CSAE Working Paper WPS/2019-04

Domestic Credit and Export Diversification: Africa from a Global Perspective

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(Revised Version: 03 November 2018)

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Abstract

As open economies, African countries need to diversify their exports for economic transformation, sustained growth, and development. Meanwhile, there has been increasing importance of development financing. Following the discussion of theoretical issues on the importance of domestic credit as a potential instrument for overcoming the liquidity constraint of developing countries, as in the case of Africa, this paper empirically explores the determinants of export diversification, with particular attention to domestic credit. The estimation is based on a five-year panel regression analysis for the 1962-2010 period involving 80 countries around the world, of which 62 are developing and 29 African countries, using as covariates variables that are traditionally viewed as affecting export diversification. System GMM estimates provide robust evidence supporting the importance of domestic credit for African countries, while its role in other countries seems rather marginal. In addition, human capital in the form of schooling, governance as measured by constraint on the chief executive of government, and being land-locked, all exert significant effects, as anticipated, on export diversification among African countries. However, except for governance, appropriately controlling for the interactive effect of domestic credit with 'Africa' yields generally insignificant impacts of these variables, together with domestic credit, on export diversification in non-African countries. These results point to the dominant role of domestic credit in Africa vis-à-vis other countries globally.

Keywords: Export diversification, domestic credit, Africa, global perspective

Domestic Credit and Export Diversification: Africa from a Global Perspective

1. Introduction

The importance of trade for growth and development has historically been based on the classical theory that countries should specialize in producing and exporting commodities in which they have a comparative advantage (Heckscher, 1919; Ohlin, 1933; Samuelson, 1948). In this regard, African countries would export primary products, while importing manufactures. However, more recent theoretical and empirical studies have emphasized the importance of export diversification, rather than export specialization (Herzer and Nowak-Lehmann, 2006). This paradigm shift may be traceable to several reasons.

First, it is now observed that export diversification favorably influences the pattern of growth and structural transformation that countries and regions experience, with larger manufacturing exports engendering higher growth (Fosu, 1990, 1996a). Second, it is found to increase a country's ability to meet such goals as job creation and improvements in income distribution (Hausmann and Klinger, 2006; Hwang, 2006; Hartmann, Guevara, Jara-figueroa, & Aristara, 2017). Third, export diversification tends to attenuate export revenue instability and the volatility in imports and capital instabilities, which tend to be growth-inhibiting (Fosu, 1991, 2001). Fourth, an expansion in export variety can increase productivity, as it leads to value addition initiatives and improvements in the quality of manufactured products (Alaya, 2012).

The rationale for the importance of exports diversification is often emphasized for especially low-income economies with small internal markets such as those of African countries generally (see, e.g., Fosu, 1990; Helleiner, 1992; and Lussier, 1993). Currently, African countries have the highest level of export concentration in the world, with its 2010 average export diversification index value of 4.12, higher than the levels of the Middle East and North Africa, South Asia, and East Asia and Pacific: 4.02, 3.34 and 2.99, respectively (note that higher values of the index imply lower levels of export diversification).[1] Indeed, within the African continent, several challenges continue to account for the high level of export concentration. One of the major challenges frequently mentioned in the literature is access to domestic credit[2] (Fox and Oviedo, 2013). Such access should accelerate the pace of export diversification through the provision of capital needed for entrepreneurial activities. Building competitive capacity for trade requires the elimination of

[1] Computed from IMF data at: https://www.imf.org/external/np/res/dfidimf/diversification.htm

[2] According to Fox and Oviedo (2013), what firms in Africa report as most hindrance to them: limitations in infrastructure, access and cost of finance and governance (corruption).

principal domestic barriers[3] to international business development, such as financial constraints (Alaya, 2012). Availability of domestic financial resources should help countries with less developed financial institutions and limited access to international markets to diversify their economies toward attaining the economic benefits associated with diversification.

A number of studies have empirically examined the determinants of export diversification. Most recent among these studies are Agosin et al. (2012), which uses data for developed and developing countries around the world, and Elhiraika and Mbate (2014), which limits the sample to African countries. Common among these determinants are: institutions and policies, technology, research and development, human capital, infrastructure, competition in international markets and domestic credit.

The objective of this study is to provide further contribution to the debate on the drivers of export diversification, with special emphasis on domestic credit, by not only providing evidence for countries globally (as in Agosin et al., 2012) but also for African countries in particular (as in Elhiraika and Mbate, 2014). The present analysis involves five-year panel regressions for a global sample of 80 countries and a subsample of 29 African countries, similarly to Agosin et al. (2012). We opt for this larger global sample in order to explore the extent to which results for Africa only (as in the case of Elhiraika and Mbate, 2014) differ from the global ones. The 1962-2010 sample period employed in the present study is also similar to that of Agosin et al. (2012), and additionally corresponds to Africa's post-colonial period as usually assumed. The estimation is also conducted using system generalized methods of moments (SYS-GMM), as in the case of these two studies, in order to deal with potential endogeneity.

While also providing evidence on the other determinants of export diversification, the present paper nonetheless focuses on the importance of domestic credit, especially in the case of African economies. This emphasis is guided by the recent literature that shows that the lack of financial resources is a prominent concern for potential investors. For example, based on the World Bank's Enterprise Surveys on firms' perceptions of the investment climate in Africa (World Bank, 2008), Fox and Oviedo (2013) find that the cost or access to finance is among the very top constraints that firms perceive in their operation on the continent.[4] Although recent studies justify the inclusion of financial resources, as a measure of financial development, in the export diversification equation (Agosin et al., 2012; Elhiraika and Mbate, 2014), there is little importance accorded it in these studies, nor do their results show that their financial constraint measures are significant for export

[3]The other principal domestic barriers reported in Alaya (2012), in the case of MENA countries, include government policies (e.g., high tariff), poor infrastructure (e.g., high transport cost) and administrative constraints (e.g., bureaucratic red tape).

diversification.[5] Thus, the current study represents a departure from extant studies at least in this regard. Perhaps critical to African countries' efforts to capitalize on the opportunities of export diversification for sustainable growth and development, as hypothesized in the present study, is access to domestic credit, which may not be as important to other more developed countries.

The rest of the study is structured as follows. The second section discusses export diversification and domestic credit in Africa in the global setting: data description and some stylised facts. The third section outlines theoretical issues related to the importance of domestic credit for export diversification, with a specification of the empirical model in the fourth section. The estimation and results are presented in the fifth section, followed by the conclusion in the sixth and final section.

2. Export Diversification: Africa versus the World

Export Diversification: Measurement and Trends

The Export Diversification Index (XDI) is a relatively new index constructed by the IMF to measure countries' export structure over time. This index has one main advantage over the usual measures of export concentration like the (normalized) Herfindahl-Hirschman Index (HHI) (Agosin, Alvarez, & Bravo-Ortega, 2012). The HHI is quite sensitive to commodity price changes. In times of commodity price hikes, for instance, primary exporters may be considered as less diversified according to HHI than they really are, since the higher prices tend to exaggerate the value component of the primary exports. Thus, HHI may be an unreliable measure of trends in export concentration/diversification over time when there are significant inter-temporal relative price changes. Nonetheless, the HHI is perhaps the most popular measure of export diversification/concentration. Indeed, it was the measure used by Elhiraika and Mbate (2014).

XDI essentially measures the export structure of a given country, compared with that of the world as whole, in terms of both the products exported and export destinations. Thus its value would be zero if a country is as diversified as the world, with higher values representing less diversification and, hence, greater concentration. The construction is based on a Theil index, which itself is the sum of two Theil indexes measuring the 'intensive' and 'extensive' margins, with the former representing essentially intensive value (as from primary to manufacturing exports), while the latter reflects the variety of products exported. XDI is measured as (see Appendix A for details):

[5] Actually, our measure for domestic resources seems similar to those of these authors; however, model specifications used in the present study differ somewhat from those of Agosin et al. (2012), which do not present differential impacts across country groups, such as that of Africa. Meanwhile, the annual panel used by Elhiraika and Mbate (2014) may fail to capture impacts beyond a year, thus our preference for the five-year averages as employed by Agosin et al.

$XDI = T_B + T_{W,}$

Where T_B is the extensive Theil index, and T_W intensive Theil index, with the former calculated for each country/year pair as:

$TB = \Sigma k\ (Nk/N)\ (\mu k/\mu)\ \ln(\mu k/\mu),$

where k represents each group (traditional, new, and non-traded), Nk is the total number of products exported in each group, and μk/μ is the relative mean of exports in each group.

The intensive Theil index for each country/year pair is:

$TW = \Sigma k\ (Nk/N)\ (\mu k/\mu)\ \{(1/Nk)\ \Sigma i \in Ik\ (xi/\mu k)\ \ln(xi/\mu k)\}.$

We focus on the broad measure, XDI, because the literature on export diversification and growth, for example, generally employs these aggregated concentration indexes. Indeed, the Theil index adopted by Agosin et al. (2012) is similar to this aggregate index. We also adopt the basic model employed by recent studies on the determinants of export diversification, such as Agosin et al. (2012) and Elhiraika and Mbate (2014), in large part because of data limitations, but also because we wish to put our results in comparative perspective.

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Figure 1 depicts the evolution of export diversification in Africa over the period 1962-2010 (2010 is the latest year for which data is available), compared with the world average based on 80 countries. The long-run trend in XDI is clearly downward for the Africa sample, suggesting that export diversification has been increasing for the continent during post-independence. Incidentally, the trend seems slightly faster for Africa than for SSA, but generally the two indices are in the same ball park, so that one might be able to draw roughly similar conclusions for both regions. There also appear to be short-run trends. For example, the improvements in diversification from the immediate post-independence years reversed course about the early-to-mid-1970s, until about the early-to-mid-1980s, then resumed from the mid-1980s until the early 2000s, with improvements again since the mid-2000s. While this intertemporal heterogeneity in trends is interesting, it is not entirely clear what might underlie it.

*****Figure 1 about here*****

Comparatively, the global trend of the index has been relatively uniformly downward, though there appear to be minor similar bumps as those of Africa. Thus, export diversification has been increasing globally. Furthermore, the gap between Africa, particularly SSA, and the world has

historically been increasing, though there appears to some closing most recently, since about the mid-2000s.

*****Table 1 about here*****

Table 1 presents cross-country evidence on export diversification in Africa. Over the whole 1962-2010 sample period, Egypt shows the largest progress, followed by Zimbabwe and Mali. However, for the more recent 1991-2010, Uganda by far evinces the greatest progress, with Mozambique and Sudan the least, while Zimbabwe has retrogressed.

*****Table 1 about here*****

Evolution of Domestic Credit in Africa: Data Description and Stylised Facts

Domestic credit[6] refers to financial resources provided to the private sector by financial corporations, through loans, purchases of non-equity securities, and trade credits and other accounts receivable, with claims for repayment. The financial corporations include monetary authorities and deposit banks, as well as other financial corporations (including corporations that do not accept transferable deposits but do incur such liabilities as time and savings deposits). This indicator is noted to have a clear advantage over other measures of monetary aggregates; it is considered as a relatively accurate representation of the actual volume of funds channeled to the private real sector (Ibrahim & Alagidede, 2017). Figure 2 shows trends in domestic credit measure, expressed as a percentage of GDP, in Africa and globally.

*****Figure 2 about here*****

Expectedly, domestic credit has been much smaller in Africa (including SSA) than in the rest of the world, averaging roughly one-half of the global average (19 percent versus 36 percent). Perhaps more interestingly, the gap has been growing fast. In 1962, it was only 11 percentage points between the world and Africa (only 4 percentage points for SSA). By 2010, the gap had ballooned to as much as 28 percentage points (33 percentage points for SSA). This widening gap was due to

[6] See World Bank (2016) for detailed descriptions on the various measures of domestic credit.

the much faster increase for domestic credit globally, even though Africa's rate was also on the rise.

3. Theoretical Issues

Why should domestic credit matter for export diversification? As discussed above, inadequate finance can constitute a major constraint to a firm's manufacturing production, at least as perceived by the firms themselves. Theoretically, this perception is likely to be based on the liquidity-constraint hypothesis, that is, the need to finance particularly physical capital but also other production inputs with significant fixed costs. Since such outlays entail lagged returns, sufficient liquidity through credit is required to keep the firm afloat until future returns are realized. Furthermore, because diversification often entails investment projects with longer gestation periods, compared with primary production, greater liquidity would be required. Where such liquidity is lacking, firms are likely to resort to shorter term, presumably less productive, investment projects, rather than those involving longer gestation periods usually required by export diversification. Such liquidity constraint is similar to that relating to a debt constraint, where longer-term projects are less attractive to investors and government in the presence of a debt constraint (see Fosu, 1996b, 1999).

More recently, Chaney (2016) argued that among potentially exporting firms facing a fixed entry cost in order to access foreign markets, as well as liquidity constraints, to finance these costs, only those firms that have sufficient liquidity are able to export. According to Chaney (2016, p. 142), "In the presence of fixed costs associated with exporting and liquidity constraints, some firms could profitably export, but they are prevented from doing because they cannot gather sufficient liquidity."

Thus, domestic credit is expected to reduce liquidity constraints through the increase in the number of entrepreneurs in the export sector and, hence, to facilitate export diversification. Indeed, Hausmann & Rodrik (2003) note that entrepreneurs face significant financial constraints in the production of new goods, and that the government could play a key role in industrial growth and structural transformation, by promoting innovation and creating the right incentives through trade credit for entrepreneurs toward investing in a new range of exporting activities.

Hence, overcoming the liquidity constraint is likely to be critical in terms of expanding exports, especially relatively diversified exports that are likely to require longer-term and riskier investment projects. Such a circumvention would in turn require readily available sources of funding. Furthermore, different countries might face disparate levels of funding availability, with developing African countries likely to be even more deprived. For example, most African countries are unable to borrow from the international markets. And, those which are able to must pay higher premiums, indeed by as much as 3 percentage points (Olabisi and Stein, 2015). By extension, a typical firm producing in these countries must pay a higher risk-adjusted interest rate. For such countries, therefore, the availability of domestic funding for the private sector is critical. In effect,

while it may prove inconsequential in firms that are able to borrow amply from the international market, domestic credit may be critical for financing diversification in African countries as a group. Furthermore, it is expected that among African countries, those with greater availability of domestic credit would enjoy higher diversification, ceteris paribus.

4. Model Specification

Following Agosin et al. (2012), in particular, we specify the following baseline equation:

$$D_{it} = a_0 + a_1 D_{i(t-1)} + \mathbf{b}\mathbf{X}_{it} + g_t + c_i + e_{it} \qquad (1)$$

for $i = 1, \ldots . N$ and $t = 1, \ldots T$, where the dependent variable, D_{it}, represents the Export Diversification Index (XDI) for country i at time t; D_{it-1} the lagged dependent variable; $\boldsymbol{X}_{it}$ a vector of determinants of export diversification (including domestic credit, human capital, terms of trade, institutions/governance, and trade policies); g_t represents time dummy variables intended to capture the impact of common global shocks across countries; c_i denotes country-specific unobserved heterogeneity; while e_{it} is the error term, which is assumed to be independently and identically distributed (i.i.d.).

Separating out to emphasise the role of domestic credit, we rewrite equation (1) as:

$$D_{it} = a_0 + a_1 D_{i(t-1)} + b_1 M_{it} + \mathbf{b_2}\mathbf{X_2}_{it} + g_t + c_i + e_{it} \qquad (2)$$

Where M is a measure of domestic credit, with b_1 its respective coefficient, and $\mathbf{X_2}_{it}$ represents the remaining vector of independent variables. Furthermore, given the hypothesis that the effect of domestic credit would be larger for African countries, equation (2) can be rewritten as:

$$D_{it} = a_0 + a_1 D_{i(t-1)} + (b_{11} + b_{12} A)\, M_{it} + \mathbf{b_2}\mathbf{X_2}_{it} + g_t + c_i + e_{it} \qquad (3)$$

Where b_{11} and $b_{12}A$ are the effects of M for non-African and African countries, respectively, with A equal to unity if a country is African and zero otherwise.

The set of variables that constitute X_{2it} can be classified roughly into four main groups: international trade factors, structural factors, institutional factors, and policy indicators. The justification for the inclusion of these groups of variables is based on recent empirical studies that identified them as relevant determinants of export diversification in Africa and elsewhere (see, for example, Elhiraika and Mbate, 2014; Agosin et al., 2012).

The first group, comprising international factors, is composed of trade openness and terms of trade. Trade openness is measured as the sum of exports and imports as a proportion of GDP. It is expected that greater openness would entail trade liberalization, which would result in greater

specialization and hence less export diversification a la Heckscher-Ohlin. Similarly, an increase in the terms of trade would provide a price incentive for a country to increase the supply of the product already being produced and exported, rather than diversifying.

The second group of variables considers the effect of structural determinants of export diversification, such as factor endowment and geographical location. Factor endowment in the form of human capital accumulation is hypothesized to induce export diversification through increased availability of skilled labor for new and innovative investment (Agosin et al., 2012; Elhiraika and Mbate, 2014). Effective measures of human capital are difficult to come by, especially in terms of long series by country. Elhiraika and Mbate (2014), for instance, use secondary school enrolment, which is not a particularly good measure; it says little about actual schooling completion due to likely dropouts, which are likely to differ particularly across countries. A better measure is that used by Agosin et al. (2013): years of schooling. Unfortunately, the data for this variable is available for a smaller number of countries, especially in the case Africa. Given this variable's superiority over school enrolment as a measure of human capital, however, we have chosen to retain its use in the present study, thus contributing to limiting the Africa sample size.

Also included among this structural group is infrastructure. By reducing investment risk, it is anticipated that better infrastructure would enhance diversification. As in the case of human capital, this variable has very limited data availability. The usual data used is fixed telephone subscription, which was employed by Agosin et al., 2014) and also used in the current study.

Concerning geographical location/economic distance, landlocked countries are expected to have greater trade costs, making their goods with marginal comparative advantages relatively expensive to export (Elhiraika and Mbate, 2014). In contrast, countries located near coastal sea or ports are more likely to have lower transportation cost, and thus possess the incentive to produce and export a variety of products. Hence, being landlocked would retard export diversification.

For the third group of independent variables - institutional factors - we consider XCONST, which measures the degree of constraints on the executive branch of government. Consistent with Fosu (2013), for instance, it is expected that greater restraint on the executive would engender less politically motivated decisions, thus mitigating investment risks, which should then provide a more conducive environment for greater diversification. While Agosin et al. (2012) does not include such institutional variables, Elhiraika and Mbate (2014) incorporates 'government effectiveness' and 'rule of law' (though not in their specifications including the lagged dependent variable as employed here), data for both of which start from 1996, and are therefore not suitable for our longer-span study. In any case, Elhiraika and Mbate (2014) found these governance measures to be generally insignificant.

The fourth and final group of independent variables comprises policy indicators. It is hypothesized that domestic credit represents a prominent variable in this category. The variable is defined in the

present study, as also in Agosin et al. (2012), as financial credit provided by the financial corporations (including monetary authorities and deposits and time money banks, as well as other financial corporations) to the private sector in GDP. It is expected that government policies, especially via the monetary authorities, would be reflected by domestic credit, whether they be the monetary policy rate, other interest rates, or reserve requirements. In turn, domestic credit should favourably influence export diversification, especially in those countries where such modality represents the main source of funding, as argued above. Other policy variables might include the real exchange rate, as employed in Elhiraika and Mbate (2014), and exchange rate volatility, as in the case of Melitz (2003) and Agosin et al. (2012). Nonetheless, neither variable was found be exercise a significant impact on export diversification in these studies.

5. Model Estimation and Results

Equation (3) is estimated, based on the sample of 80 countries around the world, 62 of which are developing countries, including 29 African. Given the diverse nature of the data, with especially the human capital data constructed in five-year moving averages (see Barro and Lee, 2013), we employ five-year averages. While capturing likely impacts beyond a year, this approach also allows us to mitigate the effect of business cycle fluctuations as well as non-systematic errors that may be present in the data.

The definitions and sources for all the variables used in the estimation are presented in appendix table B1. The summary statistics are in appendix table B2, and lists of countries in the sample in appendix tables B3-B5.

The two-step System Generalized Method of Moment (SYS-GMM) is employed for the estimation. This method has been shown to be statistically superior to the one-step in general (Blundell and Bond, 1998). In the estimation, we assume that domestic credit, along with openness, is endogenous with respect to export diversification.[7] We use one-lagged value (either in difference or in level) as an instrument in order to avoid over-fitting of the instrumented variables, and to meet the Hansen J tests of over-identification restrictions on the validity of the instruments. Given the five-year nature of the observations, a single lag was sufficient for satisfying these tests. Since, moreover, the validity of the instrument set also depends on the nature of the error (Roodman, 2006), we additionally conduct the AR (1) and AR(2) tests based on the

[7] Presumably less export diversification would induce policies to increase domestic credit, while greater export diversification would lead to greater openness.

first-difference estimation.[8] All estimations are conducted using robust standard errors.. Table 2 presents the SYS-GMM results.

*****Table 2 about here******

Equations G.1 – G.6 of Table 2 report the results based on the global sample. In interpreting these results, it is important to stress that since export diversification decreases with the export diversification index, XDI, negative (positive) coefficients should be interpreted as positive (negative) effects on diversification. In all these equations, the coefficient of initial XDI is positive and significant, implying XDI persistence, and also the need to use SYS-GMM. Human capital generally exhibits negative coefficients throughout but significant in only equations where the Africa dummy variable is not interacted with DOMCRT (equations G.1, G. 3, and G.5), suggesting that improved schooling raises export diversification where the domestic credit is not appropriately controlled in order to account for its differential effect across country groups (Africa versus the rest of the world). Similarly, being landlocked results in a positive coefficient throughout models G.1-G.6, but with significance attained only in equations G.1, G.3, and G.5 where the domestic credit is not appropriately controlled to account for the differential Africa effect. These results suggest that the DOMCRT-Africa interaction is a crucial variable in the determination of export diversification. Furthermore, neither the change in TOT nor its interaction with human capital yields a significantly negative sign as reported in Agosin et al. (2012), despite the fact that they both exhibit the expected signs. The infrastructure variable is not consequential either.[9] In contrast, the institutional variable, XCONST, displays significantly negative coefficients throughout all the models, suggesting its potency for increasing export diversification. Interestingly, in contrast, neither measure used for political institutions by Elhiraika and Mbate (2014) - government effectiveness and rule of law - was found to be significant in their export

[8] The SYS-GMM involves both level and first-difference equations, with lagged differences and lagged levels serving as instruments for the equations, respectively (Blundell and Bond, 1998). As in Agosin et al. (2012), we chose successively the number of lags according to Hansen's J and second-order autocorrelation tests. This method resulted in the use of the third lagged values as instruments in the estimations.

[9] The insignificance of infrastructure probably results from the inadequate measure: telephone line subscription, which is unlikely to constitute a good infrastructural measure. Agosin et al (2012) also reports the insignificance of this variable, though the result is not included in their tables. However, Adam and Elhiraika (2014) report a significantly negative coefficient for a similar measure of infrastructure for their African sample for 1995-2011, but based on actual telephone lines, rather than on subscriptions, using data from the African Development Indicators. Unfortunately, these data are not available for non-African countries using the World Bank Development Indicators database. Nonetheless, the results were virtually unchanged when the Adam and Elhiraika data were used in the present study for the Africa sample.

diversification/concentration models; meanwhile, the results reported in Agosin et al. (2012) do not include measures for political institutions.

The results pertaining to domestic credit, which is the main interest of the present study, are as expected. Though negative, the coefficient of this variable is insignificant, particularly in models where the interaction with the Africa dummy variable appears (equations G.2, G.4 and G.6). Thus, one cannot reject the null hypothesis that domestic credit does not matter in non-African countries. In contrast, the coefficient of the interaction of domestic credit with the Africa dummy is negative and highly significant, suggesting again that domestic credit is important for African economies, where incidentally export diversification is much lower (positive and large significant coefficient of the Africa dummy variable, AF), even if domestic credit does not seem consequential for the more developed countries.

Models A.1- A.3 in Table 2 restrict the estimation to the Africa subsample. It is apparent from these results that domestic credit is among the five significant covariates, the other four being: initial export diversification index, human capital, being landlocked, and governance (XCONST). The results clearly show domestic credit as exhibiting a significantly negative effect on the export diversification index, XDI, and therefore a positive impact on export diversification (note again that a lower value of the index constitutes a higher value of export diversification!). Thus, this finding is consistent with the above theoretical postulation that liquidity constraint is an important factor in relatively long-term investment decisions, especially in low-income countries of Africa where funding alternatives would be severely limited. The finding is also in line with existing studies that observe that financial resource constraint represents a major bottleneck affecting the development of manufacturing firms (Fox and Oviedo, 2013) and for small and medium scale enterprises (Quartey et al, 2017) in Africa.

The results for the other significant covariates are also consistent with theory. The positive effect of the initial export diversification index implies the persistence of export diversification, pointing to larger long-run than short-run effects. Export diversification also increases with human capital, as measured by years of schooling, while being landlocked tends to reduce export diversification. In addition, a higher constraint on the chief executive branch of government (XCONST) exerts a positive impact on export diversification. This governance result is consistent with prior finding that XCONST exerts a positive impact on economic growth, by attenuating the prevalence of 'policy syndromes' (Fosu, 2013). Interestingly, XCONST is the only covariate that is significant in both the Africa subsample and in the global sample when the Africa dummy variables are introduced into the model.[10]

The above results showing the dominance of domestic credit in the export diversification equation might be influenced by the stylized fact that African countries are generally low-income;[11] the

[10] Interestingly, excluding the domestic credit-Africa dummy from the models, but leaving in the Africa dummy variable, yields highly insignificant coefficients for all covariates, suggesting the crucial nature of the interactive variable.

[11] The sample mean for Africa's per capita GDP is one-seventh that of the world's (appendix table B.1).

income variable has so far not been directly controlled in the regression. Following evidence from Imbs and Wacziarg (2003) and Klinger and Lederman (2004) that the income variable enters the model as a quadratic function, we now include per capita income (in logarithm) and its squared term in the equation.[12] We present these augmented results in table 3.

Tabe 3 about here

Unlike the case of Agosin et al. (2012), but consistent with the results of Imbs and Wacziarg (2003) and Klinger and Lederman (2004), the coefficients of income and its squared term are both generally significant,[13] showing that export diversification increases with income but at a decreasing rate (significantly negative and positive income and squared income coefficients, respectively). More importantly, for gauging robustness, the present results corroborate the finding in table 2 showing dominance of the domestic credit in the export diversification equation, with its pre-eminence for Africa. That is, except for XCONST, the other covariates are insignificant generally when the Africa-domestic credit interactive variable is introduced into the model; meanwhile, this interactive term is significant and displays nearly identical respective coefficients as those in table 2.[14] The DOMCRT coefficients for the Africa sample also remain virtually the same as those in table 2, while also exhibiting significance.

Interestingly, furthermore, there appear to be general improvements in the precision of the estimates, with the infrastructure variable for example now exhibiting better statistical significance, although this precision remains weak when XCONST is accounted for (see A.1 vs. A.2 and A.3 in table 3). Thus, introducing the income terms into the export diversification equation does not change the earlier results showing the dominance of domestic credit for Africa.[15]

[12] The reported results of Agosin et al. (2012) do not include income; however, the authors state that "in general, both terms are not significant and their inclusion does not change the main results presented previously" (pp. 310-311).

[13] For the global sample, the significance occurs only in equations G.1, G.3 and G.5, where the Africa dummy variables are omitted, due likely to the tendency of per capita income to be lower in African countries. For the Africa sample, the income terms are significant in the more fully specified equations A.2 and A.3.

[14] Note, however, that the precision of the coefficient decreases somewhat for the interactive variable, as to be expected, since this variable is correlated with the income terms.

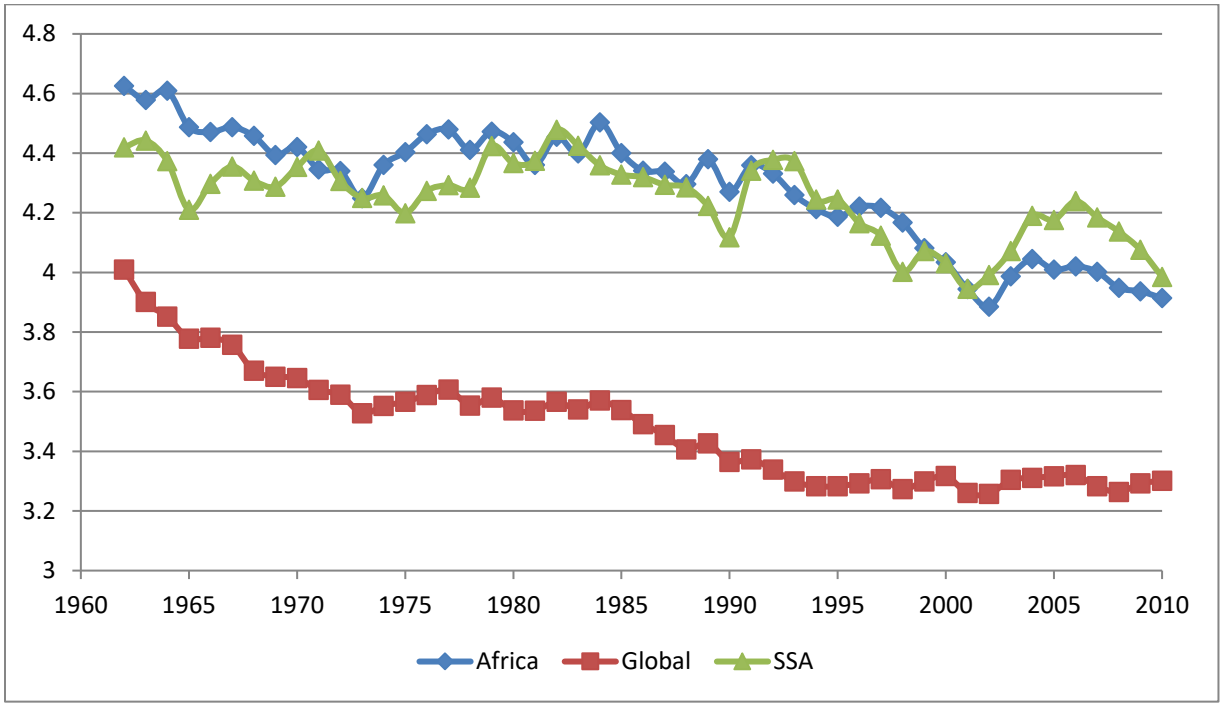
[15] Following a suggestion by a reviewer, the export diversification equation is also estimated with controls for country and time fixed effects. The results are reported as a supplementary table in appendix C. Perhaps not surprisingly, the results are not as sound, as this estimating method is not suitable for dynamic panels; indeed, the human capital variable and XCONST are now insignificant, while 'landlocked' has the wrong sign. Interestingly, though, DOMCRT continues to maintain its dominance for Africa. We further experimented with a specification that does not include the initial value of the XDI, but the results are similar (available upon request).

6. Conclusion

The present study has analyzed particularly the role of domestic credit in promoting export diversification for Africa, but situated in a global setting. Based on SYS-GMM estimation of export-diversification-index models of a 1962-2010 five-year panel, we find that domestic credit significantly improves export diversification in Africa, while its impact in non-Africa is insignificant. Furthermore, once the Africa region is appropriately controlled for, the global evidence on the traditional variables becomes weak, suggesting that the importance of these variables might be predominantly the result of conditions prevailing in less developed countries. The only exception in this regard appears to be the case of governance, as represented by constraint on the chief executive branch of government (XCONST). The effect of this variable seems robust for both Africa and the global sample, with XCONST positively influencing export diversification, not only in Africa but also elsewhere.

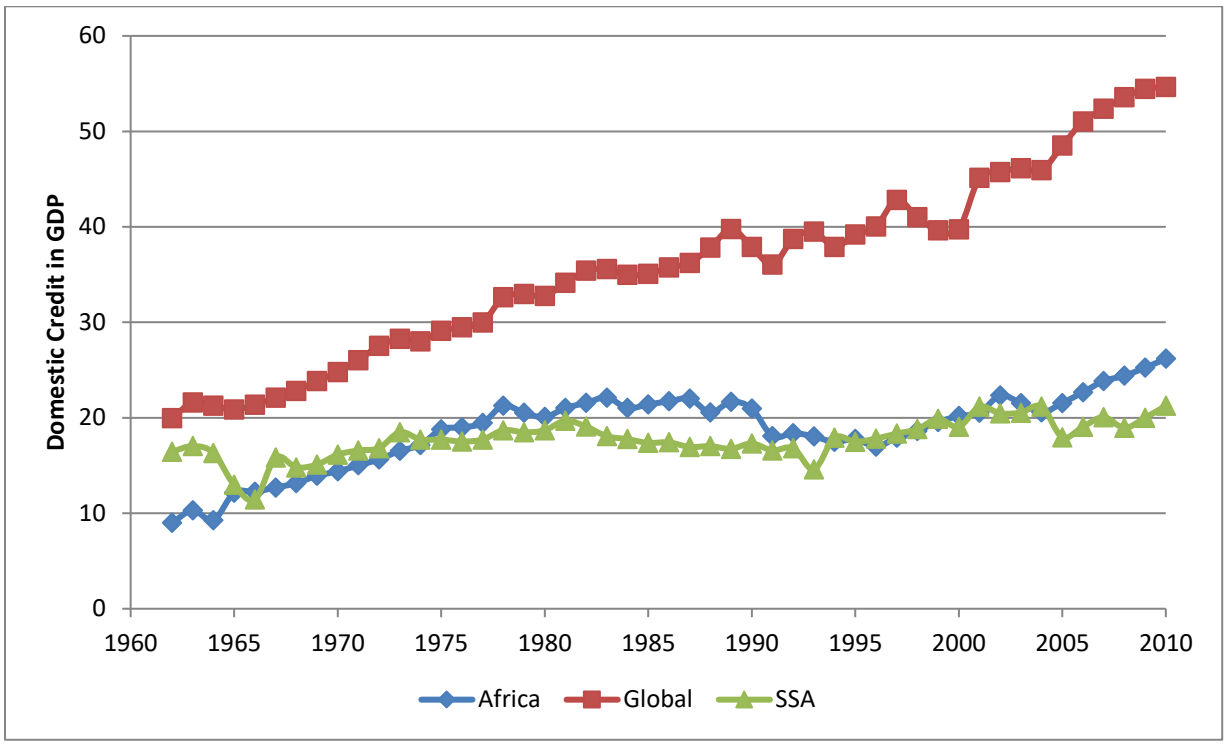
The present finding for domestic credit echoes the need for African countries to encourage policies aimed at deepening the financial markets and ensuring proper allocation of financial resources to the real economy, that is, if Africa's goal to close the global gap in export diversification is to be achieved. The results also point to the importance of human capital and governance in this regard. Although the significance of the infrastructure variable is weak, especially when XCONST is additionally accounted for, this outcome may be the result of an inadequate measure of the actual infrastructural constraint faced by African countries. Such inadequacy also points to the need to ensure that there is improved data for this potentially important constraint for export diversification, as well as for the other covariates. For now, though, ensuring access to sufficient domestic credit for potential investors engaged in export diversification appears to be a policy in the right direction.

Figure 1: Evolution of Export Diversification (XDI) in Africa, compared to the World, 1962-2010



Notes: Based on the sample countries, with data from the IMF XDI database (see appendix table B2 for details). A *higher* value of the index indicates a *lower* level of export diversification.

Figure 2: Evolution of Domestic Credit to the Private Sector in Africa, Compared to the World (% GDP), 1962-2010



Notes: Based on sample countries, with data from World Bank database (see appendix table B2 for details).

Table 1: Progress on Export Diversification in Africa - Changes in the Export Diversification Index (with negative values indicating increased diversification).

Rank	Country	ΔXDI (1962-2010)	Rank	Country	ΔXDI (1991-2010)
1	Egypt	-1.90	1	Uganda	-2.92
2	Zimbabwe	-1.82	2	Burundi	-1.49
3	Mali	-1.32	3	Gambia	-1.35
4	Niger	-1.28	4	Mali	-1.32
5	Senegal	-1.27	5	Rwanda	-1.23
6	Liberia	-0.84	6	Sierra Leone	-1.20
7	Benin	-0.71	7	Egypt	-1.193
8	Togo	-0.69	8	Benin	-0.97
9	Sudan	-0.53	9	Zambia	-0.83
10	Ghana	-0.52	10	Mauritius	-0.82
11	Morocco	-0.29	11	Togo	-0.69
12	Mauritania	-0.18	12	Malawi	-0.63
13	Mozambique	-0.12	13	Tanzania	-0.45
14	South Africa	-0.09	14	Kenya	-0.45
15	Burundi	-0.08	15	Senegal	-0.43
16	Libya	-0.02	16	CAR	-0.31
17	Gambia	-0.01	17	Cameroon	-0.25
18	Gabon	0.01	18	Morocco	-0.24
19	Uganda	0.03	19	South Africa	-0.18
20	Mauritius	0.10	20	Gabon	-0.08
21	Sierra Leone	0.42	21	Mauritania	-0.08
22	CAR	0.45	22	Liberia	-0.04
23	Kenya	0.55	23	Ghana	-0.03
24	Cameroon	0.63	24	Niger	0.08
25	Algeria	0.81	25	Zimbabwe	0.11
26	Malawi		26	Libya	0.24
27	Rwanda		27	Algeria	0.69
28	Tanzania		28	Mozambique	1.32
29	Zambia		29	Sudan	1.82

Notes: Based on data from IMF database (see appendix table B2 for details); empty cells imply missing data for both periods 1962 and 2010

Table 2: Determinants of export diversification based on Two-Step System GMM: Africa vs. Global, 1962-2010

VARIABLES	(G.1) XDI	(G.2) XDI	(G.3) XDI	(G.4) XDI	(G.5) XDI	(G.6) XDI	(A.1) XDI	(A.2) XDI	(A.3) XDI
	Global					.	Africa		.
Initial XDI	0.566***	0.495***	0.553***	0.485***	0.558***	0.481***	0.567***	0.504***	0.461**
	(3.97)	(4.14)	(5.37)	(5.93)	(5.53)	(6.15)	(4.00)	(3.36)	(2.09)
Openness	-0.002	-0.000	-0.000	0.001	-0.000	0.001	0.006	0.009*	0.010
	(-0.32)	(-0.04)	(-0.00)	(0.25)	(-0.07)	(0.26)	(1.14)	(1.69)	(1.64)
Human capital	-0.331***	-0.119	-0.190**	-0.049	-0.172*	-0.035	-0.285***	-0.252***	-0.269***
	(-3.63)	(-0.94)	(-2.19)	(-0.41)	(-1.78)	(-0.29)	(-3.14)	(-2.77)	(-2.77)
Landlocked	0.419**	0.169	0.416**	0.227	0.420**	0.240	0.320*	0.378**	0.395*
	(2.15)	(0.77)	(2.40)	(1.00)	(2.43)	(1.06)	(1.76)	(2.03)	(1.91)
DOMCRT	-0.006	-0.004	-0.008**	-0.005	-0.008**	-0.005	-0.012**	-0.013**	-0.013*
	(-1.22)	(-0.99)	(-2.07)	(-1.38)	(-2.05)	(-1.35)	(-2.50)	(-2.37)	(-1.95)
ΔTOT	0.002	0.001	0.001	0.001	-0.000	-0.001	-0.000	-0.000	0.001
	(1.30)	(0.68)	(1.10)	(1.12)	(-0.13)	(-0.30)	(-0.22)	(-0.10)	(0.20)
Infrastructure	0.002	-0.001	0.008	0.003	0.008	0.003	-0.016	-0.004	-0.002
	(0.37)	(-0.20)	(1.43)	(0.47)	(1.42)	(0.45)	(-0.84)	(-0.28)	(-0.09)
DOMCRT*AF		-0.017***		-0.013**		-0.013**			
		(-2.79)		(-2.19)		(-2.13)			
AF		0.902***		0.718***		0.715***			
		(3.28)		(2.84)		(2.78)			
XCONST			-0.108***	-0.086***	-0.109***	-0.086***		-0.093***	-0.093***
			(-4.24)	(-3.54)	(-4.28)	(-3.53)		(-3.23)	(-2.94)
Human capital*ΔTOT					0.001	0.001			-0.001
					(0.52)	(0.63)			(-0.27)
Constant	1.915***	1.512***	2.153***	1.793***	2.117***	1.781***	1.801***	2.195***	2.385**
	(4.04)	(3.60)	(6.39)	(5.29)	(6.26)	(5.24)	(3.62)	(3.64)	(2.48)
Observations	358	358	355	355	355	355	157	156	156
Number of countries	78	78	78	78	78	78	29	29	29
No. of instruments	28	40	29	41	30	42	28	29	30

AR1 p-value	0.015	0.010	0.028	0.015	0.029	0.017	0.184	0.206	0.216
AR2 p-value	0.284	0.283	0.123	0.157	0.133	0.169	0.468	0.376	0.345
Hansen p-value	0.137	0.167	0.193	0.272	0.184	0.243	0.700	0.630	0.633

Robust z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.10

AF is an African country dummy and equal 1 if the country is African and zero otherwise. Refer to appendix Table B.2 for detailed definitions and data sources for variables.

Table 3: Determinants of export diversification based on Two-Step System GMM: Africa vs. Global, 1962-2010 (including per capita income covariates)

VARIABLES	(G.1) XDI	(G.2) XDI	(G.3) XDI	(G.4) XDI	(G.5) XDI	(G.6) XDI	(A.1) XDI	(A.2) XDI	(A.3) XDI
	Global					.	Africa		.
Initial XDI	0.705***	0.629***	0.646***	0.622***	0.643***	0.618***	0.609***	0.549***	0.390*
	(7.01)	(5.67)	(8.62)	(7.89)	(8.84)	(7.59)	(4.02)	(3.85)	(1.76)
Openness	-0.003	-0.001	0.002	0.002	0.002	0.002	0.005	0.006	0.006
	(-0.64)	(-0.33)	(0.53)	(0.54)	(0.44)	(0.58)	(0.71)	(1.48)	(1.44)
Human capital	-0.355***	-0.223**	-0.256***	-0.155*	-0.255***	-0.150	-0.435***	-0.396***	-0.637**
	(-4.39)	(-2.22)	(-3.53)	(-1.70)	(-3.46)	(-1.64)	(-4.48)	(-4.25)	(-2.39)
Landlocked	0.195	0.181	0.215	0.149	0.207	0.148	0.440*	0.365*	0.376**
	(0.96)	(0.80)	(1.10)	(0.68)	(1.08)	(0.67)	(1.82)	(1.79)	(1.98)
DOMCRT	-0.005*	-0.002	-0.005**	-0.003	-0.005**	-0.003	-0.013***	-0.011**	-0.015**
	(-1.65)	(-0.67)	(-2.12)	(-1.01)	(-2.18)	(-1.03)	(-2.59)	(-2.10)	(-2.19)
ΔTOT	0.001	0.001	0.001	0.001	-0.002	-0.001	-0.000	-0.000	0.002
	(1.07)	(0.75)	(0.72)	(1.05)	(-0.57)	(-0.51)	(-0.15)	(-0.19)	(0.54)
Infrastructure	-0.027**	-0.018*	-0.023**	-0.016*	-0.023**	-0.017*	-0.051***	-0.040*	-0.025
	(-2.26)	(-1.65)	(-2.37)	(-1.82)	(-2.44)	(-1.92)	(-2.89)	(-1.81)	(-0.87)
DOMCRT*AF		-0.017**		-0.012*		-0.012*			
		(-2.30)		(-1.69)		(-1.77)			
AF		0.956***		0.671**		0.651**			
		(3.23)		(2.14)		(2.17)			
XCONST			-0.072***	-0.074***	-0.072***	-0.074***		-0.077***	-0.065**
			(-3.26)	(-3.67)	(-3.24)	(-3.53)		(-3.06)	(-2.37)
Human capital*ΔTOT					0.000	0.000			-0.000
					(1.00)	(1.05)			(-0.68)
GDP pc (in logs)	-2.111***	-0.539	-2.166***	-1.063	-2.125***	-1.073	-1.207	-2.466*	-3.394**
	(-3.30)	(-0.63)	(-4.26)	(-1.28)	(-4.06)	(-1.33)	(-0.81)	(-1.73)	(-2.02)
Squared GDP pc (in logs)	0.154***	0.051	0.154***	0.082	0.152***	0.082	0.115	0.196**	0.263**
	(3.26)	(0.86)	(4.19)	(1.47)	(4.02)	(1.50)	(1.10)	(1.97)	(2.21)

Constant	8.569***	2.363	9.101***	4.669	8.961***	4.726	4.895	9.899**	14.061**
	(3.89)	(0.77)	(5.21)	(1.53)	(5.00)	(1.61)	(0.93)	(1.97)	(2.14)
Observations	356	356	353	353	353	353	157	156	156
Number of countries	78	78	78	78	78	78	29	29	29
No. of instruments	30	42	31	43	32	44	30	31	32
AR1 p-value	0.021	0.023	0.024	0.026	0.028	0.030	0.237	0.189	0.190
AR2 p-value	0.129	0.154	0.118	0.119	0.127	0.127	0.383	0.361	0.312
Hansen p-value	0.266	0.297	0.454	0.500	0.483	0.520	0.781	0.772	0.911

Robust z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.10

AF is an African country dummy and equal 1 if the country is African and zero otherwise. Refer to appendix Table B.2 for detailed definitions and data sources for variables.

Appendices

Appendix A: Measurement of the Export Diversification Index (EDI)

"We calculate the overall, intensive (within), and extensive (between) Theil indices following the definitions and methods used in Cadot et al. (2011). We first create dummy variables to define each product as "Traditional," "New," or "Non-traded." Traditional products are goods that were exported at the beginning of the sample, and non-traded goods have zero exports for the entire sample. Thus, for each country and product, the dummy values for traditional and non-traded remain constant across all years of our sample. For each country/year/product group, products classified as "new" must have been non-traded in at least the two previous years and then exported in the two following years. Thus, the dummy values for new products may change over time.

The overall Theil index is the sum of the intensive and extensive components. The extensive Theil index is calculated for each country/year pair as:

$$T_B = \Sigma_k (N_k/N) (\mu_k/\mu) \ln(\mu_k/\mu),$$

where k represents each group (traditional, new, and non-traded), N_k is the total number of products exported in each group, and μ_k/μ is the relative mean of exports in each group.
The intensive Theil index for each country/year pair is:

$$T_W = \Sigma_k (N_k/N) (\mu_k/\mu) \{(1/N_k) \Sigma_{i \in Ik} (x_i/\mu_k) \ln(x_i/\mu_k)\}.$$

where x represents export value." (IMF, 2018; accessed at: https://www.imf.org/external/datamapper/Technical%20Appendix%20for%20Export%20Diversification%20database.pdf)

Appendix B

Table B1: Summary Statistics: Global Vs. Africa, 1962-2010

Variable		**Mean**		**Std. Dev.**		**Observations**	
		Global	Africa	Global	Africa	Global	Africa
XDI	overall	3.49	4.29	1.26	.94	N = 796	N = 290
	between			1.18	.81	n = 80	n = 29
	within			.49	.49	T-bar = 9.95	T = 10
XCONST	overall	4.26	2.94	2.35	1.90	N =785	N = 284
	between			1.83	1.33	n = 80	n = 29
	within			1.48	1.38	T-bar =9.81	T-bar=9.79
Openness	overall	47.90	49.11	33.89	41.35	N = 760	N = 272
	between			26.30	29.02	n = 80	n = 29
	within			21.06	29.42	T-bar =9.5	T-bar=9.38
DOMCRT	overall	35.90	19.04	34.75	19.86	N =742	N = 262
	between			28.55	16.66	n =80	n = 29
	within			19.58	10.48	T-bar = 9.28	T-bar=9.03
Landlocked	overall	.15	.28	.36	.45	N =800	N = 290
	between			.36	.45	n =80	n = 29
	within			0	0	T =10	T = 10
Infrastructure	overall	11.46	1.71	16.89	3.81	N =755	N = 270
	between			14.80	2.76	n =80	n = 29
	within			7.76	2.69	T-bar =9.44	T-bar=9.31
Human capital	overall	1.44	.93	.84	.82	N =799	N = 290
	between			.71	.64	n =80	n = 29
	within			.45	.53	T-bar = 9.99	T = 10
ΔTOT	overall	-3.91	-4.69	28.15	33.21	N =372	N = 161
	between			13.70	14.80	n =80	n = 29
	within			25.26	30.33	T-bar = 4.65	T-bar=5.55
GDP per capita	overall	7254.06	1164.28	11588.95	1789.21	N =746	N=265

	between			10628.79	1988.00	n =80	N=29
	within			4232.802	450.17	T-bar = 9.33	T-bar=9.14

Table B2: Definitions and sources of data

VARIABLES	DEFINITION	Units	SOURCES
XDI	Export diversification Index	Index	**IMF, UN-NBER database[d]**
DOMCRT	Domestic credit provided to the private sector by financial corporations (including the monetary authorities and deposit money banks) and mandate a claim for repayment	Percentage of GDP	**World Bank, World Development Indicators (2016)[C]**
Human capital	The average years of total schooling of individual ages 15+	Years of schooling in logs	**Barro and Lee (2017)[b]**
Change Terms of Trade (ΔTOT)	Export price divided by import prices	Index (2000=100)	**World Bank, World Development Indicators (2016)[C]**
Openness	Sum of exports and imports	Percentage of GDP	**World Bank, World Development Indicators (2016)[C]**
XCONST	Measures the degree of constraints on the government executive	Scale ranging from 0-7. With 7 for 'strict rules for governance', 1 for 'no one regulates the authority', and 0 for 'perfect incoherence'.	**Polity IV dataset (2017)**
Infrastructure	Fixed telephone subscription (per 100 people)	Fixed Telephone subscription (per 100 people)	**World Bank, World Development Indicators – WDI - (2016)[c]**
Landlocked	Dummy for landlocked countries	1 if a country is landlocked, zero otherwise .	**Wikipedia[e]**
GDP per capita	GDP per capita (constant 2005 US$)	Constant 2005 US$	**WDI (2016)[c]**

[a]http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=120
[b]http://www.barrolee.com/data/full1_old.htm
[c]http://databank.worldbank.org/data/reports.aspx?source=2&series=SL.EMP.TOTL.SP.ZS&country=#
[d]https://www.imf.org/external/np/res/dfidimf/diversification.htm
[e]https://en.wikipedia.org/wiki/Landlocked_country

Table B3: List of African Countries Included in the Sample

Algeria, Benin, Burundi, Central Africa Republic, Cameroon, Egypt Arab Rep., Gabon, Gambia, Ghana, Kenya, Liberia, Libya, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Niger, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe

Table B4: List of Non-African Developing Countries Included in the Sample

Albania, Argentina, Bangladesh, Bolivia, Brazil, China, Colombia, Costa Rica, Dominican Republic, El Salvador, Fiji, Guatemala, Guyana, Haiti, Honduras, Indonesia, Iran, Islamic Rep., Iraq, Jamaica, Mexico, Malaysia, Nicaragua, Nepal, Pakistan, Panama, Peru, Philippines, Paraguay, Sri Lanka, Thailand, Turkey, Venezuela, Yemen

Table B5: List of Advanced Countries Included in the Sample

Australia, Austria, Belgium, Canada, Chile, Denmark, Finland, France, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Spain, Sweden, United States

Appendix C – Supplementary Table

Pooled OLS Results with Time and Country Fixed Effects (with GDP per capita controlled for)

VARIABLES	(G.1) XDI	(G.2) XDI	(G.3) XDI	(G.4) XDI	(G.5) XDI	(G.6) XDI	(A.1) XDI	(A.2) XDI	(A.3) XDI
	Global					.	Africa		.
Initial XDI	0.442	0.402	0.450	0.685***	0.439	0.696***	0.752***	0.689***	0.689***
	(1.15)	(1.08)	(1.16)	(2.70)	(1.15)	(2.81)	(4.41)	(3.50)	(3.50)
Openness	0.006***	0.005**	0.006***	0.006**	0.006***	0.006**	0.009**	0.009**	0.009**
	(2.71)	(2.52)	(2.76)	(2.57)	(2.72)	(2.53)	(2.01)	(2.10)	(2.09)
Human capital	0.113	0.179	0.125	0.189	0.180	0.248	0.187	0.214	0.215
	(0.53)	(0.85)	(0.58)	(0.88)	(0.79)	(1.09)	(0.63)	(0.71)	(0.61)
Landlocked	-1.006**	-1.173**	-1.071**	-0.629	-1.106**	-0.616	0.473	1.995	1.124
	(-1.99)	(-2.28)	(-2.15)	(-0.92)	(-2.20)	(-0.92)	(0.40)	(1.40)	(0.82)
DOMCRT	-0.002	0.001	-0.003	0.000	-0.002	0.001	-0.007**	-0.007**	-0.007**
	(-1.43)	(0.39)	(-1.52)	(0.24)	(-1.41)	(0.35)	(-2.12)	(-2.17)	(-2.16)
ΔTOT	0.001	0.001	0.001	0.001	-0.002	-0.002	0.001	0.001	0.001
	(0.80)	(0.72)	(0.79)	(0.71)	(-0.58)	(-0.66)	(0.87)	(0.82)	(0.25)
Infrastructure	0.006	0.009	0.005	0.008	0.004	0.008	-0.042	-0.048	-0.048
	(0.65)	(1.07)	(0.53)	(0.95)	(0.49)	(0.93)	(-1.26)	(-1.39)	(-1.40)
DOMCRT*AF		-0.009**		-0.009**		-0.009**			
		(-2.47)		(-2.47)		(-2.49)			
AF		0.429		0.484		0.402			
		(0.66)		(1.23)		(1.02)			
XCONST			-0.017	-0.018	-0.016	-0.018		-0.020	-0.020
			(-0.93)	(-1.00)	(-0.92)	(-0.99)		(-0.64)	(-0.64)
Human capital*ΔTOT					0.001	0.001			0.000
					(0.98)	(1.04)			(0.02)
GDP pc (in log)	-1.090	-0.861	-1.228	-0.994	-1.115	-0.871	-4.619*	-5.148**	-5.148**
	(-0.92)	(-0.77)	(-1.04)	(-0.88)	(-0.96)	(-0.79)	(-1.84)	(-2.00)	(-1.99)
Squared GDP pc (in log)	0.064	0.044	0.074	0.054	0.066	0.045	0.361*	0.402*	0.402*
	(0.79)	(0.57)	(0.90)	(0.69)	(0.83)	(0.60)	(1.82)	(1.97)	(1.96)
Constant	5.509	4.992	6.569*	5.055	6.191	4.558	13.889*	15.191*	15.184*

	(1.43)	(1.36)	(1.70)	(1.26)	(1.62)	(1.16)	(1.75)	(1.90)	(1.89)
Observations	356	356	353	353	353	353	157	156	156
R-Squared	0.903	0.905	0.902	0.904	0.903	0.904	0.811	0.813	0.813
Adjusted R-Squared	0.871	0.873	0.868	0.870	0.869	0.871	0.745	0.745	0.743
SEE	0.400	0.398	0.402	0.399	0.402	0.399	0.486	0.487	0.489

Robust t-statistics in parentheses*** p<0.01, ** p<0.05, * p<0.1

Notes: See appendix B

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