

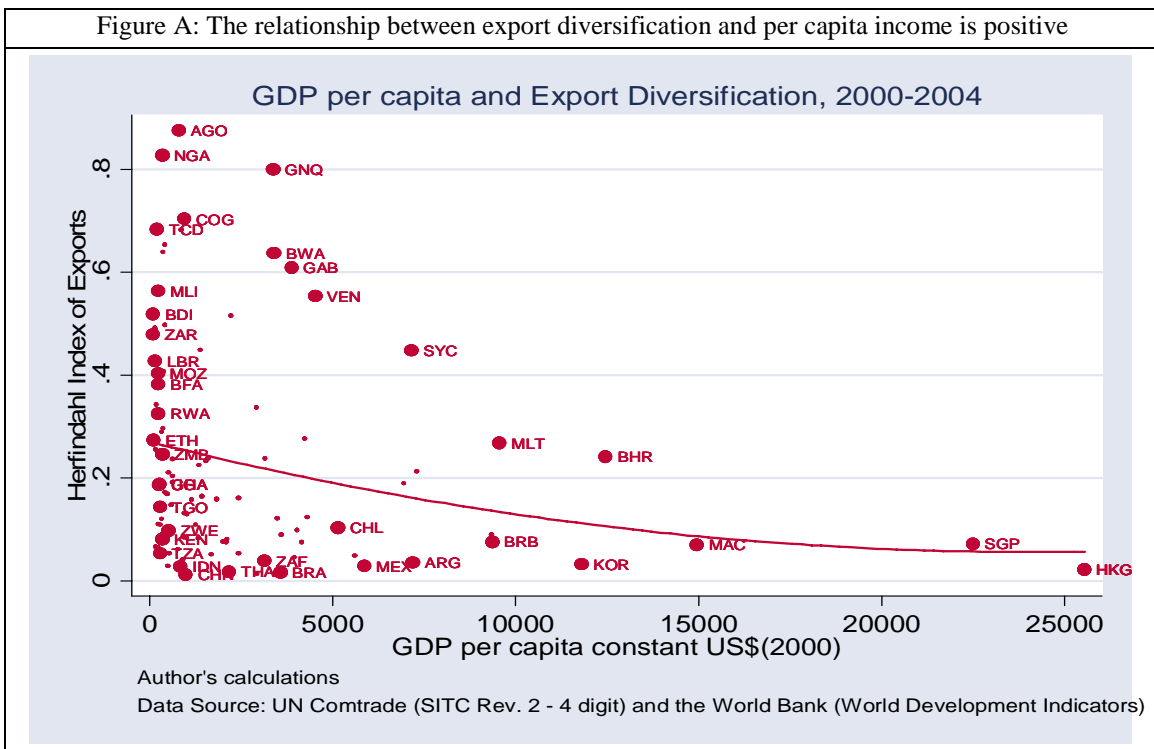
Export diversification and Competitiveness in Developing Countries

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1. INTRODUCTION

1. Countries care about export diversification to achieve a higher level of economic development. Policy makers covet it as a source of economic growth, especially when the size of the domestic market is small and the existing export basket is concentrated in products that face an inelastic demand. In such circumstances, diversification into non-traditional exports opens up new opportunities and new markets for firms and farmers. Where exports are vulnerable to external shocks, it contributes to economic growth by dampening the volatility of export growth. Above all, export diversification is valued because it is believed to be the only way a less developed country can transform itself into a modern economy that can produce and export goods that richer countries export. The notion of a modern economy is usually synonymous with a larger and growing share of manufactured goods and services exports.



2. In the past twenty five years (1980 - 2004), on average, about 60 percent of the developing countries diversified their merchandise exports by at least 10 percent. A cursory look

at a simple chart of export diversification (measured by the Herfindahl Index (hereafter HI)¹) and per capita income indicates that at the end of the twenty five year period, large differences persisted in the levels of economic development across developing countries (figure A). As the relationship between export diversification and per capita income has been shown to be, on average, positive even after controlling for the usual suspects – initial per capita GDP, population, macroeconomic environment, investment, human capital, governance, openness, terms of trade (Hesse 2006, Lederman and Maloney, 2007, Imb and Wacziarg 2003), we believe that the challenge of the export diversification problem in developing countries is related as much with developing countries that are weakly diversified as with those that are well diversified, i.e., have HI levels that are closer to 0. By the former we mean countries that are almost vertically aligned along the y-axis labeled HI, and by the latter we mean countries that are aligned horizontally along the x-axis labeled per capita GDP in figure A.² And, there are many such countries, both low and middle income as the figure shows.

3. One of the objectives of this paper is to focus on the two groups of developing countries scattered along the two axes and to understand who these countries are and why they are where they are. Figure A makes this point more precise. Clearly, for the low income or poor countries concentrated higher up along the vertical axis, significant export diversification is necessary for further economic development. But for countries aligned along the x axis, especially close to the origin, the marginal gains from further export diversification seem small unless they can help these countries to make large leaps and catch up with those much further along the x-axis. Examples include Tanzania and Kenya which, several years ago, had achieved HI levels similar to those of Uruguay, Colombia and Sri Lanka. Further to their right are countries such as India, China, Brazil, Mexico and Argentina with have some of the lowest HIs in the world but large differences in income levels. The location of these highly diversified low and middle income countries suggests that something about their exports is restraining them from catching up with the richer countries that have fairly similar levels of diversification. *Something more*³ than just the *level* of export diversification must have played a role in transforming the export baskets of countries like Hong Kong, Korea and Singapore so they could enjoy higher levels of income. These observations suggest that if that ‘something more’ is made an integral part of the export diversification process, it should enable the highly concentrated low income countries to make larger income gains as they move down the y-axis and diversify their exports. This would preempt rapid diversification without development as has happened in countries like Tanzania which must have fallen almost vertically, given its level of income. That ‘something more’ would also benefit countries like Tanzania and India as they diversify further, although the challenge would be of a very different kind. For now, we will continue to use the phrase ‘something more’ for an additional explanatory factor of export diversification.

¹ The Herfindahl Index is the the most commonly used measure of export diversification. It lies between 0 and 1 where being close to 0 indicates well diversified exports.

² For low and middle income countries, the relationship between HI and per capita GDP is almost L-shaped in figure A. In the literature, these variables chart a U-shaped curve because the sample also includes OECD countries.

³ In a related context, Hausmann, Hwang and Rodrik (2006) have asserted that ‘something more’ interpreted as market failure is one of the reasons why countries may not diversify. The distinction do not causes why

4. We propose that the ‘something more’ is an important ingredient in explaining the way export diversification affects how poorer countries can catch up with richer countries. In the related context of growth and the type of products exported, Hausmann, Hwang and Rodrik (2006) (HHR hereafter) have asserted that ‘something more’ could be market failure, a key reason why firms may find it profitable to not diversify. For the first set of countries that are aligned along the y-axis in figure A, HHR’s approach is directly relevant: it studies why countries like Ethiopia and Burundi have not diversified. However, for countries like Tanzania, we need to look elsewhere for an explanation. The issue in the case of countries like Tanzania is not *why* they did not diversify but rather, what they can do to develop further *after* they have achieved some of the highest levels of export diversification.

5. In almost all available research, export diversification has been modeled as a function of the various factors of production – capital, labor, infrastructure, good policies. All developing countries are treated as one set, or at best, there is a distinction between SSA and the ‘rest.’ The general conclusion and policy implications that follow from it are straightforward and no different from those prescribed for overall growth: policies that are good for growth should also be good for export diversification. Though theoretically and empirically robust, this approach implies that there is no case for export diversification when in fact, the latter has been shown to be positively related with economic growth. However, for policy makers who are anxious to steer their countries in the direction of a modern economy, neither the treatment of all countries as a collective nor the conclusion that what is good for growth is good for export diversification is too helpful. This may be for several reasons. Many countries undertook widespread reforms more than a decade ago, but the expectations of diversified export baskets were slow to materialize. The success of latecomers such as China and India is leading some policy makers, especially in poor countries, to conclude that active policies are needed to diversify their exports. Some just want to know what China did to catch up with richer countries so they can evaluate their options.

6. In this paper, we have tried to contribute to the literature in four ways. In section 4, we attempt to scratch below the ‘aggregate’ approach to understand how export patterns and directions have helped some developing countries to leapfrog and catch up with richer countries. While there is no blueprint for the optimal export diversification path to faster development, we apply concepts from recent research to understand whether the ‘something more’ in export diversification is enabling a country to catch up with richer countries. These concepts are useful as an early warning sign of the direction of export diversification in which a country is headed. A good example is Rwanda. About five years ago, it moved from exporting *only* coffee to exporting coffee and minerals. There was a dramatic drop in its HI levels as more minerals were discovered and the share of coffee in its exports declined rapidly and became equal to that of metals and minerals. While this has led to a sharp decline in its HI and is technically export diversification, the jump from one type of primary to another type of primary product is unlikely to usher in modern economic growth. The main theme of section 4 is that the relationship between the level of export diversification and the conventional factors that have been used to explain it is not enough to help a country to catch up with rich countries; understanding how that ‘something more’ affects the diversification process is equally important.

7. A second area in which we add value is motivated by how intrinsic differences among countries matter. The problem of export diversification in small countries or oil exporters is very different from that in large countries. Received research does not pay much attention to this issue. While by no means do we want to suggest that research on this subject should be done at the country level (unless it has to do with policy design), we do assert that ignoring country groupings leads us to only one conclusion evident from empirical work – conventional factors (human capital, natural resources etc..) that affect export and economic growth also explain export diversification. This conclusion implies a one size fits all approach which is not too meaningful in the case of export diversification as the export baskets of countries vary so much. In stead, we study how the evolution of export diversification has varied across countries because of geography, natural resource endowments, and structural economic characteristics.

8. A third area of our contribution lies in highlighting the time dimension in understanding the relationship between export diversification and factors that explain it. The process of economic development has brought about enormous changes, especially with globalization. Export diversification was once constrained by geography. Is it so even today? Are small states still at a disadvantage today? And lastly, we synthesize our findings empirically in two formats - a cross section model and a dynamic panel to - examine the country- and sector-specific facets of export diversification as well as its pattern.

2. WHAT WE KNOW

9. The potential of export diversification for economic development has engaged researchers on two interrelated themes. The first focuses on the link between export diversification and economic growth. The oldest view harks back to the 1950-60s when development economists such Prebisch and Singer tabled the natural resource hypothesis: countries that exported natural resource-based products were particularly growth-constrained because natural resource-based industries do not lend themselves easily to technological progress; besides, their exports face declining terms of trade. Since the 1980s, East Asia's spectacular growth has been paralleled by the disappointing growth experience of natural resource exporters in Latin America and SSA and has caused much alarm among development economists. In a recent paper, Lederman and Maloney (2007) showed that there is no empirical support for the Sachs and Warner (1995) argument that natural resource exports affect economic growth adversely. These findings have also been supported by others (Bonaglia and Fukasaku, 2003).

Export diversification and economic growth

10. Consensus now seems to be building around the belief that export diversification leads to economic growth. In a seminal paper, Imbs and Wacziarg (2003)⁴ showed that the relationship

⁴ Imbs and Wacziarg (2003) show that GDP per capita rises with export diversification until it reaches a turning point at about \$10,000 after which, the relationship turns negative. On the upward rising part of the U are high income countries that are distinct

between export diversification and economic development (measured by per capita GDP) is broadly positive for countries with per capita incomes of \$10,000 (2000 US dollars). Countries with incomes higher than \$10,000 tend to specialize in goods. This is evident from the export structures in upper middle income countries such as Korea, Hong Kong and the OECD countries. After factoring in the effect of openness, contribution of agriculture, manufacturing and services, and excluding OECD countries, Hesse (2006) confirms that the relationship between export diversification and economic growth continues to be positive.

11. In a significant departure from the conventional view of export diversification and economic growth, Hausmann and Rodrik (2003), and Hausmann, Hwang and Rodrik (2006) [hereafter HHR] have contended that, in addition to physical and human capital, natural resources and good institutions, market failures play an important role in affecting export diversification and through it, economic growth. Asserting that “what you export matters,” HHR have demonstrated how the income level of a country’s exports is a good predictor of economic growth. They conclude that in the presence of market failures, there is a role for governments to spur export diversification.

How researchers have explained export diversification?

12. The second stream of the literature, closely related to the first, is trying to understand what explains export diversification. The views on this subject can be grouped under two broad approaches. The conventional approach interprets export diversification as an increase in the share of manufactured exports and models it as a function of various factors of production. Although it has persisted for several decades now, research on this issue continues to grow with the increasing recognition that for most SSA countries, exports are the most potent, if not, the only source of growth. As the concentration of low value primary or resource based products constrains export growth, there is a compelling need to diversify SSA’s exports in the direction of manufactured products.

13. Why has the share of manufactured exports in SSA grown so slowly? One explanation is the unusually low combination of natural resource endowments and skills. ‘Africa has too much land to have a comparative advantage in manufacturing (in contrast to Asia) and too little skill to process a large share of its primary exports (in contrast to Latin America).’ In fact, SSA is found to export an even smaller share of manufactures than predicted by its resources (Mayer and Woods, 2001). A second view is that relative to agricultural exports, manufactured exports have higher transactions costs and higher risks. As factors that can reduce these costs are particularly weak in SSA, special attention to infrastructure and policy reform is necessary for the growth of manufactured exports in Africa (Collier, 1998, 1999). Mayer and Wood (2001) concur with Collier that infrastructure and good policies may help but conclude that they are of secondary importance in comparison to the disproportionate effect of a high land to skill ratio. Habiyaemye and Ziesemer (2006) explain low levels of export diversification in SSA by appealing to low educational attainment, capital, weak infrastructure, abundance of fuels and

from low income ones in two ways: they start specializing in manufactured exports (OECD countries, Hong Kong, Korea etc.) and the share of goods exports is smaller than exports of services.

population. With the exception of capital, they find strong support for the other factors and conclude that investment in human capital and infrastructure are necessary to reduce SSA's levels of export concentration.

14. Making creative use of the investment climate surveys for a set of SSA countries, Eifert, Gelb and Ramachandran (2005) have offered a third view of why SSA has been unable to diversify its exports in the direction of manufactures. They define net TFP, a broad productivity measure that incorporates business losses due to power outages, logistical failures, crime and differences in indirect costs to show that in addition to unfavorable resource endowments, lower net TFP in SSA's manufacturing sector makes the latter's exports uncompetitive. This is a direct obstacle to export diversification in SSA.

15. Klinger and Lederman (2004) extend HHR's market failure thesis by testing whether the free rider problem discourages firms from undertaking innovative activity that spawns new export discoveries. They find that the frequency of export discovery is positively related to export growth; hence, factors that affect the latter also affect discovery. They also find that low barriers to entry measured by the number of days it takes to start a business, are symbolic of market failure associated with imitation and reduce discovery. The prevalence of market failure suggests that government support for discoveries may be efficiency enhancing.

3. DATA AND SOME DEFINITIONS

16. We use the Herfindahl Index (HI) as the measure of export diversification in most parts of this paper. The HI lies between 0 and 1. Lower values of the index represent more diversification. The Herfindahl index simply computes the sum of squared shares of the variable in question, in this case export shares, or

$$HERFINDAHL = \sum_{i=1}^N s_i^2$$

where s_i is the share of total exports attributed to the i^{th} industry. The HI indicates that there are two factors that can lead to a lower HI: an increase in the number of products or a more even distribution of the shares of the products. For the remainder of this study, it will be useful to think about diversification in terms of thresholds. Economies with highly diversified export baskets are likely to have Herfindahl indices below 0.05, followed by a slightly less diversified range of 0.05-0.1. Between 0.1 and 0.4 is another range of much more specialized export baskets. And above 0.4 is highly specialized

We use COMTRADE exporter and importer reported trade (export) data, general indicators from the WDI and indices such as Barro-Lee from the internet. All our export data is at the SITC2-4digit level.

4. THE PATTERN OF EXPORT DIVERSIFICATION IS IMPORTANT FOR CATCH-UP

17. In this section, we analyze why countries that have diversified significantly over the past twenty five years are still so far apart in levels of economic development. A variety of country cases that we examine suggest that in addition to the level of export diversification, ‘something more’ plays a critical role in how it affects economic development.

Defining ‘something more’

18. To define ‘something more’ we first need to introduce two concepts EXPY and PRODY borrowed from HHR. The EXPY measure is useful for discerning patterns of export diversification that underlie the differences in the economic development outcomes of developing countries with the same HI. We make copious use of this measure in this section. The EXPY is a dollar value (US 2000 constant or PPP) score that measures the income level of a country’s trade and is broadly consistent with per capita GDP. We use it to rank countries and show how much their pattern of export diversification is helping them to catch up with the rich countries.

19. We name the ‘something more’ variable “high PRODY products.” The latter is constructed with the help of another HHR indicator – the PRODY⁵ which is indicative of the level of sophistication of a country’s exports. The PRODY index is a weighted average of the per capita GDPs of countries exporting a given product, where the weights correspond to the revealed comparative advantage of each country that exports that product.⁶ A sample of products and their PRODYs is provided in table 2.

20. ‘Something more’ is simply the export share of high PRODY exports constructed by excluding oil, minerals, metals, primary commodities such as cocoa, coffee etc.. A threshold of \$1000 is used for each year.⁷ An interesting aspect of the PRODY is that it is a product-based measure, indicative of the income levels of countries that export the product. The high PRODY variable does not dictate any particular diversification path unlike other measures such as the technology definition of Lall (2002,2003). For some examples of a mapping from the tech categories to PRODY, see table 3. Figures 5 and 6 illustrate how the processing of pp and rb products can transform them from low to a high PRODY exports. The case of Uganda’s impressive export diversification driven almost entirely by the transition from pp to hv and rb products is an example of how scaling up high PRODY exports of hv flowers and rb fish

⁵ The PRODY is a monetary value assigned to the RCA of a product exported by the country and weighted by its per capita GDP in a particular year. The PRODY of a product is the same for all countries in a year. The EXPY is the aggregate value of a country’s export basket where each export product is weighted by its PRODY.

⁶ The EXPY is a weighted average of the PRODY for that country where the weights are simply the value shares of the products in a country’s total exports.

⁷ This variable links very well with Lall’s technology definition which classifies products according to their technological content. In a later section, we will discuss why we care about this link.

products has contributed to a rapid increase in its EXPY, although it is trailing several decades behind its global competitors. For the interested reader, Annex 2 provides a comprehensive list of exports from 1980-04 with the corresponding technology and PRODY codes.

21. It is important to compare the PRODY with Lall's (2001, 2003) technology definition because of its policy implications for export diversification and catching up with richer countries. Most of the literature centered on SSA and export diversification has interpreted the latter as an increase in the share of manufactured exports in SSA where the latter is the summation of the low, medium and high tech product categories in Lall's technology definition. The problem with this definition of manufactured exports used in the literature is that it excludes the following product categories:

- primary products (pp - coffee);
- of which high value (hv - fresh fruits and vegetables, flowers); and
- resource based (rb) products.

We assert that the strict manufacturing definition used by researchers excludes many *processed* products that should qualify as manufactures because of their diversification and EXPY potential, especially in countries with small manufacturing sectors. These products could be processed foods (fish fillet and preserved fruit, sugar), palm and animal oils, wood furniture; processed minerals, fresh flowers, fruits and vegetables in addition to low, medium and high tech products. The policy implications for SSA's and indeed, most other countries export diversification patterns change significantly when we use the high PRODY variable to explain why some developing countries were able to diversify, develop and catch up.

The advantage with the high PRODY products is that they are as prolific among pp or agricultural products as manufactured or minerals (rb). There is no systematic pattern of development that countries must follow to attain higher EXPYs. This levels the playing as a particular category of goods can be potentially exported by all countries and even a primary product, if processed can have a high PRODY that can a poor country's EXPY.

Why are countries with similar HIs so far apart in levels of economic development ?

22. Like per capita GDP, the EXPY is negatively related with the HI (figure A from page 1 of the main text and figure 1A in Annex 0). A few examples in this paragraph assert that an important aspect of export diversification accompanied by a higher EXPY is being able to export high PRODY products.⁸ Figure 1A shows the changes in the HI and per capita incomes 25 years apart. Only two decades ago, countries such as China and India had per capita incomes of about US\$ 200 and one of the highest levels of export diversification (HI of 0.03). Twenty years later, China's economy is a little more diversified (HI of 0.01) and its income is about \$1000⁹ while

⁸ As the high PRODY products are related with the EXPY, they increase the EXPY levels of the exporter.

⁹ Rodrik (2006) explains China's spectacular achievement in terms of government policies that steered the economy towards high PRODY exports to achieve a high level of EXPY comparable to upper middle income East Asia.

India's income is below \$500. Uganda, Rwanda, Ghana and Tanzania are but a few examples of SSA countries that made great strides in diversifying their exports from highly concentrated export baskets but are far from modern economies. Kenya and Madagascar has per capita incomes in the range of about \$300 and HI of about 0.2. Twenty five years later, their HI had decreased by 50 percent but their incomes had not changed much. In the higher income range are countries like Brazil and Korea which had similar levels of per capita income (about \$3000) and export diversification in the early 1980s. For fairly small levels of export diversification, in 2000-04, Brazil's per capita income had risen to only \$3500 while Korea's was nearing \$12,000. Clearly, Korea's export diversification pattern was significantly different than the others.

23. Figure 2 repeats figure 1 with some country names made more visible and a clearer HI – EXPY relationship made small state, landlocked and oil exporter country groupings. It draws attention to some interesting relationships.

- In highly diversified countries along the x-axis, it seems that most of the increase in EXPY must come from exports of high PRODY products, not just any type of goods as the margin for further diversification seems limited. In the more concentrated countries along the y-axis, it seems the gains in EXPY could come from both the conventional factors (human capital, land, infrastructure etc.) that affect the HI and high PRODY products.
- How can we explain why low income India, middle income Sri Lanka, China, and upper middle income Turkey, Brazil, Hong Kong and Korea have strikingly different levels of EXPY but similar HIs?
- Why do countries such as Tanzania, Sri Lanka, Pakistan, Honduras, Paraguay, Ecuador, Botswana and Nigeria with such large differences in the HI have about the same EXPY (\$ 3500 – 4000)?

A cursory glance at the PRODYs of some high and low diversifiers twenty years apart explains why exporters of primary or natural resource based products and low or middle income countries are where they are in figure 2. This is also apparent from a systematic analysis of products, their PRODY and EXPY. Table 1 in Annex 0 presents examples from about 14 countries to show this. in Table 1.

24. **Well diversified countries were able to leapfrog into select 'high PRODY' products to catch-up with richer countries.** Even poor countries such as China with initially low levels of per capita income were able to leapfrog. Consider figure 2 and table 1 together. In 2000-04, China had a per capita GDP of about \$1000 and an EXPY that was greater than Brazil's, equal to Mexico and Thailand's and getting closer to Hong Kong's. Table 1 shows what made this happen. It enlists the PRODYs of the top 5 products exported by a sample of the countries located along the horizontal axis. In 1980-84, among Korea's top 5 export products (per capita GDP of \$3637) were footwear and electronic micro circuits, and 3 high quality garments and textiles products. During the same period, the top 5 exports of Hong Kong (per capita GDP of \$12550) were children's toys, watches and the same textiles and garments as Korea. China was in the low income country camp with a per capita GDP of \$199. It exported crude oils, raw

cotton, cotton yarn, silk fabrics and some auto parts – products that are important exports in some SSA countries today. Twenty years later, China reached the signpost where Korea and Hong Kong were in 1980-84. It was exporting footwear and children’s toys, but it had also leapfrogged into exports of a few electronics that its richer competitors exported. In two decades, its export mix had transformed from having only one product with a high PRODY of about \$15,000 to 4 products.

25. At the margin, transition from low to high PRODY exports is sufficient to help a highly concentrated natural resource exporter to achieve a higher EXPY. Table 2 provides a list of some low and high PRODY products. Empirically, Lederman and Maloney (2007) have debunked the myth about the natural resource curse which is believed to condemn exporters of natural resource products to remain caught in export concentration traps. Mexico and Indonesia, two oil exporters, have achieved higher EXPYs by following different export diversification paths. Indonesia is still a natural resource exporter. But in the past twenty years, 3 of its top 5 exports changed as the export basket shifted towards higher PRODY minerals and energy products, and natural rubber was replaced by palm oil, a high PRODY good. In Mexico, two products changed (compared to all 5 in China). Its transition from coffee into more high PRODY manufactures has placed it close to China in recent years (table 1).

26. In a low income country, diversification alone is insufficient for catch-up. Exports of high PRODY products are necessary. The time dimension also matters for catch-up. On a map of EXPY and HI, figure 3 illustrates how Uganda has caught up with its competitors. Starting with extreme HIs in the 1970s, Uganda, a landlocked, low income SSA country has made remarkable leaps in diversifying its exports in the last five years. Its record underscores the time dimension in studying export diversification, a longer term process. High PRODY exports of fish, flowers, fruits and vegetables, garments, as well as lower PRODY coffee and tea have helped Uganda to catch up with Colombia in flowers and Chile in fish, raising its EXPY from about \$500 in the 1970s to almost \$2000 in the last ten years, but by then, the EXPYs of its competitors had increased three-fold.

27. In a nutshell, in low income countries located on the vertical part of the HI-EXPY curve in figure 1, faster diversification and higher EXPYs can be achieved through more export discoveries, and/or a more even distribution of existing products (both of which affect the level of the HI) and/or only a few high PRODY primary or manufactured products. But for well diversified low and middle income countries located on the horizontal part of the curve, nearer to the origin, exports of high PRODY products are essential for increasing the EXPY along with further diversification. For them, the gains from further diversification are small. There *is no unique path of export diversification that leads to a higher EXPY*. Higher PRODY products can be produced as much from primary, natural resource-based, or manufactured inputs. In the next draft of this paper, we intend to investigate this empirically. But the point holds.

28. Figure 2 also introduces country groupings which show that in general, oil exporters have the most concentrated exports; in small states, the relationship between the HI and EXPY is nonlinear; and landlockedness is a disadvantage for exporters with extremely high HIs.

5. THE PATTERN OF EXPORT DIVERSIFICATION BELOW THE AGGREGATES

29. One of the stylized facts of export diversification in developing countries is that it is related positively with economic growth. A second one is that natural resource wealth is not necessarily a curse for developing countries. Combined with skills, technology and a conducive policy environment, natural resources can be a source of productivity growth (Lederman and Maloney, 2007). Most likely, the role of other factors such as geography, endowments, and the structure of the economy also influences export diversification. One can argue, as is often done in the case of SSA, that abundance of land condemns the continent to a low level of development characterized by a small manufacturing sector. In this section, we briefly focus on some of these issues but at a disaggregated level. For the policy maker in a small country, it is probably more useful to know if almost all small countries are constrained by country size or whether there are useful exceptions that may inform her policy decisions. Did small states as a group diversify and how does their performance compare with larger states? In a later section, these factors are jointly analyzed.

Export diversification and geography: does country size and location matter?

30. Among small states that had a population of 1 million or less in 1990, between 1980-85 and 2000-04, about 61 percent of the countries diversified by at least 10 percent (figure 7). The average HI decreased from 0.31 to 0.2. Within this set, 70 percent of the non-oil but only a third of the oil exporters diversified.¹⁰ Are small states still less diversified than larger states? Yes. Compared to the early 1980s, while the HI levels of most of the small states have, on average, converged closer to those of larger states both low and middle income, there remains a significant difference. In addition to the time dimension, income levels also seem important. Some small states with high per capita incomes (Macau for instance) are specializing in high PRODY exports (figure 2). All this implies that in lower income small states, export diversification strategies would have to factor in constraints such as limited economies of scale, a problem that is critical to their development process but which would not have been identified if all countries were given (the same) advice based on the analysis of a common production function that treats all countries in the same pot.

31. *Are landlocked countries less diversified than coastal ones?* On average, landlocked countries are less diversified than coastal ones although it is important to note that this outcome is driven by regional factors, time horizon under consideration and how the pattern of exports has transformed over time (figures 8). As SSA has the largest number of landlocked countries, its weight colors the outcome.

¹⁰ Several countries had HIs of about 0.7 (Sao Tome and Principe, Comoros, Gabon). Twenty years later, Comoros and Gabon had worsened.

32. In the past twenty years, landlockedness seems to have been less problematic in Bolivia and Paraguay in LAC than in SSA which has the largest number of landlocked countries. Possibly, relative to SSA, Bolivia and Paraguay always had the fortune of better infrastructure as well as more amicable relations with neighboring countries.

33. In the 1980s, landlockedness in SSA was synonymous with extremely high HIs (figure 8 and 9). More than half of the landlocked SSA countries had HIs in excess of 0.4. Twenty years later, relative to larger states, the landlocked-state disadvantage seems to be weakening but still remains. Alongside some of the most concentrated landlocked countries, SSA also has some countries that diversified dramatically. Uganda and Rwanda are among these. In the 1980s, they were among the most concentrated landlocked countries but in 2000-04, Uganda's HI was only 25 percent and Rwanda's only 50 percent of the levels in the 1980s. Interestingly, the decline was not gradual. Nor can it be attributed to improvements in infrastructure and transport. Export diversification in Uganda occurred only five years ago with the emergence of high PRODY low weight to value products. Among others, these included natural resource based fresh and processed fish, and high value agricultural produce such as flowers, vegetables, fruits etc.. Entrepreneurial exporters had discovered products which could be air-lifted from Kampala to the rich EU markets. In Rwanda, while diversification in similar products was more limited, the rapid discovery of minerals put their share on an equal footing with coffee which was Rwanda's traditional export. These examples also apply to some other landlocked countries in SSA. While geography cannot be altered, in the past better land and rail transport was the only factor that partially offset the geographic disadvantage. While it remains critical, the last 5 years have shown that rising global demand for high PRODY agricultural products, fresh and processed, seems to be working in favor of landlocked and small SSA countries that can use air transport to export these high PRODY products to distant high income markets. It is not that air transport released the constraint, but it is the combination of air transport, demand for and supply of high PRODY high value to weight products that led to export diversification which is nudged Uganda towards a higher EXPY, albeit it had a long way to go before it moves to middle income status. High PRODY export promotion also implies a set of policies that need to focus on a wider range of activities in comparison to a narrow focus on the promotion of manufactured exports.

Export diversification and natural products – How much do minerals and coffee matter?

34. With the exception of oil, the relationship between export diversification in coffee and mineral exporters seems to depend more on how the export patterns in a country transformed over time than the sole presence of these products. There remain two conflicting view on the role of natural resources in the literature. Lederman and Maloney have shown that they are not necessarily a curse while Mayer and Woods and Collier among others have been identified as the leading constraint to export diversification (defined by the share of manufactured exports) in SSA.

35. Mineral exporters seem more concentrated but the average masks the reality (figure 10 and 12). Simple histograms suggest that the story is mixed. When their levels of diversification are examined more than two decades apart, it appears that while natural resources were a critical

constraint to export diversification about two decades ago across all such exporters, they are less important today. About 70 percent of natural resources exporters diversified over the past twenty years. There is a strong regional element that is not detected in the averages analysis.

Unsurprisingly, mineral exporters in SSA have more concentrated exports than mineral exporters in other regions. But even SSA, an interesting development occurred in the past five years. During 2000-04, a large spike is observable in the HIs of Liberia, Mozambique, and South Africa for example. The spike was associated with the price of a single metal – in Mozambique it was aluminum. Once prices return to the norm, the HI of Mozambique will reveal a fairly well diversified economy. Once the prices return to their normal levels, Mozambique will reappear as an economy with diversified exports. As Mozambique is not the only country with a spike in recent years, its case underscores the importance of time in analyzing export diversification.

36. Like mineral exporters, coffee exporters too are believed to be disadvantaged in their effort to diversify their exports. Over the past twenty years, about 74 percent diversified their exports by at least 10 percent. Compared to the 1980s, they were not less diversified than non-coffee exporters (figure 11).

37. In sum, simple graphs suggest that when the pattern of export diversification, regional elements and time are introduced, the stylized fact that mineral and coffee exporters are more concentrated do not apply across the board. Of course, this needs to be validated econometrically, and we do this in the next section. Much of the answer will depend on the period of analysis.

Export diversification and the role of export discoveries

Klinger and Lederman (2006) suggest that more than the distribution of the product shares in a country's export basket, the number of its export discoveries is important for export diversification. They find that the sector concentration of the discoveries is less important than the number. They also did not find any sectoral patterns. HHR have shown that for the *growth of its per capita GDP*, the sophistication of the new products matters more than the scaling up of what the country produced earlier; they use China's example to make the point. HHR also points out that 'what you export matters.' This theme has been discussed in various parts of this paper.

38. Instead of numbers, we define export discoveries in terms of their value per product in a year. This measure is a useful indicator of the importance of export discoveries for a country and their structure can lead to a better understanding of the pattern of export diversification. Are new export discoveries likely to bend the export basket in the direction of a modern economy, or are they evolving in a direction that, as in the case of SSA, is unlikely to transform its export basket from what it was in the past?

39. Figure 14 Shows the mean value of export discoveries and the share of manufactured exports at a regional level. In all four regions, the value of export discoveries has grown over time but their mean value varies widely. In the last five years, the mean value of East Asia's export discoveries has doubled from \$30,000 to more than \$50,000 while the corresponding numbers for LAC which is second are \$8,000 and 12,000. The mean value of SSA's export discoveries finally rose above \$2000 to over \$4000 though the jump in this statistic may reflect a data recording error.

40. Are higher value export discoveries related with a higher level of economic development as represented by the share of manufactured exports? Yes, except in SSA. Over the past ten years, the share of manufactured exports has increased from a low of 10 percent to only 15 percent, while that in the other regions has been in the range of about 40-50 percent.

41. Have export discoveries nudged the export baskets of developing countries towards a modern economy? This can be examined in two ways. The total value of discoveries indicates enormous differences in scale. LAC's discoveries totaling \$3 million in 2004 pale in comparison to East Asia's that were worth \$4 billion. But the share of manufactured discoveries in South and East Asia was about 65-70 percent while the corresponding share was 30 percent in SSA and 45 percent in LAC. It seems that LAC and SSA were discovering more resource based products than manufactured ones.

Export diversification, policies, war and politics

42. With the exception of research that interprets export diversification to be explained by the factors of production alone (Mayer and Woods, UNU), the role of good governance proxied by economic policies and institutions has been incorporated explicitly in all other papers. Unsurprisingly, the results depend on the choice of variables and the data used to model that variable. Before we follow the tradition, we display a simple graph that excludes country groupings that are believed to have a special influence on export diversification, i.e. oil exporters, small states, and landlocked countries. The change in export diversification in the remaining countries twenty years apart captures the combined influence of economic policies, institutions as well as wars, internal conflicts and politics that we believe collectively represent the quality of the economic environment in which countries trade (return to figure 1A). Figure 1A illustrates that export diversification led to economic growth in most countries but the longer term time span is an important factor in arriving at this result. Twenty five years ago, the diversity in the levels of diversification was equally large between low and middle income countries. Today, the export diversification and income divide is larger and there are clearly three income classes

6. ESTIMATION AND RESULTS

43. The earlier sections of this paper focused on bivariate relationships. In this section, we use a simplistic framework to understand (i) how the relationship between export diversification and the factors that are believed to explain it has changed over the longer term, i.e., between 1976 and 2004; and (ii) whether the pattern of export diversification can explain it. We also model some of the main explanatory factors that researchers have used to explain export diversification.

44. Three measures of export diversification are used: the Herfindahl Index (HI), share of manufactured exports in total exports (in the spirit of Mayer and Woods), and the value of export discoveries (in the spirit of Klinger and Lederman, although they use the number of export discoveries). We work with two cross sectional models for 1985-89 and 2000-04. The results of these models are consistent with those for 1990-94, but we do not report the latter. We also test these relationships in a dynamic panel (systems GMM) to control for endogeneity while retaining country fixed effects. Both models lend strong support for our basic hypothesis: *in addition to the factors of production - natural endowments, labor and skills - which researchers have found to be important, country characteristics, geography, and the high PRODY product share provide a better explanation of economic diversification in the context of the varying levels of EXPY.*

45. In a simplistic model we try to explain variation in export diversification among developing countries by considering a variety of factors that have been examined in previous research. At this juncture, since the literature on what explains export diversification is still evolving, we try a kitchen sink approach to understand what explains it better [we are essentially heading in a direction (in future research) that this is not a useful concept for studying this subject, but first we need to ensure that we are on the same page with everyone else.] The factors of production approach (Mayer and Woods, Collier) is useful but does not go too far and concludes with the usual policy implications – do everything that is good for growth and export diversification will somehow happen. HHR’s approach is very insightful but is appropriate in a country-specific framework. Whether modeled at the country-specific level or across countries, the problem of finding suitable data to model market failure remains unsolved.

46. We start with a core model that considers the relationship between export diversification (measured by the Herfindahl Index) and per capita GDP, population and the initial level of the HI in 1976-80.

$$\begin{aligned} \text{LnHI}_i = & \alpha_0 + \beta_1(\text{LnGDP}_{-percapita})_i + \beta_2(\text{population})_i \\ & + \beta_3(\text{InitialHI})_i + \mu_i \end{aligned}$$

47. The dependent variable, LnHi, is the natural log of the average Herfindahl level for each country. The independent variables in the core model include controls for the level of development, measured by per capita GDP in 2000 US dollars, population as a proxy for the size of a country, and the initial level of the Herfindahl Index. Each of these variables is significant and robust. We find that more developed and larger countries have more diversified export

baskets and initial conditions matter - countries that had highly diversified export baskets in 1976-80 are likely to be more diversified today.

48. To the core model, we add the initial level of exports and export growth, and the ICA generated ‘number of days it takes to start a business’ as a proxy for market failure, in keeping with Klinger and Lederman. Land per worker and education/skills proxied by the Barro-Lee measure of human capital are included to link our work with the Mayer and Woods hypothesis.

49. We also add other variables that we expect are related to a country’s level of diversification: dummies for landlockedness to see if geographic location matters, and for exporters of natural resources specified as minerals, oil and coffee. The number of telephone lines is a proxy for infrastructure. Other specifications of the model shed light on the effect of export prices by including growth in the terms of trade.

50. The structural composition of the economy represented by the share of manufacturing value added in GDP is the crux of the research on why SSA is developing so slowly. We add this variable to our framework.

51. Finally, how the ‘pattern’ of exports is related with the level of diversification is analyzed by including the share of exports associated with a high PRODY (average PRODY above \$1000).

52. The possible relationships between export diversification and openness, using either the ratio of trade to GDP or Fraser’s Index of Economic Freedom, and ICRG index, the investment climate and the Doing Business indices were also considered but the results were not significant in any of the models and are not reported.

We start with the cross sectional models for 2000-04 and 1980-85 (in that sequence) for the Herfindahl Index. The same approach is applied to the other definitions of export diversification. All results are presented in Annex 1 - models.

Herfindahl Index - Cross section for 2000-04 and 1980-85

53. We begin with the Klinger-Lederman hypotheses of export discoveries which asserts that the initial level of exports and export growth largely explain export discoveries. The authors also found a positive relationship between export discoveries and the number of days it takes to start a business (an ICA variable). We did not find these variables significant in our framework.

54. Next, we introduce land per worker and education/skills proxied by the Barro-Lee measure of human capital to test whether the variables employed by Mayer and Woods to explain manufactured exports can explain the level of export diversification in our framework. Like them, we also find that land reduces diversification, but do not find skills to be significant unless we exclude per capita GDP. This may be due to the strong correlation between the latter and the Barro-Lee measure. We find full support for their hypothesis including for the SSA

effect (models 3, 4 and 11). The same applies to Habiyaemye and Ziesemer’s hypothesis which uses the Herfindahl Index as the dependent variable and the factors of production approach but also includes fuels and infrastructure. This hypothesis does not include per capita income which probably explains why skills are significant in their model. Instead of various infrastructure variables, these authors constructed their own infrastructure index which they find to be robust. We did not find support for infrastructure when we used the an alternative variable (telephone lines). But, as all these authors themselves note, their models explain only a small part of the relationship between export diversification and these factors of production. In later models, we work only with per capita GDP, although the Barro-Lee measure works just as well.

55. As noted earlier and supported by the graphs in section 5, country size and the initial level of development are associated with higher levels of diversification in both periods – 1985-89 and 2000-04 (core model).

56. In addition, geography seems to matter through the location effect in an interesting manner. Consistent with the mixed messages in section 5, in the 1980s, landlockedness was, on average, associated with more concentrated exports relative to coastal countries in all countries, even after controlling the SSA effect. In the 2000-04 period, it is no longer significant. This result suggests that most landlocked countries have been able to overcome the disadvantages imposed by their location in the past decades either through lower transportation costs or by diversifying into products, which allow for alternative means of transportation, such as fresh flowers that can be airlifted for export to distant markets, and are less dependent on economies of scale.

57. Diversification may be affected by the natural endowments of countries that have a relative abundance of land over capital as they may find it easier to specialize in natural resource-intensive exports. This would imply that the presence of minerals, metals and even primary commodities, and oil should be positively related with the HI. The results across all periods substantiate the conclusion that on average, an oil-exporter is probably less diversified than a non-oil exporter. The evidence on other natural resources is mixed. After controlling for oil, mineral exporters and coffee exporters had a positive and significant relationship with the HI in 1985-89, which implies that coffee and minerals exports dampened the chances of diversifying in the 1980s. However, their importance disappears in the recent period. This could explain the “successful diversification stories of many coffee exporters such as Uganda and Colombia. The terms of trade growth variable is negatively related with diversification in the 2000-2004 period but the negative sign of the interaction between coffee exporters and this variable suggests that coffee exporters are likely to be more diversified in the presence of a positive coffee price shock. In the 1980s, this effect did not exist and explains the high level of export diversification in primary exporters. .

58. It is believed that the SSA countries have, on average, always been disadvantaged in efforts to diversify their exports. We find evidence of a strong relationship between the “SSA effect” and export diversification *only* in the 2000-04 model, after controlling for the minerals, oil, coffee and landlockedness variables. During the 1985-89 period, all countries were likely to be disadvantaged by these endowment-related effects – there was nothing special about SSA.

This can be explained by the significant progress that the non-SSA countries have made in either overcoming the disadvantages related with natural resources, or putting them to good use (a finding that Lederman and Maloney show, although they do not address the time and SSA effects). The significance of the ‘SSA effect’ is mapped in figure 13. It shows the existence of certain unobserved SSA-specific factors which could be institutional, cultural, conflict –related or other characteristics.

59. Economic diversification into services and manufactured products (measured as a share of GDP) is positively related with export diversification across both periods in our models, as is infrastructure, proxied by telephone lines per 1000 subscribers. The critical importance of these variables in export diversification is repeatedly underscored in the context of growth and diversification literature (Collier and ...). Quite surprisingly though, gross FDI seems to be linked with more concentration only in 2000-2004. We have no explanation for this result except that it probably needs to be investigated further in the context of the sectoral composition of exports (more FDI into oil and mining will lead to an increase in the HI, and has done so in Tanzania and Rwanda, Burundi and Congo).

60. For the 2000-2004 models, a control for a country’s level of diversification in 1976-1980 was included to acknowledge the fact that all the different specifications in the models do not fully explain the differences in diversification across countries. The positive and significant coefficient of this variable indicates there is some persistence in the level of concentration but also that some country fixed effects, apart from those included, are behind today’s level of diversification.

61. Finally, we examine the relationship between the patterns of export diversification measured by the share of high PRODY exports in total exports. In both periods, we find a strong and robust relationship between it and export diversification. In particular, it raises the explanatory power of the model significantly. Tangentially, this result suggests that if countries want the pattern of export diversification that raises their EXPY then, in addition to achieving a more even distribution of the share of existing products by increasing their supply and/or increasing the number of products, they also need to focus on exporting high PRODY products. We hope to develop this concept further in future research.

Manufactured exports/ Total exports - Cross section for 2000-04 and 1980-85 (complete for all other variables except the introduction of the high PRODY export share.....should have it before Thursday.)

62. Countries with higher GDP per capita and population are more likely to export a higher share of manufactured exports. As in the case of the Herfindahl, being in SSA explains much of the differences in the share of manufactured exports but landlockedness does not seem to matter. The basket composition of a country is related with different outcomes across periods. In 1985-89, coffee exporters were associated with lower manufactured exports but in the later periods this effect is either irrelevant or positive. Oil and mineral exporters are always more likely to export less manufactured products. The growth in the terms of trade is negatively associated with

manufactured exports except in 1990-94 where countries that experienced a growth in their terms of trade exported a higher share of manufactured products. The significant and negative coefficient on the interaction between Terms of Trade growth and coffee exporters shows that coffee exporters had an opposite experience.

63. The effect of the education variable seems to vanish when a control for SSA is added suggesting differences in human capital are regional or captured in other SSA characteristics. Land per worker is negatively related to having more manufactures in the export basket.

64. Not surprisingly, the share of manufactured value in GDP is positively related with the share of manufactured exports but services exports as well as days to start a business do not seem to matter. Infrastructure is also consistently associated with more manufactured exports.

65. As with the Herfindahl models, the initial level of diversification for the 2000-2004 period is significant across all specifications and negatively related to a higher share of manufactured exports.

Value of Discoveries per product -- Cross section for 2000-04 and 1980-85

66. We find that richer countries and countries with a large population are more likely to have higher values of discoveries per product and support Lederman and Klinger findings. Contrary to the previous models with the level of diversification and the share of manufactured products in total exports, even after controlling for landlockedness, the ‘SSA effect’ is not significant in explaining the value of discoveries per product, at least in the 2000-04 period. This seems counterintuitive. Not quite. Figure 14 in the attachment (Annex 0) for discoveries shows that while the value of discoveries is lower in SSA, the difference between it and LAC and SA is smaller than between EA and LAC and SA.

67. Landlockedness and being a coffee exporter are the only other variables that are significant in explaining the value of discoveries per product. The models have low explanatory power and indicate that our definition of export discoveries needs to be analyzed in a different framework.

Dynamic panel models – results (complete for all explanatory variables except the highPRODY export share Coming in the next few days)

Dependent variable: Herfindahl Index

Dependent variable: Manufactured exports/ Total exports

Results

68. In a cross-sectional regression, the unobserved country-specific effect is part of the error term since these unobserved country-specific effects are not controlled for. If past levels are

important predictors of current levels, the cross section findings are likely to be biased. In our case, if a country's level of export concentration and change in its export composition remains highly stable over time, we should control for a potential serial correlation that may be biasing our coefficients. Problems of simultaneity or reverse causation may arise as well. A reasonable alternative to dealing with the problem of persistence as well as endogeneity is to use a dynamic panel specification. We use the Blundell-Bond GMM system estimator¹¹, which allows us to incorporate fixed effects apart from the time invariant regressors.

69. For all the models, the consistency of the GMM estimator was tested using three different tests¹². In general, the consistency of the GMM estimator depends on whether lagged values of the explanatory variables are valid instruments in the regression.

70. Our specifications are similar to the ones presented in the cross sections with the exception of testing the share of high PRODY products in total exports (which we plan to do in the next draft). The instruments for the regression of the Herfindahl levels are the lagged differences of the corresponding variables and are appropriate under some assumptions (Arellano and Bover 1995)

71. Tables (7 and 8) presents the results of the two step GMM estimator employing the lagged values of explanatory variables as internal instruments, including measures of economic development, and other economic variables for each specification (GDP per capita concentration and trade openness). The results indicate a strong link between lagged and current values of concentration. This was also found to be true of the 2000-04 cross sections.

72. Landlockedness does not seem to matter when we control for other characteristics such as economic structure and terms of trade. Land per worker does matter – it worsens export diversification. Oil, minerals and coffee exporters have a negative relationship with the HI and the share of manufactured exports. Countries that have a higher share of manufacturing as a percent of their GDP are, on average,¹³ likely to be less concentrated. These results are also found in the cross sectional models although there the time element provides more insights into how factors that were once important in explaining export diversification may be less so now, as is the case with landlockedness in 2000-04. Finally, the 'SSA effect' dummy is significant and positive in both models. In cross section, it was insignificant in the 1980s but became more significant in the recent period.

73. The dynamic panel results are so far also robust to other specifications. Other factors that are likely to affect diversification were also included, such as different measures of openness (

¹¹ see Bond et al. (2001)

¹² We consider two specification tests: the first is a Hansen test of over-identifying restrictions, which tests the overall validity of the instruments by analyzing the sample analog of the moment conditions used in the estimation process. Failure to reject the null hypothesis gives support to the model. The second test examines the hypothesis that the error term is not serially correlated. We test whether the differenced error term (that is, the residual of the regression in differences) is first-, and second-order serially correlated.

¹³ The evidence is not conclusive as regards the effect of size and Gdp per capita on diversification as the significance of these variables changes across specifications.

trade/GDP or economic freedom indexes), investment climate and Infrastructure (Telephone lines or roads) and FDI. As these variables are not statistically significant in any of the specifications, they are not included in these tables.

74. In the model with the share of manufactured products in total exports, with the exception of land per worker that does not seem to affect manufactured exports, results of the model with the Herfindahl are preserved with the right signs.

Conclusion

As the literature on export diversification is still evolving, we have tried to explore received hypotheses, and add a few new concepts to understand better the relationships between export diversification and factors that are believed to explain it. There are two ways in which the subject has been analyzed. First, ongoing research has shown that the relationship between export diversification and economic growth is positive. This provides a good reason for studying what explains export diversification, which is the second theme.

Two main approaches have been proposed by researchers. One conceptualizes export diversification as a production function that is modeled with the usual variables - land, labor, skills, infrastructure, and fuels. While there is strong support for this approach, also in our paper, its policy conclusions are no different from what economists recommend for economic growth. This implies that there is no case for export diversification when in fact the literature has shown the opposite. In addition, the models have low explanatory power, suggesting that something else also plays a role in driving export diversification. This notion has been explored in a second approach that asserts that market failures may be a constraint to export diversification. If so, a different breed of government policies is needed to accelerate it, not just the conventional the ones recommended for growth.

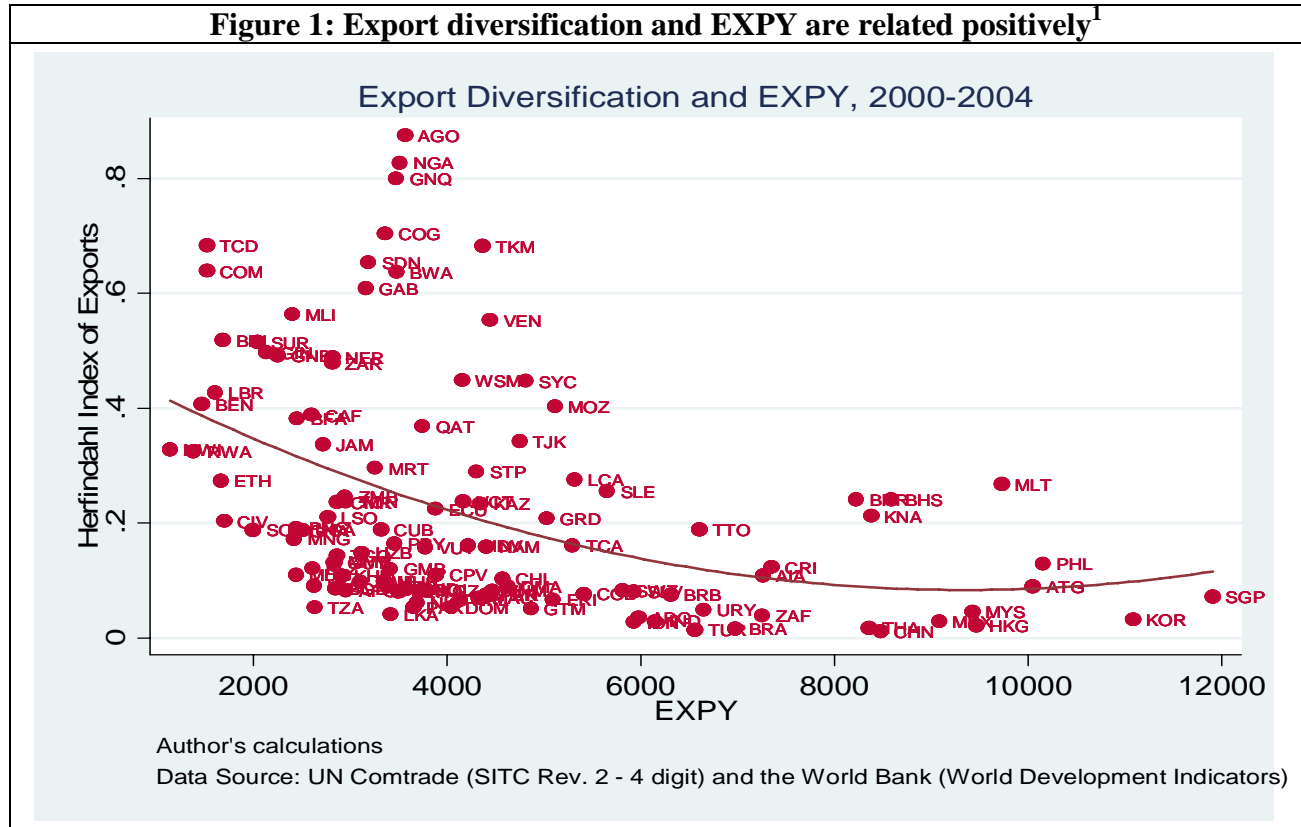
We have tried to contribute to the subject in three ways.

1. Accepting the positive relationship between export diversification and growth, we examined how well it explained the status of our client developing countries. On a map of export diversification and per capita GDP, we found them located along two planes. Those with highly concentrated exports clearly need to diversify significantly to grow. But those that were well diversified, and there are many such low and middle income countries, had a wide divergence in income levels. For them, the marginal gains from diversifying further are small unless they can find a way to rapidly catch up with rich countries. We find that the income levels of the products countries export is a good predictor of how its export diversification levels are related with its level of economic development, an idea proposed by Hausmann, Hwang and Rodrik. We use a variety of related concepts to conclude that there is no unique path to diversification. Low and middle income, primary, natural resource and even oil exporters can leapfrog if they export even a few rich country or high PRODY products (a variable that we introduce). This is happening more often than we imagine as is clear from the evidence we provide.

Our findings are in contrast to the prevailing view in the literature which asserts that low and sometimes even middle income primary, natural resource and even oil exporters are particularly disadvantaged in diversifying their exports. An exception to the prevailing view is Lederman and Maloney (2007) which has found that the effect of natural resources on economic growth is mixed.

2. We assert that an aggregate treatment of export diversification in the way we treat economic growth misses the country characteristics that are the essence of diversification, which is about *what* is in a country's export basket. Who exports what and why is necessary to understand the trends and levels of export diversification. Our contribution is in examining how geography (country size and location), factor endowments (oil, minerals, coffee), economic structure (share of manufacturing and services in GDP) and export discoveries explain export diversification. We find that these factors have a non-trivial influence in explaining it and need to be incorporated systematically in its analysis.
3. A third contribution of our paper is in explaining that export diversification is sensitive to time. We show this in cross section models. There are two interesting results. Landlockedness, natural resources, country size were likely to be negatively related with export diversification in the developing world in the 1980s. By 2000-04, except for oil, the importance of these factors had diminished significantly, to the extent that they are no longer statistically significant. The SSA dummy, the focus of a large literature, was not significant in the 1980s. Countries in other regions overcame the structural constraints to diversification by 2000. In 2000-04, the SSA dummy is very significant and robust.
4. And lastly, we demonstrate that by including a variable representing the share of rich country products in total exports, we are able to obtain a better idea of what explains export diversification. The significance of this variable suggests that by focusing exclusively on how to increase the share of manufactured exports in SSA, for example, policy makers may be missing a valuable opportunity for enabling exporters to diversify in ways that lead them to greater and faster economic development. The high PRODY variable reveals a vast range of products that can be processed and exported in low and middle income countries that are rich in natural resources. As processing is the first step to manufacturing, it makes sense to reorient the policy focus from manufacturing to processing and manufacturing when the latter relies on mostly imported inputs, especially in SSA. The advantage of the high PRODY products is that they can be produced as much by primary product exporters as middle income countries. This levels the playing field – poor countries do not have to wait until they develop their manufacturing sectors before they can start catching –up with the developed.

Annex 0: Accompanying figures and tables – part of the main text.



¹ A decrease in the Herfindahl indicates an increase in export diversification.

Figure 1 A

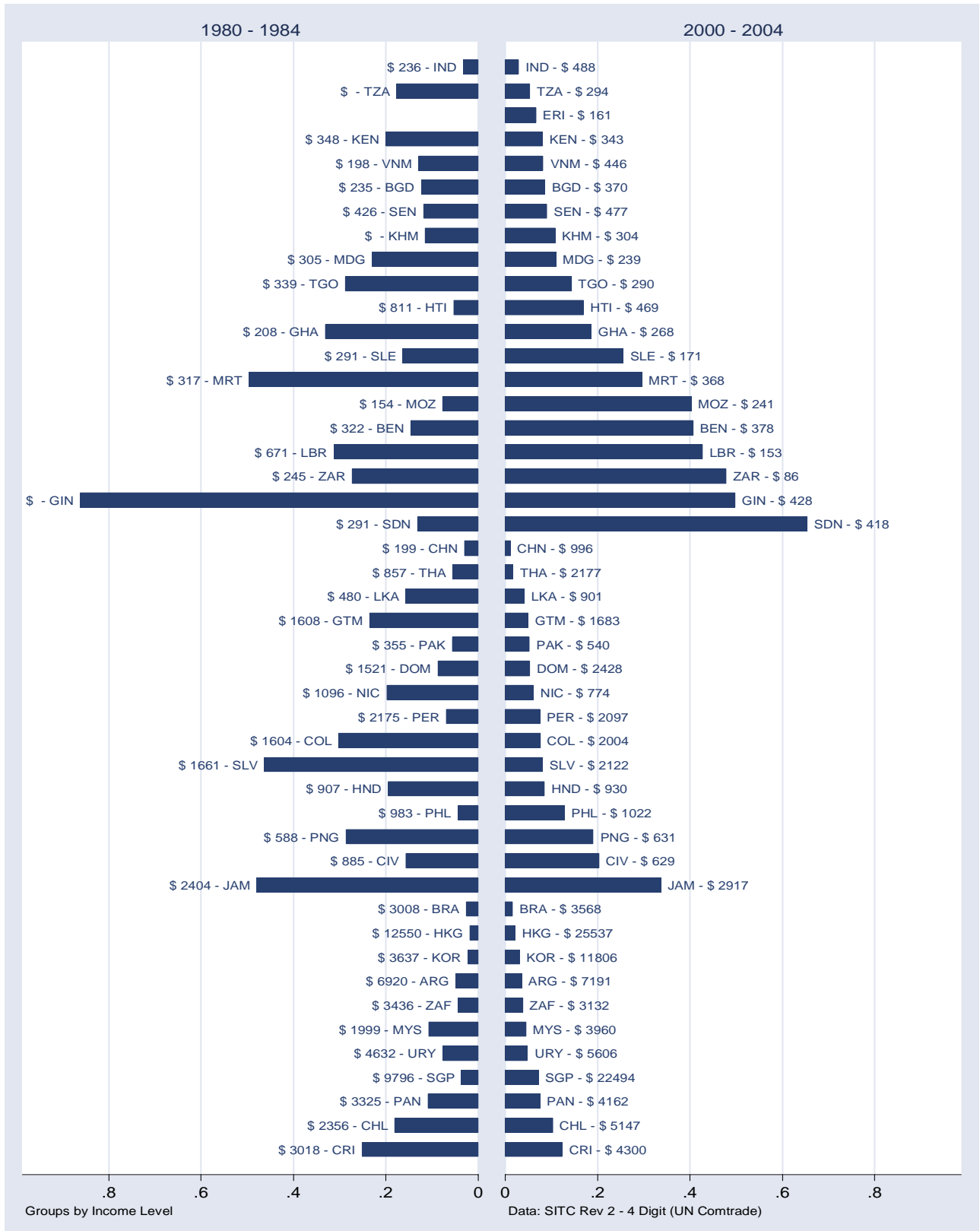


Figure 2

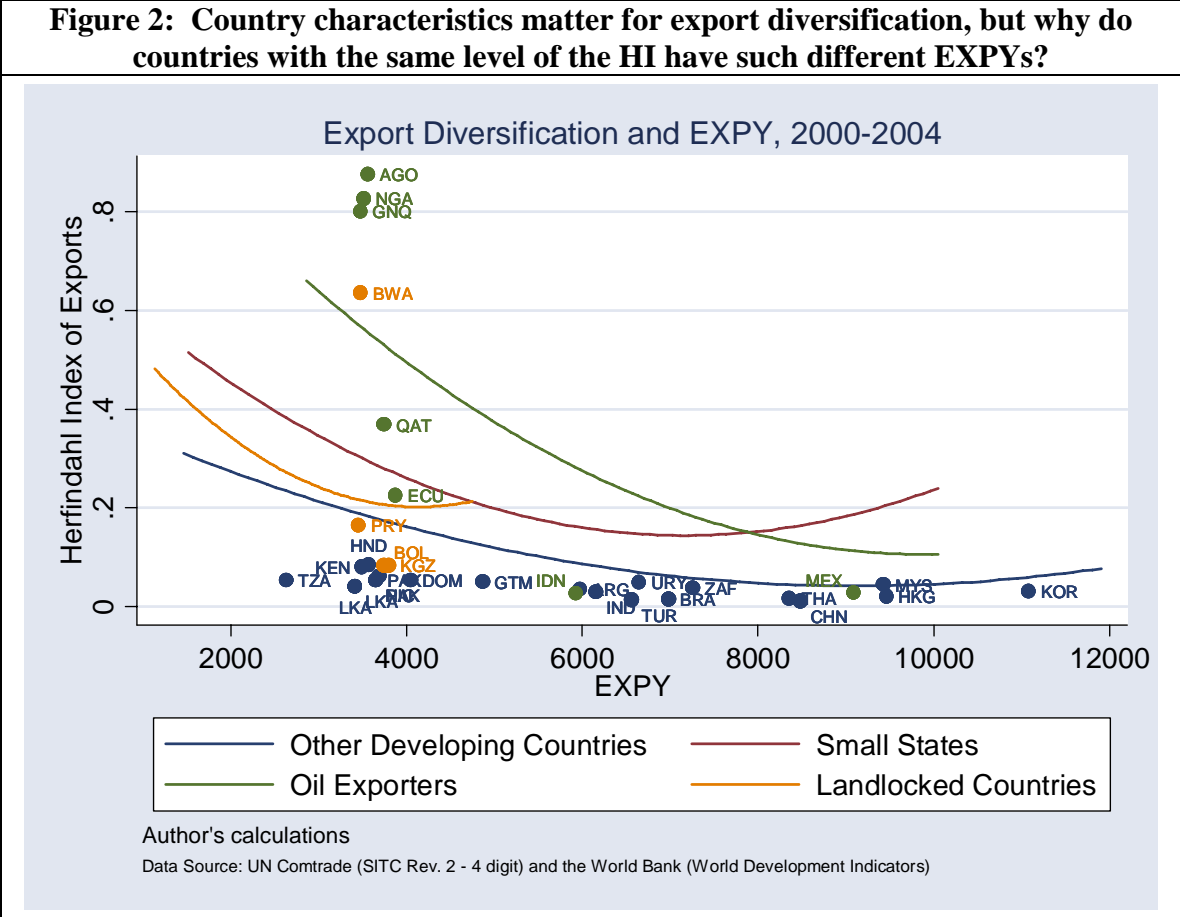


Table 1

Country	1980 - 1984			2000 - 2004		
	prody	Description	%	prody	Description	%
Bolivia	9077	Petroleum gases and other gaseous h	38	6232	Petroleum gases and other gaseous h	19
	2397	Tin and tin alloys,worked	25	5718	Oil-cake & other residues (except d	13
	934	Tin ores and concentrates	7	5171	Zinc ores and concentrates	9
	5077	Ores & concentrates of precious met	7	6491	Soya bean oil	6
	3331	Ores & concentrat.of other non-ferr	5	5716	Gold,non-monetary	5
Brazil	1383	Coffee,whether or not roasted or fr	4	6079	Soya beans	5
	3453	Oil-cake & other residues (except d	3	10149	Aircraft not exceeding an unladen w	4
	2177	Iron ore and concentrates,not agglo	2	5718	Oil-cake & other residues (except d	4
	6637	Juices;fruit & veget.(incl.grape mu	2	15411	Passenger motor cars,for transport	4
	9540	Footwear	1	4972	Iron ore and concentrates,not agglo	3
Botswana				5607	Diamonds,unwork.cut/otherwise work.	67
				4127	Nickel ores and concentrates;nickel	12
				8892	Meat of bovine animals, fresh, chil	8
				8559	Insulated,elect.wire,cable,bars,str	3
				3861	Copper ores & concentrates;copper m	2
China	4328	Petrol.oils & crude oils obt.from b	8	15707	Peripheral units,incl.control & ada	4
	1515	Cotton (other than linters),not car	3	15462	Parts of and accessories suitable f	4
	14899	Other parts & accessories of motor	3	7765	Footwear	3
	7727	Fabrics,woven,of silk,of noil or ot	3	14329	Children s toys,indoor games,etc.	3
	5461	Cotton yarn	2	15708	Parts of apparatus of division 76--	3
Ecuador	4328	Petrol.oils & crude oils obt.from b	61	5316	Petrol.oils & crude oils obt.from b	42
	1028	Bananas,fresh or dried	8	5183	Bananas,fresh or dried	18
	1383	Coffee,whether or not roasted or fr	6	10775	Fish,prepared or preserved,n.e.s. i	6
	1381	Crustaceans and molluscs,fresh,chil	5	3369	Crustaceans and molluscs,fresh,chil	5
	4974	Fuel oils,n.e.s.	4	4015	Cut flowers and foliage	5
Hong Kong, China	9909	Children s toys,indoor games,etc.	8	16474	Electronic microcircuits	9
	12390	Watches,watch movements and cases	6	15462	Parts of and accessories suitable f	5
	6033	Other outer garments of textile fab	5	4464	Jerseys,pull-overs,twinsets,cardiga	5
	7915	Jerseys,pull-overs,twinsets,cardiga	5	5607	Diamonds,unwork.cut/otherwise work.	4
	6960	Trousers,breeches etc.of textile fa	3	5408	Other outer garments of textile fab	3
Indonesia	4328	Petrol.oils & crude oils obt.from b	58	5316	Petrol.oils & crude oils obt.from b	9
	8538	Petroleum gases and other gaseous h	11	4958	Petroleum gases and other gaseous h	9
	4974	Fuel oils,n.e.s.	5	4635	Palm oil	3
	2418	Natural rubber latex; nat.rubber &	4	12166	Other coal,whether/not pulverized,n	3
	9077	Petroleum gases and other gaseous h	3	3861	Copper ores & concentrates;copper m	3
Kenya	1383	Coffee,whether or not roasted or fr	36	1655	Tea	23
	1352	Tea	24	4015	Cut flowers and foliage	12
	5022	Fruit otherwise prepared or preserv	4	5477	Other fresh or chilled vegetables	8
	5782	Portland cement,ciment fondu,slag c	4	1936	Coffee,whether or not roasted or fr	7
	4624	Other fresh or chilled vegetables	3	5408	Other outer garments of textile fab	3
Korea, Rep.	9540	Footwear	7	16474	Electronic microcircuits	12
	8378	Fabrics,woven of continuous synth.t	3	15411	Passenger motor cars,for transport	8
	8326	Electronic microcircuits	3	19274	Radiotelegraphic & radiotelephonic	8
	6277	Art.of apparel & clothing accessori	3	15707	Peripheral units,incl.control & ada	4
	7915	Jerseys,pull-overs,twinsets,cardiga	3	15462	Parts of and accessories suitable f	4

Sri Lanka	1352	Tea	38	1655	Tea	11
	2418	Natural rubber latex; nat.rubber &	13	5408	Other outer garments of textile fab	6
	6033	Other outer garments of textile fab	8	4975	Under garments,knitted of cotton	4
	6697	Other outer garments of textile fab	5	6020	Other outer garments & clothing,kni	4
	1704	Edible nuts(excl.nuts used for the	4	4789	Trousers,breeches etc.of textile fa	4
Mexico	4328	Petrol.oils & crude oils obt.from b	26	5316	Petrol.oils & crude oils obt.from b	9
	14512	Int.combustion piston engines for p	5	15411	Passenger motor cars,for transport	8
	1383	Coffee,whether or not roasted or fr	2	16734	Other parts & accessories of motor	4
	14220	Passenger motor cars,for transport	2	17782	Television receivers,colour	4
	11829	Motor vehicles for transport of goo	2	12356	Motor vehicles for transport of goo	4
Nigeria	4328	Petrol.oils & crude oils obt.from b	96	5316	Petrol.oils & crude oils obt.from b	89
	1013	Cocoa beans,whole or broken,raw or	1	4958	Petroleum gases and other gaseous h	5
	4974	Fuel oils,n.e.s.	1	1542	Cocoa beans,whole or broken,raw or	1
	3096	Cocoa butter and cocoa paste	0	5032	Fuel oils,n.e.s.	1
	10053	Gas oils	0	2156	Leather of other hides or skins	0
Nicaragua	1383	Coffee,whether or not roasted or fr	34	4789	Trousers,breeches etc.of textile fa	12
	1515	Cotton (other than linters),not car	21	1936	Coffee,whether or not roasted or fr	11
	9347	Meat of bovine animals, fresh, chil	10	3369	Crustaceans and molluscs,fresh,chil	8
	1028	Bananas,fresh or dried	7	5408	Other outer garments of textile fab	7
	2892	Refined sugars and other prod. of r	6	8892	Meat of bovine animals, fresh, chil	7
Tanzania	1383	Coffee,whether or not roasted or fr	37	5859	Fish fillets,fresh or chilled	12
	1515	Cotton (other than linters),not car	12	1936	Coffee,whether or not roasted or fr	8
	1772	Spices (except pepper and pimento)	10	1531	Tobacco,wholly or partly stripped	6
	1704	Edible nuts(excl.nuts used for the	6	1727	Edible nuts(excl.nuts used for the	6
	1352	Tea	5	1500	Cotton (other than linters),not car	6

Figure 3: Uganda: trying to catch up with the rich countries through high PRODY fish and flower exports

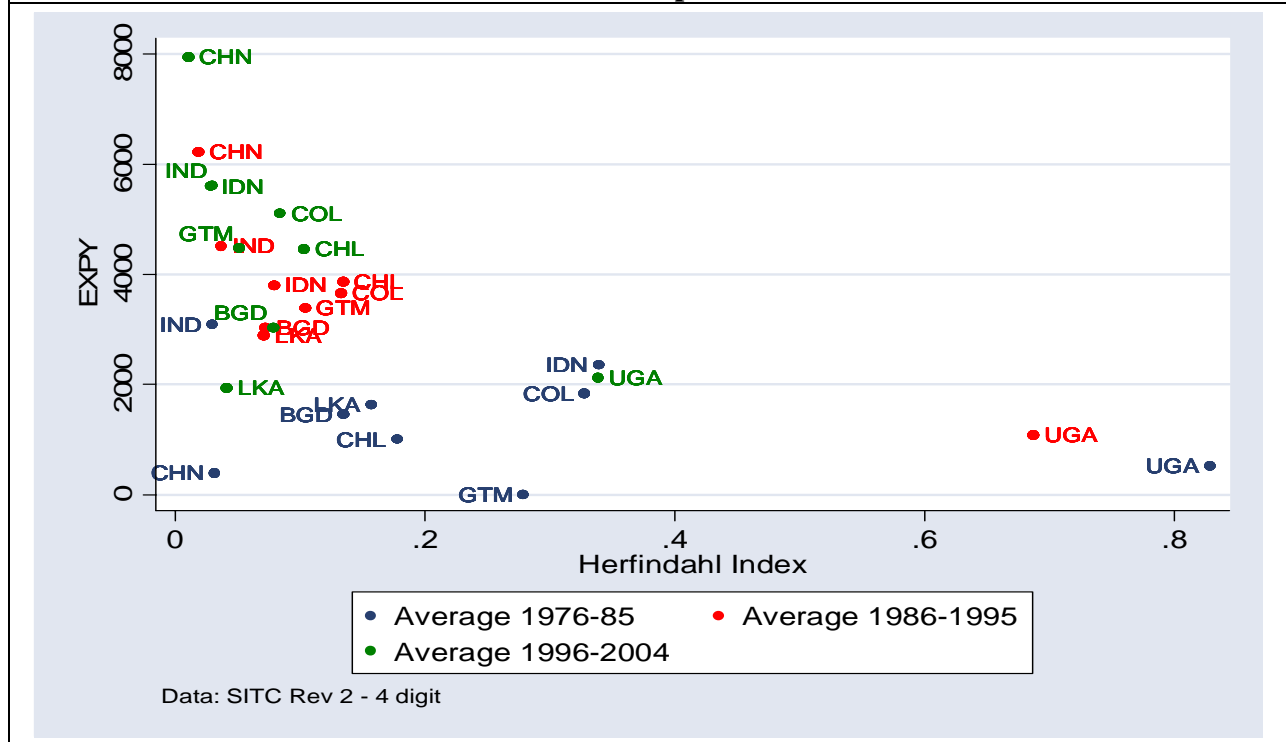


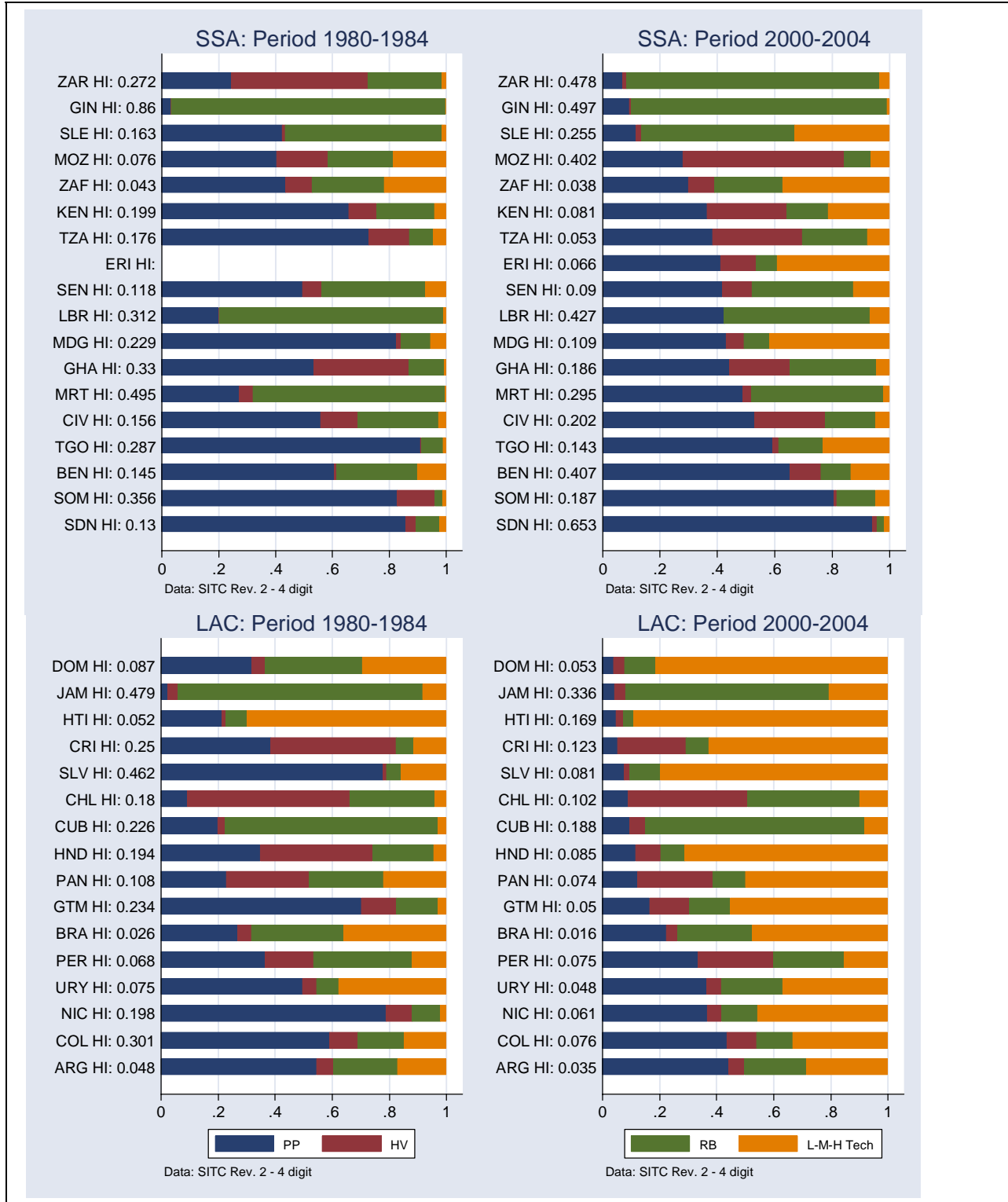
Table 2

SITC 2 CODE	Product Description	prody 1980-84	prody 2000-04
360	Crustaceans and molluscs,fresh,chil	1,381	3,369
371	Fish,prepared or preserved,n.e.s. i	3,339	10,775
545	Other fresh or chilled vegetables	4,624	5,477
573	Bananas,fresh or dried	1,028	5,183
585	Juices;fruit & veget.(incl.grape mu	6,637	5,141
589	Fruit otherwise prepared or preserv	5,022	9,337
711	Coffee,whether or not roasted or fr	1,383	1,936
721	Cocoa beans,whole or broken,raw or	1,013	1,542
2320	Natural rubber latex; nat.rubber &	2,418	1,169
2631	Cotton (other than linters),not car	1,515	1,500
2876	Tin ores and concentrates	934	1,685
2927	Cut flowers and foliage	7,059	4,015
3413	Petroleum gases and other gaseous h	8,538	4,958
3414	Petroleum gases and other gaseous h	9,077	6,232
6116	Leather of other hides or skins	1,402	2,156
6672	Diamonds,unwork.cut/otherwise work.	4,394	5,607
6872	Tin and tin alloys,worked	2,397	7,639
7591	Parts of and accessories suitable f	17,445	20,333
7599	Parts of and accessories suitable f	13,805	15,462
7611	Television receivers,colour	14,737	17,782
7764	Electronic microcircuits	8,326	16,474
7810	Passenger motor cars,for transport	14,220	15,411
7821	Motor vehicles for transport of goo	11,829	12,356
8451	Jerseys,pull-overs,twinsets,cardiga	7,915	4,464
8510	Footwear	9,540	7,765
8942	Children s toys,indoor games,etc.	9,909	14,329

Table 3: Technology definition mapped to PRODY

			PRODY GDP Constant US\$ (2004)
pp	711	Coffee,whether or not roasted or fr	694
pp	721	Cocoa beans,whole or broken,raw or	321
pp	741	Tea	548
pp	1211	Tobacco,not stripped	1731
hv	545	Other fresh or chilled vegetables	3236
hv	752	Spices (except pepper and pimento)	494
hv	2926	Bulbs,tubers & rhizomes of flowerin	6431
rb	341	Fish,fresh(live/dead)or chilled,exc	3590
rb	344	Fish fillets,frozen	8241
rb	2114	Goat & kid skins,raw (fresh,salted,	398
rb	6114	Leather of other bovine cattle and	4481
rb	2483	Wood of non-coniferous species,sawn	1673
lt	2511	Waste paper,paperboard;only for use	10672
rb	2631	Cotton (other than linters),not car	546
pp	6513	Cotton yarn	2410
lt	6534	Fabrics,woven,of discontinuous synt	3658
lt	8510	Footwear	4165
rb	2876	Tin ores and concentrates	329
mt	6727	Iron or steel coils for re-rolling	6482
mt	6732	Bars & rods,of iron/steel;hollow mi	24159
ht	7149	Parts of the engines & motors of 71	15701
ht	7162	Elect.motors & generators,generatin	10537
ht	7499	Other non-electric parts & accessor	19678

Figure 4: Evolution of the technological content of exports – 1980-85 to 2000-04.



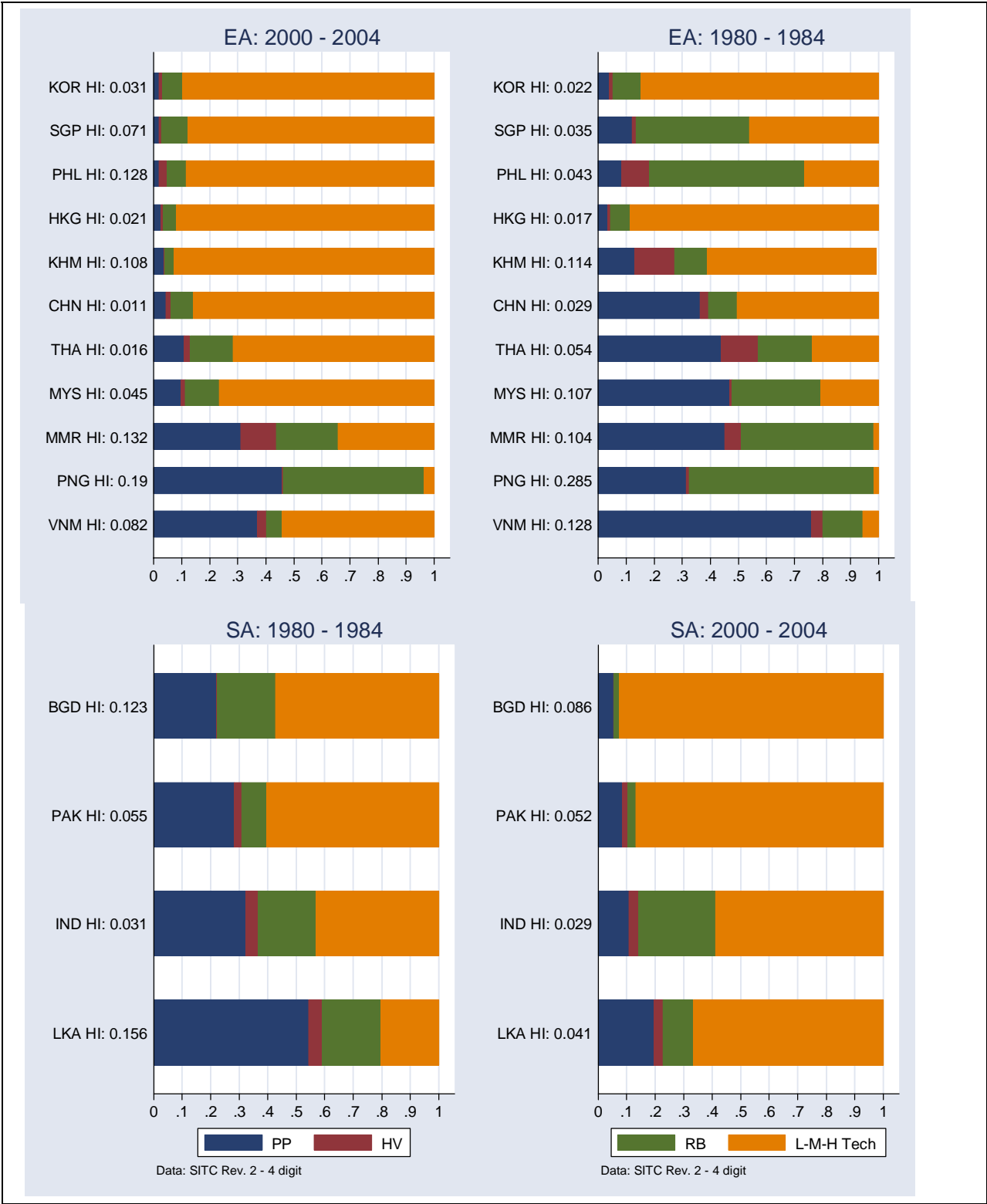


Figure 5: Low PRODY primary products

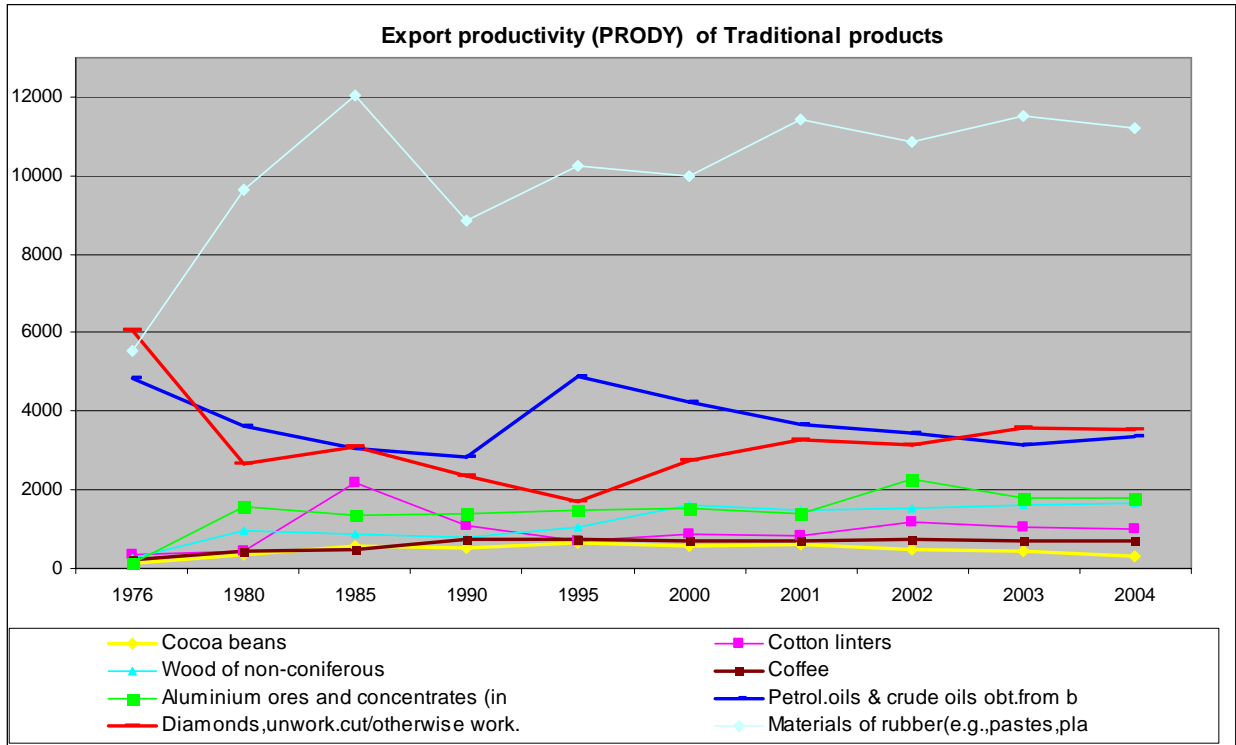


Figure 6: High PRODY processed pp and rb products that are not classified as ‘manufactured.’

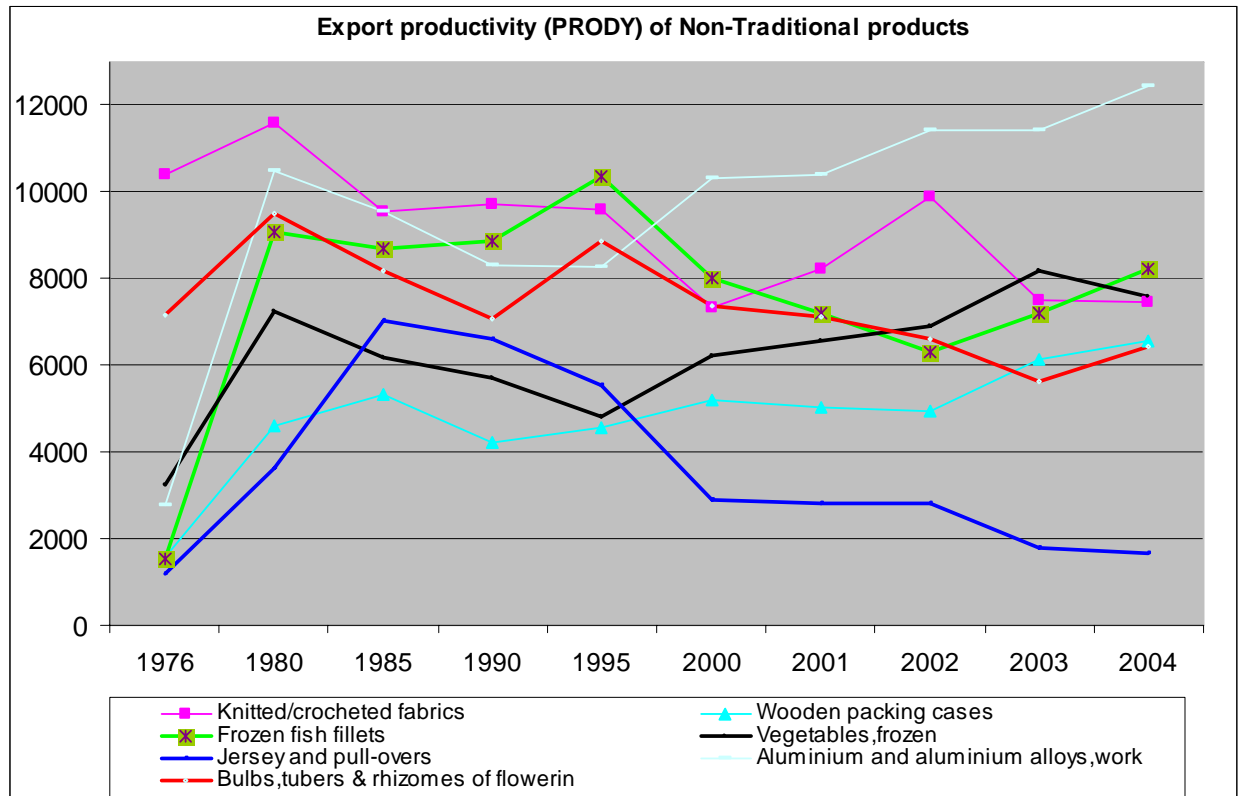
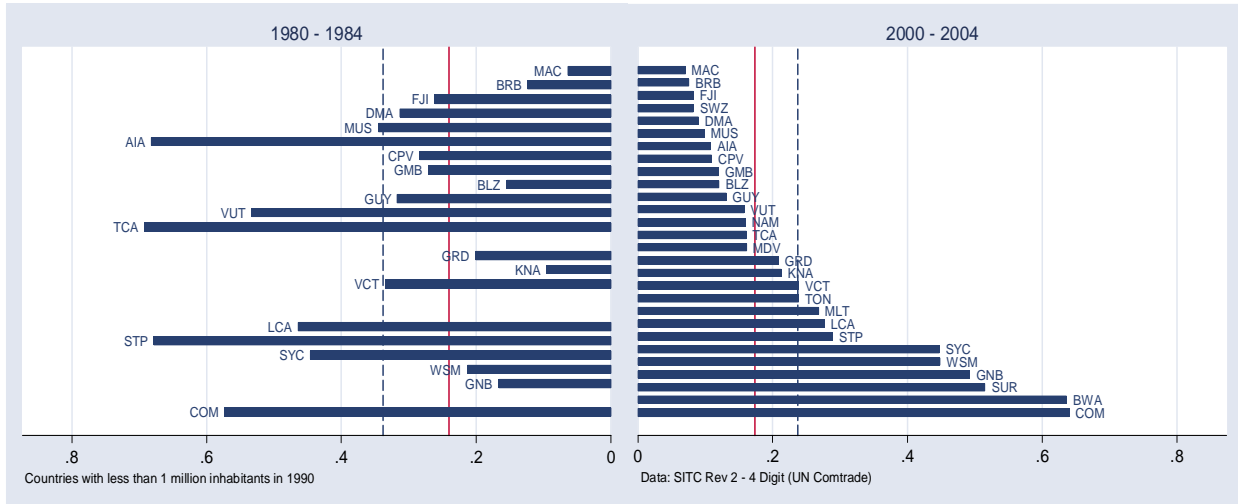


Figure 7

. Herfindahl Index of Exports in Small Countries (Not Oil Exporters)

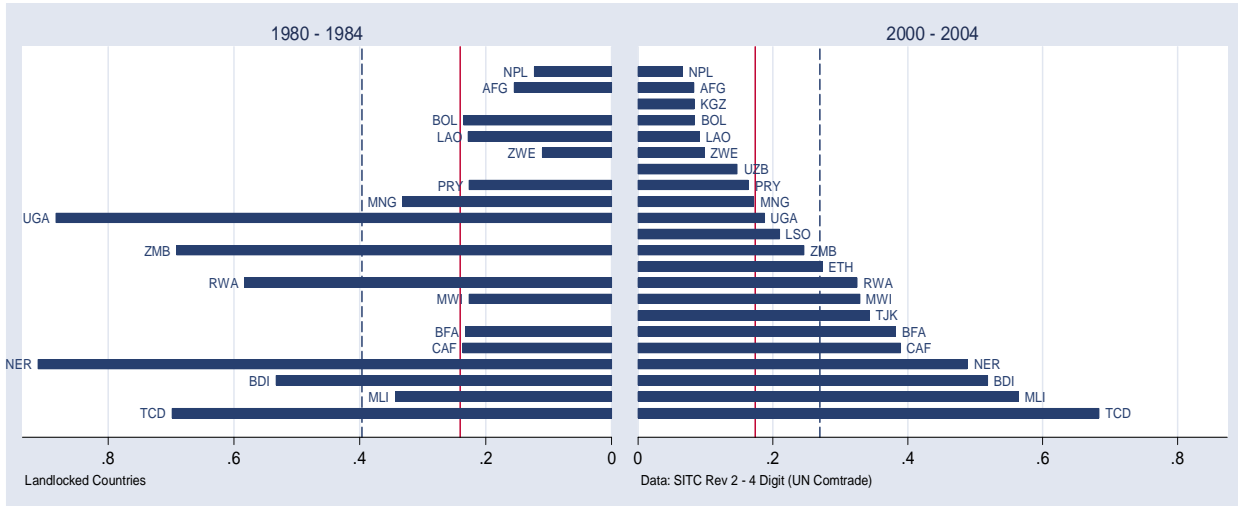


Red Lines are LICs & MICs Average Herfindahl Index in the Period

Source: Author's calculations.

Figure 8

GRAPH. Herfindahl Index of Exports in Landlocked Countries



Red Lines are LICs & MICs' Average Herfindahl Index of Exports

Source: Author's calculations.

Figure 9

GRAPH. Herfindahl Index of Exports in Coastal SSA Countries

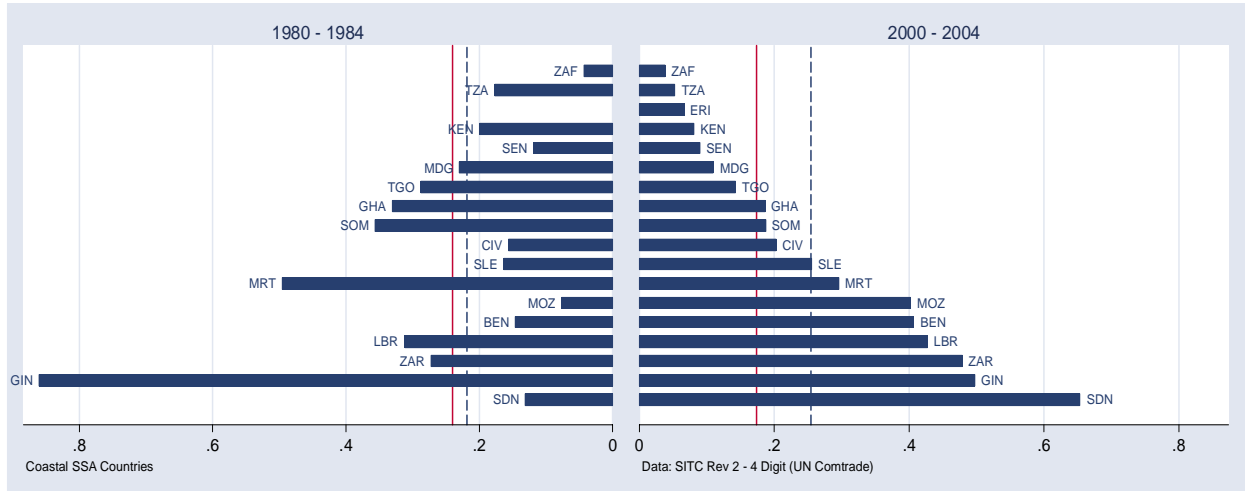
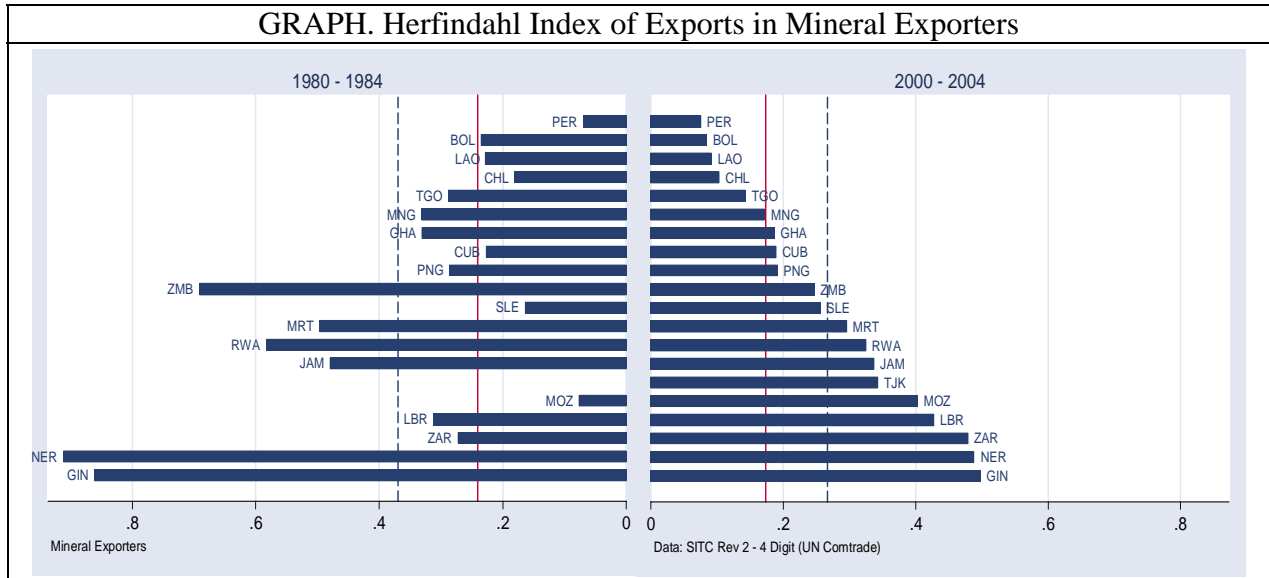


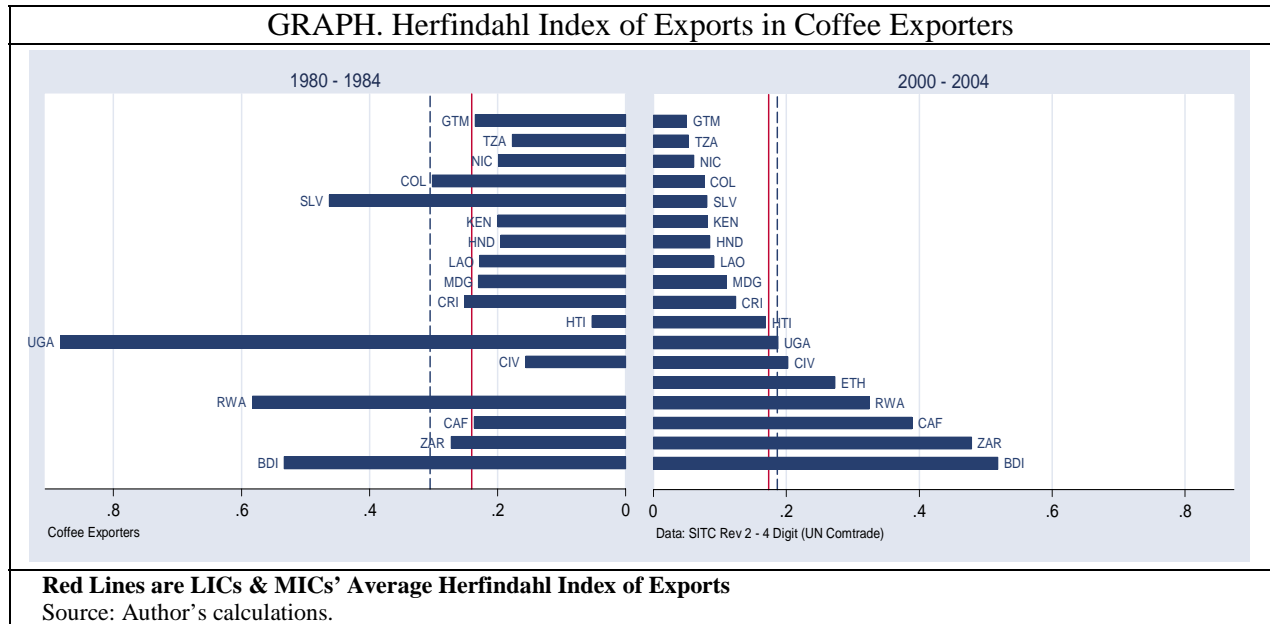
Figure 10

GRAPH. Herfindahl Index of Exports in Mineral Exporters



Red Lines are LICs & MICs' Average Herfindahl Index of Exports
Source: Author's calculations.

Figure 11



Coffee exporters		Mineral exporters	
AGO	30	AIA	25
BDI	30	ANT	30
CAF	30	ATG	30
CIV	30	BHR	9
CMR	30	BOL	30
COL	30	BWA	6
CRI	30	CHL	30
ERI	13	CMR	30
ETH	13	COM	30
GTM	30	CUB	30
HND	30	GAB	30
HTI	30	GHA	30
KEN	30	GIN	30
LAO	30	GNB	30
MDG	30	GUY	30
NIC	30	JAM	30
RWA	30	KAZ	14
SLV	30	KGZ	14
TZA	30	KHM	30
UGA	30	LAO	30
ZAR	30	LBR	30
		MNG	30
		MOZ	30
		MRT	30
		NER	30
		PER	30
		PNG	30
		RWA	30
		SEN	30
		SLE	30
		SUR	30
		TGO	30
		TJK	14
		ZAF	30
		ZAR	30
		ZMB	30
		ZWE	30

Coffee exporters(coffee share>=30% from76-1990)

Mineral exporters(Mineral share>=30% from76-1990)

Figure 12

Graph. RB Exporters (RB as a % in total exports)

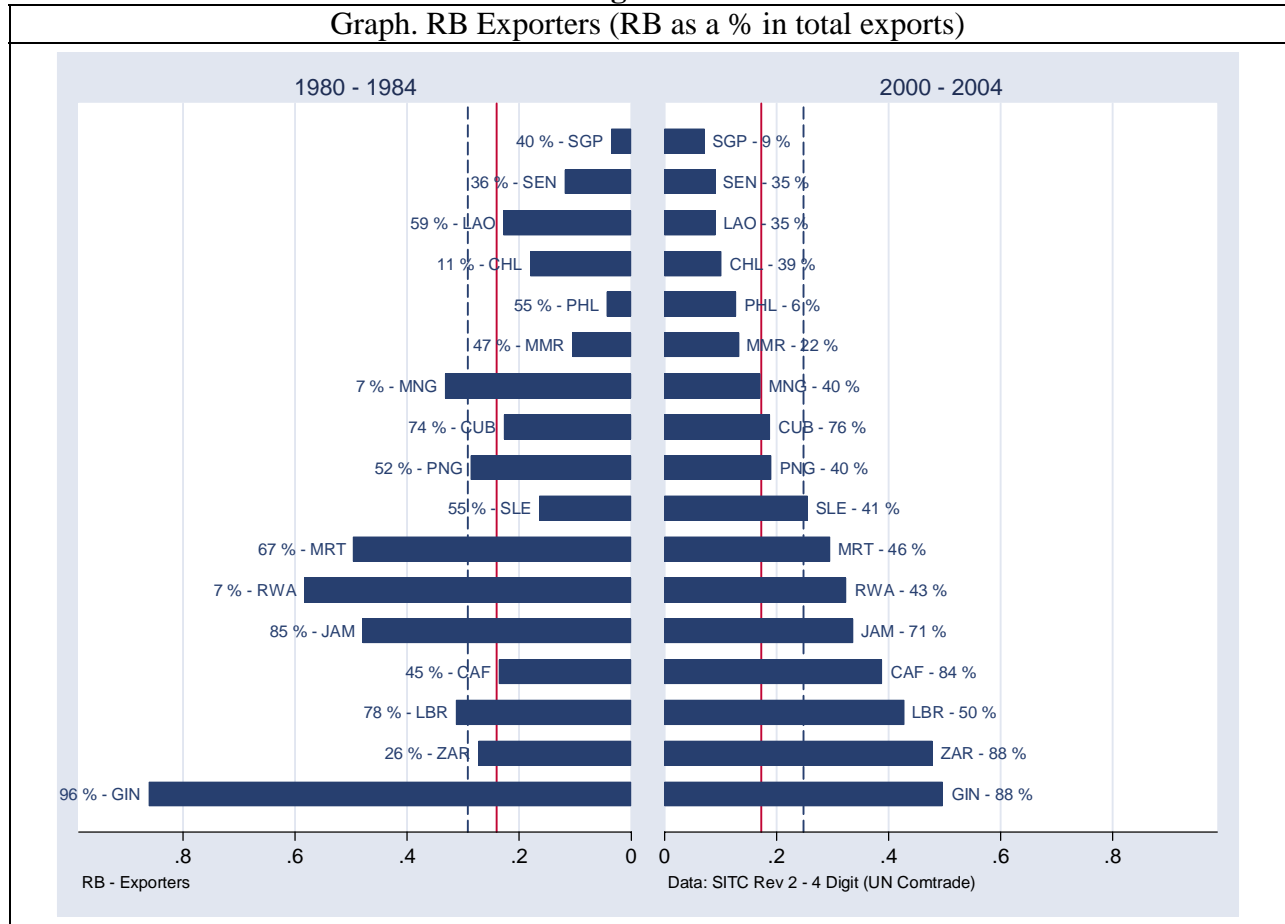
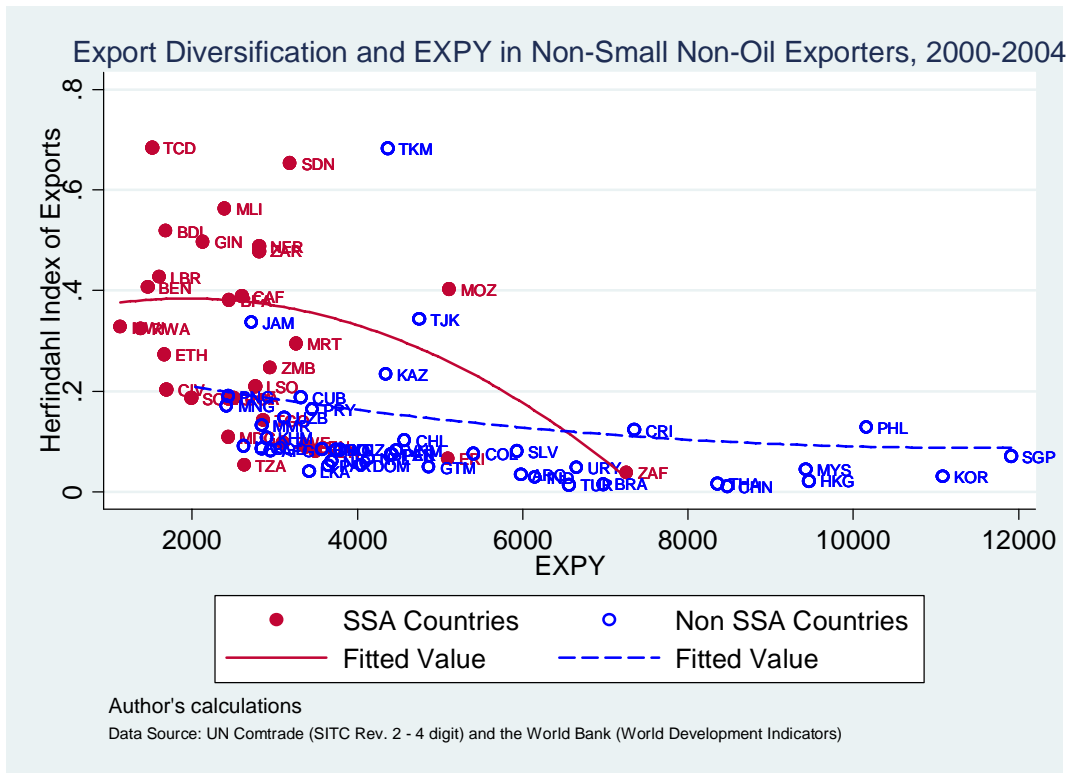
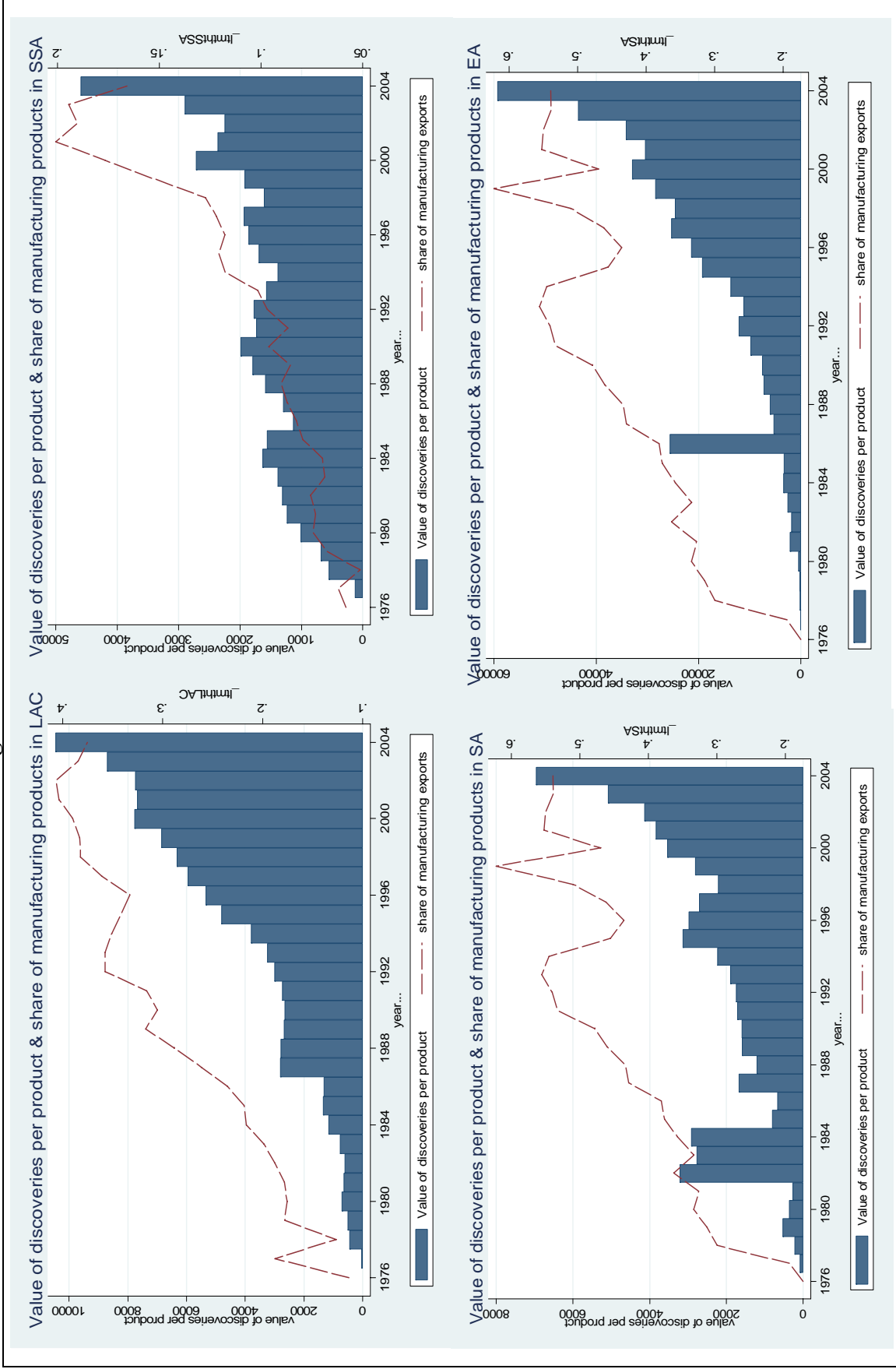
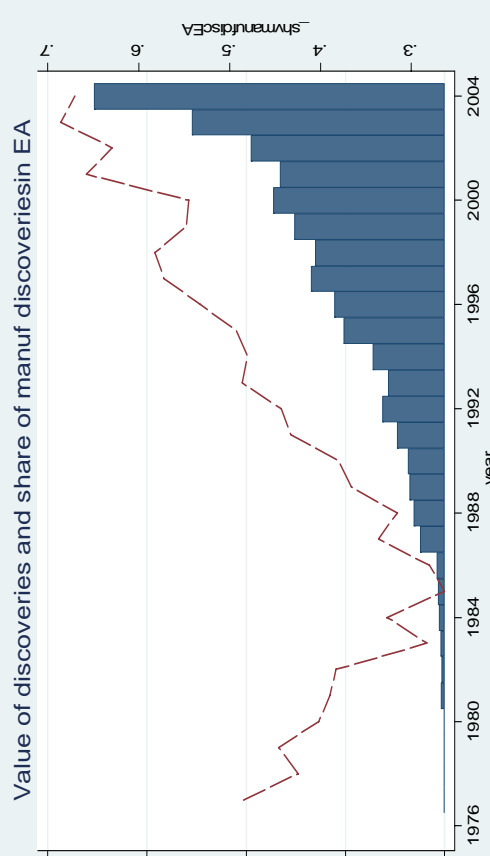
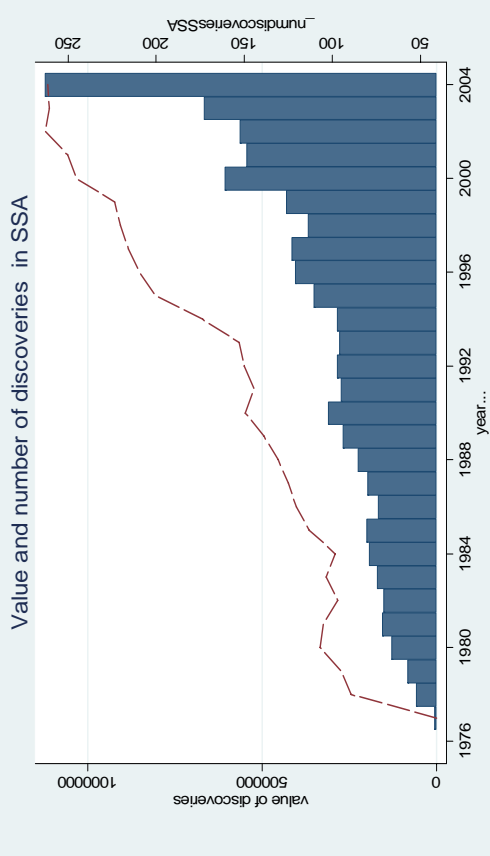
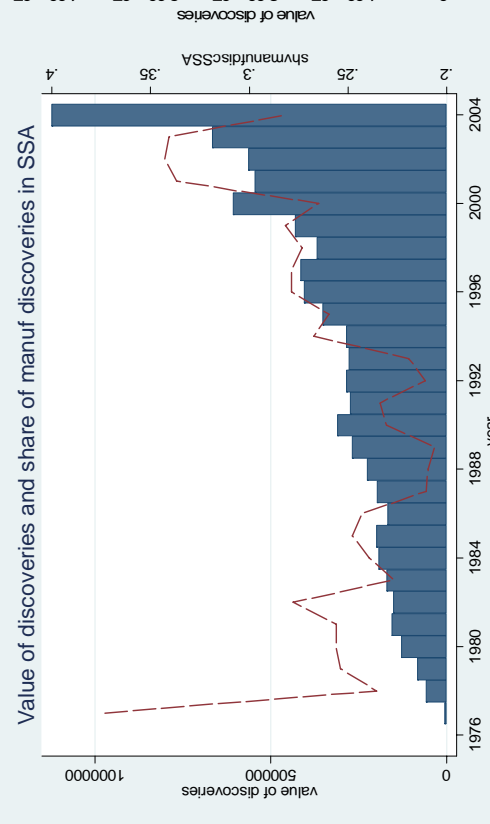
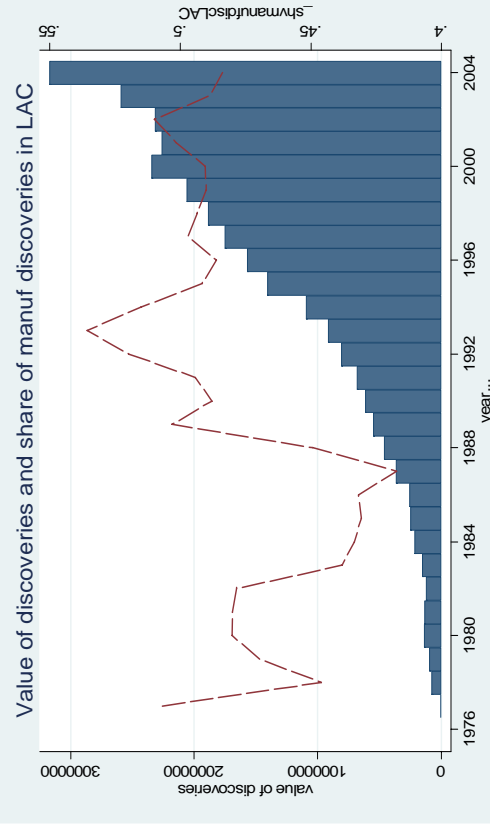


Figure 13 – the SSA effect



Figures 14 and 15





SITC 2 CODE	Product Description	prody 1980-84	prody 2000-04
360	Crustaceans and molluscs,fresh,chil	1,381	3,369
371	Fish,prepared or preserved,n.e.s. i	3,339	10,775
545	Other fresh or chilled vegetables	4,624	5,477
573	Bananas,fresh or dried	1,028	5,183
585	Juices;fruit & veget.(incl.grape mu	6,637	5,141
589	Fruit otherwise prepared or preserv	5,022	9,337
711	Coffee,whether or not roasted or fr	1,383	1,936
721	Cocoa beans,whole or broken,raw or	1,013	1,542
2320	Natural rubber latex; nat.rubber &	2,418	1,169
2631	Cotton (other than linters),not car	1,515	1,500
2876	Tin ores and concentrates	934	1,685
2927	Cut flowers and foliage	7,059	4,015
3413	Petroleum gases and other gaseous h	8,538	4,958
3414	Petroleum gases and other gaseous h	9,077	6,232
6116	Leather of other hides or skins	1,402	2,156
6672	Diamonds,unwork.cut/otherwise work.	4,394	5,607
6872	Tin and tin alloys,worked	2,397	7,639
7591	Parts of and accessories suitable f	17,445	20,333
7599	Parts of and accessories suitable f	13,805	15,462
7611	Television receivers,colour	14,737	17,782
7764	Electronic microcircuits	8,326	16,474
7810	Passenger motor cars,for transport	14,220	15,411
7821	Motor vehicles for transport of goo	11,829	12,356
8451	Jerseys,pull-overs,twinsets,cardiga	7,915	4,464
8510	Footwear	9,540	7,765
8942	Children s toys,indoor games,etc.	9,909	14,329

Annex 1 – Models

Table: Export diversification (Herfindahl Index) cross section – 1985-89													
Dependent variable: Herfindahl Index (1985-89)													
	1	2	3	4	5	6	7	8	9	10	11	12	13
In Gdp per capita, constant 2000 US\$	-0.483*** [0.000]	-0.459*** [0.000]	-0.309*** [0.001]	-0.134 [0.226]	0.365*** [0.000]	0.419*** [0.000]	0.437*** [0.000]	0.366*** [0.000]	0.273*** [0.001]	-0.166 [0.190]		-0.17 [0.121]	-0.255*** [0.002]
In population	0.272*** [0.000]	0.268*** [0.000]	0.233*** [0.000]	0.175*** [0.004]	0.243*** [0.000]	0.271*** [0.000]	0.273*** [0.000]	0.229*** [0.000]	0.269*** [0.000]	0.257*** [0.000]	0.285*** [0.000]	0.143** [0.010]	0.260*** [0.000]
In export growth 76_89		-0.041 [0.550]											
initial exports(1976-80)		0 [0.327]											
avg. years school											-0.237*** [0.000]		
SSA			0.461** [0.024]	0.517** [0.030]	0.442** [0.031]	0.118 [0.515]			-0.058 [0.719]			0.407* [0.051]	-0.047 [0.772]
landlocked			0.397* [0.078]	0.451* [0.058]		0.543*** [0.005]			0.466*** [0.007]			0.413* [0.074]	0.443** [0.011]
High prody exports/total exports									-1.092*** [0.000]				-1.264*** [0.000]
manuf val./GDP												-0.039** [0.015]	

Table: Export diversification (Herfindahl Index) cross section – 1985-89.... continued

Dependent variable: Herfindahl Index (1985-89)

	1	2	3	4	5	6	7	8	9	10	11	12	13
Telephone lines(per1000 subscribers)										-0.008**			
										[0.033]			
TOTgrowth								-3.158*					
								[0.082]					
coffee exporter						0.527***				0.334*			
						[0.006]				[0.052]			
coffee*TOTgr													
grossFDI2gdp								-0.005					
								[0.868]					
mineral exporter					0.09	0.510***				0.411**			0.315**
					[0.673]	[0.009]				[0.011]			[0.043]
oil exporter						1.231***				0.98***			0.836***
						[0.000]				[0.000]			[0.000]
land per worker				0.872*									
				[0.089]									
Constant	5.724***	5.523***	3.662***	1.531	4.269***	4.781***	5.451***	4.306***	4.55***	3.708***	3.430***	2.004	4.465***
	[0.000]	[0.000]	[0.001]	[0.289]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.002]	[0.134]	[0.000]
Observations	89	88	88	68	89	88	84	61	86	75	63	78	86
R-squared	0.463	0.474	0.51	0.461	0.496	0.664	0.433	0.399	0.752	0.382	0.412	0.544	0.739

p values in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table Export Diversification Cross Section - 2000-04

Dependent variable : Herfindahl Index 2000-04

	1	2	4	5	6	7	8	9	10	11	12	13	14	15	16
In Gdp per capita, constant 2000 US\$	-0.391*** [0.000]	-0.497*** [0.000]	-0.249*** [0.001]	-0.175** [0.031]	-0.14 [0.154]	-0.181** [0.016]	0.038 [0.763]	0.244*** [0.001]	0.323*** [0.000]	0.243*** [0.000]	0.379*** [0.000]	0.467*** [0.000]	0.325*** [0.000]	-0.117 [0.277]	
In population	0.265*** [0.000]	0.316*** [0.000]	0.161*** [0.001]	0.174*** [0.000]	0.129*** [0.007]	0.191*** [0.000]	0.299*** [0.000]	0.230*** [0.000]	0.262*** [0.000]	0.222*** [0.000]	0.189*** [0.000]	0.206*** [0.000]	-0.131* [0.055]	0.202*** [0.000]	0.208*** [0.002]
In export growth 76_04		-0.041 [0.658]													
initial exports(1976-80)		0 [0.278]													
Initial Herfindahl (1976-1980)			1.695*** [0.000]	1.697*** [0.000]	1.590*** [0.000]	1.357*** [0.002]	0.339 [0.394]	1.350*** [0.004]		0.458 [0.271]	1.372*** [0.004]	0.987** [0.041]	1.855*** [0.000]	1.722*** [0.000]	1.177* [0.060]
avg. years school															-0.120** [0.015]
SSA				0.532*** [0.007]	0.506** [0.022]	0.695*** [0.000]		0.305* [0.098]	0.567*** [0.004]	0.320* [0.084]					0.632*** [0.010]
landlocked				0.021 [0.919]	-0.019 [0.931]			0.085 [0.648]	0.233 [0.254]	0.078 [0.674]					0.043 [0.871]
Telephone lines(per1000 subscribers)															-0.002* [0.076]
days_startbusiness00_04													0.001 [0.573]		
TOTgrowth											6.048*** [0.001]	7.358*** [0.001]			
coffee exporter									-0.218 [0.306]			-0.397* [0.066]			

Table Export Diversification Cross Section - 2000-04... continued

Dependent variable : Herfindahl Index 2000-04

	1	2	4	5	6	7	8	9	10	11	12	13	14	15	16
coffee*TOTgr													-10.612*		
													[0.063]		
grossFDI2gdp											0.033**				
											[0.029]				
mineral exporter							-0.046		0.166	0.059					
							[0.820]		[0.419]	[0.738]					
oil exporter									1.002***	0.618***					
									[0.000]	[0.010]					
land per worker			1.595**		1.647**										
			[0.022]		[0.016]										
manuf val./GDP							-0.040***		-	1.222***					
							[0.005]			[0.000]					
High prody exports/total exports															
Constant	4.952***	6.376***	1.767	1.293	0.301	1.614	0.008	3.98***	3.661***	2.688**	3.198**	4.250***	1.722	1.83	1.259
	[0.000]	[0.000]	[0.118]	[0.232]	[0.812]	[0.124]	[0.994]	[0.000]	[0.000]	[0.013]	[0.012]	[0.001]	[0.214]	[0.110]	[0.312]
Observations	108	88	86	100	84	94	90	94	90	83	72	65	65	86	63
R-squared	0.378	0.464	0.454	0.543	0.507	0.589	0.579	0.63	0.732	0.501	0.505	0.624	0.488	0.439	0.561

p values in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Share of manufactured exports/total exports Cross section : 1985-89

Dependent variable: Manuf exports/total exports (1985-1989)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
In Gdp per capita, constant 2000 US\$	0.719***	0.851***	0.362**	0.211	0.336**	0.746***	0.745***	0.640***	-0.773	0.093			0.268	0.044
	[0.000]	[0.000]	[0.041]	[0.341]	[0.028]	[0.000]	[0.000]	[0.000]	[0.806]	[0.719]			[0.210]	[0.839]
In population	0.217***	0.329***	0.118	0.134	0.127*	0.258***	0.179*	0.127	-0.734	0.249**	0.283**	0.162	0.027	0.252**
	[0.008]	[0.002]	[0.144]	[0.253]	[0.095]	[0.000]	[0.056]	[0.146]	[0.875]	[0.011]	[0.020]	[0.170]	[0.802]	[0.028]
In export growth 76_89		0.249*												
		[0.058]												
initial exports(1976-80)		0												
		[0.671]												
avg. years school											0.310***	0.111		
											[0.001]	[0.299]		
SSA			-1.472***	-1.428***	-1.302***							-1.502***	-1.358***	-1.519***
			[0.000]	[0.003]	[0.001]							[0.001]	[0.001]	[0.001]
landlocked			0.222	0.414								0.108	0.249	0.156
			[0.599]	[0.380]								[0.816]	[0.579]	[0.735]
Service exports/GDP														5.416**
														[0.011]
manuf val./GDP													0.034	
													[0.278]	
Telephone lines(per1000 subscribers)										0.020***				
										[0.008]				
TOTgrowth								6.539**	-244.926					
								[0.039]	[0.366]					

Share of manufactured exports/total exports Cross section : 1985-89 continued

Dependent variable: Manuf exports/total exports (1985-1989)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
						-0.901**								
						[0.014]			[.]					
coffee*TOTgr									2.938					
									[0.520]					
grossFDI2gdp								-0.072						
							[0.242]							
mineral exporter					-1.082***	-1.819***								
					[0.005]	[0.000]								
oil exporter						-2.145***								
						[0.000]								
land per worker				-2.696***										
				[0.010]										
Constant	-10.706***	-13.057***	-6.130***	-5.216*	-5.942***	-10.770***	-10.158***	-8.716***	31.731	-7.713***	-7.872***	-4.680**	-4.688*	-6.458**
	[0.000]	[0.000]	[0.006]	[0.074]	[0.003]	[0.000]	[0.000]	[0.000]	[0.722]	[0.000]	[0.000]	[0.029]	[0.074]	[0.019]
Observations	88	88	87	68	88	88	83	61	6	75	63	63	78	73
R-squared	0.265	0.298	0.382	0.4	0.437	0.532	0.247	0.304	0.758	0.265	0.226	0.352	0.375	0.391

Manufactured exports/total exports : Cross section model – 2000-04

Dependent variable share of manuf products/ total exports (2000-04)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ln Gdp per capita, constant 2000 US\$	0.191*	0.286**	-0.019	-0.129	-0.085	0.335***	0.281**	0.352***	0.428***	0.174	-0.255			-0.089	-0.325*
	[0.076]	[0.039]	[0.886]	[0.351]	[0.495]	[0.003]	[0.023]	[0.008]	[0.002]	[0.239]	[0.143]			[0.520]	[0.094]
Initial Herfindahl(1976-80)	-3.045***	-3.037***	-2.637***	-2.038***	-2.484***	-2.120***	-3.061***	-1.486*	-1.609*	-2.637***	-2.362***	-1.832*	-1.56	-2.148***	-2.345***
	[0.000]	[0.000]	[0.000]	[0.001]	[0.001]	[0.006]	[0.000]	[0.050]	[0.053]	[0.002]	[0.001]	[0.062]	[0.102]	[0.003]	[0.004]
ln population	0.013	0.061	-0.031	-0.122*	-0.021	0.081	-0.014	0.087	0.063	-0.062	0.075	0.081	0.027	-0.159**	-0.215**
	[0.846]	[0.500]	[0.631]	[0.068]	[0.748]	[0.242]	[0.847]	[0.282]	[0.453]	[0.596]	[0.367]	[0.427]	[0.783]	[0.047]	[0.038]
ln export growth 76_04	0.281*														
	[0.060]														
initial exports(1976-80)	0														
	[0.878]														
avg. years school											0.122*	-0.007			
											[0.072]	[0.929]			
SSA			-1.224***	-1.290***	-1.341***								-1.243***	-0.967***	-1.325***
			[0.000]	[0.000]	[0.000]								[0.001]	[0.004]	[0.002]
landlocked			0.352	0.435									0.182	0.345	0.229
			[0.291]	[0.169]									[0.656]	[0.313]	[0.596]
Telephone lines(per1000 suscribers)											0.006***				
											[0.001]				
days_startbusiness00_04										-0.002					
										[0.620]					
TOTgrowth								-10.611***	-11.112***						
								[0.000]	[0.000]						
coffee exporter						0.184			0.821**						
						[0.615]			[0.029]						
coffee*TOTgr									11.019						
									[0.260]						
grossFDI2gdp							-0.046*								
							[0.064]								

Manufactured exports/total exports : Cross section model – 2000-04 continued

Dependent variable share of manuf products/ total exports (2000-04)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
mineral exporter					-0.443	-0.815**									
				[0.194]	[0.025]										
oil exporter					-1.660***										
				[0.000]											
land per worker				-5.035***											
			[0.000]												
manuf val./GDP													0.078***		
													[0.001]		
Service exports/GDP															0
															[0.103]
Constant	-2.388	-3.394	0.102	2.474	0.535	-4.437**	-2.264	-5.117**	-5.435**	-1.101	-1.222	-2.98	-1.137	1.364	4.959*
	[0.155]	[0.119]	[0.953]	[0.169]	[0.761]	[0.010]	[0.198]	[0.011]	[0.010]	[0.645]	[0.507]	[0.117]	[0.550]	[0.468]	[0.061]
Observations	101	88	99	83	94	94	83	71	65	65	85	64	63	90	71
R-squared	0.27	0.31	0.392	0.537	0.42	0.431	0.289	0.336	0.435	0.224	0.308	0.182	0.323	0.445	0.358

p values in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Model: Discoveries Cross Section - 1985-89												
Dependent variable: Value of Discoveries/Number of discoveries (1985-89)												
	1	2	3	4	5	6	7	8	9	10	11	12
ln Gdp per capita, constant 2000 US\$	0.684***	0.664***	0.547***	0.837***	0.637***	0.651***	0.747***	0.783***	1.105*	0.836***		
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.071]	[0.000]		
ln population	0.590***	0.563***	0.582***	0.629***	0.581***	0.601***	0.531***	0.521***	0.7	0.528***	0.719***	0.712***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.166]	[0.000]	[0.000]	[0.000]
ln export growth 76_89		-0.109										
		[0.239]										
initial exports(1976- 80)		0										
		[0.502]										
avg. years school											0.445***	0.427***
											[0.000]	[0.000]
SSA			-0.267	0.37	-0.166							0.073
			[0.372]	[0.256]	[0.580]							[0.836]
landlocked			-0.323	0.053								-0.393
			[0.337]	[0.873]								[0.276]
Service exports/GDP												
manuf val./GDP												
Telephone lines(per1000 suscribers)										-0.004		
										[0.337]		
TOTgrowth								-3.328	20.194			
								[0.122]	[0.241]			
coffee exporter						-0.675**			0			
						[0.042]			[.]			

Model: Discoveries Cross Section - 1985-89... continued

Dependent variable: Value of Discoveries/Number of discoveries (1985-89)

	1	2	3	4	5	6	7	8	9	10	11	12
coffee*TOTgr									-0.038			
									[0.849]			
grossFDI2gdp							-0.086*					
							[0.065]					
mineral exporter					-0.095	-0.277						
					[0.767]	[0.397]						
oil exporter						0.039						
						[0.915]						
land per worker				-0.627								
				[0.380]								
Constant	-8.522***	-8.153***	-7.316***	-10.468***	-7.978***	-8.307***	-7.836***	-8.223***	-14.435	-8.601***	-7.633***	-7.414***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.149]	[0.000]	[0.000]	[0.000]
Observations	85	83	84	68	85	85	81	60	6	75	59	59
R-squared	0.573	0.635	0.587	0.614	0.576	0.598	0.591	0.659	0.996	0.593	0.656	0.664

Table : Discoveries and export diversification: cross section - 2000-04

Dependent variable: US\$ Value of new discoveries (2000-2004)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
In Gdp per capita, constant 2000 US\$	0.305*** [0.001]	0.262*** [0.009]	0.071 [0.547]	0.159 [0.270]	0.200* [0.072]	0.038 [0.763]	0.118 [0.479]	0.298*** [0.002]	0.293*** [0.008]	0.385*** [0.001]	0.392*** [0.001]	0.360*** [0.004]	0.371** [0.016]	
In population	0.262*** [0.000]	0.252*** [0.001]	0.268*** [0.000]	0.279*** [0.000]	0.264*** [0.000]	0.299*** [0.000]	0.289*** [0.001]	0.312*** [0.000]	0.321*** [0.000]	0.303*** [0.000]	0.325*** [0.000]	0.332*** [0.001]	0.267*** [0.000]	0.305*** [0.004]
Initial discoveries (1976-1980)		0 [0.706]	0 [0.364]	0 [0.997]	0 [0.469]	0 [0.388]	0 [0.790]	0 [0.268]	0 [0.392]	0 [0.776]	0 [0.562]	0 [0.801]	0 [0.854]	0 [0.360]
In export growth 76_04		-0.083 [0.467]												
initial exports(1976-80)		0 [0.472]												
avg. years school														-0.062 [0.414]
SSA			-0.494* [0.057]	-0.211 [0.484]	-0.394 [0.131]	-0.698** [0.013]	-0.264 [0.415]							-0.629* [0.076]
landlocked			-0.631** [0.028]	-0.731** [0.015]		-0.608** [0.037]	-0.687** [0.047]							-0.996*** [0.010]
Telephone lines(per1000 subscribers)													-0.001 [0.655]	
days_startbusiness00_04											0.003 [0.248]			

Table : Discoveries and export diversification: cross section - 2000-04 continued

Dependent variable: US\$ Value of new discoveries (2000-2004)														
TOTgrowth											-3.402	-4.340**		
											[0.116]	[0.049]		
coffee exporter								-						
								0.801***					-0.648**	
								[0.006]				[0.027]		
coffee*TOTgr												8.316		
												[0.274]		
grossFDI2gdp											-0.003			
											[0.921]			
mineral exporter						0.093					-0.233			
						[0.739]					[0.412]			
oil exporter											-0.493			
											[0.119]			
land per worker						1.139								
						[0.206]								
manuf val./GDP											-0.008			
											[0.693]			
Service exports/GDP											0			
											[0.949]			
Constant	-1.157	-0.988	0.627	-0.438	-0.351	0.512	-0.232	-1.677	-2.007	-2.47	-2.718*	-3.061	-1.774	0.901
	[0.317]	[0.532]	[0.653]	[0.810]	[0.800]	[0.741]	[0.916]	[0.153]	[0.162]	[0.124]	[0.083]	[0.103]	[0.221]	[0.619]
Observations	100	81	86	73	87	81	63	87	72	62	62	57	74	58
R-squared	0.238	0.338	0.356	0.358	0.302	0.405	0.374	0.354	0.312	0.326	0.389	0.315	0.282	0.365

Dynamic panel estimates: Dependent variable: annual Herfindahl level

	W & M	W & M	Lederm an	Lederm an	Lederm an	Model 1	Model 2	Model 3	Model 4	Model 5
Herfindahl (t-1)	0.613*** [0.000]	0.584*** [0.000]	0.685*** [0.000]	0.684*** [0.000]	0.867*** [0.000]	0.507*** [0.000]	0.511*** [0.000]	0.475*** [0.000]	0.563*** [0.000]	0.484*** [0.000]
smallstate	0.015 [0.499]	-0.002 [0.905]	0.034* [0.091]	-0.027 [0.472]		0.064*** [0.003]	0.045 [0.121]	0.02 [0.443]	0.037* [0.080]	0.018 [0.627]
Gdp per capita	-0.000* [0.072]	0 [0.317]	-0.000*** [0.028]	0 [0.442]	0 [0.402]	0 [0.116]	0 [0.350]	0 [0.385]	0 [0.418]	0 [0.366]
land per worker	0.112** [0.049]	0.111*** [0.028]								
oil_exports	0.096*** [0.001]	0.107*** [0.000]					0.102** [0.013]			0.086 [0.153]
SSA		0.071*** [0.000]				0.093*** [0.000]	0.089*** [0.000]	0.075*** [0.001]	0.086*** [0.000]	0.095** [0.039]
expgr			0.002 [0.662]	-0.005 [0.486]	0.100*** [0.000]					
Initial exports			0 [0.271]	0 [0.235]	0 [0.730]					
Investment Climate					-0.003 [0.262]					
landlocked						0.055** [0.025]	0.04 [0.483]	0.044 [0.210]	0.006 [0.911]	0.052 [0.759]
Education										
Terms of trade										0.000* [0.064]
coffee exporter							0.3501 [0.3501]			0.002 [0.945]
Telephone lines per 1000							0.034			
mineral exporter							0.024 [0.369]			
Manufacturing value/GDP								0.005*** [0.004]		
Constant	0.096*** [0.000]	0.065*** [0.000]	0.076*** [0.000]	0.095 [0.150]	0.01 [0.712]	0.073*** [0.000]	0.049*** [0.006]	0.130*** [0.000]	0.074*** [0.000]	0.009 [0.845]
Observations	2364	2364	2326	1553	1371	2472	2360	2139	2242	1782
Number of group(country)	111	111	90	57	67	111	99	104	101	75
Hansen Test	0.391	0.377	0.326	0.569	0.639	0.647	0.476	0.339	0.8	0.287
AB test of AR(1) in first Diff	0	0	0	0.021	0	0	0	0	0	0.001
AB test AR(2) in first Diff	0.417	0.4	0.918	0.327	0.9	0.67	0.999	0.963	0.448	0.953

p values in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%

Dependent variable: annual share of manufacturing products/total exports

	Wood and Mayer	Wood and Mayer	Lederman	Lederman	Model 1	Model 2	Model 3	Model 4	Model 5
manuf share (t-1)	0.77*** [0.000]	0.77*** [0.000]	0.92*** [0.000]	0.95*** [0.000]	0.72*** [0.000]	0.72*** [0.000]	0.76*** [0.000]	0.69*** [0.000]	0.69*** [0.000]
smallstate	-0.009 [0.524]	0.008 [0.636]	-0.006 [0.847]	-0.012 [0.424]	-0.012 [0.404]	0.001 [0.984]	-0.034* [0.057]	0.006 [0.762]	0.001 [0.984]
Gdp per capita	0.00** [0.014]	0.00** [0.029]	0 [0.397]	0 [0.180]	0.00*** [0.002]		0.00** [0.040]	0.00*** [0.004]	0.00** [0.022]
Land per worker	-0.064 [0.158]	-0.045 [0.124]							
Oil exporter	-0.05*** [0.004]	-0.05*** [0.006]					-0.07** [0.021]		-0.09*** [0.008]
SSA		-0.05*** [0.010]			-0.07*** [0.003]	-0.034 [0.334]	-0.048 [0.149]	-0.06** [0.026]	-0.06** [0.019]
Export growth			0.002 [0.763]	0.021 [0.402]					
Initial exports			0 [0.983]	0 [0.651]					
Investment Climate				0 [0.991]					
landlocked					0.007 [0.733]	0.01 [0.554]	-0.033 [0.517]	0.014 [0.604]	0.001 [0.985]
Education			-0.006 [0.584]			0.021 [0.176]			0
Terms of trade									[0.563]
coffee exporter							-0.047* [0.078]		-0.048* [0.099]
mineral exporter							-0.057* [0.096]		
Manufacturing value/GDP								0.003* [0.060]	
Constant	0.053** [0.046]	0.078** [0.034]	0.066 [0.367]	-0.02 [0.422]	0.10*** [0.006]	0.004 [0.960]	0.12*** [0.009]	0.05 [0.173]	0.12*** [0.004]
Observations	2258	2258	1520	1361	2298	1663	2206	2018	1692
Number of group(country)	111	111	57	67	109	65	98	103	75
Hansen Test	0.441	0.777	0.407	0.409	0.495	0.549	0.434	0.621	0.641
AB test of AR(1) in first Diff	0	0	0.001	0.001	0	0.002	0	0	0.001
AB test AR(2) in first Diff	0.84	0.84	0.76	0.98	0.68	0.77	0.32	0.33	0.09

p values in brackets
 * significant at 10%; ** significant at 5%; *** significant at 1%

Countries in sample

Country	Observations
Afghanistan	30
Angola	30
Anguilla	25
Antigua and Barbuda	30
Argentina	25
Bahamas, The	30
Bahrain	10
Bangladesh	30
Barbados	30
Belize	30
Benin	30
Bhutan	6
Bolivia	28
Botswana	10
Brazil	22
Burkina Faso	30
Burundi	30
Cambodia	30
Cameroon	30
Cape Verde	30
Central African Republic	30
Chad	30
Chile	22
China	21
Colombia	27
Comoros	30
Congo, Dem. Rep.	30
Congo, Rep.	30
Costa Rica	30
Cote d'Ivoire	30
Cuba	30
Dominica	30
Dominican Republic	30
Ecuador	27
El Salvador	30
Equatorial Guinea	30
Eritrea	13
Ethiopia(excludes Eritrea)	13
Fiji	23
Gabon	30
Gambia, The	30
Ghana	30
Grenada	30
Guatemala	30

Guinea	30
Guinea-Bissau	30
Guyana	9
Haiti	30
Honduras	30
Hong Kong, China	28
India	27
Indonesia	27
Jamaica	30
Kazakhstan	14
Kenya	30
Korea, Rep.	30
Kyrgyz Republic	14
Lao PDR	30
Lesotho	6
Liberia	30
Macao	29
Madagascar	30
Malawi	30
Malaysia	27
Maldives	11
Mali	30
Malta	15
Mauritania	30
Mauritius	30
Mexico	20
Mongolia	30
Mozambique	30
Myanmar	30
Namibia	10
Nepal	30
Netherlands Antilles	30
Nicaragua	30
Niger	30
Nigeria	30
Pakistan	30
Panama	30
Papua New Guinea	18
Paraguay	22
Peru	29
Philippines	29
Qatar	15
Rwanda	30
Samoa	13
Sao Tome and Principe	30
Senegal	30
Seychelles	30

Sierra Leone	30
Singapore	27
Solomon Islands	5
Somalia	30
South Africa	30
Sri Lanka	21
St. Kitts and Nevis	25
St. Lucia	30
Vincent and the Grenadines	30
Sudan	30
Suriname	13
Swaziland	6
Tajikistan	1
Tanzania	30
Thailand	28
Togo	30
Tonga	1
Trinidad and Tobago	30
Turkey	20
Turkmenistan	28
Turks and Caicos Isl.	30
Uganda	30
Uruguay	30
Uzbekistan	14
Vanuatu	9
Venezuela	23
Vietnam	30
Zambia	30
Zimbabwe	30

Averages

Period	Variable	Obs	Mean	Std. Dev.	Min	Max	
	Herrfindahl Index	101	0.3		0.2	0.0	0.9
	Export growth (1976-1989)	103	1.9		9.2	-1.0	87.6
	Manuf. Val/GDP	89	14.3		7.7	0.6	34.8
	land per worker	78	0.1		0.2	0.0	1.0
	share of It-mt-hl/exports	98	0.14		0.23	0.00	0.96
1985-89	Gross FDI	93	2.5		5.2	0.0	41.1
	avg school (1985)	64	3.5		2.0	0.4	8.0
	Telephone lines per 1000s	87	40.6		61.2	0.5	302.5
	service exports/GDP	81	0.10		0.15	0.00	0.71
	population	106	33000000		131000000	42458	1080000000
	Value of discoveries per product	88	1796.5		11054.4	32.4	101723.2
	GDP per capita constant 2000 US\$	98	1939.4		2743.4	133.1	16428.1
	expgrowth (1985-89)	101	0.6		5.1	-1.0	51.5
	Herrfindahl Index	112	0.25		0.21	0.01	0.86
	Export growth (1976-1994)	113	1.32		6.25	-1.00	63.32
	Manuf. Val/GDP	103	13.63		7.88	0.78	35.56
	land per worker	87	0.11		0.15	0.00	0.92
	share of It-mt-hl/exports	103	0.19		0.26	0.00	0.95
1990-94	Gross FDI	96	2.72		3.54	0.00	15.05
	avg school (1985)	65	4.05		2.20	0.55	9.25
	Telephone lines per 1000s	95	61.47		85.48	0.67	401.97
	service exports/GDP	103.0	0.29		0.28	0.00	0.95
	population	96	33900000		136000000	16300	1160000000
	Value of discoveries per product	93	460.90		1271.87	19.36	10550.92
	GDP per capita constant 2000 US\$	92	2210.19		3419.71	107.23	20527.71
	expgrowth (1985-89)	103	0.06		0.19	-1.00	0.81
	Herrfindahl Index	117	0.23		0.21	0.01	0.88
	Export growth (1976-2004)	117	0.83		3.92	-1.00	40.76
	Manuf. Val/GDP	98	12.98		7.82	2.27	38.45
	land per worker	95	0.09		0.15	0.00	0.77
	share of It-mt-hl/exports	117	0.33		0.30	0.00	0.94
2000_2004	Gross FDI	87	5.65		6.22	0.09	42.91
	avg school (1985)	64	4.74		2.41	0.76	10.46
	Telephone lines per 1000s	97	104.83		132.93	0.19	523.39
	service exports/GDP	117	0.11		0.00	0.11	0.11
	population	111	41200000		158000000	46161	1280000000
	Value of discoveries per product	100	368.83		855.50	18.55	6516.98
	GDP per capita constant 2000 US\$	106	2583.97		4163.70	86.75	25337.64
	expgrowth (2000-2004)	117	0.03		0.29	-1.00	2.07