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African greenfield investment and the likely effect of the African Continental Free Trade Area

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Working Paper 387

**African greenfield investment and the
likely effect of the African Continental
Free Trade Area**

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INDIAN COUNCIL FOR RESEARCH ON INTERNATIONAL ECONOMIC RELATIONS

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Abstract

Using sector-level data on bilateral greenfield investment for 198 source and destination countries over 2003-2018 in a structural gravity model, we examine the likely effect of the African Continental Free Trade Area (AfCFTA) on African investment. Conditional general equilibrium estimates from counterfactual analysis show that the stock of intra-African greenfield investment in 2018 would have increased by 14 percent from a successful implementation of the AfCFTA in that year relative to the baseline scenario of no agreement. Exploring possible transmission channels for the investment- enhancing effect of the AfCFTA, we find the intra-African trade elasticity of greenfield investment to be positive, including for intermediates, especially in host countries with strong governance indicators. However, the effect of regulatory cooperation via bilateral investment treaties is found to be negative. This suggests that trade liberalization under the AfCFTA is more likely to foster intra-African investment via its positive effect on intra-African trade.

Key words: *Africa, greenfield investment, fDI Markets, AfCFTA, gravity model, conditional GE, counterfactual analysis, transmission channels*

JEL classification: *E22, F21*

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African greenfield investment and the likely effect of the African Continental Free Trade Area

Anirudh Shingal* and Maximiliano Mendez-Parra†

1 Introduction

Attracting foreign direct investment (FDI) is a significant policy priority for Africa. FDI is a source of employment and capital for the domestic economy. FDI is also often accompanied by new technologies and innovations, and is thus, a potentially important source of productivity growth, helping domestic industries in the host countries catch up with the international technology frontier.

African countries share an ambitious agenda to transform their economies by increasing the share of manufacturing in GDP, trade and employment. At the same time, they look actively to build on their young population to lead developments in services and the digital economy. Facilitating economic transformation exclusively on a growing population presents problems. Productivity will not rise (and real incomes will remain low) if labour is not matched with large volumes of capital. But in addition, African firms also need to transform, adopting more productive and efficient production techniques and management, increasing their links with global firms. Therefore, attracting and facilitating investment and removing barriers that constrain it is critical to the process of economic transformation.

Traditionally, African countries used to attract FDI primarily from their former colonial powers. This has begun to change in the last twenty years as China, India, Russia and other emerging economies are becoming major investment partners for many African countries. However, some patterns remain unchanged. Whether from former metropolises or from emerging economies, FDI into Africa tends to be located primarily in extractives. FDI into other sectors has been much more limited, affected by the lack of comparative advantage in these sectors and/or the existence of barriers that constrain it.

To circumvent these challenges, African countries aimed to create synergies amongst themselves and develop regional value chains by launching a major political process to negotiate and implement the African Continental Free Trade Area (AfCFTA) in January 2012. The AfCFTA seeks to foster continental cooperation and the removal of trade and investment barriers among its members. The first phase of the AfCFTA involves the creation of a free trade area (FTA) among African countries with disciplines covering trade in goods and services as well as dispute settlement.

The Agreement Establishing the AfCFTA entered into force on 30 May 2019 for 24 of the 55 African Union countries that had deposited their instruments of ratification. While 29 African countries have both signed and ratified the AfCFTA Agreement and only one country - Eritrea - is yet to sign the Agreement, trading under the AfCFTA is expected to begin on 1 July 2020. Meanwhile, negotiations into the second phase will involve adding more elements

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of deep integration to the AfCFTA by agreeing on provisions that will address intellectual property rights, competition policy and investment.

Against this background, the paper estimates a structural gravity model to examine the likely effect of the AfCFTA on African investment. In doing so, the paper adds to the literature examining the FDI-trade agreement and FDI-bilateral investment treaty relationships with its focus on Africa. While recent analysis on these subjects includes non-OECD countries (for instance see te Velde and Bezemer, 2004; Buge, 2014; Chala and Lee, 2015), this work is not centred on Africa.

To the best of our knowledge, this is also the only study that examines the likely effect of the AfCFTA on African investment. It uses conditional general equilibrium (GE) analysis to examine the likely effect of the AfCFTA, which is another original empirical contribution of this paper. Conditional GE estimates from counterfactual analysis following Larch and Yotov (2016) show that the stock of intra-African greenfield investment in 2018 would have increased by 14 percent from a successful implementation of the AfCFTA in that year relative to the baseline scenario of no agreement, with heterogeneity across both source and destination countries.

The paper also explores possible transmission channels for the investment-enhancing effect of the AfCFTA. In doing so, it examines the effect of bilateral trade, including trade in intermediates, on bilateral investment merging trade, value added and investment data sets at the disaggregated sector-level. While existing literature has studied the trade-FDI relationship extensively, and recent work includes non-OECD countries (for instance see Tekin, 2012; Were, 2015), the results are based on aggregate data. In contrast, our analysis, based on bilateral sector-level data for 198 source and destination (both OECD and non-OECD) countries¹ phased over 2003-2018, is another novel contribution.

Our results show a 10 percent rise in disaggregated bilateral imports (exports) to be associated with a 3 percent increase in disaggregated inward (outward) bilateral greenfield investment for the full sample and a 10 percent rise in disaggregated bilateral exports (imports) to be associated with a 1.8 percent increase in disaggregated inward (outward) bilateral greenfield investment; the intra-African trade elasticity of bilateral investment is found to be larger at 0.65 and 0.62, respectively. The within-Africa elasticities are found to be significant for trade in intermediates as well; for instance, a 10 percent rise in the demand for intermediates is found to be associated with a 14.4 percent increase in outward greenfield investment. On the supply-side, the intra-African elasticities range from 0.48 for outward to 0.45 for inward greenfield investment.

¹The country sample is reported in Annex table 1.

In contrast, the effect of regulatory cooperation via bilateral investment treaties (BITs) is found to be negative, which is consistent with the findings in Osnago et al. (2019). These results suggest that liberalization under phase one of the AfCFTA is more likely to foster intra-African investment via its positive effect on intra-African trade. At the same time, the within-Africa trade elasticities are found to be larger for host countries with stronger governance indicators, suggesting that any regulatory improvements emanating from the implementation of the AfCFTA are also likely to attract more investment.

Given the absence of publicly available bilateral and disaggregated data on African investment, the paper also adds value by providing a granular analysis of announced greenfield investment projects in Africa. It presents stylized facts on trends, partner and sector composition before and after the global financial crisis, using fDI Markets, a firm-level database maintained by the Financial Times. In the process, the paper identifies commonalities and differences that exist between greenfield investment from within Africa and that from its traditional and new partners outside the continent.

In a departure from most existing literature, the paper also looks at Africa as an investor. If the AfCFTA aims to foster intra-African investment, it is necessary to consider the process from the perspective of both the recipient and the investor. Moreover, development literature suggests that the effects of outward FDI from emerging economies can be considerably more positive as the characteristics of South–South investments are more likely to generate linkages with local firms that are expected to foster greater positive effects than investments from industrialised countries. These effects emanate from the smaller technology gaps between the emerging market investor and local firms in host countries and from the shorter institutional and psychic distance between partners which eases the localisation of business practices.

The remainder of the paper is structured as follows. Section 2 documents some of the vast literature on FDI in Africa, putting the present paper in context. Section 3 presents aggregate and regional trends on inward and outward African FDI using data from the 2019 World Investment Report while Section 4 presents bilateral and sectoral analysis based on the fDI Markets database. Section 5 discusses the empirical methodologies used to examine the investment effect of the AfCFTA and to explore possible transmission channels. Section 6 discusses the results from empirical estimations and Section 7 concludes.

2 Related literature

This paper is related to five different strands of the existing empirical literature. These include extant work on (i) the determinants of African FDI including descriptive statistical

evidence on investment in the continent; (ii) the relationship between preferential trade agreements (PTAs) and FDI; (iii) the relationship between BITs and FDI; (iv) the likely effects of the AfCFTA; and (v) the relationship between trade and FDI.

There is a vast empirical literature on FDI in Africa, which includes both cross-country and individual country case studies.² Most of this work is on the determinants of FDI in Africa (for instance see Morisset, 2000; Asiedu, 2002, 2004, 2006; Basu and Srinivasan, 2002; Bende-Nabende, 2002; Lemi and Asefa, 2003; Onyeiwu and Shrestha, 2004; Akinkugbe, 2005; Yasin, 2005; Dupasquier and Osakwe, 2006; Naudé and Krugell, 2007; Breslin and Samanta, 2008; Rojid et al. 2009; Hailu, 2010; Loots and Kabundi, 2012 for cross-country studies; and the compendium by Ajayi, 2006 for country-specific work on Botswana, Cameroon, Ghana, Kenya, Nigeria, South Africa, and Uganda). A review of this literature shows that market size and growth, openness of the economy, availability of natural resources, human capital costs and skills, political and economic stability, institutional quality and availability of good infrastructure are the major determinants of FDI in Africa.

A recent offshoot of this strand of literature examines the determinants of Chinese outward investment in Africa (for instance see Yao, 2008; Ajakaiye and Kaplinsky, 2009; Bräutigam et al. 2010; Cheung et al. 2011; Shen, 2013). Compared to the general findings above, the market-seeking motive, the risk factor, the resources-seeking motive and pre-existing economic links between Africa and China in the form of trade and contracted projects are found to be more important determinants of Chinese investment in the continent.

In contrast to the vast literature on inward FDI in Africa, outward investment from the continent remains largely unstudied, given its relative unimportance. There is some work that explores the subject, but only tangentially, mostly in the context of South African investment in the rest of Africa (for instance see Foster-McGregor et al. 2014).

Against this background, the present paper contributes to the literature by providing an in-depth analysis of both inward and outward African greenfield investment, by source and destination countries within and outside the continent, disaggregated by sectors and over time to compare pre- and post-crisis periods.

To the best of our knowledge, this is also the only study that examines the likely effect of the AfCFTA on both inward and outward African greenfield investment. Extant work on the effects of AfCFTA has studied trade (Obida, 2019), the labour market (Lungu, 2019) and trade facilitation (Magwape, 2018), but not investment. A recent IMF study (Abrego

²For an early review see the compendium by Ajayi (2006) that surveys both cross-country and country-specific work on the determinants, impact and potential of FDI in Sub-Saharan Africa.

et al. 2019) examines the general equilibrium effects of the AfCFTA but does not focus on investment.

In examining the investment effect of the AfCFTA, the paper also adds to the literature examining the FDI-PTA and FDI-BIT relationships. While most early empirical work on these subjects was for OECD countries (see Jang, 2011 for a review), subsequent analysis has also begun to include non-OECD countries (for instance see te Velde and Bezemer, 2004; Buge, 2014; Chala and Lee, 2015), though it does not focus on Africa. Most of the latter studies find positive effects of these policy instruments on FDI (mostly vertical investment) between high and low-cost/technology countries but not on intra-OECD investment (which is mostly horizontal). The positive effect of the AfCFTA on intra-African greenfield investment in our findings thus suggests that this investment may be more vertical than horizontal.

More recently, Osnago et al. (2017, 2019) have also examined the effect of deep integration on vertical FDI. Their analysis suggests that the depth of trade agreements is correlated with vertical FDI and that the relationship is driven by provisions that improve the contractibility of inputs provided by suppliers (such as standards), while provisions that increase the contractibility of headquarter services (such as intellectual property rights and investment protection) are found to be negatively correlated with foreign investment. The latter is also consistent with the findings in this paper on the negative effect of regulatory cooperation via BITs on intra-African greenfield investment.

This paper also explores possible transmission channels for the investment-enhancing effect of the AfCFTA. In doing so, it examines the effect of disaggregated bilateral trade, including trade in intermediates, on disaggregated bilateral investment. While existing literature has studied the trade-FDI relationship extensively, and recent work includes non-OECD countries (for instance see Tekin, 2012; Were, 2015), the results are based on aggregate data. In contrast, our analysis is based on bilateral sector-level data on 198 source and destination (both OECD and non-OECD) countries phased over 2003-2018, which is another contribution to the empirical literature.

3 Inward and outward African FDI: aggregate and regional trends

According to UNCTAD data published in the 2019 World Investment Report, the total stock of inward FDI in Africa in the year 2018 was USD 894.7 bln, which was 2.8 percent of global FDI stock of USD 32.3 trillion in that year. This share was higher than in 2000 (2.1 percent) but lower than in 2010 (3.0 percent). Meanwhile, the stock of outward African FDI in 2018

was significantly lower at USD 318 bln; this was 1 percent of the global FDI stock in that year, but double the respective share in 2000.

Figure 1 shows a breakdown of the stock of inward FDI in Africa over time by geographical regions³ following UNCTAD's classification in the World Investment Reports. While Southern, North and West African countries were the largest recipients of inward FDI in Africa in 2000 and 2010, followed by East and Central African countries, North African countries have been the dominant recipients since then. North Africa accounted for 31.8 percent of total inward FDI in Africa in 2018, followed by countries in Southern (26.1 percent), West (21.8 percent), East (10.2 percent) and Central (10.2 percent) Africa. This points to a diversified pattern of FDI destinations in the continent as opportunities to invest seem to appear in every region. This said, despite the increase in investment in all African regions, they and Africa in general, remain a marginal destination for FDI at the global level, accounting for just 2.8 percent of the total flows.

<Insert Figure 1 here>

Figure 2 shows a breakdown of the stock of outward African FDI over time by geographical regions. Southern Africa (primarily South Africa) is by far the largest source of FDI out of Africa and has become even more important over time; it accounted for 75.3 percent of African outward FDI in 2018 higher than the 70.1 percent share in 2000. North and West Africa are the other major regional sources of outward FDI and while their respective shares have risen and declined over time respectively, cumulatively they accounted only for a fifth of African outward FDI in 2018. Thus, the distribution of outward African FDI is very concentrated regionally and while most of it originates from South Africa, this investment was mostly destined within the continent during the last five years, as the analysis in the following section will show.

<Insert Figure 2 here>

Unfortunately, UNCTAD FDI data do not provide a bilateral breakdown of investment beyond 2012 or bilateral information on investment at the sector-level to enable more granular

³The regional groupings are as follows: **North** - Algeria, Egypt, Libya, Morocco, Sudan and Tunisia; **Southern** - Botswana, Eswatini (Swaziland), Lesotho, Namibia and South Africa; Central - Angola, Cameroon, Central African Republic, Chad, Congo, Dem. Rep. of the Congo, Equatorial Guinea, Gabon and Sao Tome and Principe; **East** - Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, South Sudan, Uganda, United Republic of Tanzania, Zambia and Zimbabwe; and **West** - Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Saint Helena, Senegal, Sierra Leone and Togo.

analysis. We therefore consider an alternative source of investment data - fDI Markets, which is a database on announced cross-border greenfield investment projects maintained by the Financial Times. These data cover 200 source and destination countries and 39 goods and services sectors over 2003-2018, enabling both bilateral and sectoral analysis of announced inward and outward greenfield investment, in and from Africa.

However, fDI Markets does not specify whether an announced greenfield investment project has been implemented. To that extent, some of the data may overestimate the value of greenfield investment and influence the position of individual source and recipient countries and sectors in the analysis that follows.

Another limitation of fDI Markets is that it only covers greenfield investment. According to the 2018 World Investment Report, announced greenfield investment (USD 720 bln) accounted for 50 percent of total global FDI (USD 1.43 trillion) in 2017, with the value of net cross-border mergers & acquisitions (M&A; USD 694 bln) making up for another 48.5 percent. M&A activity is thus not included in the analysis that follows, which is likely to influence some of the patterns that are observed in this paper. To that extent, our analyses may not be representative of the complete FDI picture in Africa, but that is another data limitation that we cannot circumvent in this paper.

This said, greenfield investment is the component of FDI that involves construction of new facilities by the home country in the host country and is thus more likely to be associated with transfer of knowledge/managerial skills and creation of job opportunities, in contrast to M&A activity where the market just gets consolidated for financial considerations from a firm perspective. Thus, the analysis that follows and findings from this work are likely to have more significant implications for economic growth and structural transformation of African countries.

4 Granular analysis

The raw data from fDI Markets report the value of announced greenfield investment projects in USD million between source and destination countries by sector at the monthly level over 2003-2018. These data have been aggregated annually to enable the analysis that follows. The reported data suggest that the total value of the 10734 announced greenfield investment projects in Africa over 2003-2018 was USD 1.16 trillion (Figure 3 shows the distribution of these projects over time), which exceeds the total stock of inward African FDI (USD 894.7 bln) in 2018 from UNCTAD data. Even the value of total FDI inflows in Africa in 2018 (USD 45.9 bln) according to UNCTAD data is significantly lower than the value

of announced greenfield investment projects in that year (USD 75.7 bln) as reported by fDI Markets. Since fDI Markets does not specify whether an announced project has been implemented, it overestimates the value of inward investment in the African continent.

<Insert Figure 3 here>

4.1 Direction of African greenfield investment over time

With this caveat in mind but appreciating that fDI Markets is the only source of bilateral and disaggregated investment data post-2012, Table 1 reports the top ten recipients of greenfield investment in Africa from within Africa and the rest of the world (ROW). The table reports cumulative investment over three time periods - 2003-2008, 2009-2013 and 2014-2018 - to enable both temporal and pre- and post-crisis analysis. Total greenfield investment in Africa from ROW fell slightly from USD 345 bln (cumulative 2003-08) to USD 338 bln (cumulative 2014-18) while the magnitude of intra-African investment nearly doubled from USD 18.2 bln (cumulative 2003-08) to USD 34.6 bln (cumulative 2014-18). Even so, the magnitude of intra-African greenfield investment pales in comparison to the magnitude of inward investment from ROW, though the latter has not regained the pre-crisis levels. It is also important to highlight that intra-African investment as a whole has contributed to the rise of greenfield investment in the continent more than any other individual ROW partner barring China.

<Insert Table 1 here>

Table 1 shows that Egypt is the largest recipient of greenfield investment from ROW over time; in fact, its share in total inward greenfield investment in Africa more than doubled from 15.4 percent over cumulative 2003-08 to 31.8 percent over cumulative 2014-18. The share of the top ten recipients of greenfield investment in the total also increased from 76 percent in the first five years to 84.6 percent in the last five, suggesting that the distribution of recipients may have become more concentrated. The recipient distribution also seems to have become less regionally concentrated over time; North African countries comprised at least half of the top ten recipients over 2003-2013 but not so during the last five years.

Meanwhile, Nigeria and Mozambique have been amongst the top three largest recipients of intra-African greenfield investment over time; in fact, their share in total intra-African greenfield investment increased from 20.3 percent over cumulative 2003-08 to 25.3 percent over cumulative 2014-18. The share of the top ten intra-African recipients of greenfield

investment in the total declined from 82 percent in the first five years to 72.8 percent in the last five, suggesting that this distribution of recipients may have become less concentrated. The intra-African recipient distribution also seems to be more geographically dispersed than the distribution of recipients of investment from ROW.

In this sense, while there are traditional recipients of large volumes of greenfield investment (Egypt, Nigeria, South Africa, Mozambique, Morocco, and Algeria), one also observes the emergence of new recipients such as Ethiopia and Kenya. Moreover, while there are similitudes between the composition of recipients of intra- and extra-African greenfield investment, there are also some important differences. South Africa, for example, is not an important destination for intra-African greenfield investment, while Ethiopia, Rwanda and Zambia appear more attractive to other African investors.

Following the structure of Table 1, Table 2 reports the top ten global and African sources of greenfield investment in Africa based on data in fDI Markets. The table shows that the US, UK and UAE were the top three global sources of inward greenfield investment into Africa over 2003-2013. However, China has become the largest source over the last five years, accounting for nearly a fifth of total global investment in the continent, followed by Russia, owing primarily to a USD 30 bln announced investment project in Egypt’s coal, oil and gas sector in December 2017.⁴ The share of the top ten global sources of greenfield investment in the total also fell slightly from 75 percent in the first five years to 72 percent in the last five, suggesting that the distribution of investment sources may have become somewhat less concentrated. Significantly, India was amongst the top ten sources over 2003-2013 but has dropped out of the list in the last five years.

<Insert Table 2 here>

Table 2 presents another well-established fact about the origin of greenfield investment in Africa. Traditional greenfield investors such as the UK, France and Germany are ceding space to new greenfield investors from emerging economies such as China and Russia. Moreover, the volumes of greenfield investment from non-African sources, barring China, have declined from USD 327 bln (cumulative 2003-08) to USD 275 bln (cumulative 2014-18).

⁴According to information in fDI Markets, reported in December 2017, Rosatom (Russia) is investing USD 30 mln in the city of El Dabaa (Matruh), Egypt in the coal, oil & gas sector in an electricity project. Russia-based nuclear power corporation, Rosatom, will build a new USD 30 bln power plant in El Dabaa, Egypt as part of a joint venture with Egyptian authorities. The project will comprise four water-water energetic reactor (VVER) 1200 units, each with a capacity of 1200MW. The first unit of the 4800MW plant is to be commissioned in 2026 and will serve the local market.

In the case of intra-African greenfield investment, although there is some overlapping between investors and recipients, there are also important differences. The top three intra-African greenfield investors do not appear in prominent positions among the top intra-African greenfield investment recipients. This suggests the emergence of large greenfield investors and large recipients of intra-African greenfield investment that replicates the type of pattern that exists globally.

Table 2 also shows that South Africa is the largest source of intra-African greenfield investment over time, though its share in total intra-African greenfield investment fell from 38 percent over cumulative 2003-08 to 30 percent over cumulative 2014-18. The source distribution of intra-African greenfield investment is also very concentrated with the top two sources accounting for 60 percent and the top ten sources accounting for 95 percent of total intra-African greenfield investment over time. The source distribution of intra-African greenfield investment also seems to have become less regionally concentrated over time; North African countries comprised four of the top ten sources over 2003-2013 but Southern African countries seem to have become more important sources of intra-African greenfield investment since then.

Finally, Table 3 reports the top 10 global sources of and destinations for outward greenfield investment from Africa. The first striking stylized fact relates to the magnitude of outward greenfield investment from Africa that nearly halved from USD 28.9 bln (cumulative 2003-08) to USD 14.9 bln (cumulative 2014-18). In comparison, the magnitude of intra-African investment nearly doubled from USD 18.2 bln (cumulative 2003-08) to USD 34.6 bln (cumulative 2014-18) pointing to the growing importance of African countries as preferred destinations for outward greenfield investment from Africa.⁵

<Insert Table 3 here>

The table also shows that South Africa is the largest source of outward greenfield investment from Africa over time, though its share in the total nearly halved from 81 percent over cumulative 2003-08 to 42 percent over cumulative 2014-18. The source distribution of outward greenfield investment is also very concentrated with the top ten sources accounting for almost the full total. The source distribution of outward greenfield investment also seems to have become more regionally concentrated over time with North African countries comprising five of the top ten sources during the last five years.

⁵Note that Dangote Group, a Nigerian conglomerate, accounted for 65 percent of cumulative intra-African greenfield investment from Nigeria over 2003-18. This suggests that while intra-African greenfield investment may have doubled over time, including at the expense of outward greenfield investment in ROW, the source of this investment may be extremely concentrated. This may have implications for the sustainability of this investment source as a contributor to the economic development of Africa.

Outward greenfield investment from Africa has been primarily destined to the Middle-east, emerging economies and the UK over time; the US was a top ten destination over 2003-2013 but not during the last five years. India seems to have become more important as a destination over time while the importance of China seems to have declined. The distribution of outward greenfield investment also seems to have become more diversified – the share of the top ten destinations in the total fell sharply from 90 percent over 2003-2013 to 60 percent over 2014-2018.

The fall in outward African greenfield investment in ROW is almost offset by the rise of intra-African greenfield investment. This highlights the importance of the continent as a destination for greenfield investment by African countries. At the same time, it highlights the low degree of diversification of the portfolios of African greenfield investors as more of their flows are placed in a single region.

4.2 Sectoral composition of African greenfield investment over time

Table 4 reports the top ten sectors of inward global and intra-African greenfield investment obtained by aggregating the raw data in FDI Markets by sector and year for the respective dyads. The table again reports cumulative investment over three time periods to enable temporal and pre- and post-crisis analysis: 2003-2008, 2009-2013 and 2014-2018. The table shows that coal, oil and gas; real estate; and the metals sectors have been the largest recipient of greenfield investment from ROW over time though their share in total inward greenfield investment in Africa declined from 74 percent over cumulative 2003-08 to 55.6 percent over cumulative 2014-18. The share of the top ten sectors of inward greenfield investment in the total also fell from 90.6 percent in the first five years to 85.7 percent in the last five, suggesting that the sectoral distribution may have become less concentrated. Significantly, nine of the top ten sectors attracting greenfield investment in Africa from ROW were common over the three time periods, suggesting persistence in the sectoral distribution and the absence of a diversified portfolio of sectors attracting global investment.

<Insert Table 4 here>

Meanwhile, the top ten sectors attracting greenfield investment from within Africa show some presence of services such as business and financial services, though metals; coal, oil and gas; and real estate also remain the largest recipients of intra-African greenfield investment over the three different time periods. The top ten sectors attracting greenfield investment from

within Africa also show persistence over time and a similar lack of a diversified sectoral portfolio.

Finally, Table 5 reports the top 10 sectors of outward greenfield investment from Africa based on data in fDI Markets. The table shows some clear differences in the choice of sectors for inward and outward investment, with paper, printing and packaging; consumer products; and software and IT services figuring as preferred sectors for outward investment from Africa. The share of the top ten sectors of outward greenfield investment in the total also fell from 93 percent in the first five years to 88 percent in the last five, suggesting that the sectoral distribution may have also become less concentrated. Moreover, the services sectors seem to have attracted more outward greenfield investment from Africa in the last five years compared to the decade before that.

<Insert Table 5 here>

5 Examining the investment effect of the AfCFTA

Existing literature has examined the effects of PTAs on investment of member countries from both theoretical (Ekholm et al. 2007; Kim, 2009; Tekin-Koru, 2011) and empirical (Levy-Yeyati et al. 2003; Baltagi et al. 2008; Jang, 2011; Berger et al. 2013; Buge, 2014; Chala and Lee, 2015) perspectives. This literature suggests that while trade liberalization and reduction of trade costs within a trade-bloc may deter “tariff-jumping” horizontal investment (Baltagi et al. 2008; Kim, 2009; Tekin-Koru, 2011) that typically occurs between home and host countries with similar skills and factor proportions, it may have a positive effect on vertical investment, especially when the agreement binds high and low cost economies (Ekholm et al. 2007; Chala and Lee, 2015) or those with significant differences in factor proportions (Levy-Yeyati et al. 2003) and skills (Jang, 2011). In contrast, the impact of regional integration in the “knowledge-capital” model of investment (Carr et al. 2001) is less clear-cut as this involves both horizontal and vertical investment.

While the effects are therefore likely to differ amongst African countries, there are several channels by which the AfCFTA could enhance intra-African investment. In the first phase, the AfCFTA seeks to liberalize goods and services trade amongst African countries. A positive effect of this liberalization on intra-African trade is likely to foster intra-African investment via the positive effect of such trade on investment. Existing literature has studied

the trade-FDI relationship extensively and suggests that there may be four channels by which trade may have a positive effect on investment (Fontagne, 1999).⁶

Reduction of trade costs within the bloc also makes intra-firm trade less costly thereby encouraging greenfield investment (Chala and Lee, 2015). This is particularly true in a world of regional and global value chains (GVCs), involving back and forth movement of intermediates between home and host countries. Thus, liberalization under AfCFTA is also likely to spur intra-African trade in intermediates, which may have multiplier effects on intra-African investment.

Another channel for the investment-enhancing effect of the AfCFTA could emanate from deep integration wherein preferential liberalization goes beyond tariff reduction in goods to coverage of trade in services, investment, intellectual property rights (IPRs), standards, government procurement, competition, safeguards and dispute settlement. The second phase of the AfCFTA entails negotiations on competition, IPRs and investment. Provisions on services trade, investment and IPRs in an agreement are more likely to have first-order effects on investment. In fact, a PTA with investment provisions is equivalent to a legal framework with a nested BIT (Buge, 2014). Bilateral contracts providing a legal framework for investment regulation not only reduce risk and uncertainty from the home country's perspective but also serve as a credible signalling device for the protection of foreign investors in host countries. Thus, regulatory cooperation via continent-wide BITs could be an important transmission channel for the investment-enhancing effect of the AfCFTA.

Yet another potential causal link between PTAs and investment involves the domestic political economy dimension. Trade agreements can work as a commitment device (Ethier, 1998; Buthe and Milner, 2008), solving the time-inconsistency problem in policy-making. This lends more certainty and predictability to the system, besides signalling a commitment to institutional reforms and long-term open market policies, which are essential attributes for attracting investment.

Finally, agreements could also lead to improvements in regulatory governance and the investment climate in general, which would again facilitate investment (Globerman and Shapiro, 2002; Busse and Hefeker, 2007). In fact, much existing literature on the determinants of

⁶Illustratively, exports may lead to outward FDI, with exports serving as the first stage in the internationalisation process. Symmetrically, imports may lead to inward FDI, with foreign firms establishing affiliates in the home market. Imports may also lead to outward FDI, especially when natural resources are imported. Alternatively, lack of competitiveness may promote imports and also lead domestic firms to relocate abroad especially when national disadvantage becomes too large; thus, statistically, imports may lead to FDI. Finally, exports may also lead to inward FDI as in the case when foreign firms seek to benefit from externalities on which domestic firms base their competitiveness. For instance, foreign firms locate in the Silicon Valley as it has the ecosystem conducive to exporting electronics.

investment in Africa (reviewed in Section 2) has clearly documented the direct positive link between inward FDI and quality of regulatory governance.

In the empirical analysis that follows, we estimate a structural gravity model of bilateral greenfield investment to (i) provide conditional GE counterfactual estimates of the likely effect of the AfCFTA on African greenfield investment; and (ii) explore some of the transmission channels for the investment-enhancing effect of the AfCFTA.

5.1 A structural gravity model of bilateral greenfield investment

Much like bilateral trade in goods and services, bilateral investment (I_{ijkt} , from country i to country j in sector k at time t) is governed by the same forces of “gravity” such as the GDP of the source and destination countries, prices and bilateral costs (for instance see Egger and Pfaffermayr, 2004; Bergstrand and Egger, 2007; Kleinert and Toubal, 2010). The last are typically proxied by bilateral distance between capitals of the partner countries, incidence of restrictive FDI regulation, and indicators for common international borders, language, colonial origins, legal systems, currency and membership of PTAs and BITs.

Empirically, this leads to the following baseline equation:

$$I_{ijkt} = \exp(\lambda_{ikt} + \lambda_{jkt} + \delta PTA_{ijt} + \mu BIT_{ijt} + \beta_1 \ln DIST_{ij} + \beta_2 CLNY_{ij} + \beta_3 CNTG_{ij} + \beta_4 LANG_{ij} + \beta_5 LEG_{ij} + \beta_6 CUR_{ij}) + \varepsilon_{ijkt} \quad (1)$$

where the time- and sector-varying source- (λ_{ikt}) and destination-country (λ_{jkt}) fixed effects in (1) control for the effect of the respective GDPs as well as other time-varying determinants (such as incidence of restrictive FDI regulation in the destination countries) in a panel data setting and also account for multilateral resistance (for instance see Anderson & Yotov, 2012); ε_{ijkt} is the error term.

Recent advancements in the estimation of structural gravity advocate the use of three-way fixed effects to mitigate endogeneity-induced biases in estimation (for instance see Baier et al. 2014; Piermartini and Yotov, 2016). The bilateral “gravity” variables are thus subsumed in bilateral pair-wise fixed effects (λ_{ij}) included in equation (2).

$$I_{ijkt} = \exp(\lambda_{ij} + \lambda_{ikt} + \lambda_{jkt} + \delta PTA_{ijt} + \mu BIT_{ijt}) + \varepsilon_{ijkt} \quad (2)$$

where the dependent variable is the value of announced greenfield investment project undertaken by country i in country j in sector k at time t in USD mln constructed using data from FDI Markets ; PTA_{ijt} is a binary dummy indicating membership of a preferential

goods or/and services⁷ agreement between the two partners constructed using data from the WTO’s RTA-IS database; BIT_{ijt} is a binary dummy indicating membership of a bilateral investment treaty between the two partners constructed using data from UNCTAD’s International Investment Agreements Navigator⁸; and ε_{ijkt} is the error term.

The Poisson Pseudo-Maximum Likelihood (PPML; Silva and Tenreyro, 2006) estimator is now regarded as the gold standard (for instance see Piermartini and Yotov, 2016) in the estimation of structural gravity models characterized by sample selection and heteroskedasticity. Equation (2) is thus estimated in levels using the PPML estimator, which accounts for both the incidence of zero investment flows (even more prevalent in disaggregated bilateral data) and heteroskedasticity of the error term in estimation, leading to unbiased estimates.

In keeping with recent advancements in estimating structural gravity models (Piermartini and Yotov, 2016), the dependent variable also includes data on “internal” investment using data on gross fixed capital formation, GFKF, in USD mln taken from the World Bank’s World Development Indicators. Thus, the dependent variable also includes data from country i to country j in sector k at time t , which makes the model more consistent with theory (Fally, 2015). Since GFKF data are not available at the sector-level for 190 countries over 2003-2018, these data are disaggregated using sector shares in total domestic value added, DVA, by country and year, calculated using input-output data from the EORA26 MRIO database (Lenzen et al. 2012, 2013).⁹¹⁰

5.2 Conditional general equilibrium counterfactual analysis

We provide conditional GE estimates of the likely effect of the AfCFTA on intra-African greenfield investment using the GE PPML estimator following Larch and Yotov (2016). We simulate both preferential trade liberalization under the AfCFTA and regulatory cooperation

⁷Defined as agreements notified under Article XXIV of the GATT and under Article V of the GATS, respectively.

⁸<https://investmentpolicy.unctad.org/international-investment-agreements>

⁹In doing so, we assume that the sectoral disaggregation of GFKF data by country and year is the same as that of DVA data, which is supported by the strong correlation between the two variables at the aggregate level for our country sample. Illustratively, the correlation coefficient between the two variables for our sample countries in 2018 was found to be 88.9 percent.

¹⁰This also required sectoral concordance between FDI Markets and EORA26 data, which resulted in a “common” set of 15 broad sectors for empirical analysis including Food & Beverages (fmb), Textiles and Wearing Apparel (tex), Wood and Paper (pap), Petroleum, Chemical and Non-Metallic Mineral Products (nmm), Metal Products (met), Electrical and Machinery (ele), Transport Equipment (tre), Other Manufacturing (omf), Electricity, Gas and Water (uts), Construction (con), Wholesale Trade (wtr), Hotels and Restaurants (hnr), Transport Services (trs), Financial Intermediation and Business Activities (fis), and Education, Health and Other Services (ehs). Importantly, this concordance retained all the 39 goods and services sectors reported in FDI Markets data.

via continent-wide BITs. In doing so, we also examine the possibility of spillover effects on inward investment in Africa from ROW and on African outward investment by providing conditional GE estimates of extra- and outward African greenfield investment.¹¹

In the baseline scenario of the counterfactual analysis, the PTA and BIT dummy variables amongst African countries in the database retain their actual values; the baseline year is taken as 2018 and all investment data are cumulated over 2003-18 for the purpose of this analysis. The two alternative counterfactual scenarios consist in changing the values of the PTA variables and the BIT variable amongst intra-African partners in the baseline year to unity, to capture the effect of preferential trade liberalization and regulatory cooperation under the AfCFTA, respectively. The “baseline” and “constrained” gravity model are estimated using the GE PPML estimator and the following estimating equation based on data for the year 2018¹²:

$$I_{ij} = \exp(\lambda_i + \lambda_j + \delta TA_{ij} + \mu BIT_{ij} + \beta_1 \ln DIST_{ij} + \beta_2 CLNY_{ij} + \beta_3 CNTG_{ij} + \beta_4 LANG_{ij} + \beta_5 LEG_{ij} + \beta_6 CUR_{ij}) + \varepsilon_{ij} \quad (3)$$

5.3 Transmission channels

5.3.1 Investment and final trade

While the role of regulatory cooperation as a transmission channel is directly observed from the counterfactual analysis involving the BIT variable, to explore the role of trade, equation (2) is augmented by T_{ijkt} , which is the value of bilateral trade in final products between country i and country j in sector k at time t . The variable was constructed using the BACI data (Gaulier and Zignago, 2010) and merged with the fDI Markets data for a “common” set of eight broad manufacturing sectors as per the EORA26 sectoral classification.¹³

To examine the trade-investment relationship in the context of Africa, equation (2) is further augmented by an “interaction” vector (V_{ijkt}) that includes three interaction terms - those

¹¹Existing literature has also examined the third-country effects of PTAs on investment both theoretically (Motta and Norman, 1996; Raff, 2004; Ekholm et al. 2007; Ito, 2013; Cook and Wilson, 2013) and empirically (Plummer, 2008; Chen, 2009). This literature suggests that while regional integration may lead to third-country FDI destruction (Cook and Wilson, 2013), it may also have a positive effect on export platform investment by non-members inside the trade bloc (Ekholm et al. 2007; Chen, 2009; Ito, 2013).

¹²We follow Larch and Yotov (2016) in estimating the model without dyadic fixed effects and using standard trade cost variables instead. Given that the conditional GE analysis is undertaken for one year, estimating the model without dyadic fixed effects also obviates concerns about multicollinearity.

¹³Thus, the data constructed for this analysis merged three different databases: fDI Markets, BACI and EORA26. The eight concordant merchandise sectors covered 27 of the 39 goods and services sectors in fDI Markets, accounting for close to 60 percent of the total stock of bilateral greenfield investment and total bilateral exports in 2018.

between T_{ijkt} and an African dummy vector (AFR_{ij}), where the latter comprises three dummy variables: $IntraAFR_{ij}$ that takes the value 1 when all source-destination country combinations in the data set are within Africa (and the value zero otherwise); $ExtraAFR_{ij}$ that takes the value 1 when all source-destination country combinations in the data set are from ROW to Africa (and the value zero otherwise); and $OutAFR_{ij}$ that takes the value 1 when all source-destination country combinations in the data set are from Africa to ROW (and the value zero otherwise).

Finally, consistent with recent advancements in estimating structural gravity models (Piermartini and Yotov, 2016), the time-varying data are phased over time periods to allow for adjustment effects. In particular, bilateral greenfield investment data are cumulated over the following time periods to reflect stocks of investment and to allow for adjustment effects: 2003-05, 2006-10, 2011-15, and 2016-18.

The resulting estimating equation (4) takes the following form:

$$I_{ijkt} = \exp[\lambda_{ij} + \lambda_{ikt} + \lambda_{jkt} + \delta PT A_{ijt} + \mu BIT_{ijt} + \psi T_{ijkt} + \gamma AFR_{ij} + \beta(T_{ijkt} * AFR_{ij})] + \varepsilon_{ijkt} \quad (4)$$

Since the three African dummy variables are completely collinear with the bilateral pairwise fixed effects, equation (4) is estimated in two steps in the spirit of Anderson and Yotov (2016). In the first step, we regress bilateral investment on the time- and sector-varying source and destination fixed effects and pairwise fixed effects; in the next step, we regress the residual from this estimation on the explanatory variables in equation (4). Finally, our constructed dataset enables us to empirically examine two of the four channels outlined in Fontagne (1999): the effect of exports (imports) on outward (inward) investment and the effect of imports (exports) on outward (inward) investment.

5.3.2 Investment and intermediate trade

To examine the investment effect of trade in intermediates, the variable T_{ijkt} in equation (4) is replaced with the variables S_{ijkt}^I and D_{ijkt}^I in distinct specifications; the latter variables denote the value of bilateral supply of (and demand for) intermediates by country i to (from) country j in sector k at time t . Both variables are constructed using the EORA26 data and merged with the fDI Markets data as above. All underlying data are again phased over time as above to allow for adjustment effects. The resulting estimating equations (5) and (6) are as follows:

$$I_{ijkt} = \exp[\lambda_{ij} + \lambda_{ikt} + \lambda_{jkt} + \delta PT A_{ijt} + \mu BIT_{ijt} + \psi S_{ijkt}^I + \gamma AFR_{ij} + \beta(S_{ijkt}^I * AFR_{ij})] + \varepsilon_{ijkt}$$

(5)

$$I_{ijkt} = \exp[\lambda_{ij} + \lambda_{ikt} + \lambda_{jkt} + \delta PTA_{ijt} + \mu BIT_{ijt} + \psi D_{ijkt}^I + \gamma AFR_{ij} + \beta(D_{ijkt}^I * AFR_{ij})] + \varepsilon_{ijkt} \quad (6)$$

5.3.3 Investment and quality of regulatory governance

To explore the role of the quality of regulatory governance as a transmission channel, equations (4)-(6) are augmented by the vector GOV_{jt} and its interaction terms with T_{ijkt} , S_{ijkt}^I and D_{ijkt}^I as well as those of the latter three variables with the AFR_{ij} dummy vector. The vector GOV_{jt} comprises the six attributes of regulatory governance included in the World Governance Indicators (Kaufmann et al. 2010). All underlying data are again phased over time and the resulting estimating equations (7)-(9) are as follows:

$$I_{ijkt} = \exp[\lambda_{ij} + \lambda_{ikt} + \lambda_{jkt} + \delta PTA_{ijt} + \mu BIT_{ijt} + \lambda GOV_{jt} + \psi T_{ijkt} + \gamma AFR_{ij} + \beta(T_{ijkt} * AFR_{ij}) + \Theta(T_{ijkt} * AFR_{ij} * GOV_{jt})] + \varepsilon_{ijkt} \quad (7)$$

$$I_{ijkt} = \exp[\lambda_{ij} + \lambda_{ikt} + \lambda_{jkt} + \delta PTA_{ijt} + \mu BIT_{ijt} + \lambda GOV_{jt} + \psi S_{ijkt}^I + \gamma AFR_{ij} + \beta(T_{ijkt} * AFR_{ij}) + \Theta(S_{ijkt}^I * AFR_{ij} * GOV_{jt})] + \varepsilon_{ijkt} \quad (8)$$

$$I_{ijkt} = \exp[\lambda_{ij} + \lambda_{ikt} + \lambda_{jkt} + \delta PTA_{ijt} + \mu BIT_{ijt} + \lambda GOV_{jt} + \psi D_{ijkt}^I + \gamma AFR_{ij} + \beta(T_{ijkt} * AFR_{ij}) + \Theta(D_{ijkt}^I * AFR_{ij} * GOV_{jt})] + \varepsilon_{ijkt} \quad (9)$$

6 Results and analysis

6.1 Conditional GE estimates of the likely effect of the AfCFTA on African greenfield investment

Conditional GE estimates of the likely effect of preferential trade liberalization under the AfCFTA on intra-African investment are shown in Figure 4 for source and destination countries in the left and right panels, respectively. The stock of intra-African greenfield investment is found to increase by 14 percent in the counterfactual scenario relative to the baseline, with the expected heterogeneity across both source and destination countries in the continent. Somalia (31 percent), Gabon (29.7 percent), Mauritania (28.4 percent), Mali (28.1 percent) and

Burkina Faso (25 percent) amongst destinations, and Nigeria (25.9 percent), Morocco (16.6 percent), Egypt (14.6 percent) and South Africa (13.7 percent) amongst investors, report the largest gains; significantly, none of the African countries is found to lose. Interestingly, most of the top gaining recipients are located in Sub-Saharan Africa while the top gaining investors are more geographically dispersed.

<Insert Figure 4 here>

This said, existing literature also suggests that host countries that are more open and offer a more attractive business environment are more likely to attract investment in the aftermath of regional integration (Blomstrom and Kokko 1997; Levy-Yeyati et al. 2003). Algeria, Egypt, Morocco and South Africa were amongst the top five performers amongst all African countries in terms of the World Economic Forum’s Global Competitiveness Index for 2018, while Mauritania’s share of exports and imports in GDP in that year was 125 percent. The country also took only six days to start a business, amongst the lowest in Africa, according to the World Bank’s Doing Business Indicators.

Meanwhile, extra-African inward greenfield investment as well as African outward investment into ROW witness declines by 0.34 and 6.0 percent, respectively, in the counterfactual scenario relative to the baseline. These findings suggest that while having a pan-African agreement may not necessarily attract more investment from ROW, the AfCFTA may divert African investment towards the continent.

In contrast, the effect of regulatory cooperation via the BIT variable is found to be negative, which is consistent with the findings in Osnago et al. (2019).¹⁴ The stock of intra-African greenfield investment is found to decline by 5.7 percent in the counterfactual scenario relative to the baseline. This suggests that regulatory cooperation may not be an effective transmission channel for the AfCFTA to foster intra-African investment. However, there is some evidence of regulatory spillovers in positive third-country effects of intra-African regulatory cooperation in the counterfactual estimates. The stocks of extra- and outward African greenfield investment are found to increase by 0.14 and 2.5 percent, respectively, in the counterfactual scenario relative to the baseline in each case.

¹⁴Examining the links between deep PTAs and vertical FDI, Osnago et al. (2019) note that PTA provisions improving the contractibility of components (such as standards and other regulatory requirements that promote harmonization or mutual recognition) are associated with an increase in profitability under vertical integration relative to outsourcing, leading to an increase in the share of firms engaging in FDI. In contrast, PTA provisions improving the contractibility of headquarter services (such as protection of intellectual property rights or investment provisions) are associated with an increase in profitability under outsourcing relative to vertical integration, leading to a decrease in the share of firms engaging in FDI.

6.2 Transmission channels

6.2.1 The investment effect of bilateral trade in final products

The PPML estimates from estimating equation (4) for the full sample, but without the three Africa dummy variables and their interaction terms, are reported in Table 6. These results suggest that the trade elasticity of investment may be positive irrespective of the channel, thus providing empirical evidence for two of the four channels in Fontagne (1999) based on bilateral disaggregated data. More specifically, a 10 percent rise in disaggregated bilateral imports (exports) is associated with a 3 percent increase in disaggregated inward (outward) bilateral greenfield investment while a 10 percent rise in disaggregated bilateral exports (imports) is associated with a 1.8 percent increase in disaggregated inward (outward) bilateral greenfield investment. These elasticities are higher than those in Were (2015), for instance, though those results were based on aggregate data.

<Insert Table 6 here>

Significantly, the presence of BITs or PTAs is not found to be associated with a statistically significant positive effect on bilateral greenfield investment in these results. Contrary to expectations, extant empirical literature provides mixed evidence for the impact of BITs on bilateral investment (for instance see Frenkel and Walter, 2019; Kox and Rojas-Romagosa, 2019). Illustratively, Kox and Rojas-Romagosa (2019) find the BITs coefficient to be positive and significant when using 4-year FDI averages and yearly data, but not when using 3-year FDI averages with three-way fixed effects. They also find the coefficient to be significant and negative when they replace bilateral fixed effects with standard gravity controls.

The PPML estimates from the second stage of estimating equation (4) for the full sample, with the three Africa dummy variables and their interaction terms, are reported in Table 7. These results suggest that intra-African trade is even more likely to promote intra-African investment compared to the results reported in Table 6. In fact, the trade elasticity of bilateral greenfield investment may be the largest for intra-African flows (ranging from 0.62 to 0.65), followed by ROW to Africa flows (ranging from 0.25 to 0.27) and then by Africa to ROW flows (ranging from 0.11 to 0.20).¹⁵ Thus, a positive continent-wide trade effect of liberalization under AfCFTA is likely to foster intra-African investment due to the positive investment effect of such trade .

<Insert Table 7 here>

¹⁵These effects are calculated as the estimates of $(\psi+\beta_1)$, $(\psi+\beta_2)$, and $(\psi+\beta_3)$, in columns (1)-(4) and (5)-(8), respectively.

6.2.2 The investment effect of bilateral trade in intermediates

The cross-border supply of and demand for intermediates within Africa is also found to promote both outward and inward investment within the continent in the results reported in Tables 8 and 9, respectively. A 10 percent rise in the supply of intermediates within Africa is found to be associated with a 4.8 percent increase in outward and a 4.5 percent increase in inward intra-African greenfield investment. The intermediates demand elasticity of outward intra-African greenfield investment is even larger at 1.44 (see columns 1-4 of Table 9).

<Insert Tables 8 and 9 here>

6.2.3 The quality of regulatory governance in the host countries matters

While regression results with multiple interaction terms need to be interpreted carefully, the results reported in Table 10 seem to suggest that, with the slight exception of the rule of law estimate, the intra-African trade elasticity of investment is larger for host countries with stronger governance indicators. To see this, compare the intra-African trade elasticity in column (4) of Table 7 with the respective magnitudes reported in Table 10, columns (1) through (6). Thus, to the extent that implementation of the AfCFTA leads to regulatory improvements in the member countries, this is also likely to enhance investment within Africa, including via the positive trade effect of preferential liberalization.

<Insert Table 10 here>

6.3 Sensitivity analysis

We examined the sensitivity of our overall findings to (i) the exclusion of China¹⁶ from the country sample; (ii) the exclusion of countries where data quality is considered poor for analysis according to the UNCTAD-EORA GVC database webpage¹⁷; and (iii) geographical location by looking at North vs Sub-Saharan Africa. The intra-African trade elasticity of greenfield investment was found to be qualitatively similar to the baseline results in the case of (i) and (ii). Meanwhile, the trade elasticity of North Africa (0.81) was found to be higher

¹⁶China has been heavily engaged in the African continent and in addition to being the most important source of greenfield investment in the last five years, also accounts for a fifth of Africa's global merchandise trade.

¹⁷"Due to insufficient data quality, the following countries should be excluded from this GVC analysis: Belarus, Benin, Burkina Faso, Congo, Eritrea, Ethiopia, Guinea, Guyana, Libya, Moldova, Serbia, Sudan, Yemen, Zimbabwe, Former USSR."

than that of Sub-Saharan Africa (0.74) and both these were larger in magnitude than the comparable figure for the entire continent (0.65).

Our disaggregated data set also enabled an examination of the results by sector. The intra-African trade elasticity of greenfield investment was found to be the largest for “nmm” and metal sectors followed by the electrical and machinery sector. The intra-African intermediates supply elasticity of greenfield investment was also found to be the largest for the same three sectors followed by the wood and paper sector. Meanwhile, the intra-African intermediates demand elasticity of greenfield investment was found to be the largest for these same four sectors followed by textiles and food and beverages. These findings suggest that the “nmm”, “met” and “ele” sectors are expected to witness the largest increase in intra-African investment in the aftermath of AfCFTA.

Finally, the trade elasticity of final goods was found to be higher than that for trade in intermediates at the sector-level. Illustratively, for the “nmm” sector, the elasticities were 0.54 for final goods, and 0.43 and 0.44 for intermediates supply and demand, respectively. All results in this sub-section are available upon request.

7 Conclusion

In several contributions to the empirical literature, this paper examines the likely effect of the AfCFTA on African investment and explores the likely transmission channels for the investment-enhancing effect of this agreement, using bilateral sector-level data on 198 source and destination (both OECD and non-OECD) countries. It also provides a granular analysis of announced greenfield investment projects at the sector level in and out of Africa, besides adding to the FDI-PTA and FDI-BITs literatures with its focus on Africa.

Descriptive statistics show that the share of intra-African greenfield investment in total African greenfield investment has nearly doubled from 5 percent (cumulative 2003-08) to 9.4 percent (cumulative 2014-18). This occurs at the same time as a major reallocation of the source of extra-African greenfield investment from former colonial powers to other emerging economies. The increase in intra-African greenfield investment is matched with a decline in outward African greenfield investment to ROW. While this contributes to the economic transformation of the continent, it may also present risks associated with the economic and political cycles of African countries that may need to be considered.

There are clear differences between countries that attract greenfield investment from the rest of the continent and the rest of the world. The same applies to the African countries

as investors in Africa. This suggests the existence of a defined group of large investors and countries that attract greenfield investment that mimics, at the continental level, what happens globally. However, Africa still represents a small share of global FDI, most of which is concentrated in extractives, irrespective of the source of the investment. This suggests that African potential needs to be supplemented with measures to facilitate, promote and diversify investment in the continent.

One such measure is the AfCFTA. Significantly, conditional GE estimates show a positive effect of trade liberalization under the AfCFTA on intra-African greenfield investment, with larger gains for more open and business-friendly investment destinations within the continent. Meanwhile structural gravity estimates show that the trade elasticity of greenfield investment within Africa is positive, for both final and intermediate products. A similar effect, however, is not observed for regulatory cooperation via BITs. This suggests that liberalization under AfCFTA is more likely to foster intra-African investment via its positive effect on intra-African trade.

Finally, while there are significant barriers related to doing business in Africa, in general, markets access barriers for investments are not high. Moreover, as our findings suggest, any improvements in regulation emanating from the implementation of the AfCFTA are also likely to attract more investment.

Unfortunately, however, there is little information about other barriers that may affect investment. Collecting country- and sector-specific information and data about regulatory barriers to investment in Africa is thus necessary, also to enable more effective coverage of investment issues in the second phase of the AfCFTA. At the same time, given the limitations of fDI Markets, data on both actual greenfield investment and M&A activity at the bilateral and sector-level will provide a more complete and accurate picture of both inward and outward African investment and enable more comprehensive analysis than in this paper.

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Annex table 1: Country sample

ABW AFG AGO ALB AND ARE ARG ARM ATG AUS AUT AZE BDI BEL BEN BFA
BGD BGR BHR BHS BIH BLR BLZ BMU BOL BRA BRB BRN BTN BWA CAF CAN
CHE CHL CHN CIV CMR COD COG COL COM CPV CRI CUB CYM CYP CZE DEU
DJI DMA DNK DOM DZA ECU EGY ERI ESP EST ETH FIN FJI FRA FSM GAB GBR
GEO GHA GIN GMB GNB GNQ GRC GRD GRL GTM GUY HKG HND HRV HTI HUN
IDN IND IRL IRN IRQ ISL ISR ITA JAM JOR JPN KAZ KEN KGZ KHM KNA KOR
KWT LAO LBN LBR LBY LCA LIE LKA LSO LTU LUX LVA MAC MAR MCO MDA
MDG MDV MEX MKD MLI MLT MMR MNE MNG MOZ MRT MUS MWI MYS NAM
NCL NER NGA NIC NLD NOR NPL NZL OMN PAK PAN PER PHL PNG POL PRI
PRK PRT PRY PSE PYF QAT ROU RUS RWA SAU SDN SEN SGP SLB SLE SLV SOM
SRB SSD STP SUR SVK SVN SWE SWZ SYC SYR TCA TCD TGO THA TJK TKM
TLS TTO TUN TUR TWN TZA UGA UKR URY USA UZB VCT VEN VNM VUT WSM
YEM ZAF ZMB ZWE

Figure 1: Stock of inward FDI in Africa over time by geographical region (USD bln)

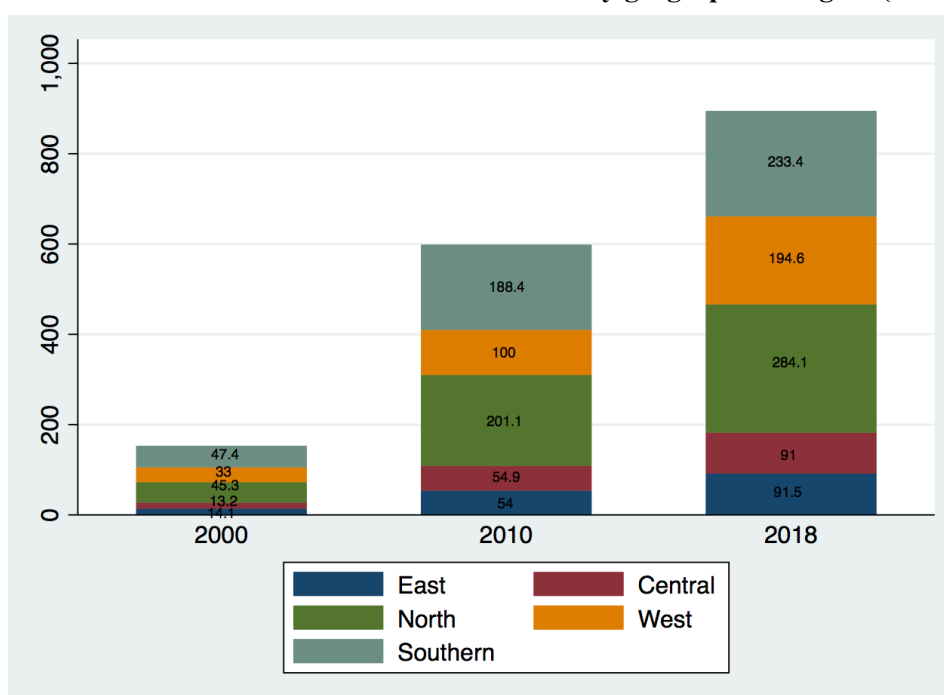
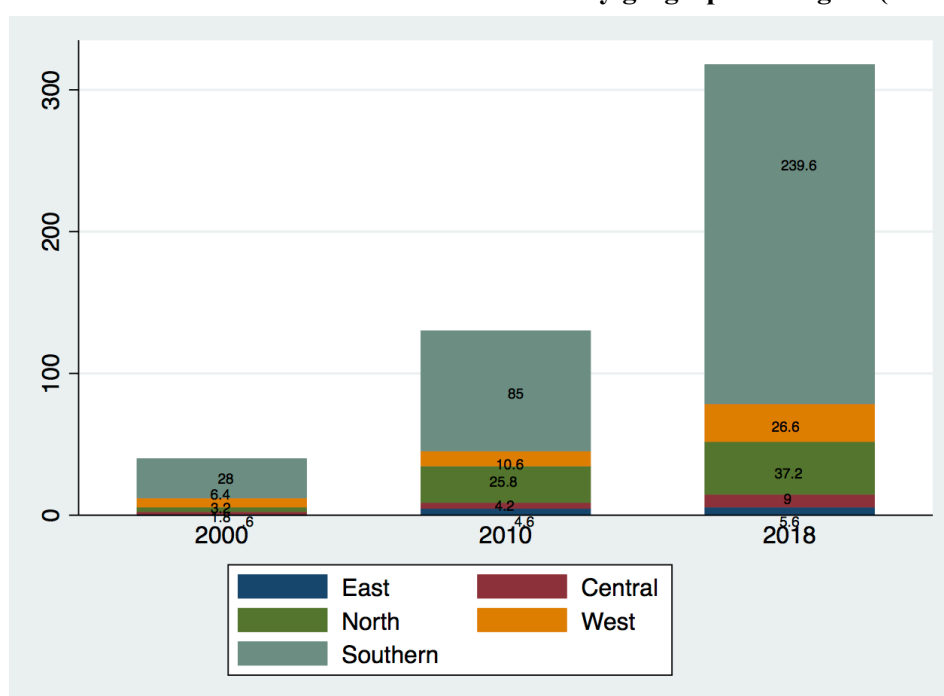


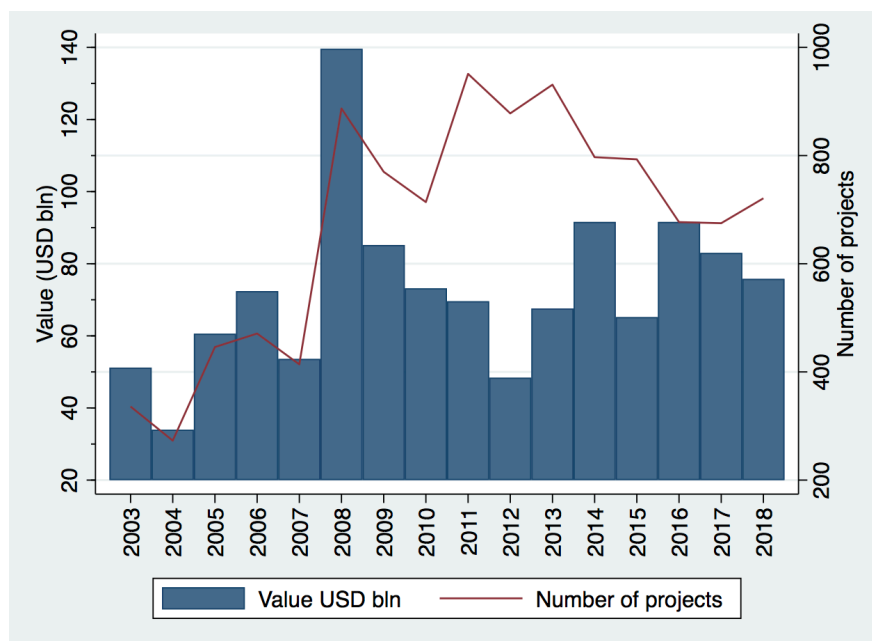
Figure 2: Stock of outward African FDI over time by geographical region (USD bln)



Source: UNCTAD; own calculations

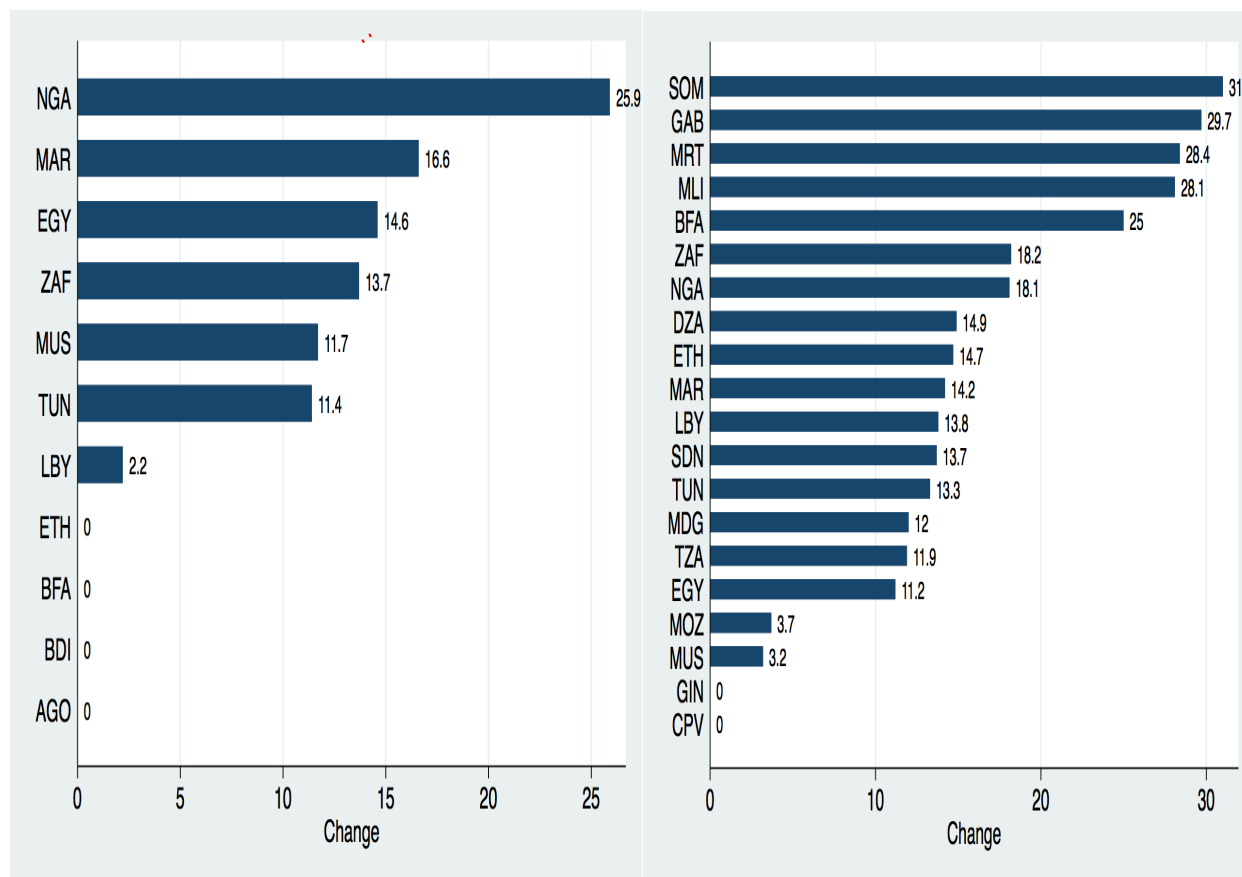
Note: **North** - Algeria, Egypt, Libya, Morocco, Sudan & Tunisia; **Southern** - Botswana, Eswatini, Lesotho, Namibia & South Africa; **Central** - Angola, Cameroon, Central African Republic, Chad, Congo, Congo Dem. Rep., Equatorial Guinea, Gabon & Sao Tome and Principe; **East** - Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, South Sudan, Uganda, Tanzania, Zambia & Zimbabwe; **West** - Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Saint Helena, Senegal, Sierra Leone & Togo.

Figure 3: Number and value of announced greenfield investment projects in Africa



Source: fDI Markets

Figure 4: Percentage change in intra-African greenfield investment across source (left) and destination (right) countries in the counterfactual scenario relative to the baseline in the year 2018



Note: The figure shows estimates from conditional GE analysis using the GE PPML estimator. The red line denotes the percentage change in total intra-African greenfield investment in the counterfactual scenario (a successfully implemented AfCFTA) relative to the baseline (no AfCFTA) in the year 2018.

Table 1: Top recipients of greenfield investment in Africa

From the (rest of the) world

2003-2008			2009-2013			2014-2018		
Country	Value (USD mln)	Share (%)	Country	Value (USD mln)	Share (%)	Country	Value (USD mln)	Share (%)
Egypt	53048	15.4	Egypt	54086	19.4	Egypt	107595	31.8
Angola	39225	11.4	South Africa	33456	12.0	Nigeria	32260	9.5
Nigeria	32484	9.4	Nigeria	22261	8.0	South Africa	29028	8.6
Algeria	30967	9.0	Mozambique	17194	6.2	Angola	25779	7.6
Morocco	29208	8.5	Morocco	14146	5.1	Mozambique	21403	6.3
Libya	26423	7.7	Tunisia	11199	4.0	Morocco	21307	6.3
South Africa	25045	7.3	Algeria	10673	3.8	Algeria	15092	4.5
Tunisia	11157	3.2	Angola	10108	3.6	Ghana	13964	4.1
DRC	7735	2.2	Cameroon	9860	3.5	Ethiopia	11715	3.5
Ghana	7386	2.1	Ghana	9027	3.2	Kenya	7755	2.3
Top 10	262682	76.1	Top 10	192013	69.0	Top 10	285902	84.6
Total	345077	100.0	Total	278213	100.0	Total	338113	100.0

Intra-African

2003-2008			2009-2013			2014-2018		
Country	Value (USD mln)	Share (%)	Country	Value (USD mln)	Share (%)	Country	Value (USD mln)	Share (%)
Algeria	5547.5	30.5	Ghana	8860.6	20.0	Ethiopia	5569.3	16.1
Mozambique	2239.3	12.3	Nigeria	7374.7	16.6	Nigeria	4733.0	13.7
Nigeria	1452.8	8.0	Mozambique	3725.3	8.4	Mozambique	4014.8	11.6
Ghana	1049.4	5.8	Uganda	3561.4	8.0	Cote d Ivoire	3011.4	8.7
Libya	992.2	5.4	Rwanda	2055.9	4.6	Zambia	1917.3	5.5
Zambia	873.6	4.8	Zambia	1782.4	4.0	Sudan	1403.1	4.1
South Africa	786.0	4.3	DRC	1492.8	3.4	Ghana	1331.4	3.9
Tanzania	762.7	4.2	Kenya	1457.7	3.3	Cameroon	1319.9	3.8
Zimbabwe	620.8	3.4	Tanzania	1308.9	3.0	Rwanda	956.4	2.8
DRC	612.0	3.4	Zimbabwe	1241.6	2.8	South Africa	897.5	2.6
Top 10	14936.3	82.0	Top 10	32861.0	74.1	Top 10	25154.2	72.8
Total	18215.8	100.0	Total	44330.2	100.0	Total	34558.9	100.0

Source: fDI Markets; own calculations

Table 2: Top sources of greenfield investment into Africa

From the (rest of the) world

2003-2008			2009-2013			2014-2018		
Country	Value (USD mln)	Share (%)	Country	Value (USD mln)	Share (%)	Country	Value (USD mln)	Share (%)
USA	49642.0	14.4	UK	35246.6	12.7	China	63931.5	18.9
UAE	40062.1	11.6	USA	25949.0	9.3	Russia	32326.4	9.6
UK	38333.4	11.1	UAE	25486.6	9.2	France	32278.4	9.5
France	25599.4	7.4	France	22051.9	7.9	USA	29147.4	8.6
Canada	23551.5	6.8	India	20250.4	7.3	Italy	26609.0	7.9
Bahrain	23438.3	6.8	Qatar	17386.4	6.2	UK	16473.7	4.9
China	18483.1	5.4	Germany	10166.3	3.7	UAE	13152.8	3.9
Australia	17276.1	5.0	Italy	8637.9	3.1	Saudi Arabia	11712.2	3.5
India	13095.0	3.8	Switzerland	8443.4	3.0	Greece	10059.1	3.0
Italy	9710.6	2.8	Australia	7586.5	2.7	Hong Kong	8979.2	2.7
Top 10	259191.5	75.1	Top 10	181205.1	65.1	Top 10	244669.6	72.4
Total	345077.5	100.0	Total	278213.7	100.0	Total	338113.6	100.0

Intra-African

2003-2008			2009-2013			2014-2018		
Country	Value (USD mln)	Share (%)	Country	Value (USD mln)	Share (%)	Country	Value (USD mln)	Share (%)
South Africa	6864.3	37.7	South Africa	20913.8	47.2	South Africa	10185.6	29.5
Egypt	5518.3	30.3	Mauritius	7262.2	16.4	Morocco	9509.0	27.5
Tunisia	1379.3	7.6	Nigeria	5697.7	12.9	Mauritius	4337.3	12.6
Nigeria	1002.5	5.5	Kenya	4942.8	11.1	Egypt	3435.1	9.9
Zimbabwe	909.6	5.0	Egypt	999.6	2.3	Nigeria	2201.9	6.4
Morocco	658.9	3.6	Morocco	572.2	1.3	Kenya	1692.8	4.9
Kenya	648.0	3.6	Togo	538.5	1.2	Zimbabwe	612.7	1.8
Libya	345.2	1.9	Tunisia	465.7	1.1	Tanzania	401.9	1.2
Togo	177.5	1.0	Senegal	317.5	0.7	Uganda	398.1	1.2
DRC	171.0	0.9	Algeria	316.8	0.7	Botswana	332.1	1.0
Top 10	17674.6	97.0	Top 10	42026.8	94.8	Top 10	33106.4	95.8
Total	18215.8	100.0	Total	44330.2	100.0	Total	34558.9	100.0

Source: fDI Markets; own calculations

Note: (1) Greece's position amongst top ten sources of greenfield investment in Africa during 2014-2018 emanates from a USD 10 bln investment in Egypt's coal, oil and gas; and chemicals sectors in July 2014. (2) China was ranked 11th with cumulative investment of USD 7.4 bln over 2009-2013.

Table 3: Top sources of and destinations for greenfield investment out of Africa

Sources

2003-2008			2009-2013			2014-2018		
Country	Value (USD mln)	Share (%)	Country	Value (USD mln)	Share (%)	Country	Value (USD mln)	Share (%)
South Africa	23475.0	81.2	South Africa	24326.4	80.7	South Africa	6237.3	41.8
Egypt	3780.8	13.1	Egypt	2750.9	9.1	Egypt	2974.1	19.9
Kenya	304.0	1.1	Morocco	1003.7	3.3	Algeria	2471.1	16.5
Nigeria	296.1	1.0	Nigeria	422.9	1.4	Morocco	657.7	4.4
Mauritius	291.2	1.0	Angola	347.8	1.2	Angola	611.0	4.1
Morocco	259.8	0.9	Kenya	313.9	1.0	Mauritius	526.0	3.5
Tunisia	222.5	0.8	Namibia	307.3	1.0	Kenya	519.8	3.5
Algeria	140.8	0.5	Togo	164.5	0.5	Ethiopia	285.5	1.9
Angola	92.1	0.3	Tunisia	155.7	0.5	Nigeria	251.4	1.7
Madagascar	27.5	0.1	Mauritius	145.8	0.5	Tunisia	239.3	1.6
Top 10	28889.8	99.9	Top 10	29938.9	99.3	Top 10	14773.1	98.9
Total	28908.4	100.0	Total	30141.7	100.0	Total	14933.0	100.0

Destinations

2003-2008			2009-2013			2014-2018		
Country	Value (USD mln)	Share (%)	Country	Value (USD mln)	Share (%)	Country	Value (USD mln)	Share (%)
Qatar	7068.6	24.5	USA	21472.8	71.2	Turkey	2048.7	13.7
China	6982.0	24.2	China	1605.4	5.3	Jordan	1133.9	7.6
Canada	3253.5	11.3	Brazil	1123.1	3.7	India	1100.4	7.4
USA	1986.3	6.9	Australia	816.0	2.7	Brazil	795.7	5.3
Saudi Arabia	1888.8	6.5	UK	602.6	2.0	Saudi Arabia	774.5	5.2
UK	1298.7	4.5	Spain	583.6	1.9	UK	769.5	5.2
Russia	1131.7	3.9	UAE	419.0	1.4	China	738.3	4.9
UAE	1131.3	3.9	India	412.1	1.4	Bulgaria	724.8	4.9
India	916.2	3.2	France	399.0	1.3	France	696.3	4.7
Pakistan	698.8	2.4	Poland	367.6	1.2	UAE	690.5	4.6
Top 10	26355.9	91.2	Top 10	27801.2	92.2	Top 10	9472.6	63.4
Total	28908.4	100.0	Total	30141.7	100.0	Total	14933.0	100.0

Source: fDI Markets; own calculations

Table 4: Top sectors attracting greenfield investment in Africa

From the (rest of the) world

2003-2008			2009-2013			2014-2018		
Sector	Value (USD mln)	Share (%)	Sector	Value (USD mln)	Share (%)	Sector	Value (USD mln)	Share (%)
Coal, oil & gas	133580.0	38.7	Coal, oil & gas	80664.7	29.0	Coal, oil & gas	115897.7	34.3
Real estate	67045.9	19.4	Metals	39263.6	14.1	Real estate	53186.4	15.7
Metals	55322.9	16.0	Real estate	32220.4	11.6	Renewable energy	30797.8	9.1
Hotels & tourism	16433.1	4.8	Renewable energy	19109.4	6.9	Chemicals	23924.0	7.1
Communications	7756.0	2.2	Communications	16687.7	6.0	Metals	18844.6	5.6
Building materials	7704.2	2.2	Chemicals	11526.8	4.1	Food & tobacco	10589.4	3.1
Chemicals	6604.1	1.9	Food & tobacco	11322.2	4.1	Transportation	10231.4	3.0
Food & tobacco	6552.6	1.9	Automotive OEM	8482.7	3.0	Warehousing	9770.4	2.9
Automotive OEM	5892.9	1.7	Hotels & tourism	6658.6	2.4	Automotive OEM	8692.3	2.6
Warehousing	5597.1	1.6	Building materials	5388.4	1.9	Communications	7831.9	2.3
Top 10	312488.7	90.6	Top 10	231324.5	83.1	Top 10	289765.9	85.7
Total	345077.5	100.0	Total	278213.7	100.0	Grand Total	338113.6	100.0

From within Africa

2003-2008			2009-2013			2014-2018		
Sector	Value (USD mln)	Share (%)	Sector	Value (USD mln)	Share (%)	Sector	Value (USD mln)	Share (%)
Metals	3320.8	18.2	Coal, oil & gas	16077.6	36.3	Real estate	7199.2	20.8
Chemicals	2868.4	15.7	Communications	8803.0	19.9	Communications	5825.8	16.9
Building materials	2572.8	14.1	Building materials	4575.1	10.3	Chemicals	5374.3	15.6
Coal, oil & gas	2507.7	13.8	Financial services	3804.6	8.6	Building materials	3543.1	10.3
Hotels & tourism	1834.8	10.1	Real estate	2283.7	5.2	Financial services	1939.2	5.6
Financial services	1473.1	8.1	Metals	2162.0	4.9	Coal, oil & gas	1891.1	5.5
Communications	752.3	4.1	Food & tobacco	1777.0	4.0	Renewable energy	1764.4	5.1
Real estate	728.1	4.0	Chemicals	925.2	2.1	Food & tobacco	1497.9	4.3
Food & tobacco	412.7	2.3	Business services	763.8	1.7	Business services	1031.6	3.0
Minerals	364.7	2.0	Hotels & tourism	532.9	1.2	Transportation	905.8	2.6
Top 10	16835.3	92.4	Top 10	41704.9	94.1	Top 10	30972.5	89.6
Total	18215.8	100.0	Total	44330.2	100.0	Total	34558.9	100.0

Source: fDI Markets; own calculations

Table 5: Top sectors of outward greenfield investment from Africa

Sector	2003-2008		Sector	2009-2013		Sector	2014-2018	
	Value (USD mln)	Share (%)		Value (USD mln)	Share (%)		Value (USD mln)	Share (%)
Coal, oil & gas	14468.4	50.0	Coal, oil & gas	18576.3	61.6	Chemicals	2574.9	17.2
Minerals	3529.6	12.2	Chemicals	2791.8	9.3	Real estate	2455.7	16.4
Real estate	3243.9	11.2	Financial services	1996.1	6.6	Financial services	2242.3	15.0
Financial services	1428.3	4.9	Metals	1777.9	5.9	Paper, printing, packaging	1908.6	12.8
Chemicals	952.9	3.3	Communications	1090.7	3.6	Software & IT services	1061.4	7.1
Communications	935.4	3.2	Paper, printing, packaging	660.4	2.2	Communications	953.7	6.4
Paper, printing, packaging	725.2	2.5	Software & IT services	513.0	1.7	Transportation	739.2	5.0
Software & IT services	559.3	1.9	Consumer products	452.4	1.5	Consumer products	504.7	3.4
Metals	526.7	1.8	Warehousing	382.6	1.3	Business services	432.9	2.9
Hotels & tourism	430.1	1.5	Semiconductors	328.0	1.1	Textiles	270.2	1.8
Top 10	26799.8	92.7	Top 10	28569.2	94.8	Top 10	13143.7	88.0
Total	28908.4	100.0	Total	30141.7	100.0	Total	14933.0	100.0

Source: fDI Markets; own calculations

Table 6: Trade effect of bilateral greenfield investment: PPML estimates (overall)

Variables	Outward investment				Inward investment			
	(1) I_{ijt}	(2) I_{ijt}	(3) I_{ijt}	(4) I_{ijt}	(5) I_{ijt}	(6) I_{ijt}	(7) I_{ijt}	(8) I_{ijt}
$\ln(T_{ijkt})$	0.297*** (0.029)	0.298*** (0.029)	0.298*** (0.029)	0.298*** (0.029)	0.179*** (0.021)	0.179*** (0.021)	0.179*** (0.021)	0.179*** (0.021)
BIT_{ijt}	-0.099*** (0.029)	-0.098*** (0.028)	-0.096*** (0.028)	-0.096*** (0.028)	-0.066*** (0.023)	-0.066*** (0.023)	-0.064*** (0.023)	-0.064*** (0.023)
GTA_{ijt}		-0.079 (0.143)		0.110 (0.202)		0.015 (0.144)		0.280 (0.210)
STA_{ijt}			-0.131 (0.119)	-0.204 (0.167)			-0.110 (0.119)	-0.288* (0.174)
Observations	14,547	14,547	14,547	14,547	15,143	15,143	15,143	15,143
Source-Sector-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Destination-Sector-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Source-Destination FE	YES	YES	YES	YES	YES	YES	YES	YES
Pseudo-R2	0.9830	0.9830	0.9830	0.9830	0.9830	0.9830	0.9830	0.9830

Note: Estimations include source-sector-year, destination-sector-year and source-destination fixed effects along with intra-national investment observations and country-specific dummies for intra-national investment. Standard errors are clustered by dyad-sector-year. Levels of significance: *10%, **5%, ***1%. Data on bilateral greenfield investment are summed over the following time periods to allow for adjustment effects: 2003-05, 2006-10, 2011-15, and 2016-18.

Table 7: Trade effect of African greenfield investment: PPML estimates

Variables	Outward investment				Inward investment			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	I_{ijt}	I_{ijt}	I_{ijt}	I_{ijt}	I_{ijt}	I_{ijt}	I_{ijt}	I_{ijt}
$\ln(T_{ijkt})$	0.942*** (0.037)	0.933*** (0.036)	0.938*** (0.036)	0.933*** (0.036)	0.879*** (0.039)	0.871*** (0.039)	0.875*** (0.039)	0.870*** (0.039)
BIT_{ijt}	-1.527*** (0.051)	-1.360*** (0.055)	-1.403*** (0.053)	-1.358*** (0.055)	-1.486*** (0.052)	-1.359*** (0.052)	-1.399*** (0.052)	-1.360*** (0.053)
intraAFR_{ij}	2.176*** (0.504)	2.110*** (0.511)	2.064*** (0.497)	2.097*** (0.508)	1.780*** (0.490)	1.697*** (0.492)	1.705*** (0.482)	1.700*** (0.492)
$\ln(T_{ijkt}) * \text{intraAFR}_{ij}$	-0.287*** (0.059)	-0.286*** (0.059)	-0.278*** (0.058)	-0.284*** (0.059)	-0.255*** (0.057)	-0.250*** (0.057)	-0.249*** (0.056)	-0.251*** (0.057)
extraAFR_{ij}	5.099*** (0.523)	5.103*** (0.494)	4.943*** (0.517)	5.067*** (0.496)	4.388*** (0.675)	4.496*** (0.634)	4.239*** (0.668)	4.527*** (0.620)
$\ln(T_{ijkt}) * \text{extraAFR}_{ij}$	-0.675*** (0.097)	-0.658*** (0.090)	-0.673*** (0.096)	-0.660*** (0.091)	-0.601*** (0.122)	-0.621*** (0.110)	-0.597*** (0.122)	-0.623*** (0.109)
outAFR_{ij}	5.956*** (0.546)	5.981*** (0.542)	5.754*** (0.544)	5.931*** (0.543)	5.111*** (0.409)	5.092*** (0.404)	4.983*** (0.398)	5.109*** (0.396)
$\ln(T_{ijkt}) * \text{outAFR}_{ij}$	-0.827*** (0.098)	-0.819*** (0.091)	-0.823*** (0.098)	-0.819*** (0.092)	-0.690*** (0.056)	-0.670*** (0.054)	-0.686*** (0.056)	-0.668*** (0.054)
GTA_{ijt}		-0.722*** (0.122)		-0.586*** (0.109)		-0.478*** (0.159)		-0.531*** (0.130)
STA_{ijt}			-0.746*** (0.165)	-0.194 (0.187)			-0.428** (0.207)	0.070 (0.240)
Observations	15,330	15,330	15,330	15,330	15,912	15,912	15,912	15,912

Source-Sector-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Destination-Sector-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Source-Destination FE	YES	YES	YES	YES	YES	YES	YES	YES
Pseudo-R2 (stage one)	0.9670	0.9670	0.9670	0.9670	0.9662	0.9662	0.9662	0.9662
Pseudo-R2 (stage two)	0.8200	0.8260	0.8250	0.8260	0.7880	0.7910	0.7900	0.7910
Calculated intraAFR elasticity	0.66	0.65	0.66	0.65	0.62	0.62	0.63	0.62
Calculated extraAFR elasticity	0.27	0.28	0.27	0.27	0.28	0.25	0.28	0.25
Calculated outAFR elasticity	0.12	0.11	0.12	0.11	0.19	0.20	0.19	0.20

Note: The table reports results from the second-stage of a two-step estimation procedure. Bilateral disaggregated greenfield investment, including data on intra-national investment, is regressed on source-sector-year, destination-sector-year and source-destination fixed effects in step one. The residual from step one is regressed on country-specific dummies for intra-national investment and all other explanatory variables in step two. Standard errors are clustered by dyad-sector-year in both steps. Levels of significance: *10%, **5%, ***1%. Data on bilateral greenfield investment are summed over the following time periods to allow for adjustment effects: 2003-05, 2006-10, 2011-15, and 2016-18.

Table 8: Effect of cross-border supply of intermediates on African greenfield investment: PPML estimates

Variables	Outward investment					Inward investment		
	(1) I_{ijt}	(2) I_{ijt}	(3) I_{ijt}	(4) I_{ijt}	(5) I_{ijt}	(6) I_{ijt}	(7) I_{ijt}	(8) I_{ijt}
$\ln(S^l_{ijkt})$	0.858*** (0.034)	0.858*** (0.035)	0.857*** (0.035)	0.858*** (0.035)	0.787*** (0.040)	0.791*** (0.039)	0.790*** (0.038)	0.791*** (0.039)
BIT_{ijt}	-0.281*** (0.091)	-0.285*** (0.090)	-0.277*** (0.090)	-0.283*** (0.090)	-0.455*** (0.096)	-0.496*** (0.108)	-0.487*** (0.110)	-0.496*** (0.110)
intraAFR_{ij}	2.770*** (0.766)	2.772*** (0.766)	2.766*** (0.766)	2.759*** (0.759)	2.244*** (0.857)	2.270*** (0.846)	2.284*** (0.855)	2.276*** (0.844)
$\ln(S^l_{ijkt}) * \text{intraAFR}_{ij}$	-0.385***	-0.385***	-0.384***	-0.383***	-0.340***	-0.342***	-0.344***	-0.343***

	(0.093)	(0.093)	(0.093)	(0.092)	(0.104)	(0.102)	(0.104)	(0.102)
extraAFR _{ij}	4.700***	4.702***	4.694***	4.680***	3.140***	3.129***	3.205***	3.150***
	(0.347)	(0.348)	(0.350)	(0.352)	(0.500)	(0.504)	(0.487)	(0.490)
ln(S ^l _{ijkt})*extraAFR _{ij}	-0.853***	-0.854***	-0.852***	-0.857***	-0.478***	-0.472***	-0.481***	-0.474***
	(0.067)	(0.067)	(0.067)	(0.067)	(0.120)	(0.122)	(0.120)	(0.120)
outAFR _{ij}	3.123***	3.120***	3.116***	3.074***	4.104***	4.120***	4.163***	4.134***
	(0.505)	(0.504)	(0.507)	(0.512)	(0.344)	(0.338)	(0.325)	(0.323)
ln(S ^l _{ijkt})*outAFR _{ij}	-0.410**	-0.409**	-0.410**	-0.404**	-0.750***	-0.761***	-0.753***	-0.760***
	(0.163)	(0.163)	(0.163)	(0.164)	(0.073)	(0.073)	(0.072)	(0.075)
GTA _{ijt}		0.015		0.071		0.136		0.107
		(0.090)		(0.138)		(0.144)		(0.140)
STA _{ijt}			-0.018	-0.082			0.135	0.038
			(0.107)	(0.165)			(0.181)	(0.221)
Observations	15,330	15,330	15,330	15,330	15,912	15,912	15,912	15,912
Source-Sector-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Destination-Sector-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Source-Destination FE	YES	YES	YES	YES	YES	YES	YES	YES
Pseudo-R2 (stage one)	0.9670	0.9670	0.9670	0.9670	0.9662	0.9662	0.9662	0.9662
Pseudo-R2 (stage two)	0.8180	0.8180	0.8180	0.8180	0.7700	0.7710	0.7710	0.7710
Calculated intraAFR elasticity	0.47	0.47	0.47	0.48	0.45	0.45	0.45	0.45
Calculated extraAFR elasticity	0.01	0.00	0.01	0.00	0.31	0.32	0.31	0.32
Calculated outAFR elasticity	0.45	0.45	0.45	0.45	0.04	0.03	0.04	0.03

Note: The table reports results from the second-stage of a two-step estimation procedure. Bilateral disaggregated greenfield investment, including data on intra-national investment, is regressed on source-sector-year, destination-sector-year and source-destination fixed effects in step one. The residual from step one is regressed on country-specific dummies for intra-national investment and all other explanatory variables in step two. Standard errors are clustered by dyad-sector-year in both steps. Levels of significance: *10%, **5%, ***1%. Data on bilateral greenfield investment are summed over the following time periods to allow for adjustment effects: 2003-05, 2006-10, 2011-15, and 2016-18.

Table 9: Effect of cross-border demand for intermediates on African greenfield investment: PPML estimates

[illegible]

Destination-Sector-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Source-Destination FE	YES	YES	YES	YES	YES	YES	YES	YES
Pseudo-R2 (stage one)	0.9670	0.9670	0.9670	0.9670	0.9662	0.9662	0.9662	0.9662
Pseudo-R2 (stage two)	0.1200	0.1210	0.1210	0.1210	0.1080	0.1100	0.1110	0.1110
Calculated intraAFR elasticity	1.44	1.46	1.44	1.44	0.23	0.23	0.23	0.23
Calculated extraAFR elasticity	0.10	0.10	0.10	0.10	0.23	0.23	0.23	0.23
Calculated outAFR elasticity	0.26	0.26	0.27	0.27	0.08	0.06	0.08	0.08

Note: The table reports results from the second-stage of a two-step estimation procedure. Bilateral disaggregated greenfield investment, including data on intra-national investment, is regressed on source-sector-year, destination-sector-year and source-destination fixed effects in step one. The residual from step one is regressed on country-specific dummies for intra-national investment and all other explanatory variables in step two. Standard errors are clustered by dyad-sector-year in both steps. Levels of significance: *10%, **5%, ***1%. Data on bilateral greenfield investment are summed over the following time periods to allow for adjustment effects: 2003-05, 2006-10, 2011-15, and 2016-18.

Table 10: Trade effect of African greenfield investment: governance matters

Variables	Outward investment					
	(1) I_{ijt}	(2) I_{ijt}	(3) I_{ijt}	(4) I_{ijt}	(5) I_{ijt}	(6) I_{ijt}
$\ln(T_{ijkt})$	0.929*** (0.026)	0.954*** (0.032)	0.972*** (0.033)	0.960*** (0.028)	0.959*** (0.030)	0.961*** (0.031)
BIT_{ijt}	-1.510*** (0.053)	-1.427*** (0.052)	-1.404*** (0.053)	-1.471*** (0.052)	-1.434*** (0.052)	-1.429*** (0.052)
GTA_{ijt}	-0.838*** (0.109)	-0.751*** (0.108)	-0.711*** (0.107)	-0.768*** (0.106)	-0.730*** (0.108)	-0.733*** (0.108)
STA_{ijt}	0.013 (0.183)	0.107 (0.177)	0.031 (0.174)	0.155 (0.166)	0.021 (0.174)	0.019 (0.175)
Voice and Accountability, Estimate (vae_{jt})	-0.283*** (0.030)					

intraAFR _{ij}	0.777 (0.585)	1.149** (0.553)	0.915* (0.502)	1.042** (0.473)	0.993** (0.450)	1.139** (0.515)
ln(T _{ijkt})*intraAFR _{ij}	-0.130* (0.071)	-0.201*** (0.064)	-0.158*** (0.060)	-0.184*** (0.056)	-0.180*** (0.054)	-0.192*** (0.061)
ln(T _{ijkt})*intraAFR _{ij} *vae _{jt}	-0.016** (0.008)					
extraAFR _{ij}	4.828*** (0.455)	5.013*** (0.455)	4.886*** (0.467)	4.881*** (0.435)	4.940*** (0.457)	4.937*** (0.470)
ln(T _{ijkt})*extraAFR _{ij}	-0.697*** (0.073)	-0.724*** (0.083)	-0.745*** (0.089)	-0.728*** (0.073)	-0.700*** (0.093)	-0.708*** (0.093)
ln(T _{ijkt})*extraAFR _{ij} *vae _{jt}	-0.063 (0.043)					
Political Stability and Absence of Violence/Terrorism, Estimate (pve _{jt})		-0.409*** (0.041)				
ln(T _{ijkt})*intraAFR _{ij} *pve _{jt}		-0.026** (0.013)				
ln(T _{ijkt})*extraAFR _{ij} *pve _{jt}		-0.022 (0.026)				
Government Effectiveness, Estimate (gee _{jt})			-0.393*** (0.041)			
ln(T _{ijkt})*intraAFR _{ij} *gee _{jt}			-0.057*** (0.013)			
ln(T _{ijkt})*extraAFR _{ij} *gee _{jt}			-0.113*** (0.044)			
Regulatory Quality, Estimate (rqe _{jt})				-0.420*** (0.040)		
ln(T _{ijkt})*intraAFR _{ij} *rqe _{jt}				-0.028** (0.011)		

$\ln(T_{ijkt}) * \text{extraAFR}_{ij} * \text{rce}_{jt}$					-0.084*	
					(0.047)	
Rule of Law, Estimate (rle_{jt})						-0.316***
						(0.038)
$\ln(T_{ijkt}) * \text{intraAFR}_{ij} * \text{rle}_{jt}$						-0.116***
						(0.031)
$\ln(T_{ijkt}) * \text{extraAFR}_{ij} * \text{rle}_{jt}$						-0.061
						(0.042)
Control of Corruption, Estimate (cce_{jt})						-0.290***
						(0.032)
$\ln(T_{ijkt}) * \text{intraAFR}_{ij} * \text{cce}_{jt}$						-0.071***
						(0.024)
$\ln(T_{ijkt}) * \text{extraAFR}_{ij} * \text{cce}_{jt}$						-0.069
						(0.042)
Observations	15,330	15,330	15,330	15,330	15,330	15,330
Source-Sector-Year FE	YES	YES	YES	YES	YES	YES
Destination-Sector-Year FE	YES	YES	YES	YES	YES	YES
Source-Destination FE	YES	YES	YES	YES	YES	YES
Pseudo-R2 (stage one)	0.9670	0.9670	0.9670	0.9670	0.9670	0.9670
Pseudo-R2 (stage two)	0.8430	0.8420	0.8400	0.8460	0.8410	0.8400
Calculated intra-African trade elasticity of investment	0.78	0.73	0.76	0.75	0.66	0.70
Calculated extra-African trade elasticity of investment	0.23	0.23	0.12	0.15	0.26	0.18

Note: The table reports results from the second-stage of a two-step estimation procedure. Bilateral disaggregated greenfield investment, including data on intra-national investment, is regressed on source-sector-year, destination-sector-year and source-destination fixed effects in step one. The residual from step one is regressed on country-specific dummies for intra-national investment and all other explanatory variables in step two. Standard errors are clustered by dyad-sector-year in both steps. Levels of significance: *10%, **5%, ***1%. Data on bilateral greenfield investment are summed over the following time periods to allow for adjustment effects: 2003-05, 2006-10, 2011-15, and 2016-18.

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