

# **Impact of Trade Facilitation Mechanisms on Export Competitiveness in Africa<sup>1</sup>**

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## **Abstract**

Export competitiveness, while seemingly intuitive, remains conceptually and empirically elusive. This paper presents three distinct ways of thinking about export competitiveness and attempts to capture their character empirically for African nations. The first, the ‘competitiveness as market share’ hypothesis, employs a Constant Market Share Analysis to examine the dynamics of the competitiveness of Africa’s exports. The second explores the foundations of export competitiveness through the Global Competitiveness Index and relates it to estimates of Total Factor Productivity on the continent. Thirdly, the character of African exports is scrutinized through the application of Hausmann, Hwang and Rodrik’s measure of the income level of exports. The analysis then turns to the impact of trade facilitation on export competitiveness. It shows that trade facilitation, captured by the four indicators created by Portugal-Perez and Wilson, significantly bolsters a key source of competitiveness, total-factor productivity, through a transaction effect but the production effect in which trade facilitation reallocates resources to more productive sectors, proxied by the impact on the income level of exports, is less sensitive. While the quality and quantity of physical infrastructure is robust across specifications, the results suggest that trade facilitation measures are best adopted as part of a holistic trade policy aimed at creating an environment conducive to the diversification of African exports to ensure long run export competitiveness.

## **1. Introduction**

Krugman (1991; 1996) argued that competitiveness is a largely meaningless concept and that economists in general do not use the word competitiveness. This dissenting voice features frequently in this paper. Krugman's first contention, that competitiveness is a largely meaningless concept, refers to its applicability to national economies. For firms within those economies competing in international export markets, the inability to sell goods and secure the bottom line is the difference between success and failure. Economists have also become increasingly engaged on competitiveness in the fifteen years since Krugman's paper, and an ever burgeoning literature stands to refute his later assertion (Porter, 1990; Porter *et al.*, 2008; Kinger, 2010; di Mauro and Forster, 2008; Arvis *et al.*, 2010; Nsouli, 2001; Fukunishi, 2004; Bigsten and Soderbom, 2006; Clark *et al.*, 2004; Eifert *et al.*, 2005; Lall, 2000). Nonetheless, despite its apparent intuitive appeal, export competitiveness remains ill-defined, conceptually vague and, as Krugman argues, subject to abuse. It is not hard to see why export competitiveness is so problematic. Firstly, it concerns what a nation is good at, and just how good at it it is: its comparative advantage. Secondly, it concerns how much the global economy demands these goods and services, which in turns depends on the prices they are traded at. Lastly, it concerns how beneficial specialization in comparative advantage activities is for the exporting country. Ricardian comparative advantage implies that exporting those goods in which the opportunity cost of production is at its lowest is welfare enhancing but, such specialization can entail substantial long-run opportunity costs if it resides in the 'wrong' activities. When one considers that none-of-the-above are static, but rather subject to a myriad of dynamic forces (see Lin, 2010), and in fact frequently in conflict with one another, the conceptual complexity is confounded.

Meanwhile, Africa continues to punch below its weight when it comes to its share of world markets and trade facilitation—broadly understood as the process of making trade easier and less costly—is increasingly viewed as the essential oil for trade's stuttering engine of growth. Countless assessments, reviewed in Section 2, have re-asserted the potential benefits of trade facilitation, although few have attempted to interpret its interaction with a dynamic and multifaceted understanding of the competitiveness of Africa's exports. This paper attempts to bridge this gap. It presents three distinct conceptualizations of export competitiveness, and attempts to quantify them for African economies. The first, outlined in Section 3, equates competitiveness with market share. A Constant Market Share Analysis is applied to the export growth of 37 African nations, revealing massive heterogeneity in the competitiveness of the continent's constituents, at both the product and partner level. Section 4 critiques the competitiveness as market share thesis as potentially detrimental to standards of living if induced by a devalued currency. This critique claims productivity, and an environment which facilitates productivity growth, determines competitiveness. In Section 5 the analysis turns to the export composition. A measure of export sophistication of Hausmann, Hwang and Rodrik's (2007) creation is employed to identify countries which may need to diversify their exports in order to reach their full potential for growth. Section 6 develops and tests a conceptual framework of the impact of trade facilitation on export competition. Using measures of total factor productivity and export sophistication estimated earlier in the paper as dependent variables, it models the impact of four trade facilitation indicators.

Section 7 summarises the papers main finding that while trade facilitation can bolster productivity, the specificity of inputs to the production process requires a degree of selectivity rather than a blanket approach to facilitating the upgrading of exports required to secure long run competitiveness.

## **2. Trade Facilitation: A Literature Review**

In the context of the growing cannon of research alluding to the growth potential available through trade and the East Asian experience of export-led growth, the poor export performance of African nations is increasingly viewed as fertile ground for the pursuit of growth in the continent. The World Bank has developed a thematic group on export competitiveness which advocates a framework based on the following three complementary elements:

- (1) The incentive framework – resources must be allocated to firms that have the capacity to compete internationally in the long run, and the most productive firms.
- (2) Reducing trade related costs – this includes physical infrastructure and complementary services related to trade, as well as policies related to the supply of capable workers.
- (3) Overcoming market and government failures – a holistic approach to mitigate weak capacity through building institutional quality in areas such as export promotion, innovation, and transparency of government procedure.

Of the above, the second – reducing trade related costs – is a crude synonym for trade facilitation. In its narrowest sense, trade facilitation refers to the reduction of the trade costs associated with moving goods across borders. A broader definition of the term recognizes that trade related costs are much more than those encountered at the border and expands to encompass all non-tariff barriers (NTBs) to trade, including behind-the border costs associated with the institutional and business environment, services in support of trade, and physical infrastructure in transport, energy and information and communication technology (ICT). Portugal-Perez and Wilson (2010; p.2) distinguish further between a “‘hard’ dimension related to tangible infrastructure such as roads, ports, highways, telecommunications, as well as a ‘soft’ dimension related to transparency, customs management, the business environment, and other institutional aspects that are intangible.” This latter component includes international efforts to make trade easier: the WTO, for example, defines trade facilitation as “the simplification and harmonization of international trade procedures.”

Reducing the costs of doing business has a long precedent in economic theory (see Coase, 1937, for example). With respect to trade facilitation, Berkowitz *et al.* (2006) distinguish between a transaction effect, the boost to productivity caused by the reduction in transaction costs incurred by exporting firms, and a production effect, the changes to production structures through the provision of more of the inputs required for the production of more sophisticated, growth-boosting products. Trade Transaction Costs (TTCs) - encompassing both directly incurred costs, such as expense relating to

supplying information and documents to the relevant authority, and indirect costs, such as those arising from procedural delays - typically amount to between one and 15 per cent of the value of traded goods (OECD, 2003). Anderson and van Wincoop's (2004) seminal study estimates the total trade cost barrier facing rich countries to have equivalence to a 170 per cent ad valorem rate: a 21 per cent ad valorem equivalent for transportation costs, 44 per cent for border-related trade barriers and 55 per cent for retail and wholesale distribution costs. Estimates associated with the broader interpretation of trade costs typically reside toward the higher end of the spectrum, as do those facing developing countries (OECD, 2005).

For the most part, empirical assessments of trade facilitation focus on its impact on trade volumes rather than export competitiveness *per se*. For example, Wilson *et al.* (2005) employ a gravity model which predicts global trade volumes would see a \$377 billion boost, with Sub-Saharan African countries exporting almost 10 per cent more (exports benefit more than imports) if countries with below average facilitation indicators were to increase them half way to the average of the 75 countries in their sample. Anderson and Macoullier's (2002) gravity model holds institutional factors culpable for observed South to North exports that are less than that predicted by factor endowments. The premium caused by the insecurity of trade within LDC's is significantly reduced if the legal system is capable of enforcing commercial contracts and formulation and implementation of government economic policy is both transparent and impartial. This result is corroborated by Elbadwi *et al.*'s (2006) firm level analysis. Using data from the World Bank's Investment Climate Report they find exports are greater where the rule of law is stronger and there is less corruption. In this case, institutional variables impact the number of exporters in a country (the extensive margin) more than the share of output existing exporters sells abroad (the intensive margin). It is probable that a poor domestic business environment also affects access to capital, increases risk premiums and encourages holding excessive stock inventories, which conspire to undermine export competitiveness (Balchin and Edwards, 2008).

Other studies emphasize infrastructure constraints. Information and Communications Technology (ICT) repeatedly features as a barrier to trade. Firms with internet access export around 11 per cent more than those without (Clarke, 2005; although it is of course possible that rather than internet use encouraging exports, exporting may necessitate internet use). Yoshino's (2008) findings imply ICT infrastructure matters more when African countries are trading with global partners, and introduce access to new vintage capital as a further source of export gains. Electricity infrastructure matters too: almost half of African respondents believed electricity to be a major constraint in Balchin and Edwards (2008) survey. In Kenya, for example, the median firm saw sales reduced by six per cent due to power failures, a loss associated with a six per cent reduction in total factor productivity (Eifert *et al.*, 2005). A third infrastructure constraint resides in costs arising from transportation. One study showed that raising transport costs by 10 per cent reduced trade volumes by more than 20 per cent, with infrastructure accounting for more than 40 per cent of transport costs (60 per cent for landlocked countries: Limao and Venebles, 2010), while another found a one day increase in inland transit time reduces exports by seven per cent on average (Freund and Rocha, 2010). Cheaper international transit is also associated with extensive expansion (Dennis and Shepard, 2007; Persson,

2010). The costs of transport are not endogenous of trade volumes, however. Clark *et al.* (2004) show evidence of economies of scale such that an increase in export volume from the level of Cyprus (15<sup>th</sup> percentile) to that of Indonesia (85<sup>th</sup> percentile) reduces transport costs by around 20 per cent.

With respect to on the border issues, the aforementioned Clark *et al.* (2004) study, each of the four indicators of port-efficiency had a negative and significant impact on the cost of trading. Djankov *et al.* (2006) show each days exporting delay corresponds to a one per cent reduction in trade volumes, with delays in developing countries and time-sensitive goods (such as agricultural perishables) associated with an even greater reduction.

Lastly, trade facilitation often concerns the simplification and synchronization of trading procedures. The complexity of import procedures required that 85 per cent of exporting enterprises using imported inputs in the African firms considered in Clarke's (2005) study employed clearing agent to assist with the process. Standardization is often touted as a route to eliminating such complexity related costs. Balchin and Edwards (2008) show that the probability of African firms exporting is enhanced by possession of an International Organization for Standardization (ISO) certificate, and Africa's exports are far less restricted by EU standards when they are harmonized with those of the ISO (Czubala, *et al.*, 2007).

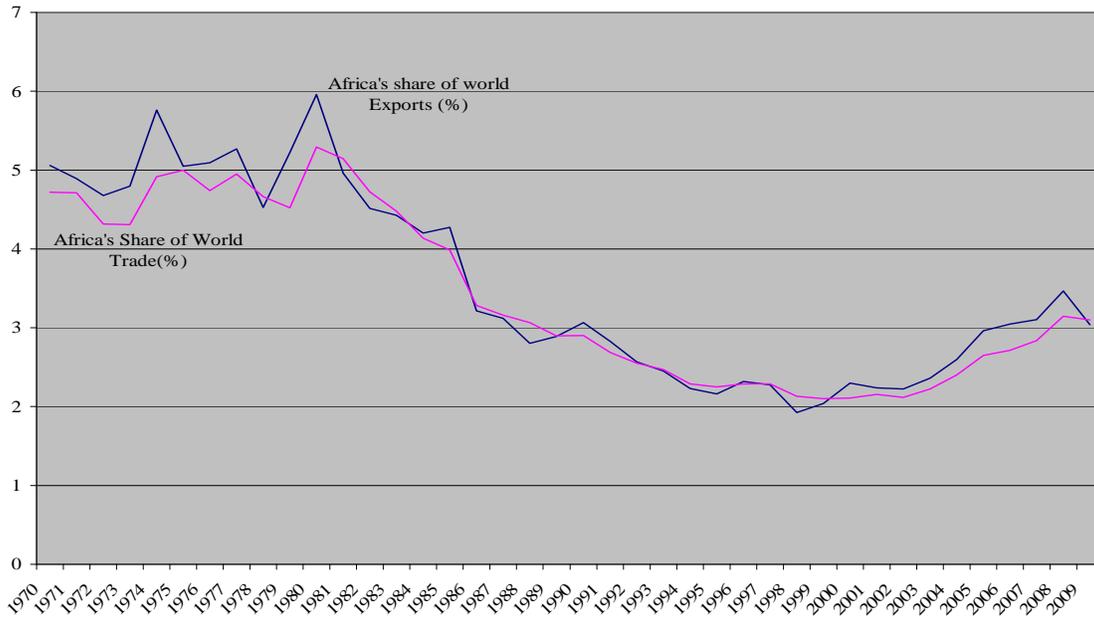
The empirical literature unequivocally endorses trade facilitation as a driver of more trade, observed and projected alike. What are less well understood, however, are the best measures African countries can take to reap the rewards, and just how much of these gains can be attributed to competitiveness. The later issue is addressed in Sections 3 – 5, but more details can be found in a bigger version of this paper, while the former is the focus of Section 6 of this paper.

### **3. Export Competitiveness as Market Share**

Porter *et al.* (2008) discusses the definition of competitiveness as a zero-sum game. With competitiveness so conceived, countries (or rather firms in countries) engage in direct competition in a global marketplace to sell their products. If one country is to expand its *share* of global markets, however, another's must contract. For every winner, there must be loser.

What can be said of African export competitiveness if it is to be taken simply as its share of world markets? Figure 1 below shows that Africa's share of global merchandise exports falls far short of the six per cent it enjoyed thirty years ago. However, substantive gains have been made over the past decade. Indeed, exports from African countries have increased five-fold in the 10 years to 2008 while world exports tripled over the same period, increasing Africa's share of world exports to 3.47 per cent. In short, Africa's exports have been getting more competitive.

**Figure 1 – Africa’s Share of Global Merchandise Trade**



SOURCE: UNECA and AUC (2011)

At this point, one would wish to ask the question whether it is the case really that Africa’s competitiveness has been improving. In other words, is the competitiveness broad in products and sources in a manner that it would provide comfort of prospects of sustainable future for most African countries and if not is the export growth predicted by the trade facilitation literature an accurate reflection of export competitiveness or the dynamics in patterns in trade? The Constant Market Share Analysis (CMSA) helps to reflect objectively on these questions. First applied to international trade by Tyszynski (1951), the refinements made by Leamer and Stern (1970) disaggregate export growth according to the following identity:

$$\begin{aligned}
 \underbrace{\sum_i (X_i^2 - X_i^1)}_{\text{export growth}} &= \underbrace{\overbrace{r \sum_i X_i^1}^{\text{world effect}} + \overbrace{\sum_i (r_i - r) X_i^1}^{\text{commodity composition effect}} + \overbrace{\sum_i \sum_j (r_{ij} - r_i) X_{ij}^1}^{\text{market distribution effect}}}_{\text{structural effect}} \\
 &+ \underbrace{\sum_i \sum_j (X_{ij}^2 - X_{ij}^1 - r_{ij} X_{ij}^1)}_{\text{competitive effect}} \quad (1)
 \end{aligned}$$

Where:

$X_i^t$  = exports of product  $i$  in period  $t$

$X_{ij}^t$  = exports of product  $i$  to market  $j$  in period  $t$

$r$  = percentage change in world exports from  $t(1)$  to  $t(2)$

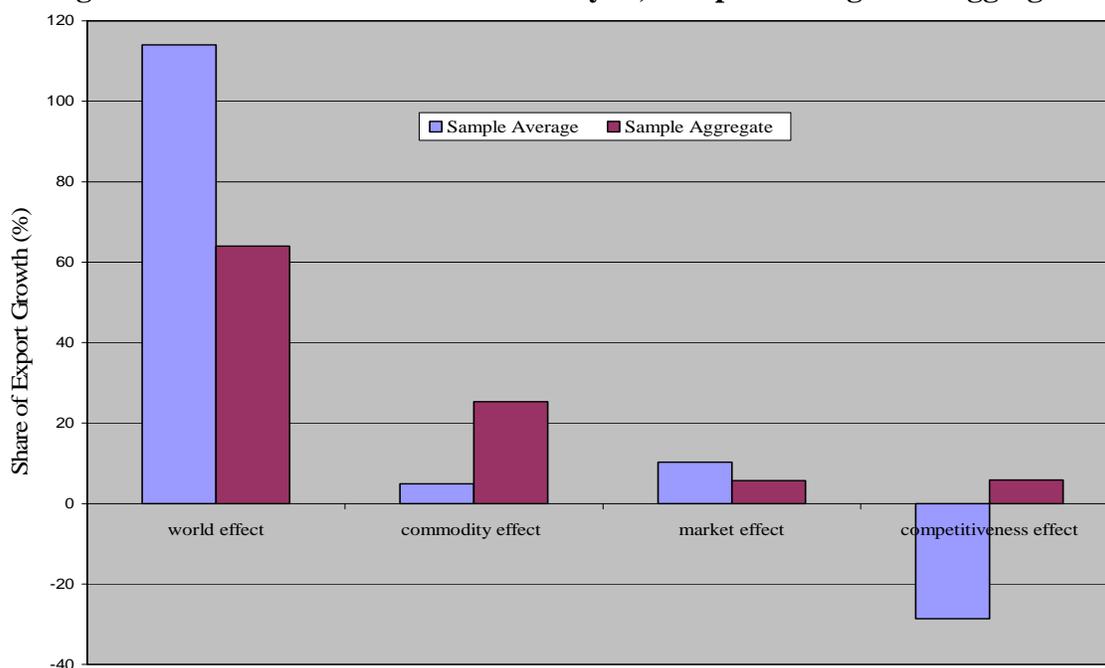
$r_i$  = percentage change in world exports of product  $i$  from  $t(1)$  to  $t(2)$

$r_{ij}$  = percentage change in the world export of product  $i$  to market  $j$  from  $t(1)$  to  $t(2)$

The intuition behind CMSA is derived from the assumption that a country's exports may succeed (fail) to grow as rapidly as the world average for three reasons. Firstly, exports may concentrate in commodities in which the demand is growing relatively quickly (slowly): the commodity composition effect. A positive (negative) value indicates the country concerned exports a mix of products growing at a rate greater (less) than total world exports. Secondly, exports may be going to relatively growing (stagnant) regions, the market distribution effect.<sup>3</sup> Thirdly, the country in question may have been able (unable) to compete effectively with other sources of supply, the competitive effect.

Using export data from the *UNCTADstat* database this paper undertakes a Constant Market Share Analysis of the growth of African countries exports from 2004 to 2008. A sample of 115 trading partners is used, comprised of the top 100 export destinations for African exports (which accounts for more than 99 per cent of African exports) and the 15 African countries not included in the top 100. The analysis covered 252 products at the 3-digit level of the third revision of the Standard International Trade Classification (petroleum products are excluded owing to price volatility and the ensuing sensitivity of Africa's oil producer's exports to external shocks).

**Figure 2 – Constant Market Share Analysis, Sample Average and Aggregate**



SOURCE: Authors calculations from *UNCTADstat* data

<sup>3</sup> Combining the commodity composition effect and the market distribution effect with the world effect – the hypothetical growth in exports consistent with the general rise in world exports – gives the structural effect, the changes that arise from the structure of trade rather than underlying competitiveness factors.

Figure 2 shows the sample aggregate and average CMSA results. A positive aggregate competitiveness effect of 6 per cent is consistent with the marginal increased share of world exports for the continent as a whole, but a negative average competitiveness effect shows that some countries have substantial competitiveness deficits too. Consider also the world effect. On aggregate African export growth far outstripped that predicted by the general rise in world trade, but for the average African country, export growth fell short of the global rate. No country is uniformly competitive or uncompetitive: in each case there is a range of positive and negative residuals across products and partners.

Trade facilitation is not indiscriminate across products and partners. Better transport infrastructure, for example, may shift the incentive structure in favour of heavier goods previously too costly to export, encourage export perishables that would previously waste in transit, or make markets once too distant more accessible. The CMSA reveals that specialization in dynamic products with dynamic partners is a substantially greater component of export growth than both price and non-price ‘competitiveness’ and as such the production effect of trade facilitation may be more relevant for competitiveness than the transaction effect for African countries.

#### **4. Productivity and the Foundations of Export Competitiveness**

Despite its intuitive appeal, the conceptualization of export competitiveness as the share of world markets has been subject to some fearsome criticism. Even the authors of the ‘most intuitive definition’ of competitiveness quoted in Section 3 go on to describe it as ‘seriously flawed.’ Their concern is that if competitiveness is simply the ability to enjoy a growing share of foreign markets it may originate from a favorable but unsustainable exchange rate position and thereby encourage policies of undervalued exchange rates and artificially low wages, a concern mirrored in the debates surrounding recent currency wars sparked by such interventionist policies.<sup>4</sup> This feature of export competitiveness is undesirable for three principal reasons. Firstly, a definition of export competitiveness should reflect phenomena in the real economy, rather than merely price effects. Secondly, export competitiveness should be based on a sustainable base, rather than transient conditions. Thirdly, export competitiveness should be prosperity enhancing, not prosperity reducing.

Further critique of the ‘competitiveness as market share’ thesis comes from Paul Krugman. In contrast to the arguments presented in Section 3, Krugman (1994) describes the characterization of competitiveness as a zero-sum conflict between nations as a ‘dangerous obsession’. A burgeoning domestic economy may actually benefit rivals by providing larger markets for their exports or by selling higher quality goods at lower prices. His reasoning also emphasizes standards of living, brandishing the idea that countries economic fortunes are largely determined by its success on world markets as ‘flatly wrong.’

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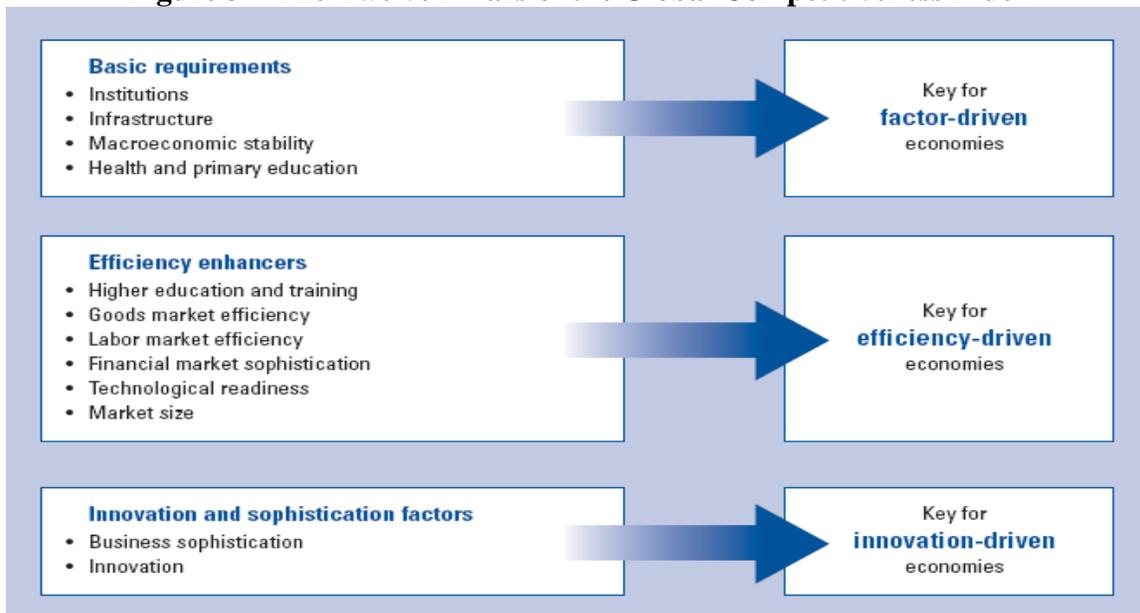
<sup>4</sup> The currency war debate was sparked by comments from Brazil’s finance minister, Guido Mantega, who viewed such policies as a threat to competitiveness: “we are in the midst of an international currency war...this threatens us because it takes away our competitiveness.” (as quoted by Martin Wolf, FT, 28<sup>th</sup> September 2010)

The arguments of Porter and Krugman converge on the conclusion that productivity is a far more meaningful concept than competitiveness. “Competitiveness is the fundamental underpinning of prosperity [and] prosperity is determined by the productivity of an economy...Productivity supports high wages, a strong currency, and attractive returns to capital – and with them a high standard of living. Productivity is the goal, not exports *per se*.” (Porter *et al.*, 2008; p.2) Only productivity growth can improve standards of living in the long-run and influence the ability to sell goods and services abroad. Export competitiveness is therefore both a driver and the manifestation of improved living standards for the wider economy.

A recent growth accounting exercise revealed that growth in Africa is predominantly driven by accumulation of factors of production and that in certain periods, notably the early 1990s, the contribution of total factor productivity (TFP) was negative (UNECA and AUC, 2007). Trade facilitation can make important imported factors of production cheaper, but also reduce the transaction costs involved in production and distribution and bolster TFP.

Equating competitiveness with productivity does little to illuminate its character or source, however. Indeed, the emphasis in the competitiveness literature is not so much on productivity, but the microeconomic and macroeconomic foundations of national competitiveness. The World Economic Forum defines competitiveness as “the set of institutions, policies and factors that determine the level of productivity of a country” (WEF, 2010; p.4). Competitiveness here concerns the enabling environment, the inputs to the firm which enable them to “be competitive.” The WEF captures these inputs through its annually published Global Competitiveness Index (GCI) based on twelve pillars, the relative importance of each weighted according to the level of development (Figure 3).

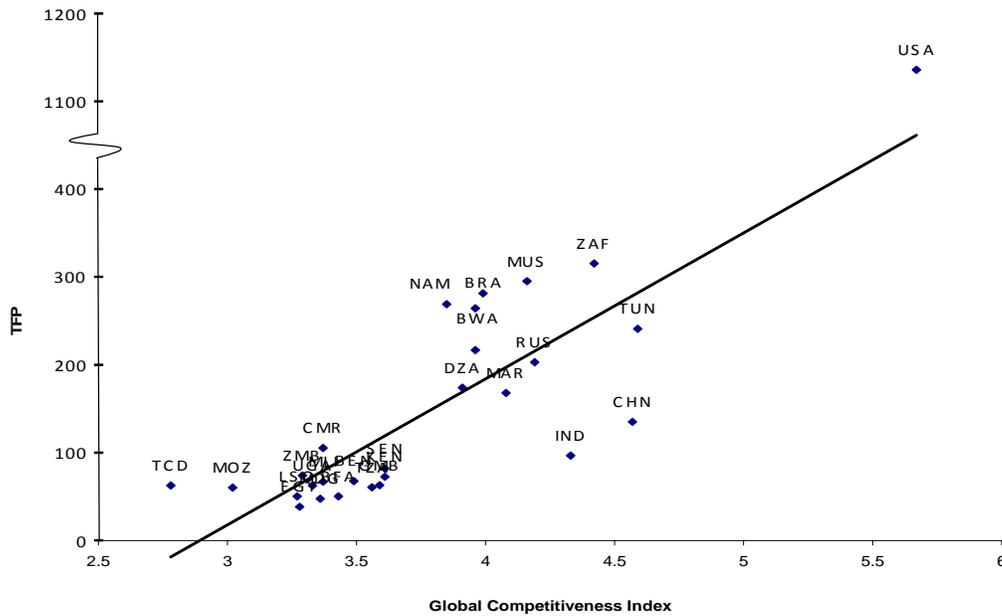
**Figure 3 – The Twelve Pillars of the Global Competitiveness Index**



Source: WEF (2010; p.8)

A low level of development is equated with a factor driven economy (in which 70 per cent of exports are primary commodities) where competitiveness is derived from certain basic requirements. Thereafter efficiency enhancers dominate before innovation and sophistication factors come to the fore. The implication is that certain requirements precede others as pre-conditions for export competitiveness such that business sophistication, for example, is inconsequential without good institutions, infrastructure, macroeconomic stability, health and primary education. Looking at export competitiveness as the enabling environment projects trade facilitation to the forefront of competitiveness strategies as trade facilitation is by definition the process of improving that enabling environment.

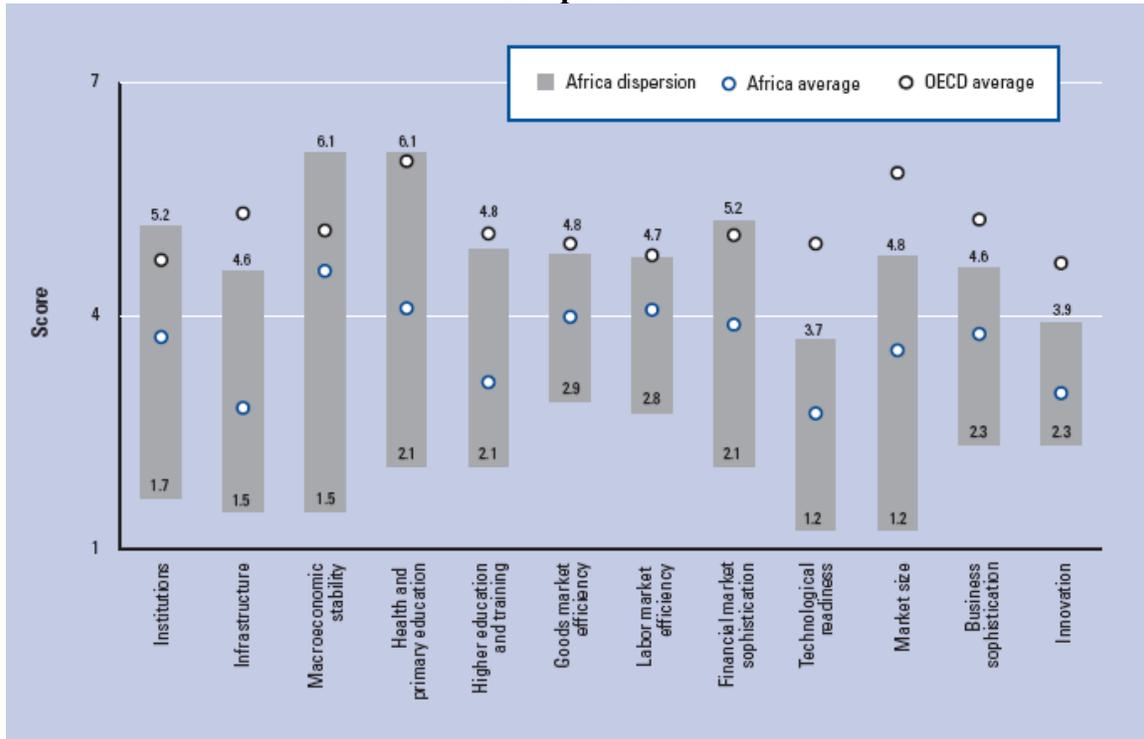
**Figure 4 – Total Factor Productivity vs. Global Competitiveness Index, 2007**



Source: Authors calculations (see Appendix C) and WEF (2008)

Figure 4 shows the GCI enjoys a robust correlation with TFP for the 23 African countries for which both TFP estimates and the GCI are available for 2007, augmented by BRIC comparators and the USA, the country with the highest GCI in 2007.

**Figure 5 – GCI Pillar Score Dispersion among African Countries and OECD Comparison**



Source: WEF (2009; p.14)

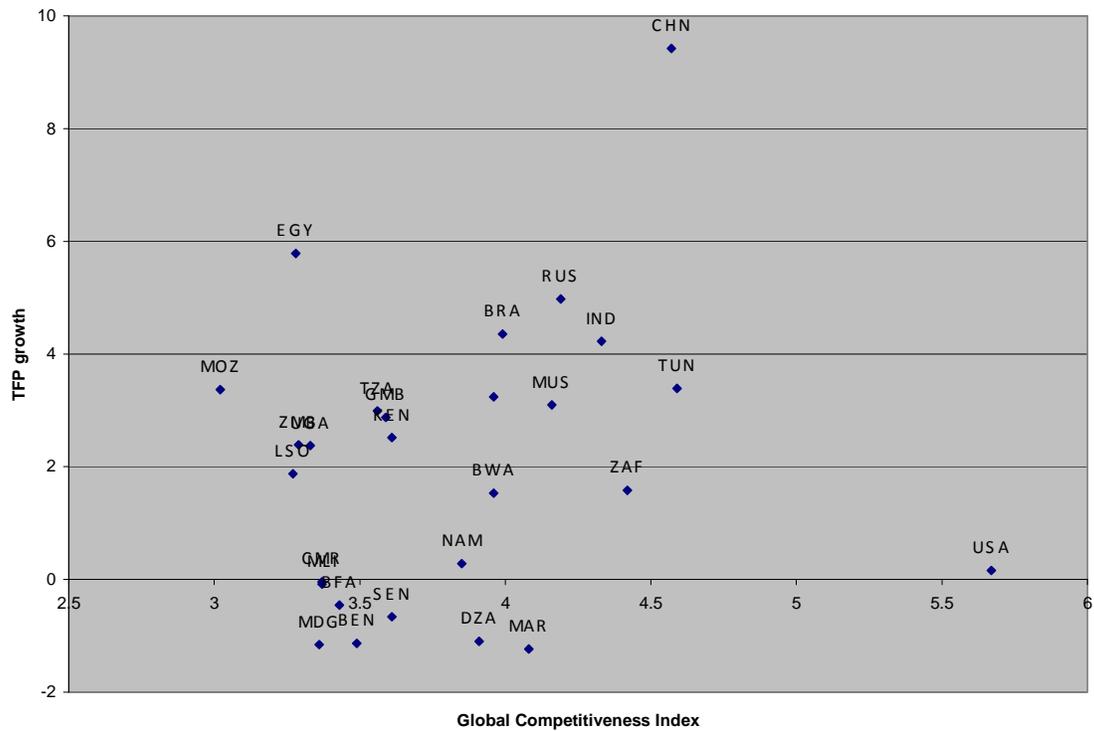
Figure 5 allows closer scrutiny of the GCI in Africa. It reports the score dispersion and an OECD comparison of the 31 African countries covered by the African Competitiveness Report 2009 over the twelve pillars. Firstly, and somewhat predictably, the African average is exceeded by the OECD average in all twelve pillars. Secondly, the range across African countries is again large. The most recent rankings of the composite Global Competitiveness Index (WEF, 2010) reveal Africa's top five as Tunisia (32<sup>nd</sup> of 139), South Africa (54<sup>th</sup>), Mauritius (55<sup>th</sup>), Namibia (74<sup>th</sup>), and Morocco (75<sup>th</sup>).<sup>5</sup> Mauritania, Zimbabwe, Burundi, Angola and Chad are not only Africa's least competitive countries; they comprise the bottom five of the sample of 139. Thirdly, of the four basic requirements, infrastructure is the only pillar in which no African country matches the benchmark of the OECD average and as such represents both a colossal competitiveness deficit, a potential trade facilitation priority and, according to the methodology embodied in the GCI, the most fertile grounds for boosting African competitiveness.

### **5. (New) Export Competitiveness**

While Section 4 showed that the GCI is indeed correlated with total factor productivity, it is clear from Figure 6 that the same cannot be said for its relationship to TFP *growth*.

<sup>5</sup> Note that South Africa and Mauritius are among the most competitive countries according to the GCI, but were among the least competitive in the CMSA showing that the stock measures of the enabling environment used to estimate the GCI do not always translate to growing shares of foreign markets.

**Figure 6 – Total Factor Productivity Growth vs. Global Competitiveness Index, 2007**



Source: Authors calculations (see Appendix C) and WEF (2008)

Imbs and Wacziarg (2003) are at the forefront of the emerging research cited by Klinger (2010) questioning the conventions of the competitiveness theory. They describe a two stage process of diversification in which growth in early stages of development is accompanied by diversification, until a turning point upon which the trend reverses toward increasing specialization once more. UNECA and AUC (2007) explore these results with respect to Africa, showing that the turning point occurs at a level of investment insufficient to engender deep diversification. Klinger and Lederman (2006) shift the focus to exports, finding export growth also corresponds to diversification therein. The most substantive innovation, however, was that by Hausmann, Hwang and Rodrik (2007). Using a specially constructed index of export productivity they showed that future growth is stronger for countries exporting more sophisticated goods, adding causality to the thesis that ‘what you export matters’. To fully exploit the potential developmental gains from trade, some countries may have to uptake new export activities. The implication is that trade facilitation must be sector specific as the inputs required for more sophisticated goods are necessarily different from those required further down the ladder. For example, competitiveness in the textiles sector is significantly impacted by scale, access to raw materials, and reliable and low cost electricity. By contrast, moving downstream just one step to the garment sector reveals labour costs, productivity, and trade preferences (market access) among the most important determinants of export competitiveness (Farole *et al.*, 2010).

The ‘new’ in ‘new’ export competitiveness refers to the need to diversify into new products rather than any novelty in the idea that certain production activities are better than others. On the contrary, economic theory offers numerous reasons why more sophisticated goods may yield more developmental gains. The fathers of development economics emphasized the greater potential of industrialized production for integration into the wider economy through backward and forward linkages and spillover effects (Hirshman, 1958; Rosenstein-Rodan, 1943). Secondly, the Springer-Prebisch (Singer, 1950; Prebisch, 1950) hypothesis that primary product exporters will face ever deteriorating terms of trade in the long run given the lesser income elasticity of demand for such commodities relative to manufactures. Thirdly, agricultural activities are subject to Malthusian diminishing returns whereas others have thus far evaded such a fate, and even offer increasing returns to scale (as per the new economic geography of Krugman, 1991), eliminating the possibility of neo-classical convergence. In the fourth instance variety and quality ladders models which describe the process of development as one in which firms are required to continuously upgrade their production to more advanced products (Akamatsu, 1962; Grossman and Helpman, 1991). Lastly Acemoglu, Johnson and Robison (2005) have pioneered research showing export expansion in certain industries can redistribute economic and political power and strengthen institutional quality, yielding associated developmental gains.

If export competitiveness is to be properly conceived of as one means to the end of long-run productivity growth and the concurrent improvement in living standards then the understanding of it must account for substantial opportunity cost entailed with specialization in certain activities, whether they are comparative advantage enhancing or denying. The methodology employed by Hausmann, Hwang and Rodrik (2007) is easily replicable to this end. Their measure of export productivity is outcomes based whereby sophisticated products are defined as those exported by richer countries.

Total exports of country  $j$  are given by the sum of exports of all goods  $l$

$$X_j = \sum_l x_{jl} \quad (2)$$

Denoting per-capita GDP as  $Y_j$ , the income or productivity level associated with each product  $k$ ,  $PRODY_k$ , is given by:

$$PRODY_k = \sum_j \frac{(x_{jk}/X_j)}{\sum_j (x_{jk}/X_j)} Y_j \quad (3)$$

As a measure of revealed comparative advantage the ratio  $x_{jk}/X_j$  gives the value share of commodity  $k$  in the country’s overall export basket. The measure  $PRODY$  therefore weights GDP per capita according to how prominent the good in question is in the export basket of those countries exporting it. If product  $k$  comprises a large proportion of poor countries exports and a small proportion of richer countries exports  $PRODY_k$  will be small, and vice versa. The income or productivity level of country  $i$ ’s export basket,  $EXPY_i$ , is in turn defined by:

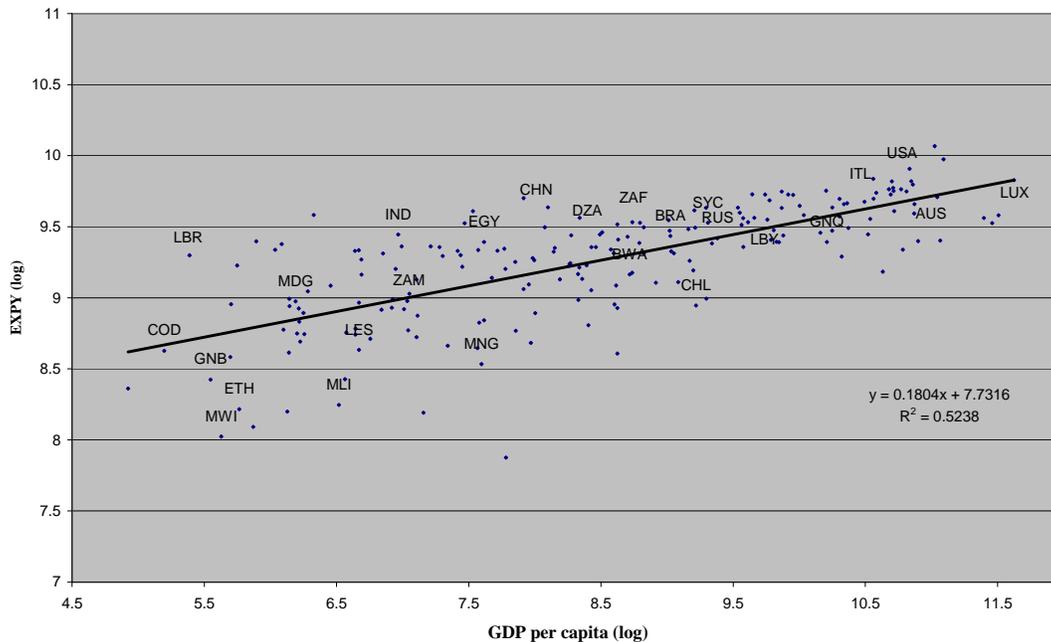
$$EXPY_i = \sum_l \left( \frac{x_{il}}{X_i} \right) PRODY_l \quad (4)$$

and is a weighted average of the *PRODY* for that country, where the weights correspond to the value shares of each good in the country's export basket.

Using the same export data as that employed for the CMSA above this measure of export sophistication was constructed for the same sample of African countries (since the same data is used, the same shortcomings apply and the sample remains restricted to 37 countries). *PRODY* is calculated using export and income data for 203 countries over 259 product lines (the 252 used for the CMSA plus 7 product lines relating to petroleum goods) for the period 2004 to 2008, with the average taken over these 5 years to calculate *EXPY* in each year.

Figure 7 plots this measure of the income level of exports for 2008 against GDP per capita in that year. As mentioned above, the main contribution of the Hausmann, Hwang and Rodrik (2007) paper was their finding that a higher income level of exports now can lead to higher rates of growth in the future. In short, you become what you export. Countries above the line such as Liberia, Madagascar or Egypt can be thought of exporting products that are 'richer' than they are, and as such can expect higher growth in the future. Nations such as Malawi, Ethiopia and Mali, which are below the line and therefore exporting products of lesser sophistication than those on similar incomes, will grow more slowly unless they can move into trading goods which are more sophisticated.

**Figure 7 – Income level of Exports (EXPY) vs. GDP per capita, 2008**



Source: Authors calculations, using data from *UNTAADstat*

**Table 1 – The Income Level of Exports (EXPY): Top 5 (World and Africa) and Bottom 5 (Africa)**

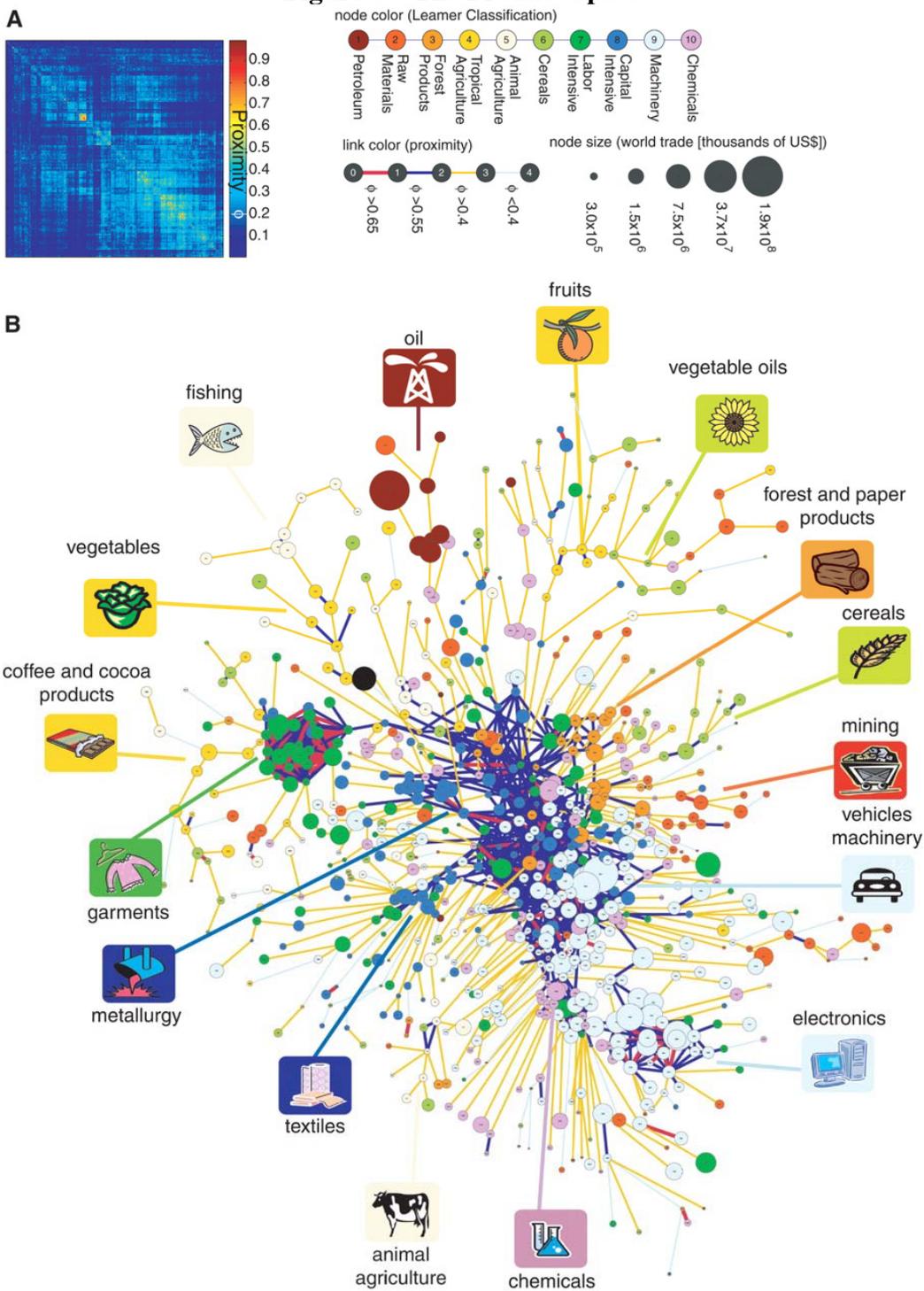
Country	EXPY	Largest export	PRODY of biggest export	% share in export basket
Top 5 Countries by EXPY				
Ireland	23,551	Organo-inorganic, heterocycl. compounds, nucl. acids	39,813	19%
Switzerland	21,473	Medicaments (incl. veterinary medicaments)	26,779	13%
Cayman Islands	20,079	Ships, boats & floating structures	16,787	57%
Japan	18,701	Motor vehicles	21,559	16%
Luxemburg	18,525	Iron & steel bars, rods, angles, shapes & Sections	20,952	21%
Top 5 African countries by EXPY				
Seychelles	13,748	Fish, aqua. invertebrates, prepared, preserved, n.e.s.	13,904	47%
South Africa	13,584	Silver, platinum, other metals of the platinum group	13,645	13%
Algeria	12,836	Petroleum oils, oils from bitumin. materials, crude	11,289	53%
Equatorial Guinea	11,993	Petroleum oils, oils from bitumin. materials, crude	11,289	76%
Egypt	11,990	Petroleum oils or bituminous minerals >70 % oil	12,724	19%
Bottom 5 African Countries by EXPY				
Dem. Rep. of the Congo	5,582	Ores and concentrates of base metals, n.e.s.	1,986	26%
Guinea-Bissau	4,559	Fruits and nuts (excluding oil nuts), fresh or dried	3,918	90%
Mali	3,817	Gold, non-monetary (excluding gold ores and concentrates)	3,220	75%
Ethiopia	3,697	Coffee and coffee substitutes	1,303	35%
Malawi	3,052	Tobacco, unmanufactured	1,460	67%

Source: Authors calculations using *UNCTADstat* data

Table 1 displays the top 5 nations in the world by EXPY, and the African countries with the smallest and largest EXPY (full results are reported in Appendix D). Again the analysis shows that the biggest exports of the best and worst African performers are primary industries. A further difference is that these largest exports typically make up a larger proportion of total exports than for the worlds best performers. The exports of wealthy countries are both more advanced and more diverse than those of African countries.

Hidalgo *et al.*(2007) have advanced this research further. They have plotted a ‘product space’, a map of products, their relative proximity determined by the likelihood it is that a country produces one if it produces the other (Figure 8). Implicit is the idea that the inputs required to produces proximate goods are similar so that countries producing goods from denser parts of the product space the conditions are more conducive to undertaking new activities. Products for which African countries exhibit a Revealed Comparative Advantage (RCA) are distributed around the more sparse periphery, but the product space reveals possible pathways to the core. Trade facilitation measures in resource constrained Africa should therefore strive to provide the inputs to production, the enabling environment, for the goods on those pathways.

**Figure 8 – The Product Space**

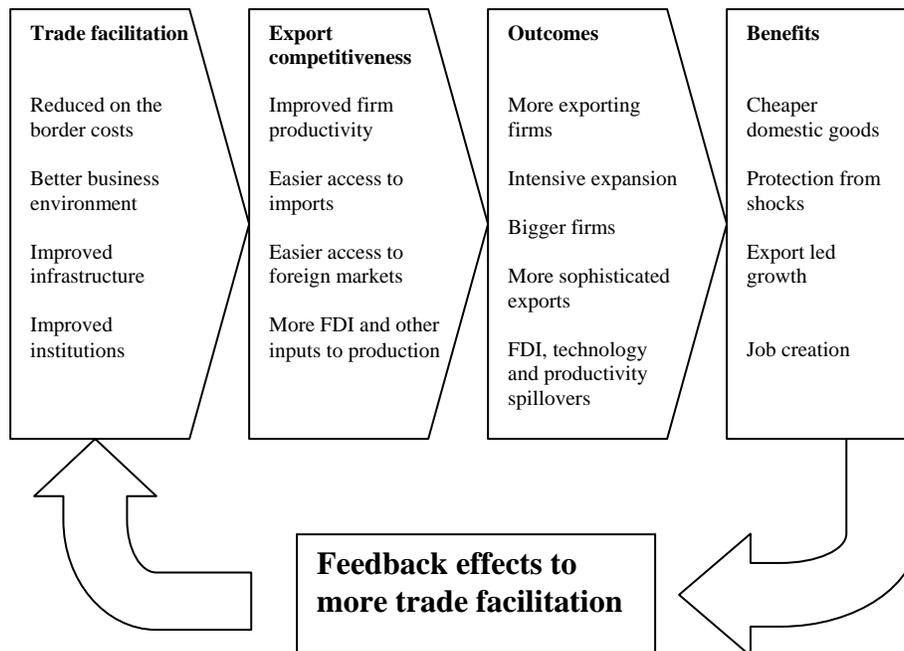


Source: Hidalgo *et al.* (2007)

## **6.0 What Can Trade Facilitation do for African Export Competitiveness?**

The analyses of export competitiveness can be married with the findings of the empirical literature on trade facilitation to surmise the possible channels through which trade facilitation can improve export competitiveness. Figure 8 provides a schematic representation. The most obvious channel is the direct impact on productivity. Reduced costs permit more output per unit of input, which can allow existing firms to export more and encourage new firms to enter export markets. Indeed, entering the export market significantly increases the probability of exporting in subsequent periods, (Bigsten *et al.*, 2004) suggesting trade facilitation can reduce the fixed costs associated with entering export markets. Exporting may also allow firms to grow and capture positive scale effects – the median exporting firm is four times larger than the median firm serving the domestic market only in Balchin and Edwards (2008) sample – available through productivity gains, Smithian and/or Ricardian specialization or the prospect that improved transport infrastructure can allow firms to grow beyond the confines of localized markets. If firms ‘learn-by-exporting’ too a productivity dividend may arise from exposure to international competition. Mengistae and Pattillo (2004), for example, show that export manufacturers have an average total factor productivity premium of 17 percent in Ghana, Ethiopia and Kenya, although there is doubtless a process of self selection at play here if only the most productive firms are capable of overcoming the costs associated with entering the export market (see also Tybout, 2001). Lastly, trade facilitation affects not only exports but imports and one can reasonably expect that easier access to imports will result in cheaper intermediate goods, more FDI, and access to better technology vintages, with spillovers into the wider economy. The upshot is lower prices for domestic consumers, job creation from expanding trade, protection from terms of trade shocks and a potential feedback effect as productivity gains, economies of scale, spillover effects and macroeconomic stability conspire to engender further trade facilitation.

### **Figure 9 – Trade Facilitation and Export Competitiveness: A Conceptual Framework**



To test the principal assertion of the conceptual framework – that trade facilitation can boost productivity – TFP is regressed on the trade facilitation indicators created by Portugal-Perez and Wilson (2010) and scaled on a range of 0 and 1, namely:

- *INF* – *Physical infrastructure* measures the level of development and quality of ports, airports, roads, and rail infrastructure.
- *ICT* – *Information and communications technology* is interpreted as the extent to which an economy uses information and communications technology to improve efficiency, and productivity as well as to reduce transaction costs. It contains indicators on the availability, use, absorption, and government prioritization of ICT.
- *BORDER* – *Border and transport efficiency* aims at quantifying the level of efficiency of customs and domestic transport that is reflected in the time, cost, and number of documents necessary for export and import procedures.
- *BUS* – *Business and regulatory environment* measures the level of development of regulations and transparency. It is built on indicators of irregular payments, favoritism, government transparency, and measures to combat corruption.

The model also controls for the following variables:

- *URB* – the ratio of urban population to total population as to capture possible agglomeration economies
- *MAN* – the ratio of manufacturing value added to GDP to account for productivity gains emanating from a more productive allocation of resources.
- *XGDP* – the ratio of exports to GDP as an indicator of openness.
- *GCONCOR* – an estimate of control of corruption from the World Bank’s Worldwide Governance Indicators.
- *DOMCRED* – domestic credit to the private sector (% of GDP) as a measure of financial deepening.

Portugal-Perez and Wilson’s (2010) indicators of trade facilitation are available for 24 African countries from 2004-2007, but missing capital accumulation data for Ghana, Nigeria and Zimbabwe prohibits the calculation of TFP for these countries, reducing the panel to 21 cross-sections over four years. The small panel size impedes the application of unit root tests, although concerns abound in the literature as to the applicability of such tests in instances where both the cross sectional ( $N$ ) and time series dimension ( $t$ ) are small (see, for example, Hlouskova & Wagner, 2005).

The correlation coefficients of the explanatory variables are reported in Table 2. Variables exhibiting a correlation coefficient in excess of 0.7 with the trade facilitation indicators are dropped from the specification (namely *DOMCRED* in the case of *ICT*, *GCONCOR* in the case of *BUS*, and *DOMCRED* and *GCONCOR* in the case of *INF*). The variable *GERSEC* reported in the correlation matrix represents the gross secondary enrollment rate, a measure of human capital frequently cited as a determinant of TFP in the literature. It is excluded from the model estimation here, however, on the grounds of high correlation with the other variables under consideration.

**Table 2 – Trade Facilitation and TFP: Correlation Matrix**

	<i>TFP</i>	<i>GERSEC</i>	<i>URB</i>	<i>MAN</i>	<i>XGDP</i>	<i>GCONCOR</i>	<i>DOMCRED</i>	<i>INF</i>	<i>ICT</i>	<i>BORDER</i>	<i>BUS</i>
<i>TFP</i>	1.00										
<i>GERSEC</i>	0.88	1.00									
<i>URB</i>	0.65	<b>0.71</b>	1.00								
<i>MAN</i>	0.45	0.33	0.26	1.00							
<i>XGDP</i>	0.52	0.50	0.45	0.13	1.00						
<i>GCONCOR</i>	0.80	0.69	0.51	0.24	0.38	1.00					
<i>DOMCRED</i>	0.77	<b>0.70</b>	0.45	0.57	0.18	0.60	1.00				
<i>INF</i>	0.83	<b>0.79</b>	0.52	0.49	0.34	<b>0.72</b>	<b>0.79</b>	1.00			
<i>ICT</i>	0.65	0.67	0.49	0.42	0.14	0.62	<b>0.72</b>	<b>0.77</b>	1.00		

<i>BORDER</i>	0.49	0.56	0.55	0.34	0.20	0.44	0.39	0.61	0.59	1.00	
<i>BUS</i>	0.69	<b>0.73</b>	0.57	0.21	0.31	<b>0.75</b>	0.58	<b>0.79</b>	0.62	0.52	1.00

**Table 3 – Trade Facilitation and TFP: Model Estimates**

Dependent Variable: log(TFP). Estimated using EGLS with cross country weights										
	(1)	(2)	(3)	(4)	(5)					
<i>Constant</i>	3.458 (0.00)***	2.789 (0.00)***	3.225 (0.00)***	3.224 (0.00)***	3.103 (0.00)***					
<i>URB</i>	0.015 (0.00)***	0.018 (0.00)***	0.017 (0.00)***	0.015 (0.00)***	0.018 (0.00)***					
<i>MAN</i>	0.015 (0.00)***	0.005 (0.37)	0.025 (0.00)***	0.007 (0.09)*	0.009 (0.00)***					
<i>XGDP</i>	0.011 (0.00)***	0.012 (0.00)***	0.012 (0.00)***	0.013 (0.00)***	0.010 (0.00)***					
<i>GCONCOR</i>	0.391 (0.00)***		0.441 (0.00)***	0.312 (0.00)***						
<i>DOMCRED</i>	0.005 (0.00)***			0.006 (0.00)***	0.008 (0.00)***					
<i>INF</i>		1.990 (0.00)***								
<i>ICT</i>			0.646 (0.00)***							
<i>BORDER</i>				0.362 (0.00)***						
<i>BUS</i>					0.377 (0.02)**					
R-squared	0.97	0.93	0.98	0.98	0.93					
N	21	21	21	21	21					
Number of observations	84	84	84	84	84					
White test on POLS estimation	51.3039 (0.00)***	26.1230 (0.02)**	57.0576 (0.00)***	58.4319 (0.00)***	31.57 (0.05)*					

Numbers in parenthesis are p-statistics \*\*\* denotes significance at the 1 per cent level, \*\* at the 5 per cent level, and \* significance at the 10 per cent level

The results of the model are reported in Table 3. The White test statistics (with p-values in parenthesis) support the rejection of the null hypothesis of no heteroskedasticity and the adoption of panel estimated generalized least squares (EGLS) with cross-section weights to minimize its impact. All coefficients are of the expected sign and are statistically significant in the base specification (1). The trade facilitation variables are all positively significant at the 1 per cent level, with the hard infrastructure variables (*INF* and *ICT*) showing the largest coefficients. At 1.99, the coefficient of *INF* suggests that an increase of 0.01 in the index (which is scaled between 0 and 1) corresponds to a 1.99 per cent increase in *TFP*. If Chad, the country with the lowest *INF*, were to improve the quantity and quality of its infrastructure to the level of Tanzania, roughly representative of the African average, the estimation suggests *TFP* would be some 50 per cent higher. The average rate of *INF* growth across the sample is approximately 5 per cent, a growth the model associated with substantive productivity gains. Improving the *ICT* of the lowest country (Chad) to that of the average country (Zambia) bolsters *TFP* by approximately 14%. The soft infrastructure variables also exhibit a strong association with total factor product productivity: a 0.01 increase in *BORDER* and *BUS* are associated with *TFP* growth of 0.36 and 0.37 per cent respectively. It is also noteworthy that the control of corruption and the measure of openness, the ratio of exports to GDP, are both associated with higher *TFP*. As governance and trade policy indicators they too are essential ingredients to a holistic by trade facilitation program. To address potential endogeneity the equations were re-estimated using once-lagged values of the independent variables. The findings are essentially unchanged, although the level of significance drops in some cases.

**Table 4 – Trade Facilitation and TFP: Granger Causality Test\***

Pairwise Granger Causality Test. Lags: 2.			
Null Hypothesis	Observations	F-Statistic	Prob.
INF does not Granger Cause TFP	42	6.60698	0.00352
TFP does not Granger Cause INF	42	0.08107	0.92229
ICT does not Granger Cause TFP	42	3.53385	0.03940
TFP does not Granger Cause ICT	42	7.07430	0.00250
BORDER does not Granger Cause TFP	42	0.91202	0.41055
TFP does not Granger Cause BORDER	42	0.07436	0.92847
BUS does not Granger Cause TFP	42	5.49763	0.00812

\* If p-value < 0.05, the null hypothesis is rejected. For instance the null hypothesis that infrastructure does not Granger Cause total factor productivity is rejected. This means that there is unidirectional causality from infrastructure to productivity.

The regression analysis is supplemented by a Granger Causality Test (Granger, 1969) to identify whether trade facilitation is the driver of total factor productivity, or vice versa. The results, reported in Table 6, verify that in the case of *INF* and *BUS* we cannot reject the null hypothesis that causality is present at the 1 per cent level. The *ICT* indicator exhibits dual causality with *TFP*, indicative of the feedback between export competitiveness hypothesized in the conceptual framework, whereas *BORDER* neither Granger causes, or is Granger caused by, *TFP*.

The above analysis is strongly supportive of the thesis that trade facilitation can bolster productivity for our sample of 21 African countries but new research described in Section 5 raises concerns that there may be an opportunity cost, or limits to the productivity premium, depending on the composition of the export basket of the country in question. Furthermore, the analysis above offers little insight as to whether the transaction effect or the production effect dominates. Regressing *EXPY*, the income level of exports defined in Section 4, on the trade facilitation indicators offers insight as to whether trade facilitation can also shape production, catalyzing transition toward more sophisticated exports and greater future growth.

Our sample in this instance is restricted to the 18 countries for which data was available for the computation of *EXPY* and Portugal-Perez and Wilson (2010) published trade facilitation indicators. Replacing the *MAN*, *DOMCRED* and *GCONCOR* control variables employed above are *POP*, the natural log of total population, *GDPPC*, the natural log of per capita GDP, both robust determinants of *EXPY* in Hausmann, Hwang and Rodrik's (2007) initial study. Also included is *TFP*, the natural log of TFP, variable described in Appendix C.

**Table 5 – Trade Facilitation and EXPY: Correlation Matrix**

	<i>EXPY</i>	<i>GDPPC</i>	<i>POP</i>	<i>URB</i>	<i>XGDP</i>	<i>TFP</i>	<i>INF</i>	<i>ICT</i>	<i>BORDER</i>	<i>BUS</i>
<i>EXPY</i>	1.00									
<i>GDPPC</i>	0.51	1.00								
<i>POP</i>	0.30	-0.24	1.00							
<i>URB</i>	0.70	0.69	-0.02	1.00						
<i>XGDP</i>	0.53	0.68	-0.10	0.68	1.00					
<i>TFP</i>	0.69	<b>0.95</b>	-0.05	<b>0.80</b>	0.68	1.00				
<i>INF</i>	0.58	<b>0.76</b>	0.00	0.67	0.50	<b>0.87</b>	1.00			
<i>ICT</i>	0.48	0.55	-0.01	0.53	0.36	0.69	<b>0.79</b>	1.00		
<i>BORDER</i>	0.46	0.55	-0.08	0.52	0.43	0.59	0.63	0.52	1.00	
<i>BUS</i>	0.37	0.71	-0.16	0.64	0.44	0.75	<b>0.77</b>	0.54	0.45	1.00

Table 5 describes the correlation matrix, with those variables sharing a correlation coefficient exceeding 0.7 once again omitted, and Table 6 presents the estimation results.

**Table 6 – Trade Facilitation and EXPY: Estimation Results**

Dependent Variable: $\log(EXPY)$ . Estimated using EGLS with cross country weights						
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Constant</i>	3.775 (0.00)***	4.020 (0.00)***	5.901 (0.00)***	3.834 (0.00)***	3.982 (0.00)***	6.377 (0.00)***
<i>GDPPC</i>	0.231 (0.00)***			0.223 (0.00)***	0.194 (0.00)***	
<i>POP</i>	0.196 (0.00)***	0.170 (0.00)***	0.122 (0.00)***	0.194 (0.00)***	0.188 (0.00)***	0.102 (0.00)***
<i>URB</i>	0.001 (0.42)		0.012 (0.00)***	0.001 (0.33)	0.002 (0.15)	0.014 (0.00)***
<i>XGDP</i>	0.010 (0.00)***	0.011 (0.00)***	0.010 (0.00)***	0.010 (0.00)***	0.010 (0.00)***	0.012 (0.00)***
<i>TFP</i>		0.377 (0.00)***				
<i>INF</i>			0.601 (0.00)***			
<i>ICT</i>				0.066 (0.56)		
<i>BORDER</i>					0.202 (0.06)*	
<i>BUS</i>						-0.283 (0.11)
R-squared	0.90	0.89	0.83	0.90	0.90	0.81
N	18	17	18	18	18	18
Number of observations	72	68	72	72	72	72
White test on POLS estimation	42.2102 (0.00)***	15.4930 (0.08)*	44.6754 (0.00)***	44.5012 (0.00)***	49.4410 (0.00)***	18.3649 (0.19)

Numbers in parenthesis are p-statistics \*\*\* denotes significance at the 1 per cent level, \*\* at the 5 per cent level, and \* significance at the 10 per cent level

Again, all coefficients exhibit the expected signs with the exception of *BUS*, which is negative but not statistically significant. Of the trade facilitation variables only *INF* and *BORDER* are significant, at the 1 and 10 per cent levels respectively, although, as with the statistically significant coefficient for *TFP* the former may reflect the greater *EXPY* at higher incomes as *GDP* is omitted from these estimations. None-the-less, the hypothesis that improved infrastructure and border efficiency make the prospect of moving into more advanced exports more attractive cannot be rejected. The elasticity of *EXPY* with respect to *INF* and *BORDER*, at 0.6 and 0.2 per cent respectively, is less than that observed for *TFP* (1.99 per cent and 0.36 per cent respectively), implying that the production effect of trade facilitation on export competitiveness is of a lesser magnitude than the transaction effect. Openness (*XGDP*) is associated with more sophisticated exports, and the significance of *URB* and *POP* strongly support the hypothesis that scale effects are important for Africa's export competitiveness and re-iterates the potential benefit of regional integration and the development of regional value chains.

The Granger Causality Test is repeated for the *EXPY* dataset, with F-statistics reported in Table 7. Both *TFP* and *ICT*, the hard infrastructure indicators, are shown to Granger cause *EXPY* at the 5 per cent level, and *INF* is a determinant at the 10 per cent level, although again the possibility that both trade facilitation and *EXPY* are driven by a income levels cannot be eliminated. It seems intuitive, however, that the availability of improved *ICT* facilitates the production of more advanced, technology intensive goods.

**Table 7 – Trade Facilitation and EXPY: Granger Causality Test**

Pairwise Granger Causality Test. Lags: 1 <sup>6</sup>			
Null Hypothesis	Observations	F-Statistic	Prob.
TFP does not Granger Cause EXPY	51	5.67465	0.02122
EXPY does not Granger Cause TFP	51	0.57543	0.45182
INF does not Granger Cause EXPY	54	3.48068	0.06785
EXPY does not Granger Cause INF	54	0.01830	0.89294
ICT does not Granger Cause EXPY	54	5.40761	0.02406
EXPY does not Granger Cause ICT	54	0.36803	0.54677
BORDER does not Granger Cause EXPY	54	2.74601	0.10364
EXPY does not Granger Cause BORDER	54	1.06218	0.30758
BUS does not Granger Cause EXPY	54	0.53733	0.46690
EXPY does not Granger Cause BUS	54	0.00975	0.92172

## **7. Conclusions and Recommendations**

The regression analysis emphatically confirms the hypothesis that trade facilitation can bolster productivity levels in Africa. All four trade facilitation indicators are statistically associated with total-factor-productivity, with three exhibiting implied causality, suggestive of a pervasive transaction effect. The evidence of the impact of so-called hard infrastructure, that in energy, transport, and ICT, is particularly compelling. The effect of the same indicators regressed on the income level of exports, as a proxy for the production effect (the channel through which trade facilitation encourages a more productive allocation of resources), is less prominent. None-the-less, infrastructure remains a robust contributor to competitiveness across specifications and as such the increasing proportion of Aid for Trade (AfT) commitments to infrastructure is to be welcomed (UNECA and AUC, 2011). China's growing commitment to infrastructure assistance, enshrined in the Beijing Action Plan, is also beneficial to African export competitiveness. The power of openness and market size variables are suggestive of the gains from accelerating regional integration, and as such moves to fast track an African free-trade area, such as that endorsed by African Ministers of Trade in Kigali in November 2010, are also welcomed.

<sup>6</sup> Owing to the small sample size, only one lag is applied in the Granger causality test.

Ultimately, however, the analysis suffers from a number of shortcomings which future research is encouraged to address. Firstly, data limitations inhibit rigorous analysis at both firm and national levels. The efforts of the World Bank, the World Economic Forum and the African Development Bank to expand coverage of competitiveness and trade facilitation data for African countries is welcomed, and should improve the perspicacity of future research. Secondly, this study has focused explicitly on the volume of trade in manufactured goods, neglecting the quality of manufactures and trade in services, which now accounts for more than 20 per cent of the continents exports (UNECA and AUC, 2011). Thirdly, little attention is paid to the price component of competitiveness and impact of long-run terms-of-trade dynamics, an area ripe for further research. Lastly, greater understanding of how productivity changes are manifest in export markets is required to more fully appreciate the impact of the transaction effect.

As is clear, the analysis undertaken here does not claim to fully capture the complexity of African export competitiveness described in the introduction. Rather, it seeks to frame export competitiveness as something more than a linear function of productivity and national supplied 'competitiveness enhancing' inputs. The grouping of African nations together in the empirical analysis undertaken here yields results of a general nature with an implied replicability. As is clear from both the CMSA and the EXPY analysis, however, competitiveness is by no means uniform, both across and within nations, and as such trade facilitation measures should be sensitive to industry level needs. Trade facilitation can bolster productivity, and while Africa's pervasive infrastructure deficit may dis-incentivise moving into more sophisticated products for export, the limited impact of trade facilitation on what is actually exported implies that structural transformation may require a more holistic trade policy to guarantee long run competitiveness. The CMSA and the estimated income measure of exports (EXPY) undertaken here can allow African nations to shed light on products in which individual nations are competitive, and the compatibility of these products with the goal of sustainable long-run growth in standards of living.

## **8. References**

Acumoglu, D., S. Johnson and J. Robinson (2005) 'The Rise of Europe: Atlantic trade, institutional change and economic growth,' *American Economic Review*, Vol. 95, No. 3, pp. 546-579

Akamatsu, K. (1962) 'A historical pattern of economic growth in developing countries' *Journal of Developing Economies*, Vol. 1, No. 1 pp.3-25

Anderson, J.E. and D. Marcouiller (2002) 'Insecurity and the pattern of trade: an empirical investigation,' *The Review of Economics and Statistics*, Vol. 84, No. 2, pp. 342-352

Anderson, J.E. and E. Van Wincoop (2004) 'Trade costs,' *Journal of Economic Literature*, Vol. 42, No. 3, pp. 691-751.

Arvis, J-F., M.A. Mustra, L. Ojala, B. Shepherd, and D. Saslavsky (2010) 'Connecting to compete 2010: trade logistics in the global economy,' World Bank, Washington, D.C

Balchin, N., and S. Edwards (2008) 'Trade-related business climate and manufacturing export performance in Africa: A firm level analysis,' *Paper presented at the 'Trade Costs and Business Environment: A focus on Africa' African Economic Research Consortium and the World Bank Workshop*, 31 May 2008, Entebbe, Uganda.

Ben Hammounda, H., S.N. Karingi, A.E. Njuguna and M. Sadni Jallab (2010) 'Growth, productivity and diversification in Africa,' *Journal of Productivity Analysis*, Vol. 33, No. 2, pp.125-146

Berkowitz, D., J. Moenius, and K. Pistor (2006) 'Trade, law, and product complexity,' *The Review of Economics and Statistics*, Vol. 88, No. 2, pp. 363–373.

Bigsten, A., P. Collier, S. Dercon, M. Fafcharns, B. Gauthier, J. Gunning, J. Habarurema, A. Isaksson, A. Oduro, R. Oostendorp, C. Pattillo, M. Soderborn, F. Teal, and A. Zeufack (1999) 'Exports of African manufactures: macro policy and firm behaviour,' *The Journal of International Trade & Economic Development*, Vol. 8. No. 1, pp. 53-71

Bigsten, A. and M. Soderbom (2006) 'What have we learned from a decade of manufacturing enterprise surveys in Africa?' *World Bank Research Observer*, Vol. 21, No. 2, pp. 241-265.

Bosworth, B.P. and S.M. Collins (2003) 'The empirics of growth: an update,' *Brookings Papers on Economic Activity*, Vol. 32, No. 2, pp. 113-206

Clark, X., D. Dollar and A. Micco (2004) 'Port efficiency, maritime transport costs and bilateral trade,' NBER Working Paper 10353

Clarke, G.R.G (2005) 'Beyond tariffs and quotas: why don't African manufactures export more?' World Bank Policy Research Working Paper 3617

Coase, R. (1937) 'The nature of the firm,' *Economica*, Vol. 4, No. 16, pp. 386-405

Dennis, A. and B. Shepherd (2007) 'Trade costs, barriers to entry, and export diversification in developing countries,' World Bank Policy Research Working Paper 4368

Di Mauro, F. and K. Forster (2008) 'Globalisation and the competitiveness of the euro area,' Occasional Paper Series 97, European Central Bank

Chang, H-J. (2007) *Bad Samaritans: The Myth of Free Trade and the Secret History of Capitalism*, Bloomsbury Press, London

- Czubala, W., B. Shepard and J.S. Wilson (2007) 'Help or hindrance: the impact of harmonized standards on African exports,' World Bank Policy Research Working Paper 4400
- Djankov, S., C. Freund and C. Pham (2006) 'Trading on time,' World Bank Policy Research Working Paper 3909
- Eifert, B., A. Gleb and V. Ramachanran (2005) 'Business environment and comparative advantage in africa: evidence from the investment climate data,' Centre for Global Development Working Paper Number 56
- Elbadwi, I., T. Mengistae and A. Zeufack (2006) 'Market access, supplier access, and Africa's manufactured exports: an analysis of the role of geography and institutions,' World Bank Policy Research Working Paper 3942
- Farole, T., J.G. Reis and S. Wagle (2010) 'Analyzing trade competitiveness: a diagnostics approach' World Bank Policy Research Working Paper 5329
- Freund, C. and N. Rocha (2010) 'What constrains Africa's exports?' World Bank Policy Research Working Paper 5184
- Fukunishi, T. (2004) 'International competitiveness of manufacturing firms in sub Saharan Africa,' Institute of Developing Economies, Discussion Paper No. 2.
- Granger, C.W.J. (1969) 'Investigating causal relations by econometric models and cross-spectral methods,' *Econometrica*, Vol. 37, No. 3, pp.424-38
- Grossman, G. and E. Helpman (1991) 'Quality ladders in the theory of growth,' *The Review of Economic Studies*, Vol. 58, No. 1., pp. 43-61
- Hall, R.E. and C. Jones (1999) 'Why do some countries produce so much more output per worker than others?' *Quarterly Journal of Economics*, Vol. 114, No. 1, pp. 83-116
- Harberger, A. (1978) 'Perspectives on capital and technology in Less Developed Countries' in M.J. Artis and A.R. Nobay (eds.) *Contemporary Economic Analysis* Croom Helm, London
- Hausmann, R., J. Hwang and D. Rodrik (2007) 'What you export matters,' *Journal of Economic Growth*, Vol. 12, No. 1, pp. 1-25
- Hausmann, R. and D. Rodrik (2006) 'Doomed to choose: industrial policy as predicament' Centre for International Development Working Paper, Harvard
- Hidalgo, C.A., B. Klinger, A.L. Barabasi and R. Hausmann (2007) 'The product space conditions the development of nations' *Science*, Vol. 317, No. 5837, pp. 482-487
- Hirschman, A. (1958) *The Strategy of Economic Development*, Yale University Press, New Haven, CT

- Hlouskova, J. and M. Wagner (2005) 'The performance of panel unit root and stationarity tests: results from a large scale simulation study,' Economics Working Papers ECO2005/05, European University Institute
- Imbs, J. and R. Wacziarg (2003) 'Stages of diversification' *American Economic Review*, Vol. 93, No. 1, pp. 63-86
- Klinger, B. and D. Lederman (2006) 'Diversification, innovation and imitation inside the global technological frontier' World Bank Policy Research Working paper 3872
- Krugman, P. (1991) 'Increasing returns and economic geography,' *Journal of Political Economy*, Vol. 99, No.3, pp. 483-499
- Krugman, P. (1994) 'Competitiveness: A Dangerous Obsession,' *Foreign Affairs*, Vol. 73, No. 2, pp. 28-44
- Krugman, P. (1996) 'Making sense of the competitiveness debate,' *Oxford Review of Economic Policy*, Vol. 12, No. 3, pp. 17-25
- Lall, S. (2000) 'Skills, competitiveness and policy in developing countries,' Queen Elizabeth House Working Paper QEHWPS46, University of Oxford
- Leamer, E.E. and R.M. Stern (1970) *Quantitative International Economics*, Aldine Publishing Company, Chicago
- Lin, J-Y. (2010) 'New structural economics: a framework for rethinking development' World Bank Policy Research Working Paper 5197
- Limão, N. and A.J. Venables (2001) 'Infrastructure, geographical disadvantage, transport costs and trade,' *World Bank Economic Review*, Vol. 15, No. 3, pp. 451-479
- Mengistae, T. and C. Pattillo (2004) 'Export orientation and productivity in Sub-Saharan Africa' *IMF Staff Papers*, Vol. 51, No. 2, pp. 327-353
- Nsouli, A., K. Fosu, and A. Varoudakis (eds.) (2001) *Policies to Promote Competitiveness in Manufacturing in Sub-Saharan Africa*. Paris: OECD.
- OECD (2003) *Quantitative Assessment of the Benefits of Trade Facilitation* OECD, Paris
- OECD (2005) *The Economic Impact of Trade Facilitation* OECD, Paris
- Persson, M. (2010) 'Trade facilitation and the extensive margin' Research Institute of Industrial Economics Working Paper 828
- Porter, M. (1990), *The Competitive Advantage of Nations*, London: Macmillan
- Porter, M., C. Ketels and M. Delgado (2008) 'The microeconomic foundations of prosperity: findings from the business competitiveness index' in WEF, *The Global Competitiveness Report 2007-2008* WEF, Geneva

Portugal-Perez, A. and J.S. Wilson (2010) 'Export performance and trade facilitation reform: hard and soft infrastructure' World Bank Policy Research Working Paper 5216

Prebisch, R. (1950) 'Commercial policy in the underdeveloped countries,' *American Economic Review*, Vol. 49, No. 2, pp. 251-273

Rosenstein-Rodan, P. (1943) 'Problems of industrialization of Eastern and South- Eastern Europe,' *Economic Journal*, Vol. 53, No. 210/211, pp. 202-11

Singer, H.W. (1950). 'U.S. foreign investment in underdeveloped areas: the distribution of gains between investing and borrowing countries,' *American Economic Review*, Vol. 40, No. 2, pp. 473-485.

Solow, R. (1957) 'Technical change and the aggregate production function,' *Review of Economics and Statistics*, Vol. 39, No.3, pp. 312-320

Tybout, J.R. (2001) 'Plant and firm level evidence on 'new' trade theories' NBER Working Paper 8418

Tyszynski, H. (1951) 'World trade in manufactured commodities, 1899-1950,' *The Manchester School of Economic and Social Studies*, Vol. 19, No. 3, pp. 272-304

UNECA and AUC (2007) *Economic Report on Africa 2007: Accelerating Africa's Development Through Diversification*, UNECA, Addis Ababa, Ethiopia

UNECA and AUC (2011) *Economic Report on Africa 2011: Governing Development in Africa – The Role of the State in Economic Transformation*, UNECA, Addis Ababa, Ethiopia

WEF (2008) *Global Competitiveness Report 2007-2008*, WEF, Geneva

WEF (2009) *The Africa Competitiveness Report 2009*, WEF, Geneva

WEF (2010) *Global Competitiveness Report 2010-2011*, WEF, Geneva

Wilson, J.S., C.L. Mann and T. Otsuki (2005) 'Assessing the potential benefit of trade facilitation: a global perspective' World Bank Policy Research Working Paper 3224

Yoshino, Y. (2008) 'Domestic constraints, firm characteristics, and geographical diversification of firm-level manufacturing exports in Africa' World Bank Policy Research Working Paper 4575