

Working paper



International
Growth Centre

Learning by exporting in Rwanda

A deep-drive into
Rwanda's export
sector focusing
on designations,
products, and firms



Sachin Gathani
Dmitri Stoelinga

April 2012

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products and firms

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Dimitri Stoelinga

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Growth Center and is part of the Learning-to-Compete program of the Africa Growth Initiative. The Africa Growth Initiative is a collaborative research program of the African Development Bank, the Brookings Institute, the Global Development Network, and the United Nations University. The objective of the

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“Learning to Compete: Accelerating Industrial Development in Africa” program, is to identify the drivers of accelerated industrial development in Africa by examining the industrialization process and the evolution of industrial policies in a number of African countries, including Ethiopia, Kenya, Ghana, Mozambique, Nigeria, Senegal, Uganda and Rwanda. The focus of this effort is both horizontal, drawing on lessons learned from cross-country comparisons on thematic focus areas such as exports, skills, agglomeration effects, FDI, industrial policy and enterprise mapping; and vertical, building on each of these thematic focus areas to gain insights on industrial development from a country perspective and advise governments on potential policy implications.

Sachin Gathani and Dimitri Stoelinga are Managing Partners at Laterite Ltd., an advisory service firm based in Kigali, Rwanda. (www.laterite-africa.com)

Table of Contents

1. Introduction	4
2. Approach & Methodology	5
3. Data	7
4. Overview of Rwanda’s Merchandise Export Sector	9
4a. Rwanda is an exporter of commodity products	9
4b. Rwanda exports few processed/manufactured products	10
4c. A growing number of firms are joining the exports sector	11
4d. Rwanda’s entry into the EAC is a game changer	14
5. Learning-by-Exporting: learning about Destinations	16
5a. Where does Rwanda export to?	16
5b. Destination discovery	17
Case Study 1: The case of Switzerland – a commodity destination	22
Case Study 2: The case of Burundi and DRC – non-commodity destinations	24
5c. Is low learning-about-destinations a constraint to exports growth?	26
6. Learning-by-Exporting: New Product Discovery and Product Upgrades	28
6a. The majority of Rwanda’s exports are at the periphery of the product space	28
6b. New product discovery in Rwanda	30
6c. What products is Rwanda likely to “discover” in the near future?	32
6d. Have exports led to product upgrades?	35
6e. Is product discovery a constraint to exports growth?	37
7. Learning-by-Exporting: does exporting lead to higher productivity at the firm level?	39
7a. Measuring value addition and defining who is an exporter	39
7b. How do exporting firms compare to non-exporting firms?	40
7c. Given that exporters perform better, can we confirm the learning-by-exporting hypothesis?	41
7d. Are low learning-by-exporting productivity gains a constraint to exports growth?	45
8. Conclusion	48
References	54

1. Introduction

General Remarks

The main objective of this policy paper is to explore how *learning-by-exporting* in Rwanda is taking place from an aggregate and firm-level perspective. It is targeted in particular at Rwandan policy-makers and academics participating in the Africa Growth Initiative. For Rwandan policy makers this paper will present: (i) a new and structured way of understanding and analyzing Rwanda's performance as an exporter based on filtered and cleaned official exports data; (ii) insights on current and likely future trends; and (iii) high-level recommendations to support the process of learning-by-exporting, from a firm, product and destination perspective. For academics it offers a new framework to explore "learning-by-exporting" dynamics applied to the case of a small developing economy, Rwanda.

The term "learning-by-exporting" has usually been associated with research focused on understanding why, in most countries, exporting firms tend to have higher levels of productivity than non-exporting firms. The debate has centered on two competing (and non-mutually exclusive) explanations of why this might be the case: either the act of exporting and competing in global markets makes firms more competitive and encourages increased value addition; or the observed productivity wedge is due to the fact that the most productive firms self-select into the exports sector in the first place (i.e. firms that don't have high productivity levels can't compete in export markets and therefore don't export, while firms that do have high levels of productivity can compete and therefore do export). Finding evidence of learning-by-exporting therefore entails establishing a causal relationship between the act of exporting and productivity improvements at the firm level.

On balance, the literature seems to favor the self-selection hypothesis (see Keller, 2004, Bigsten et al, 2004), even though there is a growing body of evidence pointing to learning-by-exporting effects in developing countries. Using various approaches, models and datasets, researchers have found evidence suggesting that: returns to exporting tend to be higher for firms in developing countries than in developed countries (Martins and Yang, 2009); that in developing countries the destination of exports plays an important role determining how large learning-by-exporting effects are (see Graner and Isaksson, 2007, Boeremans, 2010); that industry differences also matter in determining whether learning-by-exporting will take place or not (Greenaway and Kneller, 2007); that there are diminishing returns to learning-by-exporting (Martins and Yang, 2009, Fernandes and Isgut, 2010); that the more export-oriented a firm is, the higher learning-by-exporting (Andersson and Loof, 2009); and that there can be spill-over effects from learning-by-exporting to production for the domestic market (Fernandes and Isgut, 2010). While findings abound, there is an intense debate in the academic world about the validity of the econometric models utilized and potential biases, due to missing variables, endogeneity, etc. These have been extensively debated and documented (see for example de Loecker, 2010),

In this paper we move away from the purely academic debate on isolating the impact of exporting on firm level productivity, and propose a broader and more policy centered approach to analyzing learning-by-exporting. Paraphrasing Kenneth Arrow (1962) who wrote a seminal paper on learning-by-doing, we define learning-by-exporting as *the product of the experience that firms and/or countries gain by exporting*. If there is learning-by-exporting, even with decreasing returns over time, firms and countries should gradually get better at exporting, building on the experience they have gained. Getting better at exporting means not only exporting more and improving productivity within the firm, but also exporting better and more diverse products and exporting to more destinations (both at the firm and economy-wide levels).

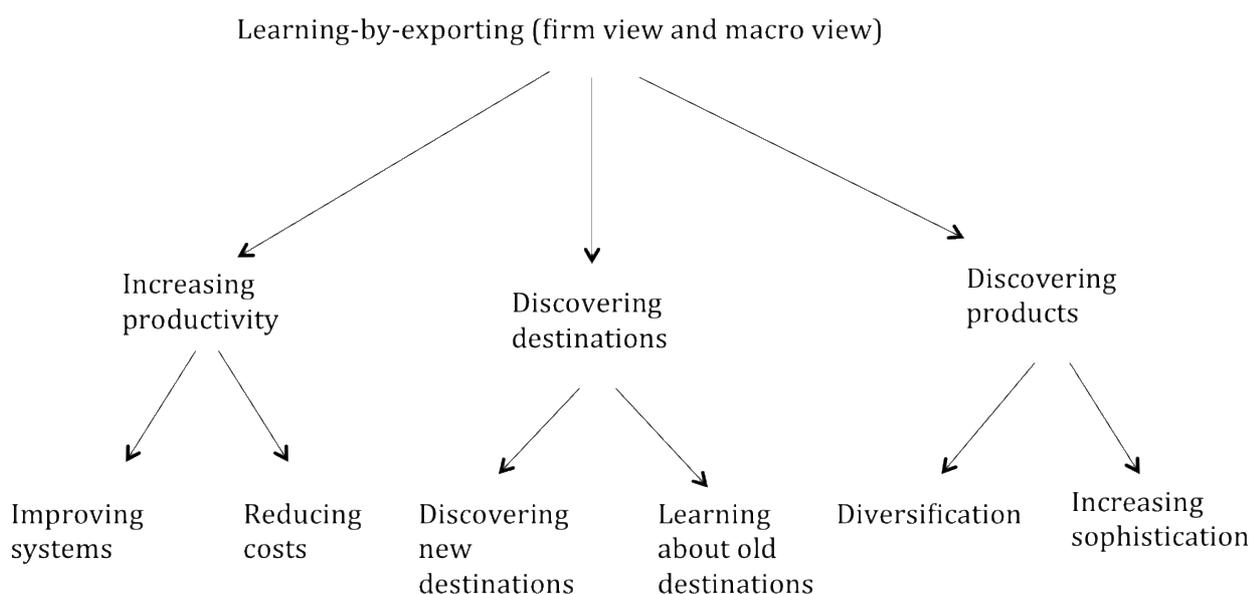
2. Approach & Methodology

The building blocks of this learning experience can be narrowed down to three units of interest: firms, products and destinations. Firms export certain products to certain destinations; firms can learn about the destinations markets they export to or learn how to export to new destinations, develop capabilities to produce new or better products by competing on global export markets, or improve internal systems and productivity to respond to demand and price competition in export markets. Not all of these learning processes necessarily translate into increased labor productivity, which is what the learning-by-exporting literature has focused on. Learning can lead to increased product sophistication through the acquisition of new knowledge and technology, increased diversification in terms of products and destinations, improved exporter/importer relationships based on trust and an established working relationship, more resilient export links that can survive temporary crises and swings in the business cycle, etc. According to Zahler (2007):

“The type of innovations required for firms to increase value, is distinct from the ones required to produce new products or the ones required to enter a given geographic market. Selling coffee in a new market is different from making coffee for the first time or improving an existing brand. Moreover, the policies required to solve potential market or coordination failures in these three dimensions are also different. Compare, for example, R&D incentives with export promotion agencies and free trade agreements”

The learning-by-exporting framework we propose is summarized in Figure 1. It is based on the premise that: (i) the three main vectors of learning-by-exporting are learning about destinations, products, as well as learning within and across firms; (ii) that these three vectors of learning are not mutually exclusive; (iii) that learning happens both at the firm and macro-levels; and (iv) that policy makers need to develop an understanding of all three dynamics to determine how learning-by-exporting is taking place and what that entails for future exports growth.

Figure 1: Learning-by-Exporting Framework



We study each branch of this learning-by-exporting tree starting from the macro-perspective, before delving into details of firms, products or destinations. We combine data analysis with case studies, in order to better understand what is behind the numbers and to explain some of insights or findings that mean seem counterintuitive in the first instance. To analyze product discovery, we rely mostly on previous work by Hausmann et al on the product space (2006) as well as subsequent research on economic complexity (2009); we study destination discovery building on export decomposition techniques designed by Zahler (2007); finally, we respond to the question of whether the observed productivity wedge between exporting and non-exporting firms is due to learning-by-exporting, by exploring productivity data in Rwanda's manufacturing sector in detail.

The outcome of this work is a detailed and structured deep-dive into Rwanda's exports sector, focusing on firms, products and destinations using revised export data. Some key findings include: (i) that destination discovery could be a significant constraint for non-commodity exports growth; (ii) that while product discovery is happening in Rwanda, firms do not have the capacity to bring these new export products to scale; and (iii) that the biggest challenge firms in Rwanda's agribusiness and manufacturing sector face is a low exports orientation to start with, which inevitably affects how much learning-by-exporting is happening.

We start this paper by providing some context, first on the data utilized and some of the corrections we have applied, and secondly, through a macro-perspective of Rwanda's export sector. Next we study each of the three branches of the learning-by-exporting tree applied to the case of Rwanda, starting with destinations, followed by products and lastly firms, before concluding and providing policy recommendations.

3. Data

This study is based on five sets of data sources: (i) Rwanda Revenue Authority (RRA) data on detailed firm-level imports and exports (2001-2011), corporate and personal annual income tax (2008-2010), Pay-As-You-Earn (2008-2011) and a taxpayers roster (detailing firm location and sector of operation); (ii) Comtrade data on Rwandan exports between 1996-2010; (iii) 2007 BACI data on global exports which we used to compute product space statistics (see the section on product discovery for more details)¹; (iv) 50 interviews with the CEOs of Rwanda's largest manufacturing and agribusiness firms conducted by Laterite Ltd. as part of the Rwanda Enterprise Mapping Exercise, commissioned by the International Growth Center and part of the Learning-to-Compete program²; and (v) World Development Indicators (World Bank) for certain macroeconomic indicators of interest.

The main dataset we use throughout this study is RRA's firm-level exports data, which covers all exports between 2001 and June 2011 at a high level of disaggregation. Each entry corresponds to the export of a certain product (identified at the HS8 level), on a certain date, by a certain firm (identified by a TIN number), to a certain destination, and for a certain value (expressed in RWF freight-on-board). We only look at product exports classified as "direct exports", as opposed to "re-exports", which limits our data-set to the 2005-2011 period – this distinction is not available in the data before 2005. For any analysis covering longer periods of time we use Comtrade data, which by and large matches official RRA data, but at the expense of firm-level information (Comtrade data covers exports and the product and destination dimensions, but does not include information on exporting firms). Export snap-shots provided in the paper focus on the most recent year of complete data available, 2010.

While the quality of the exports data post-2005 is good, we have identified some significant errors and misclassifications that we have tried to the extent possible to correct. Suspected errors include:

- The misclassification of some exports to Switzerland (for which the iso2 identifier is "CH") as exports to Swaziland (for which the iso2 code is "SW"), which made Swaziland one of Rwanda's largest export destinations. We suspect this is an error because the largest export product to Swaziland in 2010 was coffee, and we know for a fact that no Rwandan coffee exporter exports to Swaziland, whereas Switzerland is the largest destination for Rwandan coffee. In the paper, we therefore re-assign Rwanda's exports to Swaziland as exports to Switzerland, given that Rwanda's exports to Swaziland should in theory be negligible.
- Many exports have mistakenly been classified as direct exports, while they are in fact re-exports. These include the re-exports of machinery, automobiles, engines, fuel, spare-parts, etc. These misclassifications create a lot of noise in the exports statistics, and in particular lead to overstating official exports to neighboring EAC countries and the Democratic Republic

¹ The BACI database is a world trade database developed by CEPII at a high level of product disaggregation. BACI is developed using a procedure that reconciles the declarations of the exporter and the importer, based on original data provided by the United Nations Statistical Division (COMTRADE database). BACI provides bilateral values and quantities of exports at the HS 6-digit product disaggregation, for more than 200 countries.

² The **Enterprise Mapping Exercise** – a subcomponent of the L2C program – is to gain insights into *firm heterogeneity* in Africa from multiple perspectives: a sector perspective, a country perspective, and a cross-country perspective. This exercise follows an approach designed by Professor John Sutton (2010), tested and implemented for the first time in Ethiopia, based on the premise that to gain insights into what makes firms different one needs to study: *the origin and evolution of firms* (i.e. what brought them to where they are) and *their capabilities* and how these capabilities were formed. This study entailed one-on-one structured interviews approximately 50 CEOs of Rwanda's largest manufacturing and agribusiness firms.

of Congo. While the size of the dataset has made it impossible to eliminate all the noise, we have eliminated certain entries based on a number of filters: a product filter, to eliminate evident re-exports; and an activities filter, to eliminate firms that we strongly suspect re-export (for examples garages, petroleum companies, government institutions, etc).

- Another item, which is not an error per se, but has a significant impact on balance of trade calculations with neighboring EAC countries is the assignment of tea exports that transit through the tea auction in Mombasa on to other global destinations, as exports to Kenya. This is not insignificant as tea exports assigned to Kenya account for about 14% of Rwanda's total exports of goods and almost 90% of exports to Kenya, making Kenya one of Rwanda's largest trading partners, when in fact trade with Kenya is significantly smaller. We find the same issue with exports to Switzerland, which is more of a commodity-trading hub than a direct consumer of Rwanda's coffee and minerals in particular.

To calculate firm-level productivity we combined 2008-2010 RRA data on firm-level exports, income tax, employment and wages³, using firm TIN numbers as the unique identifier. The resulting dataset contains information on annual firm exports, imports, sales, expenses, input costs, employment, average wages, capital (including land, buildings and machinery), location, legal status, and sector of operation. While the level of detail of this dataset is exceptional, there are nevertheless significant shortcomings that have limited our ability to conduct regression analysis: (i) many observations were lost in the process of merging these RRA datasets as the required information was not available for all firms; (ii) in many cases the sector of activity of firms has been misclassified; and (iii) noise in the exports data, makes it difficult to distinguish between real exporters and firms that are simply re-exporting machinery, used cars, equipment, etc..

To overcome these challenges we have created a small dataset comprising of 72 confirmed manufacturing firms (excluding firms in the mining sector, but including tea and coffee producers), which according to our estimates account for about 80% of Rwanda's manufactured product exports. These are the only confirmed agribusiness and manufacturing firms for which we have all the data required to calculate labor productivity.

The data sources used at various stages of the analysis are highlighted and referenced.

³ Average annual employment levels and wages were derived from the Pay-As-You-Earn dataset, which accounts for monthly firm-level employment and wage figures.

4. Overview of Rwanda's Merchandise Export Sector

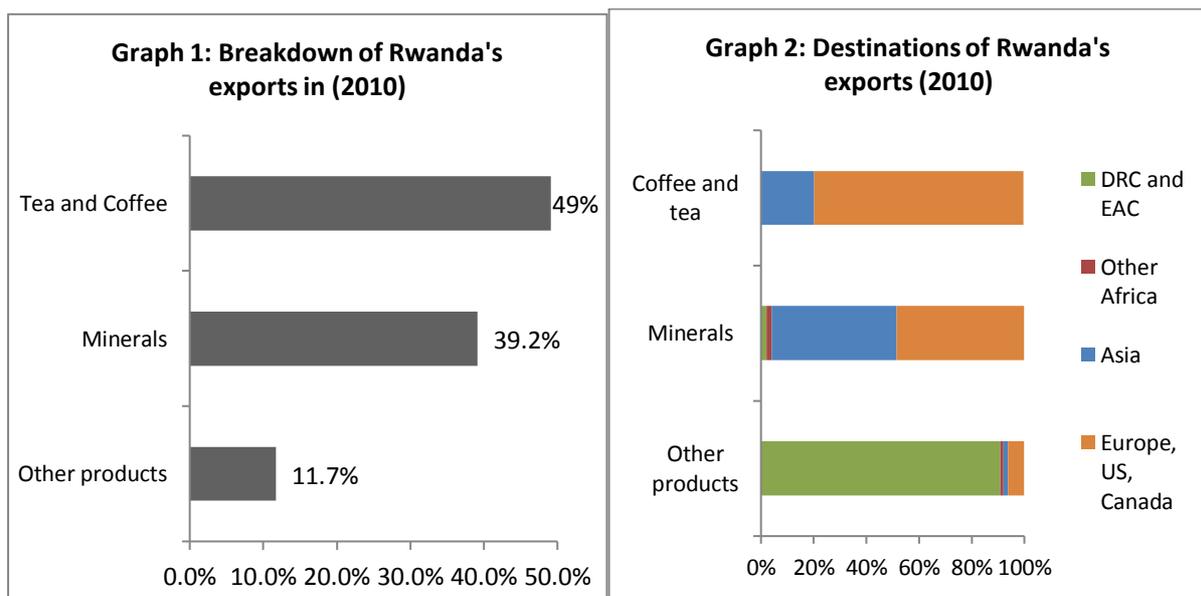
The objective of this section is to give the reader a birds-eye view of Rwanda's exports sector in terms of products, destinations and firms, and to put the ensuing discussion on learning-by-exporting into context.

4a. Rwanda is an exporter of commodity products

The key to understanding Rwanda's merchandise exports⁴ sector is to distinguish between commodity exports and non-commodity exports. We will show throughout this paper that learning-by-exporting dynamics, be it in terms of firms, products or destinations vary greatly depending on whether we are talking about commodity exports or non-commodity exports.

Rwanda is overwhelmingly an exporter of commodities⁵. Rwanda's commodity exports are concentrated around 3 types of products: coffee, tea, and mineral products, in particular tin ores, niobium, tungsten, and chromium. Together, minerals, coffee and tea account for about 88% of the country's exports. The remaining 12% of exports include in particular live animals, pyrethrum, non-processed agricultural products (e.g. beans), plastic shoes, construction materials, plastic tanks, and beverages. These numbers are based on cleaned trade data, where several filters have been applied aimed at eliminating the most likely re-exports, misclassified as exports.

As a rule of thumb, Rwanda's commodity exports of tea, coffee and minerals are mostly exported to Europe, America and Asia. In RRA data the majority of tea exports are captured as an export to Kenya because of the Mombasa auction; however, the tea just transits through Kenya on to other destinations, mostly in Europe, the US and Asia. In Graph 1 & 2 below, we re-allocate these tea exports to other destinations based on global tea imports statistics. Contrary to commodity exports, 91% of non-commodity exports (equally divided between agricultural and non-agricultural products) are exported to the Democratic Republic of Congo (DRC) and the East African Community (EAC).



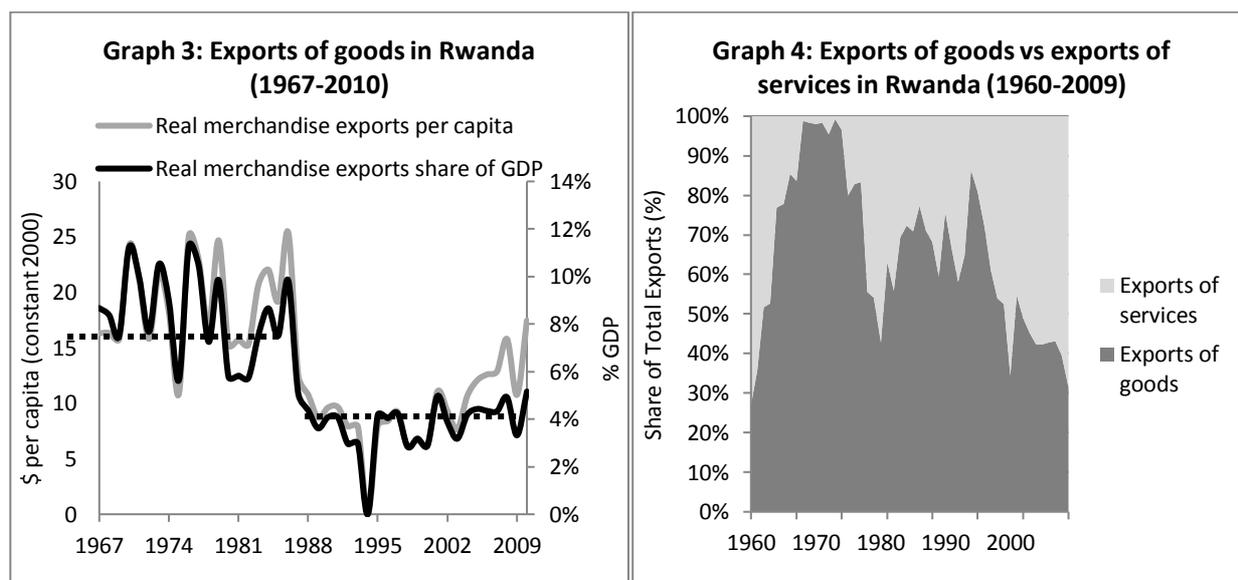
⁴ We refer to merchandise exports as any exports of goods as opposed to services

⁵ For the purposes of this paper, we refer to commodity exports as tea, coffee and mining sectors

Merchandise exports – or the exports of goods as opposed to services - account for about 30% of total exports, 4-5% of GDP, and in real terms average USD\$15 per person (in constant USD, 2000), up from about USD\$8 between 1988-2002. While there has been growth in absolute terms, Rwanda’s merchandise exports sector remains small and has not grown as a share of GDP over the past two decades (see Graph 3). There are three main periods in the development of Rwanda’s exports sector since independence:

- the 1960-1988 period, during which the exports of goods averaged 8% of GDP and 73% of total exports (total exports = merchandise exports + exports of services);
- the 1988-1995 period, during which exports collapsed, because of a drop in commodity prices for tea and coffee and of course the political situation leading to the 1994 genocide; and
- the 1995-2011 period, during which merchandise exports remained constant at about 4-5% of GDP, while the export of services (e.g. in particular tourism and transport) rapidly picked up from approximately 20% of exports in 1995 to 70% of exports today.

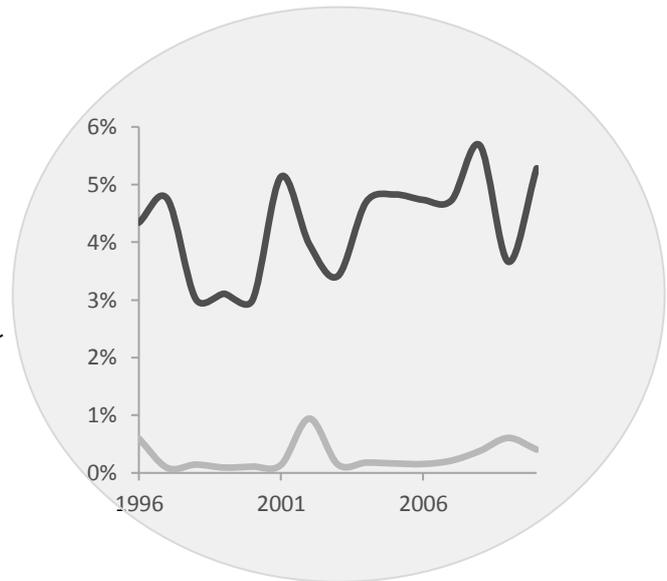
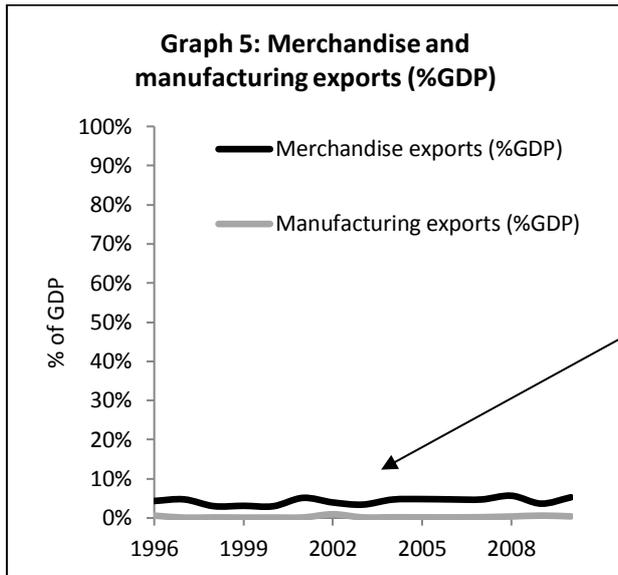
Since independence, Rwanda’s exports sector has therefore moved from a dependence on commodity exports, towards the exports of services, such as tourism and transport (see Graph 4). Throughout this period merchandise exports have stagnated in relative terms.



4b. Rwanda exports few processed/manufactured products

Rwanda is not a large exporter of manufactured products. WDI data⁶, which excludes tea, coffee and mineral exports from the list of manufactured products, reveals that Rwanda’s manufactured product exports averaged only 0.5% of GDP during the 1996-2010 period (see Graph 5). This amounts to an estimated USD\$1.5 per capita in real terms (constant USD, 2000) or a total of approximately USD\$30m in total manufactured exports (current USD, 2010). These figures include re-exports (such as cars and machinery), which have been misclassified as actual exports, so the actual numbers could be substantially lower. On average, less than 10% of the output of Rwanda’s manufacturing sector is exported, which means that manufacturing firms in Rwanda are predominantly focused on the domestic market.

⁶ WDI – World Development Indicators (World Bank)



We confirm these results at the individual firm-level using 2010 RRA data, and discover that out of Rwanda's largest manufacturing firms (outside the tea and coffee sectors) only a handful export more than 10% of their output. These include: Société Rwandaise de Chaussures (plastic shoes), Sopyerwa (pyrethrum), Kigali Cement (cement), Steelrwa (rebars for the construction sector), Master Steel (steel-based construction materials), Rwanda Plastic Industries (plastic tanks), Roto S.a.r.l. (plastic tanks), Brasserie de Milles Collines (beer), and much smaller firms such as Shekina Enterprises (dried cassava leaves, flour) and Ikirezi Natural Products (essential oils). We estimate the exports of Rwanda's top 20 manufacturing firms in 2010 (excluding tea, coffee and mining) to total approximately USD\$12m with an average export orientation of 3.5% of total sales.

4c. A growing number of firms are joining the exports sector

Rwanda's exports sector remains dominated by commodity exporters in the tea, coffee and minerals sectors. Out of the top 20 exporters in 2010 there were 5 tea companies, 5 coffee processors/exporters, and 8 mining firms. These firms are 100% export oriented, with the local market for roasted coffee, processed tea, and minerals being relatively small. The largest exporter in the country in 2010 was OCIR Thé, the National Tea Authority⁷, with exports totaling USD\$14m. The largest non-commodity exporters were:

- Bralirwa in 15th position, with exports of about USD3.5m. Bralirwa, Rwanda's largest firm by revenue, exports beer and soft drinks.
- Pembe Flour Mills, in 20th position, with exports of about USD2.3m. Pembe Flour Mills exports wheat bran, a by-product of wheat-flour production.

Since March 2011, there is a new major entrant in Rwanda's exports sector: Steelrwa⁸. After only one year in operations, Steelrwa - one of the East African Community's two reinforced steel bars (or rebars) producers - has an estimated annual turnover of USD8m, with about USD\$3.2m in exports⁹.

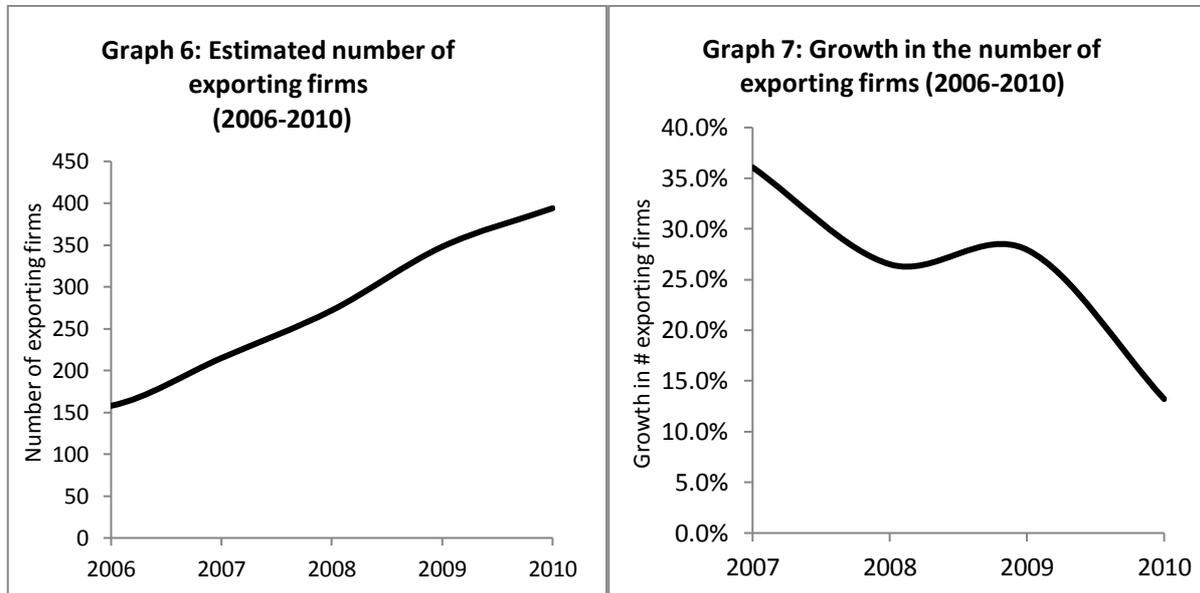
Despite the dominance commodity exporters, a growing number of firms are joining Rwanda's exports sector and are transforming its landscape. After cleaning the data to exclude evident re-exports and

⁷ OCIR Thé is in the process of privatizing the tea sector

⁸ Steelrwa was registered in 2007 but only began production in March in 2011.

⁹ Based on interview with the MD of SteelRwa for the Rwanda Enterprise Mapping Exercise, 26th January 2012

non-commercial exporters (such as embassies, government institutions, etc), we estimate that there were about 160 exporting firms in 2006, compared to approximately 400 in 2010 (see Graph 6), an increase of 150% in the space of 4 years (even though as can be seen in Graph 7 the pace of growth in the number of exporting firms has slowed over the past few years).



As can be seen in Table 1, 80% of growth in the number of exporting firms came from three sectors: (i) the vegetables sector, including tea and coffee; (ii) the construction materials / metals sector; and (iii) the animal/animal products sector. The share of vegetable exporting firms over total exporters did not change much between 2006 and 2010; 37% of exporting firms were vegetable-product exporters in 2006, compared to 40% in 2010. However, growth in the number of construction material/metals and animals/animals products exporters were impressive. In 2006 only two Rwandan firms were exporting construction materials or metals: Afrifoam and Kigali Steel and Aluminium Works. In 2010, there were 64, including major producers such as Tolirwa, Master Steel and Safintra. There was only one exporter of live animals or animal products in 2006, compared to 29 in 2010. Based on available data¹⁰, we estimate that two thirds of this growth came from retailers and wholesalers, and only one-third from the increase in the number of producers. While an estimated 70% of exporters in 2006 were producers, only 40% were producers in 2010. This reflects a change in the landscape of Rwanda's merchandise exporting sector, which on balance is shifting more towards pure trade, as opposed to manufactured exports.

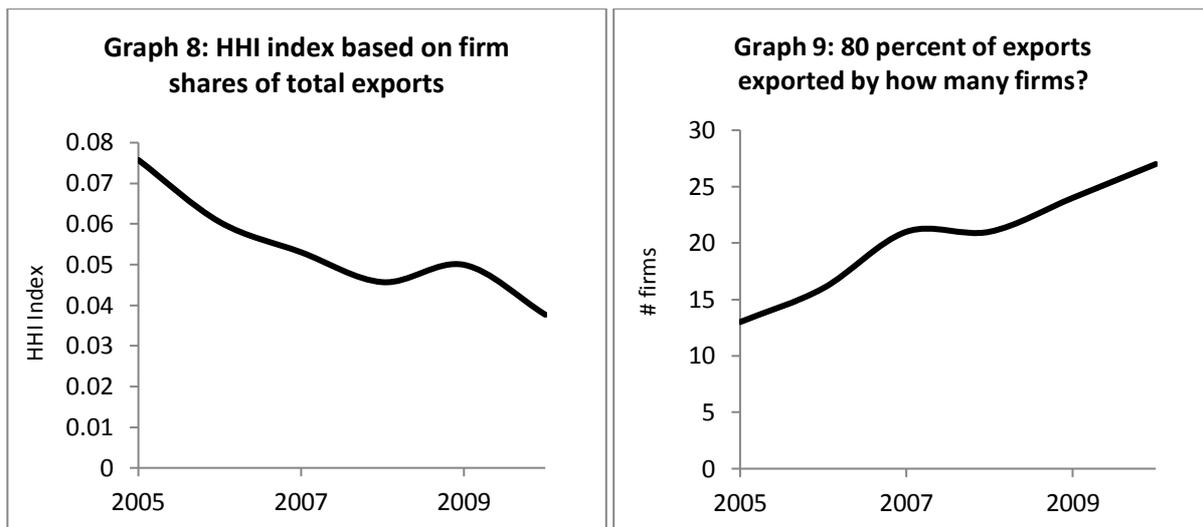
¹⁰ This estimate is based on incomplete information on the nature of exporting firms; this is due to missing observations in the tax roster, which account for about 1/3 of observations in 2010 and more than half of observations in 2006.

Table 1: Difference in Exporting Firm Growth: 2006 and 2010

Sector	Share of firms (2006)	Share of firms (2010)	Difference in share	Number of new firms
Vegetable Products	37%	40%	3%	98
Construction Materials/Metals	2%	16%	14%	61
Animal & Animal Products	1%	7%	7%	28
Chemicals & Allied Industries	2%	4%	2%	11
Machinery / Electrical	2%	3%	1%	9
Mineral Products	16%	8%	-8%	6
Miscellaneous	11%	6%	-6%	4
Wood & Wood Products	6%	3%	-2%	4
Stone / Glass	1%	2%	0%	4
Foodstuffs	5%	3%	-2%	3
Textiles	9%	4%	-5%	2
Plastics / Rubbers	4%	2%	-2%	2
Transportation	0%	1%	1%	2
Raw Hides, Skins, Leather, & Furs	3%	2%	-2%	1
Footwear / Headgear	1%	1%	0%	1

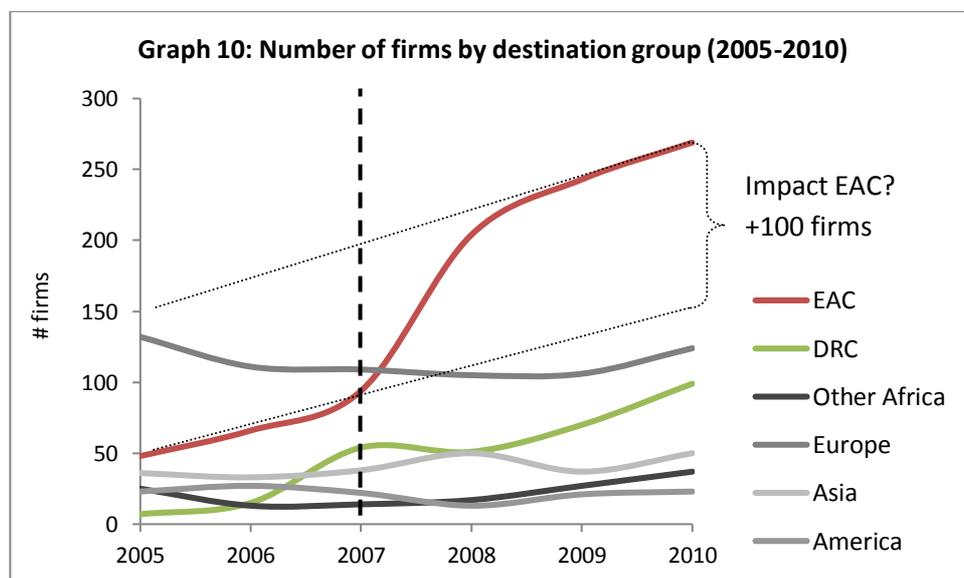
As a result of these and other dynamics, firm-level concentration has declined. In 2005, Rwanda's 14 largest exporters accounted for 80% of exports; today the 27 largest exporters account for 80% of the country's exports (see Graph 9). This trend is confirmed by the Herfindahl-Hirschman index¹¹ of concentration for Rwanda's exports sector (see Graph 8). Between 2005-2010 the index dropped from 0.08 to 0.04, pointing to a decline in the concentration of exporting firms. The main reasons firm concentration levels have declined is: (i) the number of exporting firms has increased by 150% over the past 4 years alone; (ii) the tea sector is being privatized, breaking down the dominance of state-owned OCIR Thé (new entrants include Imporient since 2004; Rwanda Mountain Tea, since 2006; and the Jay Shree Tea & Industries, 2010), (iii) the number of processors in the coffee sector has increased following the privatization era of the late 90s (new entrants include Rwashoscco in 2005, the Kivu Arabic Coffee Company in 2005, etc); and (iv) there have been new large investments in the mining sector (e.g. Minerals Supply Africa Ltd, Rwanda's largest mining company, was created in 2008).

¹¹ The Herfindahl-Hirschman Index or HHI is a measure of the size of firms in relation to the industry and an indicator of the amount of competition among them. It is defined as the sum of the squares of the market shares of the 50 largest firms (or summed over all the firms if there are fewer than 50) within the industry, where the market shares are expressed as fractions. Increases in the HHI generally indicate a decrease in competition and an increase of market power, whereas decreases indicate the opposite.

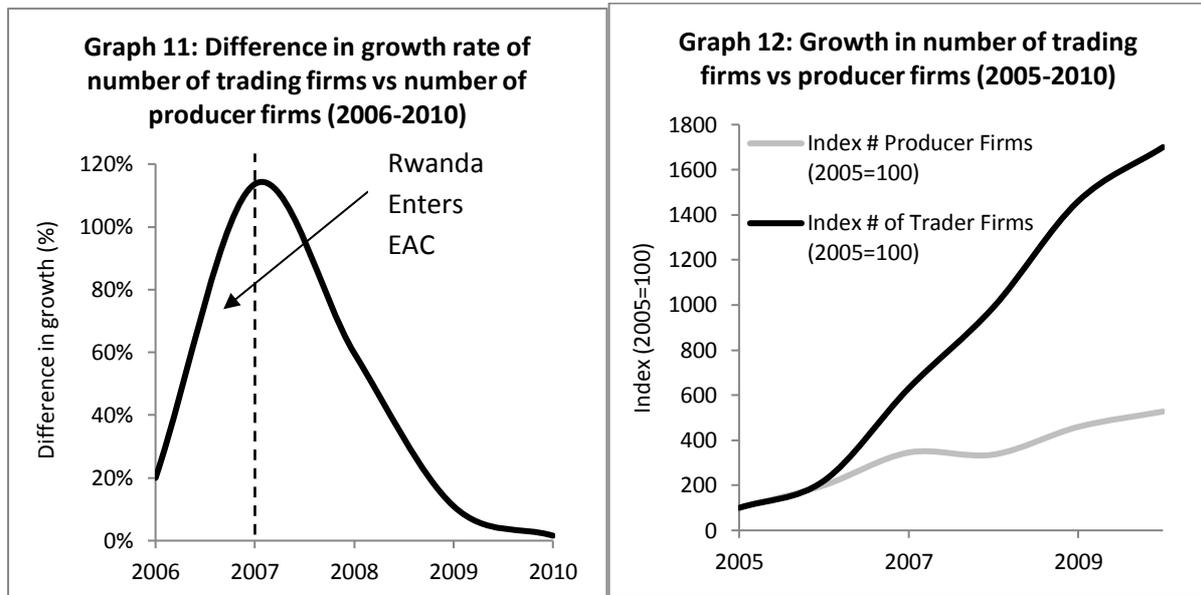


4d. Rwanda’s entry into the EAC is a game changer

One of the drivers of this change in the landscape of Rwanda’s exports sector was the country’s entry into the East African Community’s Customs Union in 2007 and the EAC Common Market in July 2010. Rwanda’s entry into the EAC’s Customs Union – which led to a gradual removal of tariff and non-tariff barriers to trade within the region – seems to have led to a very rapid increase in the number of firms exporting to Burundi, Uganda, Tanzania and Kenya (although we do not seek to establish a causal relationship). In 2006, just before Rwanda’s entry into the EAC Customs Union, there were about 66 Rwandan firms exporting to the EAC region, which was approximately half the number of firms exporting to Europe at the time; in 2008, just after Rwanda’s entry into the EAC, that number had grown to 204 (an increase of about 200%). By 2010, there were two times more firms exporting to the EAC than there were firms exporting to Europe, a complete reversal compared to 2006 (see Graph 10). The only other destination region that did not stagnate or decrease in terms of the number of exporting firms during this period was the Democratic Republic of Congo (DRC). In 2005, based on cleaned RRA data, there were 7 exporters to DRC; in 2010 there were 100 (a fifteen fold increase).



Rwanda's entry into the EAC and the relative stabilization of the situation in the DRC appears to have encouraged many Rwandan retailers and wholesalers (of either locally produced products, mostly vegetables, or imported products) to enter the regional export market¹². As can be seen in Graphs 11 & 12, the comparative growth in the number of retailers and wholesalers entering the exports market versus the number of producer firms entering the export market peaked in 2007. Approximately 90% of new traders export to EAC or DRC destinations, compared to just 36% of traders before Rwanda's entry into the EAC.



In summary, Rwanda's export sector is dominated by commodity products (in particular coffee, tea and mineral products), which are mostly exported to European and Asian destinations. The exporting of manufactured products is limited, as highlighted by the fact that the vast majority of firms in Rwanda's manufacturing sector export less than 10% of their total output. With Rwanda's entry into the EAC however, the composition of Rwanda's export sector is changing. The number of exporting firms has grown by 150% in the space of 4 years and the balance of exporting firms has shifted towards cross-border trading firms (retailers and wholesalers) as opposed to producers.

It is in this context that we study learning-by-exporting in Rwanda, starting with a focus on learning-about destinations.

¹² Again, it is important to note that these numbers are based on firms for which we have certain activity data between 2006-2010; while there are missing observations, we believe that these numbers are reflective of general trends in the exports sector.

5. Learning-by-Exporting: learning about Destinations

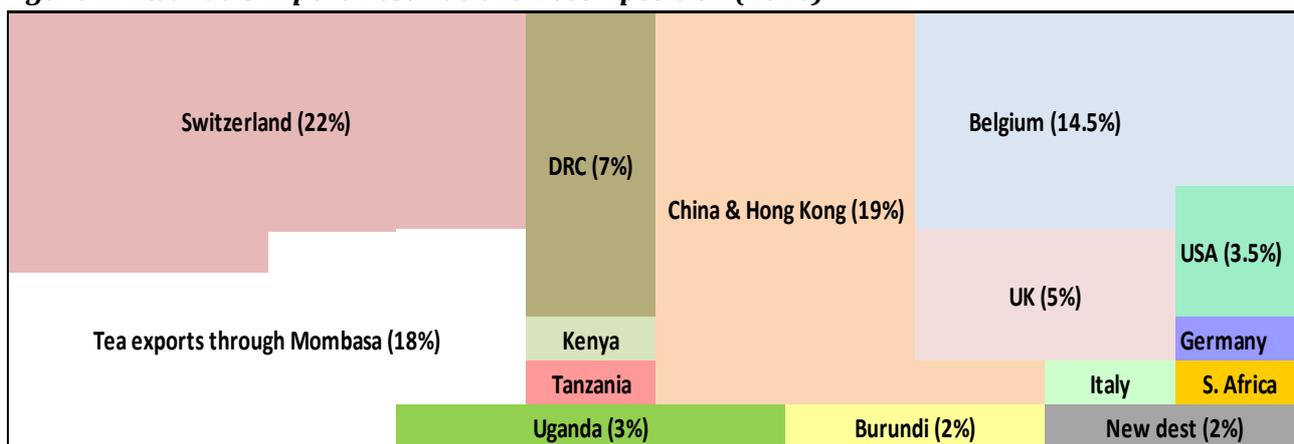
From a destinations perspective, if learning-by-exporting were taking place, we would expect firms to gradually get to know destinations markets better over time and to also get better at discovering and entering new markets. The first time a firm starts exporting to a destination, the learning-curve is bound to be steep – firms needs to understand transport logistics, pre-financing requirements (e.g. trade credits), payments and transfer systems, insurance arrangements, currency risk management, how to manage relations with foreign buyers, etc. The second destination should be somewhat easier, and so forth (see Eaton et al, 2004, 2005; Helpman, Melitz, Rubinstein, 2006, for theoretical models on the costs of entering the export market and on destination related costs). But learning hardly ever only happens within the boundaries of the firm. Our prior is that at the aggregate level, we should also expect to observe spill-over effects: incumbents/pioneers open new markets for Rwandan products and bear the searching costs, while new entrants build on this acquired knowledge to start exporting to these new destinations as well. The more firms that export to a certain destination market, the more new entrants can learn about that destination market.

We start this section by decomposing Rwanda’s export destinations, before quantifying destinations discovery and the pace of destinations discovery in the Rwandan context in order to better understand how learning-by-exporting dynamics are taking place.

5a. Where does Rwanda export to?

As can be seen in Figure 2, when excluding tea exports that transit through the Mombasa auction, Rwanda’s three top export destinations were Switzerland, China (including Hong Kong), and Belgium. Switzerland is mainly a destination for commodity products, in particular coffee and mineral products. 99% of exports to China in 2010 were mineral products; while 60% of exports to Belgium were coffee products, and the remaining 40% mineral products.

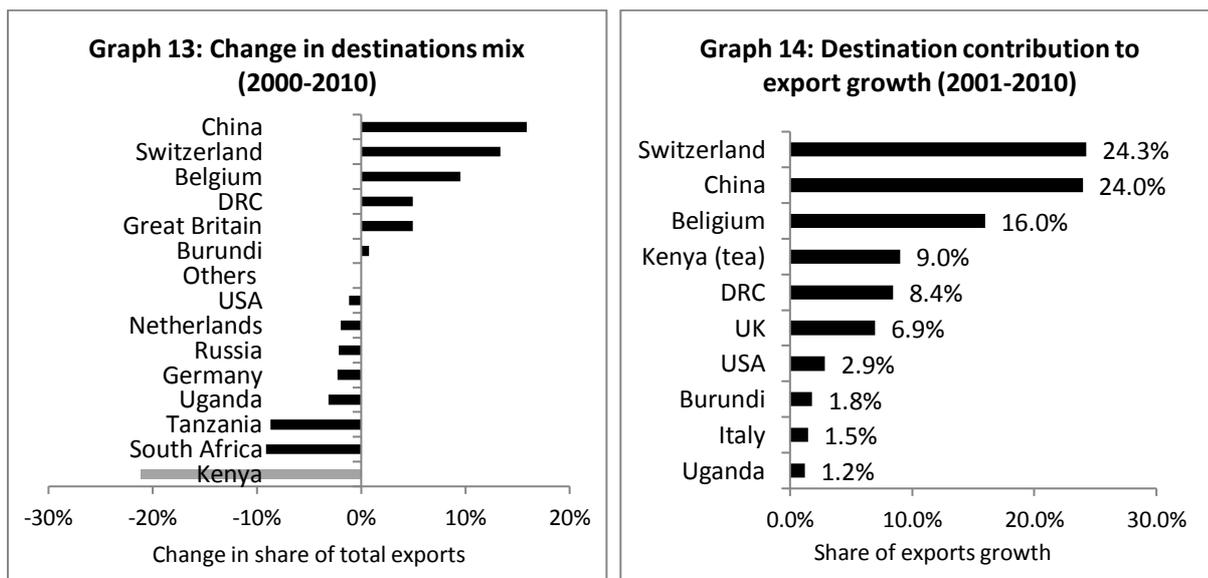
Figure 2: Rwanda’s Export Destinations Decomposition (2010)



The surprising fact in this breakdown is the comparatively small share of the East African Community (EAC) in Rwanda’s exports mix, despite the large number of companies exporting to the region. Based on cleaned RRA data, exports to Kenya accounted for approximately 18.7% of total exports in 2010, but are significantly lower when excluding tea exports, which are traded at the Mombasa tea auction and then re-exported to other destinations. **When these are excluded, actual exports to Kenya amount to only 1.4% of exports. This brings the EAC total to a mere 6.24% of Rwanda’s exports package.** Including DRC, we find that Rwanda only exports a total of about 13.4% to neighboring countries. The

reason this observation is important for the discussion on learning-by-exporting is because it means that Rwandan firms exporting to the EAC and DRC have very different characteristics to firms exporting to farther away destinations (40% of firms, but 84% of exports). We will focus on this issue in more detail in subsequent sections.

Which destinations have grown the quickest as a share of Rwanda’s exports package over the past decade? As can be seen in Graphs 13 & 14, the fastest upwards movers were without any doubt Switzerland and China who today are Rwanda’s two largest trading partners; the biggest downward movers in terms of shares (not absolute values) were Kenya and South Africa. In 2001 Switzerland accounted for about 7% of Rwanda’s exports package compared to 22.1% today, with exports growing from USD4.5m to USD\$40.2m (based on cleaned RRA data). The three main products Rwanda exports to Switzerland are coffee (72% of exports to Switzerland), tin ores and concentrates (18.43%), and niobium (8,31%). Rwanda’s exports to China grew from a mere 2% in 2001 to 18.7% of Rwanda’s total export package today, increasing from USD\$1.5m to USD\$34.1m in 2010. Together, exports to Switzerland and China explain about 50% of growth in Rwanda’s exports sector between 2001 and 2010. 90% of Rwanda’s exports growth between 2001-2010 results from exports to 6 destinations only: Switzerland, China, Belgium, Kenya (including tea exports transiting through the Mombasa auction), DRC and the UK.



5b. Destination discovery

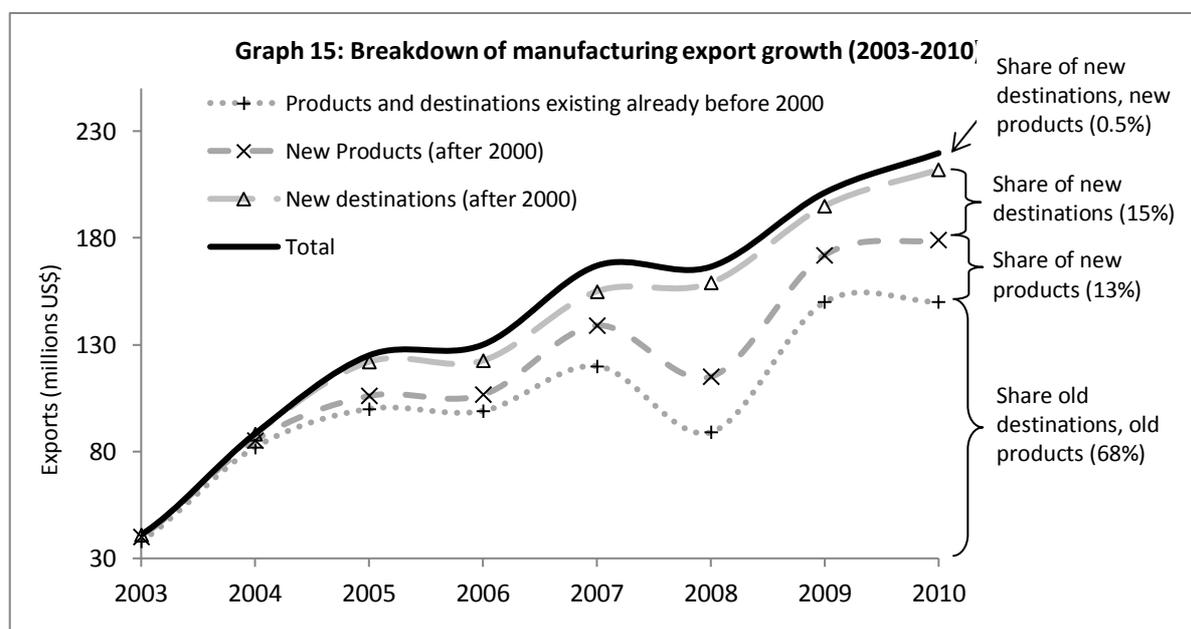
The two main questions we try to answer in this section are: (i) how much have Rwandan firms been learning about new destinations over the past decade?; and (ii) how much have they been learning about old destinations? A good place to start this analysis is to identify the sources of growth in Rwanda’s exports sector, in terms of products, destinations and firms. To determine which destinations and products have been driving exports growth, we use a straightforward and insightful approach designed by Zahler (2007) which enables us to break down exports growth into 4 groups:

- growth from old export products to old destinations {old,old};
- growth from new export products to old destinations {new, old};
- growth from old export products to new destinations {old, new}; and,
- growth from new export products to new destinations {new, new}.

We define as “old” any export destination or product that existed before 2000, and “new” any export product or destination that emerged after 1999. To ensure we do not count as “old destinations” markets to which Rwanda had insignificant exports before the year 2000, we consider that a destination was only discovered the year when Rwanda exported at least US\$100,000 worth of goods to that destination.

Using cleaned COMTRADE data, we find that over the past decade 69% of exports growth has come from the products that Rwanda already exported before 2000 (i.e. tea, coffee and minerals), to destinations that Rwanda was already exporting to before 2000 (see Graph 15). In other words, 69% of exports growth came from old export products to old destinations. New export products accounted for an estimated 13% of growth; new destinations for 15% of growth, while the combination of new products to new destinations was close to nil.

While the contribution of new destination discovery to exports growth is not small at 15%, this number is highly sensitive to the cut-off rate of US\$100,000; at a cut-off of US\$50,000 new destination discovery is only estimated at 1.27%. This is because the contribution of new destination discovery to exports growth hinges on one destination: China (including Hong Kong). If we count China as a new destination, then the contribution of new destination discovery to growth was 15%; if we count China as an old destination, then it is 1.27%. Smaller new destinations include: Luxembourg (US\$1.6m), Japan (US\$0.66m), Austria (US\$0.24m), Ghana (US\$0.2m), Ukraine (US\$0.15m), Canada (US\$0.15m), Zambia (US\$0.13m) and Norway (US\$0.11m).

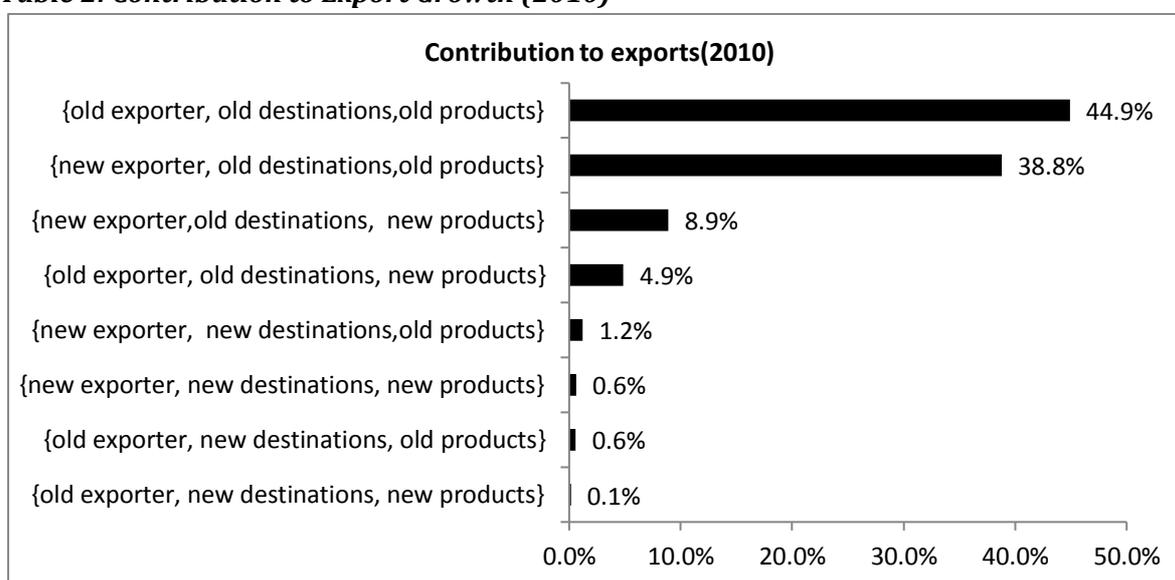


We confirm the fact that there has been little new destination discovery using RRA data. This firm-level dataset enables us to further breakdown growth in Rwanda’s exports sector during the 2005-2010 period into 9 different categories, using new and old exporters, products, and destinations. We call a “new” exporter, product or destination, any new exporter that started exporting after 2006, or any product or destination that was introduced after 2006 (it is not possible to use the year 2000 as our benchmark as we only have reliable firm-level data during the 2005-2010 period). As can be seen in Table 2, exports growth between 2006 and 2010 can be attributed to old destinations and old products,

with very little new destination discovery. Old destinations accounted for 97.5% of exports in 2010, and old products accounted for 85%.

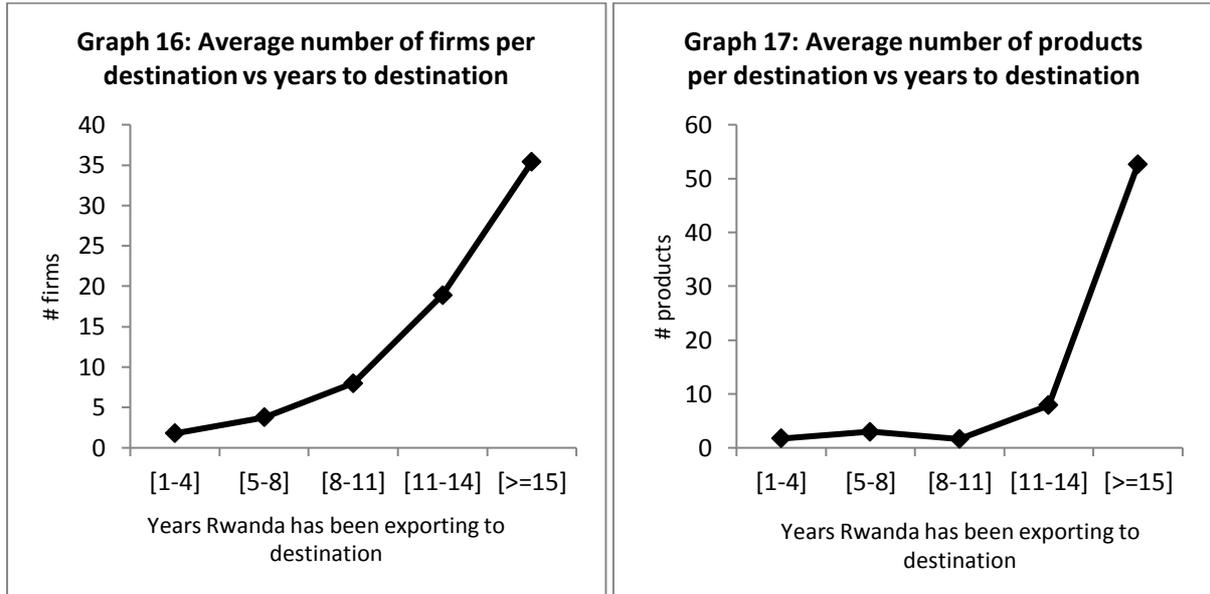
The somewhat surprising fact is that while growth in the exports sector largely came from old destinations and old products, new exporters (that entered the exports market in 2007 or after) were the ones driving growth – as opposed to incumbents, i.e. old exporters - and already accounted for 49.5% of exports in 2010. Not only were new exporters driving exports growth to established destinations, but we estimate that 65% of new product discovery during this period also came from new exporters. These findings suggest that learning-by-exporting at the firm level is not the main driver of exports growth in Rwanda; if it were, we would expect incumbents, i.e. old exporters to be driving new product and destination discovery and contributing significantly more to exports, which is not the case.

Table 2: Contribution to Export Growth (2010)

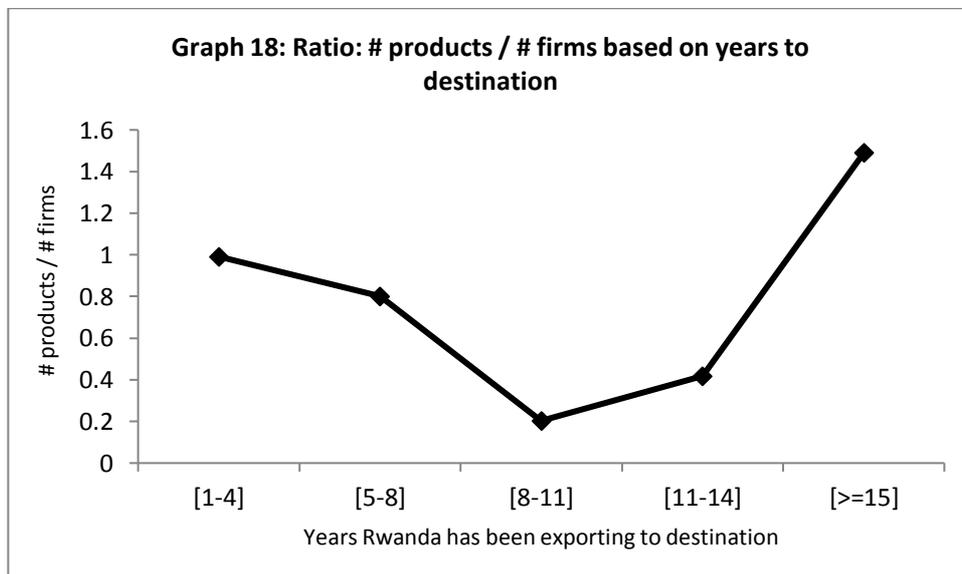


We can take a more detailed look at this relationship between firms, products and destinations by analyzing the link between (i) the number of years Rwanda has been exporting to a certain destination and (ii) the number of exporting firms / number of products exported to the same destination. This will help us shed light a number of relevant questions:

- Do firms export more products to a destination over time? If firms are learning about a certain destination market, we would expect them - on average - to increase the number of products they export to that destination over time. The logic is simple: firms enter a new destination market, gradually get to know the market better, identify new potential export opportunities in that market, and eventually start exporting new products to that destination as well.
- Once a firm has discovered a new destination market, do other firms build on this knowledge and start exporting to that destination as well? This would point to potential learning spill-over effects. The learning-mechanism in this case would be: the pioneering firm bears the cost of searching and discovering the destination market, which inspires other firms to start exploring that destination market as well. This type of learning spill-over effects could help explain why incumbents have contributed less to exports growth to old destinations than new entrants.
- If there are spill-over effects, do they happen within a sector or across sectors? In other words, do many more firms start exporting the same product to a certain destination over time or do new exporters start exporting other products to that same destination.



As can be seen in Graphs 16 & 17, we find evidence suggesting that some learning-about-destinations might be taking place, albeit at a slow pace. In graph 17, we see that the longer Rwanda has been exporting to a certain destination, the more products on average it exports to that destination – this holds for both neighboring countries and other long term partners, although we will show there is a significant difference between commodity destinations and non-commodity destinations. The relationship is exponential: for the first 10 years the increase in the number of products exported to a certain destination is marginal (less than 1 new product per year); after 10 years, the number of products exported to a destination increases exponentially. We find a similar positive association between the number of years Rwanda has been exporting to a certain destination, and the average number of Rwandan firms that export to that destination (see graph 16). The number of firms increases gradually in the first 10 years, and more rapidly thereafter. The pace of growth in the number of firms exporting to a destination and the number of products exported to that destination, is reflective of the fact that new destination discovery is happening slowly and as a result has contributed little to exports growth.



While these results confirm the slow pace of destination discovery, what do they suggest about the learning-mechanisms outlined above? Graph 18 depicts the average product to firm ratio, based on the number of years Rwanda has been exporting to a certain destination. The V-shaped curve reveals that the product to firm ratio decreases on average during the first ten years of exports to a new destination from 1 to 0.2 (5 firms, exporting 1 product), before increasing again to 1.5 thereafter (5 firms, exporting 7.5 products). This hints at two potential learning dynamics at play:

- During the first 10 years, learning about a new destination seems to happen within sectors. A firm discovers a destination market for a certain product, and followers/competitors quickly follow suit and start exporting the same product to that destination. The rate at which firms within a sector start exporting to a new destination is much faster than the rate at which new products are exported to that destination, which explains why the product to firm ratio decreases from 1 to 0.2. If the searching costs for discovering a new destination market are high, then the incumbent is at a disadvantage.
- After a certain period of time, learning spill-over effects seem to shift from within sectors to across sectors. When a destination market becomes established (after the 10 year mark), many more firms start exporting many more products to the latter. This time the rate at which firms start exporting new products to that destination outpaces new firm entry. This suggests that firms are gradually getting to know demand in the destination market better and are discovering and taking advantage of new opportunities to export to it.

A closer look at established destination markets reveals that one export destination in particular is behind the steep increase we observe in the products to firm ratio in graph 18. This country is DRC, which is by far Rwanda's most diverse export destination, in terms of number of unique products exported to it. We estimate that in 2010 Rwanda exported 147 different products to DRC, double the second most diverse destination, Uganda, with 74 products. The firms to products ratio for DRC was almost 1.7 in 2010, compared to an average of 0.76 for EAC countries and 0.6 on average for other significant exporters such as China, USA, GB, Belgium and Switzerland. This suggests that DRC is the market with the highest demand for Rwandan products (in terms of number of products, as opposed to value) and the market where the average diversity of firms is the highest (see Table 3 for more details).

Table 3: Diversity of export destinations

Countries	Product to firm ratio	# products	# firms
DRC	1.69	147	87
Burundi	1.00	68	68
Kenya	0.72	13	18
Uganda	0.70	74	106
Tanzania	0.63	24	38
USA	0.92	12	13
GB	0.72	13	18
China	0.58	11	19
Belgium	0.58	15	26
Switzerland	0.19	5	27

Not surprisingly, we also find a significant difference in the products-to-firms ratio between commodity destinations and non-commodity destinations, which are respectively 0.65 and 1.26 (almost double). As we argue throughout this paper, this wedge between commodity exports and non-commodity exports is due to the very different nature of these markets and the firms that operate within them; however, what is relevant for our discussion on learning, is that these differences translate into a very different learning-by-exporting experience for commodity exporters and non-commodity exporters. As we will show with the short case-studies of one commodity-destination (Switzerland) and the two largest non-commodity destinations (Burundi and DRC):

- commodity exporters tend to be specialized and foreign-owned: if there is any learning about destinations happening, one could argue that it happens in the opposite direction, i.e. foreign owned companies learn about Rwanda as a supplier market, rather than Rwandan firms learning about the exporting destination as a consumer market; and,
- non-commodity exporters tend to be more diversified and locally owned (or owned by regional firms): given that the market for their products are regional and less structured than commodity markets, learning how to export to a certain destination market implies understanding demand in that market and building relationships with local distributors and importers.

Case Study 1: The case of Switzerland – a commodity destination

The case of Switzerland, currently Rwanda's largest trading partner, can shed some light on the mechanisms of learning-about-destinations in the Rwandan context. In 2010 Rwanda exported USD\$40m to Switzerland, out of which about 70% was coffee and the remaining 30% minerals. Let us start with the case of coffee exports.

Switzerland is the largest buyer of Rwandan coffee. Coffee exports to Switzerland in 2010 totaled USD\$26.3m or 46% of aggregate coffee exports that same year. Below, we briefly explore the question of how this link between Swiss buyers and Rwandan producers was created, and what we can induce from this in terms of learning-about-destinations.

In the coffee business, producer/exporter-buyer markets are highly structured, with large buyers dominating global markets. In the case of a small coffee producer market like Rwanda – which is characterized by a myriad of relatively small producers/processors (the largest processor exports an estimated USD\$13-14m of coffee per year) – the bulk of the searching costs (identifying a trading partner) are borne by big international commodity or coffee trading houses, for which Switzerland is a major hub. The latter tend to invest heavily not only in identifying and sourcing local production of coffee, but also supporting local production. The burden of discovering the destination is therefore less on the exporting country or firm, and more on the buyer. We show this with a couple of examples of how Swiss-based trading companies started purchasing and processing ordinary and specialty Arabica Coffee in Rwanda.

Using OCIR Café data, we find that one buyer – Sucafina, a Geneva based company – is responsible for 50% of Rwanda's coffee exports to Switzerland. Sucafina made its entry into the Rwandan market between 1996-1998 when it jointly set-up (and then fully purchased) Rwacof, which today is Rwanda's largest coffee processor. Sucafina Group has established a network of coffee processors and exporters in a number of countries, with a very strong presence in East Africa. Sucafina owns Ugacof Ltd, which has been one of Uganda's largest coffee exporters since 1994, Tancof based in Tanzania (since 1998),

Bucale in Burundi since 2008 as well as other coffee processors and exporters in Serbia, Vietnam and Brazil¹³. The company's decision to invest in Rwanda coincided with the privatization of Rwanda's coffee sector that started soon after the 1994 genocide and came amidst a major supply gap in the global coffee sector.

It is in large part the success of Sucafina's subsidiary in Rwanda – Rwacof - that has made Switzerland such an important destination for Rwanda's coffee exports. Rwacof supplies 92% of Sucafina's coffee imports from Rwanda, which is equivalent to about USD\$14m. Sucafina is responsible for all the exporting and marketing functions of Rwacof, which itself dry-mills and quality checks local Arabica coffee for Sucafina. Through Rwacof, Sucafina gradually got to know the Rwandan coffee production market better and today imports an additional USD\$1.6m of Rwandan coffee from 10 other processors/exporters, in particular cooperatives.

There are two other major Swiss coffee trading houses that import coffee from Rwanda. These are: Schluter (which purchases 12% of Rwanda's total coffee production, or 30% of coffee exports to Switzerland) and Bernhard Rothfos Intercafé (10% of coffee exports to Switzerland). Both are highly specialized trading houses that have been involved in the exporting and processing of African coffee for decades. Schluter was founded in 1885, and since then has specialized in African coffees only. It currently imports from 14 different producer countries. Its Rwanda operations are managed by a representative on the ground, who coordinates purchases from 18 different cooperatives/processors. Bernhard Rothfos Intercafé is owned by the Neumann Kaffee Gruppe, which owns coffee processors and exporters in Burundi, Uganda, Tanzania and Kenya and has extensive experience in eastern Africa. It deals with 4 different cooperatives/processors here in Rwanda.

Sucafina, Schluter and Bernhard Rothfos Intercafé – which together account for 90% of coffee exports to Switzerland - are good examples of coffee buyers that are specialized in African coffee and have spent significant resources identifying and investing in local producer markets, such as Rwanda. Given the structure of global coffee markets and the small size of coffee producers in Rwanda, Rwanda's exports to Switzerland seem to have grown less as a result of Rwandan firms learning about Switzerland as a destination/trading market for coffee, but because of large Swiss buyers increasingly investing in the local market.

We find a similar pattern in the minerals exports sector. Switzerland is a major importer of tin ores and niobium from Rwanda. Based on RRA and Comtrade data we estimate annual imports of tin ores and niobium to average USD\$36m, 65% of which are re-exports from the DRC (i.e. about US\$14m excluding re-exports). The vast majority of mineral exports from Rwanda to Switzerland are conducted by Minerals Supply Africa Ltd (MSA), which is Rwanda's largest mining company and exports 100% of its tin ores to Switzerland, and then on to Malaysia, where it is smelted by the Malaysia Smelting Corporation (MSC).

As in the case of Rwacof in the coffee sector, a Swiss registered corporation called Cronimet Suisse AG has a majority stake in MSA. Cronimet Suisse AG is a subsidiary of the German company Cronimet, which is a large player in the global stainless steel, ferroalloys and primary metals supply chain. Through Cronimet, MSA exports the tin ore to Switzerland and then on to Malaysia. The discovery of Switzerland/Malaysia as an export destination for tin ores and niobium was therefore not the result of learning-about-destinations by MSA, but rather the result of Swiss investments in the company and Rwanda's local mining sector.

¹³ Based on Rwanda Enterprise Mapping Exercise interview with Rwacof on January 26th, 2012

Swiss companies have also invested in other firms in Rwanda's mining sector, including: Rutongo Mines Ltd, the third largest mining company in Rwanda, which is a joint venture between the Government of Rwanda and Swiss firm Ruddington Services AG; and Wolfram Mining and Processing Ltd, one of the 10 largest mining firms in Rwanda.

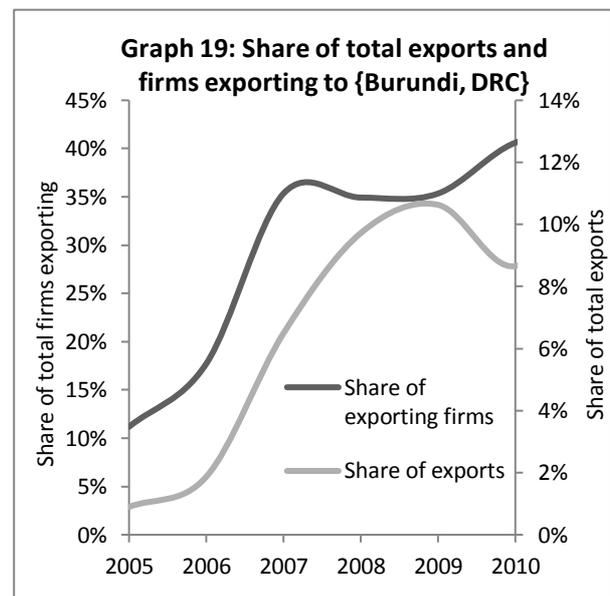
So in the case of large commodity markets such as Switzerland it seems that it is not really Rwandan firms that are learning about Switzerland as a destination market, but rather large Swiss-based companies that are learning-about-Rwanda as a supplier market.

Case Study 2: The case of Burundi and DRC – non-commodity destinations

While major foreign buyers dominate large global commodity markets – such as the tea, coffee and the minerals sectors – smaller local producers in the agribusiness and light manufacturing sectors are aggressively targeting the region, in particular Burundi and the Democratic Republic of Congo. For these destinations, we find a number of insights: (i) exports tend to be more diverse (ii) exports tend to be more sophisticated and (iii) but learning-by-exporting in these destinations is suffering from the low export-orientation of the Rwandan manufacturing firms.

In 2005 exports to Burundi and DRC accounted for a little over 1% of Rwanda's total product exports; today this number is closer to 10%. In 2005 only 11% of firms exported to Burundi and DRC; today 41%. Reported exports have grown from a little over USD\$1m in 2005 to about USD\$20m today. This is in large part due to the increase in processed food and manufactured exports, which in 2010 accounted for about 55% of exports to Burundi and DRC (compared to 35% for raw agricultural products, while the remaining 10% comprised mostly of mineral products). In fact, between 2008-2010 an estimated 76% of Rwanda's manufactured exports (excluding the mining sector, tea and coffee) went to Burundi and DRC¹⁴. Even though exports growth to the latter seems to have slowed between 2008-2010 (see graph 19), we expect manufactured exports to the two countries to grow significantly in 2011-2012 with the entry on new firms into the export market, such as Steelrwa for example and other Rwandan firms that have reported an interest in the Burundi and DRC markets.

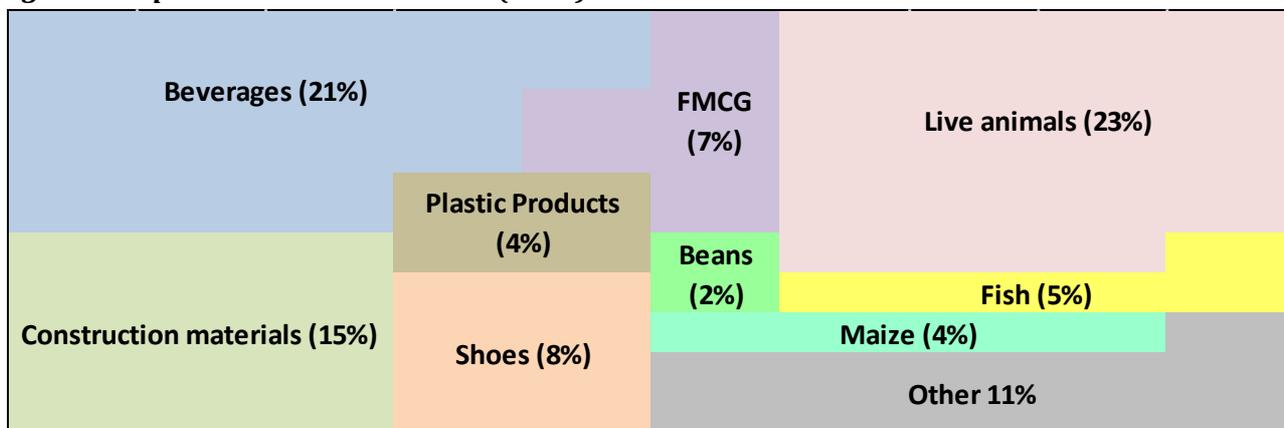
Rwandan firms are gradually learning about the potential of the Burundi and DRC markets, where there seems to be a market for everything Rwanda manufactures. Even though it is in relatively small quantities, Rwanda exports beverages to Burundi and DRC (beer, sodas, juices and milk), construction materials (roofing sheets, rebars, cement, clay products, paints), processed food (tomato paste), furniture (including mattresses), plastic products (plastic water tanks), shoes (plastic shoes), and other



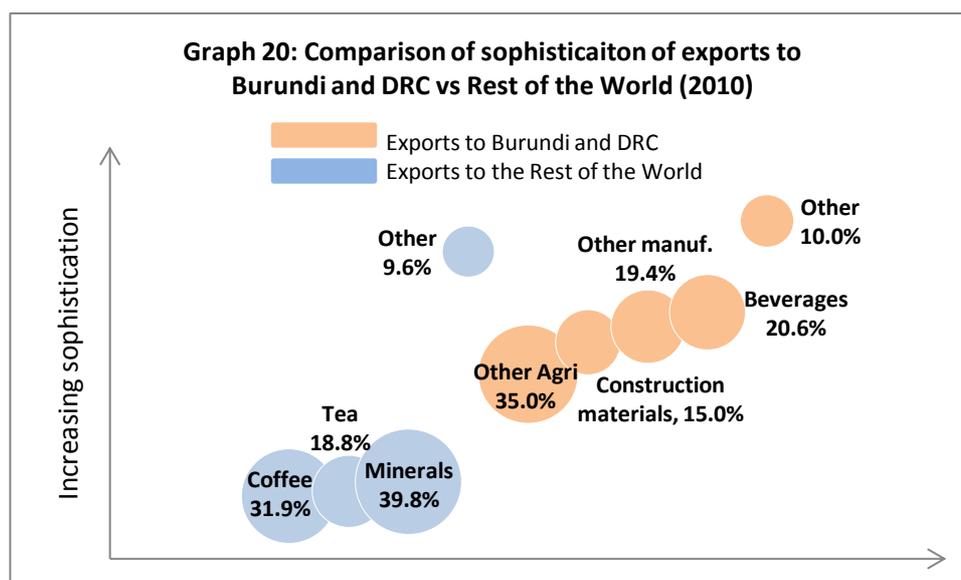
¹⁴ This estimate is based on a sample of Rwanda's largest agribusiness and manufacturing firms (excluding the mining sector) for which export data is available.

fast moving consumer goods (soaps, detergent, toilet paper, batteries). The breakdown of Rwanda’s exports to Burundi and Eastern DRC is depicted in figure 3 below.

Figure 3: Exports to Burundi and DRC (2010)



As a result, Rwanda’s exports to these two destinations are both more diverse and sophisticated than alternative destinations. In graph 20, we compare the sophistication of Rwanda’s exports to Burundi and DRC vs. the rest of the world. We measure product sophistication using the Method of Reflections introduced by Hausmann and Hidalgo (2009), which takes into account the ubiquity of a product (how many countries are capable of producing it – the fewer the more sophisticated) and the average diversity of countries that export that product with a comparative advantage (the more diverse the countries that export a certain product on average, the more sophisticated it is likely to be). Not surprisingly, we find that the processed and manufactured products that Rwanda exports to DRC and Burundi – such as beverages and construction materials, are more sophisticated on average than the coffee, tea and mineral commodities that Rwanda exports to the rest of the world. As we will see in more detail in the section on learning-about-products, these are also the sectors and destination markets where the greatest product -learning and -diversification will come from.



The main implication of these findings is that to become more export oriented, Rwanda’s manufacturing sector will have to learn how to compete on the Burundi and DRC markets. With over three quarters of Rwanda’s manufactured exports going to DRC and Burundi, these are the two markets where Rwanda’s manufacturing sector can compete. Rwandan firms have the advantage of proximity in

these two markets where, due to recent and ongoing political instability, learning is a lot about building the right trust relationships with local distributors, putting in place and testing the right payment systems, and figuring out logistics. Nevertheless, growth in exports to Burundi and DRC are only nascent and Rwanda's manufacturing sector remains non-export oriented.

To put this into perspective, we can breakdown Rwanda's manufacturing sector into three groups with respect to exports to DRC and Burundi:

- (i) ***There are only a handful of companies that are already regular exporters to Burundi and Eastern DRC markets***, with an established presence there and regular exports. In 2010 the main exporters to the region were Bralirwa (beverages), Master Steel (construction materials), Sulfo (FMCG), Société Rwandaise de Chaussures (shoes), Cimerwa (cement), Kigali Cement, and Rwanda Plastics Industries. The latter accounted for an estimated 90% of manufactured product exports to Burundi and DRC in 2010.
- (ii) ***There are many companies that are sporadic exporters about the Burundi and Eastern DRC markets***, with sporadic exports to the region but to date have not fully established systems and distribution networks. These include companies such as Minimex (maize), Premier Tobacco (cigarettes), Mutara Enterprises (furniture), Ameki Color (paints), etc. They plan to invest in expanding their presence.
- (iii) ***There are also a significant number of companies that have exited the Burundi and DRC markets***, mainly due to regional competition. Examples include Petrocom/Ufametal (construction materials), and Suku Paper Works(toilet paper).

Given the diversity of exports to non-commodity markets, their comparatively higher level of sophistication and the very different nature of firms that export to these markets, the experience firms gain by exporting to these destinations is very different to that of commodity-market destinations such as Switzerland, China and Belgium. The issue Rwanda faces is that its manufacturing sector is not very export oriented – less than 10% of output is exported – and that as a consequence learning-about non-commodity destinations remains limited.

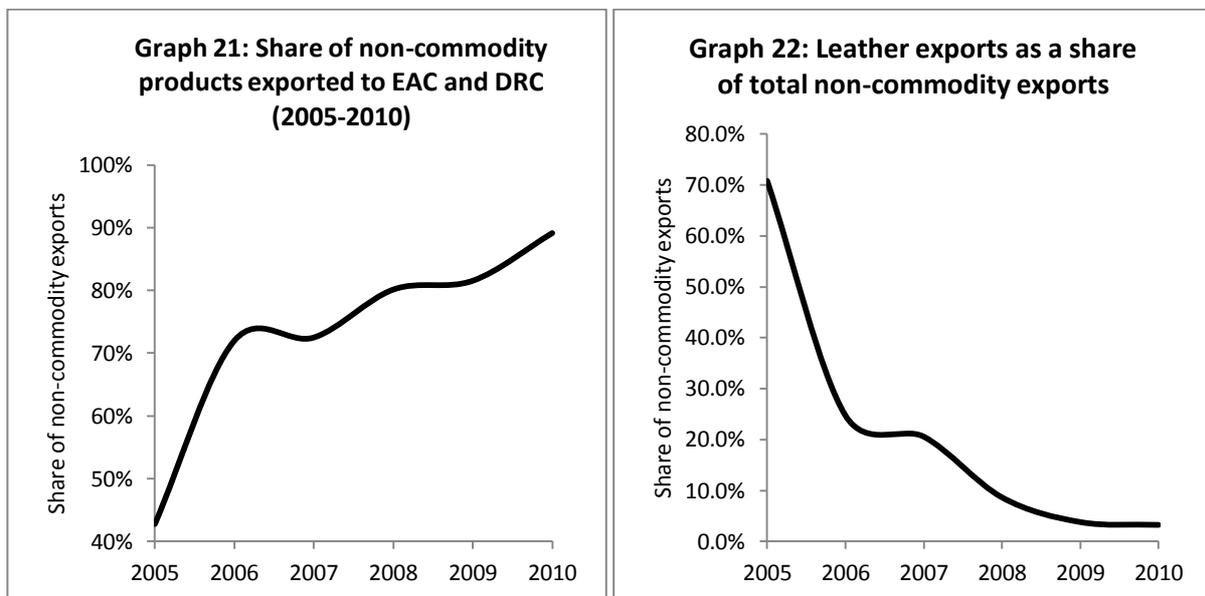
5c. Is low learning-about-destinations a constraint to exports growth?

In this section we have established: (i) that China aside, there has been very little new destination discovery; (ii) that destination discovery is a slow process – it takes an estimated 10 years before the number of firms and products exported to a destination starts picking up; (iii) that destination discovery in commodity markets seems to be happening in the opposite direction – foreign companies are discovering Rwanda as a supplier and potential investment destination, rather than Rwanda firms getting to know the destination market better; and (iv) that in non-commodity markets, such as DRC and Burundi, the majority of Rwandan exporters of manufactured and agribusiness products have yet to establish themselves as regular and significant exporters. The question then becomes: ***is low learning-about destinations (both new and old) a binding constraint to the growth of Rwanda's exports sector?***

We believe the answer is no for commodity export markets, which are already relatively diversified in terms of destinations. Out of Rwanda's top 20 destinations, which account for 99.8% of exports, 80% are mainly destinations for commodity products (coffee, tea, and minerals). These include Switzerland, China, Belgium Great Britain, USA, Germany and South Africa. Moreover, foreign ownership in the tea, coffee and mining sectors is large, thereby ensuring that there will always be a foreign buyer for Rwanda's commodity products. As described above, given the nature of commodity markets and high

demand in the sector, commodity buyers spend considerable resources identifying supplier markets, and Rwanda has now become a known supplier for coffee, tea, tin, tungsten, niobium, chromium, etc.

Low destination discovery for non-commodity export markets however, could be binding. As can be seen in graph 21, the relative diversity of Rwanda's non-commodity exports has decreased rapidly since 2005. In 2005, 45% of non-commodity exports were exported to the EAC and DRC; in 2010, this number was 90%, almost double. The rapid decrease in the relative diversity of export destinations for Rwanda's non-commodity exports can be explained by a number of parallel dynamics: (i) on the positive side, the increasing share of exports to the EAC and DRC could be the result of Rwanda's increasing integration into the EAC market following its entry into the Customs Union in 2007 and the gradual stabilization of the situation in Eastern DRC; (ii) on the negative side, it reflects the failure of some manufacturing export industries which were exporting to alternative destinations, in particular the leather sector. In 2005 leather products accounted for over 70% of non-commodity exports compared to only 3.3% in 2010. The collapse in leather exports led to the closure of Rwanda's largest tanneries, including Rwanda Leather Industries and Saban S.a.r.l (see graph 22). The latter exported to destinations such as Pakistan, China, Italy, Holland, Switzerland, India and Belgium.



The speed of the decrease in the destination diversity of Rwanda's non-commodity exports could also indicate that these are the only markets where Rwanda's non-commodity exports are currently competitive. This seems to be especially true for Rwanda's manufacturing exports sector, for which we estimate that 99% of exports go to DRC and the EAC¹⁵. While growth in non-commodity exports towards the regional DRC and EAC markets has been impressive (an estimated 42% for EAC during 2007-2010; and 123% for DRC), the decline in non-commodity exports to alternative destinations (-42% during the same period) means the latter are increasingly vulnerable to the state of the regional economy and competition therein.

¹⁵ This estimate is based on a sample of 72 of Rwanda's largest manufacturing firms for which we have data.

6. Learning-by-Exporting: New Product Discovery and Product Upgrades

In this section, we take a more detailed look at the second dimension of learning-by-exporting: new product discovery in Rwanda¹⁶. We focus on three questions in particular: (i) what are the parameters of new product discovery in Rwanda (which products, what firms and to which destinations)?; (ii) what kind of products is Rwanda likely to move-into in the near future?; and (iii) has exporting led to product upgrading or increased levels of product sophistication?

6a. The majority of Rwanda's exports are at the periphery of the product space

To understand product discovery in Rwanda we make extensive use of Hausmann et al (2006) concept of the product space. The product space is based on the intuition that some products are more similar in the competencies and inputs they require to be produced than others, and that if a country or firm produces a certain product it is more likely to move into the production (and eventually exporting) of a new product that is similar, rather than a product that is very different. If for example a company has the required skills and inputs to make bicycle tires, that firm is much more likely to diversify into the production of car or truck tires than the production of tomato paste. Based on global exports data, Hausmann et al estimate the so called "distance" between all products in the world (as classified by various product classification systems – e.g. SITC, HS, etc.) using a metric of how likely it is for a country that exports one product with a comparative advantage, to also export another product with a comparative advantage. The logic is that if a pair of products is quite similar, then on average countries that have a comparative advantage in one product are also likely to have a comparative advantage in the other. Using this metric of "distance between products" it is possible to place all products in a network, like the network representation in figure 4 below.

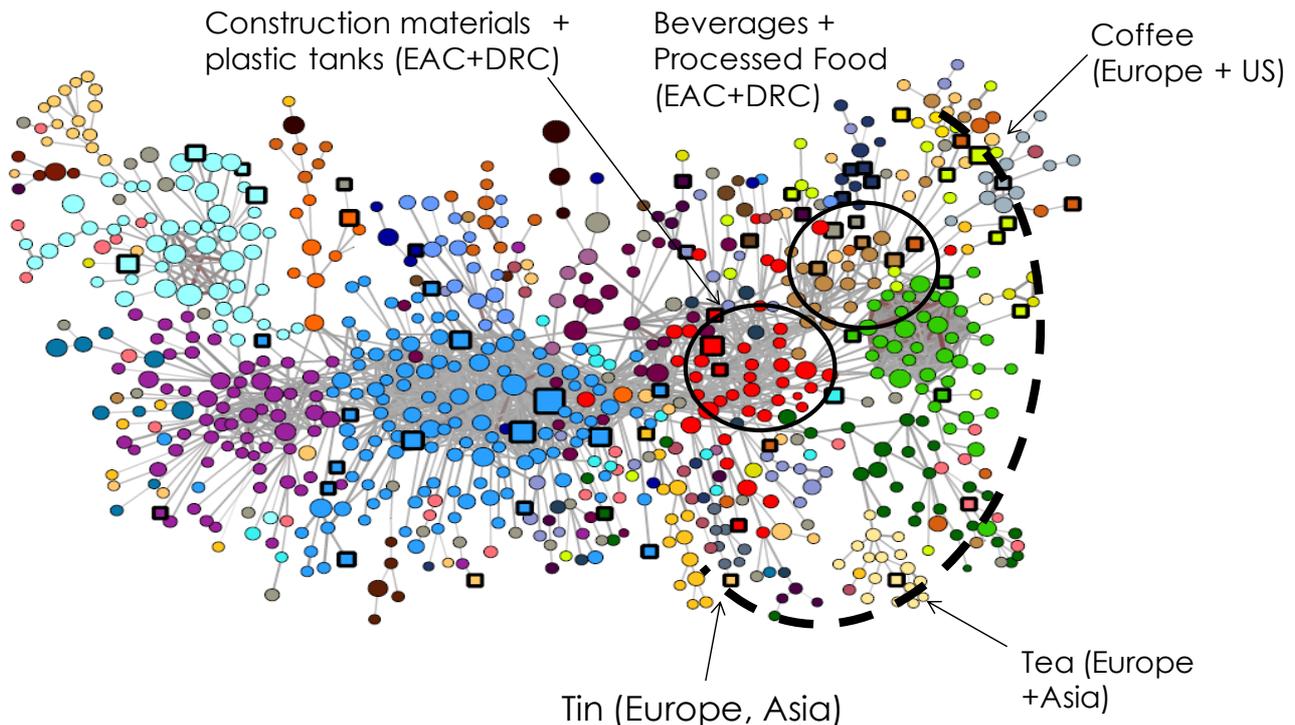
Another important insight that Hausmann et al derive from the product space and which will help us understand new product discovery in Rwanda, is that some products are better connected than others. It is more likely for a company that produces electronic computer chips for example to have the capabilities to start producing a whole range of other products (e.g. mobile phones, laptops, radios, television sets, etc.) than it is for a sugar producer. Some groups of products are very interconnected and require similar inputs, techniques and skills to be produced: examples include electronics, machinery, chemical products, construction materials, etc.; other products, at the periphery of the product space, are less well connected and don't lend themselves well to new product discovery. Typical examples include the crude oil sector, the production of raw agricultural products, mining. A firm's - and at the aggregate level, a country's - ability to diversify is dependent on its position in the product space. Diversification is path dependent: a firm and a country's current location in the product space, will determine what products it is likely to produce and export in the future. This is empirically tested (Hausmann et al, 2006).

So what does Rwanda's product space look like? In figure 4, we depict Rwanda' product space, highlighting where Rwanda's main export products are located. As can clearly be seen in the figure, Rwanda's main export products are located at the periphery of the product space: this includes tea, coffee and mining exports (tin and tungsten) which account for about 88% of Rwanda's exports. The fact that the latter are at the periphery of the product space means that in theory there are few new

¹⁶ As shown in Chapter 5, new product discovery contributed to 13% of exports growth between 2000-2010

products that firms in these sectors could organically diversify into. We see this happening in practice in Rwanda's coffee, tea and mining sectors. All of Rwanda's coffee producers only make coffee; all tea producers are exclusively in the tea business; and all mining firms only do mining. These companies might diversify within their sector – i.e. coffee companies moving from semi-washed to fully washed coffee, or tea companies moving from black tea, to green tea, white tea and orthodox tea – but they are unlikely to diversify into new products/sectors altogether. The skills and equipment required to process tea and coffee, or to mine tin and tungsten, are specific and non-transferrable.

Figure 4: Rwanda's Product Space



Source: <http://atlas.media.mit.edu/>

New discovery is more likely to happen in Rwanda's light manufacturing and agribusiness sectors which are located in a denser / more connected part of the product space. This includes the beverages and processed food sector, the furniture sector, the plastics products sector, as well as the fast moving consumer goods (FMCG) and the construction materials sectors. Even though these sectors only account for a small share of Rwanda's exports, light manufacturing and agribusiness firms in Rwanda are much more diverse than coffee, tea and mining companies.

This is substantiated by firm-level data: firms in Rwanda's construction materials sector - such as Uprotur, Master Steel, Safintra, Tolirwa - make roofing sheets of various shapes, sizes and colours, steel and plastic tubes, nails, steel frames for doors and windows, barbed wire, etc.; furniture companies such as Mutara Enterprises and Manumetal, make all kinds of furniture using wood, steel and aluminium, as well as office partitions and carpeting; agribusiness companies, such as Urwibutso, produce everything from juices, to chili sauces, biscuits, wine, water and flour; beverage companies, such as Inyange, make milk products, juices, and yogurts; and, Sulfo alone, which is Rwanda's largest fast moving consumer goods company, produces detergent, talc, body lotions, soap, shoe polish, sweets, water, margarine, and packaged tea bags. These companies have not only started producing these products, but some already export to neighboring Burundi and DRC in particular.

6b. New product discovery in Rwanda

We take a closer look at new product discovery in Rwanda by dividing export products into 5 categories:

- (i) **Established export products**, which we define as products that were first exported before the year 2000, and that have been exported for at least 4 years between 2006-2010 with exports amounting to at least US\$10,000 in 2010;
- (ii) **New product discoveries**, consisting of products that were first exported after 1999, that have been exported for at least 4 years between 2006-2010, and for which exports were worth at least US\$10,000 in 2010;
- (iii) **Incipient product discoveries**, defined as products that Rwanda first started exporting after 2007, for at least two years between 2008-2010 and for which exports in 2010 were worth at least US\$10,000;
- (iv) **Non-surviving export products**, which Rwanda stopped exporting before 2008;
- (v) **Intermittent exports**, consisting of products that Rwandan firms either don't export consistently or for which total exports in 2010 were less than US\$10,000.

Table 4 summarizes the contribution of each of these product categories to exports growth based 2000-2010 export data. Results have, to the extent possible, been cleaned, excluding evident re-exports such as cars, trucks, machinery, engines, aviation oils, petroleum, etc. As can be seen in the table, the majority of growth over the past decade has come from increased exports in established products¹⁷. In 2010, 5 products accounted for 96% of established product exports: tin ores, coffee, tea, niobium and beer. Other significant established export products include:

- Fast moving consumer goods such as beauty products, hair products, and soaps (for a total of USD\$1.5 m);
- Cement (US\$1.2m);
- Pyrethrum (US\$1.1m); and,
- Agricultural products such as kidney beans and peas (US\$0.5m), maize (US\$0.15m), potatoes (US\$0.1m) and rice;

Table 4: Contribution to Export Growth by Export Product Category

Product Category	Total exports	Contribution to exports growth (2000-2010)
Established export products	165m	74.6%
New Export Discoveries	43m	19.5%
Intermittent	9m	4.3%
Incipient	4m	1.6%

So what new surviving export product discoveries has Rwanda made over the past decade? Using the definition outlined above, we find that Rwanda exports a total of about 40 new products. As can be seen in table 5 however, two types of products alone account for approximately 70% of new export discoveries including:

- Fully washed coffee (or specialty coffee), which Rwanda has been aggressively targeting since the early '2000s;
- New mineral exports, including tungsten (also known as wolfram) and chromium ores and concentrates;

¹⁷ Note that we distinguish between ordinary and fully washed coffee. Ordinary is considered old, whereas fully-washed coffee is considered new.

Table 5: New Export Discoveries

New export products	Number of products	Share of new products	Value (USD)
Fully washed (specialty) coffee	1	44.9%	17.9m
Minerals (tungsten + chromium)	2	24.6%	9.8m
Live animals and raw hides and skins	7	16.0%	6.4m
Beverages (fruit juices)	2	3.9%	1.6m
Plastic shoes	1	3.0%	1.2m
Beans (dried and shelled)	3	2.2%	0.9m
Smoked and dried fish	2	1.9%	0.8m
Plastic tanks	1	0.9%	0.3m
Props for scaffoldings	1	0.8%	0.3m
Furniture (certain products)	3	0.5%	0.2m
Totals	22	98.6%	39.3m

This implies that - in terms of volumes at least - new product discovery in Rwanda is still happening at the periphery of the product space, i.e. commodity exports. This is not surprising given the weight of these sectors in Rwanda's current export basket (>80%) and the fact that many of Rwanda's commodity exporters are owned by larger foreign groups - firms that export commodities such as coffee and minerals have the ability to bring new export products to scale much faster than comparatively smaller exporters in Rwanda's processed food and manufacturing sectors. To give the reader a sense of scale, Rwanda's exports of these new commodity products (specialty coffee, tungsten and chromium), are equivalent in size to all of Rwanda's processed food and manufactured products exports. Therefore, an export strategy focused on new product discovery in Rwanda's commodities sector would be more likely to result in rapid exports growth in the short term than a strategy focused on the agribusiness and manufacturing sectors. However, an increased reliance on commodity exports would expose Rwanda to larger export boom and bust cycles, and in the long term would hamper product discovery, diversification and improvements in the complexity and sophistication levels of Rwanda's exports.

Other significant new export products include live animals and skins (16% of new export products) and processed/manufactured products such as fruit juices, plastic shoes, plastic tanks, dried and shelled beans, props for scaffoldings and some furniture products (together 15% of new export products). Live animals and raw hides and skins products are also at the periphery of the product space. Exports of the latter had all but halted after the 1994 genocide, as Rwanda was rebuilding its depleted bovine, goat and sheep stocks, but have steadily increased over the past decade. A natural evolution of the live animal and raw hides and skins sectors would be to diversify into the production of leather products or processed/packaged meat; but companies that started in these sectors in Rwanda, such as Saban S.a.r.l (leather) or Rwanda Leather Industries, have not been able to compete and have stopped operations.

Processed food and manufactured products only account for 15% of new product exports and have contributed 2.7% or about US\$6m to exports growth over the past decade. Even though volumes for these products remain low, the fact that Rwanda has consistently been exporting them since 2005 signals that Rwandan firms have developed the knowledge and capabilities to not only produce these kind of processed food or manufacturing products, but also to export them. The main challenge is to bring the production and exports of these products to scale. As discussed in the chapter on destinations, part of this effort will involve supporting the development of more integrated trade links

with the Burundi and DRC markets, which are the main destinations for Rwanda's current processed food and manufactured products exports.

Out of Rwanda's incipient products, which totaled US\$3.6m in 2010, many are likely to fail and few likely to survive. Rwanda's main incipient export products since 2008, have been:

- Wheat bran for which exports in 2010 amounted to US\$2.3m or 80% of total incipient product exports that year. Wheat bran is currently exported by Pembe Flour Mills, Rwanda's largest manufacturing/agribusiness firm after Bralirwa. Wheat bran is a by-product of wheat-based flour production and is used for animal feed;
- Rebars for the construction sector, which only started in March 2011, but have now been exported for two consecutive years. Exports of locally produced rebars by Steelrwa are currently estimated at US\$3.2m¹⁸.
- Aluminum alloy plates for the construction sector, which in 2010 amounted to about US\$0.2m, and are currently exported by one of Rwanda's largest construction materials firm, Master Steel.

The latter are export products that are likely to survive in coming years, given that the companies behind them - Pembe Flour Mills, Steelrwa and Master Steel- are amongst Rwanda's largest and most successful. Other incipient exports, such as starches and aluminium reservoirs, remain very small in scale.

Intermittent products, that Rwanda has been exporting on and off over the past decade but has not managed to export consistently, include mineral products such as zirconium (US\$1.4 in 2010), flat rolled non-alloy steel products for the construction sector (US\$1.3m in 2010), tanned hides and skins (US\$1.1 in 2010, but have stopped since), maize flour (US\$0.4m in 2010) and natural gum (US\$0.3 in 2010). These are products that are either on the verge of failure, such as tanned hide and skin exports which have stopped altogether after the closing of Rwanda's main tanneries, or that require additional investments and support to survive.

6c. What products is Rwanda likely to “discover” in the near future?

Based on a country's position in the product space, it is possible to determine which new export products that country is most likely to “discover” in the near future. What a country already exports, on average, determines what that country is likely to learn how to produce and export in the near future. We can illustrate how this works with a very simple example: Assume for example that we are interested in the question of whether Rwanda is likely to start exporting jumpers, and that we know for a fact that the most similar products to jumpers in the product space are t-shirts, socks, and trousers. If Rwanda were not exporting any of the latter, and were only an exporter of tea, coffee and minerals - which require very different skills to be produced than jumpers - then we could say with a certain degree of confidence that it is unlikely for Rwanda to start exporting jumpers in the near future. If however Rwanda were already exporting t-shirts, the idea that it could also move into the production of jumpers would sound somewhat more plausible, given that it is already an exporter of textile products. If in addition Rwanda were not only exporting t-shirts, but also socks and trousers, then the likelihood that firms in the country would “discover” or simply start exporting jumpers would be significantly higher. In this case we could say that jumpers are “close” to Rwanda's current product space, and that is likely for the country to start exporting jumpers in the near future. Using a similar logic, it is possible to measure how close a certain product is to Rwanda's product space, by measuring

¹⁸ Based on Rwanda Enterprise Mapping interview with Steelrwa on January 26th, 2012

how closely connected it is to products that Rwanda already exports. This measure, introduced by Hausmann et al (2007) in the context of the product space, is called “density”.

The starting point of this analysis is to first identify what products Rwanda has a comparative advantage in. To do this we use Balassa’s Revealed Comparative Advantage (RCA), using various cut-off rates. Balassa’s RCA index, basically measures in relative terms how much more or less of a product a country exports compared to the rest of the world. As a rule of thumb, if a country’s RCA index in a certain product is greater than 1 – which would indicate that the weight of that product in the country’s export basket is greater than the world average -we say that the country has a revealed comparative advantage in that product; if the RCA index of a product is smaller than 1, then the country’s doesn’t have a comparative advantage in that product. Based on the 2010 RRA exports dataset, we find that using this cut-off, the main products in which Rwanda had comparative advantage are:

- Mineral products (tin ores and concentrates, chromium, niobium, and tantalum);
- Coffee and Tea;
- Beverages (beer, milk, water, fruit juices);
- Construction materials (cement, flat rolled steel products, bricks, tiles, barbed wire);
- Plastic products (plastic tanks)
- Raw Hides and Skins;
- Products of the milling industry (cereal flours, starch, dry vegetable meals);
- Essential oils, parts of plants, vegetable saps and extracts (including Pyrethrum);
- Beauty products (hair and skin);
- Plastic shoes; and,
- Some textile products.

To calculate the density of new products in relation to Rwanda’s product space, we add to this list of products “transitional products”. Following Hausmann et al, we call any product in which Rwanda has an RCA greater than 0.5 but smaller than 1 a “transitional product”; i.e. Rwanda is already exporting that product, but does not yet have a comparative advantage in it. These are significant export products for which Rwanda has acquired some production and exporting capabilities; we take these capabilities into account when calculating the density of other products.

Using a measure of product density, we find that the products closest to Rwanda’s product space are the following¹⁹:

Table 6: Closest Products to Rwanda’s Product Space

Closest products to Rwanda’s product space (hs4 level)
Vegetable products for tanning, dyeing and plaiting
Cut flowers
Oil seeds
Sugar (including molasses)
Bananas and plantains (fresh or dried)
Tanned skins and leather products
Fruits (pineapples, avocados, papaya)
Cashew nuts and peanuts

¹⁹ We have cleaned the data to exclude products we assume that Rwanda is unable to produce due to geographic or climatic parameters, e.g. cocoa and other minerals

Manioc, sweet potato and similar roots
Spices

These are the products that Rwanda is most likely to start exporting on a larger scale in the near future (5-10 years). This is not a very surprising list given that Rwanda already produces and exports most of these products, albeit at a small-scale. Moreover, private investment has increasingly been flowing towards these sectors over the past years: East African Growers for example has recently invested in avocados production in Rwanda; Kabuye Sugar Works - Rwanda's only sugar mill - is looking to expand sugar-cane production and processing; Inyange, Rwanda's largest milk, yogurt and juice producer, is investing in the country's pineapple value chain, etc.

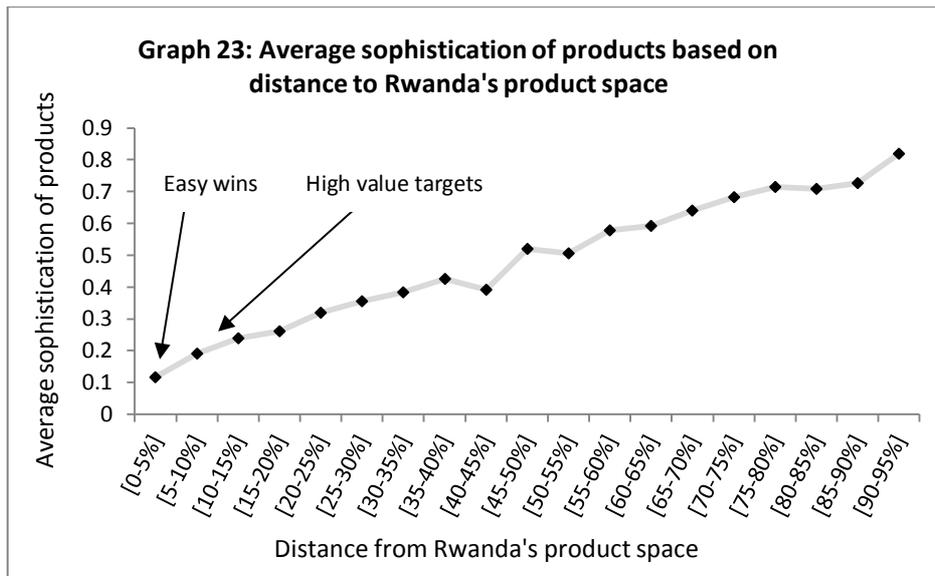
If we take a sectoral view of the density data and focus on the 5% of products that are closest to Rwanda's product space, we find that Rwanda's export sector is likely to organically grow into exporting more agricultural products (fruits, nuts, spices, vegetables, fats), flowers, some processed food products (sugar confectionery), leather, textile products and shoes. We call this group of products "easy wins".

Table 7: "Easy Wins" Export Products

Sector (hs2 level)	Products (hs6 level)
Sugars and confectionery	Raw sugar cane, refined sugar, molasses
Oil seeds and various grain seeds	Sesamum seeds, ground nuts, oil seeds, seeds fruits and spores for sowing, flour or meal of oil seeds
Flowers	Cut flowers, foliage
Fruits and nuts	Cashew nuts, bananas, plantain, citrus fruits, guavas, mangoes, avocados, papaya, other dried fruits and nuts
Spices	Capsicum, bay leaves, thyme, ginger
Edible vegetables and certain roots and tubers	Legumes, peas, lentils, chickpeas, aubergines, arrowroots, dried leguminous vegetables, manioc, cassava, capers, broad beans, sweet potatoes
Raw hides and skins and leather	Various skins and leathers
Vegetable textile fibres	Jute and bast fibres, vegetable fibers, sisal
Apparel	Various garments, including trousers, t-shirts, etc
Footwear	Waterproof and plastic shoes
Vegetable fats	Maize oil

However the realm of the possible is larger than this narrow group of easy wins. We therefore focus on a second group of products, which we call "high value targets". As can be seen in graph 23, products that are in the 5-10% range of closest products- still relatively close to Rwanda's product space - are on average more sophisticated than the first group. In addition to the sectors under "Easy wins", these include:

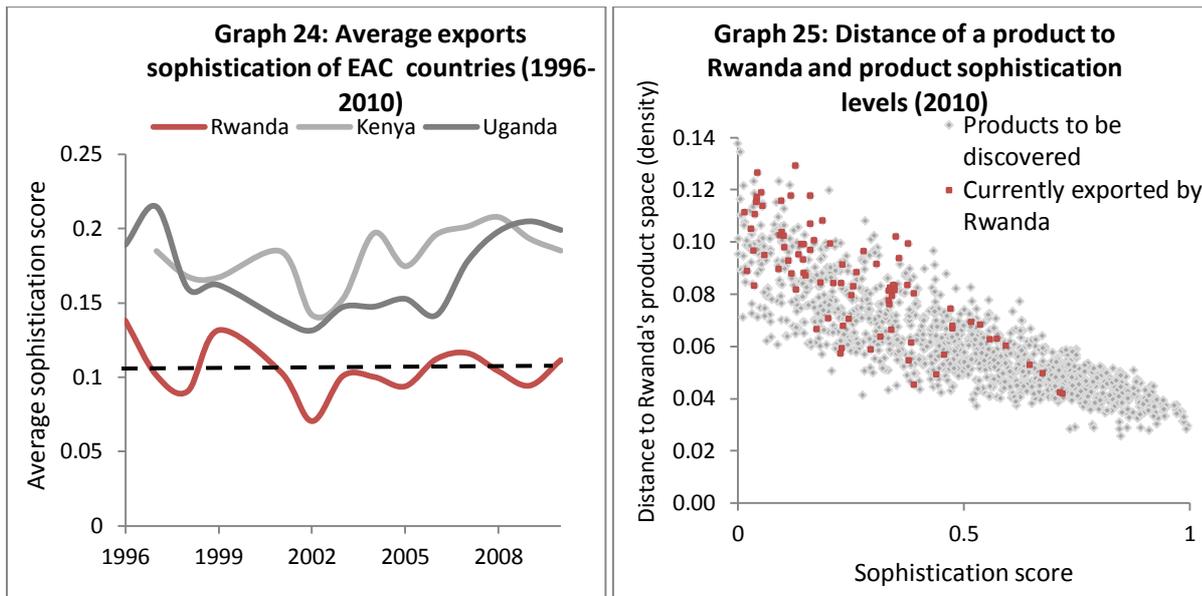
- staple crops (such as rice, maize);
- processed food and beverage products (cereals, confectionary, honey, milk, juices);
- packaging products (glass containers);
- rubber products (natural rubber and inner tubes of tires);
- wood products (wood, sawn wood, wood charcoal);
- construction materials (rebars, marble or other stone based construction materials); and,
- the extraction of the essences of coffee or tea.



Many of the products identified as “Easy Wins” and “High Value Targets” are already being produced for the domestic market. This means that there is an opportunity for Rwanda to bring these products to scale in order to export. An export discovery strategy targeted at “Easy Wins” is likely to yield rapid results and high volumes; while a strategy focused on “High Value Targets” might lead to failures and low volumes in the short term, but will ultimately drive the development of new capabilities and increase the pace of product “discovery” in Rwanda.

6d. Have exports led to product upgrades?

The average sophistication level of Rwanda’s export products, weighted by export volumes, has remained relatively constant over the past 15 years. The reason we observe this level of flatness is because export volumes are still overwhelmingly tilted towards coffee, tea and mineral products, which have relatively, low levels of sophistication. Moreover, as outlined above, 85% of growth from “new product discovery” over the past decade has come in the form of new coffee, minerals and live animal products. Graph 24 below, shows that as a consequence Rwanda has not managed to bridge the export product sophistication gap with other EAC countries, such as Kenya and Uganda.



The average sophistication level doesn't tell the whole story however. As can be seen in graph 25, which compares the sophistication and density of Rwanda's current export portfolio to the products it has yet to discover, we find that there is quite a lot of disparity in the sophistication of the products the country exports. While the majority of Rwanda's export products are clustered in the left hand corner of the graph (i.e. high density and low levels of sophistication), there are nevertheless a few products in the bottom right hand corner (i.e. low density and high sophistication). These include comparatively more complex products such as paints, aluminium tanks, and beauty products. So while the average weighted sophistication of Rwanda's exports sector has not moved significantly over the past 15 years, at the granular level entrepreneurs and investors have been diversifying into the production and exports of more sophisticated products. As we have shown in the section on destinations, the main market for these more sophisticated products are the EAC and DRC.

But has learning-by exporting led to quality improvements and increased value added in Rwanda's exports sector? While it is difficult to show this at the aggregate level given a number of data constraints – e.g. the Harmonized System HS classification does not enable us to distinguish between a good, well packaged, and tested product and a bad product - we can find anecdotal evidence of this happening at the firm level. Cases that stand out include product upgrades in Rwanda's tea and coffee sectors.

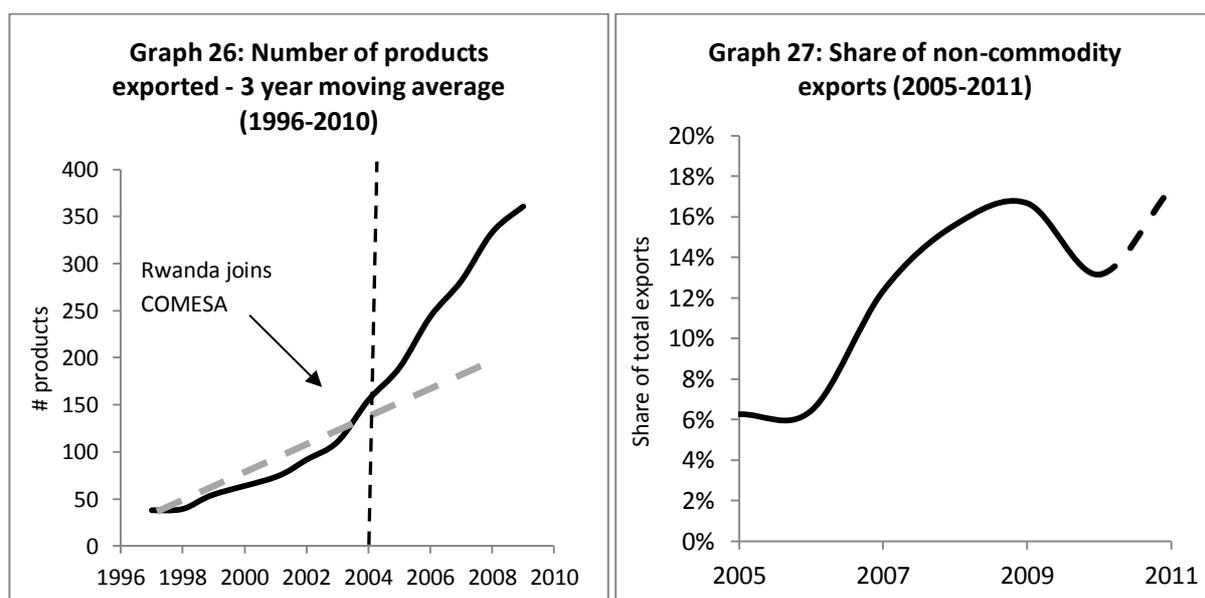
Sorwathé is one of Rwanda's largest tea exporters and has been leading new product development in Rwanda's tea sector. Product diversification at Sorwathé was in large part a response to demand patterns in the global tea market and has required new capital investments and capacity building. Sorwathé was the first tea factory in Rwanda to introduce green tea, white tea, silver tip tea and orthodox tea. Sorwathé started producing green tea in 1996 – a process which is based on a minimal oxidation of the tea leaf and required new capital investments. In 2008, Sorwathé invested in a new production line and started the production of orthodox tea, which is a higher grade black tea. Over the past two years the company has also introduced white tea and silver tips, which is a premium and expensive tea product. While not capital intensive, the processing of white tea requires extensive training in particular at the plucking stage; white teas are based on young tea leaves with a lot of fine hair and therefore have to be selected with care. Each of these steps in Sorwathé's diversification process have led to higher value addition and have enabled the company to enter niche markets in the global tea sector.

Rwanda's coffee sector has also been heavily investing in improving the quality of its produce. The gradual transition from semi-washed coffee (ordinary coffee) to the higher-value fully-washed coffee (specialty coffee), has required significant investments in terms of quality and process control. Almost all of Rwanda's large coffee processors such as CBC, Rwacof and RTC are investing heavily in: (i) human capital, by hiring qualified staff and bringing in consultants to improve processes; (ii) cupping labs and cupping specialists to test and improve the taste of the coffee produce; (iii) capacity building, to ensure the delicate process of producing specialty coffee is better controlled from the pre-harvesting stage through to dry-milling; and (iv) acquiring certain standards and certifications to increase the value of their products on global export markets (e.g. Rwacof has the Starbuck's C.A.F.E certification, the 4C certification and expected to receive Fair Trade certification by mid-2012).

In general, based on our interviews with 50 of Rwanda's largest manufacturing and agribusiness firms, we find that many exporters and potential exporters are investing in improving processes and acquiring quality certifications to enable them to compete on regional and global export markets. In order to export within the EAC, exporters require RBS certification, which comes along with certain quality requirements. In order to compete on global markets, other certifications – in particular industry-specific ISO certifications – are required. Companies such as Inyange, Sopyerwa, Rwanda Mountain Tea are currently in the process of acquiring ISO certifications.

6e. Is product discovery a constraint to exports growth?

Despite the fact that 89% of Rwanda's exports are at the periphery of the product space, which is a limiting factor for new product discovery, product discovery does not seem to be a binding constraint to growth in Rwanda's exports sector. As can be seen in graph 26 the rate of growth in the number of products Rwanda exports has accelerated over the past 15 years. The rate started to accelerate in 2004, which incidentally also corresponds to the date when Rwanda joined COMESA (although we do not seek to establish a causality relationship here). From an economy that exported only 32 products in 1996, Rwanda exported an estimated total of between 340-390 products in 2010²⁰. Moreover, the share of non-commodity exports over total exports has increased significantly, from 6% in 2005 to more than 12% in 2010 (double), pointing towards increased export diversification (see graph 27).



²⁰ We find that Rwanda exported 337 products in 2010 using RRA data and applying the product and firm-level filters we developed; using Comtrade data, to which we apply a product filter but not a firm filter, we find 393 products.

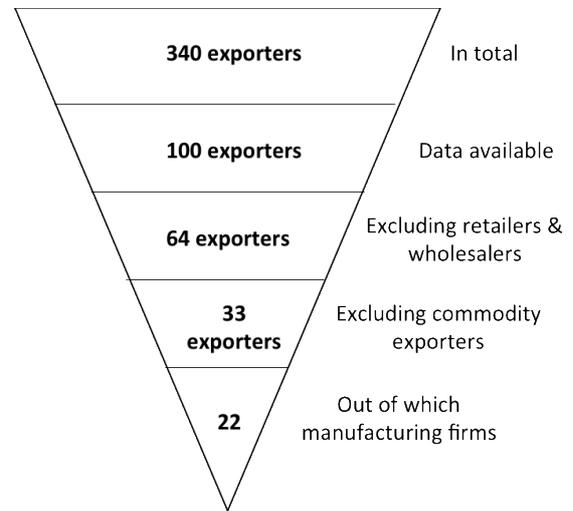
Prospects for future new export product discovery are also quite promising. Most of the “easy wins” and “high value” targets outlined above are products that Rwanda either already has incipient exports in or already produces for the local market. “Easy wins” that Rwanda already produces include: sugar, fruits (bananas, guavas, mangoes, avocados, papaya), nuts (cashew nuts, macadamia nuts), edible vegetables and roots and tubers (cassava, broad beans, sweet potatoes, peas, lentils, etc), footwear (plastic shoes), and apparel. “High value” targets that Rwanda already produces include: staple crops (rice, maize), rebars for the construction sector – which are already exported, and processed food and beverages (honey, milk, juices). Moving from the local production of these products to exports is less of a leap than developing industries in these sectors from scratch.

Rwanda’s problem is less a problem of product discovery, and more of a problem of scale. We estimate that despite the increase in the number and share of non-commodity products, Rwanda’s non-commodity export sector remains very small with exports in 2010 of about US\$23.8m, a mere 0.42% of GDP. That amounts to about US\$75,000 per product, compared to US\$5m for commodity products. The average exports of companies in the non-commodity exports sector is only US\$70,000. The issue is not that firms in the non-commodity exports sector are small; it is that they are hesitant to enter the exports market. Based on data of 50 non-commodity manufacturing firms for which we have both Business Income and exports data, we estimate that the average export orientation of Rwanda’s manufacturing sector is 4.31%.

The key to successful export product discovery for Rwanda will be an increase in the export orientation of its larger groups that have the required financial and human resources to invest in R&D, upgrade systems, acquire all the required product certifications, build lasting trade relationships and survive sudden changes in the competitive landscape and the business cycle. We already see this happening to some extent with the growing presence in Rwanda of large business groups, both local and foreign-owned. Examples of companies that are owned by larger groups and that have successfully entered the exports market include: Bralirwa – a beer and soda exporter (owned by Heineken); the Sulfo Group (which is Rwanda’s most diversified manufacturer and also has a plant in DRC); Steelrwa that produces rebars for the construction sector (owned by the Manji family that have existing businesses in DRC, Angola and Burundi); Pembe Flour and Bahkresa that export wheat bran to Kenya (owned by EAC groups); and Inyange – a juice and water exporter (owned by the Crystal Ventures Group). These are the companies that are driving export product discovery in Rwanda.

7. Learning-by-Exporting: does exporting lead to higher productivity at the firm level?

The final dimension of the learning-by-exporting framework seeks to answer the following question: does the act of exporting lead to an increase in the productivity of exporting firms in Rwanda? We face significant data challenges in answering this question given the nature of Rwanda's exports sector and missing data on firm-level income and costs. As can be seen in figure 5 to the right, when excluding firms for which 2010 income, costs and employment data is not available, we are left with only 33 exporters, out of which two thirds are manufacturing firms. That amounts to less than 10% of total exporting firms.



We therefore decide to focus our analysis on 72 agribusiness and or manufacturing firms for which we have accurate firm-level data. These include coffee and tea processors, but exclude the mining sector for which we do not have enough information on whether firms also process or simply extract minerals. The majority of Rwanda's largest agribusiness and manufacturing firms for which data is available are included in this sample, which accounts for about 80% of non-mining exports. The reason we chose not to include other firms and potential exporters in this sample, such as import-export companies, is because: (i) we are more interested in the impact of exporting on the productivity of producers, as opposed to traders; and (ii) producers and traders are very different in nature and are not comparable on measures such as labor productivity.

We start by providing some definitions and focusing on the comparative performance of exporters and non-exporters.

7a. Measuring value addition and defining who is an exporter

To determine whether exporting has led to higher productivity in Rwandan agribusiness and manufacturing firms we first need to determine: (i) how to measure firm-level productivity using available firm-level data; and (ii) how to define what constitutes an exporting firm.

We chose to measure firm-level performance using an estimate of labor productivity. Based on available Rwanda Revenue Authority data (including CIT, PIT, and PAYE), we estimate labor productivity using a measure of value added per employee based the following formula:

$$\text{Value added per employee } (v) = \frac{\text{Sales} - \text{Estimated Cost of Intermediate Inputs}}{\text{Number of employees}}$$

which we calculate using the following variables:

$$v = \frac{\text{Business Income} - (\text{Cost of Goods Sold} + \text{Expenses} - \text{Wages})}{\text{Number of employees}}$$

Unfortunately, RRA data does not enable us to distinguish between the cost of intermediate inputs (such as the cost of raw materials and energy) and other costs. We therefore estimate the cost of intermediate inputs using a second-best solution, which consists in subtracting wages from total costs. Another way of writing this measure of labor productivity is:

$$v = \frac{\text{EBITDA} - \text{Wages}}{\text{Number of employees}}$$

The next question is how to determine which firms qualify as exporters and which not. We consider three possible definitions:

- any firm with exports greater than zero in any given year;
- any firm with exports of at least a certain threshold in a given year (we use USD\$50,000 as the threshold, which at the scale of large exporting firms is very small); and,
- any firm that makes more than a certain percentage of its revenues from exports (we use a very lax threshold of 10%).

Our sample of exporters and non-exporters varies significantly depending on the definition we use:

Table 8: Definition of Exporters

Definition	Number of Non-Exporters	Number of Exporters	Out of which Tea or Coffee Exporters
1. Exports > 0	35	37	16
2. Exports > USD50,000	42	30	16
3. Share of revenue from exports > 10%	49	23	16

Each of these three definitions are valid in their own way and lead to different results. As can be seen in table 8, the more stringent the conditions the fewer the number of non-tea and coffee exporting firms. In definition 1, 57% of exporting firms come from outside the commodities sector; in definition 2 and 3, respectively 47% and 30% of exporting firms are not commodity exporters. Our preferred option moving forward is the middle option, definition 2, as it eliminates the noise in definition 1 and doesn't suffer from a lack of observations as in definition 3.

7b. How do exporting firms compare to non-exporting firms?

The learning-by-exporting literature has grown over the past 15 years on the realization that exporters tend to be very different to non-exporters, with higher labor productivity on average, greater capital intensity, more employees, etc. (see for example Clerides, Lach, and Tybout, 1998; Delgado, Farinas, and Ruano, 2002; Aw, Chung, and Roberts, 2000; Bigsten et al., 2004; and Van Biesebroeck, 2005; Bigsten et al, 2009). At a first glance, we find similar patterns in Rwanda.

As can be seen in table 9 below, we find that the median value added per employee in exporting firms tends to be much higher than in non-exporting firms, with the estimated difference ranging from about US\$3300 to US\$3450 per worker per year depending on the definition (i.e. exporting firms are more

productive by a factor of about 1 to 9). It is important to note however that these numbers are inflated due to the fact we do not have business income data on smaller producers and exporters. Based on this data, when controlling for returns to capital²¹, returns to labor, sector, location (Kigali vs non-Kigali), and legal status (individual vs corporation), we find that the median labor productivity of exporting firms is between 20-24% higher than for non-exporters using definitions 1 and 2. This number is negative using definition 3, which is due to the fact that some of the highest productivity firms, such as Bralirwa and Pembe Flour, do not qualify as exporters under definition 3.

Table 9: Median Value-Added per Employee

Exporter definition	Median Non-Tea /Coffee Exporter (2010)	Median Tea/Coffee Exporter (2010)	Median Non-Exporter (2010)
Firm exports>0	USD\$3739	USD\$4631	USD\$418
Firm exports >\$50,000 per year	USD\$3977	USD\$4631	USD\$534
Firm exports>10% of sales	USD\$3739	USD\$4631	USD\$651

In addition to the differences in labor productivity, exporters and non-exporters are different on a whole range of other performance metrics. In table 10 below, we use definition 2 to distinguish between exporters and non-exports in table 8) and control where possible for capital, labor, and the other controls outlined above. The results are in line with the findings of Bigsten et al (2009) for the case of Ethiopia and point to the fact that in Rwanda as well exporters tend to perform significantly better than non-exporters.

Table 10: Performance Metrics of Exporters vs. Non-Exporters

Metrics	Exporters compared to non-exporters in Rwanda (2010)	Points of comparison with Ethiopia (2009)
Sales	+58%	
Sales per employee	+38%	+31%
Number of employees	+124%	+41%
Capital per employee*	+79%	+32%
Average wage	+15%	+70%
Wages as a share of sales	-28%	-41%
Average Labor Productivity	+35%	+25%

*where firm-level capital is estimated using RRA import data for the 2005-2010 period on machinery and vehicle imports, discounting estimated capital by 15% per year.

7c. Given that exporters perform better, can we confirm the learning-by-exporting hypothesis?

While on average exporters in Rwanda's agribusiness and manufacturing sectors have higher productivity-levels than non-exporters, we argue that we do not find convincing evidence to support the claim that exporting has led to increased productivity in these sectors. Anecdotal evidence suggests that certain firms in the coffee and tea sectors in particular have been upgrading systems and machinery to better respond to external demand, but this does not seem to translate directly into labor

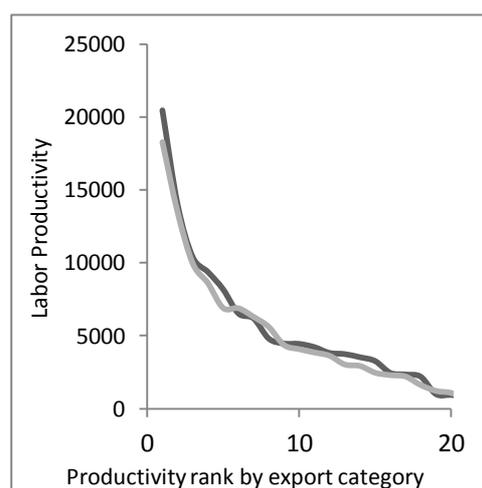
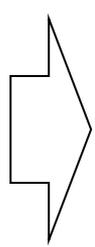
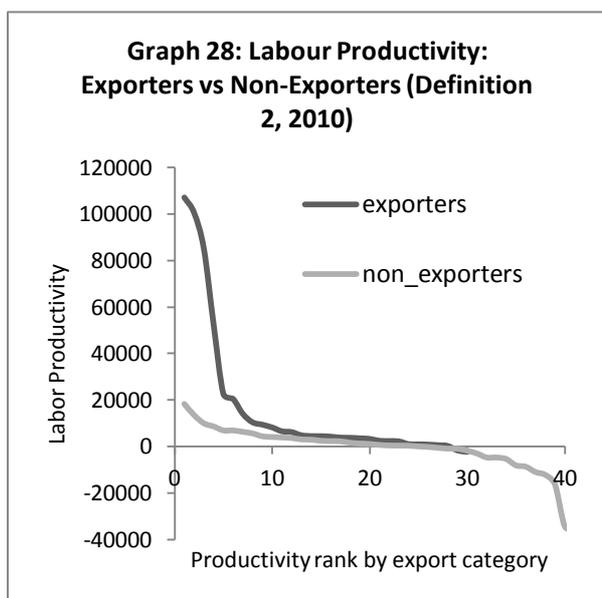
²¹ We estimate firm-level capital using RRA import data for the 2005-2010 period on machinery and vehicle imports, discounting estimated capital by 15% per.

productivity numbers. There are three main reasons why we argue we do not find enough evidence to support the learning-by-exporting hypothesis:

- I. The productivity wedge between exporters and non-exporters is driven by a very small number of firms;
- II. There are very few firms outside the tea and coffee sectors that generate more than 10% of their revenues from exports, so we argue that it does not make much sense to compare the productivity of exporters and non-exporters given that all tea and coffee processors are exporters and that the majority of exporters are tea and coffee processors; and finally,
- III. Virtually all manufacturing exports (excluding tea, coffee, pyrethrum) go to neighboring Burundi and DRC, which are less structured and organized markets than Rwanda.

I. The Productivity wedge is driven by a small number of firms

First using definition 2, we find that the productivity wedge between exporters and non-exporters is essentially driven by the 7 most productive firms. These include 5 tea companies, and 2 of Rwanda’s largest manufacturing/agribusiness firms: Pembe Flour Mills, which exports the bi-product of its wheat flour production to Kenya (wheat bran); and Bralirwa, which according to company records²² exports only 5% of its total beer and soft-drinks production. If we were to exclude these tea companies from the list (because of the idiosyncratic structure of Rwanda’s tea sector, which leads to high value addition) as well as Pembe Flour Mills and Bralirwa, which are overwhelmingly domestic focused, we find that the productivity wedge between exporters and non-exporters disappears. Graph 28 compares the estimated labour productivity of exporters vs. non exports, sorted by their level of productivity; the smaller graph to the right, highlights the same comparison this time without the top 7 performers. Note that we have also eliminated from this graph firms with negative levels of productivity. The latter were either at the set-up stage and hence had not yet started operations; or at the bankruptcy stage, and do not exist anymore today.



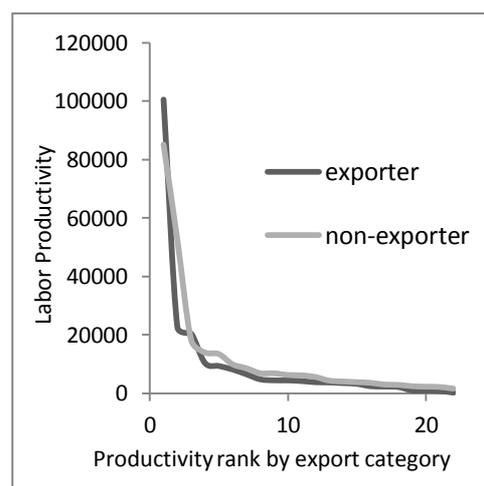
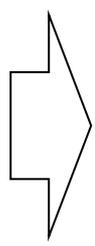
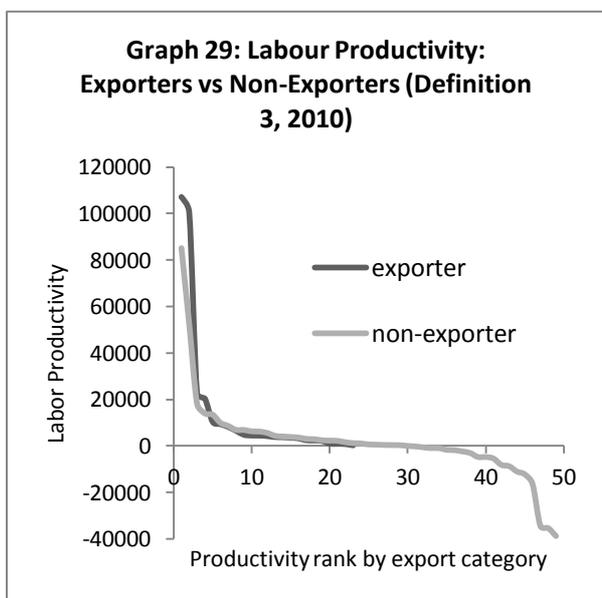
These findings seem to suggest that what is driving the labour productivity wedge between exporters and non-exporters in Rwanda is: (i) the structure of the tea sector, which lends to high levels of labour productivity; and (ii) possibly selection into the exports sector. The reason we observe high value addition in the tea sector, is because the processing of tea is relatively non-labour intensive, while the

²² Bralirwa 2011 IPO Prospectus

cost of purchasing tea leaves from farmer cooperatives is small compared to the final exporting price. A recent study found that it currently costs about USD\$0.75 to purchase 1kg of tea leaves from farmers (including the cost plucking), USD\$1.05 to process the tea, leaving processors with an average profit of USD\$0.95 (or a margin of about 35%)²³. Profitability in Rwanda’s tea sector is unusually high, leading to high levels of measured value addition.

We argue that these results also point towards selection-into-exports as a potential source of the productivity wedge, because the two non-tea “exporters” driving the this wedge are Bralirwa and Pembe Flour Mills, which are both largely focused on the domestic market. Therefore, it is difficult to argue that the reason companies like Bralirwa or Pembe Flour Mills - which respectively make 5% and 8% of their revenues from exports - have high levels of labour productivity because of learning-by-exporting. A much more likely explanation is the fact that both companies are owned by large international groups that are highly specialized in their area of activity: Bralirwa, is owned by Heineken, one of the world’s largest beer producers; and Pembe Flour Mills is owned by a Kenyan group that has flour mills across East Africa and is one of the largest producers in the region. Given their levels of labour productivity and their dominance of the domestic market, these firms are likely to have self-selected into the exports sector.

We find similar results using definition 3. As can be seen in graph 29, the wedge between the labour productivity of exporters and non-exporters is really driven by the most productive firm, a tea processor, as well as the least productive firms which were either at the start-up or bankruptcy stage. Excluding both the top performer and firms with negative labor productivity, we find that the performance wedge disappears. These results suggest that the difference between exporters and non-exports is driven by the idiosyncratic performance of a small number of firms



II. The impact of Learning-by-exporting is almost impossible to isolate in the Rwandan context

Even if there were a real wedge between the performance of exporters and non-exporters, we argue that the structure of Rwanda’s agribusiness/manufacturing sectors would make it virtually impossible

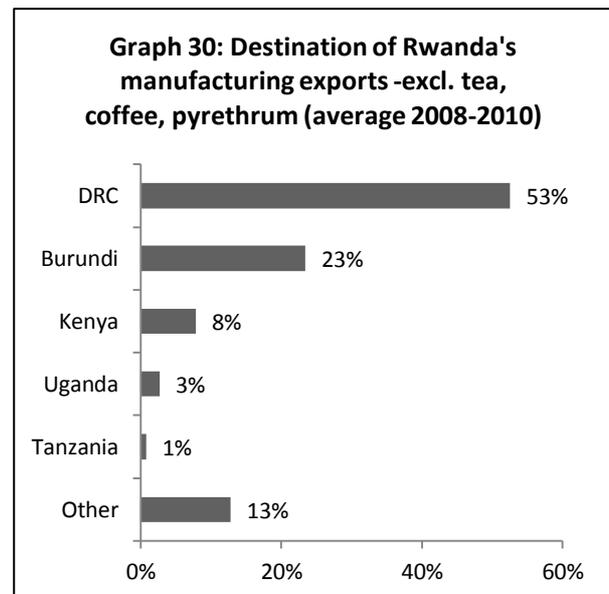
²³ IFC, 2012

to isolate the effect of exporting on labour productivity. The reason is that the majority of exporters are tea and coffee processors, which are all, and without exception, export oriented. There are no comparator processors solely focused on the domestic market that could serve as a reference point for what the labour productivity of a non-exporter of coffee and tea would look like for example. Another reason is that tea, coffee and mining firms tend to be non-diversified and highly specialized: they focus only on their specific commodity as opposed to non-commodity firms which tend to be more diversified.

Moreover, out of non-tea/coffee firms that could qualify as exporters, there is only a handful that export more than 10% of their output. In 2010, there were only 3 medium to large agribusiness/manufacturing firms that exported more than 50% of their output: Société Rwandaise de Chaussures (plastic shoes), Sopyerwa (pyrethrum), and Kigali Cement Company (cement). Given the very low export orientation of Rwanda's manufacturing sector (4.3% in our sample of 53 non-commodity manufacturing firms) it is more likely that any labour productivity differential observed is the results of the idiosyncratic performance of individual firms rather than learning-by-exporting.

III. Can firms learn-by-exporting to less developed markets?

In addition to the fact that outside the tea and coffee sectors there are very few exporters, we find that almost all non-commodity exports (excluding tea, coffee, minerals, and pyrethrum) go to the EAC (in particular Burundi) and the Democratic Republic of Congo (mostly Eastern DRC). Out of our sample of 53 agribusiness and manufacturing firms, we find that between 2008-2010 on average 53% of non-commodity exports went to DRC, 23% to Burundi, followed by Kenya (8%), Uganda (3%) and Tanzania (1%). In total the EAC and DRC accounted for 87% of manufactured exports (excluding tea, coffee, minerals and pyrethrum) between 2008-2010. This number was estimated to be more than 95% in 2010 and 2011.



Therefore, if learning-by-exporting were happening in Rwanda's agribusiness and manufacturing sectors (tea, coffee and mining excluded) it would come primarily from learning-by-exporting to the Democratic Republic of Congo and learning-by-exporting to Burundi. Limiting factors to this potential learning-experience include the fact that: (i) for most firms exports to Burundi and DRC only account for a small share of output, and hence are unlikely to have a major effect on productivity; (ii) given that both these markets are less structured, less developed and more risky than Rwanda's – with comparatively high levels of unpredictability in orders and payments – it is unlikely that Rwandan firms would invest heavily in improving labor productivity and increasing value addition simply to compete on the Burundi and DRC markets; and (iii) quality standards on these markets are comparatively low, thereby limiting the productivity and value addition gains from learning-by-competing on product quality. The question then becomes, can Rwanda learn from exporting to less developed markets?

The literature is split on this issue, although the importance of learning-by-exporting to neighboring countries cannot be understated. Many researchers have found larger learning-by-exporting effects for firms exporting to more developed countries. In the words of Boermans (2010): *“Implicitly the learning-by-exporting hypothesis is based on the notion that exporting firms trade with technologically more advanced countries and subsequently climb the technology ladder [...] Basically, the hypothesis is that if the export destination is to a more developed country, the firm can learn substantially from trade”*. In addition to Boermans (2010), who focuses on how destination effects impact learning-by-exporting for a sample of African SMEs, other researchers have found similar effects in Slovenia (De Loecker, 2004, and Damijan et al, 2004) and Kenya (Mengitsae & Pastillo, 2004). While the nature of firms exporting to wealthier markets is different to that of firms exporting to regional markets, which tend to be smaller and less capital intensive (see Graner and Isaksson, 2007; Boermans, 2010), learning-by-exporting to neighboring countries seems to play a critical role in exports development as well. For the case of Kenya, Graner and Isaksson (2007) only find evidence of learning-by-exporting in South-South trade, as opposed to South-North trade. Eaton et al (2008) for example, show that Colombian firms have significantly improved productivity by exporting to neighboring countries, and that learning-by-exporting to the latter is a stepping-stone to tapping into alternative and more developed destinations. Bahar, Hausmann and Hidalgo (2011, 2012), find that knowledge diffusion is particularly strong between neighboring countries. Firms learn from what other firms in neighboring countries are doing. On average, they find that the probability that a product is added to a country’s export basket is 65% higher if neighboring countries are already successful exporters of that product. Moreover, in accordance with the literature on technology spill-overs, they find that knowledge diffusion is stronger over short distances.

Therefore the fact that Rwanda’s agribusiness and manufacturing sectors almost exclusively export to two countries, DRC and Burundi, does not necessarily imply that there will be little learning-by-exporting to these destinations. The low export orientation of firms exporting to these destinations and the sporadic nature of many exports to Burundi and DRC however, makes it unlikely that the scale of any learning-by-exporting would be large.

7d. Are low learning-by-exporting productivity gains a constraint to exports growth?

While we do not find enough evidence to support the learning-by-exporting hypothesis as far as productivity is concerned, our assessment is that the lack of learning-by-exporting is not the most pressing constraint for exports growth at this point in time. Rather, as we also argued in the products section, the problem is that Rwandan manufacturing and agribusiness firms are not exporting. We can restate this issue as a *lack of “learning-to-export”* or “learning-how-to-export” (see Eliasson et al, 2009), rather than learning-by-exporting. Rwanda has few manufacturing and agribusiness firms to start with, and the few firms that Rwanda has do not export very much. Out of the 1291 firms for which we have business income data in 2010 (after applying an activity filter), there are only 10 non-commodity firms for which the Exports (FOB) over Business Income ratio is more than 10%;

The fact that the export-orientation of firms in these sectors is low could be the consequence of: (i) low productivity levels, making the output of Rwanda’s agribusiness and manufacturing sectors non-competitive even in regional markets, in which case the challenge is one of firm-level productivity; (ii) the land-locked nature of the country and associated transportation costs, which make competing in regional and other destination markets very difficult (even if productivity at the firm-level is relatively high); (iii) the fact that the local agribusiness and manufacturing sectors are not yet in the position to fully satisfy the rapidly growing demand of the Rwandan market, and hence don’t see the exports sector as a priority; and (iv) the fact that firms in Rwanda’s manufacturing and agribusiness sectors,

which were completely ravaged during the genocide, are still comparatively young and are in the process of equipping themselves, putting in place more effective management and production systems, building more robust supply chains and distribution networks, etc.

The answer is probably a mix of all these factors, but one issue in particular that we feel is worth highlighting, is low capacity utilization in Rwanda's agribusiness and manufacturing sectors. This leads to low returns to scale, low productivity, and limits the ability firms in these sectors to export. Based on interviews with the CEOs and/or Managing Directors of Rwanda's 50 largest manufacturing and agribusiness companies between January and April 2012 (as part of the Rwanda Enterprise Mapping Exercise for the Learning to Compete Program), we estimate that the average capacity utilization of firms in these sectors is less than 50% (see examples in table 11)²⁴. The problem therefore is not that firms are technologically less competitive than in neighboring countries – on the contrary, given the re-tooling that happened in the late 90s and early 2000s, machinery tends to be quite modern – but that firms do not have the ability to run their machines at full capacity.

Table 11: Average Capacity Utilization by Sector

Firm Id	Sector	Turnover	Capacity utilization
1	Construction Materials	8.6 m	75%
2	Construction Materials	13.2 m	70%
3	Food Processing	28.4 m	62%
4	Fast Moving Consumer Goods	1.7 m	55%
5	Food Processing	0.4 m	50%
6	Construction Materials	1.4 m	50%
7	Construction Materials	8.0m	42%
8	Beverages	7.4 m	40%
9	Fast Moving Consumer Goods / Construction Materials	0.9 m	40%
10	Fast Moving Consumer Goods	1.3 m	40%
11	Textiles	3.9 m	40%
12	Agri-processing	1.6 m	29%
13	Construction Materials	2.3 m	10%

**These figures are estimates collected during interviews with the CEOs/MDs of these firms between January-April 2012; these are only illustrative of the situation at the time and can change rapidly.*

The reasons for low capacity utilization are firm-specific, but a number of systemic issues that emerged from the interviews are:

- Firms face a skills constraint for mid-to-senior level manager positions and technical positions. There is an immediate short-term solution to this problem however, which is the importing of skilled labor from abroad and the region in particular. Firms in Rwanda's manufacturing and agribusiness sectors have already been investing heavily over the past few years in acquiring these skills and have done so quite successfully. Low skills are therefore not a binding constraint to increased capacity utilization and productivity.
- Firms need to deal with seasonality and fluctuations in demand and have a low capacity to respond to these changes because of a long order-to-delivery time lag. Firms in the construction

²⁴ Rwanda Enterprise Mapping Study, 2012

sector for example can face an order-to-delivery delay of up to four months for large orders, as they need to first import the raw material from Asia mostly (e.g. cold-rolled coils) before they can start production.

- There are systemic costs that Rwanda needs to tackle in the medium to long term, including high transportation and energy costs. High transportation costs are a double-edged sword for manufacturing firms, given that the vast majority of raw materials for the manufacturing sector need to be imported first, before the final product can be exported thereafter. High electricity costs and the low supply of electricity are also binding, in particular for electricity-intensive sectors, such as the textile and construction sectors. What high electricity costs mean for the construction sector for example, is that it only makes sense for firms to run their machines (which consume a lot of electricity) once they have received more than a certain threshold of orders which more than compensates for the cost of electricity; otherwise they would be running the machines at a loss. Firms sometimes need to wait for months before they have enough orders to justify running the machines.
- Our assessment, however, is that the most constraining factor is low access to raw materials, both internally and from abroad. Minimex for example, Rwanda's largest maize miller, is running well below capacity because it cannot procure enough good quality maize on the local market; Kabuye Sugar Works, Rwanda's only sugar producer, is running below capacity because sugarcane production in Rwanda is low and very vulnerable to weather fluctuations; Sorwatom, which produces tomato paste, needs to import semi-processed tomato paste from China because the local supply of fresh tomatoes is low and of bad quality; ICM, the largest rice processor, also faces shortages because of the quality and quantity of rice production; Ruliba Clays, which produces clay products for the construction sector and procures its raw materials locally, is running below capacity because of the absence of structured supply chains and the geographical disparity of the raw material sources; Bakhresa Grain Milling and Pembe Flour Mills, which produce wheat flour, import more than 95% of the wheat from abroad, in particular Australia; Steelrwa, which produces rebars for the construction sector, is running below capacity because of the lack of metal scrap on the local market, and the list goes on.

Therefore one of the keys to reducing low capacity utilization, improving firm-level productivity, and increasing the chances of exports growth, is to resolve Rwanda's raw materials sourcing problem. We outline potential strategies to address this issue in the concluding section which follows.

8. Conclusion

In summary, the main findings from this paper are:

Macro perspective of Rwanda's Exports:

Rwanda's exports sector is undergoing a significant transformation, highlighted by: (i) a very rapid increase in the number of firms and products exporting to the Democratic Republic of Congo (DRC) and the EAC; (ii) a gradual increase in the share of non-commodity exports over total merchandise exports, although growth stalled somewhat between 2008 and 2010 after a very rapid increase during the 2006-2008 period; (iii) an increase in the number and share of trading firms (retailers and wholesalers) in Rwanda's exports sector; (iv) the collapse of the leather sector and leather exports which accounted for 70% of non-commodity exports in 2005 compared to less than 5% today; and (v) the emergence of new export products, albeit on a small scale, such as beverages, plastic shoes, plastic tanks, some construction materials, and furniture.

Learning by Exporting: New Export Destinations:

Destination discovery is contributing little to exports growth (less than 1.5% between 2000-2010 when excluding China) and is a slow process – it takes an estimated ten years of exporting to a new destination for spill-over effects to take hold. We find that while new destination discovery is low, it is not a constraint for Rwanda in major commodity markets such as the tea, coffee and minerals sectors, given that export destinations are already relatively diverse for these products, that there is a lot foreign investment in these markets and the fact that buyers bear a lot of the searching costs in identifying suppliers (i.e. firms in Rwanda), rather than the other way around. It could however, be a significant constraint for firms operating in non-commodity markets. Between 2005-2010 the share of non-commodity exports that went to the EAC and DRC doubled, and currently account for about 90% of total non-commodity exports. The situation is even more dramatic for the agribusiness and manufacturing sectors (excluding pyrethrum, tea, coffee, and minerals), where we estimate that more than 95% of processed or manufactured products went to the DRC and EAC, compared to less than 50% in 2005. While growth in exports to the EAC and DRC could be indicative of Rwanda's rapidly increasing export capacity to these destinations, it also reveals the difficulties non-commodity exporters face in competing in alternative destinations.

Learning by Exporting: New Product Discovery:

Product discovery (at the hs6 level) has contributed about 12% to exports growth between 2000-2010 and was driven largely by new commodity export products, such as specialty coffee, tungsten and chromium. However, given that Rwanda's commodity products are at the periphery of the product space, the tea, coffee and mining sectors are unlikely to be the source of much product discovery in the future. Future product discovery will come from firms operating in Rwanda's non-commodity exports sector and is likely to happen mainly in the agriculture/floriculture sector, followed by food-processing, the construction materials sector, and other sector such as the rubber products, wood, textile sectors. While the speed of product discovery is limited by Rwanda's current position in the product space (88% of exports are at the periphery of the product space), product discovery per se is not a major constraint to exports growth, given that that many of these products are already being produced for the domestic market. The main problem is that firms in Rwanda's agribusiness and manufacturing sectors don't have the ability to bring the exporting of these new products to scale. While there are new products being exported (either consistently or sporadically) to neighboring countries, the scale of these exports is limited.

Learning by Exporting: Firm-Level Productivity

We do not find much evidence to support to the learning-by-exporting hypothesis on the impact of exporting on firm-level productivity, even though on average, exporting firms tend to have higher levels of labor productivity. The three reasons why we do not find convincing evidence of learning-by-exporting are: (i) the observed productivity wedge between exporters and non-exporters in Rwanda's manufacturing and agribusiness sectors is driven by a very small number of firms, mostly tea exporters which due to the idiosyncratic structure of the local tea sector have high returns; (ii) even if there was evidence of learning-by-exporting the structure of Rwanda's export market would make it almost impossible to empirically isolate learning-by-exporting effects; and (iii) more than 95% of agribusiness and manufactured product exports go to the DRC and Burundi; the low orientation of firms exporting to these destinations, the sporadic nature of exports, and the fact that these markets are relatively less developed than Rwanda's suggest that learning-by-exporting to these destinations is currently low. Low productivity gains from exporting are however not a major constraint to exports growth at this point in time. The biggest issue seems to be *learning-to-export*, as opposed to *learning-by-exporting*, and the fact that Rwanda's agribusiness and manufacturing sectors do not export much. One of the reasons firms are not very export oriented seems to be low productivity to start with, resulting from an underutilization of capacity.

*So what **policy options** does Rwanda have to address the main constraints identified, namely low destination discovery in the non-commodity exports sector, the low ability of firms to bring new product discoveries in commodity sector to scale, and low learning-to-export in Rwanda's agribusiness and manufacturing sectors, caused by low productivity and underutilization of production capacity?*

We structure recommendations and potential policy options around 3 main themes:

- (i) increasing the export orientation of Rwanda's manufacturing and agribusiness sectors by improving productivity;
- (ii) increasing the export orientation of Rwanda's manufacturing and agribusiness sectors by promoting investments by larger groups; and
- (iii) increasing learning-by-exporting effects by diversifying the destinations mix for non-commodity exporters.

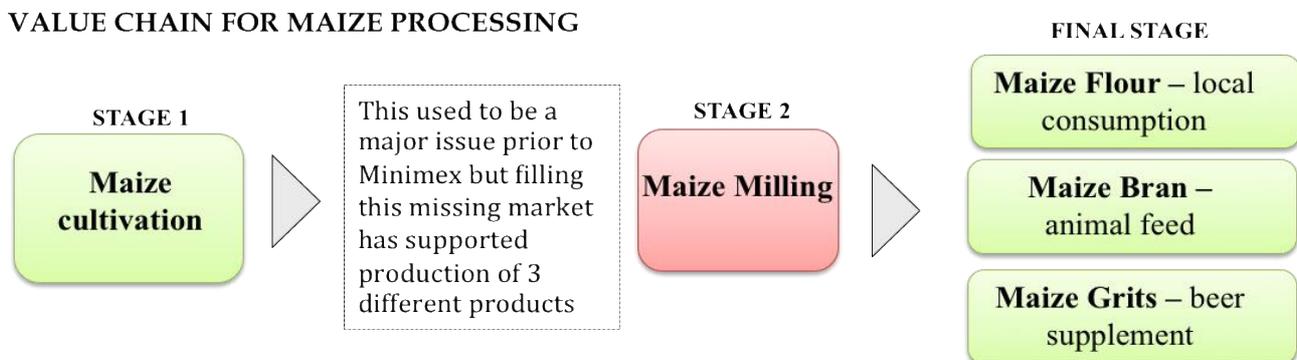
i. Increasing the export orientation of Rwanda's manufacturing and agribusiness sectors

One of the main issues identified in this paper is the low export orientation of firms in Rwanda's non-commodity exports sector, in particular in the agribusiness and manufacturing sectors, which we estimate is less than 5%. We propose some policy options to address two issues that policy makers will need to focus on in order to increase the export orientation of firms: **firm productivity and size**.

Based on our interviews with CEOs of Rwanda's 50 largest manufacturing and agribusiness firms, we find that one of the key reasons for low productivity and capacity utilization in these sectors is because of poor access to raw materials. Firms are affected by shortcomings in the quantity and quality shortcomings of raw materials available in Rwanda, by the transportation costs associated with importing these raw materials from abroad, and by the delays that this leads to in terms of the order-to-delivery time lag. Solving this issue – in particular the quality and quantity of local production for certain raw materials – is complex, but we highlight a number of high-level areas policy makers could focus on.

The first is a focus on missing markets. We highlight the role of missing markets using the example of Minimex, Rwanda's largest maize miller. As can be seen in figure 6, the introduction of Minimex in 2002 bridged a gap in Rwanda's maize market. Before Minimex started milling operations (its competitor Maiserie de Mukamira has a much smaller production capacity), there was a key missing market in the Rwanda's maize value chain. Rwanda was a maize producer; Bralirwa – Rwanda's largest manufacturing firm by far with annual revenues over USD130m – a major maize grit consumer for its brewery process; and yet there was no maize miller capable of supplying Bralirwa's needs, forcing the company to import its maize grit from abroad. Today Minimex, is Bralirwa's sole supplier in the country, and has solved a missing link in three markets: the beer processing market, the food processing market (maize flour), and the animal feeding market, which makes it a good example of an industry that strengthens the inter-connectedness of the local economy and solves the raw material issues of a number of industries.

Figure 6: Illustration of Missing Markets: Value Chain for Maize Processing



To address the issue of missing markets, policy makers could consider:

- Working with agribusiness and industry representatives to identify missing markets in key value chains, and prioritize the allocation of resources and incentives to the most critical ones. In the case of Bralirwa above, the fact that maize milling was a missing market was not a binding constraint, as the company was in a position to import and still produce profitably. Other firms, such as Ruliba Clays, have had to move down the value-chain to procure/produce the raw materials themselves. Ruliba Clays is a construction materials producer of clays, tiles and bricks, but does the quarrying of its main raw material – clay– itself. If there were a more structured market for the supply of clay, it would probably increase Ruliba Clay's productivity through cost cutting and increase its ability to scale-up by focusing on upstream activities. In other cases, missing markets are binding and prevent the development of an industry altogether.
- Working with EAC partners to address key missing markets within the region. One example of a missing regional market is the ability to produce cold-rolled coils, which is the main raw material used in the steel-based construction materials sector. Currently cold-rolled coils in the EAC are imported mostly from Asia and South Africa, which comes at a huge transportation cost for the construction sector. Regional production of cold-rolled coils, would significantly reduce costs in the sector, reduce the time-to-delivery lag, and lead to increased productivity.

Producing cold-rolled coils however requires a smelting plant, which given current energy costs in the region, is likely to be difficult to implement. Addressing these kind of gaps in the market can make a substantial difference to productivity levels in key sectors.

A second set of potential policy options include:

- A more pro-active role of government in securing sourcing markets for Rwanda's manufacturing industry. Currently trade missions focus mostly on securing new markets for Rwandan exports and attracting foreign investors to Rwanda, but securing raw materials is an equally important mission. A country that has been very successful in that respect and that had a carefully crafted raw materials strategy was China. China would not have been in a position to grow at more than 8% per annum continuously over a 30 year period, had it not been for its raw materials sourcing strategy. While the two countries are by no means comparable in scale, this is an example of proactive public-sector intervention that the Rwandan government can learn from.
- A review of the VAT policy for raw materials to create a level playing field between local and international suppliers. Currently the imports of raw materials which are not available in Rwanda are not liable to VAT; and the burden of proving that these materials are available locally is on the buyer. This puts some of Rwanda's raw materials suppliers at a competitive disadvantage. A good example to illustrate how this works is the case of Steelrwa. There are 2 ways in which this policy affects Steelrwa: (i) currently industries importing raw materials can apply for a VAT waiver, but this does not apply to companies such as Steelrwa that source locally; (ii) large construction projects get VAT exemption for the import of steel products, but this does not apply to products sourced locally.
- Strengthening linkages within value chains, by bringing together representatives of Rwanda's largest suppliers and producers within each of these value chains, to seek common solutions to supply problems. Stronger inter-linkages within sectors could for example lead to better and more organized cooperative-processor relations in the agribusiness (a problem that has been very costly for companies such as Sorwatom in the tomato sector); joint investments to improve production practices and systems further downstream in the value chain (one example of such a joint venture is BraMin, which was jointly created by Bralirwa and Minimex to explore the potential of commercialized maize farming in Rwanda), etc. Inter-linkages can go a long way in solving costly coordination failures with supplier-processor markets.

ii. Increasing the export orientation of Rwanda's manufacturing and agribusiness sectors by promoting investments by larger groups

The size of firms – and in particular the type of ownership - plays an important role in determining the productivity and the export orientation of Rwanda's manufacturing and agribusiness sectors. Based on our firm-level interviews, we find that firms owned by larger groups (either horizontally or vertically integrated) are more likely to have higher levels of productivity and enter the exports market than smaller firms owned by individuals. The key competitive advantages of larger firms in the Rwandan context are:

- A comparatively higher capacity to raise investment capital, yielding both productivity improvements and increased production capacity.
- Higher human capital investments, both at the management and technical levels.
- For vertically integrated groups, such as Pembe Flour Mills, Safintra, and Steelrwa, bring years of experience in their sector of production and a high degree of specialization.
- Returns to scale: the Crystal Ventures Group for example is investing in a joint plant for two of its companies, Mutara Enterprises (a furniture producer) and East Africa Granite (granite processing), and is in the process of centralizing a number of management functions for all its companies, such as procurement; Pembe Flour Mills and Bakhresa, both wheat flour producers, import their wheat in bulk from abroad in partnership with sister firms in other EAC locations, etc.
- Larger investments in the new product development and quality control functions: Steelrwa for example has very well equipped chemical and physical labs aimed at testing their product on a number of quality parameters; the Horizon Group, is investing in research and development on peat energy production in Rwanda; Crystal Ventures has recently launched a new company, East Africa Granite, aimed at producing granite for Rwanda's construction sector, etc.
- The ability to float companies for a longer period of time at the set-up and growth stages. A key reason why Bakhresa Grain Milling, a wheat flour producer, was able to survive during its lengthy set-up process was because the Tanzanian-owned Bakhresa group had the financial ability to float it.
- Foreign groups tend to invest in Rwanda with a regional perspective, focusing not only on the Rwanda market, but the broader EAC and DRC markets. Examples include: the Belgian owned Unibra group, which invested in Brasserie de Mille Collines with the objective of also exporting to neighboring Burundi where the drinking population is estimated to be larger than in Rwanda; Steelrwa, which initially wanted to set-up in Burundi but could not because of the low quality of the electricity supply, etc.

Supporting investments by – and the emergence of – integrated industrial and agribusiness groups in Rwanda, without impeding competition in the market, could lead to substantial improvements in the overall competitiveness of Rwanda's manufacturing and agribusiness sectors and is likely to increase the export orientation of the economy. This will involve:

- Pursuing current efforts to attract foreign investors, focusing in particular on larger groups with an interest in exporting to the EAC and DRC markets;
- Putting in place the right regulatory structure and building the capacity of regulators, in particular in the areas of competition law (to avoid non-competitive practices) and taxation (dealing with issues such as the offset of losses from one company within a group to the other, and transfer pricing).

iii. Increase learning-by-exporting effects by diversifying the destinations mix for non-commodity exporters

Destination diversity in Rwanda's non-commodity exports sector has decreased significantly since 2005, with the collapse of leather exports, Rwanda's entry into the EAC and the stabilization of the situation in Eastern DRC. While growth in non-commodity exports to Burundi and DRC has been impressive, it is important for Rwanda's non-commodity exports sector not to rely too heavily on these two comparatively risky/volatile destination markets.

In order to increase the destination diversity of Rwanda's non-commodity exports we recommend that policy makers frame their approach around the following three axes:

- ***Increasing non-commodity exports to Uganda, Kenya and Tanzania***, by identifying and promoting investments in niche sectors where Rwanda has a competitive advantage over Uganda, Kenya and Tanzania which currently only account for a cumulative 13% of manufactured product exports, compared to 76% for Burundi and DRC. One product for example which Rwanda is currently exporting effectively to Kenya, through both Pembe Flour Mills and Bakhresa, is wheat bran for animal feed.
- ***Increasing non-commodity exports significantly to at least one other regional market outside the EAC***. Rwanda has already been exploring the potential of exporting horticulture products to South Sudan²⁵, which given its proximity, oil revenue and small manufacturing sector could be a high potential market to explore.
- ***Increasing cash-crop exports to other global destinations***. Rwanda currently exports processed pyrethrum to the USA through Sopyrwa, has incipient exports of essential oils through Ikirezi Natural Products, and is exploring the potential of the floriculture sector as well as other fruits, vegetable oils and nuts.

²⁵ MINICOM Study on the Export of Agricultural Products in South Sudan, 2011

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