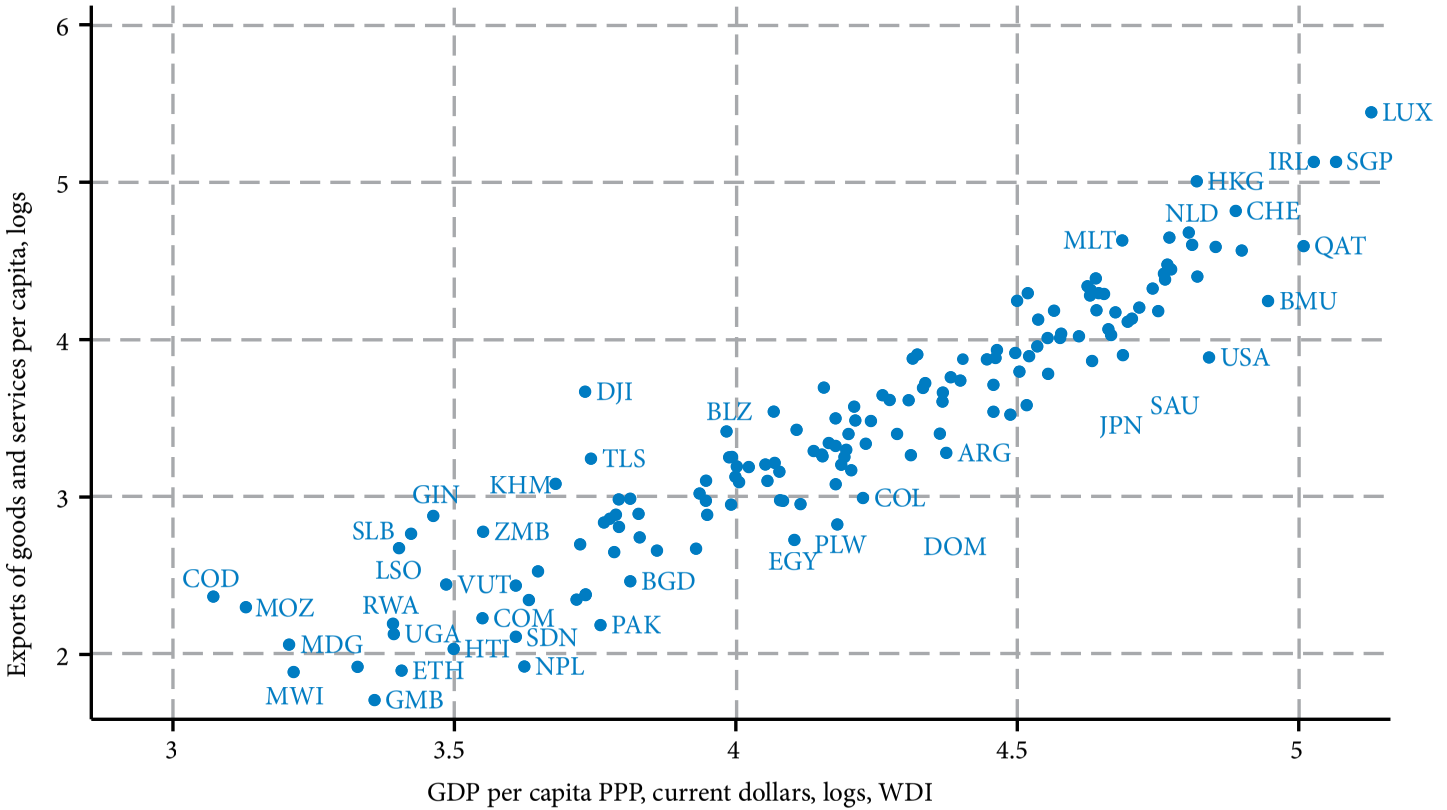
Why is growth so sensitive to external conditions? External conditions determine how many imports countries can afford, whether they pay for them with exports or with borrowed money. Imports embody technology that make firms more productive. This suggests that the availability of foreign exchange is a binding constraint in many settings and that exogenous relaxations of that constraint – whether due to terms of trade movements or the availability of capital – are associated with temporary growth accelerations.

5. *Richer countries have the capacity to make a greater variety of complex products*

The presence of a product in the export basket of a country indicates that the country has adopted whatever technologies are necessary for making that product. How much of that product it decides to make will depend on the country's comparative advantage, demand, and other factors. Here, I will explore the basic capacity to make the product.

To do this, I build on Hidalgo and Hausmann[19] and look at world trade. Consider a matrix of countries and their exports, classified into about 1,200 different products. The matrix has about 200 rows and 1,200 columns. We fill the matrix with 1s and 0s depending on whether the country exports more than an epsilon of that product, where I consider epsilon to be just 1%

Figure 5.2: Exports of goods and services per capita, and GDP per capita 2019, logs

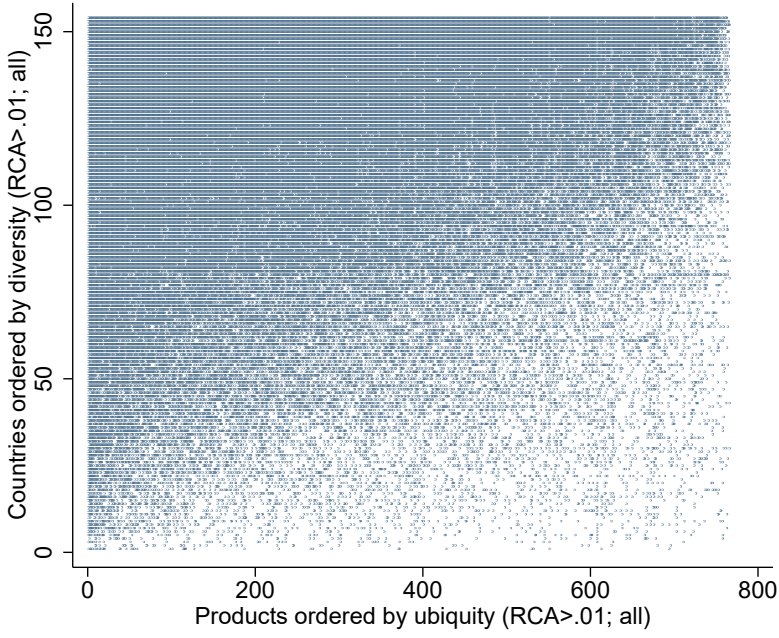


Source: author's calculations based on World Development Indicators (https://databank.worldbank.org/source/world-development-indicators).

of what it would have exported if it exported with the same intensity as the global average. I order the countries by how many 1s they have (i.e., I sum the rows and reorder them according to this measure). I order columns by how ubiquitous products are (i.e., we sum the columns and reorder them according to this measure).[20] We order the countries by how many 1s they have (i.e., we sum the rows and reorder them according to this measure). We order columns by how ubiquitous products are (i.e., we sum the columns and reorder them according to this measure).

Figure 5.3 shows the results for the year 2019. Countries at the top make at least an epsilon of almost everything. Countries at the bottom make few things. Products at the left are made in many places (they are ubiquitous, which suggests they are easy to make). Products at the right are made in fewer places. What emerges is a triangular shape where lower rows tend to be subsets of upper rows.[21] This happens because the poorly diversified countries make ubiquitous products, and more diversified countries make more unique products.[22] Countries at the top include Austria, Czech Republic, Denmark, and Sweden. Countries at the bottom include Bangladesh, Ethiopia, Guinea-Bissau, Nigeria, and Sudan.

Figure 5.3: Presence and absence of products in the export basket of countries (2019)



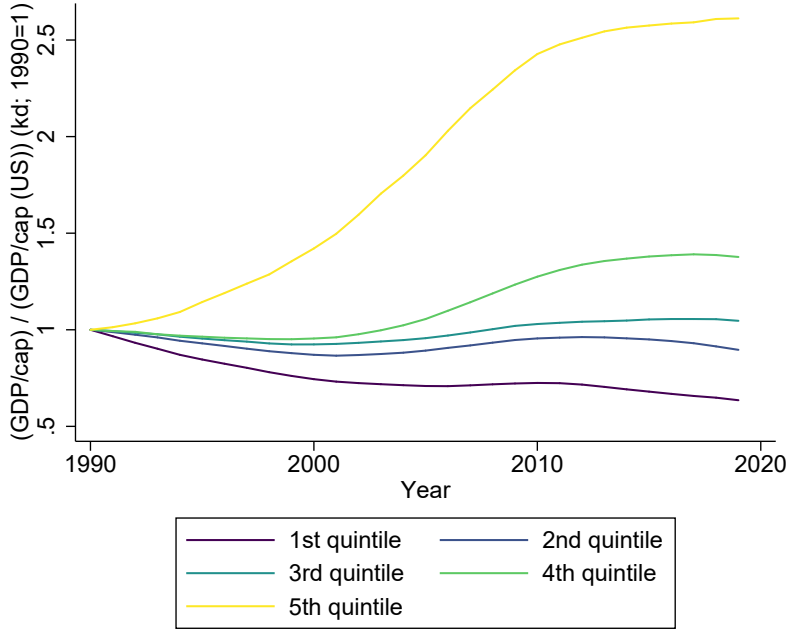
Source: authors' calculations based on the UN-COMTRADE dataset, available at https://comtradeplus.un.org/.

6. *Fast growers significantly upgraded the composition of their export basket*

Hausmann et al. show a strong association between growth and the economic complexity index.[23] Hidalgo and Hausmann developed a method to measure of a country's effective use of technology from matrixes, such as Figure 5.3, which they called the Economic Complexity Index (ECI).[24] Hausmann et al. show a strong association between growth improvements in the ECI.[25] To illustrate this, I focus on the period of the Washington Consensus and look at the developing world, defined as the bottom 75% of countries in 1990 in terms of income per capita. I calculate the cumulative percentage growth of these countries between 1990 and 2019 and split the countries into quintiles according to their 1990–2019 growth rate.

Figure 5.4 (a) shows the evolution of an index of GDP per capita relative to the US, normalised to 1 in 1990, for each of the quintiles. The figure shows that only the top quintile significantly narrowed the gap with the US. The second quintile had modest gains, the third quintile made essentially no progress, and the bottom two quintiles fell further behind.

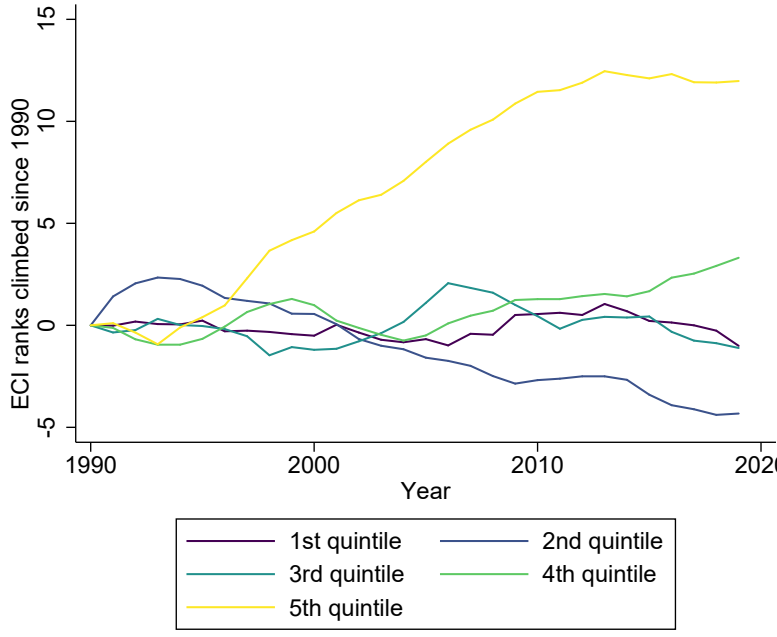
Figure 5.4 (a): Average income per capita by quintile of growth



Source: author's calculations based on ECI data.

Figure 5.4 (b) shows the evolution of the economic complexity index for those same quintiles of countries. The graph tells a very similar story: only the top quintile significantly improved its economic complexity. The second quintile shows modest gains and the others fell behind.

Figure 5.4 (b): Change in the rankings of the Economic Complexity Index by quintile of growth



Source: author's calculations based on ECI data.

This means that the countries that narrowed their income gap with the US also acquired the necessary capabilities to expand the extensive margin of their exports towards more complex goods.

III. Making sense of the stylised facts

There has been no unconditional convergence in incomes despite massive unconditional convergence in many broad-based fundamentals, such as demography, health, education, investment, urbanisation, and female labour force participation. This suggests that the typical country exhibits divergence in technology adoption, despite convergence in broad-based fundamentals.

The fact that poor countries are cheap indicates that the productivity gap in tradables is larger than in non-tradables. When countries grow, they tend to become more expensive, suggesting that sustained growth requires

technology adoption that is biased towards tradables. Whatever limits technology adoption hurts tradable industries more, and sustained progress requires the ability to revert this technological challenge.

The fact that the elasticity of exports to GDP per capita is greater than 1, both in the cross-section and in the time-series, also suggests that sustained growth is associated with more than proportional growth of exports: it is de facto 'export-led'.

Facts 5 and 6 suggest that technology is adopted in chunks: it is embedded in the capability to implement specific productive processes that go into subsets of products. According to neo-classical growth models, rich and poor countries have the capacity to make everything, but rich countries have a comparative advantage in some products and poor countries in others. That is not what we observe: rich countries do have the capacity to make nearly everything, but may choose not to use that capacity intensely. Poor countries have capacity to make fewer and more ubiquitous products. Figure 5.4 (b) suggests that sustained growth requires an expansion of the capacity to make more products and products that are more complex.

1. *An alternative interpretation of technology*

In some versions of economics, technology is defined by its outcomes: it causes factors of production to become more productive.[26] In other versions, such as in Paul Romer's view,[27] technology is defined as ideas or recipes. The first definition does not help us understand how to act on technology. The second assumes that the hard part is coming up with the idea or the recipe. It is relatively easier to adopt the idea or implement an existing recipe. So why not just adopt the ideas that others have already developed, for free?

In our alternative interpretation, technology is the productive knowledge we use to transform the physical and social world to our liking. This knowledge has grown exponentially for many centuries. However, our individual capacity to absorb knowledge has not. The number of books, scientific publications, and patents shows impressive exponential growth. Our ability to read is no greater than that of Adam Smith or Isaac Newton. To be able to use more knowledge at the societal level, given our limited individual capabilities, the world has used three complementary mechanisms. First, the division of knowledge; we put different bits of knowledge in different heads. By doing so, the whole can know much more than its parts.

Second, modularisation splits the production processes into stages. Each stage requires the coordination of a diverse group of workers that span the productive knowledge to execute that stage. However, each stage relies on inputs that were performed by other organisations in previous stages. The recipe to make a brownie cookie does not include the instructions to make sugar, chocolate, nuts, eggs, pans, ovens, or energy. These are other modules that use and embed different knowledge.

Third, codification converts tacit knowledge in brains into other forms that can more easily be shared through documentation, standardisation, classification, and a deeper scientific understanding of the mechanisms involved. Codification tries to extract the cook's knowledge into a set of recipes. A lot is lost in translation, but something remains that enhances the ability of others.

Tools and codes can easily be moved around. Tacit knowledge moves much more slowly into brains: according to Malcolm Gladwell,[28] it takes 10,000 hours of practice to become good at something.

So, implementing technology means being able to put together the human team – with their differentiated know-how – that spans the knowledge necessary to perform that stage in the production process and secure all the relevant inputs and codified knowledge.

For the human inputs, there is an important distinction between the intensive and the extensive margin of know-how. A violinist can train another violinist, and a baker can train another baker. But what do you do if you do not have a violinist to begin with? This creates a chicken-and-egg problem in the process of diversification, to which we will return.

Two important distinctions must be made about other inputs to the production process; first, some inputs are tradable and others not. To use a modern machine, a firm in a poor country does not need to know how to make the machine. It can simply buy it abroad, provided the country has access to foreign exchange, ports, roads, logistical services, and a legal framework that underpins international trade and finance. To be able to operate the machine, the electricity and repair services need to be provided locally. Hence, operating an imported machine still requires local availability of non-tradable goods and services, which must be provided locally. An entrepreneur in a poor country can take the idea of Amazon and decide to make a similar company in her country. However, the Amazon business model presumes that potential customers have access to the internet, that they have credit cards and that some delivery firms exist. Hence, the Amazon business model requires the prior diffusion of other industries on which it depends.

The second important distinction is between private and public goods. Private goods can be acquired in markets. Public goods have no markets: either some non-market organisation, like a government, provides them or society will have to operate without them. There is a market for cars, but there are no markets for roads, traffic lights, traffic signs, traffic rules, or traffic cops.

Hence, industries can exist if they can secure the necessary capabilities, including workers that span the know-how required, non-tradable market inputs, and public goods. The process of technology adoption implies growth in the availability of these non-tradable capabilities.

2. *Problems with capability accumulation at the extensive margin*

It is not easy for economies to provide the capabilities that their existing industries demand. Workers could have better skills, providers of non-tradable inputs could be more efficient, and the relevant public goods could be better. But these capabilities have been enough for incumbent industries to survive and even for some of them to thrive. More importantly, as time passes, these industries have the potential to improve through learning-by-doing, and through lobbying they might secure a better supply of public goods.

But industries that do not yet exist face a different problem. It is hard to operate a new plant without workers that have industry experience. But how can there be workers with experience in industries that do not yet exist? You cannot make watches without watchmakers, but how do you become an experienced watchmaker in a place that does not make watches? Without this experience, how can new industries get started?

It is much easier if the pioneer industry can bring workers with industry experience from a place where the industry already exists. Interestingly, a growing literature has shown the importance of human mobility,[29] migration,[30] and return migration for growth industries in general[31] and for pioneer firms[32] in particular.

Unfortunately, many developing countries have restrictive immigration policies that are typically biased against high-skill workers. In most countries, the number of foreign workers that a firm can have is limited. Professional accreditation often restricts work to those that have obtained a local diploma, thereby excluding foreigners.

The required non-tradable inputs of a new industry are the output of industries that may not yet exist, partly because the industries that would use their output as an input are also absent. This is the proverbial chicken-and-egg problem: you need car parts to run an original equipment manufacturer (OEM), but how do you set up an OEM if there are no car part producers? This may be why countries with car manufacturing capabilities obtained OEMs through explicit industrial policy that provide assurances to address these issues.

Regarding public goods, governments have enough trouble providing for the needs of existing industries. They have other priorities than worry about the needs of industries that do not yet exist. But without these public goods, those industries may never get started.

These are all examples of coordination failures. They are the norm rather than the exception at the extensive margin, and can be addressed by coordinating activities in non-market ways. Solving these problems may even generate positive externalities that markets fail to consider, and hence, do not fully exploit. If a country acquires a capability because it is demanded by a particular industry, that capability is now available to other industries. Developing the capabilities needed by one industry may cause positive spillovers to other potential industries.

Learning-by-doing can also generate positive spillovers. A pioneer may train workers that are then hired by new entrants, meaning the discovery process creates positive externalities, hence, the market underprovides them.[33] The newly trained workers may even be hired by other new industries that have similar know-how requirements.

Such distortions differentially impact the tradable vis-à-vis the non-tradable sector. Workers and firms improve as they produce, something known in the literature as Wright's Law.[34] They experience cost reductions as they acquire experience. Contrast a pioneer firm in a non-tradable industry with one in a tradable industry. The first one, being a pioneer, is by definition a monopolist in its industry. It will be able to appropriate monopoly rents that may be enough to finance the learning process. The local pioneer in a tradable industry is not a global pioneer. It enters a market with foreign suppliers that have already gone through a learning process, improved their productivity, and lowered costs. The local pioneer cannot expect to earn equivalent monopoly profits to finance the learning because it faces competition from abroad from the beginning. This may make innovation harder in tradable industries, explaining why poor countries are relatively less productive in these industries.

Lucas argues that growth depends on learning-by-doing,[35] but this process peters out within existing industries. To sustain growth, countries need to move to new industries where they can then benefit from new rounds of learning-by-doing. But entering new industries is difficult because of market failures.

IV. What does this all mean for policy?

Clearly, the policy-induced distortions that were the focus of the Washington Consensus – misaligned exchange rates, financial repression, protectionism, and unsustainable fiscal policies – remain a relevant concern, although in a dwindling number of countries. These issues affect stability and short-term efficiency. But long-term growth requires sustained adoption of technology, which is rife with market failures. This explains why the Washington Consensus has been ineffective on this front.

So, what should policies be like in a world rife with market failures? The standard economics answer, going back to Pigou,[36] is that you need to specify the market failure and figure out if externalities are positive or negative. Activities that generate positive externalities should be subsidised, while negative externalities should be taxed.

But this is a simplification that takes poor account of what markets do and what their failure implies. Instead, it is useful to recall what a well-functioning market does – to better understand what happens when it fails. First, **the market is an information system** that reveals highly decentralised and dispersed information. Every good or service has a price that conveys information about willingness to pay, relative costs, and much more. Externalities and other distortions imply that prices may not fully convey the right information.

Second, **the market is an incentive system**. Firms try to make profits by maximising the gap between the value of the output they produce and the value of the inputs used to produce it. Those values embed the information contained in prices. Third, **the market is a resource mobilisation system**: decentralised financial markets try to make money by funding activities that are expected to be profitable because they correctly respond to information contained in prices.

A few market failures have to do exclusively with distorted price signals that can be addressed through taxes and subsidies or through competition policy. But this presumes that the government can figure out what prices are distorted and how.

A couple of examples of such distortions come to mind. R&D create positive externalities that imply that markets tend to underprovide them in general. This justifies some form of subsidy. This is the argument that has made R&D tax credits ubiquitous in developed countries.[37] Out of the 38 OECD countries, 34 countries offered R&D subsidies in 2021, up from 20 in 2000. It is not obvious what should count as R&D spending across industries as different as software, steel, and medicines, or whether they generate the same positive spillovers. It is also not obvious what should count as R&D at different levels of development: setting up a new venture in a developing country involves initial setup and self-discovery costs that generate economies of scale and potential positive externalities for followers. Yet, to solve this, a relatively simple rule[38] could be included in the tax code, as many OECD countries do with R&D expenditures.

Industrial zones can also serve as a generic solution to a class of problems. At the highest level, industrial zones address the fact that manufacturing needs to take place in urban settings, which are highly regulated. Manufacturing requires access to roads, ports, and airports so materials and products can be brought in and out, and it requires urban transport to allow workers to commute. It requires power, water, water treatment plants, security, and other services. Markets cannot ensure that all inputs will be provided simultaneously and continuously everywhere, but governments can make sure that they are provided at a particular spot.

Special economic zones (SEZs) include some exceptions to the general legislation of a country, especially to avoid distortions for export-oriented activities. Their free zone status can reduce transaction costs associated with getting imported inputs through customs for products that are expected to be re-exported. The SEZs avoid value-added taxes and tariffs on imports, avoiding the need to request their reimbursement when exporting. Sometimes they include lower corporate income tax rates that are justified by the fact that optimal tax rates should be sensitive to the elasticity of tax bases to tax rates, and that tradable activities are more mobile than non-tradable activities. In other instances, like Panama, SEZs are exempted from the general immigration law.[39] On the downside, SEZs create a border with the rest of the country and can limit the integration of domestic value chains.

Agglomeration economies can be created in backward regions through a combination of tax incentives, the location of government activities, government procurement preferences, and infrastructure investments. The state of Colorado grew through the relocation of important federal government agencies, the development of the airport, and the highway system. The states of Arizona, New Mexico, Nevada, and California have had similar developments. Yet, there is still no consensus on place-based policies.

R&D subsidies, industrial zones, and SEZs exemplify a common class of problems. Other market failures are more **systemic** as they involve disruptions in all three functions of the market. Public goods are a good example as they have no price; they are not supplied with a profit motive; and they are expressed in millions of pages of legislation, thousands of government agencies, and highly localised and diverse infrastructure. Where is the government supposed to get information about what specific public goods are needed? What is the incentive to respond to the information? And how will resources be mobilised for that purpose?

Missing markets pose a similar systemic challenge: they have no price, there are no profit motivated firms, and there is nothing for capital markets to fund.

Consequently, to overcome systemic market failures policies need to address the information, incentives, and resource mobilisation functions that markets provide. We need to clarify how to handle highly decentralised information, how to implement incentives to respond to that information and how to respond and allocate resources.

Defining such policies is highly context- and industry-specific. First, we must distinguish between existing industries and potential new industries. Second, we distinguish between mature technologies and emerging technologies. Third, we distinguish between technologies and processes in terms of the degree of local adaptation they require. Fourth, we need to consider that industries emerge with different minimum-scale requirements. Fifth, we consider differences among the agents of change that can initiate or participate in an industry: established large organisations versus start-ups, and global corporations versus small- and medium-sized enterprises. Finally, different industries need different types of public goods.

These distinctions mean that horizontal policies, i.e., policies that are industry agnostic, such as the ones emphasised in the World Bank's Doing Business indicators,[40] are woefully inadequate and impractical. Governments should deal with challenges and opportunities at the most appropriate level. Electrical vehicles, mining, and pharmaceuticals need very different public goods and face different coordination challenges and externalities. Policies to address industry needs should be as horizontal as possible but as vertical as necessary.

Governments must help reveal the information that is required to identify opportunities and obstacles for expanding into new industries amid a context of systemic market failures. This critical information revelation process depends on how governments can embed themselves in information flows

that are needed to act effectively. Existing industries tend to form chambers of commerce and other associations that lobby for the provision of the public goods they need. The United States has over 20,000 registered lobby groups that speak to 224 committees and sub-committees of the United States Congress. The existence of these associations indicates that there are private gains from influencing policy. A large literature, starting with George Stigler,[41] looks at these activities as rent-seeking and unproductive. However, since many public goods are complements of privately owned productive assets, improving their provision could create value. Rent-seeking can be contained through competition between lobby groups, procedural transparency, and mechanisms of accountability.

It is easier for incumbent industries to coordinate and form lobby groups than for industries that do not yet exist. If a government wants to promote diversification, it must develop mechanisms to learn about agents that explore the adjacent possible, the opportunities they encounter, and the obstacles and market failures they face. A network of public and semi-public entities has evolved to play this role. For example, investment promotion agencies talk to potential investors in firms that do not yet exist. Managers of industrial zones talk to potential tenants that uncover possibilities and obstacles. Development banks offer funding to pioneer firms and get access to their business plans. Agencies that authorise R&D-related tax expenditures get information regarding firms' innovation efforts. Vocational training entities, often organised with the participation of firms and worker representatives, try to align training programmes with business needs. Major investors, as in aerospace in Mexico, medical devices in Costa Rica, or green hydrogen in Namibia, demand university programmes that align with their needs. State-owned enterprises expose the government to information about new markets, technologies, and opportunities. Some governments perform technological surveillance to keep them abreast of challenges and opportunities. The media informs of problems, initiatives, and opportunities that different members of society are facing or considering.

But without incentives to respond, information can go to waste, just like the tragedy of September 11 is said to have occurred because intelligence agencies failed to connect the dots. Connecting the dots between the myriad of information flows that governments possess could do wonders.

The Washington Consensus policies prescribed 10 simplified commandments for government action. A new consensus should recognise that while governments may have clear goals, they often do not know what opportunities can take them there, and what obstacles they will face. Government strategy must consider how to find out about such new opportunities and obstacles.

This is similar to climate change policy, where the goal is clear, trade-offs are difficult, and the instruments to deploy are up for grabs (e.g., carbon taxes, science, technology and R&D subsidies, regulations, government-run labs, and government procurement). Policies require the capacity to do real-time

assessments of trends and impacts of adopted policies, so they can be adjusted in light of the learning process. In contrast with monetary policy, where one institution has the bulk of the responsibility, climate change policy involves a network of institutions that must coordinate and align.

Most governments aspire to shared and sustainable prosperity as an ultimate goal of growth policy. But they need smart intermediate policy goals to help them achieve these aspirations. The goal of expanding exports both at the intensive and the extensive margin could be an appropriate intermediate goal that forces governments to figure out how to increase productivity in tradable activities, which is where the gaps are largest. It will force society to explore the extensive margin where externalities, chicken-and-egg problems, and missing public goods are more severe.

To achieve this intermediate goal, governments need to reveal information about opportunities and obstacles, and connect the dots between the information that reaches growth-promoting entities – like development banks, investment promotion entities, export promotion agencies, SEZs, business associations, universities, research centres, vocational training institutions, science and technology policy entities, and diaspora organisations, to promote problem identification and capability building.

I propose a guide to the search process for action with the below set of questions.

Question 1: On current trends, are existing exports poised to grow at a significant pace, compatible with the growth aspirations of the country? If yes, an export focus may not be the right frame for this country's growth strategy. If the answer is no, the country is unlikely to sustain a decent growth rate unless it addresses the export question. One reason for a negative answer may be that the current export basket does not have the capacity to move the country forward. For many countries, such as Saudi Arabia, the United Arab Emirates, Kazakhstan, Colombia, and Venezuela, oil has been a large share of exports, but oil production (measured in barrels per capita) has been falling for decades. For a while, declining production was compensated by high oil prices, but since 2014 that is no longer the case. Given global decarbonisation ambitions, oil exports are unlikely to grow much, if at all. Copper, fruits, forestry, and salmon will not be sufficient to power the Chilean economy forward and the soybean revolution cannot bring many more gains to Argentina's economy.

Question 2: What constrains the export potential of existing industries? Are existing industries constrained by insufficient supply of skills, infrastructure, energy, or other public goods? Or does the country need better access to foreign markets? A diagnostic approach could help identify the binding constraint.[42] For example, South Africa's export performance has been disappointing. The most obvious reason is a recent collapse in the country's electricity, transport, and port capacity due to mismanagement of

state-owned enterprises.[43] The concern starts with exports, but the solution may point to other policy areas.

An important aspect of existing activities is that they exist. Incumbent firms understand what matters to them and will complain and lobby for solutions. Many governments engage the private sector constructively at the industry or cluster level to identify and resolve issues, such as deliberation councils in Japan and Korea, Black-Belt teams in Albania,[44] or *Mesas Ejecutivas* in Peru and Argentina,[45] and cluster initiatives in Colombia.[46] Other governments engage through export promotion and investment retention institutions. In other cases, a strong private sector lobby can de facto coordinate the government, as is the case with the Dominican Association of Free Zones (ADOZONAS).[47]

Question 3: What new ideas in tradable goods and services are in the adjacent possible, given existing capabilities? Which ideas are currently being explored by pioneering investors? What obstacles are investors bumping against? Is there a clear pipeline of potential new industries in gestation or is the scene relatively barren? Policymakers may face a costly information revelation problem. The industries that policymakers want to promote may not yet exist for reasons that are hard to pin down. Is it a chicken-and-egg problem among feasible private sector investments that just needs to be coordinated? Or does the new industry require capabilities the country does not yet have and is unlikely to acquire? Are there missing public goods and can they be identified and provided? Can you attract foreign investors to explore the industry's feasibility? Will you be able to negotiate a reasonable deal with investors? Is it worthwhile to risk public resources in the attempt?

These questions can only be answered by organisations that are dedicated to addressing them. Such organisations take several forms: investment promotion agencies, such as Ireland's IDA and Costa Rica's CINDE, engage with new and incumbent investors to figure out which industries they want to attract, what instruments seem most effective, what it takes for the investment to happen, and whether it would be valuable for the country to make the effort. Another approach is the use of investment development corporations, such as South Africa's Industrial Development Corporation (IDC) or the Corporación de Fomento de la Producción de Chile. While IDC has been used for other purposes, it has the mandate to look at new opportunities and consider providing debt or equity. As part of the government, IDC can influence public policy to secure needed public goods. The government does not need an *ex ante* view on what investments it wants to attract in order for these approaches to work. Instead, it has an open window for actors to contribute relevant information, so the government can figure out what opportunities are attractive. This is the idea behind 'Smart Development Banks'.[48]

ADOZONAS is another organisational form with similar effects. The business association of privately-owned free zones stand to benefit from attracting new investors that will rent out their industrial real estate. To do

so, it engages closely with investors, connects them with capabilities in the private sector, and lobbies the government for changes in the provision of public goods.

The fundamental problem is that this information is costly to reveal and acquire. It is not obvious what opportunities are feasible, attractive or strategic, and finding out involves significant costs. Hopefully, incurring these costs is an investment that creates valuable information. While these investments are risky, not doing them is potentially extremely costly in terms of forgone feasible growth opportunities.

Question 4: Who are the potential agents of change that can lead structural change? Economists tend to assume that things happen if the incentives are right. Many have even defined economics as the science of incentives. According to this view, people avoid actions because of a lack of incentives. Seldom in this approach is the possibility that things do not happen, not just because people may not have the incentives: they may just not have the capabilities.

Countries differ in the types of capabilities they possess and in the organisations that possess them. Most places do not have an ecosystem of start-ups, venture capital firms, incubators, accelerators, private equity firms, and stock markets. For the few places that do, exploring new business ventures can be done from the proverbial home garage. Most other places require firms that can internalise those functions. In the United States, before the emergence of Silicon Valley, innovation mostly happened inside large corporations, such as AT&T that was a private, regulated monopoly.

Structural breakthroughs often happen within large conglomerates that have the balance sheet to make large investments – meaning they possess an internal capital market. They also have experienced managerial capital that can be reallocated to new ventures. They have the reputational capital to reach complex deals with other organisations and with the government. Toyota, Samsung, Turkey's Koç group, and Colombia's Grupo Empresarial Antioqueño are examples of this.

State-owned enterprises can play a similar role. Companies such as OCP Group in Morocco, Sasol in South Africa, Empresas Públicas de Medellín in Colombia, ARAMCO in Saudi Arabia and many examples in China (e.g., CNPC, China Mobile, ICBC, CNOOC, and Chem China) are organisations that have the capacity to execute strategic diversification bets. In other contexts, the attraction of a multinational corporation can have transformative effects, such as INTEL in Costa Rica, De Beers in Botswana and Namibia, and Volkswagen in Slovakia.

Very often, growth strategies do not spell out who are the agents of change that will execute the strategy. These agents are often bequests of the past and differ markedly across countries and over time. They constitute the organisational endowment that countries have to mobilise in order to catalyse the growth process.

V. Concluding remarks

Technology adoption is critical for long-term growth, but it cannot be delegated to the proverbial invisible hand of the market. Technology adoption is rife with market failures that only concerted actions can address. Technology adoption seems to be more challenging and impactful in tradable activities. The fact that poor countries are cheap reflects that the productivity gaps are larger in tradables than in non-tradables. The fact that when countries grow sustainably their exports grow more than proportionally and they expand the basket of feasible products towards more complex goods, suggesting that it is good to focus technology adoption on tradable activities.

The resulting policy implication is not a new list of concrete policies that all countries can adopt in the way the Washington Consensus was formulated. Instead, it is an organised and costly search process for growth opportunities, both at the intensive and extensive margins of production. This does not require a list of policies, but rather a set of processes that can endogenously generate such policies by actively exploring opportunities and obstacles. A country cannot walk away from the institutional and organisational structure that has been bequeathed by history. Instead, societies need to incur the risks of exploration in a responsible way. This process might be difficult, but its absence is bound to make growth impossible.

Notes

[1] Balassa (1964).

[2] Krueger (1998).

[3] Bhagwati (2004).

[4] Talvi et al. (1997).

[5] Amsden (2001).

[6] Acemoglu et al. (2005).

[7] Rodrik et al. (2004).

[8] Galor (2005; 2022).

[9] Galor and Weil (1999); Weil and Galor (2000).

[10] The 'adjacent possible' is a term introduced by Stuart Kauffman to describe the possible evolutionary paths that a complex system can take at any point in time. See Kauffmann (2014).

[11] Hall and Jones (1999).

[12] North (1990); Acemoglu et al. (2005).

[13] Balassa (1964).

[14] Samuelson (1964).

[15] An estimation of the impact of GDP growth on the PPP adjustment factor, controlling for fixed country characteristics and year effects, delivers an elasticity that is slightly smaller than that implied by the cross-section.

[16] These are the results of an estimation of the impact of the log of exports on the log GDP, controlling for fixed country characteristics and year effects.

[17] Hausmann et al. (2005).

[18] Gruss et al. (2018).

[19] Hidalgo and Hausmann (2009).

[20] More precisely, I use Balassa's measure of revealed comparative advantage, which is the ratio of the share of the product in the country's export basket to the share of the product in world exports. A ratio of 1 would mean that the country exports what would be expected given the size of the country's total exports and the size of the product's world market. Our epsilon implies a ratio of just 0.01. I am indebted to Ulrich Schetter for the idea of looking at this extreme of RCA>0.01 rather than 1, as Hildago and Hausmann (2019) did. The latter is plausibly influenced by comparative advantage, while 0.01 just indicates an ability to make the product.

[21] In mathematical terms, this means that the matrix is nested. The literature on ecology has found that ecological networks tend to be nested in the sense that rare species tend to live in highly diversified places while ubiquitous species inhabit both (Hultén, 1937). Bustos et al. (2012) show that the nestedness is stable in international trade data such as that in Figure 5.3.

[22] This observation was first demonstrated in Hidalgo and Hausmann (2009), where they used a revealed comparative advantage of 1 rather than 0.01 to binarise the matrix. We focus on a lower cut-off to emphasise that we are focusing on the extensive margin.

[23] Hausmann et al. (2014).

[24] Hidalgo and Hausmann (2009).

[25] Hausmann et al. (2014).

[26] Solow (1957).

[27] Romer (1994).

[28] Gladwell (2008).

[29] For example, Coscia et al. (2020) study the impact of business travel on the evolution of productivity, employment, and exports at the country–product level.

[30] For example, Bahar and Rapoport (2018) study the impact of migration on the evolution of comparative advantage in receiving countries.

[31] For example, return migration as a source of industry dynamism has been studied by Hausmann and Nedelkoska (2018) for Albania, Bahar et al. (2019) for the former Yugoslavia, and by Diodato et al. (2023) for Mexico.

[32] For example, Mostafa and Klepper (2018) show how the garment industry was seeded into Bangladesh by one Korean company that trained 126 workers who went on to start 56 new high-performing companies. Hausmann and Neffke (2019) study regional pioneer firms in Germany. They found that pioneer firms intensively hired workers with industry experience from other regions. This was particularly important for the re-industrialisation of Eastern Germany post-reunification.

[33] See Hausmann and Rodrik (2003).

[34] Wright (1936).

[35] Lucas (1993).

[36] Pigou (1912).

[37] OECD (2023).

[38] The rule typically involves allowing accepted R&D investments to be deducted from taxable income at a rate greater than 100%.

[39] In the case of Panama, SEZs have exemptions from the rule that firms cannot have more than 10% foreign workers and the SEZs benefit from several special visa regimes (Hausmann et al. 2016).

[40] World Bank (2021).

[41] Stigler (1971).

[42] Hausmann et al. (2008).

[43] Hausmann et al. (2023).

[44] Andrews and Harrington (2023).

[45] Ghezzi (2017).

[46] Llinás (2021).

[47] Jiménez et al. (2012).

[48] Fernández-Arias et al. (2020).

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Response to Ricardo Hausmann by Isabela Manelici

The fundamental cure for poverty is not money but knowledge.

Sir Arthur Lewis, Nobel Laureate in Economics

I. Exports as a bedrock for growth strategies

Hausmann posits that low- and middle-income countries (LMICs) can achieve long-term economic growth through strategies that explicitly promote exports. How much such strategies improve long-term aggregate welfare, whether deviations from policy neutrality favouring exports increase welfare more than alternative policies, and the distributional implications of such strategies are core concerns in academic and policy debates.

Hausmann argues that narrowing the distance to the technology frontier is essential for closing income gaps between countries. LMICs have converged in development goals, such as life expectancy and school attainment – but not in income. Hausmann interprets these patterns as evidence that while local institutions in LMICs can achieve the former development goals, the latter goal cannot be achieved solely 'from within'. Market failures and distortions in LMICs can disincentivise technology upgrading. Hausmann's conjecture is that export-promoting policies would alleviate market failures and distortions that otherwise stymie technology upgrading.

Hausmann advocates for policies that support the exploration of 'productive opportunities' (particularly in tradable goods and services). He portrays the export market as one where firms from LMICs can achieve scale and amortise the large investments that are often necessary for technology adoption. He also highlights the important role of the export basket complexity, arguing that LMICs should prioritise exploration of complex goods that provide greater learning-by-doing prospects. Why is policy needed to facilitate such exploration (i.e., what stands in the way of profit-maximising entrepreneurs undertaking such exploration without government intervention)? And why can exports best facilitate the exploration process? These questions are at the heart of Hausmann's policy recommendation.

Where could the technology necessary to export more complex goods and services come from? Hausmann sees technology as 'productive knowledge' that takes three forms: (1) embedded in tools and materials; (2) codified in recipes, manuals, etc.; and (3) embedded in people as tacit knowledge. Local

producers may be able to invest in acquiring the first type of knowledge whenever they have access to capital, and when rents from such investments are protected. In such cases, the role of export-specific policies is more speculative, e.g., will these policies alleviate credit constraints or reduce crime and corruption? The second and third types of knowledge likely require direct exposure to superior technologies and opportunities to gauge whether they will be appropriate for local use. In such cases, we can draw a more direct link to exposure through exports, assuming foreign workers and firms possess more advanced knowledge than local workers and firms, and that they share such knowledge with their suppliers from LMICs.

II. Globalisation-led growth?

According to Nobel Laureate Michael Spence, a major weakness of the Washington Consensus as a guide to development policy formation is its underemphasis on knowledge transfers, as well as on the domestic conditions and investments that facilitate absorption and diffusion of knowledge and technology.[1]

LMICs that encourage trade and the entry of multinational enterprises (MNEs) can expand their productive knowledge by exposing their workers and firms to the more advanced knowledge of workers and firms from abroad. Such exposure could happen through international firm-to-firm trade (where the domestic firm is an exporter or an importer) or intranational firm-to-firm trade (when the domestic firm supplies or buys from an MNE subsidiary in the country). Such exposure could also happen through domestic workers employed by globally engaged firms (domestic importers/exporters or MNE subsidiaries), who then transition to entrepreneurship or employers yet to be globally engaged.

Which pursuit of those favouring exports, imports, or MNE entry will be most effective and the potential complementarities among them requires further research. Estimating the separate causal effects of trade or foreign direct investment (FDI) exposure on workers, firms, and aggregate growth (let alone their interactions) is notoriously difficult. Moreover, the data requirements to pin down these mechanisms are rarely met economy-wide, particularly not in LMICs, where data coverage and quality tend to be lower. The fact that most economic activity and employment in LMICs occur in the informal sector further hinders the ability to provide complete answers on the aggregate effects of trade or FDI-seeking policies. These caveats notwithstanding, importers, exporters, and MNEs (often the same firms) are among the leading firms in each country.[2] Therefore, it is helpful to take stock of what we currently know and do not know about the effects of their trading and MNE status on knowledge accumulation, diffusion, and aggregate growth.

III. Evidence supporting export promotion

The Washington Consensus recommended supporting trade through unified exchange rates and reduced trade barriers. Hausmann goes a step further in recommending explicit support for firms and industries to boost their export performance. His first argument in favour of such explicit support is that it helps countries achieve market scale, which matters in settings with internal returns to scale or fixed investment costs.[3] Whether or not improved market access is accompanied by investment hinges on whether capital access improves alongside market access.

Hausmann's second pro-exports argument relates to the complexity of the export basket. It is yet to be fully settled whether the relationship between a country's development and the complexity of its export basket is one-way or two-way. Atkin, Costinot, and Fukui explore this relationship theoretically and empirically.[4] The classical Ricardian perspective is that development may give countries comparative advantage in more complex goods. According to this perspective, laissez-faire policies are optimal. Alternatively, industrial policies fostering specialisation in more complex goods may lead to faster growth, which could justify export-targeting policies. Atkin, Costinot, and Fukui find evidence of positive dynamic economies of scale in more complex sectors (similar to Young, and Hausmann et al.).[5;6;7] However, this finding does not imply pervasive dynamic gains from trade because such a result would require that more complex sectors face less foreign competition. However, more complex sectors tend to face *more* – not less – foreign competition, which makes them shrink relative to other sectors. Since complex sectors are the source of dynamic spillovers, opening up to international trade can hurt the development of LMICs. Atkin, Costinot, and Fukui conclude by inviting more research into the unexpected correlation between economic complexity and competition.[8]

Another potential benefit of exporting (less explored in Hausmann's chapter) is that exporting may provide opportunities to learn from sophisticated foreign buyers. To probe this channel's existence and quantitative importance, Atkin, Khandelwal, and Osman randomly allocated export orders for high-quality rugs to handmade rug manufacturers from Egypt.[9] The authors provide compelling evidence of knowledge transfers from foreign buyers to the rug manufacturers that were mediated by export intermediaries. A caveat noted by the authors is that finding sophisticated foreign buyers of complex goods is onerous. The chapter did not conduct a cost–benefit analysis of export facilitation programmes, nor did it isolate market failures preventing firms from exporting without assistance. The finding that learning-from-exporting benefits exist is not sufficient to justify policy intervention, and a thorough cost–benefit analysis is necessary before concluding that an export-led growth strategy is net positive for an economy.

IV. Evidence supporting import promotion

Policymakers have long been focused on the risk of labour dislocation from import penetration. However, even when holding production technology constant, imports used as inputs in production can lead to lower production costs and consumer prices (as shown by Blaum, Lelarge, and Peters).[10] A caveat worth mentioning is that it is hard to measure the resources spent on finding trading partners abroad (like in the case of export promotion), meaning that we are yet to have a complete welfare estimate of access to cheaper imports.

When technology adapts in reaction to imports, reductions in import tariffs can increase access to imported input varieties and product scope.[11] R&D as well as technology upgrading can also exhibit complementarities with imported inputs. According to Bøler, Moxnes, and Ulltveit-Moe, cheaper R&D stimulates not only R&D investments but also imports of intermediates, magnifying the productivity gains from R&D.[12] Conversely, trade liberalisation can affect firms' technologies through changed incentives to undertake R&D or quality upgrading.[13] To activate this complementarity between R&D and imports requires well-functioning capital markets. Lastly, Buera and Oberfield argue that imports can lead to dynamic gains from trade as domestic firms may draw insights when importing from the most productive foreign firms.[14] However, the ability to draw insights is likely to depend on the absorptive capacity of domestic importers. If firms have lower absorptive capacity in LMICs, these gains from importing are stifled.

V. Evidence supporting multinational enterprises attraction

Most foreign direct investment is made via the entry of subsidiaries of MNEs. MNE subsidiaries account for most of the exports of countries across the development spectrum (e.g., 45% in Uganda, 84% in Costa Rica, 61% in Belgium) and most complex goods exports (e.g., 90% for medical devices in Costa Rica and a similar percentage for cars in Romania). Therefore, MNEs deserve a centre seat at any discussion over export-led growth and a separate discussion about their benefits for the domestic economy. The need to discuss the gains from MNEs is also motivated by the fact that the abolition of barriers to FDI is a central tenet in the Washington Consensus.

Regarding the benefits of MNEs, there is an emerging consensus that suppliers to MNEs experience substantial improvements in their productivity.[15;16;17] Domestic firms may also benefit from purchasing inputs developed by domestic suppliers for the MNEs or from imitating MNE products.[18;19;20] MNEs can also benefit the domestic economy through former MNE workers joining domestic employers and sharing the knowledge acquired during their MNE tenure or through entrepreneurship after their MNE employment.[21;22] MNEs can further improve welfare through channels that do not hinge on knowledge transfers (such as MNE-driven changes in labour standards within their supply chain).[23]

Whether policies such as SEZs, suggested by Professor Hausmann in his chapter, that warrant a preferential tax treatment to MNEs are welfare-enhancing or not depends on the magnitude of the (knowledge) benefits from MNEs, whether MNEs internalise them or not, the extent to which MNEs interact with the domestic economy, and how distortionary SEZ benefits are. More evidence along these lines is welcome. The merits of other policy instruments, such as investment promotion agencies that aim to reduce information frictions, depend on the market failures plaguing an economy and whether those instruments can address the relevant failures.

VI. Conclusion

Hausmann's chapter on export-led growth is a thought-provoking reflection on the limited role played by exports in the Washington Consensus and the more prominent role exports could play following the London Consensus. In reaction, I welcome the proposal of Hausmann and read it as a broad invitation to scholars to address the remaining open questions on the contributions of globalisation (in its many forms) to development and growth.

Notes

[1] Spence (2012).

[2] Sutton and Kellow (2010).

[3] Bustos (2011).

[4] Atkin et al. (2024).

[5] Atkin et al. (2024).

[6] Young (1991).

[7] Hausmann et al. (2007).

[8] Atkin et al. (2024).

[9] Atkin et al. (2017).

[10] Blaum et al. (2018).

[11] Goldberg et al. (2010).

[12] Bøler et al. (2015).

[13] Eslava et al. (2018).

[14] Buera and Oberfield (2020).

[15] Javorcik (2004).

[16] Alfaro-Ureña et al. (2022a).

[17] Amiti et al. (2023).

[18] Rodríguez-Clare (1996).

[19] Kee (2015).

[20] Brambilla et al. (2009).

[21] Poole (2013).

[22] Liu et al. (2014).

[23] Alfaro-Ureña et al. (2022b).

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Response to Ricardo Hausmann by Danny Quah

I. The trade-technology relation in small and poor economies

In 'Export-led growth', Ricardo Hausmann concludes that what determines aggregate economic performance is (a) not just trade but exports and (b) not just technological progress but economic complexity.[1] This chapter challenges those conclusions on analytical and empirical grounds. I argue that because poor countries are cheap a wage-price mechanism underpins the growth impact of trade and technology. It is that mechanism, rather than exports and economic complexity, that more fundamentally determines aggregate economic performance.

In this commentary I build on Hausmann's framework, but depart from it in two significant ways. First, I show empirically that small economies are surprisingly successful. Their per capita incomes are unexpectedly high relative to larger economies. This finding contradicts theoretical models that feature as key growth drivers the advantages of diversity, scale economies, and economic complexity and experimentation. This is not to say that all small countries are rich, indeed, many are poor. Instead, it is to say the converse: almost all rich countries happen to be small. Smallness is not sufficient for economic success but is (close to) necessary. Good aggregate economic performance is not just the preserve of one or two small countries; rather, success characterises a broad range of small states, each with very different circumstances.

Singapore is a tiny country with a population of only 5.6 million and a land area of just 734 sq km (smaller than New York City or urban London). Yet, Singapore is the world's sixth-richest nation by per capita income (averaged from 2013 to 2023). Does that make Singapore unusual? There is only one large country among the nine richest countries in the world: the United States (ranked eighth). The average population among the nine richest nations, excluding the US, is only 4.2 million, i.e., less than Singapore's. The largest nation in this high-performing group (excluding the US) is Switzerland with a population of only 8.5 million. Among the rich, small states are the norm, not the exception. Second, I argue that in a world where poor countries are cheap, the effects of technological improvements and trade openness are not monotone, but vary with sectoral wage-price characteristics across the

economy. On average, economic complexity in advanced technology matters for growth, but less so in countries that are extremely successful.

Why might this be? Conventional wisdom is that both trade and technological advance are good for everyone. In economic analysis this is, typically, unambiguous at the level of the aggregate economy. Following this thinking, moreover, if shifts in trade and technology disadvantage anyone in the economy, government can more than fully compensate those affected individuals while still keeping overall gains positive on net.

However, that poor countries are cheap indicates that those standard mechanisms are failing to function as expected in both rich and poor nations. Instead, in the model of this commentary, a wage-price mechanism with particular features ends up sequencing different dynamic adjustment across different sectors: international price convergence in tradable sectors then implies unconventional and counter-intuitive price response in non-tradables. The result is political resistance to trade and technology advance in specific sectors in the economy as those shifts wind up privileging certain workers and business and disadvantaging others.[2] This divergence between aggregate economic effect and domestic consensus also carries implications for geopolitical relations between nations.[3]

II. Poor cheap countries in the global economy

For four decades, the Washington Consensus has been an important if controversial reference for development policy in the global economy.[4;5;6;7] It provided guiding principles on three broad topics: first, property rights, privatisation, and liberalisation; second, monetary and fiscal policy; and third, trade, and foreign investment.

When Spence surveyed post-1970s growth experiences worldwide, he concluded that two features, not emphasised in the Washington Consensus, have been key for developmental success in the world and, in particular, in Asia: one, knowledge transfer and two, engagement with the global economy.[8] High incomes result from high productivity and advanced technology, and the fastest, most efficient way to improve technology levels in an economy is through knowledge transfer with the rest of the world. But it is not just in technical advancement, driven by knowledge transfer, where gains are obtained from engagement with the global economy. Benefits are obtained from just having access to large markets. Trade and investment opportunities in any country, especially a low-income emerging economy, are dwarfed in comparison with those available in the global economy.

Along the same lines is a third key observation: despite an impression of universalism, the Washington Consensus relates more obviously to the Latin American growth experience than generally elsewhere around the world. Hausmann builds on these three observations. His growth analysis emphasises exports where Asia succeeded while Latin America did not – and technology – to increase productivity rather than just stabilise the macroeconomy. In his

approach, Hausmann raises two challenges. First, the Washington Consensus does not work: Latin American countries that followed the Washington Consensus recommendations were not as successful as Asian ones that ignored them. Second, traditional growth models too do not work: across nations, per capita incomes remain widely dispersed whereas convergence (again across nations) has already occurred in the values of neoclassical explanatory variables – number of workers per capita, capital per worker, education, and urbanisation; and in indicators of demographic transition, such as life expectancy, fertility, and female labour force participation rates.

The final ingredient in Hausmann's analysis is that poor countries are cheap, a relation discussed both in Hausmann's chapter and in subsection II.1. This hypothesised empirical regularity does not mean those countries' currencies are undervalued. Instead, the cheapness of poor countries signals that those countries' production structures bear particular features. Hausmann uses this maintained hypothesis to motivate his emphasis on technological progress in products of ever greater economic complexity. I will use this same fact to argue, instead, that certain kinds of economic openness and technical progress can harm economic wellbeing. Thus, in my analysis, a world where poor countries are cheap is a world of potential political resistance to trade openness and technological improvement.

To understand this, we need to begin with an explanation for the cheapness of poor countries. Informal intuition for this is that countries are poor when their technology is less advanced, thus lowering worker productivity. But it is incorrect to say that this implies low prices. If, for instance, wages are pre-determined or less than fully flexible downwards, then reduced productivity results in higher prices, not lower. This is no mere hypothetical possibility. In the early 2000s, many poor countries did not yet have widely available high-speed broadband Wi-Fi internet service at home or at work. Instead, to get online, users visited costly, slow, wired internet cafes. Less advanced technology did not make things cheap. Quite the opposite: poor countries worked with less advanced technology that was both costlier and less convenient.

Farming provides a second example. While traditional, low-tech agricultural methods are appropriate when low-wage labour is plentiful, continuing with that less advanced technology implies ever higher output prices as wages rise. Only by upgrading agricultural technology and raising labour productivity would it be possible to reduce food prices as wages rise. Again, less advanced technology does not make things cheap.

Therefore, a more robust analysis is needed to understand why poor countries are cheap: It is this that will motivate both Hausmann's emphasis on economic complexity and the current commentary's hypotheses on domestic resistance to trade and technical progress.

Suppose the economy produces different kinds of outputs, some of which are not (yet) traded internationally. For sectors producing traded output, prices on their outputs are equalised to world prices, after normalising by market

exchange rates. These sectors' outputs are neither cheaper nor costlier than in the rest of the world. In traded-output sectors technology levels together with world prices determine wages. Assuming labour can move freely in the economy, the wage rate across all sectors – both traded and non-traded – is equalised, and is thus exogenously determined relative to technology in non-traded sectors. Therefore, poor countries with low technology levels in their traded sectors will have low wages. Those low wages propagate through the entire economy and result in low prices in non-traded sectors. Thus, poor countries are cheap.[9]

At this point, Hausmann's analysis draws on a key asymmetry between the non-traded and traded sectors. The equalisation of traded-sector prices with the rest of the world means that technical advances in that sector translate into a corresponding rise in wages. That increase in wages, in turn, means that prices rise in the non-traded sector. On the other hand, technical advances in non-traded sectors does not raise wages – those are fixed by technology and price in the traded sector – but instead lowers output price in the sector concerned. It is thus only technical advances in the traded sectors that improve the economy; technical advance overall has ambiguous effects. Because Hausmann associates economic complexity with exports, and thus with trade more generally, he deduces economic complexity to be the key driving variable for exports and thus for growth. The empirical analysis in Hausmann's chapter examines that relation.

An alternative rendering is possible for this Balassa-Samuelson mechanism resulting in a substantively different emphasis: begin by noting that, in general, technical advance in traded sectors is welcomed by all segments of the polity. However, in a world where poor countries are cheap, technical advance in non-traded sectors will be opposed by segments of the population, for its lowering output prices, and thus its being perceived to cause job destruction and to put at risk both employment and business sustainability. In this reasoning, moreover, it is trade that matters, not just exports (or imports). As long as trade causes a rise in output prices, i.e., as long as domestic prices converge upwards to world levels with trade, then wages too rise everywhere in the economy. Non-traded sector output prices are more likely low when technology in that sector is relatively advanced. In these circumstances economic openness attracts popular support. However, a low-tech, non-trading sector will, other things equal, have relatively high output price. Trade for that sector will then drive down output price, and be perceived to cause job destruction, unemployment, and failing businesses. Such economic openness attracts political opposition.[10]

This description highlights yet another difference between my reasoning and the analysis in Hausmann's chapter. On the trade openness side, Hausmann's focus is exports, a quantity variable. Mine is not quantities but instead prices and wages, changes in which emerge from trade. My analysis does not suggest separating out exports and imports: either one of these matters as much as the other.

In summary, understanding why poor economies are cheap can, as in Hausmann's chapter, motivate scrutiny of the economic complexity of exports and can potentially help explain the positive impact on growth of economic complexity. Further extending the reasoning, as I do here, helps shed light on why trade and technical advancements are not always unambiguously accepted by the population in a given economy.

Policymakers have a range of options for trade and technology that can increase growth and lift economic performance. Not all options, however, are politically acceptable. What does not work is to simply boost technology or open up the economy, without first working through their impact on wages and prices.

Section III will present empirical evidence on cross-country aggregate economic performance relative to the large forces of trade openness and economic complexity just discussed. For completeness, however, the following subsection II.1 now discusses the empirics of relating poor countries to cheapness.

1. *Empirics for how poor countries are cheap*

How empirically accurate is the hypothesis that poor countries are cheap – if, as I have argued, poor countries' use of less advanced technology does not lower prices? While that informal intuition is incorrect, the empirical evidence will, indeed, show poor countries are cheap. (Also, I highlight the key features of the data using a format that I will deploy again repeatedly for efficiency in the following section III.)

Hausmann analyses the relation between incomes and prices using PPP adjustment factors. But unless one knows what convention is being used for numerator and denominator in the definition of a PPP adjustment factor, it will be unclear how exactly a downward-sloping line in Hausmann's Figure 5.1 shows what it intends. Does a high adjustment factor mean the country is cheap? Or expensive? What is the direction of adjustment?

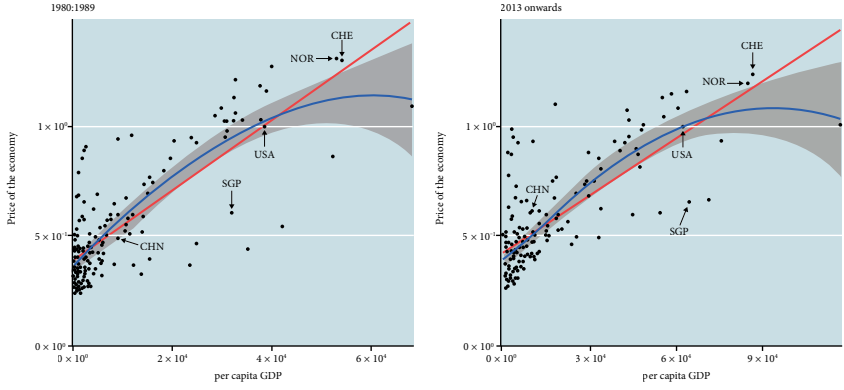
Instead then, define R the real price of the economy as the number of local currency units (LCUs) needed to purchase what one international dollar can buy, divided by the market exchange rate (in LCUs per international dollar). This price is low – the economy is cheap – when fewer LCUs are needed to make a purchase than the market exchange suggests.[11] In all the empirical analyses here and in section III, I present snapshots of different variables at the beginning and the end of the available time sample, where beginning means taking the timeseries average over the decade 1980–1989 and end means the timeseries average over the decade since 2013.

Figure 5.5 graphs R the real price of the economy on the vertical axis, and per capita GDP on the horizontal axis. Each panel shows the ordinary least squares line and a nonparametrically-fitted trend line, as well as its 95% confidence interval.[12]

We can conclude that poor countries are indeed cheap on average: both panels of Figure 5.5 have the best-fitting lines slope upwards. However, there is considerable variation in the distribution of data points around the positively-sloped lines. Where the bulk of the cross- section distribution rests, the locally estimated scatterplot smoothed (loess) line is firmly positive with tight confidence interval around the estimate. It is striking, however, that even in that midrange there are significant outliers both upwards and downwards. Singapore, for one, is consistently cheap relative to what its high GDP per capita would predict. In the cross-section Singapore is balanced by other more expensive countries: Switzerland, Norway, Iceland, and Denmark.

While cheapness is the focus of explanation in this discussion, subsequent empirical analysis in this commentary will use measurements at market exchange rates, rather than corrected for cheapness or using PPP. This is because in section III the focus of interest becomes the economy's position in the world. While correcting for purchasing power, i.e., using PPP, is appropriate for understanding the wellbeing of a country's people, it is inappropriate for assessing that country's role in the global economy: jet fighters and Apple iPhones are purchased not with PPP-corrected dollars but with dollars bought at market exchange rates.

Figure 5.5: Relationship between real price of the economy and GDP (per capita)



Source: author's own calculations based on World Development Indicators.
Notes: Poor countries are cheap. The left panel shows the situation for the 1980s; the right, that since 2013. The vertical axis is the real price of the economy, R in the text; it is the reciprocal of cheapness. The horizontal axis is GDP per capita. The data points are all the national economies in the World Bank's World Development Indicators database. Each graph displays OLS and nonparametric loess lines, the latter together with its 95% confidence interval. The panels also explicitly indicate Switzerland, Norway, Singapore, the United States, and China – to help calibrate the reader's intuition on what the figures show, and to which the analysis will return subsequently.

III. The global distribution of economic success

This section quantifies the significance of trade and technology in the cross-section distribution of aggregate economic performance across countries. This is to help assess the export and complexity channels for economic growth proposed by Hausmann.

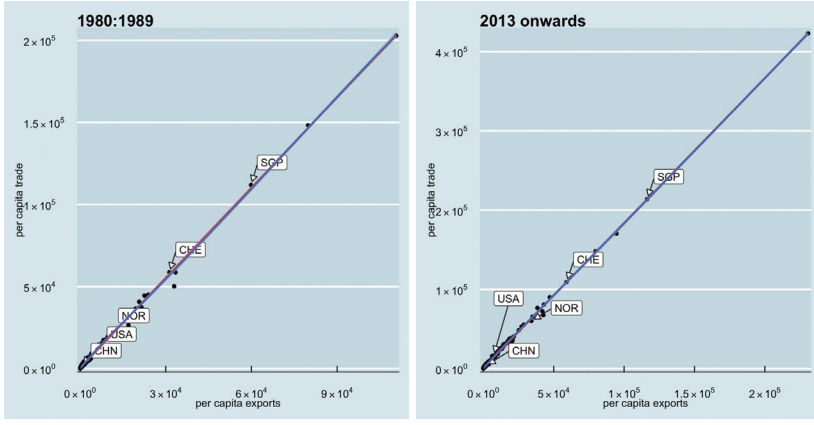
The key finding, however, will be that small countries are surprisingly successful economically. This casts doubt on the idea that complexity and scale are the critical drivers for aggregate economic performance. More directly, this section will also document how the effects of technological improvements are not monotone: economic complexity is good for raising per capita GDP for ordinary economies; however, the richest, most successful economies escape this correlation and are extraordinarily rich without having to be unusually complex.

First, consider the distinction between exports and trade, the sum total of exports and imports. Do exports need to be highlighted as the engine of growth and prosperity? Or will trade suffice?

Figure 5.6 shows how, once business cycle variations have been removed, exports and trade in the cross section of countries are tightly related to the point of being indistinguishable. Over the longer term, total trade just equals twice exports. The slope of the ordinary least squares line equals exactly that ratio, with the exception of one or two instances, deviations from the line too small to be visible to the human eye.

Consequently, it will not be possible to tell if it is exports that drive growth, as suggested by Hausmann, or whether it is more generally trade that does so.

Figure 5.6: Relationship between trade and exports



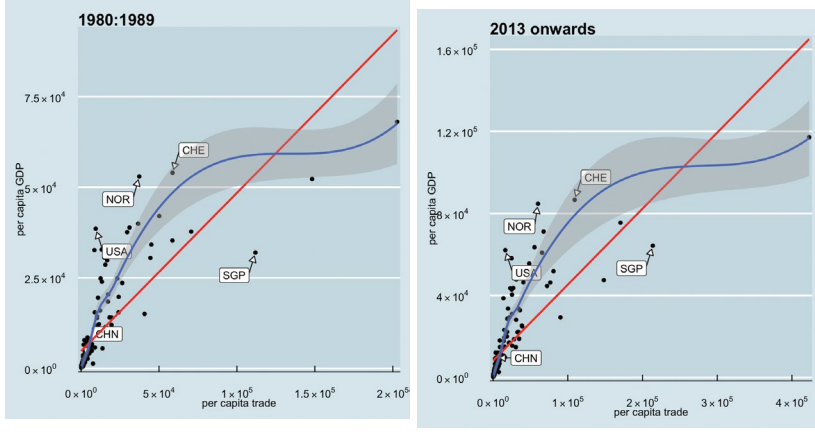
Source: author's own calculations based on World Development Indicators.
Notes: Modulo, a proportionality constant, when smoothed over a decade, exports and trade are indistinguishable in the cross section.

Next, consider the hypothesis that engagement with the global economy encourages technological advance and thus increases growth and raises economic performance more generally.

Figure 5.7 shows that for both beginning and end of the data sample, income and trade are strongly positively related. Economies are richer, the greater their openness. This positive relationship has a relatively narrow confidence interval around it. At the same time, however, the data show significant outliers, e.g., Singapore. Conditional on its trade, Singapore's GDP per capita is unexpectedly low. Two other outliers, but in the opposite direction, are Norway and the United States: these two countries are unexpectedly rich, given the relatively little that they trade.

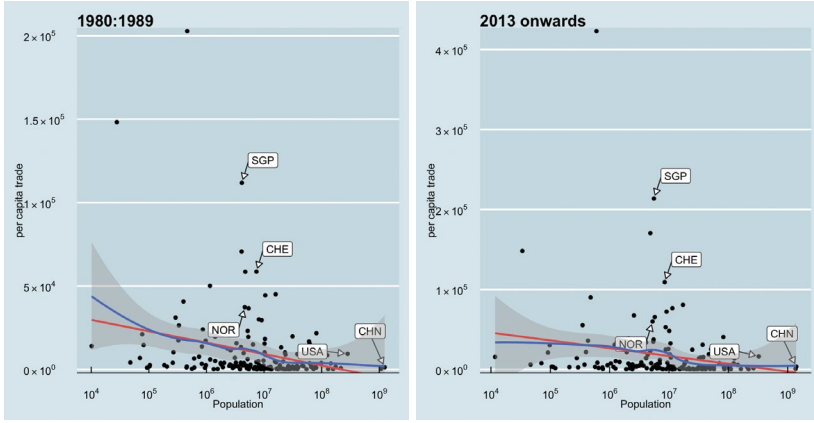
One of the most interesting features of Figure 5.7 is how China is strikingly unremarkable. For all the attention China attracts in its being nearly every other nation's lead trading partner, the reality is China does relatively little trade per person. Many other countries do much more. Singapore, for one, does 50 times more trade than China per capita. China's trade is notable primarily because its population is so large. In trade per capita, China is unremarkable.

Figure 5.7: Relationship between income (GDP per capita) and trade (per capita)



Source: author's own calculations based on World Development Indicators.
Notes: Incomes and trade are positively related. The vertical axis is GDP per capita; the horizontal axis, total trade per capita. The positive relationship has a relatively narrow 95% confidence interval, but with significant outliers. Singapore, conditional on how much it trades, has relatively low per capita income. Norway and the US, on the other hand, deviate in the opposite direction. Relative to how little they trade, those two nations are unexpectedly rich. Finally, given its very large population, China's pattern of trade and income is unremarkable.

Figure 5.8: Relationship between trade (per capita) and population size

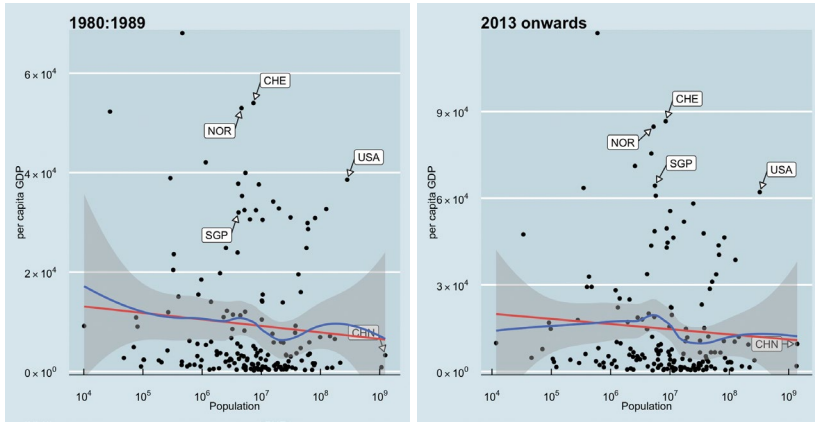


Source: author's own calculations based on World Development Indicators.
Notes: On average, per capita, small states do not trade significantly more than large economies. The vertical axis is trade per capita; the horizontal axis is population, measured on a log (base 10) scale. The most striking feature is how nations like Singapore and Switzerland consistently trade orders of magnitude more than world average.

This empirical regularity on trade and country size is sometimes dismissed with the suggestion that arithmetic alone, mechanically and misleadingly makes small states appear to trade more. However, Figure 5.8 shows that this is not the reality. Many small countries trade as little per capita as large countries. Some large economies trade hardly at all; others considerably more. Countries exercise significant agency in how much they choose to trade. On average the relationship between trade and size is negative, but only slightly so. Instead, the most outstanding empirical feature in Figure 5.8 is how successful countries like Singapore and Switzerland consistently trade orders of magnitude more than the world average. It is not that small countries trade a lot. Instead, it is that successful countries who trade a lot happen to be small.

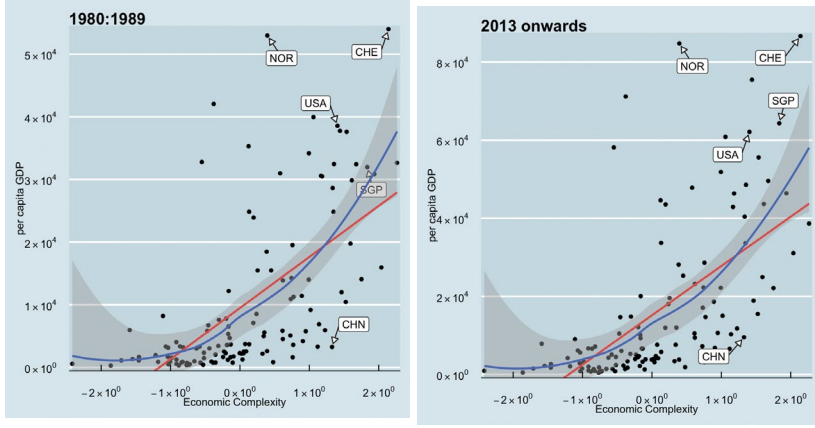
To expand on this, Figure 5.9 shows the relationship between income per capita and population. The figure shows the sense in which small countries succeed at economics. During 2013–22, of the nine richest nations on Earth, only the United States had a population greater than 10 million. With its over 300 million people, the United States was obviously an outlier. Singapore's population, by contrast, was only 5.6 million. Even more remarkably, the average population of the nine richest states, excluding the United States outlier, only came to 4.2 million. The largest of these eight, Switzerland, had a population of only 8.5 million. To be clear, Figure 5.9 is not a statement that small states always succeed: it shows many small nations are poor. Instead, the lesson in Figure 5.9 is that successful nations are small, not that small states succeed.

Figure 5.9: Relationship between GDP (per capita) and population size



Source: author.
Notes: The richest nations on the planet are almost all small states. Since 2013, of the nine richest nations only the US has a large population. Singapore in this time has only 5.6 million. But, more striking, the average population of the nine richest states, excluding the US, is only 4.2 million, with the largest, Switzerland, having a population of just 8.5 million. Obviously, many small nations are poor. Not all small states succeed but almost all successful nations happen to be small.

Figure 5.10: Relationship between GDP (per capita) and economic complexity



Source: author.
Notes: Incomes and high-complexity production are strongly positively related. At the same time, however, complexity cannot account for the performance of the small-state, successful economies. The figure shows GDP per capita on the vertical axis and the Hausmann–Hidalgo index of production complexity on the horizontal axis.

Finally, and most critical for the analysis in Hausmann's chapter, we turn to economic complexity and economic performance. Does complexity account for the greatest economic successes? Is economic complexity the best, fastest way to improve the level of technology in the tradables sector and to maintain it at a high level? Is economic complexity the best way to raise the price of tradables, thereby allowing incomes, wages, and all prices to rise without mass opposition?

Figure 5.10 shows that the relationship between income and economic complexity is strongly positive. However, the most successful economies are distinct upwards outliers relative to that relationship. By contrast, nations that do not outperform the positive relationship are many and hew close to the ordinary least squares and loess lines. Economic complexity accounts well for average economic performance, but not for successes.

This pattern of outliers is predicted from the earlier finding that small states are surprisingly successful. By logic, small states do not have the size to encompass the wide diversity of skills and insights that create complex products. When they succeed, therefore, they escape in an upwards direction from the predicted average relation between incomes and economic complexity. This reasoning helps explain Figure 5.10. It leaves open, however, the reasons underlying the economic performance of those small countries that do succeed.

Small states will, naturally, tend to make too much of what its people can do, and too little of what its people want. It is trade – both exports and imports together – that overcomes these bottlenecks.

IV. Conclusion

This response has developed a simple analysis of the effects of trade and technology on aggregate economic performance. The core mechanism I draw on is wage–price dynamics in a global economy where poor nations are cheap.

The commentary departed from Hausmann's work in two important conclusions: (1) what matters is trade generally, not exports in particular; (2) what matters is technological progress generally, not economic complexity in particular. It is important, however, that those sectors where technological advancements occur and where trade impacts significantly have particular wage–price patterns. Empirically, for average nations, technological advancement through complexity matters; for extreme successes, it is trade that matters.

This response's key empirical findings, however, concern the economic performance of small states. A small economy, all else equal, tends to produce too much of what its people can do and too little of what its people want. Small states cannot match the scale, variety, or complexity that bigger economies can leverage. They face significant obstacles for growth and economic success. Yet, small states are the most successful economies on the planet.

Small nations, provided they remain open to the global economy, can draw on different channels of knowledge transfer. Advanced technology levels are indeed critical for prosperity and aggregate economic performance – but they can come through multiple pathways, not only home-grown research and complexity of the domestic economy. Trade helps small states overcome their natural bottlenecks.

Trade with the global economy is essential for small states, whereas larger nations can afford autarky. Thus, although a more elaborate analysis is not given in the current commentary, a simple conjecture is natural on the role small states can play in the global economy. All else equal, small states have the most to gain from an open global trading system. Consequently, it is they who will show greatest commitment to such an international order.[13]

Notes

[1] The analysis in the current chapter of aggregate economic performance rests on the understanding that that is actually what many observers have in mind when they speak of economic growth. For policymakers, growth rates – the first-differences of log incomes, typically analysed in regressions – are meaningful not for their measured values but for the endpoint to which they draw the economy.

[2] While my reasoning might appear unconventional, the differential effect in my argument is, in essence, the same as that in analyses of inequality and growth. Indeed, my use of the specific wage-price mechanism – essentially a Balassa–Samuelson effect – can be viewed as yet another driver for inequality in growing economies.

[3] Quah (2024a).

[4] Its author notably reported that 'there are people who cannot utter the term without foaming at the mouth' (Williamson, 2002).

[5] Rodrik (2006).

[6] Spence (2021).

[7] Quah (2024b).

[8] Spence (2021).

[9] This reasoning is basically that of the so-called Balassa–Samuelson effect, named after the economists who first proposed an explanation for this pattern of prices across countries.

[10] In the language of Great Power rivalry this is what happened with 'The China Shock' (Quah, 2024a). While the economy in such a situation can always choose to block trade, or otherwise retreat into autarky, the better way to combat this negative impact, according to the analysis in the text, is to improve technology in the traded sector.

[11] Variable R is available as PA.NUS.PPPC.RF from the World Bank's World Development Indicators database.

[12] Being cheap or costly is always relative. The World Bank constructs R in World Bank international dollars, a measure akin to the US dollar. In Figure 5.5, being vertically lower than 1 means roughly that the economy is cheaper than the US; being higher, costlier. To help the reader mentally calibrate the graph, observe that the World Bank's international dollar turns out to be close to but not identical with the US dollar, so the United States appears near but not exactly at the value 1 on the vertical axis.

[13] Quah (2024a).

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