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EXPORTS AND EXPORT DIVERSIFICATION IN SUB-SAHARAN AFRICA

A STRATEGY FOR POST-CRISIS GROWTH

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at BROOKINGS

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Author's Note:

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Abstract:

In this paper, we are concerned with the effects of exports and export diversification on growth and the policy implications for post-crisis export strategies. Using a panel of 30 selected sub-Saharan African countries over the period 1995-2008, we estimate the impact of exports and export diversification on value added, labor productivity, and conditional and unconditional labor demand. We find, first, that exports have a positive impact on value added, labor productivity and labor demand. Second, we find that export diversification of products and markets increase value added and labor productivity, but not labor demand. When we drop natural resource-intensive countries from the sample, we can confirm these results for value added, labor productivity and unconditional labor demand. Third, controlling for the export market share to the U.S., EU-25, China and sub-Saharan Africa, we find that the export destination matters for growth and employment.

We also interact exports with export diversification of products and markets as well as export market shares. Contrary to expectations, we find that the positive value added and labor productivity effects from exports are larger the more concentrated (instead of diversified) in export products and markets the countries in our sample are. Finally, we find that the effect of exports on growth and employment is also influenced by export destination. We argue that sub-Saharan Africa's export structure is one of the main reasons the region has been able to get a head start out of the recent recession. We also suggest that sub-Saharan African countries, especially the resource-based economies, need to concentrate on improving productivity in areas where they have a comparative advantage and on moving up the value chain in those commodities.

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1. INTRODUCTION

The past decade has been one of great volatility for Africa but also of substantial progress. At the turn of the decade, many in the developing world wondered if Africa would become "the doomed continent" (Quenum 2000), crippled by political and ethnic tensions (Easterly and Levine 1997), or if in fact Africa could claim the 21st century (Gelb 2000). In that environment, predictions that sub-Saharan Africa (SSA) as a continent was about to enter the fastest growth period of its young 50-year history would have seemed impossible. However, between 2002 and 2008 gross domestic product (GDP) grew by 6.5 percent annually in the region. Commodity-exporting countries as well as non-commodity-exporting countries experienced high growth rates. In fact, some of the non-commodity-exporting countries such as Burkina Faso, Mali and Rwanda grew faster than their commodity-exporting neighbors.

The hitherto poor macroeconomic indicators that had become synonymous with Africa have also changed. Inflation in most countries was brought down to single digits for the first time in decades, debt ratios fell to sustainable levels, and deficits were reduced as countries moved to consolidate the size of government, rationalize spending, and obtain debt write-offs. In an overall favorable external economic environment, these reforms quickly began to produce results. Foreign exchange reserves, including gold, increased more than 300 percent from $37 billion in 2001 to $154 billion in 2008. Net flows of foreign direct investment more than doubled from $14 billion in 2001 to $34 billion in 2008. Goods exports over the period 2000–2008 grew by 18 percent per year as the continent became increasingly more open and globally connected.

The channels through which export expansion enhances aggregate productivity and growth are well-known. Exports allow for specialization in a country's comparative advantage and thereby raise growth. Ricardo, in his famed theory of comparative advantage, showed that countries benefit by specializing in the production of those goods with the lowest opportunity cost and trading the surplus of production over domestic demand, taking as given appropriate exchange-rate regimes. Under this model, a country will quickly specialize in sectors in which it has a comparative advantage. The new trade theory à la Helpman

and Krugman (1985) and generalized by Grossman and Helpman (1991), however, shifted the focus from the static gains from trade to dynamic ones in which the increased investment, knowledge and technology associated with increased productivity growth can transform trade patterns and accelerate overall economic growth. Under the new theory, specialization is a result of scale and concomitant efficiencies.

However, even as gross output increased in both commodity- and non-commodity-exporting African countries, the debate over the quality of growth in Africa continued. This debate shifted from the need to support export-based growth to the quality of exports and its impact on growth—that is, what a country exports matters. The argument is as follows: A reliance on a less sophisticated export base is not sufficient to guarantee sustained long-term growth. Hausman, Hwang and Rodrik (2006) developed an indicator that measures the productivity associated with a country's export basket. Their research concluded that Africa needs to diversify its export base away from less sophisticated primary commodities into high-productivity sectors such as manufacturing in order to enjoy faster growth.

One of the primary challenges facing Africa's resource-rich economies is how to diversify production beyond the natural resource sector. Natural resource-based products have dominated exports for the past 50 years, but reliance on such products has not made African countries richer. Some economists refer to the "resource curse" as a reason that some African countries have not been able to use their wealth to drive economic growth. However, others believe that export concentration, not natural resources, is negatively associated with growth (Lederman and Maloney 2007). In spite of the circumstances, resource-rich countries like Norway, Indonesia and Malaysia have demonstrated that it is possible to use natural resource wealth to diversify and support economic growth.

In this paper, we are concerned with the effects of exports and export diversification on growth and employment for 30 selected SSA countries over the period 1995-2008 and the policy implications for post-crisis export strategies. Table 1 shows the development of exports and export diversification in 30 selected SSA countries for 1995 and 2008. Real exports of goods and services grew by more than 20 percent in Chad, Zambia and Sudan and by 10-20 percent in Mozambique, Ethiopia, Uganda and Lesotho. Only Malawi, Eritrea, the Central African Republic, Comoros and Zimbabwe experienced negative growth. The biggest exporter in 2008 was South Africa, followed by Cote d'Ivoire, Sudan, Chad, Kenya, Zambia and Botswana.

We use the Hirschman-Herfindahl Index (HHI) of market and product concentration as an inverse measure of export diversification.[3] Sixteen out of 30 countries, especially Uganda and Botswana, had a higher export diversification of products in 2008 compared to the base year. Fourteen countries, in particular Sudan, Namibia and Guinea-Bissau, had a higher product concentration of exports. In contrast, only seven countries, in particular Swaziland and the Central African Republic, had more diversified markets in 2008, while the remaining 23 countries, especially Namibia, Lesotho, Sudan and Chad, showed a higher concentration of export markets.

Using a panel of 30 selected SSA countries over the period 1995-2008, we estimate the impact of exports

Table 1: Exports and Export Diversification, 30 SSA Countries, 1995 vs. 2008									
Country	**Real Exports (M. USD)**			**HHI: Product**			**HHI: Market**		
	1995	**2008**	**CAGR**	**1995**	**2008**	**CAGR**	**1995**	**2008**	**CAGR**
Botswana	2,235	4,099	4.8%	0.80*	0.25	-12.0%	0.06**	0.13	6.0%
Burkina Faso	221	586	7.8%	0.34	0.37	0.8%	0.12	0.11	-0.5%
Cameroon	1,552	2,369	3.3%	0.12	0.31	7.8%	0.12	0.2	4.0%
Central African Republic	266	203	-2.0%	0.31	0.16	-5.1%	0.32	0.11	-7.6%
Chad	267	4,664	24.6%	0.59	0.88	3.1%	0.2	0.75	10.8%
Comoros	37	32	-1.2%	0.34	0.15	-6.3%	0.29	0.17	-4.2%
Cote d'Ivoire	3,523	5,608	3.6%	0.13	0.12	-0.3%	0.1	0.16	3.9%
Eritrea	113	76	-3.1%	0.05	0.08	3.0%	0.27	0.13	-5.6%
Ethiopia	502	2,034	11.4%	0.38	0.14	-7.3%	0.16	0.12	-2.3%
Ghana	1,410	3,511	7.3%	0.12	0.21	4.4%	0.09	0.13	2.7%
Guinea	739	905	1.6%	0.31	0.29	-0.7%	0.1	0.13	2.3%
Guinea-Bissau	26	81	9.0%	0.19	0.86	12.2%	0.25	0.61	7.0%
Kenya	2,790	4,504	3.8%	0.08	0.04	-4.1%	0.07	0.1	2.7%
Lesotho	161	570	10.2%	0.16	0.21	2.3%	0.05***	0.33	18.2%
Madagascar	946	1,621	4.2%	0.06	0.04	-3.6%	0.18	0.2	0.8%
Malawi	378	232	-3.7%	0.37	0.27	-2.5%	0.09	0.1	1.0%
Mali	375	1,170	9.1%	0.62	0.5	-1.7%	0.08	0.11	1.9%
Mauritania	572	1,124	5.3%	0.3	0.26	-1.1%	0.15	0.19	1.6%
Mauritius	2,151	3,464	3.7%	0.08	0.07	-1.5%	0.19	0.21	0.6%
Mozambique	372	2,805	16.8%	0.13	0.16	1.4%	0.1	0.14	2.9%
Namibia	1,554	2,887	4.9%	0.01	0.09	14.4%	0.01	0.12	19.0%
Senegal	1,277	1,797	2.7%	0.06	0.11	4.4%	0.15	0.15	0.2%
South Africa	27,951	49,410	4.5%	0.02	0.02	0.3%	0.06	0.09	3.3%
Sudan	481	5,087	19.9%	0.13	0.84	15.4%	0.09	0.33	11.0%
Swaziland	824	2,058	7.3%	0.06	0.05	-1.8%	0.21	0.06	-8.7%
Tanzania	1,517	2,842	4.9%	0.1	0.03	-8.8%	0.06	0.07	0.9%
Togo	399	680	4.2%	0.15	0.2	2.6%	0.07	0.2	8.6%
Uganda	402	1,629	11.4%	0.71	0.13	-12.5%	0.09	0.14	3.4%
Zambia	382	4,383	20.6%	0.44	0.33	-2.1%	0.09	0.09	-0.2%
Zimbabwe	1,799	1,689	-0.5%	0.05	0.07	2.6%	0.08	0.12	3.7%

Source: U.N. Comstat, HS 1988/92 and World Bank, World Development Indicators.
*NB: Exports at 2000 prices. A lower HHI denotes more diversification. *Base year 1999. **Base year 1996. ***Base year 1997.*

and export diversification on value added, labor productivity, and conditional and unconditional labor demand. We find, first, that exports have a positive impact on value added, labor productivity and labor demand. Second, we find that export diversification of products and markets increase value added and labor productivity, but not labor demand. When we drop natural resource-intensive countries from the sample, we can confirm these results for value added, labor productivity and unconditional labor demand. Third, controlling for the export market share to the U.S., EU-25, China and SSA, we find that export destination matters for growth and employment.

We also interact exports with export diversification of products and markets as well as export market shares. Contrary to expectations, we find that the positive value added and labor productivity effects from exports are larger the more concentrated (instead of diversified) in export products and markets the countries in our sample are. Finally, we find that the effect of exports on growth and employment is also influenced by export destination. A higher export share to the U.S. increases value added and labor productivity in both the reduced and full sample, while a higher export share to China is only advantageous for value added when natural resource-intensive countries are included. We do not find such an impact for the EU-25 and SSA. In regards to the impact on labor demand, a country's higher export share to the U.S., China and SSA increases labor demand; while a country's higher export share to the EU-25 has labor demand-reducing effects.

This paper argues that Africa's export structure is one of the main reasons Africa has been able to get a head start out of the recent recession. Africa has not missed the boat, as many predicted, because of a reliance on commodity exports; on the contrary, it has benefited from its export structure, which enabled it to rebound quickly after the crisis. Finally, we suggest that African countries, especially the resource-based economies, need to concentrate on improving productivity in areas where they have a comparative advantage and on moving up the value chain in those commodities.

The remainder of the paper is organized as follows. In section two, we provide a literature overview on the impact of exports and export diversification on growth and employment. In section three, we estimate the effects of exports and export diversification on value added and labor productivity. We also examine whether the effects from exports on labor productivity and value added are influenced by export diversification of products and markets or export destination. Section four focuses on the impact of exports and export diversification on conditional and unconditional labor demand. In the final section, we focus on the policy implications of our results for post-crisis export strategies in SSA.

2. LITERATURE REVIEW

Exports, Export Diversification and Growth

An extensive literature review on the relationship between trade openness and growth since the 1970s can be found in Harrison and Rodríguez-Clare (2009) and covers almost 180 studies. Most empirical papers with a focus on Africa are cross-country or comparative studies. Mbaku (1989) shows for 37 African countries that export growth had a positive impact on economic growth between 1970 and 1981. Fosu (1996), using a cross-section from 1960 to 1970 and from 1970 to 1980, finds for 28 least developed African countries exports enhanced economic growth, but this positive impact is smaller in comparison to other least developed countries. Ukpolo (1994) finds for eight low-income African countries that non-fuel commodity exports had a significantly positive effect on growth between 1969 and 1988. Amoateng and Amoako-Adu (1996) confirm the positive effect of export growth on GDP growth for 35 African countries over the period 1970-1990. Onafowora and Owoye (1998) also find positive effects of exports on growth in 10 out of 12 analyzed SSA countries from 1963 to 1993.

Ahmad and Kwan (1991) reject the hypothesis of export-led growth using a sample of 47 developing African countries over the period 1981-1987 and three measures of exports (total exports, manufacturing exports, and the share of manufacturing exports in total exports). At the country level, Egwaikhide (1992) only finds weak evidence of positive output growth effects of crude oil exports in Nigeria between 1973 to 1978, while Alege (1993) cannot confirm a positive effect of export growth on GDP growth in Nigeria between 1960 and 1985.

Some early empirical studies confirmed the positive effect of export growth on productivity (e.g., Krueger and Tuncer 1982 for Turkey; Nishimizu and Robinson 1984 for semi-industrialized countries). Bernard and Jensen (1995) examined the relationship between exporting and productivity at the firm-level and many studies have followed since. This type of study examines whether exporting increases productivity (learning-by-exporting) or whether more productive firms self-select into exporting. Evidence for learning-by-exporting is generally mixed, and there are only few studies for African countries. In a firm-level panel data approach covering Kenya, Ghana, Zimbabwe and Cameroon from 1991 to 1995, Bigsten et al. (2004) confirm that exporting raises productivity. Biesebroeck (2005) confirms the positive productivity effects of exporting at the firm-level for nine SSA countries between 1992 and 1996.

In addition to export growth, export diversification can be positively associated with economic growth. Diversity in exports can reduce income volatility for countries with large populations living in poverty and reduce vulnerability to sharp declines in the terms-of-trade. Diversification also increases the potential for generating spillovers, whereas reliance on only a few exports generally has greater negative consequences for growth (Lederman and Maloney 2007). However, Lederman and Klinger (2006, p. 5) find that “a country’s export basket becomes more diversified as income rises until a relatively high level, at which point the process reverses itself and specialization occurs.” Naude and Rossouw (2011) confirm this U-shaped relationship for Brazil, China, India and South Africa. As a result, the effect of export diversification on growth depends on a country’s level of economic development.

Dodaro (1991) uses panel data for 41 developing countries and finds that a higher share of manufacturing exports of total exports influences real GDP growth positively. Pineres and Ferrantino (1997, 1999) find a positive relationship between export diversification and economic growth for Chile between 1962 and 1991 and for Columbia between 1967 and 1990. Al-Marhubi (2000) confirms this positive association for a cross-section of 91 countries from 1961 to 1988. Hausmann et al. (2006) find that countries exporting high-productivity goods grow faster than countries exporting lower-productivity goods. Agosin (2007) finds a strong positive impact of export diversification on per capita GDP growth in Latin America and fast-growing Asian economies between 1980 and 2003. Lederman and Maloney (2007) find evidence that export concentration lowers subsequent economic growth. Hesse (2009) confirms that export concentration is detrimental for per capita GDP growth in developing countries over five-year intervals between 1961 and 2000.

Fewer studies have examined the relationship between export diversification and productivity. Weinhold and Rauch (1999) find a positive impact of export concentration on manufacturing labor productivity growth for 39 developing countries between 1960 and 1990, implying that increased specialization accelerates productivity growth. Alcala and Ciccone (2004), focusing on trade openness defined as exports plus imports as percentage of GDP, in a gravity-model setting, also confirm a labor productivity-enhancing effect for 138 countries in 1985.

Our literature review reveals that while some studies have focused on the output growth effects of exports in SSA countries, only a few have focused on productivity effects. Second, there is a lack of studies focusing on export diversification in African economies. Moreover, none of the studies covers the 2000s, a period of increased trade integration. Our contribution is the following: (i) We estimate the effect of exports on value added and labor productivity. (ii) Our data span from 1995 to 2008 and, thus, reflect the increased trade integration of the 2000s. (iii) Besides the effects of exports, we also focus on the effect of export diversification.

Exports, Export Diversification and Labor Demand

Researchers have been interested in the relationship between international trade and employment early on, relying on an input-output, growth accounting or factor content framework. There are fewer econometric studies on export-induced employment effects, especially for developing countries. Using firm-level data for South Africa, Edwards (2004) finds that exporting had a negative effect on labor demand for both skilled and unskilled workers in large manufacturing firms between 1997 and 1998. Manda and Sen (2004) do not find an effect of export intensity on labor demand in Kenyan manufacturing sectors between 1975 and 1998. Other studies find positive effects of exports on employment for non-African developing countries. Jenkins (2004), for example, finds that export intensity increased employment at the sector level in Vietnam from 1995 to 1999, but not employment growth. Fu and Balasubramanyam (2005) confirm positive employment effects from exports using panel data for 29 Chinese provinces between 1987 and 1998.

There is only one study to our knowledge that measures the effect of export diversification on employment. Using an applied general equilibrium model, Naude and Rossouw (2011) measure the effect of export diversification on employment for Brazil, China, India and South Africa from 1962 to 2000. The authors find that export diversification shows a clearly posi-

tive impact on employment only in South Africa, while export concentration had a more beneficial effect on employment in Brazil, China and India. The authors explain this result with the U-shaped relationship between a country's export basket and economic development: Only at early stages of development might it be fruitful to diversify exports.

The literature review above rejects the existence of positive employment effects from exports in African countries. Also, there is a lack of studies measuring the impact of export diversification on employment. Finally, none of these studies covers the 2000s. Our paper makes the following contributions: (i) We estimate the effect of exports on conditional and unconditional labor demand in SSA. (ii) Our data span from 1995 to 2008 and, thus, reflect the increasing trade integration of the 2000s. (iii) Besides the effects of exports, we also focus on the effect of export diversification on employment.

3. THE EFFECT OF EXPORTS AND EXPORT DIVERSIFICATION ON GROWTH

Empirical Model

We postulate the following value added function:

$$(Y\text{-}INP) = VA = F(K, L, T) \quad \frac{\partial F}{\partial x_1} > 0, \ \frac{\partial^2 F}{\partial x_1^2} < 0, \ \frac{\partial^2 F}{\partial x_1 \partial x_2} > 0 \quad \text{with } x_1, x_2 = K, L, T \tag{1}$$

where capital K, labor L and technology T are the input factors, $VA = (Y\text{-}INP)$ designates the value added and is the difference between output Y and intermediate inputs INP. The technology shifter $T = T(EX, TAR)$ is a function of exports EX and tariffs TAR.

Equation (1) in log-linear form yields the following empirical model:

$$\ln VA_{it} = \alpha_0 + \alpha_1 \ln K_{it} + \alpha_2 \ln L_{it} + \beta_1 \ln EX_{it} + \beta_2 \ln TAR_{it} + \delta_i D_i + \delta_t D_t + \varepsilon_{it} \tag{2}$$

where i designates countries, t years, D_i fixed country effects, D_t fixed year effects and ε_{it} the idiosyncratic error term. We hypothesize that capital, labor and exports have a positive impact on value added, while tariffs—as an inverse measure of trade liberalization—should have a negative influence.

Next, we are interested in the effects of export diversification and its interaction with exports on value added:

$$\ln VA_{it} = \alpha_0 + \alpha_1 \ln K_{it} + \alpha_2 \ln L_{it} + \beta_1 \ln EX_{it} + \beta_2 \ln TAR_{it} + \gamma_1 \ln EX_{it} * DIV_{it} + \gamma DIV_{it} + \delta_i D_i + \delta_t D_t + \varepsilon_{it} \tag{3}$$

We use the HHI of market and product concentration as an inverse measure of export diversification. We also include a country's export share to the U.S., the EU-25, China and SSA as a measure of export diversification. In a second step, we formulate equation (2) as a labor productivity (LP) function:

$$\ln (VA/L)_{it} = \alpha_0 + \alpha_1 \ln (K/L)_{it} + \beta_1 \ln EX_{it} + \beta_2 \ln TAR_{it} + \delta_i D_i + \delta_t D_t + \varepsilon_{it} \tag{4}$$

Interacting exports in equation (4) with export diversification yields the following function:

$$\ln (VA/L)_{it} = \alpha_0 + \alpha_1 \ln (K/L)_{it} + \beta_1 \ln EX_{it} + \beta_2 \ln TAR_{it} + \gamma_1 \ln EX_{it} * DIV_{it} + \gamma_2 DIV_{it} + \delta_i D_i + \delta_t D_t + \varepsilon_{it} \tag{5}$$

We hypothesize the same coefficient signs as in equations (2) and (3).

First Indicators

Our empirical analysis covers 30 SSA countries for the period 1995–2008. The choice of countries was based on data availability only. Our sample includes Botswana, Burkina Faso, Cameroon, the Central African Republic, Chad, Comoros, Cote d'Ivoire, Eritrea, Ethiopia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Senegal, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe. For a data description, see Appendix 1.

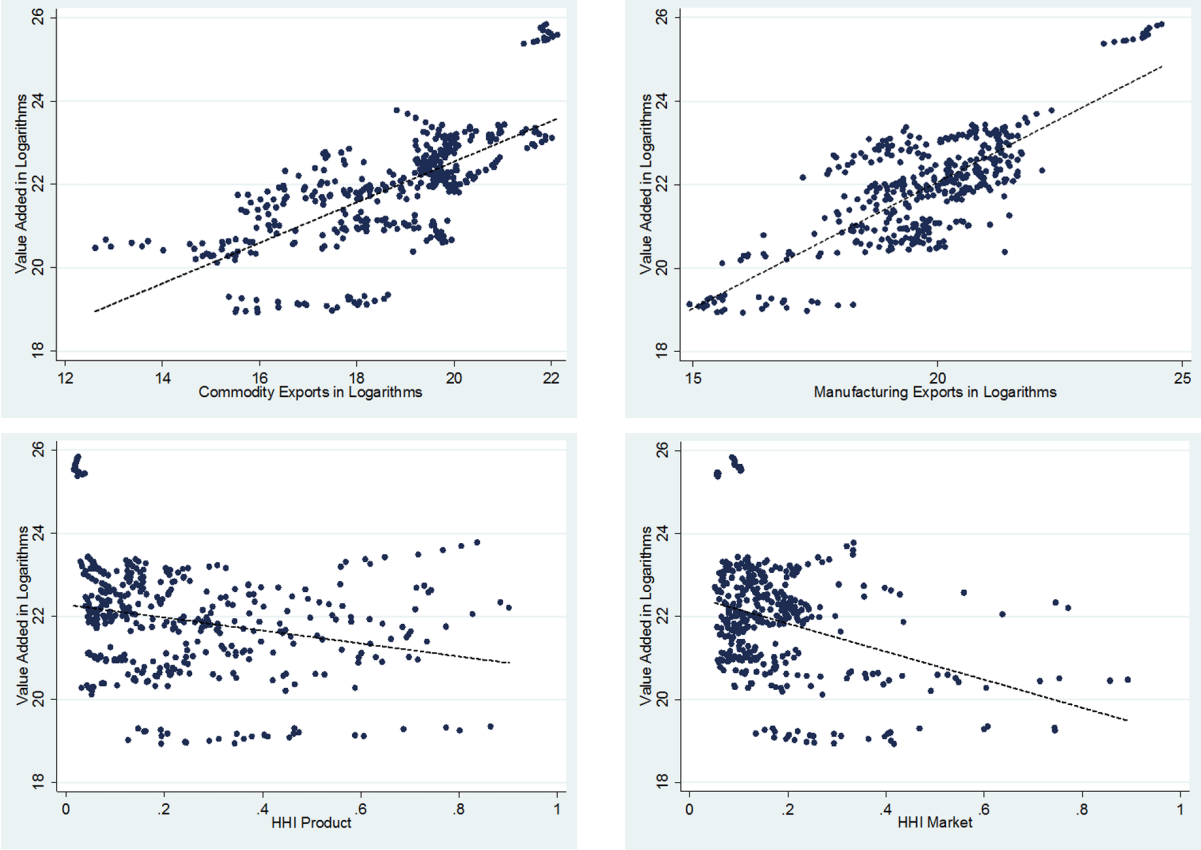
As a first indicator of the relationship between exports and value added, we plot exports and value added in logarithms for our country sample for 1995–2008. Since there might be a differential effect on value added depending on the type of exports, we split the product sample into commodities (Figure 1, upper left) and manufactured exports (Figure 1, upper right). The bivariate regression lines indicate a stronger positive relationship between exports of manufactured goods and value added than for commodity exports. This finding confirms results of Hausman et al. (2006) that growth is more responsive to exports of manufactured goods than it is to exports of commodities. Countries exporting goods with higher value added grow faster. While commodity exports interact positively with value added, the effects are less pronounced.

This result confirms the "law of development," according to which industrialization leads to rapid economic development in emerging markets. The East Asian successes, for instance, relied heavily on the manufacturing sector to achieve rapid economic growth. The East Asian Tigers (Hong Kong SAR, the Republic of Korea, Singapore, and Taiwan), Japan, and the second-generation successes (Indonesia, Malaysia, Thailand and recently China) all have shares of manufacturing value added that exceed the global average (UNIDO 2009).

In a next step, we shift our focus to export diversification. Export diversification can take place in two ways: exporting new products and exporting to new markets. The first involves increasing the number of products exported to international markets. This effort requires discovering new products and moving up the value chain to produce products of higher value and sophistication. Much of the developing countries' focus on diversification efforts in the past has been on the process of discovering new exports. A second component of diversification relates to breaking into new geographical markets, that is, expanding market reach for products that have already proven competitive.

As a first indication, we show the relationship between value added and export diversification of both products (Figure 1, bottom left) and markets (Figure 1, bottom right) for our 30 SSA countries over 1995–2008. We use the HHI of market and product concentration as an inverse measure of export diversification. Export concentration and value added are negatively correlated, or, analogously, export diversification and value added have a positive relationship. The steeper regression line in figure 1 (bottom right) suggests that the effect is stronger for export diversification of markets.

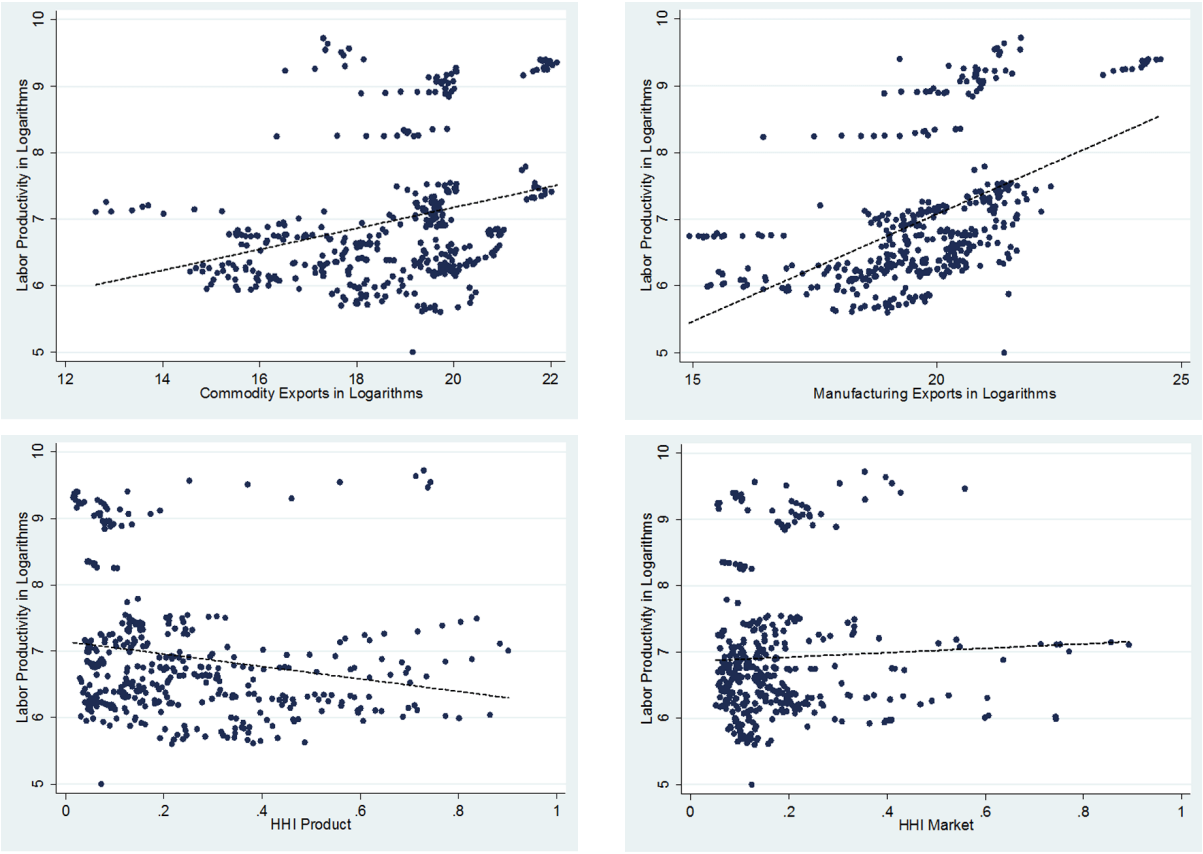
Figure 1: Exports and Export Diversification vs. Value Added, 1995-2008, 30 SSA Countries



Sources: U.N. Comstat, HS 1988/92 and World Bank, World Development Indicators.
NB: Exports are deflated using an export deflator (see data description in Appendix 1).

Figure 2 shows the relationship between export types and labor productivity in the top graphs and export diversification and labor productivity in the lower graphs for 30 SSA countries over the period 1995-2008. The results show a positive relationship between labor productivity and exports, confirming many firm-level studies. The positive relationship between exports and labor productivity is stronger for manufacturing exports (upper right) than commodity exports (upper left). The relationship between export diversification and labor productivity is ambiguous. The scatterplots suggest a positive relationship between export diversification of products and labor productivity (bottom left), which cannot be confirmed for markets.

Figure 2: Exports and Export Diversification vs. Labor Productivity, 1995-2008, 30 SSA Countries



Sources: U.N. Comstat, HS 1988/92 and World Bank, World Development Indicators.
NB: Exports are deflated using an export deflator (see data description in Appendix 1).

Regression Results: Value Added

Table 2 plots the value added regression results using the fixed effects estimator for the 30 SSA countries from 1995 to 2008. The summary statistics can be found in Appendix 2. In order to address the potential endogeneity between exports and value added, we use one-period lags of exports.[4] As hypothesized, capital, labor and exports have a significantly positive effect on value added. We also split exports into three broad product categories: commodities, manufacturing and services. The positive effect of exports can be confirmed for manufacturing and services exports (column 3).

Remarkably, the elasticity of exports is larger than the one of capital, while the labor elasticity is the highest. This reflects the labor-intensive production structure in these SSA countries. Tariffs have no influence on value added. Since we are concerned that the results above could be driven by natural resource-intensive countries, we drop four natural-resource intensive economies (as identified by the International Monetary Fund), namely Cameroon, Chad, Côte d'Ivoire and Zambia, in the next regressions (see Table 3). The results above can be confirmed.

We then focus on the effect of export diversification on value added. We hypothesize that a higher HHI—that is, less export diversification—has a negative effect on value added. The regression results using the full country sample show that both a higher HHI of market and product concentration of exports significantly lower value added (columns 4 and 5 of Table 2), which is in line with our conjecture. The effects are the same when we drop the natural resource-intensive countries (columns 4 and 5 of Table 3).

We also examine the role of export destination on value added. In the full country sample, a larger export share to the U.S. and China significantly increases value added (columns 6 and 8 of Table 2), while the positive effect of China on value added is no longer significant in the reduced country sample (column 8 of Table 3).

Interacting exports with the two measures of export concentration yields a positive coefficient, which is significant in the full and reduced country sample and contrary to our expectations (columns 4 and 5 of Tables 2 and 3). That is, the positive impact of exports on value added is higher the more concentrated exports are in terms of different products and markets.

Interacting exports with a country's export share (columns 6 and 8 of Table 2) results in a negative interaction terms for the U.S. and China in the full country sample. That is, the value added gains from exports decline the more dependent a country is on the U.S. and China. When we drop natural resource-intensive countries, the negative interaction term for China is no longer significant (column 8 of Table 3). This might be because countries that are less natural resource-intensive depend more strongly on the U.S., while natural resource-intensive countries depend more strongly on China as a major export destination. A country's export share to the EU-25 or SSA does not influence the impact of exports on value added in both the full and reduced country sample.

Table 2: Exports, Export Diversification and Value Added, 30 SSA Countries, 1995-2008									
Dependent variable:	**Fixed effects estimator**								
lnVA_t	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
lnK_t	0.0738***	0.0764***	0.0550	0.0672**	0.0627**	0.0632**	0.0789***	0.0690**	0.0745**
	(0.006)	(0.009)	(0.106)	(0.017)	(0.030)	(0.048)	(0.005)	(0.041)	(0.016)
lnL_t	0.3289**	0.3315**	0.3349**	0.3119***	0.3973***	0.3153**	0.3469***	0.3545**	0.4473***
	(0.019)	(0.011)	(0.025)	(0.006)	(0.002)	(0.011)	(0.009)	(0.011)	(0.001)
lnEX_{t-1}	0.1647***	0.1681***		0.1542***	0.1468***	0.1816***	0.1544***	0.1928***	0.1733***
	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lnEX_comm_{t-1}			-0.0028						
			(0.854)						
lnEX_mfg_{t-1}			0.0578***						
			(0.000)						
lnEX_serv_{t-1}			0.0597***						
			(0.000)						
ln$TARIFF_t$		-0.0020	0.0053	-0.0106	-0.0072	-0.0019	0.0060	0.0013	-0.0134
		(0.940)	(0.858)	(0.684)	(0.777)	(0.944)	(0.828)	(0.963)	(0.598)
HHI_PROD_{t-1}				-1.9707**					
				(0.016)					
lnEX_{t-1} *HHI_PROD_{t-1}				0.0932**					
				(0.018)					
HHI_MKT_{t-1}					-3.1838***				
					(0.005)				
lnEX_{t-1}*HHI_MKT_{t-1}					0.1630***				
					(0.004)				
$EXshare\_US_t$						3.1605**			
						(0.047)			
lnEX_{t-1}*$EXshare\_US_t$						-0.1509*			
						(0.054)			
$EXshare\_EU25_t$							-0.6664		
							(0.553)		
lnEX_{t-1}*$EXshare\_EU25_t$							0.0395		
							(0.463)		
$EXshare\_CHN_t$								2.4725*	
								(0.054)	
lnEX_{t-1}*$EXshare\_CHN_t$								-0.1215*	
								(0.058)	
$EXshare\_SSA_t$									-0.4514
									(0.630)
lnEX_{t-1}*$EXshare\_SSA_t$									0.0182
									(0.693)
Fixed country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (within)	0.80	0.80	0.77	0.81	0.81	0.80	0.80	0.80	0.80
Observations	381	368	346	364	365	368	368	356	357

*Source: Own calculations, *p<0.1, **p<0.05, ***p<0.01 (p-values in parentheses).*

Table 3: Exports, Export Diversification and Value Added, 26 SSA Countries, 1995-2008									
Dependent variable:	**Fixed effects estimator**								
lnVA_t	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
lnK_t	0.0581**	0.0603**	0.0381	0.0543*	0.0445	0.0444	0.0570**	0.0464	0.0562*
	(0.033)	(0.041)	(0.263)	(0.052)	(0.122)	(0.158)	(0.036)	(0.169)	(0.078)
lnL_t	0.2235*	0.2229*	0.1851	0.2120**	0.2852**	0.3065**	0.2450**	0.2488*	0.3368***
	(0.089)	(0.067)	(0.140)	(0.046)	(0.015)	(0.010)	(0.035)	(0.060)	(0.007)
lnEX_{t-1}	0.1627***	0.1661***		0.1632***	0.1458***	0.1860***	0.1550***	0.1912***	0.1730***
	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lnEX_comm_{t-1}			0.0158						
			(0.344)						
lnEX_mfg_{t-1}			0.0542***						
			(0.000)						
lnEX_serv_{t-1}			0.0675***						
			(0.000)						
ln$TARIFF_t$		-0.0000	0.0109	-0.0087	-0.0054	0.0063	0.0137	0.0014	-0.0085
		(0.999)	(0.705)	(0.733)	(0.826)	(0.802)	(0.607)	(0.959)	(0.725)
HHI_PROD_{t-1}				-1.7485**					
				(0.029)					
lnEX_{t-1} *HHI_PROD_{t-1}				0.0816**					
				(0.035)					
HHI_MKT_{t-1}					-3.1355***				
					(0.009)				
lnEX_{t-1}*HHI_MKT_{t-1}					0.1597***				
					(0.008)				
$EXshare\_US_t$						3.3200***			
						(0.008)			
lnEX_{t-1}*$EXshare\_US_t$						-0.1802***			
						(0.003)			
$EXshare\_EU25_t$							0.0981		
							(0.917)		
lnEX_{t-1}*$EXshare\_EU25_t$							0.0062		
							(0.892)		
$EXshare\_CHN_t$								1.6229	
								(0.182)	
lnEX_{t-1}*$EXshare\_CHN_t$								-0.0799	
								(0.188)	
$EXshare\_SSA_t$									-0.7768
									(0.453)
lnEX_{t-1}*$EXshare\_SSA_t$									0.0376
									(0.468)
Fixed country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (within)	0.80	0.80	0.79	0.81	0.81	0.82	0.81	0.80	0.80
Observations	332	319	297	315	316	319	319	307	308

*Source: Own calculations, *p<0.1, **p<0.05, ***p<0.01 (p-values in parentheses).*
NB: We exclude the following four natural resource-intensive economies: Cameroon, Chad, Côte d'Ivoire and Zambia.

Regression Results: Labor Productivity

In a second step, we formulate the value added equation as a labor productivity function. Labor productivity, defined as value added per worker, depends on capital intensity and the technology shifter i.e., exports and tariffs. Our study differs from studies that measure the effect on per capita GDP in a new growth theory model, which include exports among other control variables such as the initial per capita GDP, human capital, population growth, terms-of-trade and investment ratio (see e.g., Greenaway, Morgan and Wright 1999). We hypothesize the same coefficient signs as the value added regressions. Again, we use one-period lags of exports to account for the potential endogeneity problem between exports and labor productivity.[5] The labor productivity regression results are plotted in Table 4. The summary statistics can be found in Appendix 2.

Capital intensity and exports show a significantly positive effect on labor productivity, while tariffs have a significantly negative impact, which is line with our conjecture. This positive effect of exports can be confirmed at the broad product level for manufacturing and services exports (column 3 of Table 4). Interestingly, the export elasticity is higher than the one of capital intensity, i.e., a 1 percent increase of exports results in larger productivity gains than a 1 percent increase in capital intensity. This reveals the potential of exports to increase the region's competiveness and growth. The results become more significant when we drop the four natural-resource intensive countries (see Table 5).

Next, we show the effects of export diversification on labor productivity (columns 4 and 5 of Table 4). Export diversification of products and markets both increase labor productivity. When we drop natural resource-intensive countries from the sample, these results can be confirmed for export diversification markets only (column 5 of Table 5).

We also examine the role of export destination on labor productivity. In the full country sample, only a larger export share to the U.S. significantly increases labor productivity, which holds for both the full and reduced country sample (column 6 of Tables 4 and 5).

Interacting the HHI with exports, a higher product concentration of exports significantly increases the positive productivity effects from exports. Analogously, a higher market concentration of exports significantly increases the positive productivity effects from exports (columns 4 and 5 of Table 4). These findings also hold for market concentration of exports when natural resource-intensive countries are excluded (column 5 of Table 5).

Finally, we interact export market shares with exports which results in a significantly negative interaction term for the U.S. only in both the full and reduced country sample (column 6 of Tables 4 and 5). That is, the productivity gains from exports decline the more dependent a country is on the U.S. Higher export shares to the EU-25, China or SSA do not influence the effect of exports on productivity in both the full and the reduced country sample.

To sum up, the results show that exports significantly increase value added and labor productivity. The export elasticity is larger than the elasticity of capital in the value added regressions, and it is larger than the elasticity of capital intensity in the labor productivity regressions. This finding reveals the potential of exports for increasing the region's competiveness and growth.

Moreover, the results show that greater diversification of export products and markets has a positive impact on value added and labor productivity. Finally, a larger export share to the U.S. increases value added and productivity in the full and reduced country sample,

while a larger export share to China increases value added only in the full country sample.

Surprisingly, the positive value added and labor productivity effects from exports are larger the more concentrated the export markets are in our sample countries. Moreover, the value added and productivity gains from exports are lower the more dependent a country is on the U.S.

Table 4: Exports, Export Diversification and Labor Productivity, 30 SSA Countries, 1995-2008

Dependent variable:	**Fixed effects estimator**								
ln*(VA/L)$_t$*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ln*(K/L)$_t$*	0.1058***	0.1095***	0.0929***	0.1037***	0.0884***	0.0974***	0.1096***	0.0969***	0.1001***
	(0.000)	(0.000)	(0.005)	(0.000)	(0.003)	(0.002)	(0.000)	(0.004)	(0.001)
ln*EX$_{t-1}$*	0.1629***	0.1690***		0.1585***	0.1464***	0.1843***	0.1587***	0.1890***	0.1718***
	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln*EX_comm$_{t-1}$*			0.0034						
			(0.813)						
ln*EX_mfg$_{t-1}$*			0.0615***						
			(0.000)						
ln*EX_serv$_{t-1}$*			0.0535***						
			(0.000)						
ln*TARIFF$_t$*		-0.0323	-0.0283	-0.0418	-0.0345	-0.0315	-0.0222	-0.0322	-0.0370
		(0.238)	(0.350)	(0.120)	(0.190)	(0.246)	(0.434)	(0.271)	(0.157)
HHI_PROD$_{t-1}$				-1.4751*					
				(0.074)					
ln*EX$_{t-1}$ *HHI_PROD$_{t-1}$*				0.0703*					
				(0.079)					
HHI_MKT$_{t-1}$					-3.2863***				
					(0.004)				
ln*EX $_{t-1}$*HHI_MKT$_{t-1}$*					0.1694***				
					(0.003)				
EXshare_US$_t$						2.8718*			
						(0.050)			
ln*EX$_{t-1}$*EXshare_US$_t$*						-0.1419*			
						(0.052)			
EXshare_EU25$_t$							-0.3993		
							(0.670)		
ln*EX$_{t-1}$*EXshare_EU25$_t$*							0.0274		
							(0.544)		
EXshare_CHN$_t$								1.6761	
								(0.193)	
ln*EX$_{t-1}$*EXshare_CHN$_t$*								-0.0812	
								(0.206)	
EXshare_SSA$_t$									-1.0472
									(0.263)
ln*EX$_{t-1}$*EXshare_SSA$_t$*									0.0468
									(0.310)
Fixed country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (within)	0.48	0.48	0.43	0.51	0.52	0.49	0.50	0.50	0.51
Observations	381	368	346	364	365	368	368	356	357

*Source: Own calculations, *p<0.1, **p<0.05, ***p<0.01 (p-values in parentheses).*

Table 5: Exports, Export Diversification and Labor Productivity, 26 SSA Countries, 1995-2008									
Dependent variable:	**Fixed effects estimator**								
ln$(VA/L)_t$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ln$(K/L)_t$	0.1013***	0.1046***	0.0919***	0.1012***	0.0801***	0.0832***	0.0986***	0.0862**	0.0924***
	(0.000)	(0.000)	(0.006)	(0.001)	(0.007)	(0.006)	(0.001)	(0.010)	(0.003)
lnEX_{t-1}	0.1612***	0.1686***		0.1670***	0.1469***	0.1881***	0.1608***	0.1889***	0.1720***
	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lnEX_comm_{t-1}			0.0217						
			(0.157)						
lnEX_mfg_{t-1}			0.0593***						
			(0.000)						
lnEX_serv_{t-1}			0.0591***						
			(0.000)						
ln$TARIFF_t$		-0.0361	-0.0311	-0.0449*	-0.0389	-0.0238	-0.0209	-0.0384	-0.0378
		(0.177)	(0.297)	(0.087)	(0.127)	(0.358)	(0.456)	(0.174)	(0.134)
HHI_PROD_{t-1}				-1.2314					
				(0.135)					
lnEX_{t-1} *HHI_PROD_{t-1}				0.0578					
				(0.149)					
HHI_MKT_{t-1}					-3.2212***				
					(0.009)				
lnEX_{t-1}*HHI_MKT_{t-1}					0.1655***				
					(0.007)				
$EXshare\_US_t$						3.0826***			
						(0.007)			
lnEX_{t-1}*$EXshare\_US_t$						-0.1736***			
						(0.002)			
$EXshare\_EU25_t$							0.3507		
							(0.647)		
lnEX_{t-1}*$EXshare\_EU25_t$							-0.0057		
							(0.880)		
$EXshare\_CHN_t$								0.9655	
								(0.427)	
lnEX_{t-1}*$EXshare\_CHN_t$								-0.0461	
								(0.448)	
$EXshare\_SSA_t$									-1.5997
									(0.105)
lnEX_{t-1}*$EXshare\_SSA_t$									0.0773
									(0.117)
Fixed country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (within)	0.45	0.46	0.44	0.49	0.50	0.52	0.50	0.49	0.50
Observations	332	319	297	315	316	319	319	307	308

*Source: Own calculations,*p<0.1, **p<0.05, ***p<0.01 (p-values in parentheses).*
NB: We exclude the following four natural resources-intensive economies: Cameroon, Chad, Côte d'Ivoire and Zambia.

4. THE EFFECT OF EXPORTS AND EXPORT DIVERSIFICATION ON LABOR DEMAND

Empirical Model

A firm's linearly homogeneous cost function, conditional on the level of output Y is described as follows:

$$C = C(Y, w, r, p^{INP}, T) \quad \frac{\partial C}{\partial c_1} > 0, \quad \frac{\partial C}{\partial c_1 \partial c_2} > 0 \quad \text{with } c_1, c_2, = w, r, p^{INP}, T \tag{6}$$

where Y designates the constant output, w wages, r the rental rate on capital, and p^{INP} the prices for intermediate inputs. Following Feenstra and Hanson (2003), any structural variables that shift the production function and thus affect costs can be included into the cost function. We therefore include the technology shifter $T = T\ (EX, TAR)$ to equation (6), which is a function of exports EX and tariffs TAR.

Using Shephard's Lemma, the conditional labor demand function L is derived as follows:[6]

$$L = T^* L^d(Y, w, r, p^{INP}, T) \tag{7}$$

The conditional labor demand function in equation (7) can be written in log-linear form as:

$$\ln L_{it} = \alpha_0 + \eta_Y \ln Y_{it} + \eta_L \ln w_{it} + \eta_K \ln r_{it} + \eta_{INP} p_{it}^{INP} + \beta_1 \ln EX_{it} + \beta_2 \ln TAR_{it} + \delta_i D_i + \delta_t D_t + \varepsilon_{it} \tag{8}$$

Besides wages and prices of intermediate inputs, the rental rate on capital needs to be operationalized as follows. Following Amiti and Wei (2005), the rental rate on capital r is expected to be the same for all companies and a function of time $r=f(t)$. Not directly included in the estimation model, r will be captured by adding fixed-year dummies.

We expect higher output to have a positive effect on labor demand ($\eta_Y > 0$), while an increase in wages will lower labor demand ($\eta_w < 0$). An increase in intermediate input prices might have a positive ($\eta_{INP} > 0$) or negative ($\eta_{INP} < 0$) effect on labor demand, depending on whether intermediate inputs are substitutes or complements for labor. We also expect increasing tariffs to have a positive impact on labor demand, as higher tariffs render imports more expensive ($\beta_2 > 0$). Countries will have an incentive to produce more goods at home instead of importing them.

Exports can have at least three effects on labor demand: (i) Export products are expected to be more sophisticated than domestic products. That is, for a given level of output being produced, a bigger share of export products requires more labor because of the higher sophistication of exports, which we call the positive sophistication effect ($\beta_1 > 0$). (ii) Exports are expected to increase labor productivity through learning-by-exporting, thus, reducing the amount of labor for every unit of output produced, which we call the negative productivity effect ($\beta_1 < 0$). (iii) Finally, if exporters share their productivity gains from exporting with consumers by lowering their export prices, this might

lead to increasing foreign demand for exports, which we call positive scale effect ($\beta_1 > 0$). The net effect is ambiguous depending on the relative importance of these three effects.

The conditional labor demand function in equation (8) only considers the productivity and substitution effect. Scale effects are taken into account, when the output price P is substituted for the quantity of output Y (Amiti and Wei 2006). Allowing for scale effects, the unconditional labor demand equation is described as follows:

$$\ln L_{it} = \alpha_0 + \eta_Y \ln P_{it} + \eta_L \ln w_{it} + \eta_K \ln r_{it} + \eta_{INP} p_{it}^{INP} + \beta_1 \ln EX_{it} + \beta_2 \ln TAR_{it} + \delta_i D_i + \delta_t D_t + \varepsilon_{it} \quad (9)$$

Next, we are interested in the effects of export diversification and its interaction with exports on labor demand. The conditional labor demand function in equation (8) now becomes:

$$\ln L_{it} = \alpha_0 + \eta_Y \ln Y_{it} + \eta_L \ln w_{it} + \eta_K \ln r_{it} + \eta_{INP} p_{it}^{INP} + \beta_1 \ln EX_{it} + \beta_2 \ln TAR_{it} + \gamma_1 \ln EX_{it} DIV_{it} + \gamma_2 DIV_{it} + \delta_i D_i + \delta_t D_t + \varepsilon_{it} \quad (10)$$

The unconditional labor demand function in equation (9) turns into:

$$\ln L_{it} = \alpha_0 + \eta_Y \ln P_{it} + \eta_L \ln w_{it} + \eta_K \ln r_{it} + \eta_{INP} p_{it}^{INP} + \beta_1 \ln EX_{it} + \beta_2 \ln TAR_{it} + \gamma_1 \ln EX_{it} DIV_{it} + \gamma_2 DIV_{it} + \delta_i D_i + \delta_t D_t + \varepsilon_{it} \quad (11)$$

First Indicators

Figure 3 shows the relationship between exports, export diversification and employment for 30 SSA countries over the period 1995-2008. The bivariate regression lines in the top graphs suggest a positive correlation between commodity and manufacturing exports and employment. Interestingly, the positive effect seems to be at least as strong for commodity products as for manufacturing exports. One explanation would be that indirect linkage effects on employment are larger for commodity than manufacturing export sectors. Studies have found that a strong commodity export sector in developing countries can spread over to other sectors (e.g., Boame 1998, for Ghana). Growing commodity exports increase labor demand in other sectors (i) to build infrastructure e.g., roads, electricity, water supply or capital goods (backward linkages); (ii) to further process the exporting sector's output (forward linkage); and (iii) to produce inputs for the exporting sector including consumer goods, intermediates and services (final demand linkage).

The bottom part of Figure 3 shows the relationship between export diversification and employment. While both export diversification of products and markets seem to have a positive correlation with employment, this positive effect appears to be much more pronounced for market diversification. That is, exporting to different markets seems to matter more for labor demand than exporting different types of products.

Regression Results: Conditional Labor Demand

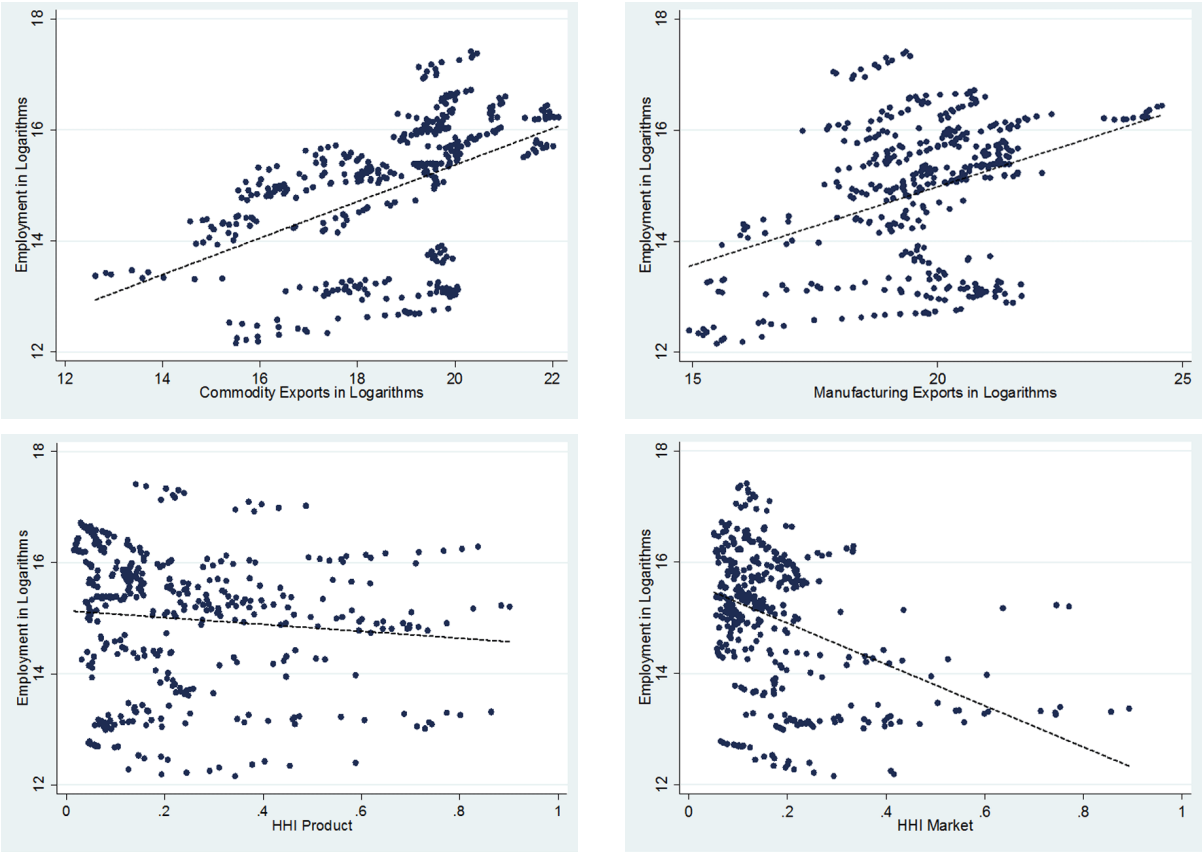
Table 6 reports the conditional labor demand regressions as specified in equations (8) and (10) for all 30 SSA countries covering the period 1995-2008. The summary statistics can be found in Appendix 2. As expected, output has a positive impact on conditional labor demand. Wages and intermediate input prices show a negative influence on conditional labor demand, which is stronger and more significant for wages. Exports have a positive effect on conditional labor demand, which is significant in most specifications. As hypothesized, increasing tariffs have a positive impact on labor demand, as higher tariffs tax imports and encourage domestic production. This positive effect of exports cannot be confirmed at the broad product level (column 3 of Table 6).

To test whether these results are driven by resource-intensive countries, Table 7 shows the results for the conditional labor demand regressions for our reduced country sample. While the results for output, wages, intermediate input prices and tariffs can be confirmed, we only find a positive effect of exports on conditional labor demand in one specification (column 8 of Table 7). That is, natural resource-intensive countries seem to have driven the results of Table 6. However, the coefficients are all positive and similar in terms of coefficient size.

Export diversification of products and markets do not affect conditional demand in the full country sample (columns 4 and 5 of Table 6), while a higher export concentration of markets has a significantly positive effect on conditional labor demand in the reduced country sample (column 5 of Table 7).

Next, we focus on the role of export destination for conditional labor demand. A higher export share to the U.S., China and SSA significantly increases conditional labor demand, while a higher export share to the EU-25 significantly lowers it in the full country sample (columns 6 to 9 of Table 6). The results are the same in the reduced country sample (columns 6 to 9 of Table 7) except for the export share to the U.S., which no longer shows a significant impact.

Figure 3: Exports and Export Diversification vs. Employment, 1995-2008, 30 SSA Countries



Sources: U.N. Comstat, HS 1988/92 and World Bank, World Development Indicators.
NB: Exports are deflated using an export deflator (see data description in Appendix 1).

We then focus on the interaction effects of export diversification with exports. The employment gains from exports are not influenced by a higher export diversification of products and markets in the full country sample (columns 4 and 5 of Table 6), whereas a higher export diversification of markets significantly increases the gains from exports in the reduced country sample (column 5 of Table 7).

Finally, we interact exports with export shares (columns 6 to 9 of Table 6). We find that the positive effects of exports on conditional labor demand are lower the higher the export share to China and SSA, while a higher export share to the EU-25 increases the positive employment effects from exports. A higher export share to the U.S. has no influence on the export-employment nexus. This holds for both the full and reduced country sample.

We sum up that exports increase conditional labor demand in the full country sample suggesting that the positive sophistication effect is stronger than the nega-

tive productivity effect. Such an effect cannot be confirmed when natural resource-intensive countries are excluded, indicating that counterbalancing negative productivity effects might be stronger in countries that are less reliant on natural resources. Note that scale effects have not been taken into account yet.

Table 6: Exports, Export Diversification and Conditional Labor Demand, 30 SSA Countries, 1995-2008

Dependent variable:	**Fixed effects estimator**								
lnL_t	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
lnY_t	0.0970***	0.0728***	0.0942***	0.0681***	0.0806***	0.0604**	0.0797***	0.0788***	0.0904***
	(0.001)	(0.002)	(0.000)	(0.007)	(0.001)	(0.010)	(0.001)	(0.000)	(0.000)
lnw_t	-0.0809***	-0.0842***	-0.0699***	-0.0800***	-0.0794***	-0.0795***	-0.0837***	-0.0736***	-0.0780***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
p_t^{INP}	-0.0009**	-0.0011**	-0.0009	-0.0011**	-0.0010*	-0.0009*	-0.0009*	-0.0008	-0.0010*
	(0.033)	(0.047)	(0.107)	(0.048)	(0.052)	(0.072)	(0.092)	(0.105)	(0.053)
lnEX_{t-1}	0.0244**	0.0260**		0.0242*	0.0251*	0.0197	0.0111	0.0298***	0.0229**
	(0.027)	(0.013)		(0.066)	(0.056)	(0.134)	(0.330)	(0.004)	(0.024)
lnEX_comm_{t-1}			-0.0013						
			(0.823)						
lnEX_mfg_{t-1}			0.0005						
			(0.912)						
lnEX_serv_{t-1}			0.0057						
			(0.286)						
ln$TARIFF_t$		0.0529***	0.0538***	0.0537***	0.0518***	0.0517***	0.0507***	0.0615***	0.0494***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
HHI_PROD_{t-1}				-0.1832					
				(0.526)					
lnEX_{t-1}*HHI_PROD_{t-1}				0.0078					
				(0.580)					
HHI_MKT_{t-1}					0.3320				
					(0.444)				
lnEX_{t-1}*HHI_MKT_{t-1}					-0.0168				
					(0.431)				
$EXshare\_US_t$						0.7787*			
						(0.066)			
lnEX_{t-1}*$EXshare\_US_t$						-0.0318			
						(0.112)			
$EXshare\_EU25_t$							-0.8511***		
							(0.006)		
lnEX_{t-1}*$EXshare\_EU25_t$							0.0397***		
							(0.008)		
$EXshare\_CHN_t$								1.8707***	
								(0.003)	
lnEX_{t-1}*$EXshare\_CHN_t$								-0.0957***	
								(0.002)	
$EXshare\_SSA_t$									1.2612***
									(0.002)
lnEX_{t-1}*$EXshare\_SSA_t$									-0.0622***
									(0.001)
Fixed country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (within)	0.86	0.88	0.88	0.88	0.88	0.89	0.88	0.88	0.88
Observations	377	364	342	360	361	364	364	352	353

*Source: Own calculations, *p<0.1, **p<0.05, ***p<0.01 (p-values in parentheses).*

Table 7: Exports, Export Diversification and Conditional Labor Demand, 26 SSA Countries, 1995-2008									
Dependent variable:	**Fixed effects estimator**								
lnL_t	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
lnY_t	0.0984**	0.0782***	0.0894***	0.0743**	0.0961***	0.0981***	0.1002***	0.0831***	0.0983***
	(0.015)	(0.007)	(0.004)	(0.022)	(0.001)	(0.001)	(0.002)	(0.002)	(0.000)
lnw_t	-0.0856***	-0.0903***	-0.0759***	-0.0871***	-0.0849***	-0.0913***	-0.0925***	-0.0805***	-0.0839***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
p_t^{INP}	-0.0020***	-0.0027***	-0.0024***	-0.0029***	-0.0024***	-0.0026***	-0.0025***	-0.0023***	-0.0025***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lnEX_{t-1}	0.0234	0.0236		0.0260	0.0249	0.0229	0.0109	0.0294*	0.0190
	(0.141)	(0.118)		(0.113)	(0.138)	(0.150)	(0.491)	(0.080)	(0.209)
lnEX_comm_{t-1}			-0.0041						
			(0.517)						
lnEX_mfg_{t-1}			-0.0021						
			(0.622)						
lnEX_serv_{t-1}			0.0058						
			(0.320)						
ln$TARIFF_t$		0.0546***	0.0563***	0.0554***	0.0536***	0.0499***	0.0514***	0.0625***	0.0513***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
HHI_PROD_{t-1}				-0.1649					
				(0.631)					
lnEX_{t-1}*HHI_PROD_{t-1}				0.0065					
				(0.697)					
HHI_MKT_{t-1}					1.0200**				
					(0.033)				
lnEX_{t-1}*HHI_MKT_{t-1}					-0.0528**				
					(0.027)				
$EXshare\_US_t$						0.6499			
						(0.332)			
lnEX_{t-1}*$EXshare\_US_t$						-0.0228			
						(0.488)			
$EXshare\_EU25_t$							-0.8372**		
							(0.012)		
lnEX_{t-1}*$EXshare\_EU25_t$							0.0390**		
							(0.016)		
$EXshare\_CHN_t$								1.6907**	
								(0.010)	
lnEX_{t-1}*$EXshare\_CHN_t$								-0.0867***	
								(0.007)	
$EXshare\_SSA_t$									1.1660***
									(0.010)
lnEX_{t-1}*$EXshare\_SSA_t$									-0.0576**
									(0.010)
Fixed country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (within)	0.84	0.86	0.86	0.87	0.86	0.87	0.87	0.86	0.87
Observations	325	312	290	308	309	312	312	300	301

*Source: Own calculations, *p<0.1, **p<0.05, ***p<0.01 (p-values in parentheses).*
NB: We exclude the following four natural resources-intensive economies: Cameroon, Chad, Côte d'Ivoire and Zambia.

Regression Results: Unconditional Labor Demand

In this section, we focus on the effect of exports on unconditional labor demand allowing for scale effects. Table 8 reports the results for the whole 30-country sample. These results confirm the negative effect of wages and intermediate input prices and the positive effect of tariffs on unconditional labor demand. Exports increase unconditional labor demand, which is significant across all specifications and shows slightly larger coefficients compared to the conditional labor demand regressions. Again, the positive effect of exports cannot be confirmed at the broad product category level (column 3 of Table 8). These results also hold for the reduced country sample (Table 9).

Export diversification of products and markets has no impact on unconditional labor demand in the full and reduced country sample (columns 4 and 5 of tables 8 and 9). As in the conditional labor demand regressions, a higher export share to the U.S., China and SSA significantly increases labor demand, while a higher export share to the EU-25 significantly lowers it in the full country sample (columns 6 to 9 of Table 8). The results are the same in the reduced country sample (columns 6 to 9 of Table 9) except for the export share to the U.S., which no longer shows a significant impact.

The interaction of exports with export diversification of products and markets is insignificant in the full and reduced country sample (columns 4 and 5 of Tables 8 and 9). In the full sample, the interaction terms of exports with export share to the U.S., China and SSA are negative, indicating that the employment gains from exports are lowered, while the gains from exports increase with a higher export share to the EU-25. These results also hold for the reduced country sample, except for the export share to the U.S., which is no longer significant (columns 6 to 9 of Table 9).

We sum up that exports have a positive effect on unconditional labor demand in both the full and the reduced country sample. This result suggests that positive scale and sophistication effects are stronger than negative productivity effects. The positive effect of exports on conditional labor demand can only be confirmed when natural resource-intensive countries are included in the model, implying that counterbalancing negative productivity effects might be stronger in countries that are less reliant on natural resources.

Table 8: Exports, Export Diversification and Unconditional Labor Demand, 30 SSA Countries, 1995-2008									
Dependent variable:	**Fixed effects estimator**								
lnL_t	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
lnP_t	0.0133	0.0030	0.0073	0.0053	0.0040	-0.0010	0.0008	0.0021	-0.0017
	(0.152)	(0.722)	(0.419)	(0.552)	(0.645)	(0.898)	(0.926)	(0.797)	(0.835)
lnw_t	-0.0755***	-0.0794***	-0.0626***	-0.0744***	-0.0732***	-0.0751***	-0.0785***	-0.0685***	-0.0721***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
p_t^{INP}	-0.0007***	-0.0009**	-0.0007*	-0.0011**	-0.0009**	-0.0007*	-0.0007*	-0.0007*	-0.0008**
	(0.003)	(0.019)	(0.060)	(0.019)	(0.025)	(0.056)	(0.056)	(0.075)	(0.028)
lnEX_{t-1}	0.0349***	0.0344***		0.0289**	0.0312**	0.0270**	0.0214*	0.0399***	0.0345***
	(0.000)	(0.000)		(0.021)	(0.016)	(0.030)	(0.052)	(0.000)	(0.000)
lnEX_comm_{t-1}			-0.0032						
			(0.579)						
lnEX_mfg_{t-1}			0.0063						
			(0.136)						
lnEX_serv_{t-1}			0.0086						
			(0.136)						
ln$TARIFF_t$		0.0560***	0.0570***	0.0555***	0.0549***	0.0547***	0.0548***	0.0647***	0.0539***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
HHI_PROD_{t-1}				-0.3903					
				(0.115)					
lnEX_{t-1}*HHI_PROD_{t-1}				0.0174					
				(0.154)					
HHI_MKT_{t-1}					0.0658				
					(0.864)				
lnEX_{t-1}*HHI_MKT_{t-1}					-0.0036				
					(0.850)				
$EXshare\_US_t$						0.8665**			
						(0.045)			
lnEX_{t-1}*$EXshare\_US_t$						-0.0356*			
						(0.082)			
$EXshare\_EU25_t$							-0.8297**		
							(0.032)		
lnEX_{t-1}*$EXshare\_EU25_t$							0.0390**		
							(0.037)		
$EXshare\_CHN_t$								2.0213***	
								(0.003)	
lnEX_{t-1}*$EXshare\_CHN_t$								-0.1027***	
								(0.002)	
$EXshare\_SSA_t$									1.1905***
									(0.005)
lnEX_{t-1}*$EXshare\_SSA_t$									-0.0589***
									(0.005)
Fixed country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (within)	0.86	0.88	0.87	0.88	0.87	0.88	0.88	0.88	0.88
Observations	377	364	342	360	361	364	364	352	353

*Source: Own calculations. *p<0.1, **p<0.05, ***p<0.01 (p-values in parentheses).*

Table 9: Exports, Export Diversification and Unconditional Labor Demand, 26 SSA Countries, 1995-2008									
Dependent variable:	**Fixed effects estimator**								
lnL_t	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
lnP_t	0.0130	(0.0013)	(0.0020)	0.0014	-0.0007	-0.0035	-0.0027	-0.0012	-0.0059
	(0.213)	(0.879)	(0.818)	(0.881)	(0.934)	(0.678)	(0.748)	(0.890)	(0.484)
lnw_t	-0.0771***	-0.0820***	-0.0646***	-0.0795***	-0.0741***	-0.0823***	-0.0820***	-0.0716***	-0.0734***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
p_t^{INP}	(0.001)	-0.0020***	-0.0016***	-0.0023***	-0.0016***	-0.0018***	-0.0017***	-0.0016***	-0.0017***
	(0.120)	(0.000)	(0.003)	(0.000)	(0.006)	(0.003)	(0.005)	(0.009)	(0.004)
lnEX_{t-1}	0.0335**	0.0314**		0.0330**	0.0309*	0.0346**	0.0205	0.0389**	0.0297**
	(0.020)	(0.028)		(0.033)	(0.062)	(0.022)	(0.177)	(0.018)	(0.044)
lnEX_comm_{t-1}			-0.0030						
			(0.637)						
lnEX_mfg_{t-1}			0.0008						
			(0.860)						
lnEX_serv_{t-1}			0.0100						
			(0.120)						
ln$TARIFF_t$		0.0579***	0.0604***	0.0574***	0.0573***	0.0551***	0.0571***	0.0558***	0.0658***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
HHI_PROD_{t-1}				-0.3467					
				(0.249)					
lnEX_{t-1}*HHI_PROD_{t-1}				0.0150					
				(0.308)					
HHI_MKT_{t-1}					0.6299				
					(0.165)				
lnEX_{t-1}*HHI_MKT_{t-1}					-0.0330				
					(0.148)				
$EXshare\_US_t$						0.8042			
						(0.248)			
lnEX_{t-1}*$EXshare\_US_t$						-0.0317			
						(0.352)			
$EXshare\_EU25_t$							-0.7816**		
							(0.049)		
lnEX_{t-1}*$EXshare\_EU25_t$							0.0374**		
							(0.050)		
$EXshare\_CHN_t$								1.8045**	
								(0.010)	
lnEX_{t-1}*$EXshare\_CHN_t$								-0.0921***	
								(0.007)	
$EXshare\_SSA_t$									1.1623**
									(0.016)
lnEX_{t-1}*$EXshare\_SSA_t$									-0.0576**
									(0.017)
Fixed country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (within)	0.84	0.86	0.86	0.87	0.86	0.87	0.87	0.86	0.86
Observations	325	312	290	308	309	312	312	300	301

*Source: Own calculations. *p<0.1, **p<0.05, ***p<0.01 (p-values in parentheses).*
NB: We exclude the following four natural resources-intensive economies: Cameroon, Chad, Côte d'Ivoire and Zambia.

5. POLICY IMPLICATIONS FOR POST-CRISIS EXPORT STRATEGIES

In 2008, the world economy was plunged into a deep and prolonged crisis—the worst recession since the Great Depression. Global GDP contracted for the first time on record. Africa's hard-won gains came under threat from the crisis. Growth in SSA plunged from a 6.5 percent average between 2000 and 2007 to 1.6 percent in 2009 (IMF 2009 and 2010). Between 2007 and 2008, SSA was hit by a triple shock—the food, fuel and financial crises.

The first hint of an impending crisis was the rapid rise in food prices caused by the high price volatility of oil markets, which was transferred to corn markets as oil prices rose above $50 per barrel, and use of corn-based ethanol increased. Second, many financial institutions, seeking safety and an exit from the more risky and less transparent derivatives market, diversified into commodity markets, putting further pressure on commodity prices (Songwe 2011).

In addition to increased use of crops for bio-fuels and rising oil prices, the standard literature on the food price crisis has attributed the rise in prices to increased food and meat consumption in emerging markets due to rising incomes and a growing world population. The rising commodity prices had a mixed impact on the continent: Commodity-exporting countries such as Angola, the Democratic Republic of the Congo and Nigeria benefited from the steep increase in prices, while the non-commodity-exporting countries suffered from increases in food prices and deterioration in their balance of payments.

Third, the collapse of Lehman Brothers in September 2008 marked the beginning of the financial crisis. Asset values contracted as stock markets hit historic lows. According to some estimates (Bollard and Ng 2009), the amount of money lost in global stock markets totaled $30 trillion dollars. This amount is equivalent to over 71 percent of the amount raised by the International Development Association for the 2012-2014 period, $42 billion over three years.

The crisis reached SSA through three main channels of transmission: labor markets, capital markets and export markets. The impact of the crisis on trade was devastating for SSA, which was the hardest hit region in terms of exports. SSA goods exports alone fell by more than 40 percent in January 2009 compared to January 2008 (see Figure 4). It is no surprise that the collapse in commodity trade following the real sector collapse in the West affected SSA so severely, given that one-third of the world's resource-dependent countries are in the region.

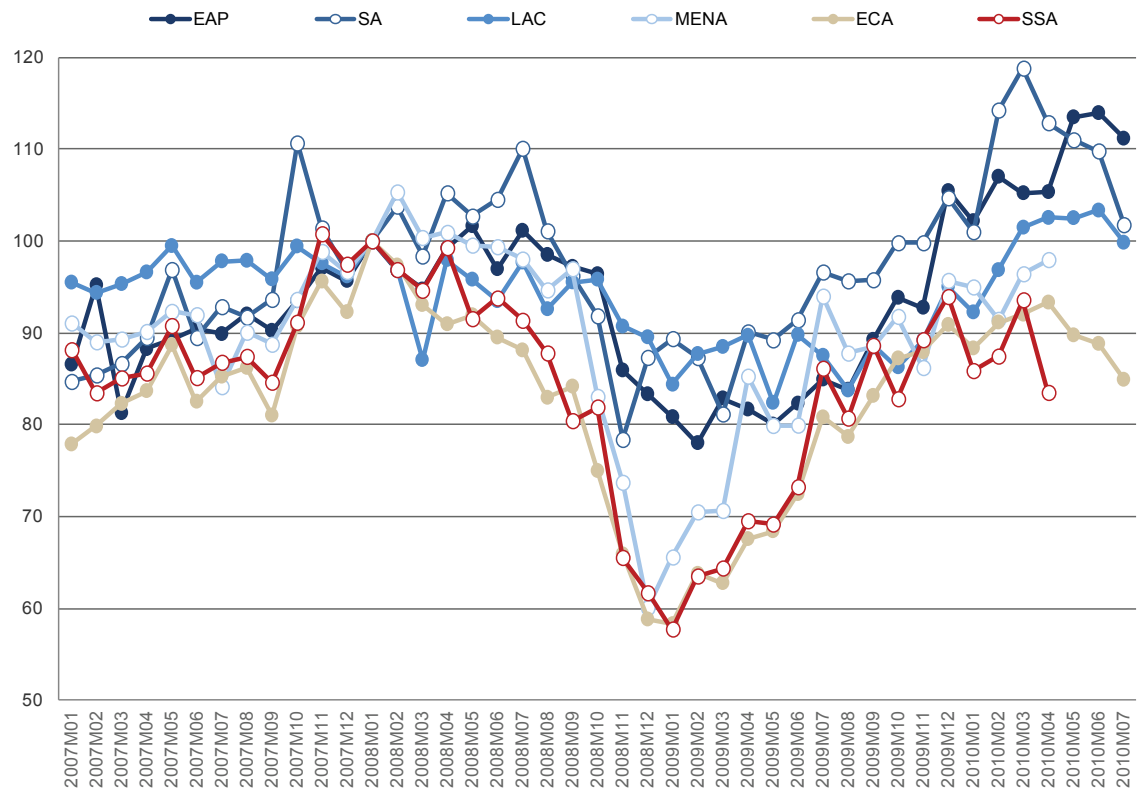
During the second half of 2008, non-energy commodity prices plunged 38 percent. In December, non-energy prices fell 6.8 percent, down for the fifth consecutive month. Oil prices fell 69 percent between July and December 2008, reversing the oil price increases of the previous three and a half years. Oil exporters suffered a loss, but many of them, such as Nigeria, had built up a savings cushion during the boom years and were better able to withstand the crisis. By end 2009, however, oil prices had recovered from their low point of $40 in December 2008 to about $70. Some poorer countries suffered particularly large shocks. Many of them experienced terms-of-trade losses of over 3 percent of 2008 GDP, with losses exceeding 5 percent in Chad, Guinea, Mozambique and Zambia.

Over the last decade, many developing countries embraced export-led strategies as an engine for growth and employment and have increasingly diversified both export markets and products. The food, fuel and

financial crises were the first test of the resilience of this strategy to shocks. Our analysis shows that this strategy has served Africa well, helping facilitate its early recovery from the global crisis. In terms of GDP, Africa is projected to come out of the crisis faster than most other regions. Africa's growth is projected to rebound to 5.5 percent in 2011, up from 1.6 percent in 2009 (IMF 2009 and 2010). While this increase is still significantly below pre-crisis levels compared to other regions, Africa has bounced back faster than Europe and Central Asia, and the Middle East and North Africa. Africa has performed well but has also exhibited some structural weaknesses that must be addressed if it is to accelerate growth and reduce poverty.

The recent global economic downturn has highlighted the critical importance of trade as an engine for Africa's growth and employment and, more importantly, as a way of smoothing out the crisis impact. In view of our results, we conclude that the export structure of SSA is

Figure 4: Goods Exports for Six World Regions, Constant and Seasonally Adjusted, 2007-10



Source: Own illustration. Data: Global Economic Monitor, World Bank.

one of the main reasons why it has been able to get a head start out of the recession. Africa has not missed the boat, as many predicted, because of its reliance on commodity exports; on the contrary, it has benefited from its export structure, particularly because of high demand from China. In sum, while Africa's rally was mainly the result of sound macroeconomic fundamentals in place before the crisis, the structural composition of Africa's exports also supported the region's economic resurgence.

While pre-crisis trade discussion on Africa focused on the need for increased product diversification, the crisis has demonstrated that increased market diversification is equally important for growth as product diversification. Our findings also imply that export concentration in a few products in which countries have a high comparative advantage yields more benefits than product diversification in goods in which they have less comparative advantage. In cases where countries have a revealed comparative advantage in a few commodities, specialization should precede diversification. Product diversification must therefore be managed to safeguard market share of exports. For example, Nigeria and other oil-exporting countries could move into the pharmaceuticals industry, while Côte d'Ivoire and other cocoa-producing countries could move into the manufacturing of chocolate-based products such as biscuits and drinks. These results also indicate that while product and market diversification is important for growth, the effects may be nonlinear: Product specialization even at the commodity stage might be more beneficial for short-term growth than product diversification over the medium term.

Despite the strong rebound, the crisis has interrupted the growth acceleration experienced on the continent: Growth averages have dropped. African countries will need to do more, better and faster to catch up to pre-2008 growth levels. The first order of business should be to protect past gains in macroeconomic stability and continue structural reforms. Second, countries should put in place policies that exploit the increasing benefits of South-South trade, including improved intra-regional trade. Growth in exports to low- and middle-income countries offers Africa a chance to diversify export markets further while it works to diversify its product market.

Most importantly, SSA countries must pursue a dual strategy of diversifying both export markets and product markets to accelerate growth. African countries need to work to protect market share in existing commodity markets by retaining and increasing their competitiveness in the areas where they have a comparative advantage. The crisis has shown that this strategy allows countries to manage economic downturns better. The above analysis also shows that exports of manufactures contribute more to growth than exports of commodities.

Therefore, while acquiring new markets for commodities, countries also need to expand and diversify exports to high-value markets such as the U.S. Our analysis shows that while export market share to the developed countries is dropping, a higher export share to the U.S. has positive growth effects in non-resource-intensive countries. Part of the strategy is to put in place policies that attract more foreign direct investment in order to facilitate more technology transfer. Countries therefore need to improve their business regulation, property rights legislation and, most importantly, the governance environment for business.

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ENDNOTES

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3. The HHI of market concentration is defined as the sum over a country's squared market shares of export destinations. If a country exports to only one destination, the HHI would be 1, while a lower HHI reflects a higher regional export diversification. Accordingly, the HHI of product concentration is defined as the sum over a country's squared market shares of different export products. For a description of the data, see Appendix 1.
4. We tested for endogeneity of exports in the value added regressions using the first three period lags as instruments (Baum, Schaffer and Stillman 2007). As expected, the results reject the null hypothesis that the specified endogenous export variable is exogenous ($Chi^2(1)$p-value=0. 0716). However, when we perform the same test on the lagged value of exports using the three previous lags as instruments, the results cannot reject the null hypothesis ($Chi^2(1)$p-value=0.2537).
5. Performing the same endogeneity tests as described above (Baum et al. 2007), the results cannot reject the null hypothesis in both cases. While endogeneity seems to be less of a problem in the labor productivity regressions, we still apply one-period lags.
6. According to Shephard's Lemma, factor demand is determined by the first partial derivative of the cost function with respect to the corresponding factor price, regardless of the kind of production function.

APPENDIX 1: DATA

Our panel data regression covers the following 30 sub-Saharan African countries over the period 1995-2008: Botswana, Burkina Faso, Cameroon, the Central African Republic, Chad, Comoros, Cote d'Ivoire, Eritrea, Ethiopia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Senegal, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe. We identify the following four natural resource-intensive economies: Cameroon, Chad, Côte d'Ivoire and Zambia, which we exclude in some specifications.

We retrieved the following variables from the World Development Indicators (WDI) Database: gross value added (constant 2000 U.S. dollars), GDP (constant 2000 U.S. dollars), gross fixed capital formation (constant 2000 U.S. dollars), total employment, exports of goods and services (constant 2000 U.S. dollars) and tariffs (mfn, weighted average). We calculated capital stock applying the perpetual inventory method assuming a depreciation rate of 6 percent. Since initial capital stock levels were not available, we calculated initial capital stocks following Hall and Jones (1999).

The calculation of intermediate input prices involved three steps: (i) We first subtracted a country's value added from its GDP (both in current U.S. dollars) to obtain the value of intermediates (in current U.S. dollars). (ii) Second, we subtracted a country's value added from its GDP (both in constant 2000 U.S. dollars) to obtain the volume of intermediates (in constant 2000 US$); value added and GDP data were obtained from the WDI Database. (iii) Finally, we obtained intermediate input prices by dividing the value of intermediates by the volume of intermediates.

We retrieved data on a country's wages and salaries (current LCU) from the African Development Indicators Database which we converted into U.S. dollars using official exchange rates (LCU per U.S. dollars, period average) from the WDI Database. Wages and salaries consist of all payments in cash to employees in return for services rendered, before deduction of withholding taxes and employees contributions to social security and pension funds. We deflated the wage bill using a value added deflator which we constructed by dividing a country's nominal value added by its real value added (constant 2000 U.S. dollars). Both were obtained from the WDI Database. In order to obtain average wages per worker, we divided the wage bill by the number of employees.

We obtained commodity and manufacturing exports from the U.N. Comtrade Database and deflated these using an export deflator, which we constructed by dividing a country's total nominal exports by its total real exports (constant 2000 U.S. dollars). Both are retrieved from the WDI database. We calculated the HHI of market and product concentration using detailed bilateral and sectoral trade data from U.N. Comtrade based on the HS 1988/92 product classification at the 6-digit product level. We inter- and extrapolated missing data in order to maintain a sufficient number of observations.

APPENDIX 2: SUMMARY STATISTICS

	Obs	Mean	Std Dev	Min	Max
$\ln EX_{t-1}$	390	20.62099	1.412765	17.02076	24.60611
$\ln EX\_comm_{t-1}$	381	18.66031	1.867066	12.6204	22.12198
$\ln EX\_mfg_{t-1}$	387	19.67247	1.69196	14.9289	24.49164
$\ln EX\_serv_{t-1}$	377	19.03374	1.470295	15.19129	22.73734
$\ln TARIFF_t$	404	2.403894	0.4272339	0.4187094	4.130355
HHI_PROD_{t-1}	386	0.2397694	0.2020564	0.0148509	0.9019499
HHI_MKT_{t-1}	387	0.1773059	0.132687	0.012086	0.8927198
$EXshare\_US_t$	420	0.1046051	0.1593687	0.0000906	0.9584857
$EXshare\_EU25_t$	420	0.4535174	0.2158698	0.0145065	0.9274451
$EXshare\_CHN_t$	402	0.0417268	0.0916105	1.01E-06	0.5471057
$EXshare\_SSA_t$	405	0.1231127	0.1234237	0.000596	0.720306
$\ln VA_t$	420	21.87483	1.299148	18.93411	25.84126
$\ln K_t$	409	22.61887	1.265241	19.3683	26.45117
$\ln L_t$	420	14.88708	1.289172	12.15541	17.4134
$\ln (VA/L)_t$	420	6.987748	1.030342	4.999063	9.723015
$\ln (K/L)_t$	409	7.727246	1.339766	5.464159	11.13748
$\ln Y_t$	420	21.96203	1.301789	19.0379	25.93275
$\ln w_t$	406	4.567821	1.85271	1.815518	12.53312
p_t^{INP}	418	1.010106	5.34647	-28.78741	80.93427
lnP_t	419	1.292145	0.4490524	0.1666319	3.76749

Source: Own calculations.

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