RAPID
Rethinking African Paths to Industrial Development

How do the Goods a Country Produces Affect its Growth?

Implications for Sectoral Selection

By Stefan Dercon, Nicolas Lippolis and Stephen Peel

csae
CENTRE FOR THE STUDY OF AFRICAN ECONOMIES

BLAVATNIK SCHOOL OF GOVERNMENT

UNIVERSITY OF OXFORD

Abstract

This paper discusses different theories bearing on the question of how sectoral specialization affects an economy's growth prospects, a matter of great relevance for governments thinking of targeting particular sectors or sub-sectors. We first trace the implications of the influential Heckscher-Ohlin model, followed by a discussion of an older research agenda on structural transformation and development policy. Both these literatures have a deterministic flavour to them, however, and cannot account for the consequences of targeting certain sectors over others. In the second part of the paper, we discuss a more recent literature inspired by the work of Ricardo Hausmann and César Hidalgo and by empirical work in international trade, which spell out the dynamic consequences of different patterns of specialization. We conclude with some guidelines for sectoral section, where we emphasize the need for African economies to move away from their current specialization in primary activities and low-productivity services, and towards sectors that provide greater scope for capability accumulation, which translates into a greater potential for quality improvements and further diversification.

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1. Introduction

The question of how productive structures evolve as a country develops has a long pedigree in development economics. Scholars such as Simon Kuznets (1957; 1966; 1973) and Hollis Chenery (1960) noted a tendency for the share of manufacturing output to rise and the share of agricultural output to fall over the course of development. The idea that entering the production of manufactures would open the door for accelerated development was also implicit behind many state-led industrialization drives in the developing world during the second half of the twentieth century. The economic crisis that afflicted most economies in Africa and Latin America in the 1980's and 1990's tarnished the credibility of such views, and theories emphasizing factor endowments as determinants of specialization patterns came to gain the upper hand. However, the recent shift in mainstream development discourse towards greater acceptance of industrial policy, and evidence of successes of interventionist regimes in fostering economic growth, have once again raised interest in the question of what a country should seek to produce.

This paper reviews theories linking patterns of specialization and economic growth, with the aim of shedding light on the scope for government action in influencing the sectoral composition of output. Our emphasis is on the implication of different theories for the 'typical' African economy. Although scholarly work bearing on this topic does not form a coherent body of thought, we organize the review around four different perspectives on the relationship between economic development and the goods a country produces. The first perspective comes from neoclassical trade theory, which predicts goods exports based on a country's factor endowments. We then look at the literature on structural transformation, in both its older and more recent incarnations, which invokes changes in domestic production and consumption patterns to explain observed changes in productive structure. This is followed by a discussion of these two perspectives, which we jointly refer to as 'Paths of Development', as they share the understanding that changes in the productive structure are a natural byproduct of development.

In the second part of the review, we discuss theories that claim an exogenous role for patterns of specialization in affecting economic growth, starting with Ricardo Hausmann and Cesar Hidalgo's 'Product Space Analysis'. After discussing Daniel Lederman and William Maloney's critique of Hausmann and Hidalgo's framework, we move on to discuss the literature on industrial capabilities, and conclude with a reflection on the primacy of capabilities as the object of industrial policies. African economies must move away from their current specialization in primary activities and low-productivity services, and towards sectors that provide greater scope for

capability accumulation, which translates into a greater potential for quality improvements and further diversification.

2. Paths of Development

2.1 The Ricardian Model

The two canonical models for predicting patterns of international trade are the Ricardian model and the Heckscher-Ohlin model. Both make use of the concept of 'comparative advantage', but while in the Ricardian model comparative advantage is determined by technological differences, in the Heckscher-Ohlin model this role is played by factor endowments. Below we briefly outline the main assumptions and theoretical results of each model, before moving on to discussing models that build on the Heckscher-Ohlin model to predict different paths of development.

The simplest version of the Ricardian model assumes two goods and one factor of production (generally labour), which is mobile across industries but not across countries. Labour in each industry has a fixed relative productivity parameter, and countries are price takers for both goods in international markets. The result of the model shows that countries will specialize in industries in which they have a *comparative advantage*, that is, the relative productivity of that industry is higher than the relative price offered for its output in international markets (which under perfect competition is equivalent to sayng the country has the highest relative productivity for that industry). This occurs even if a country has an absolute advantage in both goods because wages adjust so as to reflect the productivity of each industry. Therefore, even if trade patterns in the Ricardian model are determined by comparative advantage, the level of wages across countries is determined by *absolute advantage*. The Ricardian model can be generalized to more goods, or to a continuum of goods, as in Dornbusch et al. (1977), but the outcome remains qualitatively similar.

2.2 The Heckscher-Ohlin Model

The Heckscher-Ohlin model differs from the Ricardian model due to its focus on factor endowments, rather than productivity differences. In its simplest version, there are two countries, two goods and two factors of production. Unlike the Ricardian model, technologies are assumed to be identical across countries, as are consumer preferences, which are also homothetical (meaning that the composition of consumption does not vary with the level of income). Each good has different factor

intensities, and there are no factor intensity reversals, meaning that the ordering of factor intensities across goods remains the same at any value of relative prices. There is free trade in goods, but not in factors, and trade is assumed to be balanced, so that the value of exports equals the value of imports.

The determining assumption for the model's results is that each country has different factor endowments. Moreover, the model makes use of two results from the trade literature, which use the same assumptions: Firstly, the Stolper-Samuelson Theorem, which states that an increase in the relative price of a good will increase the real return to the factor used intensively in that good and reduce the real return to the other factor. Second, the Rybczynski Theorem, which says that an increase in a factor endowment will increase the output of the industry using it intensively, and decrease the output of the other industry. According to the Heckscher-Ohlin model, each country will export the good that uses its abundant factor intensively. Since the price for the abundant factor in each country will be higher internationally that in autarky, it follows from the Stolper-Samuelson Theorem that the abundant factor in each country gains from trade, while the scarce factor loses.

2.3 Leamer's 'Paths of Development'

Both classical trade models have similar implications for the typical African economy. Most Sub-Saharan African countries are characterized by low levels of skilled labour and technology, which in light of Ricardian theory suggests they will be relatively more productive in agriculture than in manufacturing industry. For those countries endowed with mineral wealth, being able to extract minerals that other countries simply cannot signals a higher productivity in that industry, leading to specialization. The Heckscher-Ohlin model complements the Ricardian model by bringing to the fore the role of factor endowments in determining specialization patterns. In addition, it allows us to trace what will happen to a country's export mix as its economy grows, if we interpret growth purely as capital accumulation. In the traditional two-by-two Heckscher-Ohlin model, the 'path of development' is the same for every country, as endowments vary solely along the capital-intensity dimension.

However, the Heckscher-Ohlin model is not limited to two factors of production and two goods, and some versions of it allow for many factors of production and many goods, or even a continuum of goods (as in Dornbusch et al. 1980). For the purposes of distinguishing between changes in sectoral composition over the course of development, the most commonly used model is Leamer's (1987) 'paths of development'. In it, the addition of land (meant to proxy for natural resource endowments) as a third factor of production opens up the possibility for different paths of development depending on a country's resource endowments.

Leamer models a world in which there are four commodities: a labour-intensive agricultural good, a capital-intensive agricultural good, a labour-intensive manufacturing good, and a capital-intensive manufacturing good. Similar to other versions of the Heckscher-Ohlin model, and to the structural transformation literature discussed below, economic growth is equated with capital accumulation, and the two terms are used interchangeably. Importantly, capital accumulation is taken to be exogenous, and no connection is made between a country's export mix and its growth rate. In this model, the differences in natural resource endowments mean that even at the same level of the capital stock, countries can have very different export mixes. In particular, it may be that "countries scarce in land become involved in manufacturing at much lower levels of capital per worker than countries more abundant in land, and countries that are very abundant in land may never produce manufactures at all." (Leamer 1987).

Wood and Mayer (2000) and Wood (2003) spell out some of the implications of the Leamer model (which they call the 'Krueger-Leamer' model, in reference to the similar work of Krueger 1977) for thinking about the development path of the typical African country. Rather than looking at capital and labour, they single out the skill (or human capital) to labour ratio and the land to labour ratio as the factor endowments relevant for the comparison. This is justified by reference to the high degree of capital mobility in a globalized economy. The authors then use data on these skill and land ratios to claim that Africa's factor endowments are more similar to those of the Americas than to those of Asia. Within their categorization, Africa is a lower-skilled version of Latin America, which itself is a lower-skilled version of North America and other natural resource-abundant OECD countries such as Australia, New Zealand and Norway. Land-scarce regions of the world are similarly categorized according to their skill level, starting from South Asia, up to East Asia (which includes South-East Asia here) and finally land-scarce OECD countries. According to the logic of the three-factor model, in poor, land-scarce countries, capital accumulation will first involve a shift from unprocessed primary products to labour-intensive manufactures. As capital accumulates further, the country will eventually move into more capital-intensive manufactures. Meanwhile, for land-abundant countries, the process will involve first a shift from unprocessed to processed primary products, followed by a shift to capital-intensive manufactures. Although the end result is similar, the land-abundant countries differ from the land-scarce countries in that they are likely to be net exporters of primary products for longer, and they are less likely ever to export labour-intensive manufactures.

Data on the export structures of the different regions confirm their expectations: they find that for any particular skill level, countries with greater land-abundance have a higher share of primary exports. Similarly, as the level of education increases within both the land-abundant and land-scarce categories, the share of primary products

in exports falls and the share of processed items in primary exports rises, as does the share of skill-intensive items in manufactured exports. Their hypothesis is further supported by regressions that show statistically significant relationships between the variables in the model (Wood and Mayer 2000). In an update of his empirical results, Wood (2017) finds that between 1985 and 2015, global sectoral specialization, as measured by exports, output and employment, came to align more closely with what the Heckscher-Ohlin model would predict based on factor endowments, probably as a result of globalization, as well as reductions in travel and communication costs. He emphasizes the finding that all land-scarce regions increasing their shares of manufacturing under all three measures (with the exception of manufacturing employment in India and land-scarce OECD countries), while the opposite was true for land-abundant regions. Moreover, some of the predicted relationships themselves changed, as the regression showing the relationship between land endowments and the share of manufacturing yielded a steeper gradient, indicating a strengthening of the comparative advantage of land-scarce countries in manufacturing.

Further empirical support for the utility of Heckscher-Ohlin theory is provided by Peter Schott (2003; 2004). He performs an empirical test of the Heckscher-Ohlin model by testing the fit of a model with an equal number of goods and factors against one with more goods than factors. In the former, all countries produce a single mix of goods, with the proportions determined by their factor endowments, while in the latter the mix of goods produced can differ. Schott's test looks at the relative endowment of capital and labour, and includes controls to account for Leamer's idea that natural resource abundance might result in differing paths of development. The tests reject the hypothesis of an equal number of goods and factors in favour of the hypothesis that countries specialize in different subsets of goods according to their factor endowments. The estimated development paths, though indicating that the labour-abundant countries do produce relatively little of the most capital-intensive sectors, are 'twin-peaked' for many goods, meaning that production rises up to a certain capital to labour ratio, then falls, and then rises again at a higher capital to labour ratio. This finding suggests that goods with different capital intensities are being grouped within the same ISIC (International Standard Industrial Classification) aggregate. Schott gives the example of the Electronics category, which includes both portable radios and satellites, two goods with very different capital-intensities.

To account for these observations, he constructs 'Heckscher-Ohlin aggregates', whereby he groups industries in each country according to their capital-intensity[1].

[1] To account for natural resource abundance in the construction of his Heckscher-Ohlin aggregates, Schott divides countries in two groups according to their degree of land abundance, finding some evidence that land-abundant countries move out of labour-intensive and into capital-intensive aggregates at higher levels of development. On a related note, Leamer et al. (1999) suggest that sectors associated with natural resource

Using these Heckscher-Ohlin aggregates rather than the ISIC aggregates, he finds that the least capital-intensive Heckscher-Ohlin aggregate is overwhelmingly produced by countries with the lowest capital-per-labour ratio. Conversely, the most capital-intensive aggregate is produced almost exclusively by OECD countries. Finally, the intermediate Heckscher-Ohlin aggregate has an inverted U development path, with output rising up to a capital per labour ratio of around $20,000 and falling thereafter.

In a similar vein, Schott (2004) finds that even when countries with different capital-per-labour ratios export the same good, their prices are much higher, which suggests that capital- and skill-abundant countries use their endowment advantage to produce varieties with added features or higher quality. Thus, it appears that not only do richer countries produce goods that require more sophisticated technologies, but even when they are producing the same good as poorer countries, they produce higher-quality varieties.

2.4 Structural Transformation

The Krueger-Leamer model and its variants provide a dynamic adaptation of the Heckscher-Ohlin model to predict sectoral composition over time. However, in order to do this, they assume that capital accumulation is exogenous, and are thus unable to specify the links, if any, between capital accumulation and changes in sectoral composition. Moreover, the models only make predictions of patterns of international trade, since they assume small open economies. Therefore, they cannot account for changes in the composition of domestic output. But these questions are the object of an older literature in development economics that can be broadly characterized as concerned with 'structural transformation', where an economy's 'structure' is understood primarily as "the relative importance of sectors of the economy in terms of production and factor use." (Syrquin 1988)[2]. Structural transformation has also been the object of a recent literature more preoccupied with formal modelling.[3]

abundance absorb capital that might otherwise flow into manufacturing, depressing workers' incentives to accumulate skills and delaying industrialization.

[2] Although there is no consensus on terminology in the literature on the definitions of 'structural change' and 'structural transformation', for our purposes it is satisfactory to adopt the Syrquin's (1988) distinction: a 'structural change' is a change to one of many technological or behavioural relationships in an economy. The definition includes variables such as the sectoral composition of economic activity, the location of economic activity, income distribution, or even demography. The set of structural changes expected over the typical path of development are jointly referred to as 'structural transformation'.

[3] This section relies mostly on Syrquin (1988). For overviews of the more recent literature on structural transformation, see Herrendorf, Rogerson and Valentinyi (2014).

The literature touches on the question of what goods a country should produce in a few ways. The first springs from the original work of Kuznets (1957; 1966; 1973) and Chenery (1960) and is mainly preoccupied with documenting changes in the sectoral composition of production among developed countries. The falling share of agriculture and the rising shares of manufacturing and services over time are taken to imply that the process of capital accumulation is closely linked to structural transformation. The stylized facts of structural transformation are thus seen as typifying the standard 'path of development' expected to be followed by all countries. A similar line of work, albeit better equipped with data, is undertaken by Herrendorf et al. (2014), who note the tendency for the value added share of agriculture to fall over the course of development, the share of services to rise, and the share of manufactures to follow an inverted U-shape. Subsequent work by Chenery and others (Chenery and Taylor 1968; Chenery and Syrquin 1975; Ranis 1984) develops typologies of alternative paths of development based on country characteristics such as size and natural resource dependence.

A second, related strand of research in this tradition deals with the interrelation between capital accumulation and changes in sectoral composition. Although the structural transformation literature does not take capital accumulation for granted as in the Krueger-Leamer model, Syrquin (1988) notes that the links between capital accumulation and structural change are not clearly specified. Views on the matter include: Kuznets' (1971) recognition that *some* structural change is necessary; Chenery's (1979) stance on the interrelatedness of growth and structural change; Abramovitz's view that structural change is "both a necessary condition and a concomitant of productivity growth" (Abramovitz 1983); and finally the idea that neither structural change nor GDP growth are exogenous variables, with both resulting from complex interactions between the supply and the demand side (Matthews et al. 1982). None of these texts fully spells out the mechanisms through which the sectoral composition of output and the level of income, of productivity, or the capital stock (three terms used interchangeably in this literature) interact.

Another way in which the structural transformation literature deals with issues pertinent to sectoral choice is by investigating the domestic drivers of structural change, an angle that is not explored by the trade literature. Both the older and more recent literatures basically posit two such drivers: non-homotheticities in demand, and differential rates of productivity growth across sectors, which translate into price changes (Herrendorf et al. 2013; Herrendorf et al. 2014). One example of a non-homotheticity in demand is Engel's law, according to which as income rises, food comes to represent a falling share of the consumption basket. Kongsmamut et al. (2001) is an example of a model that relies on non-homotheticities in consumption to generate structural transformation, while Ngai and Pissarides (2007) model structural transformation driven solely by price changes. In practice, however, many

models combine both mechanisms of structural transformation, as in Laitner (2000), Caselli and Coleman (2001), and Gollin et al. (2002). In these models, the combination of non-homotheticities and differential rates of productivity growth result in workers moving out of agriculture and into manufacturing[4]. Later in the development process, a similar process can lead to an increase in the share of services in GDP (Duarte and Restuccia 2016).

The literature also includes models where manufacturing productivity growth is state-dependent due to learning by doing or economies of scale (as in Murphy et al. 1989, Matsuyama 1991 and Matsuyama 2008), and models where countries are open to trade, which can affect the mechanism of structural change (Matsuyama 1992 and Uy et al. 2013). These two varieties of structural change models can lead to situations in which policy interventions are warranted as a means of propelling an economy towards a self-sustaining growth path. In models where manufacturing production requires a minimum scale of production, or where the small size – and consequently the low productivity – of the manufacturing sector prevents it from attracting workers, the policy implication is that a coordinated, large-scale scale investment is required to escape the low-productivity equilibrium. In the case of models with international trade, such as Matsuyama (1992), an economy might not shift resources towards manufacturing because of a comparative advantage in agriculture. If manufacturing generally has higher rates of productivity growth, this can have negative implications for economic growth, warranting some kind of trade policy intervention.

2.5 'High Development Theory'

An alternative approach comes from a tradition within the structural transformation literature broadly referred to as 'high development theory' by Krugman (1992). This body of work is marked by a more prescriptive stance towards development policy. From their general ideas on development strategy, it is possible to extract views on the benefits of targeting particular sectors. Two basic assumptions of great importance in such accounts are economies of scale and demand complementarities (Krugman 1992). In addition, Chenery (1961) notes sectoral differences in the scope for productivity growth, and the vulnerability of excessively specialized countries to international price changes.

[4] This process can occur either due to workers being 'pushed' out of agriculture as a result of productivity gains, or 'pulled' into manufacturing due to higher productivity growth. See Matsuyama (2008) for a simple exposition of these two different mechanisms. Alvarez-Cuadrado and Poschke (2011) argue that in early stages of structural transformation, it is the 'pull' channel that matters more, while the 'push' channel comes to prevail later on.

One of the seminal works in this tradition is Albert Hirchman's (1958) *The Strategy of Economic Development*. In the book, he advocates 'unbalanced growth' as a means of mobilizing the entrepreneurial resources of developing countries towards investment in new industries. Growth is 'unbalanced' in the sense that it is not uniform across sectors, but stronger in leading sectors, from which it eventually diffuses into other parts of the economy through inducement mechanisms. The most prominent of these mechanisms, and the most relevant for the present study, are 'backward and forward linkages'. For Hirschman, a backward linkage is the contribution made by a downstream industry towards the establishment of an upstream industry at a minimum economic size. Conversely, a forward linkage is the contribution made towards the establishment of downstream industries. Although in theory, inter-industry linkages are no more likely to occur in the same country than in between countries, Hirschman mentions three reasons why this might take place: the specificity of skills needed to import, which reduces the supply of foreign-produced goods; uncertainties with the balance-of-payments, particularly with regards to unanticipated movements in the real exchange rate; and the likelihood that those involved in the production of a particular good will work toward expanding its domestic market.

The strength of an industry's linkage can be measured by the product of the increase in output induced by it and of the probability that it will lead to the establishment of a new industry. As Krugman (1992) points out, Hirschman does not see linkages as crude measure of entries in input-output tables, but as contributions towards the establishment of upstream or downstream industries at minimum economic size. As the range of industries present in a country increases, linkages get maximized, much like the pieces of a jigsaw puzzle, which can be more easily placed once there is a higher number of them. Hirschman proposes that policymakers target industries with the greatest linkages, which he notes tend to be in manufacturing, rather than in agriculture and other forms of primary production. Within the manufacturing sector, priority is to be given to basic industries, since they provide inputs to many others. At the same time, final goods industries, which at initial stages of development will mostly consist of assembling imported inputs, are to be avoided because entrenched interests might subsequently hinder the development of local suppliers. Having said that, he notes that in many instances the only way of starting a new industry is by first engaging with this type of assembly, so it might often be inevitable.

2.6 Discussion

Standard trade theory models are concerned with static problems of resource allocation, or with long-run equilibrium allocations, so they cannot directly be brought to bear on questions concerning the dynamic consequences of the sectoral

composition of output. Chenery (1961) notes that the Ricardian comparative advantage model relies on the assumption of perfect competition to enable prices to reflect opportunity costs; given the pervasiveness of market failures in developing countries, a theory whose main result depends on this assumption seems inadequate as guidance on the desirable sectoral composition of output.

In fact, the most common treatments of this question are based on the Heckscher-Ohlin model, where the assumption of perfect competition is not present (Chenery 1961). The Krueger-Leamer model and its variants assume an exogenous process of capital accumulation and trace the consequent sectoral changes over time in a Heckscher-Ohlin framework. Although Wood and Mayer (2000) provide some empirical evidence in support of their model, their results suffer from a number of empirical and theoretical shortcomings. On the empirical side, the coefficients obtained in their cross-country regressions, though significant and of the right sign, do not account for intra-African variation. They also run a regression of the ratio of processed primary goods to narrow (ie. unprocessed) primary goods on the skill and land ratios, testing one of the main predictions of their model. The regressions also include a specification where the two explanatory variables are interacted with an Africa dummy, meant as a test of whether a different relationship holds within Africa. While the skill and land ratios have the predicted effects on the ratio of processed primary goods to narrow primary goods, their interactions with the dummy variable for Africa are not significant. They interpret this as a sign that the same relationship holds in Africa. In any case, it is hard to put much weight on evidence provided by cross-country regressions, since one cannot convincingly dismiss the presence of omitted variable bias.

Peter Schott's work offers a more convincing defense of Heckscher-Ohlin theory, though it comes short of spelling out a relationship between patterns of specialization and economic growth. Moreover, as Schott (2003) himself admits, his methodology for constructing Heckscher-Ohlin aggregates does not include technological differences between countries, which can account for the dispersion of countries' aggregate production along the estimated development paths. As highlighted by growth theory debates on the interpretation of the Solow residual, 'technology' can often be used to refer to other, unobserved determinants of productivity. This omission relates to a more general issue with Heckscher-Ohlin theory concerning the choice of factors of production seen as relevant. As mentioned above, Wood and Mayer's version of the paths of development model differed from Leamer's on the choice of factors of production. This choice was not backed by empirical studies of actual production processes, but by aprioristic reasoning on which factors of production should be more important. But if this approach is taken, then there is no reason why other elements that affect productivity such as infrastructure or the business environment should not be treated as factors of production.

These observations accord with the case study evidence provided by Cramer (1999). He finds that in the Mozambican cashew nut industry, the processing technique that required more advanced technology did not require a high level of skill to sustain it. This contradicts the assumptions of Wood and Mayer's Heckscher-Ohlin model that greater skill levels are required for more capital-intensive industries. In fact, Cramer notes that it was the most labour-intensive industry that faced greater difficulties operating in the country. Overall, he concludes that the major constraints to the cashew nut industry:

> …have more to do with firm and sector organization, the maximization of sector-specific knowledge and the scope for fully exploiting competitive practices internationally, institutional development, and government policy than with aggregate skills endowment relative to available land, or capital endowment relative to labor.

Which we can neatly summarize as the predominance of capabilities and institutional arrangements over endowments. In a different paper, Wood and Jordan (2000) make the same point when comparing Uganda and Zimbabwe. They note the path dependency of the export structure in Zimbabwe, a country that exported more manufactures than predicted from its factor endowments due to the historical presence of European know-how. In contrast, Uganda's expulsion of Asians in 1972 depleted the stock of industrial capabilities and drastically reduced manufacturing output in the country. We return to the theme of capabilities in later sections and in the conclusion.

In contrast to the trade theory literature and its testing of abstract models, research on structural transformation aims to explain empirically observed patterns. In particular, many accounts in this tradition note the connection between economic growth and the sectoral composition of output. However, their attempts at explaining the relationship vary in their thoroughness and clarity. Most of them fail to spell out the causal chain linking capital accumulation to structural change, limiting themselves to vague remarks on the inter-connectedness of the two phenomena. As a result, one is left wondering what the growth engine is, and what exactly is the role of policy. The latter is surprising, given the historical role of government intervention in industrialization, which was clear to contemporaries such as Gerschenkron (1962). Ultimately, their policy implications are somewhat lacking, and the state's function is seen mainly as removing the stumbling blocks to smoothen a process that would take place regardless of government action.

Texts in 'high development theory', including Hirschman's work, are more explicit in delineating the possible growth consequences of entering certain sectors, and in offering criteria for sector selection. However, as pointed out by Krugman (1992), they are often vague with regards to the specific causal mechanisms at play, and do not clearly outline the settings in which particular policy interventions are warranted. A case in point is Hirschman's ideas on linkages. In his exposition, Hirschman hints at

some quantitative criteria for capturing the strength of forward and backward linkages. However, he repeatedly qualifies the significance of these criteria, and resorts to calls for judgment in their application. Of course, one cannot peremptorily dismiss the importance of judgment in policymaking, particularly when adapting policies to local context. But the lack of clarity on the causal mechanisms and the absence of quantitative criteria for gauging the strength of linkage effects combine to offer poor guidance on sectoral selection for policymakers.

Both neoclassical trade theory and the literature on structural transformation (here subsumed under the label of 'paths of development') contain a number of important ideas for thinking about sectoral selection. But perhaps the only shared one is the recognition that countries tend to follow similar patterns of sectoral composition of output over the course of development. In trade theory and in some accounts on structural transformation, this is seen as an inexorable, though poorly explained, process of capital accumulation and consequent income growth. Surprisingly for ideas that are by now somewhat dated, this view of the development process has experienced a resurgence in recent years on the back of the publication of Justin Lin's (2012) *New Structural Economics*, which espouses very similar ideas.

A second set of ideas that has retained significance concerns the role of diversification over the course of development. High-development theorists such as Rosenstein-Rodan (1943), Nurkse (1953), Myrdal (1957) and Hirschman (1958) saw the development of a modern economy as intrinsically linked to the creation of new industries and generally to the diversification of the productive structure. The increase in sectoral diversification in the initial stages of development has been documented by Imbs and Wacziarg (2003), and the importance of diversifying the industrial structure forms an essential part of Ricardo Hausmann's and Cesar Hidalgo's theory of the product space, which we discuss below. Diversification is of course linked to complementarities between different sectors, another surviving theme once dear to high development theorists. Among sectors, the darling of development theorists has traditionally been manufacturing. Not only is it an incubator for the skills and modes of life required in a modern economy, but it provides 'dynamic external economies' and offers the greatest scope for productivity increases. Unsurprisingly, this idea has also survived, most prominently in the work of Dani Rodrik (2013; 2016). Finally, the work of Schott points to the strong correlation between GDP levels and productive capabilities. A central role for the latter, tinged with ideas from the 'paths of development' literature, forms the basis of the theories laid out in the next section.

3. Capability-based Approaches

3.1 Ubiquity, Complexity and the Product Space

Hausmann et al. (2007) explicitly tackle the link between a country's export mix and its growth performance. They argue that although a country's 'fundamentals' – ie. its endowments of physical and human capital, labour and natural resources along with the overall quality of its institutions – do play an important role in determining relative costs and the patterns of specialization that go with them, they do not uniquely pin down what a country will produce and export. The authors build an index that ranks traded goods in terms of their implied productivity by taking the weighted average (weighted by the proportion of a country's export basket represented by that good) of the per-capita GDPs of the countries exporting a product. Using this index, they construct a measure of the income/productivity level that corresponds to a given country's export basket, and find that this measure is highly correlated with per-capita GDP. Their measure is also a strong and robust predictor of subsequent economic growth, controlling for standard covariates; this means that countries that export goods produced by countries richer than themselves tend to grow faster. This is the case of China and India for example. The authors explain their result by referring to an earlier paper (Hausmann and Rodrik 2003) where they described how it is possible for economies to be trapped in low-growth equilibria if they do not have an institutional environment that enables entrepreneurs to discover which goods can be produced profitably. This cost-discovery process is what they allege determines the specific goods produced within the bounds of a country's comparative advantage.

Ricardo Hausmann and Cesar Hidalgo propose an alternative mechanism for explaining the link between product sophistication and economic growth, though not one that is necessarily incompatible with the cost-discovery story. In Hausmann and Hidalgo (2011) they find that there is a systematic relationship between the number of different products a country makes and the number of other countries that on average make those products (ie. the ubiquity of the product). Developed countries tend to export products that are less ubiquitous, while developing countries' exports are more ubiquitous. They explain this finding through the concept of 'capabilities'. These are all the non-tradable productive inputs that go into the production of a good. They assume that countries differ in the number and specific combination of capabilities they have and products differ in the combination of capabilities they require. More ubiquitous products require a larger number of capabilities (ie. are more complex).

Based on these assumptions, they build an 'Economic Complexity Index' (ECI), which measures the complexity of the product mix made by a country. Hausmann et al. (2011) show that the ECI is correlated with a country's income level, as well as with

how fast it grows in the future. Complementing this strand of research, Hidalgo et al. (2007) develop the idea of the 'product space', a map showing the proximity of different goods to each other, as measured by the conditional likelihood that a country exporting one of the goods will also export the other. They show that new export products tend to emerge close to existing areas of the product space, implying that diversification is easier for countries located in denser parts of the product space. This property of the model creates a 'quiescence trap', in the sense that countries with too few capabilities will not have incentives to accumulate additional capabilities, as they are unlikely to be demanded. Moreover, the quiescence trap can get deeper if the goods produced in the global economy become more complex – thus requiring a larger fraction of the total number of capabilities – or when the total number of capabilities in the world becomes relatively large. These conditions can both potentially drive the industrial development of different regions of the world towards divergence, rather than convergence.

3.2 Thinking about Capabilities

Daniel Lederman and William Maloney (2012) provide a thorough critique of product space analysis and related work, based on the international trade literature. They start by criticizing the idea, present in many accounts in the 'high development theory' tradition, that some industries might be characterized by Marshallian externalities (ie. their productivity increases with their size). They cite Rodriguez-Clare's (2007) argument that even if this is the case, it is likely that other countries have already taken advantage of these externalities, driving prices down and offsetting the benefits of entering the sector. Lederman and Maloney take this as an indication that ignoring the role of market structure and demand might lead to an overstatement of the benefits of certain patterns of sectoral specialization.

Moving to a more targeted discussion of Hausmann et al.'s (2007) claim that "what you export matters", they note some problems with their arguments. They find that including the investment share of GDP or a measure of export concentration eliminates the significance of the income level of a country's exports in the growth regression. They also note the difficulty in inferring the links between current capabilities and others that might be developed in the future from the current product space; as technology changes, the way in which the production methods of different industries relate to each other is also likely to change. They give the example of the 19th-century Scottish coal industry, that led to the development of the steam engine, but is unlikely to be a promoter of new manufacturing techniques today.

The authors move on to discussing a trade literature that questions the relevance of the good as the unit of analysis, pointing to Schott (2004) and Hummels and Klenow's

(2005) findings that the average unit value of exports increases with per capita GDP. Krishna and Maloney (2011) is seen as a "dynamic analogue" of these papers, as they trace the evolution of export unit values (taken as an indicator of quality) over time. Krishna and Maloney find that goods from OECD countries have the highest rate of quality growth, indicating divergence between countries. At the same time, there is evidence of *convergence* within products, as the growth rates of export unit values are higher for goods further away from the quality frontier. They take this as evidence that goods vary in the length of their quality ladders, a view supported by Khandelwal (2010). In particular, countries in Latin America and the Middle East and North Africa might already be close to the frontier of their mostly natural resource-based goods, while OECD countries and high-income Asian countries might be placed on ladders with greater growth potential. But the characteristics of goods are not the entire story; even when controlling for the composition of the basket of exports, there is still a significant OECD effect on quality growth.

Surveying the literature, Lederman and Maloney list factors that have been linked to the rate of quality growth. These include: exposure to international trade; the income level of the destination market; and the riskiness of the good, measured as the standard deviation of unit values. Surprisingly, richer countries tend to produce riskier goods, although the overall riskiness of their export basket is lower due to greater diversification. They suggest this might be a result of developing countries' inability to invest in risky projects, due either to the lack of financial depth, the difficulty in resolving market failures in innovation, overall institutional development, or possibly the level of human capital. Still, they note that the empirical evidence on this question is limited.

Sutton (2012) follows a similar line of inquiry, differentiating theoretically between two components, quality and productivity, that in conjunction constitute a firm's capabilities. In his model, quality is a 'demand shifter', that is, any characteristic that increases a good's sale volume for a given price. Productivity is a 'cost shifter'; ie. any characteristic that shifts a good's cost curve. The decomposition of the concept of 'capabilities' also allows to shed light on some of Schott's findings by linking capabilities to income levels. Sutton and Trefler (2016) build a model where, by assuming that products can be ordered by the scarcity of quality capabilities, and that goods are differentiated only by quality, they obtain a correlation between a country's income and its export mix. In the model, a country that can produce only a few goods at high quality will survive in only a few markets, and these will be the easy markets. As a result, derived demand for the country's labour will be low and wages will be low. Conversely, a country that can produce many goods at high quality will have a high derived demand for its labour and have high wages. High wages will make the country a high-cost producer of the 'easy' goods, hence the

high-wage country will only survive in the 'difficult' markets. They also find empirical support for their model.

A further indication that the emphasis on conventional good categories might be misplaced comes from a literature emphasizing the *way* in which goods are produced. Lederman and Maloney (2012) point to evidence on differences in productivity levels between more and less developed countries even in relatively homogeneous industries such as mining and forestry (Blomstrom and Kokko 2007; Wright and Czelusta 2007). They also mention examples of high-technology companies such as Nokia and Outokumpu which were born as producers of primary commodities, citing this as evidence that 'knowing how to learn' (ie. being capable of developing and/or adopting more advanced production methods) is more important than the specific good produced by a company. This is of particular relevance in the current world trading environment, where the advent of global value chains (GVCs) has led to a fragmentation of production processes. As a result, it makes more sense to think of a global trade in tasks than a trade in goods. Under these conditions, success in global trade is a function of being able to capture the biggest possible share of a good's value added, which requires making use of the rarest and most valuable skills.

3.3 Discussion

Before assessing the different capability-based approaches to sectoral specialization, it is important to note that most of the studies described in this section focus on exports. From a national accounting of perspective, net exports can be a driver of growth, though not necessarily the only one. Still, historical experience and economic intuition give reason to believe that exports are the key channel for growth. In the first place, selling goods on the world market can provide an elastic source of demand that will induce domestic firms to increase their productivity. This source of demand is of particular importance for countries that are small and/or lack natural resources. Moreover, productivity may be increased not only due to the greater rewards provided by foreign markets, but also due to their greater degree of competition, as well as the more demanding requirements of international buyers (Van Biesebroeck 2005; Harrison and Rodriguez-Clare 2010; Atkin et al. 2017b). Closer to the point of this review, the export sector generally is a repository of the most advanced capabilities in an economy; once a certain know-how is developed in one sector, one can imagine it might spread to other parts of the economy through the expansion of that sector or through worker mobility[5].

[5] See Rodrik (2008) for a statement on the special role of tradable goods in economic growth.

Returning to the theme of capabilities, it is clear that Hausmann, Hidalgo and co-authors provide a highly valuable contribution to the debate on patterns of specialization and growth. The greatest virtue of their framework perhaps is offering a systematic, quantitative method for mapping a country's current productive structure and assessing the growth benefits of producing any given good. Moreover, even though they present no direct evidence on the process through which the existence of a capability facilitates the production of new goods, their methodology is accompanied by a sensible theoretical explanation. Despite these virtues, it is clear that Lederman and Maloney's critique does strike a chord. In particular, it is likely that product space analysis overemphasizes goods as the unit of analysis, sidestepping the considerable literature questioning conventional industry classifications. It also makes no mention of differences in quality, or of the vast differences in productivity in the production of similar goods.

Lederman and Maloney see these shortcomings of product space analysis as implying that there is no role for sectoral selection in government policy. However, it seems that they overstate their case. Lederman and Maloney themselves offer some elements that allow us to build a coherent theory by piecing together the theory and evidence surveyed here. The existence of quality ladders and the importance of the productive processes are not necessarily incompatible with sectoral selection if producing certain goods incentivizes capability accumulation. If some goods have longer quality ladders, then entering their production is clearly desirable. Lederman and Maloney's argue against this by invoking the idea of comparative advantage; namely, unless a country has a 'deep' comparative advantage, they still see no reason to pursue these more desirable goods.

Besides the lack of clarity on what exactly such 'deep' comparative advantage actually is[6], the fundamental assumptions of capability-based theories of development are themselves incompatible with this view. Capabilities are inherently path-dependent; as studies on the origins of particular industries have shown, a country's specialization in a given good owe more to history than to some pre-ordained comparative advantage (Sabel et al. 2012; Artopoulos et al. 2013; Atkin et al. 2017a). Furthermore, historical experience suggests that the development of certain industries can induce the acquisition of capabilities. Even if there are considerable variations in quality within a single good, it is likely that some goods (and services) require a higher minimum level of capabilities than others. In this way, targeting certain industries, maintaining international competitiveness in them, and

[6] The authors cite the example of tequila, a good in which Mexico possess a 'deep' comparative advantage due to its climatic suitability to the agave plant. However, it is harder to grasp what a deep comparative advantage in non-resource based goods would consist of. What determines Switzerland's 'deep' comparative advantage in watches?

climbing the quality ladder can serve as inducement mechanisms for the development of technical and managerial capabilities.

Mention of inducement mechanisms brings to the fore the strategic complementarity between industries, another central theme of the structural transformation literature. Many recent contributions take the view that success in goods markets is a function of being able to combine a series of public and private inputs (Rodrik 2004; Rodrik and Hausmann 2006; Hausmann et al. 2008). The adequate provision of such inputs is conditional on the presence of the corresponding capabilities in the public and private sectors. As stated in the theory of product space analysis, some capabilities are of use in a greater variety of activities than in others, and in this sense are more valuable. Thus, a good way of developing such capabilities can be to target the production of goods that require them. Moreover, in an era of GVCs, some capabilities enable a country to capture a bigger share of a given industry's value added and to earn larger rents in international markets. For countries at higher income levels, rather than entering sectors ex novo, the best course of action might be upgrading along a quality ladder, or entering a higher segment of the value chain. In all these cases, public policy has a role to play in prioritizing and coordinating the acquisition of capabilities that are deemed to offer the greatest long term rewards for the economy.

4. Conclusion

The discussion above shows that we have come full circle in the debate on sectoral targeting. The early literature on structural transformation emphasized issues such as industrialization, economic diversification, sectoral complementarities and inducement mechanisms. Critics of these approaches noted the absence of rigorous theoretical backing for the literature's policy prescriptions. Neoclassical trade theory also came to adapt its traditional models of comparative advantage to account for the stylized facts uncovered by Kuznets and others. However, lacking a convincing explanation for how economic specialization relates to growth, it ultimately failed to generate policy-relevant advice.

In our view, a focus on capabilities as the guiding principle of industrial policy can overcome the limitations of the early literature, whilst incorporating their most valuable insights. As described above, this focus is consistent with empirical findings on structural transformation and sectoral diversification over the course of development. It also explains the idea that industrial policy must somehow be strategic, in that it must seek synergies between different parts of the economy and find inducement mechanisms to bring about outcomes that might otherwise not

occur. This is not to mean that any capability can be built in any circumstance; in some settings, building any but the simplest capabilities might be simply unfeasible due to low human capital, adverse political conditions or other reasons. Nevertheless, we believe that an overall approach guided by capability accumulation is likely to bring about the most desirable growth outcomes, while avoiding the excesses and pitfalls of the misguided industrial policies of the past.

5. References

Abramovitz, M. (1983). Notes on International Differences in Productivity Growth Rates. In D. Mueller (Ed.), *The Political Economy of Growth*. New Haven: Yale University Press.

Alvarez-Cuadrado, F., & Poschke, M. (2011). Structural Change Out of Agriculture: Labor Push versus Labor Pull. *American Economic Journal: Macroeconomics, 3*(3), 127-158.

Artopoulos, A., Friel, D., & Hallak, J. C. (2013). Export Emergence of Differentiated Goods from Developing Countries: Export Pioneers and Business Practices in Argentina. *Journal of Development Economics, 105*, 19-35.

Atkin, D., Chaudhry, A., Chaudry, S., Khandelwal, A. K., Raza, T., & Verhoogen, E. (2017a). On the Origins and Development of Pakistan's Soccer-Ball Cluster. *World Bank Economic Review, 30*(Suppl_1), S34-S41.

Atkin, D., Khandelwal, A. K., & Osman, A. (2017b). Exporting and Firm Performance: Evidence from a Randomized Experiment. *Quarterly Journal of Economics, 132*(2), 551-615.

Blomstrom, M., & Kokko, A. (2007). From Natural Resources to High-Tech Production: The Evolution of Industrial Competitiveness in Sweden and Finland. In *Natural Resources: Neither Curse nor Destiny*. Stanford University Press.

Caselli, F., & Coleman, W. J. (2001). The US structural transformation and regional convergence: a reinterpretation. *Journal of Political Economy, 109*, 584-616.

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

Chenery, H. B. (1961). Comparative Advantage and Development Policy. *American Economic Review, 51*(1), 18-51.

Chenery, H. B. (1979). *Structural Change and Development Policy.* New York: Oxford University Press.

Chenery, H. B., & Syrquin, M. (1975). *Patterns of Development, 1950-1970.* London: Oxford University Press.

Chenery, H. B., & Taylor, L. (1968). Development patterns among countries over time. *Review of Economics and Statistics, 50*, 391-416.

Cramer, C. (1999). Can Africa Industrialize by Processing Primary Commodities? The Case of Mozambican Cashew Nuts. *World Development, 27*(7), 1247-1266.

Dornbusch, R., Fischer, S., & Samuelson, P. (1980). Heckscher-Ohlin Trade Theory with a Continuum of Goods. *Quarterly Journal of Economics, 95*, 203-24.

Dornbusch, R., Fischer, S., & Samuelson, P. A. (1977). Comparative Advantage, Trade, and Payments in a Ricardian Model with a Continuum of Goods. *American Economic Review, 67*(5), 823-839.

Duarte, M., & Restuccia, D. (2016). Relative Prices and Sectoral Productivity. *University of Toronto, Department of Economics Working Paper 555*.

Gerschenkron, A. (1962). *Economic Backwardness in Historical Perspective: A Book of Essays.* Cambridge, MA: Harvard University Press.

Gollin, D., Parente, S. L., & Rogerson, R. (2002). The Role of Agriculture in Development. *American Economic Review, Papers and Proceedings, 92*, 160-164.

Harrison, A., & Rodriguez-Clare, A. (2010). Trade, Foreign Investment, and Industrial Policy for Developing Countries. In D. Rodrik, & M. Rosenzweig (Eds.).

Hausmann, R., & Hidalgo, C. A. (2011). The network structure of economic output. *Journal of Economic Growth, 16*, 309-342.

Hausmann, R., & Rodrik, D. (2003). Economic development as self-discovery. *Journal of Development Economics, 72*, 603-633.

Hausmann, R., & Rodrik, D. (2006). Doomed to Choose: Industrial Policy as Predicament.

Hausmann, R., Hidalgo, C. A., Bustos, S., Coscia, M., Simoes, A., & Yildirim, M. A. (2011). *The Atlas of Economic Complexity.* Cambridge, MA: Puritan Press.

Hausmann, R., Hwang, J., & Rodrik, D. (2007). What You Export Matters. *Journal of Economic Growth, 12*(1), 1-25.

Hausmann, R., Rodrik, D., & Sabel, C. F. (2008). Reconfiguring Industrial Policy: A Framework with an Application to South Africa. *CID Policy Brief*.

Herrendorf, B., Rogerson, R., & Valentinyi, A. (2013). Two Perspectives on Preferences and Structural Transformation. *American Economic Review, 103*(7), 2752-2789.

Herrendorf, B., Rogerson, R., & Valentinyi, A. (2014). Growth and Structural Transformation. In P. Aghion, & S. N. Durlauf (Eds.), *Handbook of Economic Growth* (Vol. 2B, pp. 855-941). Elsevier.

Hidalgo, C., Klinger, B., Barabasi, A., & Hausmann, R. (2007). The Product Space Conditions the Development of Nations. *Science, 317*.

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

Hummels, D., & Klenow, P. J. (2005). The Variety and Quality of a Nation's Exports. *American Economic Review, 95*(3), 704-723.

Imbs, J., & Wacziarg, R. (2003). Stages of Diversification. *American Economic Review, 93*(1), 63-86.

Khandelwal, A. (2010). The Long and Short (of) Quality Ladders. *Review of Economic Studies, 77*(4), 1450-1476.

Kongsamut, P., Rebelo, S., & Xie, D. (2001). Beyond Balanced Growth. *Review of Economic Studies, 68*, 869-882.

Krishna, P., & Maloney, W. F. (2011). Export Unit Value Dynamics: Some Stylized Facts. *World Bank Policy Research Working Paper. 5701*.

Krueger, A. (1977). Growth, Distortions, and Pattern of Trade among Many Countries. *Princeton Studies in International Finance, 40*.

Krugman, P. (1992). Toward a Counter-Counterrevolution in Development Theory. *World Bank Economic Review, 6*(suppl. 1), 15-38.

Kuznets, S. (1957). Quantitative aspects of the economic growth of nations: II. Industrial distribution of national product and labor force. *Economic Development and Cultural Change, 5*(supplement).

Kuznets, S. (1966). *Modern Economic Growth*. New Haven, CT: Yale University Press.

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

Kuznets, S. (1973). Modern economic growth: findings and reflections. *American Economic Review, 63*(3), 247-258.

Laitner, J. (2000). Structural Change and Economic Growth. *Review of Economic Studies, 67*, 545-561.

Leamer, E. E. (1987). Paths of Development in the Three-Factor, n-Good General Equilibrium Model. *Journal of Political Economy, 95*(5), 961-999.

Leamer, E., Maul, H., Rodriguez, S., & Schott, P. (1999). Does Natural Resource Abundance Increase Latin American Income Inequality? *Journal of Development Economics, 59*(1), 3-42.

Lederman, D., & Maloney, W. F. (2012). *Does What You Export Matter? In Search of Empirical Guidance for Industrial Policies.* Washington, DC: World Bank.

Matsuyama, K. (1991). Increasing returns, industrialization, and indeterminacy of equilibrium. *Quarterly Journal of Economics, 106*, 617-50.

Matsuyama, K. (1992). Agricultural Productivity, Comparative Advantage, and Economic Growth. *Journal of Economic Theory, 58*, 317-334.

Murphy, K. M., Shleifer, A., & Vishny, R. (1989). Income Distribution, Market Size, and Industrialization. *Quarterly Journal of Economics, 104*, 537-64.

Myrdal, G. (1957). *Economic Theory and Under-Developed Regions.* London: Gerald Duckworth.

Ngai, L. R., & Pissarides, C. A. (2007). Structural Change in a Multi-Sector Model of Growth. *American Economic Review, 97*, 429-443.

Nurkse, R. (1953). *Problems of Capital Formation in Underdeveloped Countries.* Oxford: Basil Blackwell.

Ranis, G. (1984). Typology in development theory: Retrospective and prospects. In M. Syrquin, L. Taylor, & L. E. Westphal (Eds.), *Economic Structure and Performance: Essays in honor of Hollis B. Chenery.* New York: Academic Press.

Rodriguez-Clare, A. (2007). Clusters and Comparative Advantage: Implications for Industrial Policy. *Journal of Development Economics, 82*(1), 43-57.

Rodrik, D. (2004). Industrial Policy for the Twenty-First Century.

Rodrik, D. (2008). The Real Exchange Rate and Economic Growth. *Brookings Papers on Economic Activity*, 365-412.

Rodrik, D. (2013). Unconditional Convergence in Manufacturing. *Quarterly Journal of Economics, 128*(1), 165-204.

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

Rosenstein-Rodan, P. (1943). Problems of Industrialisation of Eastern and South-Eastern Europe. *Economic Journal, 53*(210/211), 202-211.

Sabel, C., Fernandez-Arias, E., Hausmann, R., Rodriguez-Clare, A., & Stein, E. (Eds.). (2012). *Export Pioneers in Latin America.* Washington and Cambridge: Inter-American Development Bank and David Rockefeller Center for Latin American Studies, Harvard University.

Schott, P. K. (2003). One Size Fits All? Heckscher-Ohlin Specialization in Global Production. *American Economic Review, 93*(3), 686-708.

Schott, P. K. (2004). Across-Product versus Within-Product Specialization in International Trade. *Quarterly Journal of Economics, 119*(2), 647-678.

Sutton, J. (2012). *Competing in Capabilities: The Globalization Process.* Oxford: Oxford University Press.

Sutton, J., & Trefler, D. (2016). Capabilities, Wealth, and Trade. *Journal of Political Economy, 124*(3), 826-878.

Syrquin, M. (1988). Patterns of Structural Change. In H. Chenery, & T. Srinivasan (Eds.), *Handbook of Development Economics* (Vol. I, pp. 203-273). Elsevier.

Uy, T., Yi, K.-M., & Zhang, J. (2013). Structural change in an open economy. *Journal of Monetary Economics, 60*, 667-682.

Van Biesebroeck, J. (2005). Exporting raises productivity in Sub-Saharan African manufacturing firms. *Journal of International Economics, 67*, 373-391.

Wood, A. (2003). Could Africa be like America? In B. Pleskovic, & N. Stern, *Annual Proceedings of the World Bank Conference on Development Economics.* New York: Oxford University Press.

Wood, A. (2017). Variation in structural change around the world, 1985-2015: Patterns, causes, and implications. *WIDER Working Paper 2017/34*.

Wood, A., & Jordan, K. (2000). Why does Zimbabwe Export Manufactures and Uganda Not? Econometrics Meets History. *Journal of Development Studies, 37*(2), 91-116.

Wood, A., & Mayer, J. (2000). Africa's Export Structure in a Comparative Perspective. *Cambridge Journal of Economics, 25*(3), 369-94.

Wright, G., & Czelusta, J. W. (2007). Resource-Based Growth Past and Present. In *Natural Resources: Neither Curse nor Destiny.* Stanford University Press.