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China's Slowdown and Rebalancing:
Potential Growth and Poverty Impacts on Sub-Saharan Africa

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Abstract

This paper explores the economic impacts of two related tracks of China's expected transformation – economic slowdown and rebalancing away from investment towards consumption - and estimates the spillovers for the rest of the world with a special focus on Sub-Saharan African countries. We find that an average annual slowdown of GDP in China of 1 percent over 2016-2030 is expected to result in a decline of GDP in Sub-Saharan Africa by 1.1 percent and globally by 0.6 percent relative to the past trends scenario by 2030. However, if China's transformation also entails substantial rebalancing, the negative income effects of the economic slowdown could be offset by the positive changes brought along by rebalancing through higher overall imports by China and positive terms of trade effects for its trading partners. If global supply responds positively to the shifts in relative prices and the new sources of consumer demand from China, a substantial rebalancing in China could have an overall favorable impact on the global economy. Economic growth could turn positive and higher on average by 6 percent in SSA and 5.5 percent globally as compared to the past trends scenario. Finally, rebalancing reduces the prevalence of poverty in SSA compared with the isolated negative effects of China's slowdown, which slightly increases the incidence of poverty. Overall, China's slowdown and rebalancing combined are estimated to increase GDP in SSA by 4.7 percent by 2030 and reduce poverty, but the extent of this varies by country.

1. Introduction

Economic engagement with Africa[2] has been a priority for Chinese policy makers since the 1990s. Through improved economic relations, China benefits from access to dynamic and growing markets for Chinese goods and services, a reliable source of raw materials and energy, a destination for foreign direct investment that makes use of lower local wages, and finally, reinforced political support from African countries in international affairs. On the other hand, Africa benefits from China's financial and technical assistance in infrastructure investment, transfer of technology and knowledge, and China's relatively strong capacity to implement development and industrialization projects.

Even so, China's economy is undergoing significant changes. The 12th Five Year Plan recognizes that the annual growth in excess of 10 percent (average over 2003-2010) is unsustainable in the long run and envisages the growth rate of 7 percent a year. Apart from putting the brakes on fast growth, Chinese authorities aim to rebalance the economy towards consumption and away from investment. Indeed, recent data shows that investment as a share of GDP has risen to more than 46 percent in 2013 which in turn led to the build-up of excess capacity. Among the most important measures set out in favor of facilitating China's structural transformation were a) policies that promote urbanization – this in turn would help fuel domestic consumption; b) policies that encourage lower domestic savings – leading to lower investment and c) policies that improve the efficiency of state-owned enterprises and allow more sectors to be open for non-state investment.

The most important channels of transmission of economic spillovers are the income effects on trade and investment. First, China's economic strategy will lower external demand for African exports. As the Chinese economy moves towards a targeted 7 percent growth per annum towards a projected 4.6 percent by 2030, it could require fewer imports to fuel its domestic manufacturing production. A lower demand for imports could in turn disproportionately impact SSA countries that are exporters of commodities, raw materials and oil. Also, as Chinese domestic aggregate demand shifts from investment goods to household consumption and services, exporters of consumption goods and services can gain from rebalancing. Second, weaker global demand is expected to translate into falling commodity prices, which will negatively impact terms of trade of net commodity exporters. Third, motivated by increasing labor costs some Chinese firms might relocate production to the relatively more labor abundant Africa. Although FDI and multinational companies are not explicitly considered in our modeling framework, such effects will be indirectly represented as a result of changing comparative advantages and the specialization of SSA economies in goods that are relatively labor abundant (Chandra et al., 2012; Dollar, 2013). Fourth, as economic growth in China slows down, the pool of savings is likely to decline leading to less funding for Chinese investment in Africa, in particular in natural resource sectors and infrastructure.

The paper is centered on two main pillars. First, we explore the economic impacts of China's slowdown on the rest of the world with a focus on Sub-Saharan Africa. Second, we separately consider the impacts of China's rebalancing by providing an in-depth examination of the driving forces of the expected benefits and losses and shedding light on potential areas of policy intervention.

The contributions of this study to the existing literature are multi-fold. First, we explore not only growth spillovers commonly analyzed by other authors but we also separately consider the impacts of China's

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[2] The focus of this analysis is Sub-Saharan Africa (SSA). "SSA" and "Africa" are used interchangeably.

rebalancing, along with the combined aggregate impacts of China's expected transformation. Second, we provide estimates of the impact of China's transformation on poverty and shared prosperity in Africa. Finally, we have updated and extended our modeling tools, so that a similar analysis could be conducted for other parts of the world.

2. The economic engagement of Africa and China

2.1. Trade relations

Trade between China and Sub-Saharan Africa has been growing at a staggering pace and increased over 100-fold since 1990 (Figure 1). In 2014, exports from China to SSA reached $84 billion compared to $63 billion exports from SSA to China. China's WTO accession in 2001 made a significant positive difference in trade relations between the two regions. Trade between the two regions grew at an average annual growth rate of 17 percent during the 1990-2000 period. Since China's WTO accession, it has been growing by 27 percent over 2001-2014, despite the slump in global trade during the 2008-09 financial crisis. As a result, China has become SSA's largest trading partner after it surpassed the US in 2009.

For the region as a whole, China is a destination for 16 percent of SSA's total exports (surpassing even intra-regional exports, which account for 10 percent) and a source of 14.3 percent of total imports. A regional decomposition of these aggregates in Figure 2 highlights important regional heterogeneities. South Africa, Zambia and the rest of SSA export relatively more than the regional average while Madagascar, Botswana and Ghana import from China at above the regional average.

In terms of sectoral composition, SSA exports to China are concentrated in natural resource industries – about 78 percent of the total. On the other hand, the majority of SSA's imports are accounted for by high- and low-skill manufactures with 48.6 percent and 37.7 percent, respectively. A concern related to the sectoral composition of trade between the two regions is that China's imports from Africa are mainly focused on low value-added and raw commodities, which may limit opportunities for Africa's industrialization and moving up the value chain. Implicitly, the nature of SSA-China trade tends to limit African growth prospects away from a sustainable structural upgrade and economic diversification (Ighobor, 2013).

These concerns are however often controversial in the empirical literature. Previous studies find that African countries with a concentration in primary product exports experienced broader growth benefits than more diversified exporters and that countries may recover from the global financial crisis faster if their exports contribute to China's production chain or its consumption chain (Maswana, 2010). Contrary to the common view that increasing imports from China would have a negative effect on growth, empirical evidence shows that the China's share in a country's total imports has a robust positive effect on growth (Baliamoune-Lutz, 2011).

Figure 1 The increasing importance of China for SSA

Panel A: Trade linkages ($ billions)
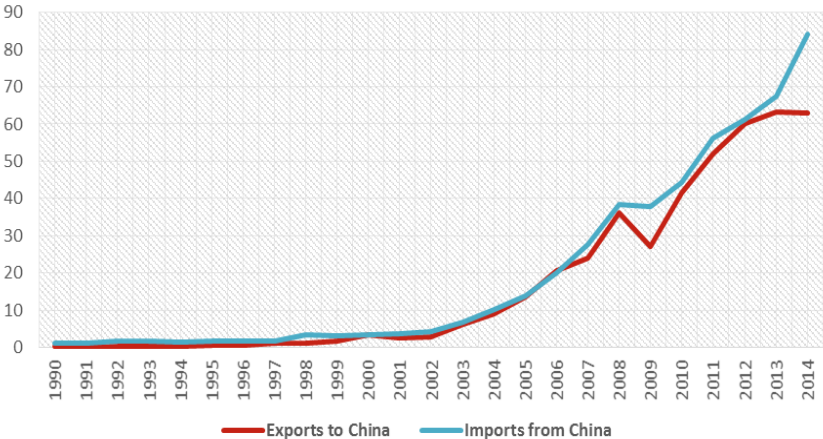
Panel B: Investment linkages ($ billions)
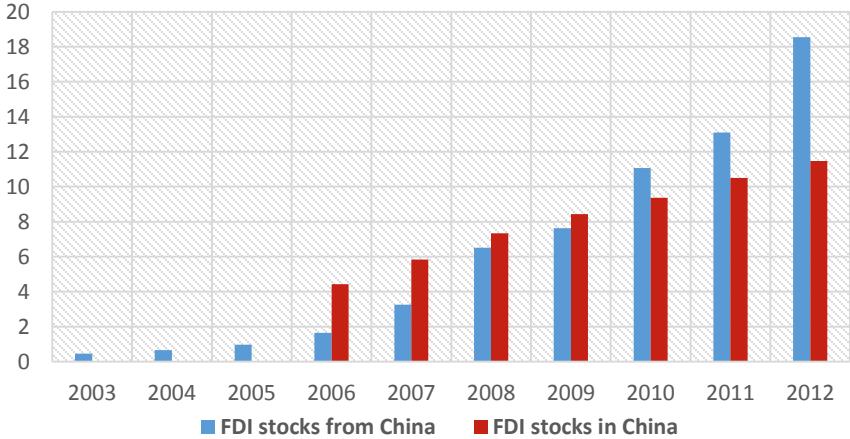
Source: Direction of Trade Statistics (IMF) and UNCTAD bilateral FDI statistics

In terms of trade preferences, currently there are no free trade agreements between China and any of the SSA's countries or regions. Average tariff barriers faced by Chinese exporters to SSA markets are significantly higher (10.1 percent) than barriers faced by SSA's exporters to Chinese markets (5.2 percent). Sectoral protection patterns reveal significant variations. In terms of Chinese exports to SSA's markets, low-skill manufactures and agriculture are the most protected with average tariffs of 19.2 percent and 16.5 percent, respectively, compared to a much lower 5.8 percent in high-skill manufactures. On the other hand, the most protected Chinese sectors for SSA exporters are agriculture and high-skill manufactures with 7.3 percent and 7.6 percent tariff rates. We also note that imports of natural resource products (coal, oil, gas, and their products) have duty free access to Chinese markets.

Like other developed countries, China started offering duty-free market access to SSA's Least Developed Countries (LDCs) shortly after its accession to the WTO in 2003, a scheme that covered 190 types of

commodities. In 2007, 440 items were exempt. Finally, in 2009 it extended duty-free exemptions to 95 percent of exports from LDCs in Africa. Among LDCs in Africa, Angola, Sudan, Congo, Equatorial Guinea, Congo DR benefit significantly since they account for 90 percent of LDC exports to China.

Figure 2 China is the main trading partner for most SSA countries
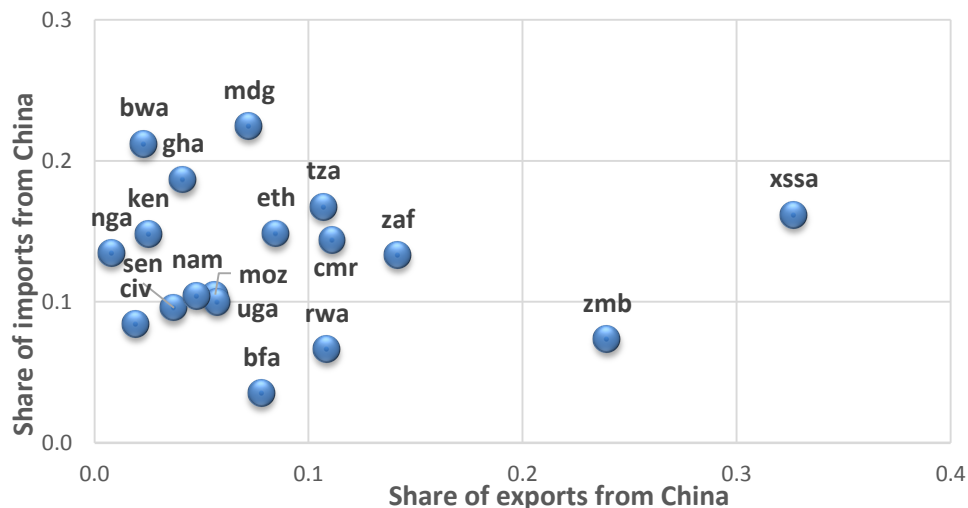
Source: GTAP9 database

China's rebalancing away from investment-led towards consumption-based growth is expected to change the composition of Chinese imports with a possible shift towards consumer or final goods. As highlighted in Figure 3, given that SSA's exports to China are less intensive in consumer goods than that of the rest of the world, such a compositional change will provide a new source for trade expansion if supply in Sub-Saharan Africa could respond positively to the shifting opportunities.

Figure 3 The composition of China's imports

Panel A: China's overall imports
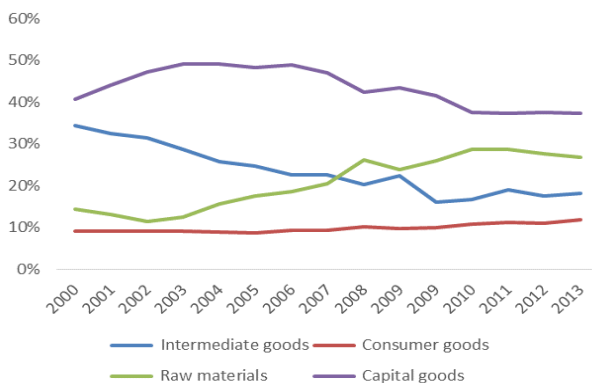
Panel B: China's imports from SSA
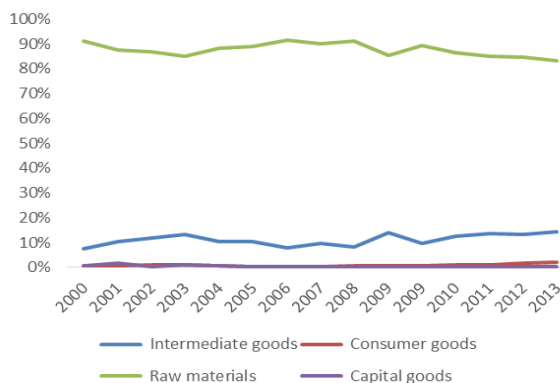
Source: WITS

As shown in Table 1, certain SSA countries have untapped potential in exporting final goods to Chinese markets when compared to the structure of their exports to other similar markets. For example, we find

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that while consumer goods represent only 16 percent of Kenya's exports to China, exports to Japan are dominated by flowers and tea and coffee products. Senegal's exports of fish and crustacean products to Japanese and Korean markets accounts for more than 90 percent of their total exports but only 24 percent of exports to China. In the case of Madagascar, major export products such as vanilla and cloves that account for the majority of final goods exports to Japan are underrepresented when it comes to exports to China.

Table 1 The prevalence of final goods in SSA's exports (2004-2014, percent of total)

	Exports to China			Exports to Japan			Exports to Korea		
	Final goods	Interme diates	Capital goods	Final goods	Interme diates	Capital goods	Final goods	Interme diates	Capital goods
Burkina Faso	0.0	100.0	0.0	0.3	99.7	0.0	0.2	98.9	1.0
Botswana	0.0	100.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0
Cote d'Ivoire	0.2	99.8	0.0	1.5	98.5	0.0	3.3	96.4	0.3
Cameroon	0.0	100.0	0.0	3.2	88.3	8.3	0.2	99.5	0.3
Ethiopia	0.4	99.6	0.0	4.4	95.6	0.0	0.2	99.7	0.0
Ghana	0.2	99.8	0.0	2.5	97.2	0.0	5.2	94.2	0.5
Kenya	16.0	83.9	0.0	69.0	30.4	0.5	2.7	94.3	3.0
Madagascar	7.5	92.3	0.1	51.7	48.2	0.1	10.0	89.8	0.2
Mozambique	0.2	99.5	0.0	16.8	83.2	0.0	0.8	99.2	0.0
Namibia	0.7	99.2	0.0	24.2	75.7	0.0	1.3	98.6	0.0
Nigeria	0.0	99.9	0.0	0.0	99.7	0.0	0.0	99.6	0.4
Rwanda	0.0	100.0	0.0	19.9	80.0	0.1	3.2	95.9	0.9
Senegal	23.6	76.3	0.1	91.7	7.4	0.9	91.4	8.2	0.3
Tanzania	0.5	99.4	0.0	6.5	93.5	0.0	1.2	98.6	0.1
Uganda	0.3	99.5	0.0	28.5	71.3	0.2	1.0	98.7	0.2
South Africa	1.4	98.1	0.5	11.0	88.2	0.6	1.6	97.7	0.6
Zambia	0.0	100.0	0.0	0.6	99.3	0.0	0.0	100.0	0.0

Source: Authors' calculations based on UN COMTRADE

2.2. Investment relations

Although not as remarkably as trade, investment between China and Sub-Saharan Africa has been growing significantly (limited data availability complicates the assessment of the true extent of Chinese engagement in Africa). By 2012, accumulated Chinese FDI stocks in SSA amounted to $18.5 billion compared to only $0.46 billion in 2003 (see Figure 1). On the other hand, SSA's FDI stocks in China are reportedly $11.5 billion (UNCTAD, 2014). The majority of China's investment in Africa is concentrated in resource-rich countries such as Angola, Nigeria and South Africa, DRC, Sudan and Zambia (Ighobor, 2013). Top industries for China's investment are mining (30.6 percent) and finance (19.5 percent) (MOFCOM, 2013).

China's investment policy toward Africa is complicated and non-transparent (Johnston and Yuan, 2014). The institutional framework that regulates investment relations is mainly based on the Forum on China and Africa Cooperation (FOCAC) under which 45 economic and technical cooperation (ETC) agreements

have been signed. In addition, a myriad of 32 Bilateral Investment Treaties (BITs) and 9 Double Taxation Treaties (DTTs) add to the complexity of existing regulations.

An important mechanism for China's direct investment in manufacturing in Africa is through industrial parks or special economic zones (SEZs). Of the 19 zones approved by the Chinese government as of 2011, five are in Sub-Saharan Africa, namely Ethiopia, Mauritius, Nigeria (2) and Zambia. The government of China stopped holding more tenders after 2007, but private enterprises continued to establish, expand or propose new industrial parks or free trade zones in Africa on their own, in Nigeria, Sierra Leone, Uganda, Botswana and South Africa.

It is interesting to note that only one economic zone concentrates on mining. The industrial focus of the SEZs varies across the zones, which span a range of industries including copper mining, garment, food, appliances, machinery, and construction materials. The following table describes the sector focus of the zones.

Table 2 Examples of special economic zones by country and sector

Zambia	- Chambishi: copper and cobalt mining - Lusaka: garments, food, appliances, tobacco, electronics
Nigeria	- Lekki: transportation equipment, textile, light industries, home appliances, telecommunications - Ogun: construction materials and ceramics, furniture, wood processing, medicine, computers, lighting
Mauritius	- Manufacturing and services
Ethiopia	- Oriental: electric machinery, steel, construction materials

Source: Brautigam et al. (2011)

Chinese SEZ projects in Africa may succeed for several reasons (Brautigam et al., 2010, 2011). First, China has a successful experience with its own SEZs. Second, the effort is part of an important government initiative with both a political and economic aim. The political will may help with the implementation of the projects. Third, the initiative is assisted with generous financial and nonfinancial support from the Chinese government. Finally, the zones are profit-driven initiatives led by private sector consortia, though many lead firms are SOEs. On the other extreme, there are significant political, economic and social challenges to making SEZs in SSA successful. Most notably, insufficient local learning and participation may affect the ability of the SEZs to facilitate SSA's industrialization. Furthermore, challenges such as cross-cultural communication barriers, governance issues, disputes with local communities, lack of transparency and implementation capacity of African governments could potentially limit the success of SEZs. SEZs will only be successful if they attract sufficient local and foreign investment, create local jobs,

promote exports and promote local industrial competitiveness. If the zones fail to get integrated, transfer knowledge and technology, and generate local employment, they may not be viable.

2.3.   Chinese development aid

Empirical evidence shows that China's official development aid (ODA) in Africa is distributed relatively evenly across the continent both in LDCs and developing countries (Brautigam 2011a; 2011b). Grants and zero interest loans were the main instruments for foreign aid used by China until 1995. Over time, unlike OECD countries, China has deviated from the traditional aid instruments, and implemented a combination of official development aid and other official financing, via export buyers' credits, official loans at market rates and strategic lines of credit provided to Chinese enterprises in Africa. Most development funds come from China's policy banks. As of 2009, about half (47 percent) of China's foreign aid was committed to Africa.

Several interesting findings emerge from the study by Brautigam (2011a). First, not surprisingly, countries did not receive official development aid from China when they had have diplomatic ties with Taiwan. Second, contrarily to general perceptions, aid was not given in larger amounts to resource-rich countries such as Nigeria and DRC. Grants and interest-free loans are distributed evenly while concessional loans are correlated with a country's ability to pay. For example, market-rate official loans may be provided to middle-income countries such as Mauritius, Namibia, Botswana or countries that are financing an income generating project. Indeed, Lin and Wang (2014) also point out that as of 2009, only 8.9 percent of China's concessional loans to Africa were used in the extraction of natural resources. In contrast, the study highlights the fact that 61 percent of concessional loans were used to finance infrastructure construction, and 16 percent to finance industrial development.

2.4.   Integration into global and Chinese value chains (GVCs)

In a world dominated by international production networks and global value chains, looking at trade data in gross terms might not provide a clear enough picture of a country's comparative advantage. Surprisingly, as pointed out in the 2014 African Economic Outlook (African Development Bank, 2014), Africa's integration into global value chains is greater than one might have expected – as the third most GVC-integrated region after North America and South East Asia. Expected medium- and long-run structural changes in China might further benefit Africa's increasing participation in global value chains. As China's working-age population is expected to stop growing coupled with rising wages, China's attractiveness as a manufacturing hub is likely to decline (African Development Bank, 2014). As suggested by Chandra et al. (2012), China might soon have 85 million light manufacturing jobs to export and with the right policies in place, Africa might benefit from these opportunities.

3. Literature review of economic spillovers

While the economic literature that explores the external effects of policy actions undertaken in one country on others, i.e. spillovers is relatively extensive and rich[3], there are only few studies that explore the impact of potential changes in China's domestic policies on the rest of the world in general, or on Africa in particular.

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[3] The IMF's yearly Economic Spillover Reports initiated in 2011 contributed significantly to providing a continuous and reliable quantitative analysis of economic spillovers between countries.

3.1. China's slowdown

As shown in IMF (2014), China's economic slowdown is expected to have a larger impact on advanced economies than on emerging markets outside of Asia. On average, a one percentage point slowdown in China can lead to a 0.15 percent slowdown in growth in advanced economies (most significantly, around 0.2 percent in Japan) while the overall impact on other emerging markets is expected to be smaller. Nevertheless, commodity-exporting emerging economies may be more significantly affected by terms of trade effects. These estimates are consistent with the ones reported in the literature. Among others, Duval et al. (2014)[4] also provide quantitative evidence that changes in China's growth patterns have sizeable international spillovers. They estimate that a one percentage point increase in China's growth could increase GDP growth in the median Asian economy by about 0.3 percentage points after a year, compared with 0.1 percentage points for the median non-Asian economy. Arora and Vamvakidis (2010) also estimate that a one percentage point increase in China's growth is associated with an average 0.5 percentage point increase in the growth of other countries.

Using a structural vector auto-regression (VAR) model for South Africa with data from 2000Q2–2014Q2, World Bank (2015) estimate that one percentage point reduction in China's growth results in a 0.37 percentage point decline in output growth in South Africa in the short run. As pointed out by the authors, their results are consistent with those reported by Houssa et al. (2015).

In the same vein, Anderson et al (2015) use a dynamic general equilibrium macroeconomic model (AFRMOD) to explore various aspects of China's transformation on Sub-Saharan Africa. Their results show that a cumulative real GDP loss of 2.6 percentage points in China could result in the decline of sub-Saharan African real GDP by about 0.2 percentage points compared to the past trends scenario. The authors also highlight the fact that regional aggregates conceal a wide range of country heterogeneity. More specifically, the real GDP of SSA commodity exporters (excluding Nigeria and South Africa) is found to fall by nearly 0.8 percent relative to the past trends scenario compared to only 0.01 percent for non-commodity exporters.

3.2. China's rebalancing

Ahuja and Nabar (2012) consider the impacts of rebalancing China's growth from investment to consumption. The authors emphasize the fact that due to the low import intensity of consumption in China, rebalancing away from investment towards consumption results in negligible spillover effects on trading partners. Accordingly, their results show that a one percentage point decrease in investment in China could potentially lead to the reduction of global growth of just under 0.1 of a percentage point.

The results reported by Drummond and Liu (2013) are comparable for Sub-Saharan African countries. The authors use a fixed effects dynamic panel regression model and find that a one percentage point increase in China's domestic investment growth is associated with an average 0.6 percentage point increase in SSA countries' exports. This impact could be larger for resource-rich countries. Bandara (2012) finds that SSA's exports to China and FDI from China have an impact on African countries' economic growth, but this impact became smaller in their more recent sample period.

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[4] Departing from previous studies, Duval et al. (2014) use value added trade data to capture the extent of international spillovers noting that gross trade data often misrepresents trade linkages between countries in the context of the increasing importance of global value chains.

Busse et al. (2014) use a Solow-type growth model with panel data to consider the impact of Chinese trade, FDI and aid on SSA countries and find that exporters of natural resources have benefited from positive terms-of-trade effects. However, the authors find no evidence that Chinese foreign investment and aid in Africa have an impact on growth.

In a scenario that captures the economic reforms in China that rebalance the sources of growth towards domestic demand from external demand, Anderson et al (2015) find that 15 years after the reforms, commodity exporters (excluding South Africa and Nigeria) register real consumption gains of about 6.5 percent over the baseline driven by higher commodity wealth, higher domestic demand, and greater investment. Gains for commodity importers are expectedly lower, around 0.4 percent over the baseline[5].

It is thus evident from the econometric literature that the economic ties between the two regions have important implications for Africa's growth prospects. The results reported by different studies are however highly sensitive to the data and methodology used in for the estimation. VAR (vector autoregressive) models are the most widespread specifications in the literature when estimating growth spillovers. Several studies use structural regression while few use general equilibrium techniques. Their results are highly sensitive to the time period, data issues, and econometric specification. Moreover, one would expect general equilibrium model estimates that take into consideration supply, demand, and factor market constraints to yield more moderate estimates than specifications where such factors are not controlled for.

4. Economy-wide implications of China's transformation on Sub-Saharan Africa

Expected changes in China's economy present both challenges and opportunities for Sub-Saharan African countries. The planned rebalancing of growth away from investment towards domestic consumption, coupled with the shift of Chinese growth away from external to domestic demand is expected to have important effects on China's main economic partners among which SSA countries. Global general equilibrium models with well-defined economic linkages among different agents, trade and current account flows are particularly well-suited for analyzing economy-wide implications of such policy changes. Next sections describe the modeling framework and the results of the simulations.

4.1. Methodology

The empirical analysis carried out here relies on LINKAGE– a global, multi-sector, multi-factor, dynamic computable general equilibrium (CGE) model developed at the World Bank's DEC Prospects Group (van der Mensbrugghe, 2011 and 2013). LINKAGE is an ideal tool for analyzing the impact of policy changes that have repercussions on different facets of the domestic or global economy as it can take into consideration interactions between agents (consumers, producers, government, etc.), inter- and intra-industry linkages, domestic and foreign markets, and the interaction between supply, demand and resource constraints.

The CGE models are best thought of as tools used for understanding the implications of different scenarios. Thanks to their rich structure they capture complex inter-linkages between sectors and long-

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[5] The rebalancing scenario captures different domestic reforms in China: a) reducing government spending on unproductive investment by 3 percent of GDP; b) reforms that increase TFP by 1.5 percent by 2024; c) the reduction of effective export subsidies by 3 percent of GDP over 6 years.

term developments in demand and supply. However, they cannot track the short-term dynamics and by focusing only on the developments in the real sphere of the economy, they cannot be used as forecasting tools. The CGE models cannot be tested for statistical accuracy of forecast in the same way as econometric models can be. In short these are tools for scenario building, not for forecasting.

The current version of LINKAGE largely relies on release 9 of the GTAP database (Narayanan et al., 2015). The database allows for a flexible aggregation of 141 countries/regions and 57 sectors. We cover 17 individual Sub-Saharan African countries and one SSA regional aggregate for the remaining countries. The rest of the world is represented by large countries such as China, India and the United States, EU28 and regional aggregates (rest of high-income countries and rest of the world). Sectors have been aggregated to reflect the most important trade linkages between China and Africa (at least 5 percent of trade with China) and represent agriculture, natural resources, food, high- and low-skill manufactures and services (see Tables A and B in the Appendix).

The core specification of the model replicates largely a standard global dynamic CGE model[6]. Production is specified as a series of nested constant elasticity of substitution (CES) functions for the various inputs – unskilled and skilled labor, capital, land, natural resources (sector-specific), energy and other material inputs. LINKAGE uses a vintage structure of production that allows for putty-semi putty capital. In the labor market, we assume constant participation rates and unchanged unemployment rate. Labor market segmentation allows for rural-urban migration of unskilled workers.

Demand by each domestic agent is specified at the Armington level, i.e., demand for a bundle of domestically produced and imported goods. Armington demand is aggregated across all agents and allocated at the national level between domestic production and imports by region of origin.

The standard scenario incorporates three closure rules. First, government expenditures are held constant as a share of GDP; the fiscal balance is exogenous while direct taxes adjust to cover any changes in the revenues to keep the fiscal balance at the exogenous level. The second closure rule determines the investment-savings balance. Households save a portion of their income, with the average propensity to save influenced by elderly and youth dependency rates, as well as GDP per capita growth rates. The savings function specification follows Loayza et al. (2000) with different coefficients for developed and developing countries. Since government and foreign savings are exogenous, investment is savings driven. The last closure determines the external balance. We determine exogenouse the foreign savings balance as a share of GDP in line with World Bank and DRC (2014) and, therefore, the trade balance. For most countries we assume that foreign savings as a share of GDP decline to more sustainable levels by 2030. Hence, changes in trade flows result in shifts in the real exchange rate, but not in the shifts in trade balances.

The model characterizes a few key dynamics. Population growth is based on the medium fertility variant of the UN's 2012 population projections. Labor force growth is equated to the growth of the working age population—defined here as the demographic cohort aged between 15 and 64 years of age. Investment is equated to the sum of domestic, government and foreign savings. Capital accumulation is then equated to the previous period's (depreciated) capital stock plus investment. Productivity growth in the past trends scenario is 'calibrated' to achieve a given trend in long-term growth in line with historical and projected

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[6] Other well-known models in this class include the GTAP model (Hertel, 1997) and CEPII's Mirage (Decreux and Valin, 2007).

growth rates (i.e. up to 2018), and then productivity growth remains fixed up to 2030 at the average level of 2011-2018.

4.2.   The past trends scenario

The dynamic nature of the model allows us to look at the long-term impacts of the policies considered here. In order to look at the impact of slowdown and rebalancing separately, we need to create a hypothetical, unrealistic scenario where neither slowdown nor rebalancing take place. We refer to it as the "past trends scenario" scenario. It initially tracks historical changes in macroeconomic variables such as real GDP growth, current account balance and the share of investment in total GDP from 2011 to 2015, but then it assumes that the growth rate remains fixed at 7 percent up to 2030 and that the share of investment and consumption in GDP remain at the 2015 levels. We view our slowdown and rebalancing scenario as the realistic one. It also tracks the historical GDP, investment and current account developments up to 2015 and then follows the evolution of these up to 2018 based on projections reported in the latest version of the Global Economic Prospects (World Bank, 2015b). Finally, for 2019-2030 we realy on the scenario from World Bank –DRC (2014) refine further the China slowdown and rebalancing scenario by defining the growth rates, the evolution of Chinese investment, consumption and sectoral composition of value added up to 2030.

This hypothetical past trends scenario is aimed to reflect past growth trends of the Chinese economy. First, it is assumed that China will continue to grow at an average annual growth rate of 7 percent until 2030. Second, the share of investment in total GDP remains constant at its 2015 level at 46.7 percent until 2030. Finally, we impose no explicit structural shift in the Chinese economy to boost the share of the services sector as a share of total value added. While a convenient benchmark, it is important to note that this scenario assumes a continuation of the unsustainable, investment-based growth model in China, and therefore may underestimate the true benefits of the transition.

As depicted in Figure 4, measured in 2011 constant prices, with a constant 7 percent growth rate the Chinese economy is expected to reach $27.9 trillion by 2030 accounting for about 21 percent of the global GDP. In line with past trends scenario, the share of different components of GDP are not expected to change significantly over time: household consumption and investment are assumed to account for around 34 percent and 46 percent of total GDP, respectively.

The Sub-Saharan African region is anticipated to more than double in size from $1.7 trillion to $4.1 trillion by 2030 with an underlying average annual real GDP growth rate of 6 percent and GDP per capita growth of 3.7 percent. As a result, SSA's share of the global economy will increase from the current 2 percent to 3 percent by 2030. The share of investment in total GDP is expected to increase slightly to the detriment of private consumption.

The fastest growing regions are expected to be Mozambique, Cote d'Ivoire and Kenya with an average yearly GDP per capita growth rate of 5.7, 5.4, and 5.4 percent respectively. On the other extreme, Madagascar and Namibia will grow slower than the regional average with a projected annual growth of GDP per capita of 1.8 percent and 2.5 percent, respectively between 2015-2030. Over the same time horizon, the two biggest economies in the region will grow at a different pace and thus altering the composition of SSA's regional GDP: as highlighted in Figure 4, Nigeria is expected to gain more intra-regional market share by growing from 29 percent to 38 percent of SSA's GDP just as South Africa's economy shrinks from 25 percent to 17 percent.

Figure 4 Past trends scenario for China and Sub-Saharan Africa (2011 constant $ trillions)
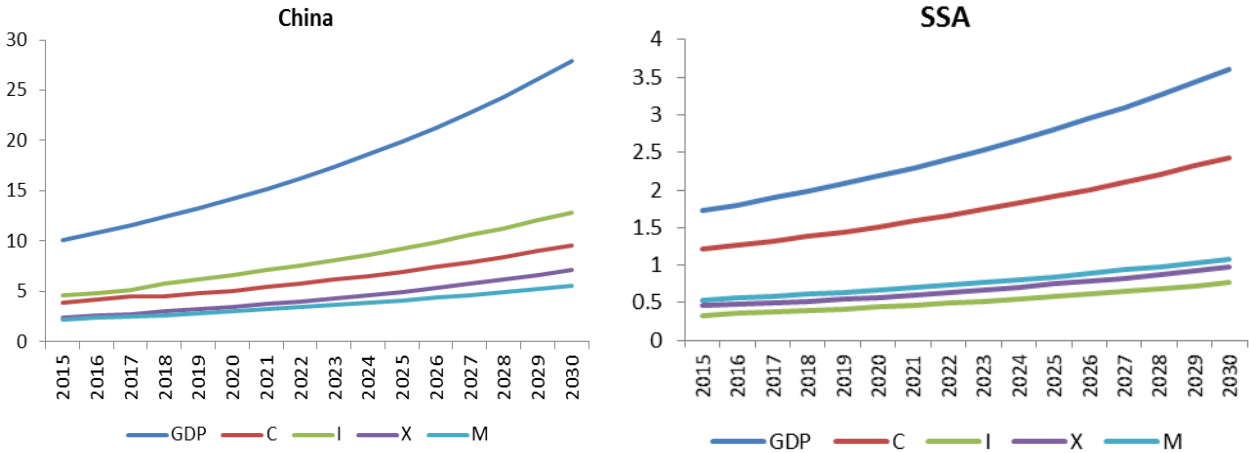
Source: LINKAGE simulations

Figure 5 Past trends scenario: the structure of SSA's GDP in 2015 and 2030 ($ million)
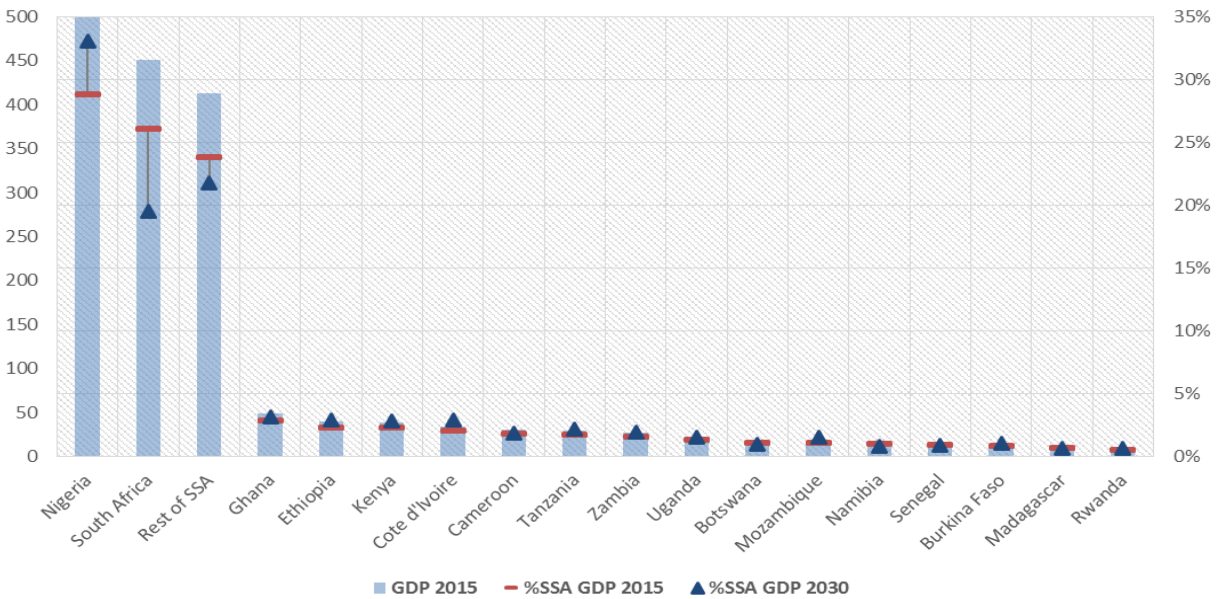
Source: LINKAGE simulations

To shed light on the different channels of transmission of China's expected structural transformation on Sub-Saharan Africa we consider the following separate scenarios and compare results to those reported in the past trends scenario: 1) slowdown in China and 2) rebalancing in China.

4.3.   The impacts of China's slowdown

The "slowdown" scenario aims to explore endogenous growth spillovers between China and Sub-Saharan African countries in the context of China's anticipated growth changes. China's growth is gradually assumed to slow down from the current 7 percent to 4.6 percent in 2030 (as in World Bank, 2014 "Past

trends scenario") resulting in a cumulative real GDP loss of 13.5 percent over a 15-year time horizon. This setting is equivalent to a still relatively high 6 percent average annual growth rate over 2015-2030.

Results show that the spillovers of China's slowdown on the rest of the world are relatively small resulting in a GDP loss of 0.6 percent relative to the past trends scenario by 2030 ($645 billion). The impact on the SSA region is found to be more pronounced and is expected to result in GDP that is 1.1 percent or about $43 billion lower than in the past trends scenario by 2030 (Figure 6)[7].

As depicted in Figure 7, slower growth in China also significantly impacts demand for foreign goods resulting in a decrease of 12.3 percent ($667 billion) of worldwide exports to China compared to 10.9 percent for SSA countries ($25 billion).

China's slowdown is expected further contribute to the downward pressure on the world price of commodities – the world price of agricultural, food and natural resources commodities are estimated to fall by -2.9 percent, -1 percent and -0.3 percent by 2030 relative to the past trends scenario. As world prices decline, terms of trade of net agricultural, food and natural resource commodity exporters' deteriorate (Figure 8). While these effects are as expected in terms of the direction of changes, they could be considered as lower bound estimates. The commodity price declines are in line with the stream of literature represented among others by Villoria (2009) and Roache (2012), who find that China's growth does not necessarily translate into significant pressures on world commodity prices. Villoria (2009) explores the possibility of China affecting SSA agricultural exports through higher world agricultural prices and finds that although China has moderately increased agricultural prices (in an aggregated sense), SSA exports do not seem to have benefited from these price increases.

As in this modeling framework trade is the most significant channel of transmission of economic spillovers, we proceed with further decomposing aggregate impacts by sectors and regions to gain a better understanding of why certain SSA regions are more affected than others.

As highlighted in Figure 9, a slowdown in China leads to the decline in the world price of agricultural products by -2.9 percent relative to the past trends scenario by 2030 followed by that of food products by -1 percent. As world prices decline, terms of trade of net agricultural, food and natural resource commodity exporters' decrease. Depending on a country's aggregate and sectoral share of trade with China, country level results can vary significantly. As highlighted in Figure 6, countries that have most to lose from China's slowdown are Madagascar, Cameroon and Ethiopia with an expected GDP loss of -2.4 percent, -2.2 percent and -1.7 percent compared to the past trends scenario in 2030. A closer look at the sectoral export shares of these countries, reveals the importance of agricultural and natural resource products as a share of their total exports to China. Cameroon's main exports to China in 2011 were petroleum crude oil (natural resources), wood and cotton products (agricultural products) accounting for about 80 percent of total exports. In the case of Ethiopia the diversification of products exported to China is even lower: sesame seeds (agricultural products) were the main export product with about 76 percent of total exports. Finally, for Madagascar data reveals that natural resource products such as zirconium, chromium and titanium ores add up to 71 percent their exports to China. Given their low export

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[7] It is important to emphasize that due to the nature of the modeling framework used here, we only capture "real" effects of China's transformation – i.e. those associated with "real" linkages between the two regions through trade. Financial markets and their impact on these economies are not explicitly modeled. Furthermore, the impact of investment linkages lacks a bilateral dimensions and is limited by assumptions about fixed current accounts.

diversification, as world prices for their main exports decline, these are the countries with the most significant terms of trade losses, -2.3 percent, -3.4 percent and -1.9 percent relative to the past trends scenario by 2030 (Figure 8) which in turn translates into GDP losses. On the other extreme, SSA regions that are not expected to be significantly affected by China's slowdown are Botswana, Uganda, and Cote d'Ivoire. For all of these, the lower than average spillovers can be explained by the low share of their exports sent to Chinese markets (see Figure 2) – i.e. with an estimated 2 percent, 6 percent and 2 percent of total exports, respectively.

Our earlier work based on a similar methodology (World Bank, 2015a) found that a persistent slowdown in the BRICs (with their average GDP rate about three percentage points lower than in the past trends scenario), would reduce Sub-Saharan African countries' GDP by four percent by 2025. These results are higher than those presented here, mainly because the magnitude of the slowdown was higher, the slowdown took place in all BRICS economies, including South Africa, which is the second biggest economy in SSA with strong ties to the region and finally these estimates did not include the impact of rebalancing.

Estimates of growth spillovers reported here are broadly consistent with those found in the empirical literature. We estimate that a one percentage point slowdown in China can lead to 0.12 percent slowdown in SSA. IMF (2014) estimate that on average, a one percentage point slowdown in China can lead to a 0.15 percent slowdown in growth in advanced economies (most significantly, around 0.2 percent in Japan) while the overall impact on other emerging markets is expected to be smaller. Duval et al. (2014) show that a one percentage point increase in China's growth could increase GDP growth in the median Asian economy by about 0.3 percentage points after a year, compared with 0.1 percentage points for the median non-Asian economy. Results by Arora and Vamvakidis (2010) are on the higher end, estimating that a one percentage point increase in China's growth is associated with an average 0.5 percentage point increase in the growth of other countries.

4.4.   The impacts of China's rebalancing

The objective of the rebalancing scenario is to decompose further the impacts of China's economic transformation and separate the impacts of general economic slowdown from more structural changes expected to occur in the Chinese economy. The rebalancing strategy is implemented through two major channels. First, following World Bank (2014) China Urbanization past trends scenario, we assume that the share of investment in total GDP gradually falls from 46.7 percent to 35.5 percent in 2030 while the difference accrues to household consumption. Second, structural shift in the Chinese economy allows the importance of the services sector to grow as a share of total value added from 50 percent in 2015 to 61 percent in 2030. In line with the rebalancing strategy, household consumption is anticipated to overtake investment in terms of share of total GDP – change that according to our assumptions materializes in the year 2024. The growth rate in China is assumed to be the same as in the slowdown scenario i.e. average 6 percent per year over 2015-2030.

Compared to the slowdown scenario that leads to global losses, rebalancing in China is shown to be beneficial for both the rest of the world and for Sub-Saharan Africa with GDP gains of 5.5 percent and 6 percent relative to the past trends scenario by 2030 (Figure 6). With great simplification, this contrast may be understood through the lens of a production frontier curve between consumer and investment good. A slowdown or contraction implies an inward shift of the production transformation curve, resulting in losses in both consumer and investment goods and implying a reduction in overall productivity and potential output. A rebalancing, on the other hand, tilts the production curve towards consumer goods

and away from investment good. It does not necessarily imply a contraction, but a reallocation of resources towards the favored sector (i.e., the production curve and its expansion path are shifting). Moreover, it does not preclude an expansion of the new and tilted output curve, albeit at a slower pace since capital in the economy will not be growing as fast as it was in the past. For the rest of the world to benefit from this shift and the resulting changes in relative prices, global supply (including those in SSA) must be able to respond by reallocating resources towards the new sources of consumer demand from China. The significant changes to bring about the positive effects are driven by numerous factors.

Rebalancing in China boosts private consumption and implicitly demand for imported products, as consumption demand is more import-intensive than investment[8]. This change benefits the rest of the world through higher demand for their exports. In particular in the rebalancing scenario, Chinese consumers demand significantly more services both domestic and imported, leading to expansion of imports of services by China. At the same time with Chinese production shifting towards services, the domestic production of agricultural, natural resource and manufacturing goods is replaced to some extent by increased imports of these products in order to satisfy domestic demand. Further, higher consumer demand biased towards services is driving up the prices of non-tradable goods relative to tradable goods, which will lead to real exchange rate appreciation by 15 percent by 2030. All these mechanisms contribute to a significant increase of imports into China.

Our results indicate that rebalancing away from investment towards consumption is expected to have significant positive effects on China's external demand. World exports to China are expected to increase 7.9 percent ($425 billion) faster than in the past trends scenario while SSA's exports to China are found to increase 13.2 percent ($30.6 billion) faster than in the past trends scenario by 2030 (Figure 7). For the same period, SSA's imports from China are estimated to be 11 percent ($25.8 billion) higher than in the past trends scenario (Figure 7).

As in the case of the estimated impact of China's slowdown, country level estimates vary. SSA countries that are expected to benefit the most from China's rebalancing are Kenya, Madagascar and Nigeria with additional GDP gain of 7.5 percent, 6.9 percent, and 6.5 percent compared to the past trends scenario by 2030, respectively (Figure 6). In the case of Madagascar and Nigeria, the higher than average gains can be traced back to the prevalence of agricultural and natural resource products as a share of their exports to China (see discussion above for the slowdown scenario). As rebalancing in China leads to the increase in the world price of agricultural and natural resources products by 5.4 percent and 4.4 percent relative to the past trends scenario by 2030 (Figure 9), terms of trade for Madagascar and Nigeria improve by 2.9 percent and 1.7 percent, respectively leading to above average GDP gains. In the case of Kenya, it is the prevalence of the services sector in their total exports to China (40 percent) which explains the gains – driven by the increased demand for services by China; the price of services products expands by 5.8 percent relative to the past trends scenario and thus improves Kenya's their terms of trade and GDP.

Previous empirical estimates of the spillovers impact of China's domestic rebalancing are less numerous and paint a picture of contradictory results. Contrarily to measuring growth spillovers, the exact definition

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[8] GTAP v. 9 data indicates that in 2011 private consumption in China was relatively more intensive in imported commodities than the formation of gross fixed capital. The biggest component of formation of capital goods in China are construction services (54 percent) which are not much traded. This data is consistent with WIOD data base, where the share of imports in final consumption (5 percent) is only slightly lower than the share of imports in gross fixed capital investment (6 percent).

of the meaning of China's rebalancing is still open for interpretation and given the lack of an existing natural experiment, the effects are much harder to capture. Out of the studies discussed in the literature review section, our results are very much in line with the most recent analysis by Anderson et al (2015), who find real GDP gains of 1% and real consumption gains of about 6.5 percent over the baseline for commodity exporters (excluding South Africa and Nigeria), driven by higher commodity wealth, higher domestic demand, and greater investment. The real GDP of commodity importers is hardly affected.

Figure 6 GDP (percent change relative to past trends scenario)

Source: LINKAGE simulations

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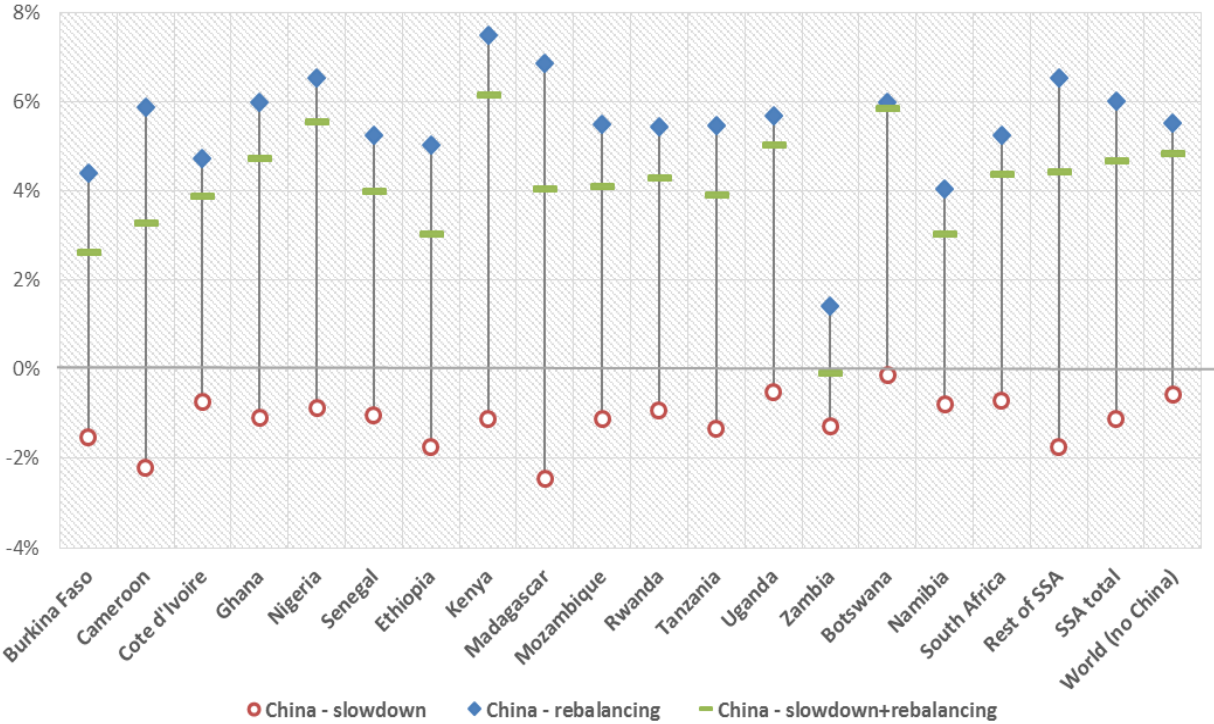
Figure 7 SSA-China bilateral trade (percent change relative to the past trends scenario)

Exports to China

Legend: ○ China - slowdown ◆ China - rebalancing — China - slowdown+rebalancing

Imports from China

Legend: ○ China - slowdown ◆ China - rebalancing — China - slowdown+rebalancing
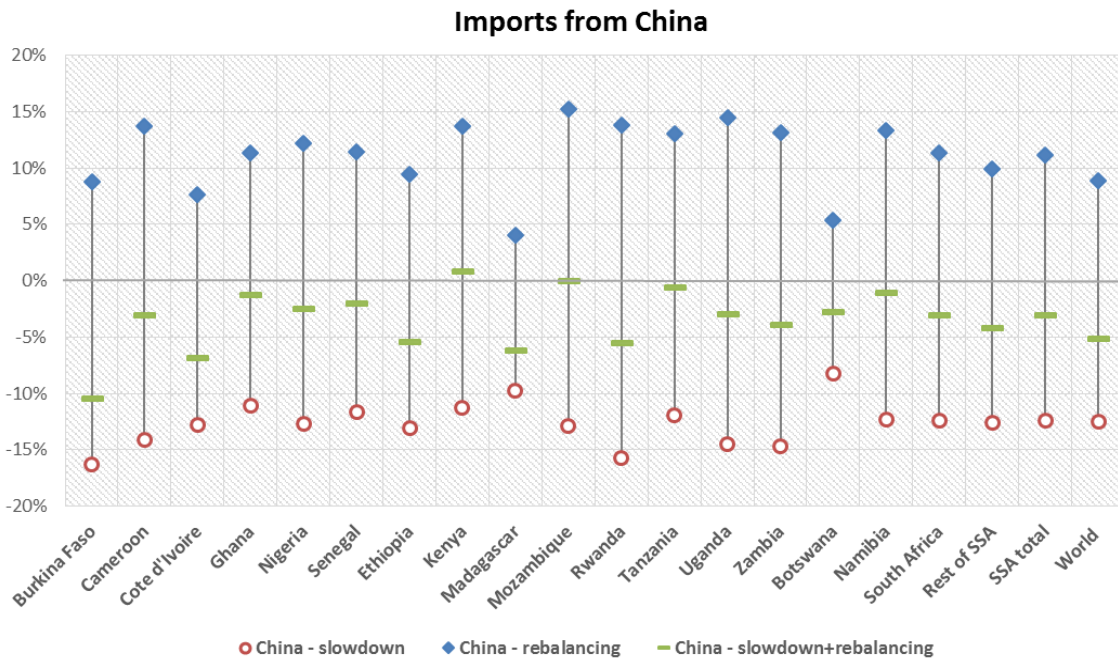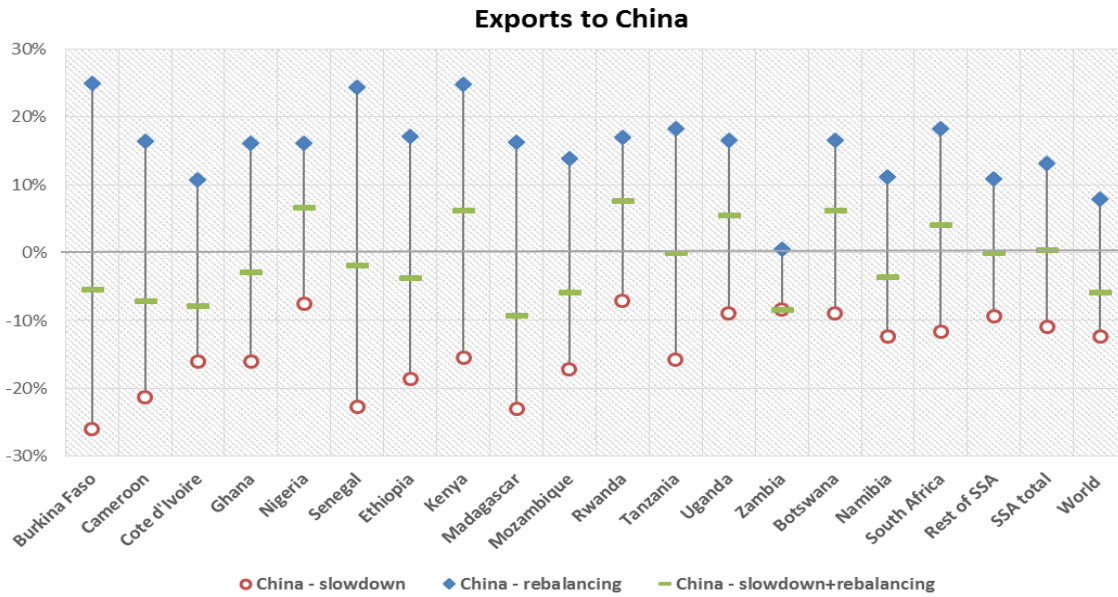
Source: LINKAGE simulations

Figure 8 Terms of trade effects (percent change relative to the past trends scenario)
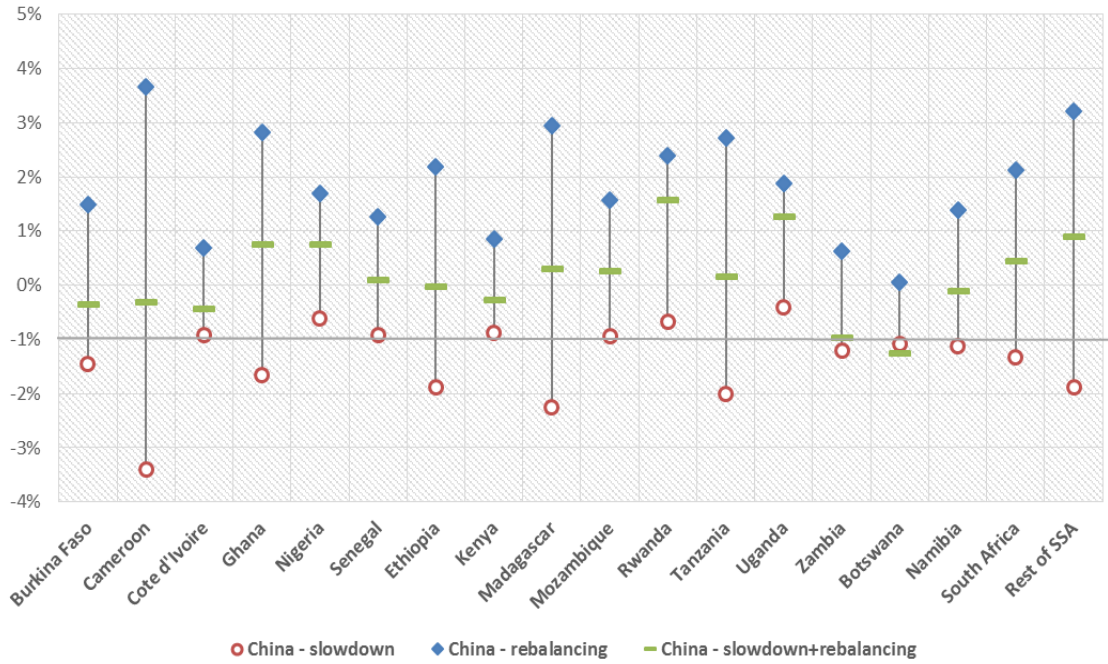
Source: LINKAGE simulations

Figure 9 World prices (percent change relative to the past trends scenario)

Source: LINKAGE simulations

4.5.   The impacts of China's slowdown and rebalancing

Finally, we consider the impacts of both slowdown and rebalancing. Our results indicate that China's transformation, if it entails substantial rebalancing, is expected to have an overall positive impact on the global economy and Sub-Saharan Africa. We find that the negative impacts of China's slowdown are outweighed by positive changes brought along by rebalancing, as it entails higher overall imports by China and positive terms of trade effects for exporters of agricultural 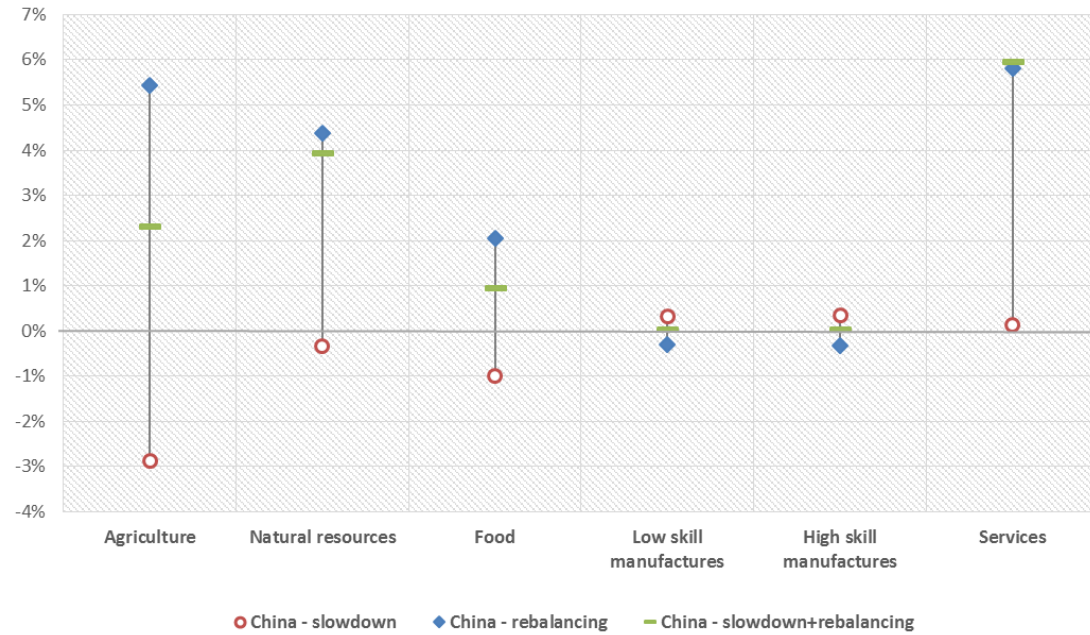commodities. The average annual slowdown of GDP in China by 1 percent results in a decline of GDP in Sub-Saharan Africa by 0.12 percent and 0.03 percent globally. However, if accompanied by a substantial rebalancing of the growth model as envisaged by the past trends scenario in World Bank (2014), the average annual growth rate could instead be higher on average by 0.34 percent in SSA and 0.36 percent globally. China's transformation is expected to be beneficial for both the rest of the world and for Sub-Saharan Africa with GDP gains of 4.8 percent and 4.7 percent relative to the past trends scenario by 2030.

Countries that benefit the most are the ones that enjoy the highest relative gains from China's rebalancing i.e. Kenya, Botswana, and Nigeria with 6.2 percent, 5.8 percent and 5.5 percent increase in GDP by 2030. Zambia—a big copper exporter—is shown to be the only SSA country that experiences small overall losses from China's transition. As the world price of these products declines as a result of China's switch from investment- to consumption-based growth model, terms of trade and GDP gains for Zambia are small in the rebalancing scenario.

5.   Poverty and inequality impacts

The analysis of the effects of these different scenarios on poverty and income distribution are carried out using the Global Income Distribution Dynamics (GIDD) model. The GIDD is a top-down macro-micro simulation framework, which distributes a consistent set of price and volume changes from a CGE model into household surveys (see Bussolo, De Hoyos, & Medvedev 2010 and Bourguignon and Bussolo 2013). Counterfactuals for income distribution are obtained by applying the following changes to the initial distribution observed on household level data: 1) demographic changes[9] (considering the age-gender structure and improvements in education); 2) sectoral employment relocation; 3) changes in relative wages across skills and sectors; 4) growth in consumption per capita; and 5) relative changes in food and non-food prices. Recent applications using LINKAGE and GIDD include the effect of agriculture distortions in the global economy (Dessus, Herrera, and de Hoyos 2008; Bussolo et al. 2009), the effect of global growth and income distribution (Bussolo et al. 2012), the effect of demographic change on Africa (Ahmed et al. 2014), and external and internal shocks in Africa (Devarajan et al. 2015).

We employ a large sample of 130 household surveys, covering approximately 90 percent of global population and global GDP. The GIDD model allows the analysis of macro shocks on the World Bank twin goals of reducing extreme poverty and promoting shared prosperity. Also, the richness of the micro data can provide insights regarding regional and demographic characteristics of the most affected households, which can be useful for defining contingent policies.

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[9] The GIDD methodology updates the household survey data for the end year of our simulation, 2030. This is done by re-weighting the population characterized by most recent available household survey in GIDD using non-parametric cross-entropy methods as in Wittenberg, (2010) keeping it consistent with the UN 2012 population projections

Figure 10 below decomposes changes in the past trends scenario into three components, which correspond to the micro-simulation framework. The starting point is the flat red line that corresponds to a distribution-neutral simulation from 2011 to 2030. In a distribution-neutral simulation, only change in per capita growth is applied. The second step corresponds to the demographic and structural changes (inter-sectoral labor shifts), marked with the letter *a*. In China, these changes benefit relatively households in the middle of the income distribution, while in SSA, demographic and structural changes slightly benefit households at the top of the income distribution. Third, households in the bottom 40 percent (B40) in China benefit from higher relative wages while household in SSA are hurt. This result is shown in Figure 10 via the movements from curves *a* to *b*. Finally, changes in relative prices of food to non-food will affect more drastically consumers in the lower part of the income distribution in both China and SSA. The final distributional effects from 2011 to 2030 are depicted with the growth incidence curves marked with letter *c*.

Figure 10 Growth Incidence Curves for China and SSA 2011 – 2030, Past trends scenario
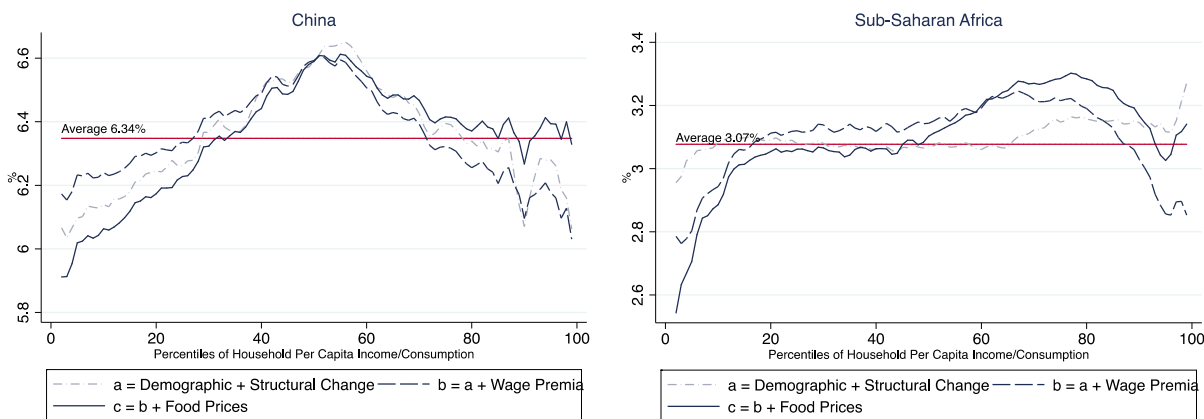
Source: Authors' calculations

In China, eradication of extreme poverty would be close to completion even under the most pessimistic assumptions. With an initial poverty headcount of 6.49 percent in 2012, the simulations suggest that even moderate per capita income growth would be sufficient to lift out of poverty the large majority of the remaining 87.4 million poor in China. Table 3 below reports initial and simulated poverty and shared prosperity indicators for each one of our scenarios. Under past trends scenario conditions, per capita income growth for B40 in China is expected to grow at an annual rate of 6.19 percent - slightly slower than the national average of 6.35 percent. The emergence of China's global middle class can be fully appreciated in Figure 11, which depicts the global distribution of income for 2012 and 2030, in the latter case for the slowdown and rebalance scenario. By 2030, 66.1 percent of the Chinese households would live with a per capita daily income between $10 to $50 a day, starting from 23.5 percent in 2012. In a global perspective, China would have a net contribution of 620 million to the global middle-class earning between $10 to $50 a day.

For the case of Sub-Saharan Africa, the prevalence of extreme poverty would be reduced from 43.73 percent in 2012 to 19.83 percent by 2030. During this period, SSA will experience a rapid population increase of 60 percent reaching 1.216 billion. Under the past trends scenario, approximately 333 million would still be living with less than PPP$1.90/day. Results also suggest that China's transformation is

expected to increase the income of B40 across SSA countries (Figure 12) and lower poverty by an additional 4.0 million by 2030 (Table 3). This net decrease results from two opposite trends. On the one hand, the isolated effect of "slowdown" increases extreme poverty in SSA (+2.45 million) while "rebalancing" helps to reduce it (-7.18 million). The combined effect of "slowdown" and "rebalancing" leans towards reducing poverty although the magnitude of these effects varies across countries depending mostly on trade-intensity with China. Despite the fact that extreme poverty would be halved by 2030 in SSA, a large proportion of the population would still be living under vulnerable conditions. With the combined effects of China's slowdown and rebalancing 64 percent of the total population in SSA, or 785 million, would be living with a daily income between PPP$1.90 and PPP$10.00 a day in 2030. Full set of country poverty and shared prosperity impacts is presented in Table C in the Appendix.

Figure 11 Global Income Distribution in 2011 and 2030
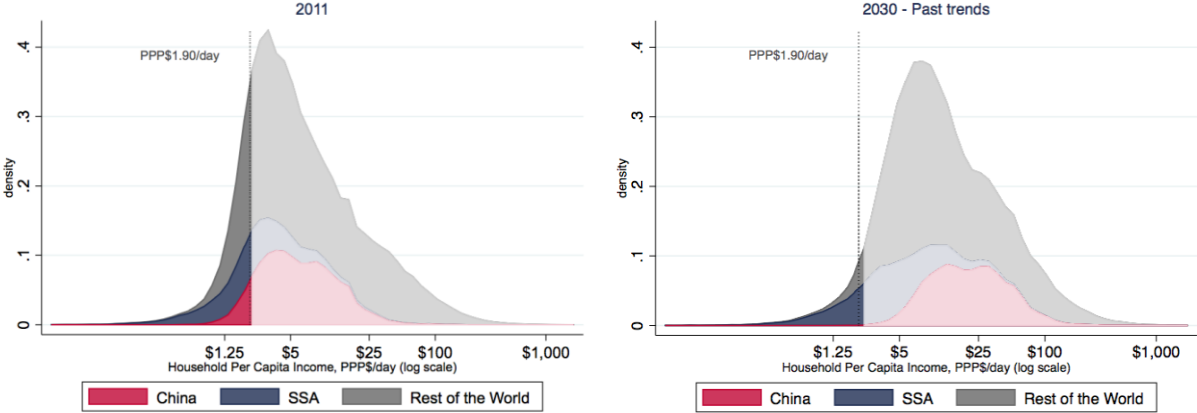
Source: Authors' calculations

Table 3 Poverty and Shared Prosperity Results

Indicator/Scenario	Initial*	Past trends	Slowdown	Rebal-ance	Slow + Rebal
Poverty Headcount* (PPP$1.90/day), %					
(Initial, past trends, and p.p. deviations w.r.t past trends)					
China	6.49	**0.07**	+0.02	-0.03	-0.03
*Sub-Saharan Africa**	*43.73*	*19.83*	*+0.20*	*-0.59*	*-0.33*
Poverty, millions					
(Initial, past trends, and p.p. deviations w.r.t past trends)					
China	87.44	**0.95**	+0.23	-0.38	-0.38
*Sub-Saharan Africa**	*332.83*	*241.19*	*+2.45*	*-7.18*	*-4.00*
Daily per capita income, PPP$					
(Initial, and annual % change 2011-2030)					
China	7.71	**6.35**	5.63	7.69	6.97
*Sub-Saharan Africa**	*3.71*	*3.53*	*+3.50*	*+3.63*	*+3.60*
Daily per capita income of B40, PPP$					
China	2.79	**6.19**	5.51	7.55	6.88
*Sub-Saharan Africa**	*1.22*	*3.33*	*+3.28*	*+3.43*	*+3.38*

* Based on countries with available household survey data and data from World Population Prospects (2012).

Figure 12 Bottom 40 percent in Africa could benefit from China's rebalancing

Per Capita Income of B40,
% change gains w.r.t. past trends
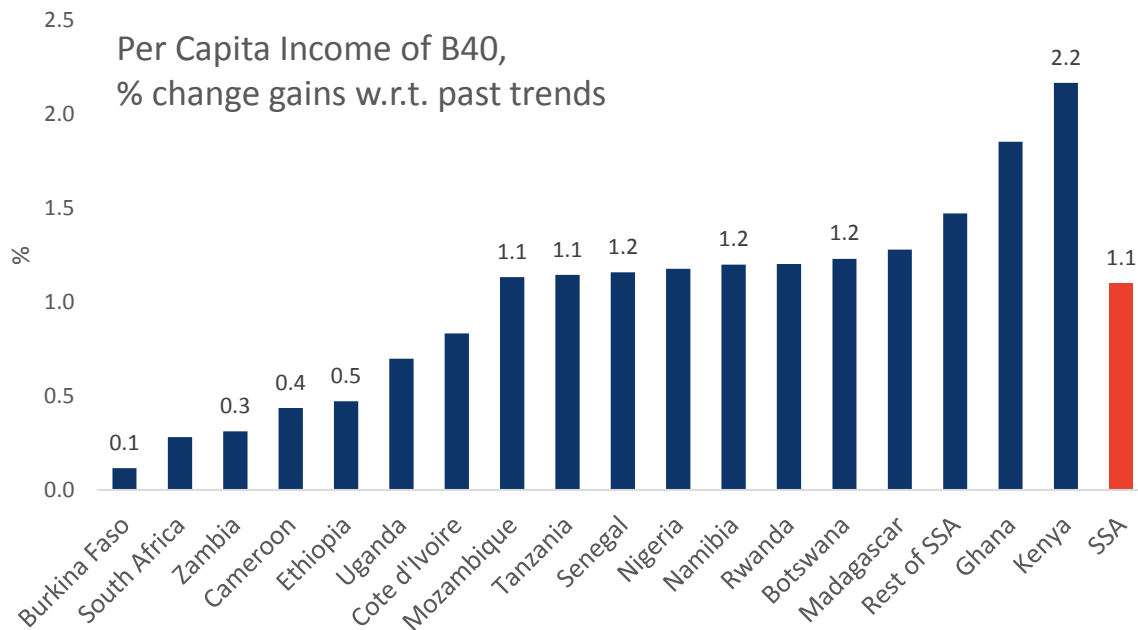
Source: Authors' calculations

6.   Conclusions

Given its importance in the global economy, the anticipated transformation of the Chinese economy will have important repercussions for the global economy as a whole with varying consequences for individual economies. The aim of this paper is to quantify the impact of a changing China on the rest of the world with a special focus on Sub-Saharan Africa and to disentangle the effects of China's predicted slowdown from the rebalancing away from investment towards domestic consumption. Results show that China's transformation, if it entails substantial rebalancing, is expected to have an overall positive impact on global economy and Sub-Saharan Africa, as the negative impacts of China's slowdown are expected to be outweighed by positive changes brought along by rebalancing. Overall, our results indicate that China's transformation could translate into GDP gains of 4.8 percent and 4.5 percent by 2030 relative to the past trends scenario for the rest of the world and Sub-Saharan Africa, respectively. Furthermore, rebalancing is shown to reduce the prevalence of poverty in SSA compared with the isolated negative effect of a slowdown, which increases the incidence of poverty. For SSA, the combined effect of slowdown and rebalancing leans towards poverty reduction but the extent of this intensity varies by country.

A closer look at the drivers of the heterogeneity in country level estimates points towards important policy implications. SSA countries have numerous policy options that will allow them to minimize the losses from China's slowdown and maximize the benefits of rebalancing. First, it is implied that the lack of diversification of production and exports may exacerbate negative terms of trade shocks. Policies that encourage diversification while at the same time supporting countries in their comparative advantages could be beneficial in tackling the negative impacts of China's slowdown. For resource-rich countries, these would imply for instance policies that support increasing the depth of processing of exports or developing services sectors. Economic policies that will boost SSA's gains from China's rebalancing relate to improving its integration in global value chains. As highlighted in IMF (2015), the quality of infrastructure is the most important impediment to the expansion of exports from the region, followed by governance and overall business climate and availability of credit for the private sector.

Results reported in this paper are novel in that they highlight that rebalancing in China is expected to have much more significant impacts on the rest of the world than the anticipated slowdown. In addition, the poverty and shared prosperity implications are uniquely derived. Future studies could focus on assessing the costs and benefits of various policy responses that could enhance benefits that countries could derive from the upcoming China transformation.

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Appendix

Table A.: Sectoral classification

Agriculture	Paddy rice, Wheat, Cereal grains nec, Vegetables, fruit, nuts, Oil seeds, Sugar cane, sugar beet, Plant-based fibers, Crops nec, Bovine cattle, sheep and goats, horses, Animal products nec, Raw milk, Wool, silk-worm cocoons, Forestry, Fishing
Natural resources	Coal, Oil, Gas, Minerals nec, Petroleum, coal products
Food products	Bovine meat products, Meat products nec, Vegetable oils and fats, Dairy products, Processed rice, Sugar, Food products nec, Beverages and tobacco products
Low skill manufacturing	Textiles, Wearing apparel, Leather products, Wood products, Mineral products nec, Ferrous metals, Metals nec, Metal products, Manufactures nec
High skill manufacturing	Paper products, publishing, Chemical, rubber, plastic products, Motor vehicles and parts, Transport equipment nec, Electronic equipment, Machinery and equipment nec
Services	Electricity, Gas manufacture, distribution, Water, Construction, Trade, Transport nec, Water transport, Air transport, Communication, Financial services nec, Insurance, Business services nec, Recreational and other services, Public Administration, Defense, Education, Health, Dwellings

Table B.: Regional classification

Burkina Faso	Burkina Faso
Botswana	Botswana
Cote d'Ivoire	Cote d'Ivoire
Cameroon	Cameroon
Ethiopia	Ethiopia
Ghana	Ghana
Kenya	Kenya
Madagascar	Madagascar
Mozambique	Mozambique
Namibia	Namibia
Nigeria	Nigeria
Rwanda	Rwanda
Senegal	Senegal
Tanzania	Tanzania United Republic of
Uganda	Uganda
South Africa	South Africa
Zambia	Zambia
Rest of Sub Saharan Africa	Benin, Guinea, Togo, Rest of Western Africa, Zimbabwe, Central Africa, South Central Africa, Malawi, Mauritius, Rest of Eastern Africa, Rest of South African Customs Union
China	China, Hong Kong

EU28 + EFTA	Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, United Kingdom, Switzerland, Norway, Rest of EFTA, Bulgaria, Croatia, Romania
United States of America	United States of America
Rest of high income	Australia, New Zealand, Japan, Korea Republic of, Taiwan, Singapore, Canada, Rest of North America, Russian Federation, Bahrain, Israel, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates
India	India
Rest of the world	Rest of Oceania, Mongolia, Rest of East Asia, Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Philippines, Thailand, Viet Nam, Rest of Southeast Asia, Bangladesh, Nepal, Pakistan, Sri Lanka, Rest of South Asia, Mexico, Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela, Rest of South America, Costa Rica, Guatemala, Honduras, Nicaragua, Panama, El Salvador, Rest of Central America, Dominican Republic, Jamaica, Puerto Rico, Trinidad and Tobago, Caribbean, Albania, Belarus, Ukraine, Rest of Eastern Europe, Rest of Europe, Kazakhstan, Kyrgyzstan, Rest of Former Soviet Union, Armenia, Azerbaijan, Georgia, Iran Islamic Republic of, Jordan, Turkey, Rest of Western Asia, Egypt, Morocco, Tunisia, Rest of North Africa, Rest of the World

Table C. Poverty and Shared Prosperity Results in China and SSA countries

Scenario definition	Initial	Past trends	Slowdown	Rebalance	Slowdown + Rebalance
Poverty Headcount (PPP$1.90/day), %					
(and p.p. deviations w.r.t past trends)					
01 China	6.49	**0.07**	0.02	-0.03	-0.03
02 Burkina Faso	46.48	**10.19**	0.30	-0.32	-0.15
03 Botswana	13.45	**4.19**	0.04	0.00	-0.02
04 Cote d'Ivoire	27.70	**2.55**	-0.01	-0.12	-0.05
05 Cameroon	27.05	**7.82**	0.58	-0.85	-0.10
06 Ethiopia	29.18	**5.75**	-0.17	-0.16	-0.30
07 Ghana	12.70	**4.83**	0.07	-0.15	-0.01
08 Kenya	25.78	**12.98**	0.13	-0.59	-0.54
09 Madagascar	82.15	**74.53**	0.58	-1.28	-0.65
10 Mozambique	62.03	**25.01**	-0.10	-0.89	-0.31
11 Namibia	19.68	**9.00**	-0.34	-0.61	-0.58
12 Nigeria	51.74	**17.53**	0.02	-0.28	-0.29
13 Rwanda	57.20	**29.17**	-0.42	-0.91	-0.47
14 Senegal	37.89	**30.60**	0.44	-0.99	-0.49
15 Tanzania	45.14	**20.10**	0.14	-0.65	-0.15
16 Uganda	33.38	**6.64**	0.28	-0.07	-0.07
17 South Africa	16.22	**7.43**	0.16	-0.27	-0.12
18 Zambia	62.21	**30.21**	1.13	-1.52	-0.06
19 Rest of SSA	57.80	**32.41**	0.51	-1.12	-0.57
Sub-Saharan Africa*	*43.73*	*19.83*	*0.20*	*-0.59*	*-0.33*
20 India	18.66	**0.60**	0.01	0.00	0.00
21 United States	1.85	**1.54**	0.00	-0.01	-0.01
22 Europe	1.95	**1.72**	0.00	0.00	0.00
23 Rest of High-Income	2.59	**1.81**	0.00	-0.03	-0.02
24 Rest of the World	10.47	**2.84**	0.05	-0.09	-0.10
Poverty, millions					
(and deviations w.r.t past trends, mills)					
01 China	87.44	**0.95**	0.23	-0.38	-0.38
02 Burkina Faso	7.43	**2.70**	0.08	-0.09	-0.04
03 Botswana	0.27	**0.10**	0.00	0.00	0.00
04 Cote d'Ivoire	5.37	**0.74**	0.00	-0.04	-0.02
05 Cameroon	5.70	**2.57**	0.19	-0.28	-0.03
06 Ethiopia	25.99	**7.86**	-0.24	-0.22	-0.41
07 Ghana	3.13	**1.70**	0.03	-0.05	0.00
08 Kenya	10.80	**8.57**	0.09	-0.39	-0.35
09 Madagascar	17.77	**26.71**	0.21	-0.46	-0.23
10 Mozambique	15.12	**9.62**	-0.04	-0.34	-0.12
11 Namibia	0.44	**0.27**	-0.01	-0.02	-0.02
12 Nigeria	84.94	**47.76**	0.06	-0.76	-0.78
13 Rwanda	6.36	**5.16**	-0.08	-0.16	-0.08
14 Senegal	5.04	**6.67**	0.10	-0.21	-0.11
15 Tanzania	20.88	**15.87**	0.11	-0.51	-0.12
16 Uganda	11.69	**4.18**	0.18	-0.04	-0.04
17 South Africa	8.33	**4.26**	0.09	-0.16	-0.07
18 Zambia	8.48	**7.51**	0.28	-0.38	-0.01
19 Rest of SSA	95.10	**88.94**	1.40	-3.07	-1.55
Sub-Saharan Africa*	*332.83*	*241.19*	*2.45*	*-7.18*	*-4.00*
20 India	226.14	**8.76**	0.19	-0.06	0.04
21 United States	5.60	**5.29**	0.00	-0.03	-0.03
22 Europe	10.08	**8.38**	0.00	-0.02	-0.02
23 Rest of High-Income	4.76	**3.53**	0.00	-0.05	-0.05
24 Rest of the World	191.84	**64.66**	1.03	-2.09	-2.16

Scenario definition	Initial	Past trends	Slowdown	Rebalance	Slowdown + Rebalance
Per capita Income, annual % change 2011 - 2030					
(and initial per capita income for 2011)					
01 China	234.58	**6.35**	5.63	7.69	6.97
02 Burkina Faso	88.36	**4.59**	4.56	4.66	4.63
03 Botswana	787.65	**5.54**	5.53	5.62	5.61
04 Cote d'Ivoire	133.41	**6.27**	6.26	6.35	6.33
05 Cameroon	130.69	**2.65**	2.60	2.76	2.70
06 Ethiopia	112.88	**3.63**	3.62	3.68	3.67
07 Ghana	219.51	**2.83**	2.81	2.97	2.93
08 Kenya	145.12	**2.51**	2.50	2.68	2.66
09 Madagascar	41.29	**0.99**	0.94	1.14	1.08
10 Mozambique	78.09	**6.48**	6.46	6.58	6.56
11 Namibia	362.23	**3.12**	3.09	3.19	3.16
12 Nigeria	74.99	**4.44**	4.44	4.52	4.52
13 Rwanda	97.32	**3.54**	3.54	3.59	3.59
14 Senegal	100.50	**0.87**	0.85	0.97	0.94
15 Tanzania	97.21	**2.54**	2.51	2.64	2.61
16 Uganda	107.96	**4.19**	4.19	4.26	4.26
17 South Africa	279.88	**2.50**	2.47	2.61	2.57
18 Zambia	86.69	**4.12**	4.09	4.14	4.10
19 Rest of SSA	83.88	**3.01**	2.96	3.16	3.10
Sub-Saharan Africa*	*112.70*	*3.53*	*3.50*	*3.63*	*3.60*
20 India	115.61	**4.77**	4.77	4.82	4.82
21 United States	2,343.00	**2.01**	1.99	2.08	2.06
22 Europe	1,017.48	**1.63**	1.62	1.71	1.70
23 Rest of High-Income	1,066.19	**2.21**	2.19	2.27	2.25
24 Rest of the World	415.99	**3.09**	3.05	3.19	3.15
Per capita Income of B40%, annual % change 2011 - 2030					
(and initial per capita income pf B40% for 2011)					
01 China	84.94	**6.19**	5.51	7.55	6.88
02 Burkina Faso	33.15	**4.54**	4.47	4.63	4.54
03 Botswana	84.44	**6.04**	6.01	6.11	6.11
04 Cote d'Ivoire	46.63	**6.02**	5.99	6.09	6.06
05 Cameroon	49.52	**2.72**	2.62	2.85	2.75
06 Ethiopia	49.32	**2.66**	2.64	2.73	2.68
07 Ghana	74.48	**2.61**	2.60	2.75	2.71
08 Kenya	48.92	**2.00**	1.96	2.12	2.11
09 Madagascar	15.64	**1.19**	1.10	1.34	1.26
10 Mozambique	16.13	**6.01**	6.01	6.18	6.07
11 Namibia	58.22	**2.56**	2.55	2.68	2.62
12 Nigeria	26.03	**4.48**	4.46	4.55	4.54
13 Rwanda	24.89	**3.06**	3.06	3.16	3.12
14 Senegal	40.45	**0.71**	0.67	0.82	0.77
15 Tanzania	32.11	**2.19**	2.15	2.30	2.25
16 Uganda	45.06	**3.45**	3.36	3.50	3.49
17 South Africa	62.35	**2.87**	2.75	3.02	2.89
18 Zambia	19.49	**4.27**	4.20	4.37	4.28
19 Rest of SSA	29.18	**3.02**	2.95	3.16	3.09
Sub-Saharan Africa*	*37.04*	*3.33*	*3.28*	*3.43*	*3.38*
20 India	57.65	**4.33**	4.33	4.38	4.38
21 United States	703.63	**2.04**	2.02	2.12	2.11
22 Europe	504.06	**1.59**	1.58	1.67	1.65
23 Rest of High-Income	318.17	**2.40**	2.39	2.47	2.45
24 Rest of the World	129.61	**3.13**	3.09	3.23	3.19

Source: Authors' calculations. Aggregate results based on available household surveys