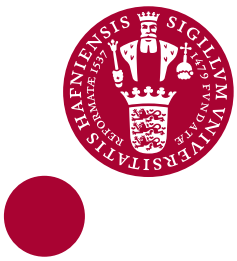

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Learning by Exporting: The Case of Mozambican Manufacturing

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Abstract

In this article, we analyse the learning-by-exporting (LBE) hypothesis in the Mozambican context. Due to the presence of the 'Born-Global' phenomenon among exporters, we address the endogeneity introduced by self-selection, combining a generalised Blinder–Oaxaca approach with results from traditional matching techniques. Our results show that very few manufacturing firms export, and that export participation is highly persistent. There is also evidence supporting the LBE hypothesis and the results suggest a significant export premium of between 17 and 21%, controlling for differences in observable characteristics between exporters and non-exporters. Finally, qualitative information on non-exporters seeking new markets suggests that 'lack of knowledge of potential markets' is the most severe constraint to international market entry. We conclude that the Mozambican Export Promotion Institute (IPEX) could play an important role in overcoming this information deficit for potential Mozambican exporters.

Key words: firm level analysis, learning spillovers, export, Mozambique

JEL classification: D22, F14, O12, O55

1. Introduction

Although the post-conflict growth experience has been impressive in Mozambique since 1994, there is currently a need to focus on inclusive growth policies fostering broad-based sustainable economic development and formal sector employment for a larger share of the population. An explicit top priority in the most recent poverty reduction strategy paper (PARPA II) is the promotion and expansion of export-oriented agro-industrial and labour-intensive manufacturing activities, on the argument that these areas are associated with the greatest potential for enhancing overall industrial productivity and creating new jobs.

The size of the manufacturing sector is relatively small and production is highly concentrated in a few sub-sectors. According to INE (2004), only 10% of all registered businesses are in manufacturing, and most of them are located in the two largest cities. Most manufacturers source intermediates and raw materials from abroad, and the industrial sector generally has a relatively low degree of linkages. This comes in combination with the fact that very few manufacturing firms have entered foreign markets, and only about 10% of the manufacturing enterprises have foreign ownership.

The central focus of this article is to analyse the relationship between firm level productivity and export participation in the Mozambican manufacturing sector, with Table 1 providing an aggregate picture for the period 1999–2006.

Although it is clear that Mozambique has seen impressive improvements in its export performance in the new Millennium, this performance is due almost exclusively to exports produced by megaprojects exploiting the country's vast mineral resources. Excluding megaproject exports, the contribution of the export sector to the Mozambican economy has remained rather modest and exporting manufacturing firms often have foreign ownership involvement (INE, 2013). The lack of diversity in manufacturing exports has caused concern about whether potential learning effects from exports have the necessary conditions in place to 'spill over' to the rest of the economy (ICA, 2009).

What is the reason for the continued 'under-development' of the manufacturing sector in Mozambique twenty years after the end of armed conflict? Recently, Krause and Kaufmann (2011) reviewed the (few) central industrial policies in Mozambique. Arguing that a well-designed and well-coordinated industrial policy is one of the most crucial instruments to foster inclusive economic growth, they conclude that policies have lacked the necessary vision and leadership. This has prevented the development of a policy mix aimed at both (i) improving the overall competitive level of the nation and the general investment climate, and (ii) providing specific targeted interventions to accelerate productivity growth and enhance firm competitiveness.

Table 1: Data Overview

	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
GDP (constant USD, millions)	4249	4754	5173	5485	5918	6484	6893
Exports (% of GDP)	8.6	17.3	19.3	22.4	26.4	26.5	33.6
Manufacturing share (% of exports)	75.9	86.1	85.0	85.0	85.9	83.7	83.4
Sector—Five largest exporting sectors as percentage of total manufacturing exports							
Basic Metals (ISIC 27)	23.1	64.5	53.3	64.6	71.7	72.0	72.0
Food and Beverages (ISIC 15)	51.2	21.6	27.5	16.6	14.9	12.7	12.6
Tobacco (ISIC 16)	2.8	1.5	3.6	2.4	3.2	3.0	5.6
Textiles (ISIC 17)	9.7	2.9	2.5	4.3	2.3	4.1	2.4
Wood (ISIC 20)	5.2	2.0	2.6	1.8	2.6	2.2	1.8

Source: INE Documentos Base.

Note: World Bank reported export numbers (% of GDP) are around 5% points higher each year.

According to Krause and Kaufmann (2011), the Government of Mozambique (GoM) appears to be taking the critique seriously. This is for example evident in the 2007 Industrial Policy and Strategy (IPS07). Ten years after the first Industrial Policy and Strategy (IPS97) the new IPS built on a better articulated and multi-sector industrial dynamic approach (MIC, 2007). As such it was an improvement over the first IPS, as it promoted a more coordinated industrial system. However, both the IPS97 and IPS07 followed typical liberal approaches to industrialisation, and during the period under consideration the most central policy of the IPSs was to ensure a quick and painless privatisation process. On top of this the main stated task of the Mozambican Government was to guide, regulate and supervise industrial development, while building appropriate conditions for robust industrial activity and ensuring promotion of an appropriate business environment for producers and investors. The IPSs also stated that the State had the responsibility to set up a system of transparent incentives, including undertaking complementary investments in order to attract especially private foreign investors. As part of this, public investments were focused on the development of infrastructure, including the establishment of industrial zones, and ensuring a sufficient delivery of public utilities including the supply of water and electricity.[1]

Specifically for trade promotion the IPSs introduced the following simple measures: (i) simplification of the import procedures for industrial firms, mainly regarding raw materials and intermediate goods; (ii) creation of export promotion zones (as an example the Beluluane Export Processing Zone hosting the Mozal Smelter Project and its suppliers); and (iii) development of commercial information centres focused on relevant export markets, to foster quality improvements in industrial production, especially with the aim of improving productivity of smaller scale light manufacturing industries in the future.

Results/effects of the above initiatives are not easily found in the data. No significant increase in the number of exporting manufacturing firms is recorded during the period 2002–12 (DNEAP, 2006, 2013). As such, it has been argued that the IPS97 and IPS07 left the manufacturing sector divided, especially when considering firm exposure to export markets. On the one side, private smaller light manufacturing firms were left to liberalised market forces serving mostly domestic demand. On the other side, the Government pursued a strategy focused on supporting and ensuring larger scale export-oriented joint ventures, which have been under much public scrutiny, especially due to the low degree of integration with the rest of the economy (Castel-Branco, 2010). As a result, the recorded growth rate in the number of manufacturing firms between 2002 and 2012 was also relatively limited (annual growth of 1.9%) (DNEAP, 2006; Schou and Cardoso, 2014). The weak role and growth of the private-led manufacturing industry is in line with evidence on the limited structural transformation taking place in Mozambique (Castel-Branco, 2010; Jones and Tarp, 2012).

Behind the policy focus on improving firm level productivity by promoting and expanding larger scale export-oriented industries are the implicit assumptions that (i) some kind of learning by exporting actually takes place, or at least will take place in the future, and (ii) there are significant productivity spillover effects from exporters to the local industry. In this article, we focus exclusively on analysing the former assumption using firm level data from 1999 to 2006. As such, this article aims to contribute to the discussion about whether learning-by-

1 The GoM also created specific commercial bank credit lines for industrial sectors with a focus on directing credit to specific areas and objectives, including MSMEs and young new entrepreneurs aiming production towards export market demand.

exporting (LBE) has taken place in Mozambique. However, under the new policy shift/focus we acknowledge that very different types of export firms may eventually emerge. Historical data must on this background be used with caution when formulating policy for the future.

Borrowing terminology from the literature on technology diffusion, LBE effects may come from (i) knowledge flows from competitors (a horizontal spillover effect), and/or (ii) knowledge flows from customers (a vertical spillover effect). As emphasised in Wagner (2007), the competition (horizontal spillover) effect comes directly from the firm entering international markets, observing best practice, and thereby becoming exposed to more intense competition. Consequently, exporters must improve efficiency faster than firms that only sell domestically to survive in foreign markets. The vertical spillover effect occurs as foreign buyers may wish to improve process technology by providing product designs/specifications and technical assistance. As highlighted in Clerides *et al.* (1998) foreign customers may even transmit knowledge from other suppliers in order to increase competitive pressure and lower costs/improve quality.

However, observing a positive association between firm level productivity and export participation does not necessarily mean that LBE is taking place. This positive correlation may be driven by self-selection of more productive firms into export markets, and entry often comes at an extra cost (marketing, networking, licensing, administrative barriers, etc.), which the more productive/capable firms are better able to cope with. Moreover, since export markets are more competitive than domestic markets, it may also be harder for less productive firms to enter in the first place. LBE and self-selection are not mutually exclusive, and higher efficiency producers entering foreign markets may improve productivity even faster than domestic firms post-entry.

In this article, we analyse the LBE hypothesis in the Mozambican context and seek to solve the endogeneity problem introduced by self-selection by combining a generalised Blinder–Oaxaca (BO approach with results from traditional matching techniques. Our results show that very few manufacturing firms export, and also that export participation is highly persistent. There is evidence supporting the LBE hypothesis and our results suggest a significant export premium in terms of firm-level productivity of between 17 and 21%, controlling for differences in observable characteristics between exporters and non-exporters.

Section 2 provides a literature review of empirical studies. We focus on the LBE hypothesis in Africa and available firm level productivity studies of the Mozambican economy. Section 3 presents the data, and Section 4 outlines the empirical approach. Section 5 presents the results and Section 6 concludes.

2. Manufacturing productivity and export behaviour in Mozambique: A literature review

The LBE literature is relatively developed and several survey papers have already summarised existing results (most recently Wagner, 2012). In the following, we focus on LBE findings related to Sub-Saharan Africa.

Martins and Yang (2009) put forward a meta-analysis of 33 studies that address the LBE hypothesis including three papers (Bigsten *et al.*, 2004; Mengistae and Pattillo, 2004; van Biesebroeck, 2005) related to Sub-Saharan Africa. They conclude that the impact of exporting on productivity is higher for developing than for developed economies, and that the export effect tends to be highest in first year firms start exporting whereafter the effect diminishes.

More specifically, Mengistae and Pattillo (2004) analyse manufacturing firm-level panel data in Ethiopia, Ghana and Kenya and find an average TFP-level exporter premium of 17%, and that exporters tend to experience higher productivity growth than non-exporters post-entry. They interpret the finding of higher premiums for direct exporters that focus on markets outside the African region to be consistent with LBE effects. Bigsten *et al.* (2004) study Cameroon, Ghana, Kenya and Zimbabwe and aim to disentangle the causal relationship between exporting and productivity using an estimation approach similar to that of Clerides *et al.* (1998). They carry out a simultaneous estimation of a dynamic production function and a dynamic discrete choice model for the decision to export. They also find support for the LBE hypothesis, although this is not well determined in all specifications. Van Biesebroeck (2005), studying Burundi, Cameroon, Cote d'Ivoire, Ethiopia, Ghana, Kenya, Tanzania, Zambia and Zimbabwe, supports these results. Using three different methodological approaches to handle the simultaneity between productivity and export status (GMM, CLT as in Bigsten *et al.*, 2004 and the semi-parametric Olley-Pakes (OP) estimator) he finds that exporters increase their productivity advantage after entry into foreign markets, and all approaches produce an estimate for the effect of exporting on productivity of between 25 and 28%.

In addition to the studies included in these surveys, we would like to highlight the work by Bigsten and Gebreeyesus (2009) who study Ethiopia. They find support for both exporter self-selection and LBE using a GMM approach (as in van Biesebroeck, 2005) as well as a matching estimator to control for selection bias. Of the studies on Sub-Saharan Africa mentioned here, Bigsten and Gebreeyesus (2009) is methodologically closest to the estimation approach used in this article.

Very few papers have studied the relationship between manufacturing exports and productivity in the case of Mozambique and none have directly addressed the above-mentioned biases due to self-selection of more productive firms into foreign markets. In 1998, the Confederation of Mozambican Business Associations (CTA) in collaboration with the World Bank undertook the first Regional Program on Enterprise Development (RPED) study of 153 manufacturing enterprises. This study was followed by a survey of 193 enterprises in 2002 (87 of which were also interviewed in 1998) under the auspices of the World Bank's Investment Climate Assessment (ICA, 2003). These studies were the first attempts to measure manufacturing performance and productivity at the firm level in Mozambique. Using a cross-section stochastic frontier approach, they estimated average technical efficiency at 0.38 with a relatively high standard deviation of 0.23, indicating that many inefficient firms are able to survive in the manufacturing sector in Mozambique. Moreover, exporting firms were relatively more efficient than non-exporters, whereas no efficiency differences existed between 100% domestically owned firms and enterprises with foreign capital/involvement.

Comparing these figures with the ones reported for other developing countries and documented in Tybout (2000) shows that the efficiency dispersion is higher than observed in several other developing countries. Moreover, according to RPED (1999) and ICA (2003) Mozambique also lags behind in terms of absolute productivity, questioning the regional competitiveness of the Mozambican manufacturing sector. Eifert, Gelb and Ramachandran (2005) use cross-country firm-level data (including the one described in ICA, 2003) and study the period 2001–04. They find Mozambican manufacturing production efficiency to be the lowest among their sample of countries. They highlight that

productivity within Africa relates strongly to exports, but most Sub-Saharan African firms are simply not productive/competitive enough to export manufactures and those firms that do are often isolated from the host country economy. Mozambique is no exception and according to Wood and Mayer (2001), its significant skill deficit and relative abundance in natural resources will make it more likely that comparative advantages and successes will be found within primary product exports in the near future.

However, several studies suggest that efficiency has improved in Mozambique since the first generation ICAs. First, the follow-up study of the same Mozambican firms as in ICA (2003) carried out by DNEAP (2006) suggests that capacity utilisation has improved significantly between 2003 and 2006. This could indicate that overall production efficiency has improved during the period. While DNEAP (2006) did not carry out a formal productivity analysis, these results suggest that exporters produce more efficiently than non-exporters. However, these conclusions follow from very few export observations. Second, Jones (2008) looks at productivity from a macroeconomic perspective by undertaking a growth accounting exercise for Mozambique. He concludes that the annual average contribution of TFP to post-war output growth was 23% (or 1.4% points). Changes in TFP were largely driven by improvements in capacity utilisation rates, and 'deep' TFP growth was modest. Jones (2008) concludes that the change in TFP was dominated by movements towards the production frontier, rather than by outward movements of the frontier itself. Third, Saxegaard (2008) (also using a macroeconomic framework) highlights that learning spillovers from exporting must be limited since most manufacturing exports have been focused on megaprojects with limited spillover effects to the remaining economy.

Finally, using a qualitative interview approach, Warren (2010) explored factors shaping technological patterns and dynamics in the Mozambican manufacturing sector (especially the metalworking and chemicals sectors) and their relationship to enterprise performance. His analysis reveals that the two industries in focus appear to be experiencing a process of growing technological obsolescence, but that firms in export markets were less likely to engage in production processes that were getting more and more simplified. However, given the skill-level and technology at hand, firms (especially those with an export focus) are producing relatively efficiently and improving productivity. He concludes that the limited level of knowledge and simple production systems are insufficient to support a process of sustained technology and industrial development.

3. Data overview

The data used in this article combines five different enterprise surveys (containing information for the years 1999–2006) with the INE enterprise census (CEMPRE), which has 2002 as the base year.[2] Using firm names and addresses, we were able to combine the data sources. All firms included in the data were observed at least twice during the period 1999–2006. This criterion was selected due to the estimation approach chosen in this article and in order to be able to check the consistency of time-invariant characteristics and financial data. Moreover, the survey information on location, legal structure, sector, firm age and size, financial information, an indicator variable regarding export, and constraints facing firms were made comparable over time.

2 The five surveys are: ICA (2003), DNEAP (2006), INE (2006), ICA (2009) and KPMG (various years).

In some cases, the surveys overlap. The information was compared and in the few cases where the answers differ, we relied on the survey that was carried out closest to the desired year. For example, in the case of financial information KPMG is often superior to the other data sources. It only asks the firms about previous year financial numbers, whereas for example the ICA (2009) reports refer to the years 2003 and 2006. This requires recollection of at least three years back in time. Combining data sources in this way was also necessary in order to reduce data generated 'attrition', due to the significant amount of missing financial accounts data in ICA (2003), DNEAP (2006) and ICA (2009).

All surveys have detailed financial accounts information and some of the surveys and the census cover agricultural (primary), manufacturing and industry (secondary) and service sector (tertiary) firms. In this article, we focus exclusively on the manufacturing sector (ISIC 15—ISIC 37). In the analyses, we operate with a sample of 714 observations for 240 firms.[3]

In addition to the above-mentioned survey data we also obtained information from the most recent enterprise survey in Mozambique referred to as the IIM 2012 (DNEAP, 2013). However, due to a different sampling strategy and limited financial information on re-surveyed firms, in what follows we only use the IIM 2012 data to support or question the main findings obtained using 1999–2006 information.

The surveys in combination provide the information necessary to test the LBE hypothesis. Table 2 provides summary statistics by export status of the variables considered in the subsequent analysis. It should be noted that the sample we are considering is for surviving firms only. As firm exit is not captured by the data, population growth and employment generation may be weaker than the growth numbers among survivors suggest. We use real revenue as our output measure. Real capital stock is measured as the end-period capital stock book value.[4] Material inputs include all indirect costs plus raw material costs. All figures were deflated by a GDP-deflator. Ideally, we would have preferred sector level deflators and variable specific deflators. However, producer-price indices and investment/capital deflators are not available in the Mozambican case. Behind the numbers reported for the sample we have an: (i) Average number of employees of sixty seven, confirming that the average firm is relatively large in this sample as compared to the firm 'population' average according to the CEMPRE (INE, 2004); (ii) average capital-revenue relationship of 1.27; and (iii) average real revenue per employee of 318,069 MTN.[5] From Table 2 it is clear that

3 The ICA (2003) surveyed 193 manufacturing firms. These firms were traced by (DNEAP, 2006), resulting in identification of 137 that were also interviewed in ICA (2003). The ICA (2009) included a survey of 358 manufacturing firms, but no attempt was made to link these firms to the first ICA (2003) or DNEAP (2006). In order to establish a panel dimension, we were able to trace twenty seven firms in the ICA (2009) back to ICA (2003) and DNEAP (2006) based on names, addresses, telephone numbers and selected time-invariant firm attributes. Of a total of 524 different manufacturing firms observed from these three surveys, only 137 firms were observed at least twice. Only by combining names, addresses, telephone numbers with the two additional data sources were we able to increase the number of firms observed at least twice to 240. Of the remaining 284 firms, 264 were only observed once (remaining were non-exporters in sectors where no comparison exporter existed) and none of the firms observed once were exporters.

4 Ideally we would have liked re-sale values on capital equipment, machinery and buildings and not accounting values. However, re-sale values were not available at the time of the surveys.

5 Exchange rate during the period under study: 29MTN = 1 USD.

Table 2: Summary Statistics by Export Status

	All		Exporters		Non-exporters	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Share of firm exporting	0.168	0.374	1.000	0.000	0.000	0.000
Real revenue (million MTN, note (1))	43.5	178.7	131.8	338.0	25.7	116.6
Real capital (million MTN note (1))	37.1	144.7	99.0	248.7	24.5	108.7
Real intermediates (million MTN, note (1))	31.0	137.6	88.9	256.4	19.3	93.6
Labour productivity (log)	11.5	1.4	12.6	1.3	11.3	1.3
Employees	66.5	139.6	134.1	163.2	52.8	130.2
Share						
Small (less than 10 employees)	0.311	0.463	0.017	0.129	0.370	0.483
Medium (10 to 99 employees)	0.542	0.499	0.575	0.496	0.535	0.499
Large (100 employees and above)	0.147	0.354	0.408	0.494	0.094	0.292
Firm Age (Year of establishment)	1987	14	1980	18	1989	12
Share 0–10 years old	0.242	0.429	0.133	0.341	0.264	0.441
Share 11–20 years old	0.405	0.491	0.383	0.488	0.409	0.492
Share above 20 years old	0.353	0.478	0.483	0.502	0.327	0.469
Revenue growth (#1)	0.455	1.047	0.409	0.900	0.460	1.062
Employment growth (#1)	0.354	0.727	0.590	1.097	0.332	0.682
Revenue per employee growth (#1)	0.206	0.905	0.243	0.959	0.203	0.902
Legal status (Sole proprietorship = 1, Other = 0)	0.444	0.497	0.100	0.301	0.513	0.500
Location (Maputo = 1, Other = 0)	0.824	0.381	0.750	0.435	0.838	0.368
Food processing (ISIC 15)	0.275	0.447	0.317	0.467	0.266	0.442
Textiles, garments, footwear etc. (ISIC 17, 18 and 19)	0.150	0.357	0.100	0.301	0.160	0.367
Wood and furniture, etc. (ISIC 20 and 36)	0.182	0.386	0.133	0.341	0.192	0.394
Non-metallic products, etc. (ISIC 22, 24, 25 and 26)	0.139	0.346	0.217	0.414	0.123	0.329
Metal products, equipment and machinery, etc. (ISIC 27, 28 and 29)	0.255	0.436	0.233	0.425	0.259	0.439
Total observations (firms in parenthesis)	714	(263)	120	(29)	594	(234)

Note: Data covers the period 1999–2006. Years 2003 and 2006 are best covered with 238 and 222 observations, respectively. (#1) Three year growth rates (2003–06). Estimates based on 217 firm observations. Mozal (revenue dominant) and firms in the Electrical machinery and transport sectors (ISIC 31, 34 and 35—non-exporters) have been excluded from the analysis. Note (1): 29 MTN = 1 USD during the period under study.

exporters are much larger than non-exporters; on average 4–5 times in terms of revenue and capital and 2.5 times with respect to the number of employees. These differences are also reflected in relatively large average labour productivity differences between exporters and non-exporters, with exporters having almost three times as high output per employee as compared to non-exporters.

Most firms in the sample are relatively old with an average establishment year of 1988 and exporters are even more well-established (average establishment year is 1980). Location of the firm may be a little misleading since most firms (82%) reported their headquarters as being in Maputo, while their main production facility may be located in another province. Several of the firms considered are multi-product firms. Unfortunately, we do not have information on which product contributes most to the firm's overall activity and

several two-digit sectors have therefore been grouped together. An example is ISIC 20 (wood) and ISIC 36 (furniture)—8.2% of the sample—where a typical case is a carpenter who produces both products of wood and wood furniture. Similarly, ISIC 17 (textiles), ISIC 18 (garments) and ISIC 19 (footwear)—15.0% of the full sample—are found to have many overlapping multi-productulti-product firms. Using the same reasoning firms found in ISIC 27 (basic metals), ISIC 28 (fabricated metal products) and ISIC 29 (equipment and machinery) are added into one sector (25.5% of the data considered). The remaining sectors are grouped into a non-metallic product sector (13.9%). It consists of firms in publishing and printing (ISIC 22), chemicals (ISIC 24), rubber (ISIC 25) and other non-metallic mineral products (ISIC 26).[6] It should be noted that exporters (compared at sample means) are more likely to be in this last sector as well as in food processing.

Table 2 also provides summary statistics on some selected performance indicators: (a) real revenue growth, (b) employment growth and (c) revenue per employee growth. The reported figures are growth rates from 2003 to 2006 and have 211 firm observations. The general picture emerging is rather positive. The firms considered have in three years increased real revenue by 45.5% on average (median 17%), showing that the manufacturing sector is maintaining its growth momentum (in terms of real revenue) as documented in RPED (1999) and ICA (2003). The same picture emerges in terms of employment generation with a three-year increase of on average 35.4% (median 20%), leaving three year increases in labour productivity of 20.6% (median 0%). This result is contrary to that of RPED (1999) and ICA (2003), which found very limited employment creation by Mozambican manufacturing sectors in the late 1990s and the early Millennium. Comparing exporters and non-exporters we see that employment generation on average (and at the median) has been higher among exporters, whereas revenue and labour productivity growth are on average not apparently different between the two groups.

Zooming in on the born global exporters, in Appendix Table B1 we document mean differences between exporters and non-exporters by firm size category. Not surprisingly, very few exporters are found among small firms (below ten employees), but among medium (10–99 employees) firms and large (100 employees and above) firms the mean differences between exporters and non-exporters largely follow the same patterns as described above. In the subsequent sections we carry out all analysis with and without the sample of smaller firms.

One additional concern, when observing so few exporters in a relatively large sample of manufacturing firms is that exports among smaller firms are carried out through trading companies and therefore not recorded as direct exports. However, in a sample of 599 firms the ICA (2009) data only record two firms that export indirectly through a third party. Moreover, this is confirmed in the IIM 2012 (DNEAP, 2013) where only 29 out of 831 firms interviewed were exporters and only a couple of manufacturers exported via a specialised trading company.

A main aim of this article is to analyse whether firms in Mozambique become more productive as they start exporting or if the positive correlation between export and firm productivity is just a result of more efficient firms self-selecting into exporting. As described in the literature review, previous papers provided a dynamic framework for analysing these

6 Electrical machinery (ISIC 31) and transport means (ISIC 34 and 35) have been excluded from the analysis (under 4% of the sample) as no firms are observed as exporters.

issues. The data available for Mozambique are limited by the fact that there is no within-firm export participation variation observed. During the period 1999–2006, firms sampled are either exporters or non-exporters; we do not observe any switchers. This has implications for the empirical strategy chosen below. Moreover, we would have liked to study whether efficiency differences among exporters exist depending on (i) the origin of the firms' export partners and (ii) the share of total production being exported. Appendix Table C1 provides summary statistics for the year 2006 for the born global exporters in the sample.[7] However, due to the relatively few exporters (which limits variation along these dimensions) and because of the lack of detailed export data over time, we do not explore these dimensions any further in what follows.

4. Empirical framework

Our point of departure for analysing the LBE hypothesis is the traditional production function approach. We use the following standard production function

$$Y_{i,t} = A_{it} K_{it}^{\beta_K} N_{it}^{\beta_N} M_{it}^{\beta_M} \Rightarrow \left(\frac{Y}{N}\right)_{i,t} = A_{it}\left(\frac{K}{N}\right)_{it}^{\beta_K} N_{it}^{\beta_K+\beta_N+\beta_M-1}\left(\frac{M}{N}\right)_{it}^{\beta_M} \quad (1)$$

Formulated in logarithms and using a difference specification leads to (noting that $\beta_n = \beta_N + \beta_K + \beta_M - 1$ and assuming that changes in the independent variables are uncorrelated with production output levels in all periods):

$$\Delta y_{i,t} = \beta_n \Delta n_{i,t} + \beta_K \Delta k_{i,t} + \beta_M \Delta m_{i,t} + \Delta a_{i,t} + \Delta \eta_{i,t} \quad (2)$$

where y is revenue per employee (labour productivity), n is number of employees (firm size), k is log capital per employee (capital intensity) and m is log intermediate inputs (including raw materials) per employee (intermediate input intensity). Total factor productivity (TFP) is represented by a, and η is a serially uncorrelated error term capturing efficiency shocks, which we assume are exogenous.

The available data for Mozambique are characterised by the fact that all sampled exporters have been exporting since they were established (born-global) and that none of the non-exporting firms have ever entered foreign markets, meaning that $\exp_{i,t} = \exp_i$ for all t. However, it is also a fact that most born-global exporters in our sample primarily service neighbouring countries in the southern region of Africa, which could question whether the label 'global' is suitable in the Mozambican context. But the data still suggest that entry costs into external markets are substantial (and likely to be increasing with distance to export markets). Consequently, producers do not begin to export unless the present value of their expected future export profit stream is very large. To avoid reestablishment costs (when times get better) firms might continue to export even if net profits are negative for a period (Das *et al.*, 2007).

The born-global phenomenon is well-described in the management/business literature and stands in contrast to the more established sequential international entry literature.

7 From Appendix Table C1, we see that only five firms are producing exclusively for the export market. Destination of exports vary; 50% export to the EU, 3% to South Africa, 19% to SADC countries, 13% to the US and 25% to other not well specified countries.

Oviatt and McDougall (1994) define an international new venture (a born global) as a business organisation that from establishment seeks foreign markets. Although 'born globals' or international new venture firms are often not a distinct breed of firms, the decision to internationalise immediately after starting operation is highly influenced by the size of its home market (Fan and Phan, 2007). The 'born global' literature initially suggested that knowledge-intensive firms were the most likely international new ventures, but recently the phenomenon is also found in sectors that by most criteria would be regarded as very traditional and not knowledge-intensive (Knight, Bell and McNaughton, 2001).

In the absence of sufficient variation on export status, in the following, we consider whether labour productivity growth has been higher for exporting firms as compared to non-exporters. Assuming that changes in TFP are dependent on export participation (thereby implicitly assuming that export participation is uncorrelated with $\Delta\eta$ when controlling for changes in inputs) and allowing for observed heterogeneity in TFP (represented by $c_{i,t}$) by including a set of indicator variables representing sector, legal status, establishment year (age) and time we get the following equation:

$$\Delta a_{i,t} = \delta \exp_{\mathrm{i}} + c_{i,t} \tag{3}$$

where exp is an indicator variable equal to one if the firm exports and zero otherwise.[8] Substituting equation (3) into (2) yields the specification, which forms the basis for the econometric test of a modified LBE hypothesis:

$$\Delta y_{i,t} = \beta_n \Delta n_{i,t} + \beta_K \Delta k_{i,t} + \beta_M \Delta m_{i,t} + \delta \exp_i + c_{i,t} + \Delta\eta_{i,t} \tag{4}$$

where a positive and well determined δ would indicate support for the LBE hypothesis.

The methodological contribution of this article is straightforward in the sense that in equation (4) we combine the BO approach suggested by Aw and Hwang (1995) with the recent literature using matching techniques (see Wagner, 2007 for a survey) to cast light on the LBE hypothesis. The regression based BO estimator of counterfactual means constitutes a propensity score reweighting estimator based upon a linear model for the conditional odds of being treated (in this case participating in foreign markets). As highlighted in Kline (2011) the estimator enjoys the status of a doubly robust estimator of counterfactuals, as estimation is consistent if either the propensity score assumption or the model for outcomes is correct. The BO estimator may be particularly relevant for these data. This estimator is convenient in settings where few treated observations are available, as estimation only requires that collinearity problems be absent among the controls.

The BO method (described in detail in Fortin *et al.*, 2011) essentially identifies two components of the unconditional labour productivity gap, i.e., the difference between labour productivity of firms exporting and of firms not exporting, respectively. The first component of the decomposition measures the importance of differences in observable characteristics between exporters and non-exporters. Following the literature, we refer to this component as the 'characteristics effect'. The second component measures the importance of differences in parameters for the two groups. This captures the variation in the returns to the characteristics between exporters and non-exporters. In the following it is denoted

8 Contrary to Bigsten *et al.* (2004) we hypothesise that changes (and not levels) in TFP depends on export participation in line with the born-global hypothesis.

the 'coefficient effect' or the unexplained component. Algebraically, the labour productivity gap between exporters and non-exporters can be described by the following decomposition into two components where Δ is the expected labour productivity gap given both the export specific characteristics and coefficients:

$$\begin{aligned}\Delta &= \left[E_{\beta_{EX}}(LP_{iEX}|X_{iEX}) - E_{\beta_{EX}}(LP_{iN}|X_{iN})\right] + \left[E_{\beta_{EX}}(LP_{iN}|X_{iN}) - E_{\beta_N}(LP_{iN}|X_{iN})\right] \\ &= \left[E_{\beta_N}(LP_{iEX}|X_{iEX}) - E_{\beta_N}(LP_{iN}|X_{iN})\right] + E_{\beta_{EX}}(LP_{iEX}|X_{iEX}) - E_{\beta_N}(LP_{iEX}|X_{iEX})\end{aligned} \tag{5}$$

Focusing on the first line, the first term in brackets on the RHS is the difference in expected labour productivity for exporters (EX) and non-exporters (N) where the expectation is evaluated under exporting firms' parameters (β_{EX}). This is the explained component as it is extracting the importance of differences in endowments and weighing these using the same weights (the exporters' parameters). The second term in brackets is the difference in expected labour productivity for non-exporters when the expectation is evaluated under the exporters' parameters and the non-exporters' parameters, respectively. This is the unexplained component of the labour productivity gap.

The first line in the decomposition in equation (5) is formulated from the viewpoint of exporting firms, which means that group differences in the characteristics are weighted by the coefficients of exporting firms to determine the endowments effect. For the unexplained component, the difference in expectations for the two different coefficient sets are weighted by non-exporting firm characteristics, i.e., the coefficient effect measures the change in expectations of the non-exporting firm outcome, if they had exporter coefficients. In the second line, non-exporting and exporting firm coefficients and determinants are simply interchanged, showing the standard result that different weighting leads to different component estimates for a given average gap.

The BO weights may yield specification errors at particular control variable values. However, such errors will induce bias only if they are correlated with outcomes in the control sample. In the absence of prior knowledge of the propensity score, approximations should be sought with respect to the propensity score (applying conventional matching techniques) or the weights themselves (BO approach). Which approach removes more bias in a misspecified environment will depend on the specifics of the true data-generating process. In the following we therefore report results following a traditional BO decomposition approach as well as kernel and nearest neighbour matching results following the approach suggested by Abadie and Imbens (2002) and used in the LBE context in Bigsten and Gebreeyesus (2009).[9]

5. Results

First, we look at differences in characteristics between exporters and non-exporters using an export participation specification as in Bigsten *et al.* (2004). Table 3 presents estimated average marginal effects on the probability of exporting using both a contemporaneous specification (columns 1 and 2) and a lagged specification (columns 3 and 4). This is to ensure

9 It should also be noted that Kline (2014) show that BO routines (as applied in this article) that ignore variability in the mean values of the covariates are likely to yield conservative inference.

Table 3: Export Participation

	Contemporaneous Specification		Lagged Specification	
	1 All firms	2 Excl. small	3 All firms	4 Excl. small
Employment	0.043*	0.066	0.081	0.062
	(1.68)	(1.46)	(1.06)	(0.82)
Labour productivity	0.030	0.071	0.039	0.080
	(1.22)	(1.41)	(0.50)	(0.87)
Capital/labour ratio	0.002	0.017	0.040	0.077
	(0.16)	(0.60)	(0.80)	(1.17)
Intermediate/labour ratio	0.013	0.018	0.019	0.002
	(0.70)	(0.48)	(0.37)	(0.04)
Young firm (Yes = 1)	−0.027	−0.072	−0.096	−0.108
	(0.70)	(0.97)	(0.66)	(0.62)
Location (Maputo = 1)	−0.105	−0.219	−0.135	−0.159
	(1.39)	(1.62)	(0.83)	(0.91)
Legal structure (Sole Propr. = 1)	−0.063	−0.025	−0.091	0.161
	(0.89)	(0.20)	(0.34)	(0.47)
Sector dummies included	Yes	Yes	Yes	Yes
Time dummies included	Yes	Yes	Yes	Yes
Observations	714	492	240	217
Firms	263	168	83	75
F-stat joint significance (p value)	0.00	0.00	0.13	0.06
R^2	0.29	0.22	0.13	0.11

Note: Dependent variable: Indicator variable taking the value one if the firm exports, zero otherwise. Logit estimates, marginal effects. t-stats (reported in parenthesis) are heteroskedasticity (cluster) robust.
*, **, *** Significance at a 10, 5 and 1% level, respectively.

comparability with previous studies, which mix specification choices depending on the data available. Columns 2 and 4 exclude small firms from the analysis, but this does not change the overall results. Sector indicators are included in all specifications and are statistically significant as a group. Also included are variables representing location, legal structure and firm establishment year (represented by an indicator variable for young firms, below ten years of age), which are all time-invariant during the period under consideration. None of the time-invariant variables are good predictors of export participation, when controlling for differences in labour productivity and the intensity of intermediates and capital.

In the export participation specification the coefficient on labour productivity is positive but insignificant. Thus, the self-selection mechanism does not seem to be strong in the data. However, given the fully persistent export data it is not possible to exploit the panel structure and interpret results regarding the self-selection hypothesis as strongly as papers following the Clerides *et al.* (1998) approach. The results are, however, in accordance with findings in Bigsten *et al.* (2004) for Cameroon, Ghana, Kenya and Zimbabwe.

As in previous literature labour productivity is strongly correlated with intermediate use and capital intensity, and a joint significance test (all coefficients zero) is rejected at the 10% level, when including time-invariant firm controls. As in Bigsten *et al.* (2004) we

therefore conclude that the strong association between increases in labour productivity and better utilisation of intermediates and capital makes it difficult to identify direct efficiency effects on exporting. Moreover, we interpret the strong/perfect export persistence and the generally well-determined coefficient estimate on employment (firm size) as an indication of fixed costs associated with exports in line with the account by Roberts and Tybout (1997).

Second, zooming in on the LBE hypothesis, we start in Column 1 in Table 4 with a difference specification as outlined in equation (4). The export indicator shows a well-determined export effect, indicating that exporting firms have higher labour productivity growth than non-exporting firms, even when controlling for changes in firm size and intensity of intermediates and capital. Moreover, changes in firm size and the intensity of intermediary use have significant negative and positive coefficient estimates, respectively.[10] Column 2 includes explanatory variables in both levels and differences, which does not change the well-determined coefficient estimate on the export indicator. Excluding small firms from the sample in column 3, does not change the result either.

Columns 4, 5 and 6 in Table 4 includes an interaction term between the export indicator variable and firm size, as larger firms may be more able to reap the benefits of internationalisation. Interaction of the export indicator variable with the continuous firm size explanatory variable allows us to test whether the efficiency return to being a larger firm is the same for exporters and non-exporters, allowing for a constant labour productivity differential between exporters and non-exporters (which we already documented to be the case). Table 4 thereby shows that we should expect different firm size productivity effects (the interaction term is significant at the 5% level in columns 5 and 6) between exporters and non-exporters. Note however, that negative learning effects in terms of labour productivity growth will only start to kick in at a relatively high threshold level of 373 employees (using specification in column 5), which constitutes 15% of the exporting firms in the sample. These negative learning effects at relatively high employment levels are also consistent with the average negative labour productivity summary statistics reported for large firms in Appendix Table B1. Moreover, a test of the joint significance of the export participation decision and the size-export interaction (all coefficients zero) is rejected at the 1% level.

The result, i.e., that export effects are larger for medium sized firms as compared to larger enterprises, is quite interesting and not directly in tune with common perceptions of learning by exporting. The result that scope for learning is particularly high among medium sized firms could relate to the traditional story of the 'missing middle' and the potential gains of promoting especially this segment of firms along the firm size distribution (see recent discussion in Hsieh and Olken, 2014 and Tybout, 2014 for an elaboration on the actual presence of a missing middle). If medium sized firms are 'structurally disadvantaged', it is not surprising that those which are able to break through the glass ceiling of the medium size disadvantage are likely to have more scope for learning.

Several reasons for the missing middle have been advocated but differences in access to finance and regulatory obstacles are dominating views. To get a feeling of the access to finance problem (going beyond self-reported assessments) we follow Hsieh and Olken

10 It should be noted that the negative coefficient on firm size should be interpreted in the context of the labour productivity specification where $\beta_n = \beta_N + \beta_K + \beta_M - 1$. As an example, in column 1, estimated coefficients lead to a positive estimate of $\beta_N = 0.033$, signalling that care should be taken when interpreting the relationship between firm size and productivity.

Table 4: Labour Productivity Growth

	1 All firms	2 All firms	3 Excl. small	4 All firms	5 All firms	6 Excl. small
Export	0.169***	0.165***	0.169***	0.513**	0.657***	0.686***
	(2.89)	(2.69)	(2.74)	(2.15)	(2.51)	(2.51)
D.Employment (t)	−0.767***	−0.758***	−0.735***	−0.790***	−0.773***	−0.749***
	(5.74)	(5.49)	(4.85)	(5.84)	(5.46)	(4.79)
L.Employment (t)		−0.001	−0.002		0.036	0.041
		(0.04)	(0.09)		(1.32)	(1.24)
D.Capital/labour ratio (t)	−0.019	−0.007	0.017	−0.017	−0.002	0.025
	(0.38)	(0.16)	(0.28)	(0.35)	(0.03)	(0.41)
L.Capital/labour ratio (t)		0.021	0.018		0.024	0.022
		(0.82)	(0.47)		(0.96)	(0.57)
D.Intermediate/labour ratio (t)	0.219***	0.212***	0.214***	0.213***	0.201***	0.200***
	(3.17)	(3.31)	(3.27)	(3.15)	(3.22)	(3.16)
L.Intermediate/labour ratio (t)		−0.012	−0.014		−0.020	−0.024
		(0.44)	(0.47)		(0.69)	(0.80)
Export* firm size interaction				−0.076	−0.111**	−0.116**
				(1.62)	(2.10)	(2.09)
Young firm (Yes = 1)	0.016	0.016	0.018	0.025	0.010	0.012
	(0.27)	(0.26)	(0.29)	(0.41)	(0.17)	(0.19)
Location (Maputo = 1)	0.024	0.030	0.035	0.019	0.013	0.020
	(0.53)	(0.67)	(0.62)	(0.39)	(0.26)	(0.33)
Legal structure (Sole Propr. = 1)	−0.056	−0.036	−0.034	−0.057	0.013	−0.003
	(0.84)	(0.39)	(0.28)	(0.86)	(0.15)	(0.03)
Sector dummies included	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies included	Yes	Yes	Yes	Yes	Yes	Yes
Observations	240	240	217	240	240	217
Firms	83	83	75	83	83	75
R^2	0.32	0.32	0.32	0.33	0.33	0.33

Note: Dependent variable: Labour productivity growth—difference specification. OLS estimates, t-stats (reported in parenthesis) are heteroskedasticity (cluster) robust.
*, **, *** Significance at a 10, 5 and 1% level, respectively.

(2014) and compare the average product of capital and labour along the firm size distribution. We find that the average product of capital is significantly higher in medium compared to larger firms, suggesting that (if marginal and average costs move together) medium firms are (ceteris paribus) in shortage of capital.[11]

Looking in the other end of the firm size distribution (comparing small and medium firms), Schou and Cardoso (2014) study manufacturing census information in

11 No significant differences are found along the firm size distribution with respect to average product of labour (log(value added/employees)).

Table 5: Blinder Oaxaca Decomposition

	Full sample (240 observations)			
	A: Only differences		B: Including levels	
	(1)	(2)	(3)	(4)
Difference	0.158**		0.158**	
	(0.072)		(0.074)	
Characteristics (explained) effect	−0.036	0.021	−0.026	−0.006
	(0.053)	(0.068)	(0.056)	(0.083)
Coefficients (unexplained) effect	0.194***	0.137**	0.184***	0.164***
	(0.074)	(0.057)	(0.078)	(0.068)
Reference group	Exporter coefficients	Non-exporter coefficients	Exporter coefficients	Non-exporter coefficients

Note: Dependent variable: Labour productivity growth. BO decomposition. Standard errors reported in parenthesis.
*, **, *** Significance at a 10, 5 and 1% level, respectively.

Mozambique, and identify a threshold level along the firm size distribution (i.e., an unusually large number of firms just below the classification 'small firms', especially outside the Maputo region). Meaningful discontinuities are often a signal of regulatory distortions creating 'obstacles' for firms wanting to grow and 'graduate' to medium size. These institutional problems are often linked to an observed unequal tax burden along the firm size distribution. This is also the case in Mozambique where taxes fall disproportionately on a few formal externally oriented enterprises. According to Nathan Associates (2004) firms below a certain threshold are able to register for a simplified business tax regime, which suffers from ineffective tax administration. Significant evasion is therefore observed for smaller firms. Tax enforcement problems may therefore have contributed to the threshold observed along the firm size distribution.

In Table 5, we turn to the generalised BO decomposition, and report results using both exporters' and non-exporters' firm coefficients as reference parameters. First, focusing on the difference specification (Panel A) or the combined levels and difference specification (Panel B) the unconditional difference in labour productivity growth (in logs) between exporters and non-exporters is 0.158 (significant). The difference in labour productivity growth between exporters and non-exporters is highly driven by the unexplained component in the BO decomposition (in both panels). Moreover, the characteristics effect is generally negative. This indicates that if the decision to participate in foreign markets were based on differences in observable characteristics, exporters would experience lower labour productivity growth than non-exporters. The observation that exporters are on average experiencing higher productivity growth is therefore driven by the unexplained effect, a result that can be interpreted as being in favour of the LBE hypothesis, indicating a significant exporter premium independent of specification choice.[12]

12 Kline (2011) shows that the classical Oaxaca-Blinder decomposition is equivalent to a reweighting impact estimator in which the odds of treatment is a linear function of the control variables (in contrast to the more widespread procedure in which the propensity scores, or the odds, are estimated by a logit or probit model).

Table 6: Learning-by-Exporting: Summary of Different Specifications and Estimators

	A: Only differences—no additional controls					C: Only differences—with additional controls			
	OLS	Kernel	NN	BO		OLS	Kernel	NN	BO
Effect	0.166***	0.182**	0.169*	0.182***	Effect	0.169***	0.178**	0.171**	0.188***
t-stat	3.03	2.09	1.95	3.20	t-stat	2.89	2.07	1.98	2.59
	B: Including levels—no additional controls					D: Including levels—with additional controls			
	OLS	Kernel	NN	BO		OLS	Kernel	NN	BO
Effect	0.158***	0.181	0.170*	0.159**	Effect	0.165***	0.181**	0.188**	0.178**
t-stat	2.59	1.52	1.83	2.51	t-stat	2.69	2.20	2.25	2.34

Note: See Table 5 for details on the OLS and BO. Kernel refers to matching using an epanechnikov kernel and NN refers to the average treatment effect of the treated (ATT) using bias corrected nearest neighbour matching (4 matches per observation). *t*-values (reported in parenthesis) are heteroskedasticity robust.
*, **, *** Significance at a 10, 5 and 1% level, respectively. Estimations done using the nnmatch command in Stata (Abadie *et al*., 2004).

Table 7: Learning By Exporting—Summary of Results

		R2	LR	*p* Value	Mean Bias	Median Bias	Rubin's B	Rubin's R	% Concern	% Bad
Specification A	Unmatched	0.044	12.92	0.166	14.1	12.6	50.4	1.27	50	0
	Matched	0.004	0.73	1.000	4.3	3.8	14.0	0.69	20	0
Specification B	Unmatched	0.128	37.93	0.000	25.5	16.1	92.5	0.52	46	0
	Matched	0.004	0.82	1.000	3.7	3.2	14.7	1.60	23	0
Specification C	Unmatched	0.082	24.22	0.085	15.3	12.5	69.9	0.79	59	0
	Matched	0.010	1.94	1.000	4.1	2.8	23.1	0.74	18	0
Specification D	Unmatched	0.161	47.83	0.000	22.6	12.7	102.5	0.41	40	5
	Matched	0.010	2.09	1.000	4.3	4.2	23.9	0.88	25	0

Note: Balancing summary statistics based on *pstest.ado* in Stata. Rubin's B is recommended to be under 25 whereas Rubin's R should be between 0.5 and 2 for the samples to be considered sufficiently balanced.

Comparisons between OLS, kernel and nearest neighbour matching (Abadie and Imbens, 2002) and BO decomposition estimates are summarised in Table 6. Balancing tests for the different specifications are outlined in Table 7, and Appendix Figures A1 and B1 visually document tests of the common support restriction (Appendix Figure A1) as well as covariate imbalance tests (Appendix Figure B1). The balancing tests show that there are significant differences between exporters and non-exporters along observable dimensions. However, matching on the above described variables reduce both the mean and median bias significantly. In addition, for most specifications the percentage of all covariates

orthogonal to the propensity score with the specified variance ratios is reduced significantly and the 'percent of concern' is at an acceptable level (Rubin, 2001). Moreover, both Rubin's B (the absolute standardized difference of the means of the linear index of the propensity score in the treated and (matched) non-treated group) and R (the ratio of treated to (matched) non-treated variances of the propensity score index) are for most specifications within acceptable ranges.[13]

There is strong support for the LBE hypothesis independent of estimator and specification choice (levels or differences), and overall, the coefficient estimates, which are similar across all specifications, suggest a significant export premium (on labour productivity growth) [100 *(exp(δ)−1)] of between 17.2 and 20.7%. However, one should keep in mind that these estimates basically rely upon selection on observables given that all exporters in the sample are 'born globals'. Care should therefore be taken before turning to a causal interpretation of these results. There may be time-varying unobservables correlated with both export participation and changes in labour productivity.

According to the study by The International Study Group on Exports and Productivity (ISGEP, 2008) the high export premium identified in Mozambique is not surprising, since the export productivity premium tend to increase with low export participation rates and low institutional quality (in terms of regulatory environment and government effectiveness). Moreover, several studies have found that firms exporting to relatively distant markets are more likely to experience spillovers leading to improvements in productivity. Although our data cannot confirm this quantitatively (missing data), a web search in September 2012 (21 exporters out of 29 identified) combined with information from the most recent enterprise survey (10 exporters out of 29 identified) may help shed some light on this. We do find that firms exporting to markets that are more distant have a larger engagement in exporting (a larger share of firms' total revenue comes from export when serving the EU) and may therefore be more prone to spillovers from exporting. However, only half of the exporters have the EU as their main export destination, whereas the remaining half serves the SSA region (SADC), and we find no immediate differences in efficiency between exporting to SADC or the EU (not reported).

Finally, the recent IIM 2012 enterprise survey (DNEAP, 2013) confirms that very few Mozambican manufacturing firms export. In the sample of 761 manufacturing companies, only 22 (or 3%) are exporters. This low export participation rate suggests that although we find well-determined productivity effects of exporting, there is overall a limited efficiency effect on the manufacturing sector, especially if local downstream and upstream spillover effects are negligible (as one expects in thin markets). However, exporter characteristics are slowly starting to change. Exporters are 'moving away' from the born-global phenomenon (six firms out of the 22 exporters started out as serving domestic markets only but have recently moved into international markets). This could suggest that foreign market entry barriers are falling. Moreover, although exporters seem to remain in the food, wood and metal sectors, we do observe changes in export destination to include Asia, where especially China has entered as a main export market. The big question is therefore: Why do so few Mozambican manufacturing firms export, given the positive effects it can have on exporters' performance? Qualitative information from the IIM 2012 on non-

13 Rubin's B is recommended to be under 25 whereas Rubin's R should be between 0.5 and 2 for the samples to be considered sufficiently balanced.

exporters seeking new markets suggests that a 'lack of knowledge of potential markets' is the most serious constraint for international market entry. The implication is that the Mozambican Export Promotion Institute (IPEX) could play an important role in overcoming this substantial information deficit for potential Mozambican exporters.

6. Conclusion

The Mozambican economy is one of the fastest growing economies in the World. However, the manufacturing sector is currently finding it difficult to keep up with the growth pace of the rest of the economy. It therefore remains relatively small (employs fewer than 3% of the labour force), production is highly concentrated in a few sectors and very few manufacturing firms have entered foreign markets. The lack of focused and well-designed industrial policies have been cited as the main reasons for the observed low level of development of manufacturing, and especially the lack of policies designed to improve competitiveness and efficiency of targeted manufacturing sectors has been criticised.

The Mozambican government has recently recognised the necessity of re-developing the manufacturing sector and initiatives have focused on improving firm level productivity by promoting and expanding export-oriented industries under the implicit assumption that LBE takes place. In this article, we exclusively focused on analysing the LBE assumption in the Mozambican context using a unique firm level data set from 1999 to 2006. We analysed the LBE hypothesis and addressed the endogeneity problem introduced by self-selection by combining a generalised BO approach with results from traditional matching techniques. Results reveal that very few manufacturing firms export, and that exporters tend to be born global. The difficulty in addressing selection when there is no variation in export status led us to using a BO decomposition approach, resulting in support of the LBE hypothesis, where the export premium was found to be between 17 and 21%, controlling for differences in observable characteristics between exporters and non-exporters.

Mozambique remains a poor country and exports clearly need to increase in order to generate much needed foreign currency and underpin continued growth. Based on our results it would also appear that policies to strengthen exporting (such as addressing the information deficit) could have an added benefit through potentially important learning effects. Although the size of such effects cannot be expected to be of a sizeable dimension in the immediate future they may gradually become more important as Mozambique puts in place an effective package of industrial policies and new forms of exporting firms emerge.

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Appendix

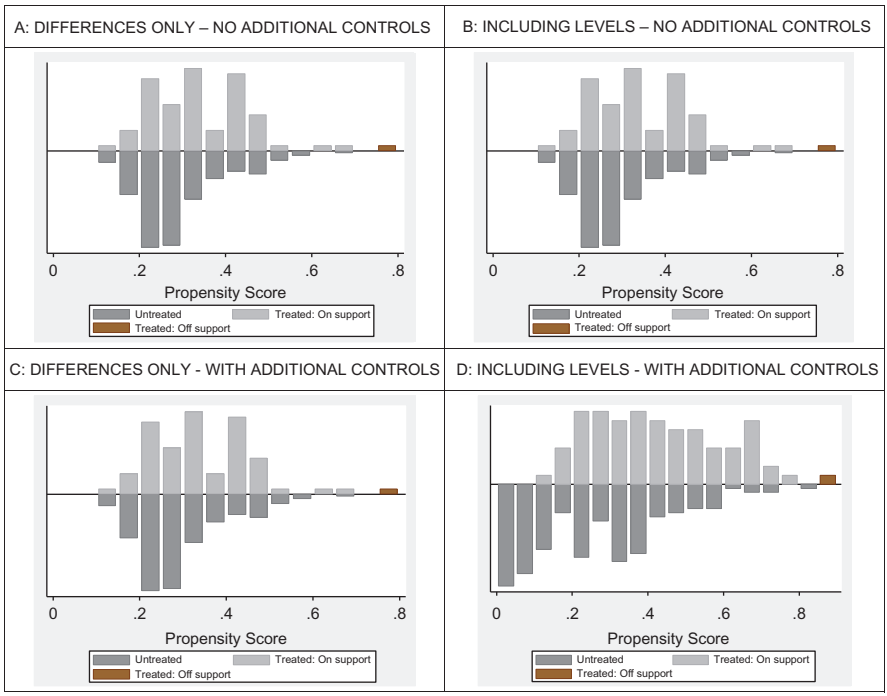

Figure A1: Balancing Tests—Common Support Restrictions Imposed. A: Differences Only—No Additional Controls. B: Including Levels—No Additional Controls. C: Differences Only—With Additional Controls. D: Including Levels—With Additional Controls.

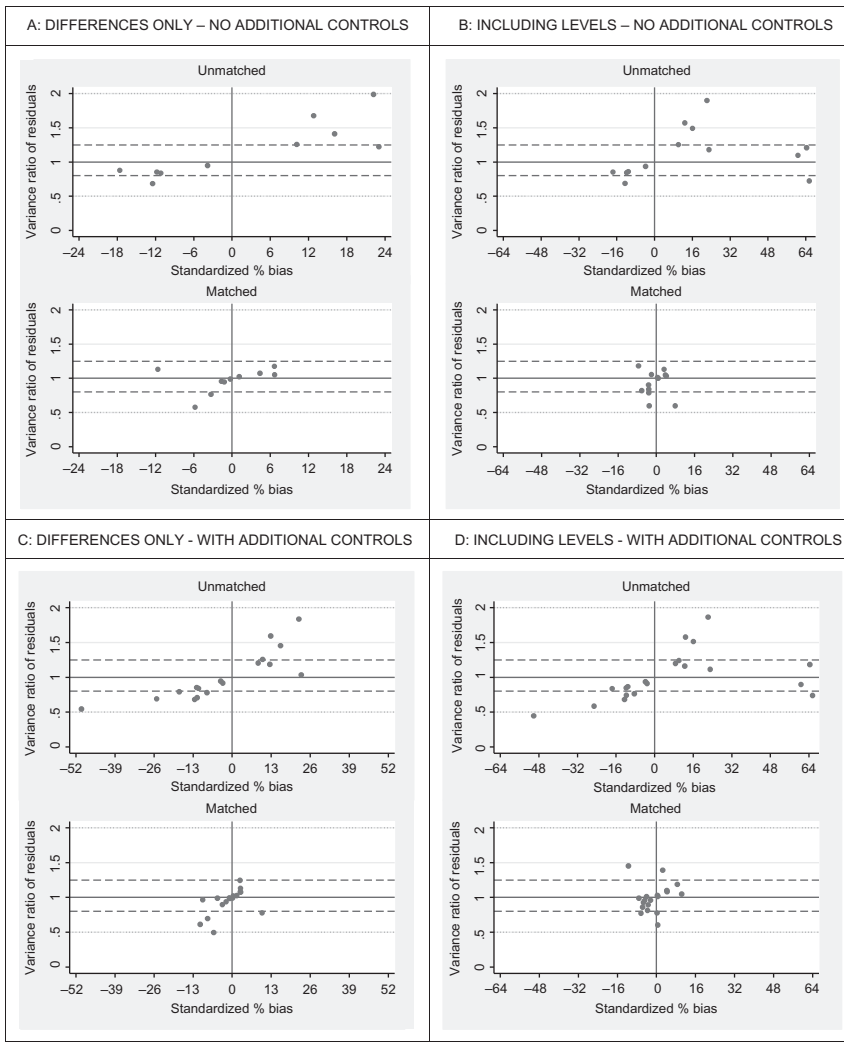

Figure B1: Balancing Tests—Covariate Imbalances. A: Differences Only—No Additional Controls. B: Including Levels—No Additional Controls. C: Differences Only—With Additional Controls. D: Including Levels—With Additional Controls.
Note: Standardized percentage bias vs residual variance ratio.

Table A1: Two-Digit Manufacturing Sectors (ISIC Classification)

Sector 15: Food products and beverages
Sector 16: Tobacco
Sector 17: Textiles
Sector 18: Garments and apparel
Sector 19: Leather, luggage, handbags and footwear
Sector 20: Wood and of products of wood and cork
Sector 21: Paper and paper products
Sector 22: Publishing, printing and reproduction of recorded media
Sector 23: Coke oven products and refined petroleum
Sector 24: Chemicals and chemical products
Sector 25: Rubber and plastic products
Sector 26: Other non-metallic mineral products
Sector 27: Basic metals
Sector 28: Fabricated metal products, except machinery and equipment
Sector 29: Equipment and machinery
Sector 30: Office, accounting and computing machinery
Sector 31: Electrical machinery and apparatus
Sector 32: Television and communication equipment and apparatus
Sector 33: Medical precision and optical instruments, watches and clocks
Sector 34: Motor vehicles, trailers and semi-trailers
Sector 35: Other transport means
Sector 36: Furniture
Sector 37: Recycling

Note: Several of the firms considered are multiproduct firms. Unfortunately, we do not have information on which product that contributes most to the firms overall activity and several two-digit sectors have therefore been grouped together: ISIC 20 (wood) and ISIC 36 (furniture), where a typical case is a carpenter that produces both products of wood and wood furniture. Similarly, ISIC 17 (textiles), ISIC 18 (garments) and ISIC 19 (footwear) are found to have many overlapping multiproduct firms. Using the same reasoning firms found in ISIC 27 (basic metals), ISIC 28 (fabricated metal products) and ISIC 29 (equipment and machinery) are added into one sector, as is electrical machinery (ISIC 31) and transport means (ISIC 34 and 35). The remaining sectors are grouped into a non-metallic product sector and consist of firms in publishing and printing (ISIC 22), chemicals (ISIC 24), rubber (ISIC 25) and other non-metallic mineral products (ISIC 26).

Table B1: Summary Statistics by Firm Size

	Small		Medium		Large	
	Exporters	Non-exp	Exporters	Non-exp	Exporters	Non-exp
Share of firm exporting	1.000	0.000	1.000	0.000	1.000	0.000
Real revenue (million MTN)	1.1	1.0	33.7	9.0	275.2	217.5
Real capital (million MTN)	0.9	7.1	26.2	7.9	205.6	187.6
Real intermediates (million MTN)	0.4	0.2	24.7	5.9	183.0	170.6
Labour productivity (log)	12.1	10.7	12.4	11.5	12.9	12.4
Employees	6.5	5.5	53.9	35.6	252.3	336.5
Firm Age (Year of establishment)	1999	1991	1980	1987	1979	1989
Share 0–10 years old	1.000	0.350	0.116	0.214	0.122	0.214
Share 11–20 years old	0.000	0.386	0.333	0.396	0.469	0.571
Share above 20 years old	0.000	0.264	0.551	0.390	0.408	0.214
Revenue growth (#1)	0.171	0.558	0.474	0.356	0.378	0.651
Employment growth (#1)	1.250	0.319	0.365	0.329	0.718	0.536
Revenue per employee growth (#1)	−0.480	0.290	0.662	0.127	−0.049	0.138
Legal status (Sole proprietorship = 1, Other = 0)	0.000	0.859	0.130	0.352	0.061	0.071
Location (Maputo = 1, Other = 0)	1.000	0.773	0.826	0.868	0.633	0.929
Food processing (ISIC 15)	0.000	0.159	0.246	0.302	0.429	0.482
Textiles, garments, footwear, etc. (ISIC 17, 18 and 19)	0.000	0.273	0.087	0.104	0.122	0.036
Wood and furniture, etc. (ISIC 20 and 36)	0.000	0.209	0.217	0.195	0.020	0.107
Non-metallic products, etc. (ISIC 22, 24, 25 and 26)	1.000	0.018	0.188	0.173	0.224	0.250
Metal products, equipment and machinery, etc. (ISIC 27, 28 and 29)	0.000	0.341	0.261	0.226	0.204	0.125
Total observations	2	220	69	318	49	56

Note: Data covers the period 1999–2006. Years 2003 and 2006 are best covered with 238 and 222 observations, respectively. (#1) Three year growth rates (2003–06). Estimates based on 217 firm observations. Mozal (revenue dominant) and firms in the Electrical machinery and transport sectors (ISIC 31, 34 and 35—non-exporters) have been excluded from the analysis.

Table C1: Exporter Details

Firm number	Share of total production exported	Destination of exports
1	60%	EU, US and SA
2	90%	Holland
3	100%	SADC and EU
4	NA	NA
5	1%	SADC
6	20%	SADC/Malawi
7	100%	EU
8	1%	EU, US and SA
9	5%	South Africa
10	100%	EU
11	20%	Swaziland
12	NA	NA
13	100%	South Africa
14	10%	Swaziland
15	NA	NA
16	NA	NA
17	60%	Portugal
18	NA	NA
19	10%	Angola
20	NA	NA
21	60%	Italy
22	100%	South Africa

Note: Numbers based on 2006 export information from either ICA (2009) or DNEAP (2006). Where available firm webpage information has verified 'destination of export'.