Economic Diversification in Low-Income Countries: Stylized Facts

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Abstract

Limited diversification in exports and the broader structure of the economy has been an underlying characteristic of many LICs. Concentration in sectors with limited scope for productivity growth and quality upgrading, such as primary commodities, may result in less broad-based and sustainable growth. Moreover, lack of diversification may increase exposure to adverse external shocks and macroeconomic instability. This note seeks to shed more light on the role of diversification in the macroeconomic performance of LICs by considering diversification not just in trade, but also in the broader domestic economy. Using cross-country data and case studies the note reviews and extends the evidence from the existing literature and ongoing IMF work that point to diversification as a crucial aspect of the development process. Diversification involves significant changes in both the type and quality of goods produced and exported. However, there are major differences across regions and countries in the degree to which they have succeeded in carrying out such economic transformation. Increases in diversification have been associated with lower volatility and higher growth, especially after 1995 and in LICs with better institutions. This evidence makes the case for further analytical work to inform the policy debate on how diversification can help LICs enhance their macroeconomic performance, and on what factors can spur or, alternatively, impede diversification in LICs.

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I. INTRODUCTION

Little is known about how diversification is linked to growth and macroeconomic stability in LICs. Most low-income countries (LICs)[2] have historically been heavily dependent for the bulk of their export earnings on a narrow range of traditional primary products and few export markets. A key concern is that such limited diversification, reflecting a broad range of market and government failures, may result in less broad-based and sustainable growth, with production and exports concentrated in sectors characterized by low technology spillovers and limited opportunities for productivity growth or quality upgrading. Moreover, lack of diversification may increase exposure to adverse external shocks and vulnerability to macroeconomic instability. While diversification is a longstanding ambition of many LICs, experience is limited with regard to which aspects of diversification are important, what drives it, and how to promote it without resorting to the risky and often counterproductive practice of ‘picking winners’.

Recent analytical work suggests diversification is closely related to the early stages of the development process. This work is primarily based on case studies and suggests that the early stages of development are accompanied by significant changes in the nature of LICs’ trade, in terms of both their traded products and their trading partners (Gaertner and Papageorgiou, 2011, and IMF, 2011). In addition, Imbs and Wacziarg (2003) document that higher incomes per capita are associated first with diversification, and then with re-concentration, in production and employment. Cadot et al. (2011) argue that this pattern “… is an inherent feature of the economic development process”. This nonlinearity in the diversification process suggests that it is important not just to examine the process as a whole, but also to consider separately LICs, middle-income countries (MICs), and advanced economies.

In the early stages of development, diversification is also intimately related to structural transformation. Both theory and evidence indicate that economic development ultimately involves structural transformation—that is, the continued, dynamic reallocation of resources from less productive to more productive sectors and activities (this literature has recently been reignited by McMillan and Rodrik, 2011, and Lin, 2012). Prime examples are the development experiences of the East Asian Tigers and Tiger Cubs in the 1970s and 1980s, and many ex-Soviet bloc economies in the 1990s, as they transformed from relatively agrarian economies towards manufacturing. LICs still remain largely specialized in agriculture and other resource-based activities with limited potential for quality upgrading. In their case, structural transformation will inevitably involve diversification, both in terms of domestic production and, given small domestic market size, external trade.

The two main goals of this note are to review and extend existing work on diversification and motivate further analysis from a macroeconomic perspective. First, the note reviews the evidence from both the existing literature and ongoing IMF work that points to diversification as an important aspect of the development process in developing countries. It extends existing analysis by considering diversification not just in external trade, but also in the broader domestic economy, using a new internal IMF database. Second, the note argues that further analytical work on diversification is needed to inform the policy debate on how diversification can help LICs enhance their macroeconomic stability and resilience to shocks, and promote a transition to

[2] Throughout, we use the World Bank classification for LICs.

higher and more sustained growth. While the note touches on some of the possible policy implications, its primary focus is to establish a set of stylized facts that can underpin future analytical and policy work.

The note examines diversification from a cross-country as well as case study perspective, before linking it to growth and volatility. Section II discusses data and measurement. Section III then examines broad cross-country patterns of diversification by income and geographic groups, covering both external trade and real-sector diversification, and documenting both historical and more recent trends. Section IV covers quality upgrading, through which countries may leverage the revenue potential of already existing exports. Section V complements this analysis by case studies, highlighting both patterns of diversification in selected LICs and some important lessons from successfully diversified middle-income economies. Finally, Sections VI and VII focus on the links between diversification on the one hand, and volatility and growth on the other.

II. How is Diversification Measured

Measures of economic diversification need to look beyond trade, to capture domestic sector diversification and the underlying dynamic process of structural transformation. *Trade diversification* and *domestic diversification* are in principle interlinked, the former reflecting diversification in the external sector and the latter capturing diversification in the domestic production process across sectors. An underlying theme of this note is that focusing on the entire structure of production paints a more comprehensive and illuminating picture. Therefore, the two dimensions of diversification are evaluated simultaneously, thus filling a gap in the existing literature which has treated them independently. In addition, the analysis focuses on "diversification spurts", that is, rapid, sustained, significant spells of diversification.

Trade diversification can be achieved along several dimensions. First, diversification may occur across either products or trading partners. Second, product diversification may occur through the introduction of new product lines (the *extensive* margin), or a more balanced mix of existing exports (*intensive* margin). Finally, product-quality upgrading represents a slightly different notion and is evidenced by higher prices for existing exports. The main data source is an updated version of the UN–NBER dataset, which harmonizes COMTRADE bilateral trade flow data at the 4-digit SITC (Rev. 1) level.[3] However, while the existing literature typically focuses on the post–1988 period, this note uses data extending back to 1962. The extended time dimension turns out to be greatly helpful in examining relationships more comprehensively.

Analysis of LICs' domestic diversification required construction of a new IMF dataset. This note examines diversification in sectoral output and the sectoral allocation of labor using data from existing and new sources. Existing datasets include measures of value added for 28 manufacturing sectors, during 1985–2010, from the latest version of UNIDO (3-digit ISIC classification); and labor employment shares in 9 economy-wide sectors, during 1969–2008, from the latest version of ILO (1-digit classification). It is well known, however, that both of these datasets are quite limited in their coverage of LICs. For this reason, a new dataset was

[3] The dataset combines importer- and exporter-reported data from COMTRADE to maximize comprehensiveness, while ensuring internal consistency, using the methodology of Asmundson (forthcoming).

constructed, covering 12 economy-wide sectors during 2000–2010, using country data compiled from IMF desk inputs (see below for further discussion).

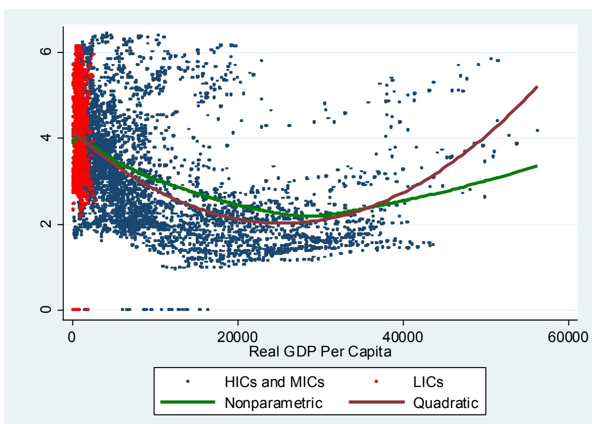
In measuring diversification, the analysis focuses on two main indices. For both the trade and real sector datasets, the analysis considers two main indices of trade and real-sector diversification: the Herfindahl index and the Theil index (see Appendix 1 for precise definitions). While the Herfindahl index is easier conceptually and most popular in the literature, the Theil index has the advantage of being decomposable into diversification along the extensive and intensive margins. For both indices, lower values indicate higher diversification.[4]

III. PATTERNS OF DIVERSIFICATION

Trade Diversification

Higher per capita income is broadly associated with greater trade diversification. This general relationship holds true at least until an economy reaches advanced-economy status (with GDP per capita of $25,000-$30,000; see also Cadot et al., 2011). The relationship is evident in Figure 1, which plots country-year observations, with a lower value of the Theil index signaling higher diversification. It also holds true when the figure is restricted to show the pure cross-sectional or time-series variation; in the latter case, the dataset's extended time dimension is critical to confirming the relationship.[5]

Figure 1. Diversification and Real GDP Per Capita



Source: COMTRADE, Penn World Table 7.0, IMF staff calculations.

However, there is much heterogeneity in diversification levels, even after controlling for income per capita. Two special cases stand out. First, many small states (with population less than 1 million) are relatively undiversified in their production and exports, in light of their narrow resource base, small domestic markets, and significant fixed costs in many activities, particularly

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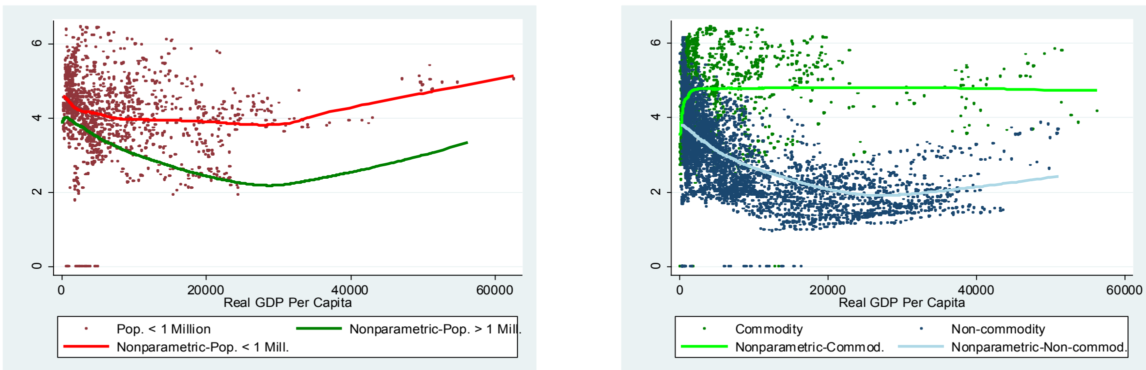
[4] All the measure of diversification considered here will be influenced by changes in commodity prices. It should, however, be noted that we typically examine separately commodity-exporters and other countries. In addition, for many questions, it may not matter whether diversification is driven by changes in prices or in volumes.

[5] These additional figures are not shown. Depicting the time-series variation involves controlling for country fixed effects.

manufacturing (Figure 2; in line with the existing literature, small states are excluded from the rest of the analysis).[6] Second, commodity exporters are, as expected, relatively undiversified. Less obviously, higher incomes are not typically associated with greater diversification for commodity exporters.[7]

Figure 2. Diversification and Real GDP Per Capita

Small States vs. Others | Commodity-Exporters vs. Others

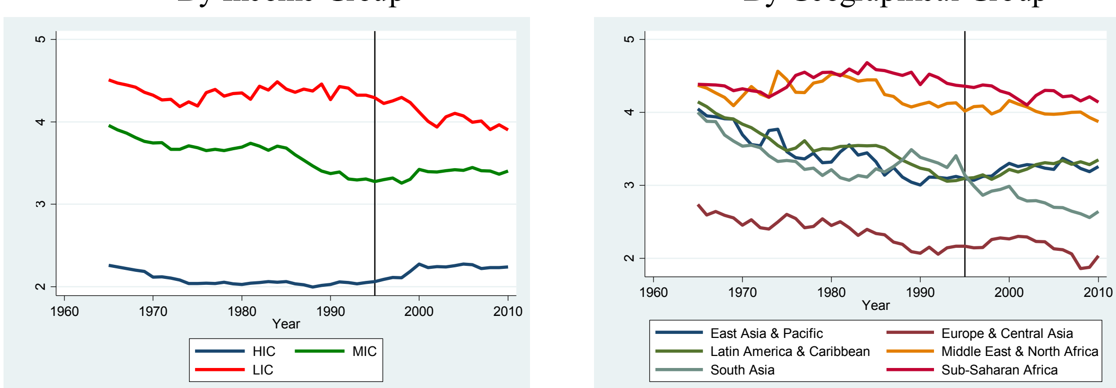


Source: COMTRADE, Penn World Table 7.0, IMF staff calculations.

LICs' diversification took off in the mid–1990s. For an extended period, many LICs, in particular in sub-Saharan Africa (SSA), enjoyed little success in diversifying their exports even when controlling for size, and commodity-exporting status (Figure 3; see also IMF, 2012, for the recent SSA experience with structural transformation). Around 1995, that started to change. Much of the progress has occurred through diversification along the extensive margin, that is, through entry into completely new products (Figure 4).

Figure 3. Diversification over Time

By Income Group | By Geographical Group



Source: COMTRADE, IMF staff calculations.

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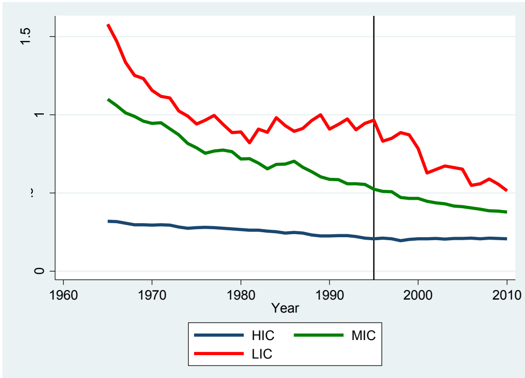
[6] Data limitations restrict our analysis to merchandise exports. If services exports, particularly tourism, could also be evaluated on a bilateral basis, then small states' measured diversification might be higher.

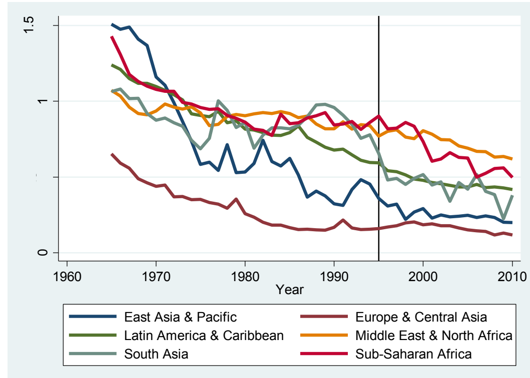
[7] Following the WEO definition, countries are classified as commodity exporters if either fuel or primary commodities are the main source of export earnings. The resulting sample includes 44 commodity producers.

Figure 4. Extensive-Margin Diversification over Time

By Income Group



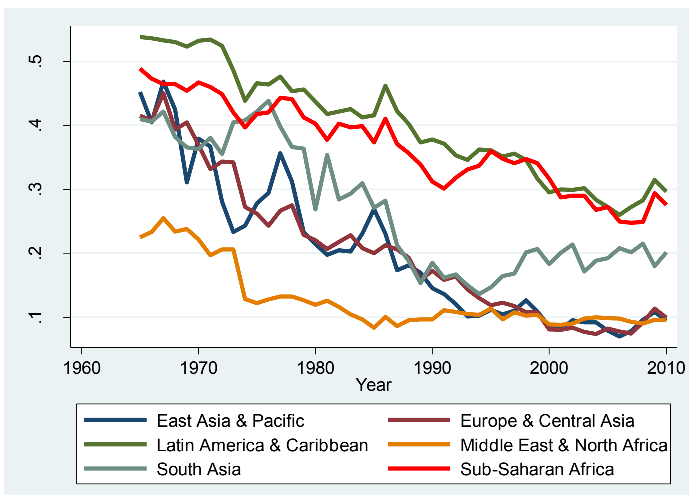
By Geographical Group



Source: COMTRADE, IMF staff calculations.

Diversification in early development typically entails a move away from agriculture. Changes in trade diversification within LICs are broadly paralleled by shifts in the relative importance of agricultural versus manufacturing exports. For instance, East Asia's diversification since the 1960s has been accompanied by a steady decline in the share of agricultural products (Figure 5).

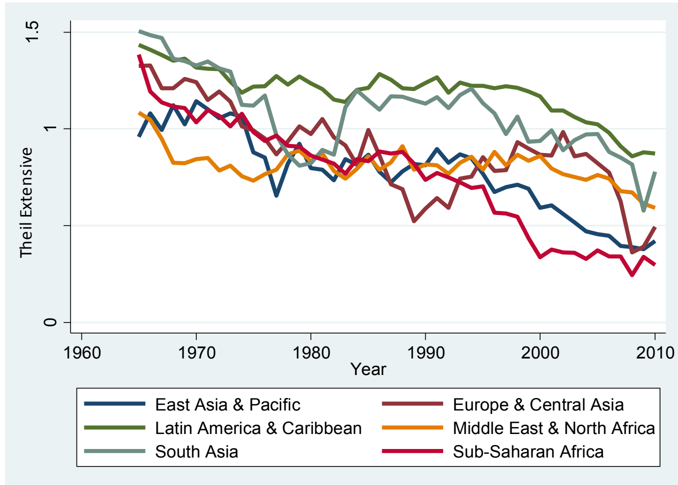
Figure 5. Agricultural Share of Exports over Time



Source: COMTRADE, IMF staff calculations.

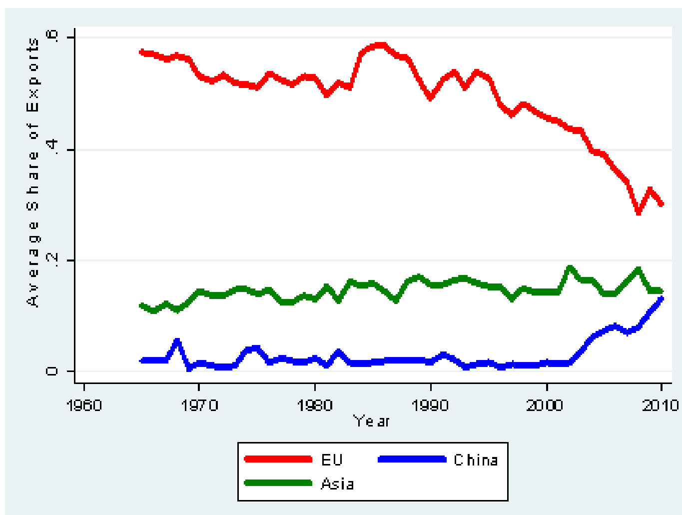
Higher income levels are also associated with increasing diversification across trade partners; at least until advanced-economy status is reached. After 1995, LICs in general, and SSA in particular, have made significant progress in diversifying their exports across partners (Figure 6). The trend is especially clear when considering the extensive margin, with a significant increase in exports to completely new partners. This is related to the ongoing process of globalization and a clear shift in trade away from the EU and towards Asia, and China in particular (Figure 7; see also Samake and Yang, 2011).

Figure 6. Diversification Across Partners over Time



Source: COMTRADE, IMF staff calculations.

Figure 7. Share of LIC exports to E.U. and to China



Source: COMTRADE, IMF staff calculations.

Real Sector Diversification

Existing measures of real-sector diversification suffer from significant problems. Those based on UNIDO output data only cover agriculture and manufacturing, disregarding services. Measures based on ILO employment data often cover only a small fraction of the workforce and relatively few LICs; in addition, ILO employment data for LICs suffer from serious quality issues.[8]

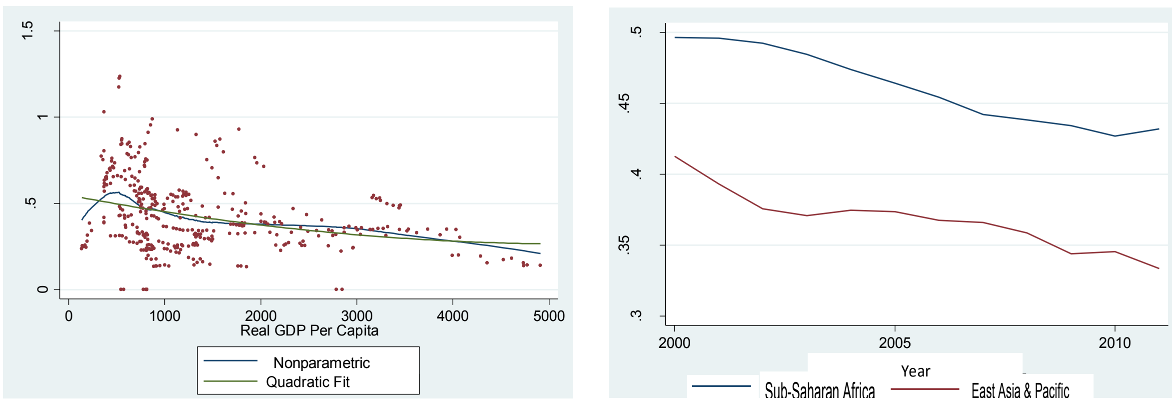
To redress these gaps in both sectoral and LIC coverage, a new IMF dataset was built. The dataset is based on IMF desk inputs, providing information on value added in 12 economy-wide sectors in over 50 LICs and MICs in Africa and East Asia and the Pacific during 2000–2010 (see

[8] In particular, reported employment change considerably over time as different types of surveys are merged.

Appendix 2 for data coverage; this dataset builds on the U.N. Statistics Division 7-sector output breakdown). This new dataset again underpins the notion that, within developing countries, greater income per capita is associated with greater real-sector diversification (Figure 8). During the 2000s, both SSA and Asia witnessed significant diversification, although Asia started from a higher level.

Figure 8. Real-Sector Diversification

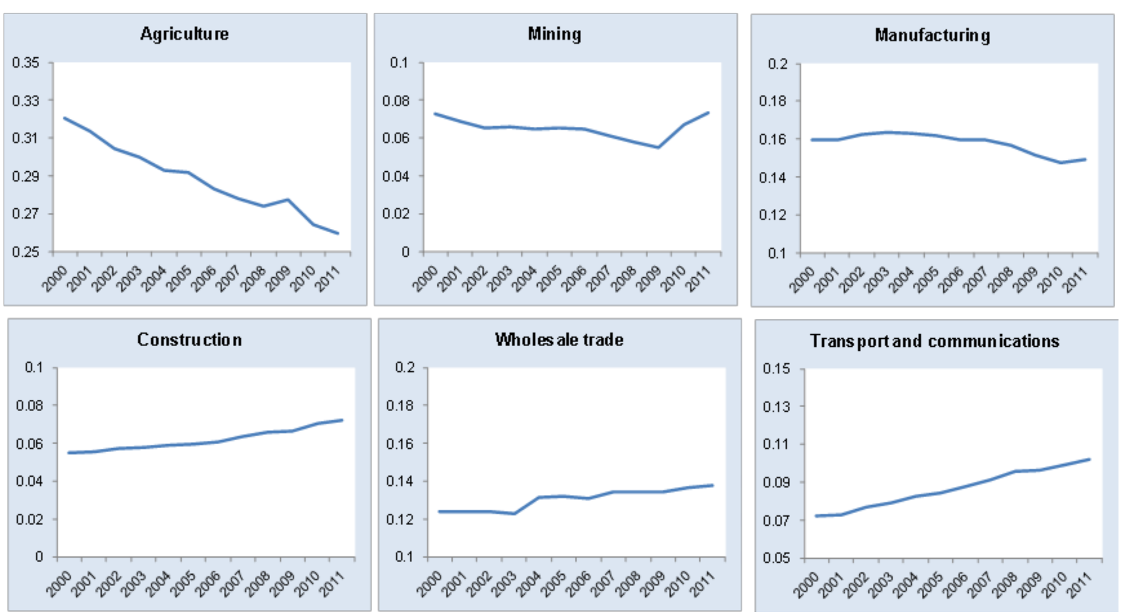
Diversification and GDP | Diversification over Time



Source: IMF internal data, IMF staff calculations.

Over the past decade the share of agriculture in output has declined significantly. This result holds both across all countries and (not shown) in LICs alone. Analysis of 6 key sectors shows that the gap has been filled largely by non-tradables such as construction, wholesale trade, and transportation, rather than by manufacturing (Figure 9).

Figure 9. Share of GDP in Six Real Sectors



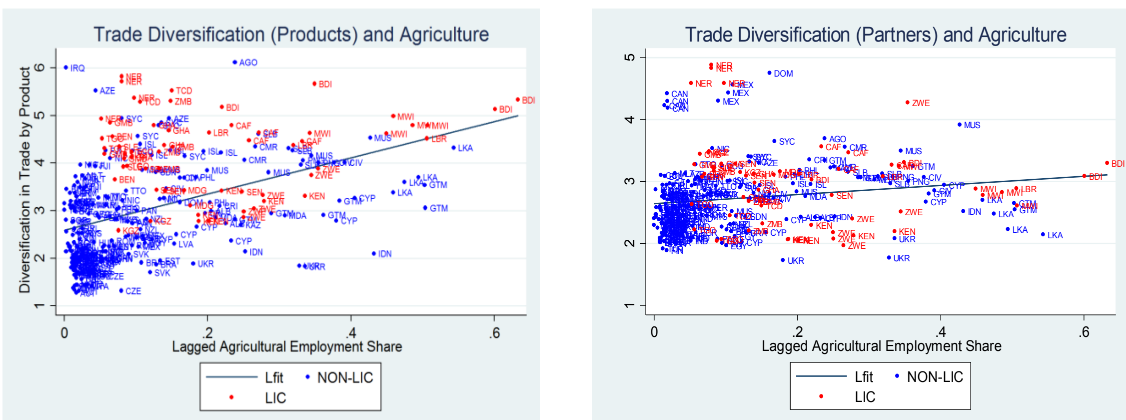
Source: IMF internal data, IMF staff calculations.

Again, there is significant cross-country variation, both in the magnitude of the resource shift out of agriculture, and in the precise identity of the sectors that have expanded in its place. Related to this, Ndulu et al. (2007) have argued that geography matters significantly, and that in SSA the resource-rich countries, the coastal non-resource-rich countries, and the land-locked non-resource-rich countries may all need different growth models. In particular, coastal countries have more potential to expand manufactured exports to partners outside the region, provided there is sufficient policy support. Other countries may be able to move directly from agriculture to services, without focusing on manufacturing, as happened in India. Put differently, one size may not fit all. The case studies below highlight the role of such heterogeneities.

Trade diversification increases as economies diversify their production out of agriculture. This result holds for both LICs and other developing countries, and regardless of whether one focuses on the agricultural share in employment or in output. However, the relationship is much stronger for diversification in traded products than in trading partners (Figure 10). This link between trade diversification and broader structural transformation is what would be expected, in a world where most goods are tradable. That said, the case studies below illustrate that, when significant production diversification occurs within non-tradables, it is also possible to observe significant structural transformation with little change in export baskets.

Figure 10. Trade Diversification and Lagged Agricultural Employment Share

Diversification in Products — Diversification in Partners



Source: IMF internal data, IMF staff calculations.

IV. Quality Upgrading

Development and structural transformation crucially involves changes in the quality levels of goods produced, in addition to those in the product mix. Producing higher quality varieties of existing products can constitute a way of building on existing comparative advantages. It can boost countries' export revenue potential through the use of more physical- and human-capital intensive production techniques.[9] Yet the potential for quality upgrading, that is, the length of a product's quality ladder, varies by product (Khandelwal, 2010; Schott, 2004). Agricultural and

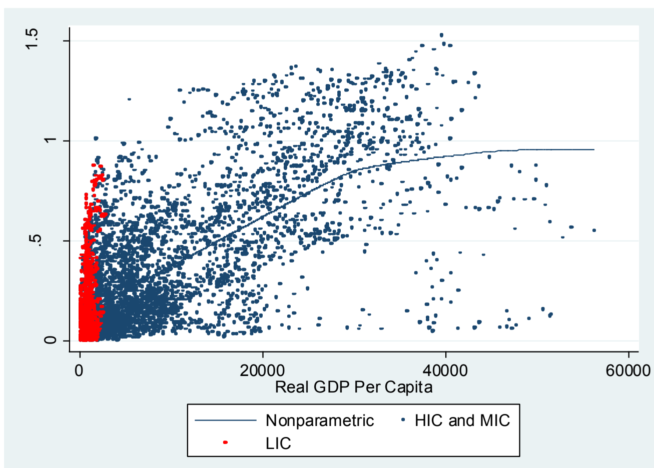
[9] Schott (2004) shows that within-product quality differences can be dramatic. For instance, unit values for cotton shirts imported by the U.S. from Japan are 30 times higher than those from the Philippines.

natural resources tend to have lower potential for quality upgrading than manufactures. Therefore, for LICs at early stages of development, diversification into products with longer quality ladders may be a necessary first step before large gains from quality improvement can be reaped. On the other hand, LICs' small economic size and limited potential to exploit economies of scale may result in a high cost of moving into many new products, making quality upgrading within existing products all the more important.

Quality is proxied by the unit values of exports. Unit values can readily be calculated from the bilateral trade values and quantities in the updated UN-NBER dataset. Although unit values have some drawbacks, they constitute an easily observable approximation for quality (Hallak, 2006).[10] Individual product unit-values are then normalized by the world average, and country-average unit values are constructed as a geometric value-weighted mean of the individual product unit values.[11] These data suggest some clear patterns.

Higher incomes per capita are broadly associated with greater export quality at the country level. The relationship holds both across all goods, and (even more clearly) within manufactures, which have greater scope for differentiation (Figure 11). The general relationship holds true in both the cross-sectional dimension, and the time-series dimension.

Figure 11. Export Quality and GDP, within Manufacturing



Source: COMTRADE, IMF staff calculations.

Again, there is much heterogeneity in quality levels, even controlling for income per capita. In particular, SSA stands out as producing relatively low quality goods (Figure 12). Focusing on the time dimension, for an extended period most LICs and MICs made little progress in increasing their export quality. Since 1990, that has started changing, particularly in MICs, in East Asia, and among countries of the ex-Soviet bloc. However, SSA had been largely excluded from these developments. Only since 2000 has there been some indication of quality upgrading in SSA.

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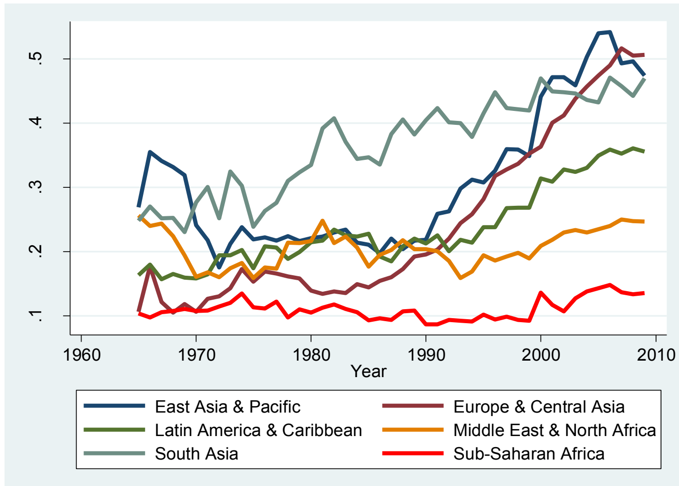
[10] Ongoing work is focusing on estimating a set of quality measures which correct some of these shortcomings by capturing the notion that higher unit values, if associated with much smaller market shares, may not reflect higher quality.

[11] Note that changes in the prices of individual commodities will not affect a country's measured export quality.

Figure 12. Export Quality over Time



Source: COMTRADE, IMF staff calculations.

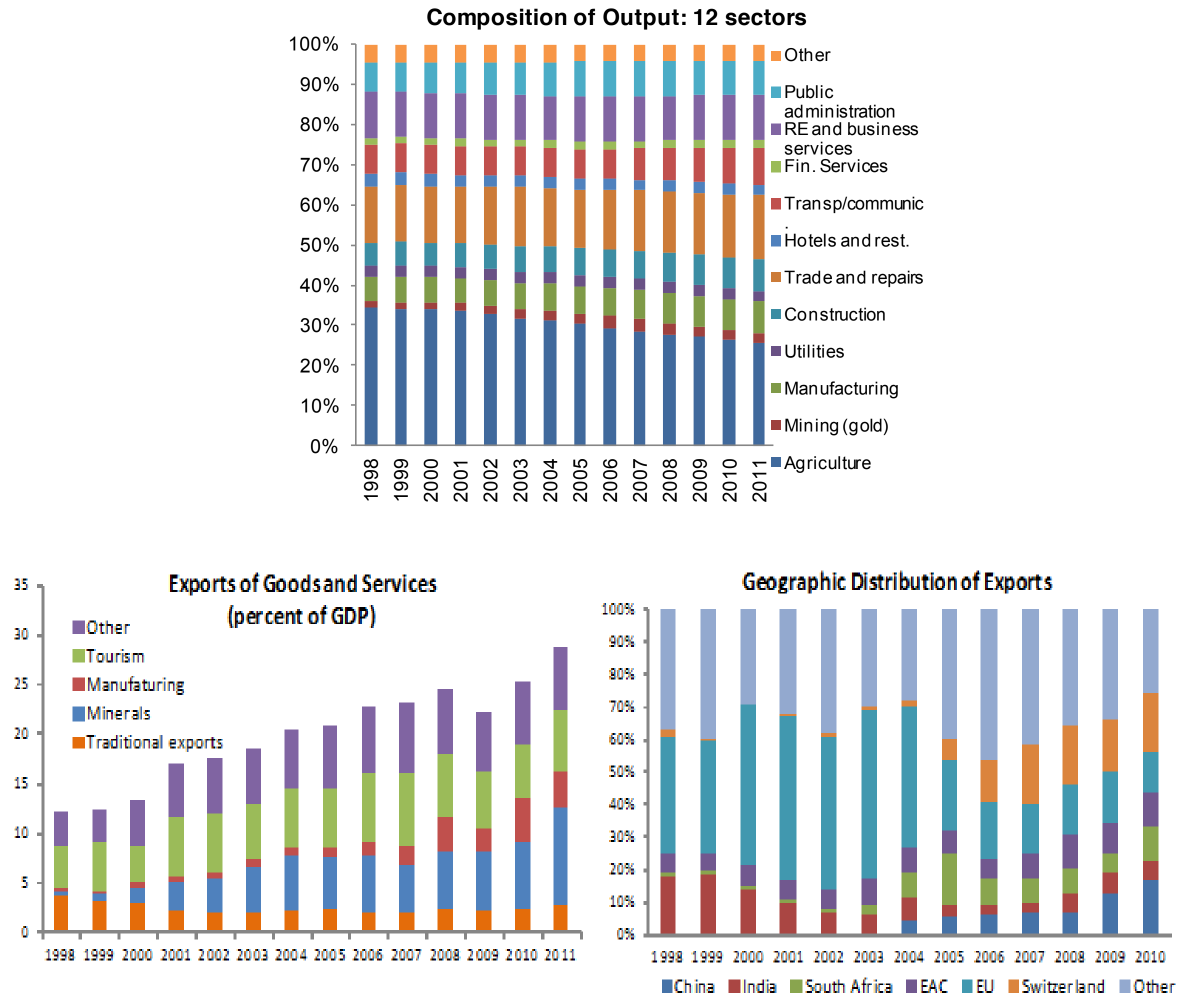
Exposure to industries with potential for quality upgrading could speed convergence. Within manufacturing, unit values appear to converge unconditionally to the world's quality frontier, closing the gap at a speed of about 2 percent per annum (Rodrik, 2011). Put differently, once a country establishes a beachhead in manufacturing, there may be strong tendencies towards quality upgrading, irrespective of other country-specific factors.

V. Case Studies: Diversification in Tanzania, Bangladesh, Vietnam, and Malaysia

Case studies illustrate lessons from structural transformation at different stages of development. The four case studies of this section are carefully selected from LICs and MICs in SSA and East Asia over the past three decades. The countries considered include: *Tanzania* and *Bangladesh*, two LICs with income per capita well below $1,000; *Vietnam*, a country well on its way to emerging market status; and *Malaysia*, a dynamic East Asian economy, whose income per capita has grown five-fold over the past 40 years. The latter two cases illustrate lessons from the experiences of countries that have successfully diversified or are successfully diversifying their economies.

Tanzania represents a prime example of a LIC witnessing major changes in its economic structure since the 1990s. Available data shows that the late 1990s and early 2000s saw major increases in, and diversification of, output and exports (Figure 13). Growth was particularly strong in mining, manufacturing, construction, and services—the areas which benefitted the most from market-oriented reforms. At the same time, production and exports of traditional agricultural cash crops (such as cotton, coffee, tea, sisal, cashew nuts, and tobacco), which were the basis of the colonial economy, declined considerably in importance. As a result, output concentration decreased quickly over the years. The geographical distribution of Tanzania's export also changed considerably over the past decade. The EU decreased in importance, while regional trade, especially with the East African Community (EAC) and South Africa, increased. In addition, the emergence of gold as a significant export was reflected in a rising share of trade with Switzerland and China.

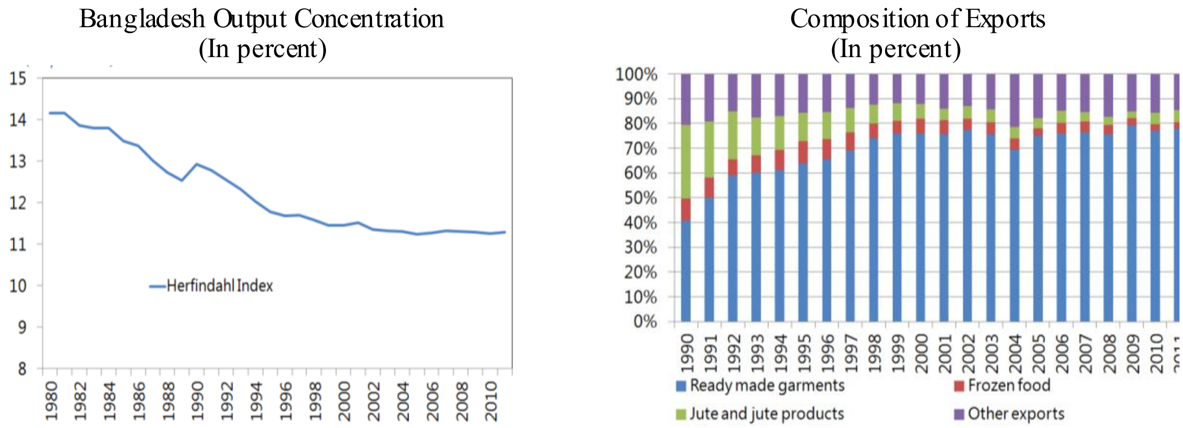
Figure 13. Tanzania: Composition of Output and Exports



Source: Country authorities and IMF staff calculations.

Bangladesh illustrates that initial diversification success, to be sustained, requires a combination of further reforms. Diversification in Bangladesh was largely triggered by external factors such as the introductions of the multi-fiber agreement (MFA) and the generalized system of preferences in the 1970s. These spurred development of the ready-made garments industry. As a result, Bangladesh shifted rapidly away from traditional agricultural and jute products towards manufacturing (Figure 14). Combined with the rise in output from wholesale and retail trade, this contributed to a steady increase in output diversification. Now, however, with ready-made garments accounting for 80 percent of total exports, Bangladesh's output diversification has seemingly peaked, although as a low cost producer scope remains for further gains through increases in global garment market shares. Attempts to move beyond garments or to increase their quality have been hindered by a lack of supportive reforms. Challenges include poor governance and the high cost of doing business as a result of scarce electricity supplies, severe infrastructure bottlenecks, weak contract enforcement, and expensive credit provision. While such factors did not hinder diversification and inward FDI in the 1990s and early 2000s, they may now be preventing further progress.

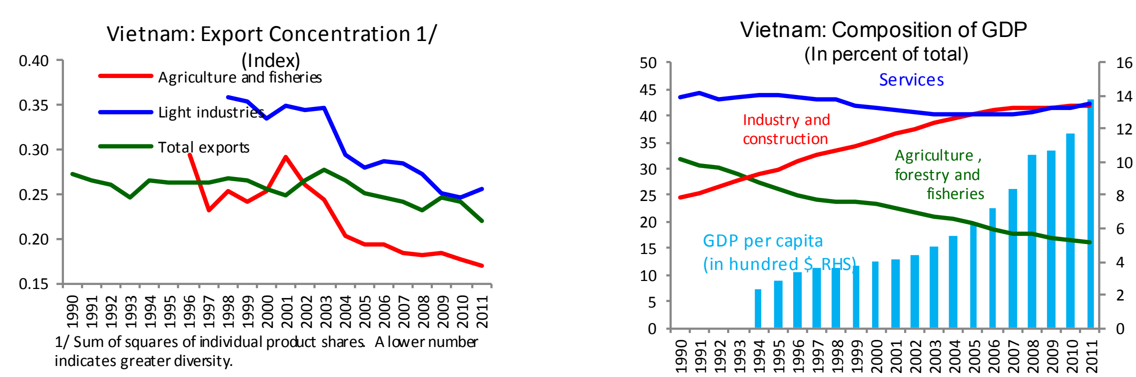
Figure 14. Bangladesh: Concentration of Output and Composition of Exports



Source: Country authorities and IMF staff calculations.

In contrast, Vietnam's experience shows that "waves" of supportive reforms can sustain diversification and structural transformation. The first wave of reforms during the 1980s opened new areas of activity to the private sector by reducing barriers to entry and expansion. Domestic prices, external trade and access to foreign exchange were liberalized; the rationing system largely abolished; subsidies significantly cut back; and inflation reduced. In agriculture, individual land-use rights were recognized, production freed from state-set quotas, and collective assets privatized. As a result, agriculture expanded, rising to almost half of total exports in 1995, and also diversified into cash crops, such as coffee and marine and forestry products (Figure 15). In a second wave of reforms, during the 1990s, liberalization of FDI helped develop other sectors. Initially, FDI was concentrated in the oil sector, but real estate (including hotels), food processing and heavy and light industry gained importance. FDI helped Vietnam integrate into emerging global supply chains, and gradually diversify its output and exports from textiles to footwear and electronics. This product diversification was accompanied by a diversification of trade partners, first from the Soviet Union to Asia, and then towards Europe and the U.S.

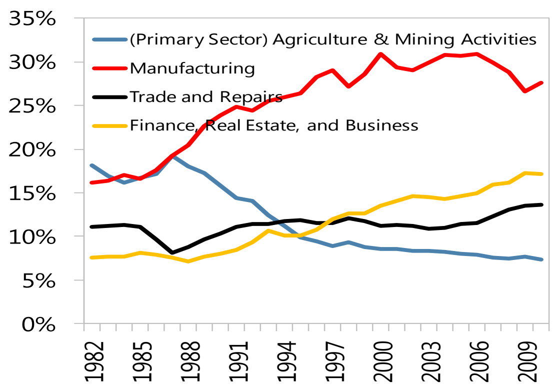
Figure 15. Vietnam: Diversification of Exports and Composition of GDP

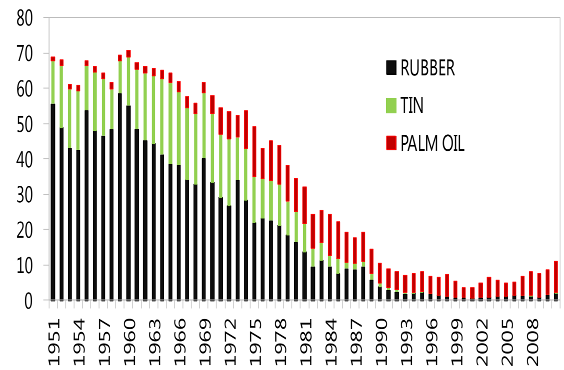


Source: Country authorities and IMF staff calculations.

Malaysia has been a great diversification success, but now it also shows that MICs face different challenges in their pursuit of advanced-economy status. Over the past four decades, Malaysia witnessed rapid economic growth accompanied by significant transformation in its economic and trade structures. Primary commodities, in particular rubber and tin, accounted for about 70 percent of total exports during the 1950s and 1960s, and exports of mineral fuels played a significant role (Figure 16). But since 1970 manufactures have surged from 5 percent to almost 70 percent of merchandise exports, and their composition has shifted towards higher value-added products, such as machinery. Malaysia's structural transformation was underpinned by political stability and sound macroeconomic management. It was also helped by microeconomic deregulation, relatively liberal trade policies, export promotion through tax incentives, and the establishment of free trade zones. Over time, however, Malaysia has seen far slower progress in terms of moving into new sectors, or of continuing to upgrade product quality.

Figure 16. Malaysia: Composition of Output and Commodities as Percent of Total Exports





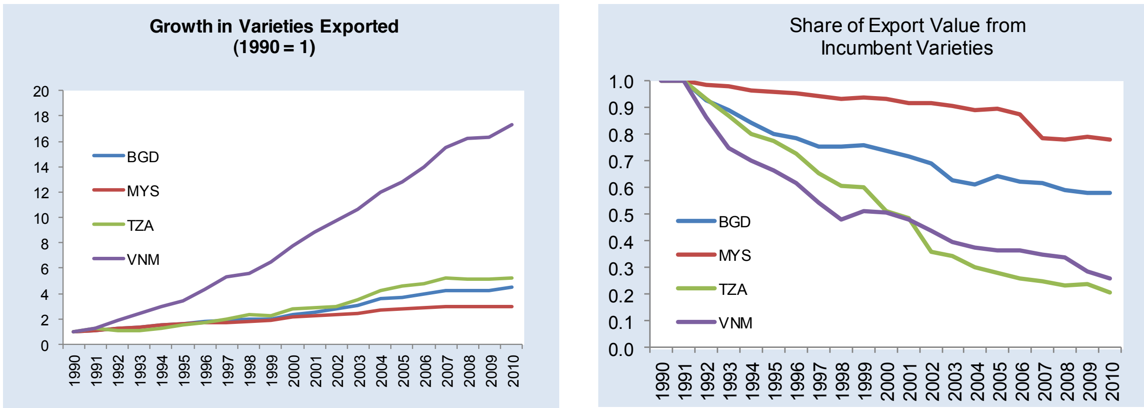
Source: IMF IFTS Database; CEIC Data Company Ltd., IMF staff calculations.

Diversification in LICs depends crucially on the frequency with which new products are introduced, the likelihood that they will survive, and their growth prospects. Initial trade diversification in LICs is mainly driven by entry into new products (the extensive margin). In the above four countries, over 1990–2011, there were significant differences (over time and across countries) in three key measures of the extensive margin: (i) the number of new product varieties introduced in a given year,[12] (ii) the survival rates of new varieties, (iii) and the growth rates of surviving varieties. Over time, such differences can cumulate into large differences in overall exports.

Differences in these measures underline the case studies' different experiences. Malaysia showed the least growth over time in product varieties and, conversely, had the greatest share of exports accounted for by incumbent varieties (Figure 17). While relatively natural for a more mature market, Malaysia's low rates of experimentation may lie behind its recent and possibly premature re-concentration. In contrast, Vietnam and Tanzania showed significant new entry and reductions over time in the relative importance of incumbent varieties. Vietnam in particular stood out as having a high probability of survival of new varieties. In Tanzania, there was less growth in varieties, but surviving varieties grew more, so that it managed a similar reduction in the share of incumbent varieties. Bangladesh had less experimentation than Tanzania and also less growth in surviving varieties, accounting for its current, unusually high concentration.

[12] Here, a variety is defined as a specific product exported to a specific country as in Asmundson (forthcoming).

Figure 17. Export Experimentation



Source: COMTRADE, IMF staff calculations.

Overall, these case studies provide some tentative evidence in favor of four main themes:

- Analyzing the entire structure of production paints a more comprehensive and illuminating picture than focusing purely on external trade. Structural transformation may well be associated with significant diversification of domestic production, including of non-tradables. Analyzing this may shed light on the underlying mechanisms and barriers to further transformation.

- Diversification and structural transformation are often underpinned by reforms and policy measures that are general in scope. Macroeconomic stabilization is a clear example. But even microeconomic measures are often broad-based, focusing on improving the quantity and quality of infrastructure or essential business services, or on setting up a welcoming environment for foreign investors. It remains an open issue to what extent industry-focused and narrowly targeted measures have historically helped underpin diversification efforts.

- Effective policy measures come in "waves" and aim at exploiting the evolving comparative advantages of the economy in changing external conditions. The types of reforms underpinning diversification and structural transformation in the early stages of development are different from those required later on and need to be adapted to the external environment faced by the economy.

- The frequency with which new products are introduced, and the rate at which they grow, can indicate potential policy-driven bottlenecks. Little entry may indicate that barriers deter firms from exporting or experimenting. If survival rates are low, firms may face more obstacles than expected. If surviving firms cannot expand, they may have inadequate access to finance. This type of analysis suggests directions for further study.

VI. Macroeconomic Stability Through Diversification

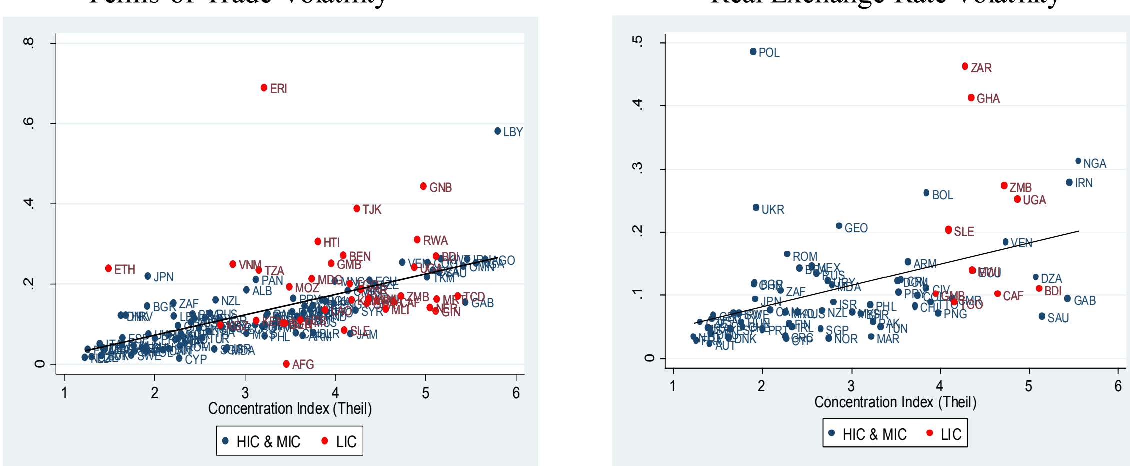
Do trade and real-sector diversification serve as buffers against external shocks? Related, are episodes of rapid, significant, and sustained diversification—so called "diversification spurts"—associated with increased macroeconomic stability? The existing literature provides some evidence that countries with more diversified production structures tend to have lower volatility of output, consumption and investment (Mobarak, 2005; Moore and Walkes, 2010). Further, product diversification can increase the resilience of LICs to external shocks, for instance to external demand or the terms of trade (Koren and Tenreyro, 2007). A key channel is that diversification involves LICs shifting resources from sectors where prices are highly volatile and correlated, such as mining and agriculture, to less volatile and correlated sectors, such as manufacturing, resulting in greater macroeconomic stability.

Geographic diversification also helps reduce volatility. Countries whose exports are geographically concentrated are more likely to import volatility from their trading partners and be exposed to external shocks. Conversely, if there is low correlation between fluctuations in different countries, geographical diversification will reduce exposure to external shocks (Jansen et al., 2009; Farshbaf, 2012). For instance, for many SSA countries, the ongoing diversification away from the EU and towards emerging market and neighboring countries may help buffer them from the Euro area crisis. The relationship is nonlinear, with the beneficial effect of diversification decreasing as a country becomes more diversified.

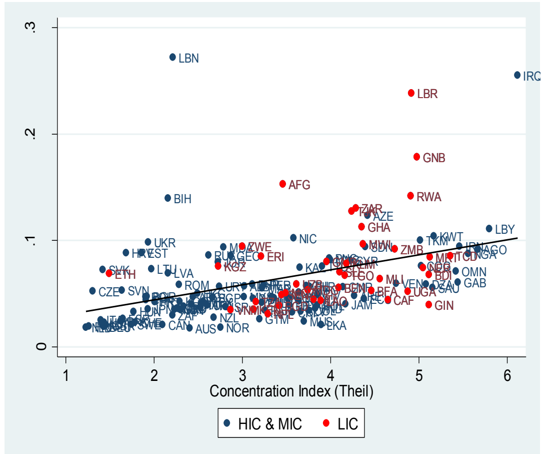
Export diversification is in general associated with lower terms-of-trade and real exchange rate volatility (Figure 18). As a result, export diversification is also associated with lower output volatility. These results continue to hold even after controlling for other determinants of output volatility (Lederman and Maloney, 2012). Indeed, recent evidence suggests that industry diversification helped attenuate the impact of the global financial crisis (da Costa Neto and Romeu, 2011).

Figure 18. Volatility and Export Diversification

Terms-of-Trade Volatility | Real Exchange Rate Volatility



Output Volatility



Source: COMTRADE, Penn World Table 7.0, IMF staff calculations.

The link between diversification and volatility is easiest to observe in the context of large diversification spurts. A total of 61 diversification spurts were identified in the post–1962 period, involving 51 developing and emerging countries (Table 1).[13] Diversification spurts occurred more frequently in the 1960s and 1990s, and are evenly distributed across regions (after controlling for the relative number of countries). The spurts last 13 years, on average rising to 20 years in the East Asia and Pacific region.

Table 1. Descriptive Statistics of Diversification Spurts: 1962–2010

	Number of observations, unless otherwise indicated								
Regions	**1962-69**	**1970-79**	**1980-89**	**1990-99**	**2000-10**	**Total per region**	**Duration (In years)**	**Relative per region (In percent)**	**Countries**
Asia and Pacific	3	2	4	1	1	11	**19.4**	**18.0**	**10**
Europe	4	0	0	3	1	8	**8.1**	**13.1**	**8**
Latin America	4	1	2	2	3	12	**11.8**	**19.7**	**9**
Sub Saharan Africa	8	3	1	3	3	18	**12.2**	**29.5**	**10**
Middle-East and North Africa	5	1	1	4	1	12	**10.6**	**19.7**	**14**
Total per decade	**24**	**7**	**8**	**13**	**9**	**61**	**12.6**	**100.0**	**51**
Relative per decade (In percent)	**39.3**	**11.5**	**13.1**	**21.3**	**14.8**	**100.0**	**..**	**..**	**..**
Duration (In years)	**13**	**13**	**19**	**11**	**8**	**13**	**..**	**..**	**..**
Countries [(1)]	**24**	**7**	**8**	**13**	**9**	**61**	**..**	**..**	**..**

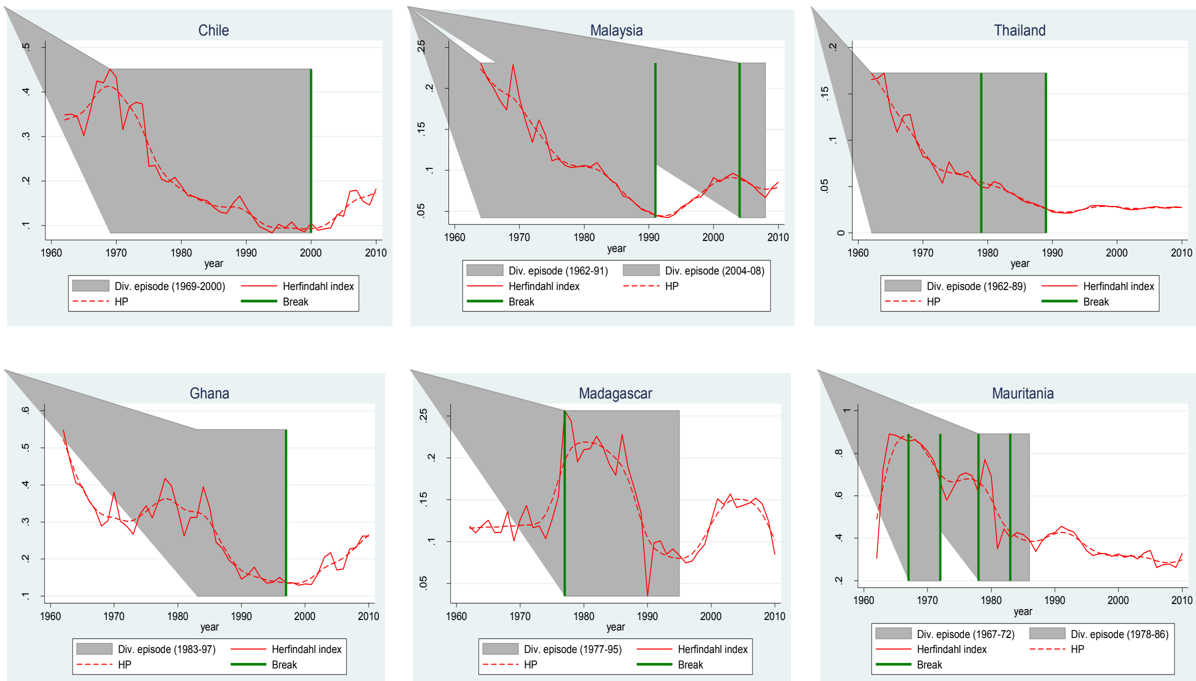
Note: Diversification episodes identified using a variant of Bai-Perron's multiple breaks technique. Critical values are sample-specific and take into account heteroskedasticity and sample size as opposed to asymptotic critical values. Minimum "interstitiary period" (number of years) between breaks is set to 5 and the significance level to 10 percent. (1) 5 countries have experienced 2 episodes.

Examples of rapid diversification spurts include Chile, Malaysia and Thailand in the 1970s and 1980s (Figure 19). The diversification spurts identified by our procedure accord well with the country-specific literature. For instance, as discussed in the case studies, it is broadly accepted

[13] The procedure for identifying diversification spurts is based on the Berg et al. (2012) procedure for identifying "growth spells". The underlying notion is that analysis of periods of significant, sustained diversification can more easily uncover effects on the economy than the customary regression trend analysis. See also Allain et al. (2012).

that Malaysia underwent rapid and significant diversification in the 1970s and 1980s, but the process came to a halt in the 1990s. A similar procedure can be carried out to identify episodes of rapid and significant diversification across trade partners. Generally, these are concentrated after 1990 and may relate to drops in shipping and communications costs.

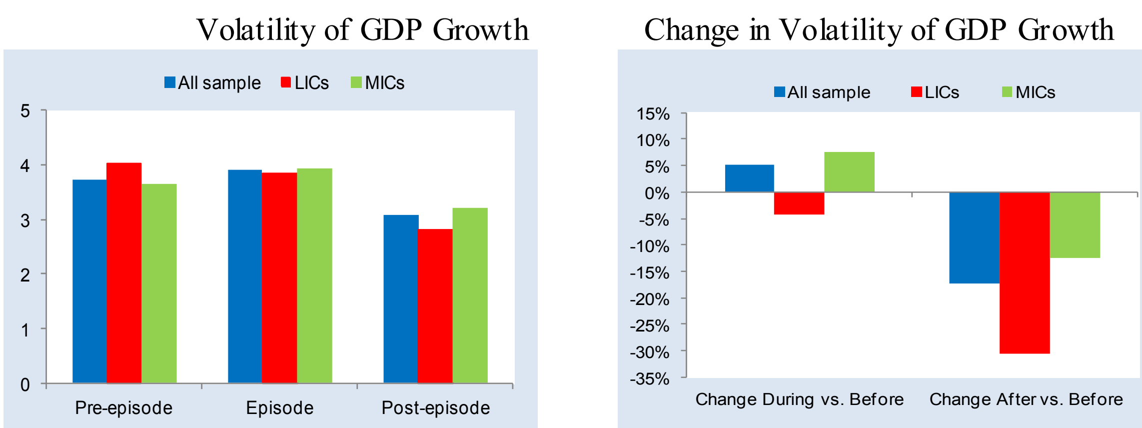
Figure 19. Diversification Episodes in Selected Countries



Source: COMTRADE, IMF staff calculations.

Diversification spurts are associated with a 17 percent average reduction in the volatility of output growth in developing countries (Figure 20). The decrease is especially pronounced in LICs, where volatility diminishes by 30 percent in the wake of diversification spurts. In MICs, volatility falls by a still significant 12 percent.

Figure 20. Diversification Episodes and Output Volatility (1962–2010)

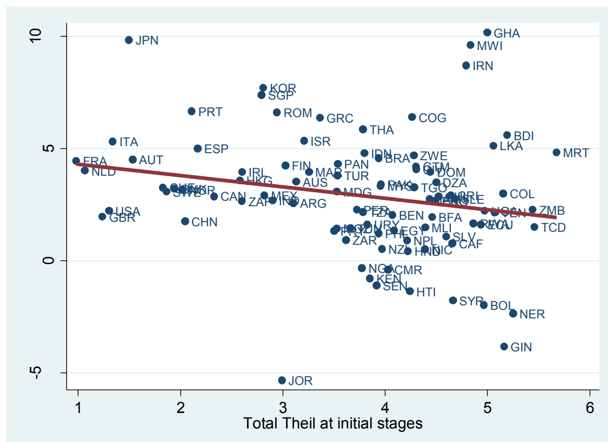


Source: COMTRADE, Penn World Table 7.0, IMF staff calculations.
Notes: Volatility is calculated as the standard deviation of real GDP growth using a 5-year moving window.

VII. GROWTH THROUGH DIVERSIFICATION

Growth and diversification patterns are clearly related, although the relationship displays much heterogeneity. Consistent with a literature that can be traced as far back as Singer (1950), initial diversification is on average positively associated with subsequent growth, although the relationship is far from precise (Figure 21). Also, in line with the stylized facts discussed earlier, fast growers have historically experienced more rapid diversification, with this trend especially clear in the post–1990 period.

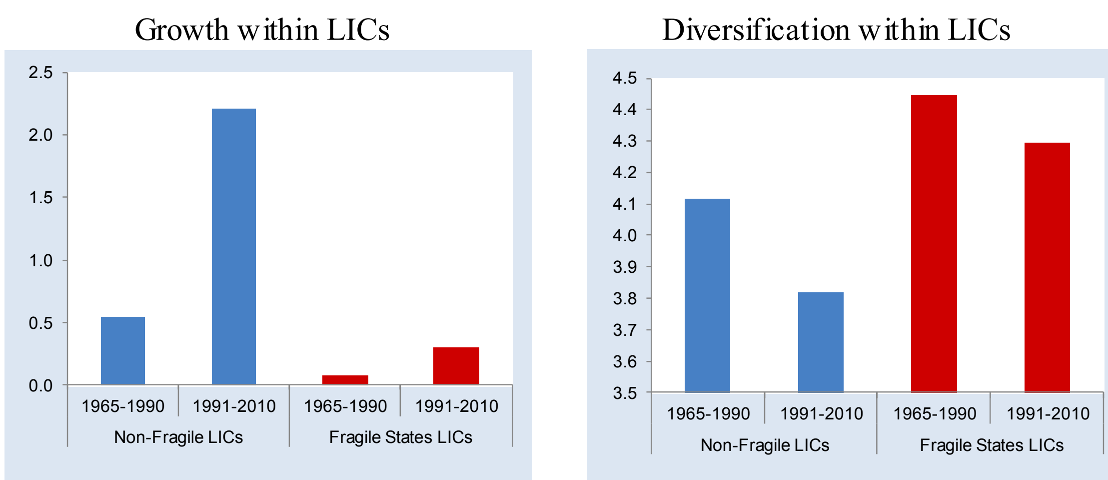
Figure 21. Trade diversification and Growth



Source: COMTRADE, Penn World Table 7.0, IMF staff calculations.

Focusing on LICs, both output growth and trade diversification picked up sharply after 1990, but again average patterns mask significant cross-country differences. Over the past 15-20 years many LICs have grown at unprecedented rates, after a long period of poor performance. However, the growth spurt was not universal: post–1990 growth has been far more rapid in Fragile State LICs (Figure 22). A similar heterogeneity was observed in terms of trade diversification; many LICs diversified rapidly, but progress in others, including in particular fragile states, was more halting.

Figure 22. Growth and Diversification Before and After 1990 within LICs

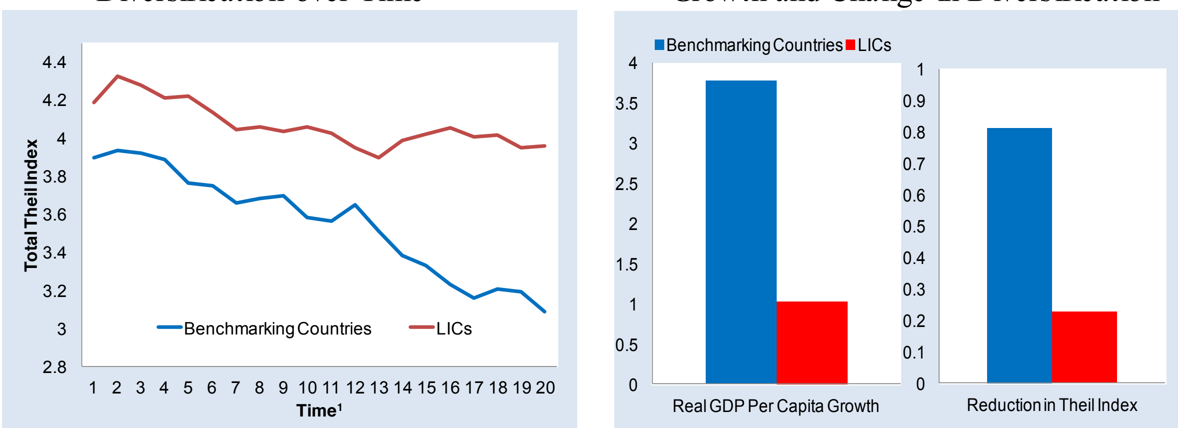


Source: COMTRADE, Penn World Table 7.0, IMF staff calculations.

Event studies confirm the links between growth and diversification, as well as the significant cross-country heterogeneity. Figure 23 benchmarks growth and diversification patterns in LICs against those in more advanced countries when they stood at a similar income level. Specifically, the focus is on the 20-year period after countries first attained a real GDP per capita of $1,200, comparable to the average for LICs in the early 1990s. Over this time frame, the benchmarking countries experienced notably faster growth and deeper diversification than did the LICs after 1990.

Figure 23. Trade Diversification and Growth: LICs vs. Benchmarking Countries

Diversification over Time | Growth and Change in Diversification



Source: COMTRADE, Penn World Table 7.0, IMF staff calculations.

Notes: For LICs, time=0 in the year 1990. For benchmarking countries, time=0 in the first year when PPP-adjusted income exceeds $1,200 (specifically, 1963 for Morocco, 1964 for Thailand, 1970 for Sri Lanka and Pakistan, and 1973 for Indonesia).

Diversification spurts and "growth accelerations" are correlated. Most clearly, diversification spurts are associated with sharp subsequent growth accelerations (defined analogously to diversification spurts). This is especially true for non-fragile LICs (Figure 24). In a similar vein, growth accelerations are associated with subsequent increases in diversification among non-fragile LICs.[14]

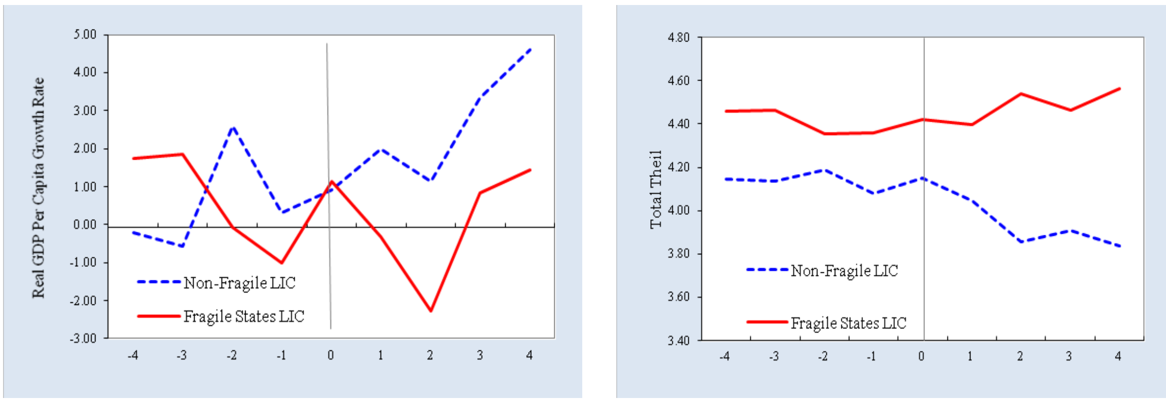
The relationship between diversification and growth may be conceptualized as reflecting more fundamental, underlying determinants. On-going work is focusing on the precise nature of this relationship, and in particular on how policy and institutional factors may influence the transition to more diverse production structures, and thereby affect the pace at which growth can be sustained. For instance, policy barriers and structural rigidities in labor and product markets may hamper the process of diversification. Structural transformation involves inter-sectoral resource transfers, and this underlines the importance of business-friendly institutions. Likewise, insufficient or low-quality public infrastructure may retard the development of those sectors that rely disproportionately upon it (Lowe et al., 2012); this factor may prove especially important in LICs, where a large portion of investment stems from the public sector. Again, barriers to financial development may hinder economic diversification, as can an inappropriate macroeconomic policy stance (as manifested in an overvalued real exchange rate). Most broadly, the increasing spread and importance of global production chains, and the rapid growth of new

[14] None of these results are driven by the inclusion of any particular decade.

sources of demand in large emerging economies (such as Brazil, China, and India), may be radically altering the opportunities and constraints facing LICs in their quest for diversification.

Figure 24. Diversification Spurts and Growth Accelerations

Diversification Spurts | Growth Breaks



Source: COMTRADE, WEO database, IMF staff estimates.

Notes: The left panel plots per capita GDP growth in fragile and non-fragile LICs during the periods leading up to, and following, a diversification spurt (year 0 on the horizontal axis). The right panel plots diversification during the periods leading up to, and following, a growth acceleration (year 0 on the horizontal axis). Growth breaks and diversification spurts are identified using Berg et al. (2012).

VIII. Conclusions

The process of continuous diversification and structural transformation is a key component of development. This process involves not just external trade, but the broader economy. It features significant changes in both the type and quality of goods produced and exported. However, there are major differences across regions and countries in the degree to which they have succeeded in carrying out such transformation.

Greater diversification has been associated with improved macroeconomic performance in LICs. Such improvements include higher growth and reduced volatility, especially after 1990 and in non-fragile states. Such links imply that IMF policy advice must encompass strategies to increase the likelihood of successful diversification.

All this raises a key policy question: what factors can spur or, alternatively, impede diversification in LICs? Case studies of individual countries point to diversification being driven by "waves" of reforms, exploiting both comparative advantage and shifts in external conditions. But much remains to be understood. To what extent can weak institutions, labor and product market rigidities, or lack of financial development impede the process of structural transformation and diversification? Can public-sector inefficiencies, or the lack of financial development, also hamper diversification? Can an overvalued real exchange rate block diversification, particularly in countries experiencing natural-resource booms or large capital inflows? And are globalization and the emergence of China alongside other emerging markets creating new opportunities or obstacles for diversification in LICs?

Analytical work is now underway, aiming to further advance our understanding of these issues, and to inform the policy debate. Many LICs have undergone substantial structural reforms since the early 1990s in an effort to promote diversification. But more measures may be needed, and it is important to identify the most helpful ones. Such questions take on added urgency in light of the ongoing policy and academic debate on industrial policy, focusing on the notion that changes in the product mix can significantly influence a country's growth prospects (Hausmann et al., 2007; and Lin, 2011, 2012). This research will be of special value to those LICs that experienced relatively poor performance post–1990.

References

Allain, L., E. Bova, and C. Mira, 2012, "Factors of Sustained Diversification" (forthcoming; Washington: International Monetary Fund).

Asmundson, I., 2012, "More World Trade Flows: An Updated Dataset" (forthcoming; Washington: International Monetary Fund).

Bai, J. and P. Perron, 1998, "Estimating and Testing Linear Models with Multiple Structural Changes," *Econometrica*, Vol. 66, pp.47–78.

Berg, A., J. Ostry, and J. Zettelmeyer, 2012, "What Makes Growth Sustained?" *Journal of Development Economics*, Vol. 98, No. 2, pp. 149–166.

Cadot, O., Carrere, C., and V. Strauss-Kahn, 2011, "Export Diversification: What's Behind the Hump?" *Review of Economics and Statistic,* Vol. 93, pp. 590–605.

Collier, P., J. W. Gunning, S. A. O'Connell, and B. Ndulu, 2007, "Harnessing Growth Opportunities: How Africa Can Advance," in *The Political Economy of Economic Growth in Africa, 1960-2000*, ed. by B. Ndulu, S. O'Connell, R. H. Bates, P. Collier, and C. Soludo (Cambrigde: Cambridge University Press).

Da Costa Neto, N., and R. Romeu, 2011, "Did Export Diversification Soften the Impact of the Global Financial Crisis?" IMF Working Paper 11/99 (Washington: International Monetary Fund).

Domeland, D., and F. Sander, 2007, "Growth in African Small States" (mimeo; Washington: World Bank).

Farshbaf, A., 2012, "Does Geographical Diversification in International Trade Reduce Business Cycle Volatility?" (mimeo; California: University of Southern California).

Feenstra, R. and J. Romalis, 2012, "International Prices and Endogenous Quality" (mimeo; California: University of California).

Frankel, J., 2010, "Mauritius: An African Success Story," NBER Working Paper No. 16569 (Cambridge, Massachusetts: National Bureau of Economic Research).

Gaertner, M. and C. Papageorgiou, 2011, "Sustaining Tanzania's High Growth Path Through Exports" (mimeo; Washington: International Monetary Fund).

Hallak, J.C., 2006, "Product Quality and the Direction of Trade," *Journal of International Economics*, Vol. 68, pp. 238–265.

Hausmann, R., J. Hwang, and D. Rodrik, 2007, "What You Export Matters," *Journal of Economic Growth,* Vol. 12, pp. 1–25.

ILO, 2011, *Yearbook of Labor Statistics*.

Imbs, J. and R. Wacziarg, 2003, "Stages of Diversification," *American Economic Review* Vol. 93, pp. 63–86.

IMF, 2011, *Regional Economic Outlook: Sub-Saharan Africa*, "The East African Community: Taking Off?" (Washington: International Monetary Fund).

IMF, 2012, *Regional Economic Outlook: Sub-Saharan Africa*, "Structural Transformation in Sub-Saharan Africa", October (Washington: International Monetary Fund).

Jansen, M., C. Lennon, and R. Piermartini, 2009, "Exposure to External Country Specific Shocks and Income Volatility," WTO Staff Working Paper ERSD-2009-04.

Khandelwal, A., 2010, "The Long and Short (of) Quality Ladders," *Review of Economic* Studies, Vol. 77, pp. 1450–76.

Koren, M., and S. Tenreyro, 2007, "Volatility and Development," *Quarterly Journal of Economics,* Vol. 122, pp. 243–287.

Lederman, D. and W. Maloney, 2012, *Does what you export matter? In search of Empirical Guidance for Industrial Policies* (Washington: World Bank).

Lin, J.Y., 2011, "New Structural Economics: A Framework for Rethinking Development," *World Bank Research Observer,* Vol. 26, pp. 193–221.

Lin, J.Y., 2012, *The Quest for Prosperity: How Developing Economies Can Take Off*.

Lowe, M., C. Papageorgiou, and F. Perez-Sebastian, 2012, "Public and Private MPK," draft working paper, IMF.

McMillan, M., and D. Rodrik, 2011, "Globalization, Structural Change and Productivity Growth," NBER Working Paper No. 17143 (Cambridge, Massachusetts: National Bureau of Economic Research).

Mobarak, A.M., 2005, "Democracy, Volatility, and Economic Development," *Review of Economics and Statistics,* Vol. 87, pp. 348–361.

Moore, W., and C. Walkes, 2010, "Does Industrial Concentration Impact on the Relationship between Policies and Volatility?" *International Review of Applied Economics*, Vol. 24, pp. 179–202.

Ndulu, S., O'Connell, R., H. Bates, P. Collier, and C. Soludo, 2007, *The Political Economy of Economic Growth in Africa, 1960-2000*, (Cambrigde: Cambridge University Press).

Rodrik, D., 2011, "Unconditional Convergence," NBER Working Paper No. 17546 (Cambridge, Massachusetts: National Bureau of Economic Research).

Samake, I., and Y. Yang, 2011, "Low-Income Countries' BRIC Linkage: Are There Growth Spillovers?" IMF Working Paper 11/267 (Washington: International Monetary Fund).

Schott, P., 2004, "Across-Product versus Within-Product Specialization in International Trade," *Quarterly Journal of Economics*, Vol. 119, pp. 647–678.

Singer, H., 1950, "US Foreign Investment in Underdeveloped Areas: The Distribution of Gains between Investing and Borrowing Countries," *American Economic Review,* Vol. 40, pp. 473–485.

UNIDO, 2011, *Industrial Statistics Database*.

APPENDIX 1. DEFINITIONS OF MAIN INDICES

A. Herfindahl Index

As a starting point, we measure diversification using the Herfindahl index. The value of Herfindahl index, for any given country *i* and time period *t*, equals the sum of squares of export shares (in total exports), where the summation is across all goods *j* in the set J_{it} of categories which the country exports:

$$HFI_{it} \quad = \qquad \Sigma_{j\in Jit} \left(X_{ijt} / \Sigma_{k\in Jit} X_{ikt}\right)^2$$

where X_{ijt} equals the value of exports by country *i* of good *j* at time *t*. This is an inverse measure of diversification which ranges from maximum of 1 (no diversification: all exports lie in a single category) down to 0 (full diversification: each category contains a negligible fraction of the country's exports).

B. Theil Index

We calculate the overall, within, and between Theil indices following the definitions and methods used in Cadot et al (2007). 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 a sum of the within and between components. The between Theil index is calculated for each country/year pair as:

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

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

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

$$T_W = \sum_k (N_k/N)\ (\mu_k/\mu)\ \{(1/N_k) \sum_{i\in I_k} (x_i/\mu_k)\ \ln(x_i/\mu_k)\}$$

C. Quality upgrading

The Herfindahl and Theil indices constitute measures of the extent of diversification *across* product categories. Consequently, they do not cover quality upgrading, which describes the average quality *within* any product category. The only directly observable measures of quality are unit values of exported products. Quality upgrading is assumed to take place if these unit values increase over time. Unit values are computed by dividing total export value in a product category by export quantity. For most SITC 4-digit product categories, there is one individual product unit value for each exporter.[15] Individual product unit-values are then normalized by the world average, and country-average unit values are constructed as a geometric value-weighted mean of the individual product unit values.

[15] Two or more unit values may exist for a given SITC 4-digit category, if quantities are measured in two or more different units (e.g. kilograms and number of units). If this is the case, also trade values are separately available in the dataset for each unit of measurement, so that effectively two or more "SITC4-plus" categories are constituted.

APPENDIX 2. IMF REAL SECTOR DATASET

Sectors	
Agriculture	Hotels and restaurants
Mining	Transport and communications
Manufacturing	Financial services
Utilities	Real estate and other business services
Construction	Public administration
Wholesale trade	Other
Countries	
Bangladesh	Malawi
Benin	Malaysia
Botswana	Mali
Burkina Faso	Mauritius
Burundi	Mongolia
Cambodia	Mozambique
Cameroon	Namibia
Central African Republic	Nigeria
Comoros	Papua New Guinea
Cote d'Ivoire	Philippines
Equatorial Guinea	Rwanda
Eritrea	Senegal
Ethiopia	Seychelles
Gabon	Sierra Leone
Gambia	Sri Lanka
Ghana	Swaziland
Guinea	São Tomé and Príncipe
Guinea Bissau	Tanzania
Indonesia	Thailand
Korea	Togo
Lao	Uganda
Lesotho	Vietnam
Liberia	Zambia
Madagascar	Zimbabwe