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Master in Economic Development and Growth

The Role of Official Development Assistance and Private Capital Flows in Sub-Saharan African Structural Change: A time series analysis

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Abstract: External financial flows geared towards Sub-Saharan Africa have provided new financing for investment opportunities, beyond the resources that are scarcely available domestically. Within the greater context of structural transformation in today's globalized world, this thesis studied the dynamic effects of Official Development Assistance (ODA) and private capital flows on structural change in Sub-Saharan Africa using Vector Autoregressive and Vector Error Correction models. Using combinations of productivity and employment data on eight Sub-Saharan African countries for the period 1977-2016, it is shown that private capital flows have a tendency to spur structural change in the short run, whereas Official Development Assistance spurs structural change over longer time frames.

Key words: Structural change, Official Development Assistance, private capital flows, financial flows, time series

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1. Introduction

The international development community has long recognized that Sub-Saharan African (henceforth, SSA) countries should diversify their economies from the traditional agriculture sector toward modern, higher productivity, tradable sectors such as labour-intensive manufacturing and services, in order to sustain economic growth. The pace at which such structural change occurs has –especially in the case of allocative inefficiencies in developing countries– been argued to be detrimental in this regard (Rodrik & McMillan, 2014, p.11). Yet, it has often been debated whether SSA will be able to industrialize within the current globalizing world. In fact, a recent study has found that in the last few decades, SSA actually has been characterized by undesirable growth-reducing structural change, i.e. employment shifts toward lower productivity sectors (Rodrik & McMillan, 2014, p.12). To make matters worse, it appears to be the case that developing countries deindustrialize faster and at lower incomes than ever before (Rodrik, 2016b). As a consequence, economic growth has stagnated and the lack of structural change has attributed to the narrative of long lasting poverty and underdevelopment in SSA. All in all, this pessimistic outlook suggests that SSA has a difficult road ahead in their efforts to industrialize (rather, diversify). Economic theory states that an imperative pre-requisite for structural change is a sound policy climate, such that savings are stimulated, investments can be made, and profitable opportunities –in modern, higher productivity sectors– may be recognized and financed (Nelson & Pack, 1999; Page, 2012). This is exactly an issue that seems to be lacking in the African continent. In fact, SSA countries have been characterised by the lowest domestic savings rates (as a share of GDP) for decades (World Bank, World Development Indicators). In addition, there is a lack of investments in fundamentals (infrastructure, human capital etc.) and the private sector, which collectively serve as pivotal bottlenecks to the process of structural change, i.e. industrial development (Page, 2012, pp.105-109). All things considered, there is a recognized lack of financing and much of the development community has shifted its focus towards financing for development, proposing several financial frameworks aimed at crowding-in various sources of international financing (UNCTAD, 2000; United Nations, 2003). In the context of low-income developing countries, particularly external financing is argued to play an important role in the effort to raise investments and possibly induce structural change (Arndt et al. 2010; Kumi et al. 2017; UNCTAD, 2002). These financial flows from abroad provide resources above and beyond the scarcely available domestic resources in a way that constitutes a new source of financing.

Initially, external financial flows geared toward SSA had been restricted to official flows in the form of Official Development Assistance (henceforth, ODA). In the African context, such (often conditional) aid flows from donor countries have usually been granted in acts of morality, human rights violations, and in efforts to combat persistent poverty. But more importantly, aid has also been provided to finance transfers of technical (and managerial) skills and technology with the intent to build and strengthen national capacity. As such, ODA flows display a clear public character aimed at structural problems. With such a vast range of allocation possibilities, aid could be conducive to structural change (and subsequently, economic growth), at least in the long run, if allocated efficiently and appropriately (Arndt et al., 2010; Kumi et al., 2017). That being said, there does not exist a consensus amongst the development community

regarding the effectiveness of foreign aid to Sub-Saharan African countries. Case in point, several researchers and scholars have found conflicting results regarding the effects of development aid on economic development (Boone, 1995; Rajan & Subramanian, 2005; Burnside & Dollar, 1994; Dalgaard, Hansen & Tarp, 2004). Negative effects of aid are often attributed to the misallocation of funds in political regimes, causing the poor and those actually in need of aid financing to miss out on aid benefits (Boone, 1995, p.27). Others cite Dutch Disease-type problems associated with large aid inflows as major detrimental factors to industrial development (Nkusu, 2004; Rajan & Subramanian, 2011). As such, foreign aid has often been scrutinized while other (rather, complementary) development financing vehicles –such as the mobilization of foreign private investments– have been recognized (United Nations, 2003, p.9).

That being said, SSA has managed to increasingly attract financing from abroad in the form of private flows (see figure 1). Figure 1 shows that the past three decades have been marked by a shift in the type of financial flows directed toward SSA from ODA –mainly in early years– to private capital flows. What's more, the share of private capital flows appears to have overtaken the share of ODA around 2007. The same pattern holds for these flows in levels (Addison, Morrissey & Tarp, 2017). Actually, it appears that private capital flows toward Sub-Saharan Africa have been marked by a positive trend since the 1990s, whereas the reverse seems to hold for aid flows. To the extent that African governments are able to attract, maintain, and exploit this relatively new type of foreign investments, new opportunities might be created that could have the potential to foster structural change beyond the effects of development aid. This may especially be the case for Foreign Direct Investments (FDI), which is often associated with job creation, technology spillovers and enterprise development (OECD, 2002). Unsurprisingly, most of these private investments have been targeted toward the exploitation of SSA's natural resources. Although, it appears that many developing countries have managed to diversify their FDI inflows across sectors from mainly primary sectors (mining) toward the rest of the economy (predominantly services, but also manufacturing) (UNCTAD, 2011, p.94). Therefore, private capital flows may have an interesting role to play in the process of SSA structural change.

All the above considered, the introduction of this relatively new financial form of African development promotion raises questions regarding the relative effectiveness of these financial vehicles within the process of structural change. A key difference between the two types of financial flows that explains some of the differences in the relative effectiveness is that ODA is administered exclusively by government agencies (hence the term 'official'). Private capital flows, on the other hand, originate from the private sector and are subject to market terms. As such, the objectives, incentives, and targets behind these financial flows differ and consequently, one would finds different effects on structural change. Granted, ODA is targeted toward structural problems and could therefore facilitate SSA structural change indirectly, i.e. in the long run. Private capital flows on the other hand, are more volatile and are associated with investments and opportunities that may affect structural change more directly, i.e. in the short run. The dynamics behind these relationships are of special interest for African governments in their efforts to induce structural change. Thus, it is exactly these relationships that lay at the epicentre of this thesis. Unique to this study is the side-by-side empirical examination of these financial flows within one model. The aforementioned studies often exclusively focus on either one of the two types of financial flows in determining the possible growth-enhancing effects. Furthermore, such studies often relate these types of financial flows to economic (GDP) growth itself and do not consider the effects on structural change (of which growth might be the outcome). Studying

variations in financial flows and relating them to structural change would contribute to the understanding of structural change by providing insights on its possible drivers. Time series methods will be applied throughout this thesis in order to distinguish between short and long run dynamics.

This thesis is structured as follows: chapter 2 embarks on the terminology of the different types of financial flows considered in this thesis. Furthermore, a comprehensive review of the literature on aid and private capital flows in African context is provided in chapter 3. In chapter 4, the dataset underlying the empirical analysis is described. Subsequently, the main empirical models under investigation are presented. Specifically, Vector Autoregressive and Vector Error Correction Models will be introduced. Chapter 5 provides the results of the empirical analysis and a discussion pertaining to the interpretation of the results. Finally, chapter 6 concludes.

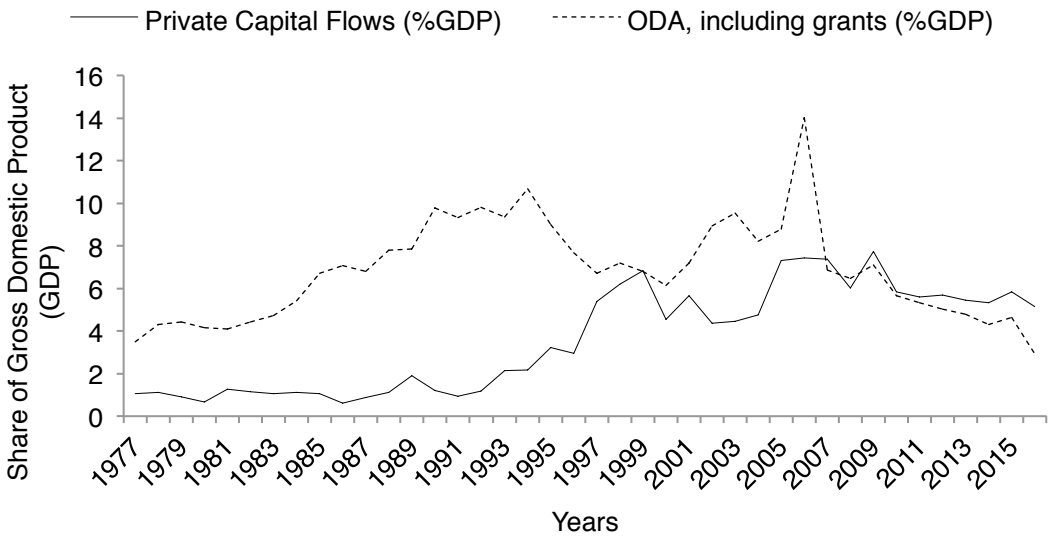


Figure 1. Private Capital and Aid flows to Sub-Saharan Africa (%GDP)

Source: (Calculations based on) World Development Indicators, World Bank
Note: Private capital flows are comprised of the sum of Foreign Direct Investments (FDI) net inflows, portfolio equity and personal remittances received. Aid flows are comprised of Official Development Assistance (ODA), grants and technical cooperation grants. For exact definitions regarding this terminology refer to chapter 2. Same pattern is found when excluding high-income SSA countries.

2. Definitions

In order to thoroughly assess whether ODA and private capital flows induce structural change, it is imperative to establish definitions and dissect the composition of these respective terms. The definitions adhered to within this thesis are defined by the International Monetary Fund (IMF) and Organisation for Economic Co-operation and Development (OECD) (unless stated

otherwise). As mentioned in the introduction, foreign aid is estimated by Official Development Aid (ODA) throughout. The IMF defines ODA as:

> Grants and loans to countries and territories on the DAC List of ODA Recipients (developing countries) and to multilateral agencies which are: (a) undertaken by the official sector; (b) with promotion of economic development and welfare as the main objective; (c) at concessional financial terms (if a loan, having a grant elements of at least 25 per cent). In addition to financial flows, technical co-operation is included in aid. Grants, loans and credits for military purposes are excluded. Transfer payments to private individuals (e.g. pensions, reparations or insurance payouts) are in general not counted (IMF, 2003, p. 263)

From this definition it becomes clear that ODA hinges on three key characteristics (see (a), (b) and (c)). Furthermore, within ODA, flows can be distinguished between multilateral and bilateral aid flows. The former consists of flows channelled through multilateral organisation concerned with development issues (World Bank, etc.), which are used fund the organisations' own programmes. The latter on the other hand consists of flows provided directly by official sources of the donor country to official sources of the aid recipient country (OECD). This is an important distinction to make, given the possible claimed differences in aid-effectives of both types of flows. By structure, one is arguably more politicised while the other enjoys some degree of autonomy (Gulrajani, 2016, p.10). One could argue that especially in SSA, where institutions and rule of law are still underdeveloped, one channel may be preferred over the other in terms of effectiveness. Nevertheless, the three characteristics of ODA is what sets these flows distinctively apart from private (capital) flows, which the OECD defines as:

> Consists of flows at market terms financed out of the private sector resources (i.e. changes in holdings of private long-term assets held by residents of the reporting country) private grants (i.e. grants by non-governmental organizations and other private bodies, net of subsidies received from the official sector)… (Glossary of Key Terms and Concepts. From the "Development Co-operation Report: Efforts and Policies of Members of the Development Assistance Committee")

The key characteristic here is that private flows are at market terms. The exact components of private capital flows as considered in this thesis consist of: Foreign Direct Investments, portfolio equity and personal remittances. From these definitions it becomes clear that the key difference between these two types of flows lies within the nature of these financial flows. Specifically, ODA can flow to recipient countries whenever there is cause to create new opportunities that foster economic development and promote welfare (which is naturally the case for the SSA, characterized by decades of underdevelopment, infrastructure gaps, skills gaps and persistent poverty). As such, structural problems appear to be the main aim of ODA, which could influence the process of structural change in the long run (meaning, in the long run one could expect ODA and structural change to move positively together). Furthermore, ODA flows are concessional, meaning that they are provided under much more favourable conditions compared to market terms. And in the extreme case, grants are provided for which no repayment is required. Private capital flows on the other hand, do not comply with this characteristic of concessional market terms (c), as they, by definition, are valued at market terms. A direct by-product of this is that these investment decisions are up to the discretion of (and generally undertaken by) private investors who will have profit maximization as their main objective, as opposed to the promotion (or creation) of economic development and well-being (see (a) and (b)). Thus, private capital flows are likely to flow where returns are expected to be highest, granted there is a sound investment climate. As a consequence of these different incentives, one could expect these financial flows to impact structural change differently. For instance, ODA could flow to SSA to stimulate human capital development through educational projects, whereas, say, FDI would flow to SSA for prospective profitable FDI market-seeking reasons. The former would then act as a catalyst to the process of structural change, whereas the latter would have a more direct effect on the process of structural change through, say, job creation. Furthermore, the time required for these investments to mature and be fully realized will also differ, making a dynamic, time-sensitive analysis imperative for this analysis.

3. Literature Review

3.1 Structural change

The debate on African development and its path to sustained growth has often surrounded the economic structure of the continent. Much of the emphasis has often been placed on the path to African industrialization, as it generally accepted that this area is what lacks most in Africa. Page (2012, p.89) illustrates how Africa's structure differs from an average benchmark middle-income country. In his study it becomes clear that Africa has some major catching up to do regarding its manufacturing sector, as its lacks behind in value added, employment shares and even productivity (see also World Bank, World Development Indicators). Interestingly so, Page does not find major differences in any other sectors suggesting that much of Africa's stagnated growth has indeed everything to do with its (lack of) labour-intensive manufacturing activities.

Recently, a landmark study by Rodrik and McMillan (2014) has set the stage for important implications of structural change for economic development. Their particular study serves as an essential precedent for this thesis. Rodrik and McMillan (2014) show that structural

change, i.e. the move toward higher productivity sectors, can facilitate as a vehicle for economic growth. Productivity improvements within sectors, they argue, are not necessarily required. Moreover, they note that much of differential growth rates can be accounted for by the different patterns of structural change across countries. As a consequence, insights in the drivers and mechanisms behind structural change are imperative in the effort to sustained economic growth in SSA. However, Page (2012) recognizes that within the current context of globalization in which Asia has taken the lead, the path to an industrialized Africa may not be as clear-cut. Adding to this, Rodrik (2016b) concludes that present-day countries trying to industrialize exhaust their industrialization opportunities sooner and at lower incomes compared to early-industrializers. This phenomenon is attributed to globalization and the shift of manufacturing activities to China (Rodrik, 2016b, p.16). In fact, Rodrik and McMillan (2014, p.20) find that on average, SSA has been characterized by growth-reducing structural change, i.e. labour moving from high to lower productivity activities, in the period 1990-2005. Specifically, they find that this pertains to labour flowing out of (already minimal) manufacturing sectors toward low productivity agriculture and services sectors. Put in perspective, approximately 57% of total people employed in present-day SSA still engage in low-productivity agriculture activities (World Bank, World Development Indicators). In the presence of such large labour allocation inefficient, one would expect especially SSA the gain from a shift of labour toward higher productivity sector activities (Rodrik & McMillan, 2014, p.16). Rodrik and McMillan (2014) note that growth-reducing structural change has been detrimental to SSA economic growth to the tune of 1.3%-points on average per year. Nevertheless, the authors do recognize that structural change is not an automatic process and needs to be stimulated (Rodrik & McMillan, 2014, p.28).

Rodrik and McMillan (2014) identify three possible drivers of structural change in their study (comparative advantage, currency valuation and labour market flexibility). As far as I am aware, this is the only renowned study of its kind attempting to uncover the mechanisms behind structural change. That being said, there are limitations to this study. The main limitation in particular is that they resort to basic OLS estimation techniques in trying to establish causal relationships between these aforementioned (possible) drivers and structural change. As a matter of fact, Rodrik and McMillan (2014, p. 26) themselves acknowledge these results as explorative rather than a causal analysis. In that sense, not much effort has been put in uncovering the causal relationships regarding the drivers of structural change. Furthermore, their analysis only pertains to the structural change term, $\sum_{i=1} y_{i,t}\Delta\theta_{i,t}$, which is the summed product of sectoral productivity and employment change. This aggregate measure could possibly overlook the effects of driving factors on changes in employment in specific sectors that may be especially important in the African context (namely, agriculture and mining). That being said, this thesis departs from their study in a number ways. While maintaining the larger narrative of structural change, this thesis studies structural change in relation to external financial flows. Furthermore, insights on actual changes in sectoral employment are also provided. Specifically this entails how certain types of financial flows (ODA or PCF) are linked to (changes in) employment activities in low and high productivity sectors (see methodology in chapter 4).

3.2. Official Development Aid

An early study by Chenery and Strout (1966) provides a theoretical model in which foreign aid plays a growth-improving role by augmenting domestic resources in an effort to make more efficient use of those resources. In their model, aid serves to fill a financing gap (the difference between required investments and savings). Especially in countries with low savings rates such as SSA then, one would expect foreign aid to play an instrumental role in providing additional resources to finance investments that could possibly induce growth and structural transformation. In fact, Levy (1988) has found that foreign aid in Sub-Saharan Africa has spurred domestic investments and economic growth. A range of other studies emphasise similar growth-enhancing effects of aid, generated through its complementary role to domestic resources and savings (Easterly, 2005; Hansen & Tarp, 2001; Minoiu & Reddy, 2010) or other mechanisms (Dalgaard, Hansen & Tarp, 2004). More importantly, Arndt et al. (2014) actually find that in the long run, aid does not only stimulate growth, but also induces structural change (measured as the share of industry value added). Similarly, Kumi et al. (2017) finds that ODA both spurs growth in tradable and non-tradable sectors. Based on these findings, one could assume that ODA would indeed spur investments (and alleviate structural problems) that, at some point, induce structural change. Nevertheless, these primarily positive effects of foreign aid are not the norm. In general, the development community has remained divided regarding the effectiveness of aid on development. Contrary to the aforementioned empirical studies, some studies find that the effectiveness of aid is conditional rather than strictly positive (Burnside & Dollar, 1994). Others find that positive effects of aid are non-existent, regardless of political environment (Boone, 1995; Rajan & Subramanian, 2005). The latter deserves particular attention, as these findings appear to be in stark contrast with the prescribed growth-enhancing aid theory (Rostow, 1960; Chenery and Strout, 1966). A study by Nkusu (2004) notes how adverse effects of aid could possibly arise through Dutch Disease-type effects. In such cases large inflows of aid may result in appreciated real exchange rates, the shrinkage of tradable sectors and the crowding out of the private sector (Nkusu, 2004, p.7). In conjunction, Rajan & Subramanian (2011) find that aid, indeed, negatively affects growth in manufacturing sectors (relative to services sector growth). As a consequence, manufacturing exports, international competitiveness and private sector development will be greatly affected, complicating the process of structural change.

That being said, the aid literature suggests that there are cases to be made on both sides of the debate that is aid effectiveness. Either way, much of these conflicting results can be argued to be the outcome of different stages in the aid literature, and the consequent differences in methodologies used (Addison et al., 2017). Methodological issues within the aid-literature were pointed out as early as 1986 through Mosley's (1986) micro-macro paradox, which dictates how project-based micro studies often find positive effects of aid whereas macro studies fail to do so. Other empirical issues were brought to the forefront by White (1992). Because the allocation of aid involves policy and is up to the discretion of donors, aid flows depend on a lot of possible factors and therefore should not be treated as exogenous. In fact, Bräutigam and Knack (2004, p. 258) note that aid dependence is not merely a function of poverty as some would think, given that many low income countries rely less on aid than others. Multiple studies have attempted to address this endogeneity problem by implementing a variety of methods.

Addison et al. (2017) provide a clear overview of the econometric challenges faced, and methods used within aid-literature over time. They conclude that much of the criticism of

negative (or non-existent) effects of aid is based on old studies characterized by weak methodology and a misunderstanding of causation. For instance, Boone (1995) attempts to determine the effect of foreign aid flows on economic development in the context of different political regimes using instrumental variables (IV) such as population, lagged aid and political ties. The main limitation of this study (and other similar studies relying on IV estimation methods) is the fact that for all of the instruments used, there is a more than convincible counter-argument to be made regarding the validity of these instruments (i.e. instruments not satisfying the exclusion restriction because they are not truly exogenous themselves). As pointed out by Durlauf, Johson and Temple (2004, cited in Rajan and Subramanian, 2005), this is in an issue that especially persists in the broad economic growth theory. In fact, instruments such as population and political ties may be of importance in establishing the magnitude of aid flows assigned to countries, signalling a strong first stage. But this very method also assumes that these instruments are independent of all other determinants of economic growth, which could be questioned. Moreover, the use of lagged (aid) policy as an exogenous variable rests on the claim that current (aid) policy affects economic development directly whereas lagged policy does not (Rajan & Subramanian, 2005). This is in contrast with the very common notion that (aid) policy necessitates time to be effective and reap the benefits of investments being made (Minoiu & Reddy, 2010, p.37) Thus, it would be more likely for the reverse to hold, i.e. lagged aid affects current economic development directly.

On the other hand, Dalgaard et al. (2004) and Rajan and Subramanian (2005) implemented Generalized Method of Moments (GMM) regressions using fixed effects and IV methods to address the endogeneity problem. Interestingly, these are two fairly similar studies in terms of estimation methods. Yet, these studies manage to find contrasting results regarding the effect of aid of growth. Specifically, Dalgaard et al. (2004) find positive effects of aid on growth (irrespective of the policy environment), while Rajan and Subramanian find the exact opposite result. The fact that one implements fairly similar methods and data, yet obtains conflicting results gives reason to believe that the identifying strategies used may play an important role for the results found. Furthermore, such conflicting findings only add to the ambiguity of the contentious issue that is the aid-growth relationship. That being said, results by Dalgaard et al. (2004) and Rajan and Subramanian (2005) may be argued to be in contrast with the consensus amongst most development economists that institutional quality and political environment play an important role in fostering economic growth and development. The vast historical economic literature on the importance of institutional quality is a testament to the suspected importance of institutions for economic growth. In fact, many studies have considered the historical growth failures of countries in the African continent to be associated with the mismanagement of resources, rent-seeking behaviour, corruption and other phenomena associated with institutional failures (Broadberry & Gardner, 2013; Rodrik, 2016a). In that sense, it would be expected that the efficient management and allocation of foreign aid resources –and thus institutional quality– are of utmost importance for the aid-effectiveness on structural change. This is especially relevant considering ODA may be channelled through either multilateral agencies or bilaterally. Multilateral agencies are often considered autonomous, whereas bilateral trade flows tend to be influenced by political ties (Nunnenkamp & Thiele, 2006, p.1199). As such, the underlying incentives and strategic allocation of resources of donor countries likely plays a role and one may find different results for the effectiveness of aid depending on the degree to which multilateral aid flows are assumed to be less contingent on government officials compared to bilateral aid

flows. All the above considered, findings for conditional aid-effectiveness such as those by Burnside and Dollar (2014) seem more plausible.

Addison et al. (2017) suggest that there is a trend visible over time from these old, methodologically weak studies toward more methodologically sound studies that attempt to establish aid-growth relationships for aggregate country-groups over extended periods of time (a vital point that is overlooked in the older studies). This is because of obvious reasons of lags in the returns of investments associated with aid flows. Especially considering the wide range of aid-targets that may exist across and even within the countries that make up SSA (e.g. infrastructure projects, human capital, food-security). It is safe to say that the returns on investments across these targets vary, and as such a sufficiently large time frame should be applied to encapsulate the effects of all investments. In this regard, Addison et al. (2017) point out newer studies that have applied time series Vector Autoregressive models (VAR) in determining aid-growth relationships. The justification of such methods as opposed to the panel methods discussed prior is based on the fact within these models "there is an established protocol for testing which variables are endogenous (to be determined by) the system, which are exogenous (driven) and which can be excluded from the relationship" (Addison et al., 2017, p. 993). Said differently, all variables are considered endogenous and no prior assumptions about the exogeneity of variables need to be made. This is one of the main advantages of this method. Within the context of endogeneity and aid policy then, VAR models may be preferred over structural simultaneous equations in which causal inference are hard to uncover. Moreover, the importance of timing need not be neglected. Arguably, these issues are relevant especially within the contentious aid literature as has been illustrated above. Therefore, similar methods are implemented in this thesis.

3.3. Private capital flows

Similar to the literature on aid flows, there is a large variety of literature on the effectiveness of private capital flows on economic development, which does not particularly focuses on structural change. As mentioned in the introduction, private capital flows toward SSA have been (and to a lesser extent today, still are) scarce (see figure 1). Nevertheless, increases in private capital flows toward SSA have made these flows a significant source of investment (UNDP, 2011). As illustrated by Alley (2015), neoclassical theory prescribes how private capital flows can add to domestic resources in order to spur economic output and investments. As such, it would not be surprising to see that such countries –which have seen significant increases in private capital flows– depend on these flows to induce investments that could facilitate structural change. Especially FDI flows bear special attention in this regard. Generally, FDI flows are perceived to be growth-improving due to their association with employment opportunity creation, enterprise development, and technology spillovers, i.e. linkages (OECD, 2002; UNCTAD, 2010). Furthermore, it appears to be the case that many developing countries have managed to diversify their FDI inflows across sectors from mainly primary sectors (mining) toward the rest of the economy (predominantly services, but also manufacturing) (UNCTAD, 2011, p.94). In fact, the World Investment Report (2017) indicates that Africa's agribusiness is most likely to attract FDI flows (UNCTAD, 2017, p.8). This includes agriculture, manufacturing (food and beverages) and services industries. That being said, present-day mining industries in Africa still make up around

20 to 30% of total FDI stock (UNCTAD, 2017, p. 23). All the above considered, there appears to be great potential for private capital flows to spur employment flows from agriculture into labour-intensive manufacturing and services. As such, one would expect positive feedback between private capital flows and structural change. Nevertheless, it should be noted that prior experiences in Asia allude to the notion that merely attracting private capital flows at any cost will not lead to success; factors such as the macroeconomic environment, industrial policies and strategic decision-making matter (UNCTAD, 2005, p.58). For instance, Dutch Disease-type problems similar to those discussed in the case of ODA may arise. Capital inflows have the potential to worsen the investment problem through real exchange rate appreciation, ultimately incentivizing investors to invest less with much of the tradable sectors being affected (Rodrik & Subramanian, 2008, p.2). Consequently, structural change may actually be negatively related to private capital inflows.

Either way, it is often stated that international capital flows tend to flow toward countries with sound investment climates, and that benefits in such environments are highest (World Bank, 2001, p.59). Agbloyor et al. (2014) find results consistent with this proposition. Specifically, they find that private capital flows (FDI, portfolio equity) have negatively effected economic development in SSA. What's more, they find that such negative effects can be transformed into positive ones in countries with stronger domestic financial markets. On the other hand, Alley (2015) finds contrasting results. He concludes that private capital flows positively affected economic output and growth in SSA between 1990 and 2013. Furthermore, he states that the negative relationship found between private capital flows and African GDP can be accounted for by private capital shocks. It should be noted that private capital flows are highly volatile, and shocks in private capital flows may therefore have adverse affects on economic development. In fact, it can be shown that the (absolute) average annual rate of change in FDI inflows is around 207% for developing countries (UNCTAD, 2011, p.98). Consequently, those countries that rely most on such flows for investment and development purposes also show to be volatile in terms of growth outcomes (perhaps also in terms of structural change) (UNCTAD, 2011, 99).

The discussion above would suggest that the presence of private capital flows would be larger in more developed countries, or at least in countries with sound economic environments. Generally, these would not be countries that are underdeveloped. In that sense, an interlinked relationship may exist between private capital flows and ODA. In the ODI (Overseas Development Institute) Report on different ODA channels, it is illustrated through examples how ODA may have positive (un)intended spillover effects on the investment climate (Gulrajani, 2016, p. 10). More general, these examples clearly display how private capital flows may act as a complementary rather than substitute financial vehicle to ODA. In particular, ODA has a tendency to be mainly targeted toward structural problems (see chapter 2 on definitions). Addison et al. (2017) insinuate that less than half of aid finances physical investments, with most of aid financing government social sectors or human capital (p. 993). To the extent that ODA alleviates structural bottlenecks, these investments then act as a catalyst to induce other types investments such as private capital flows. Point in case, Thorbecke and Ouyang (2016, p.27) argue that one of the reasons of the recent growth spell in SSA has been the rise in FDI flows from abroad, partly induced by the improvements made in SSA governance. In similar vein, Alfaro et al. (2008) conclude that much lack of capital flows in early years can be attributed to the quality of institutions and governance, and to a lesser extent imperfect capital markets and

human capital. Accordingly, such structural problems have often been cited to be an explanation to what is known as the Lucas Paradox. This paradox prescribes how capital flows should flow towards developing countries where capital flows are generally scarce in order to obtain the highest returns on investments, based on the law of diminishing returns to capital (Lucas, 1990). Yet in practice, countries in which capital flows are scarce such as SSA are generally at the lower receiving-end of such flows. This is a particular issue that is recognized in the Monterrey Consensus, held by the United Nations International Conference on Financing for Development. In this consensus it is recognized that private (capital) flows are unlikely to flow into countries that are highly underdeveloped, as this would entail high-risk investments (United Nations, 2003). By default, such countries that lack basic fundamentals are likely to have not been subject to heavy ODA flows. Hence, one would expect private capital flows to play a larger role in the process of SSA structural transformation whenever ODA has addressed structural problems. But of course this need not be the case. This complex interlinked relationship between ODA and PCF then deserves special attention from an empirical standpoint.

3.4. Discussion

Having discussed the different strands of literature, it is of interest to link all strands of literature in order to investigate the main hypotheses of interest. As such, the question still remains why one would expect for private capital flows and ODA to positively affect structural change, if at all. In this thesis, it is believed that in order to answer this question one needs to revert back to the definitions of both flows. As mentioned in the beginning section, ODA flows have a public characteristic as flows are only induced whenever development opportunities arise. In contrast, private capital flows are at market value and are generally undertaken whenever profitable opportunities arise. Hence, the types of targets (investments) made, the relative timing of these investments, and subsequently their effects on structural change are likely to differ between the two. From the discussion above it becomes clear that ODA has a tendency to be mainly targeted toward structural problems. These investments may set the stage for, or actually facilitate, structural change. Goldin et al. (2002, p. 2) note that it is expected for the effectiveness of ODA to exceed beyond the projects they finance, and to emerge primarily through inducing changes in institutional quality and education. As such, one would expect indirect positive effects of ODA on structural change, or said differently, long-run effects. In similar vein, Minoiu and Reddy (2010, p. 37) find that the impact of aid, indeed, spans over multiple decades. They relate this to the notion that aid mainly finances investments in fundamentals (human development, infrastructure and organizational development), of which the return materialize only over long periods of time. Based on this reasoning, one could propose that ODA induces structural change in the long run. This is one of the two hypotheses under empirical investigation in the next section.

That being said, private capital flows may have a more direct effect on structural change and economic growth by fostering employment opportunities in sectors beyond agriculture/natural-resources, enterprise development and technological transfers (OECD, 2002). Furthermore, these flows are generally more volatile. All the above considered, one could propose that private capital flows foster structural change in the short run. Either way, these types of financial flows appear to be interlinked to some degree. Based on theory, it seems to be

the case that private capital flows tend to flow more into countries that are not too underdeveloped. As a consequence, it is imperative that the analysis in this thesis manages to account for this. In similar vein, it has become clear that the contentious aid literature should also be handled accordingly. In particular, problems pertaining to endogeneity need to be addresses. Furthermore, a time sensitive analysis should be applied in order to allow for a fully dynamic analysis. Based on these findings, advanced time series methods (VAR/VEC models) will be implemented in the next section.

The mere fact that most of the studies discussed have not focused on structural change in an empirical setting per se, opens the door to interesting hypotheses. Furthermore, the fact that a causal analysis on the drivers of structural change has not yet been fully explored could lead to major contributions in the structural change literature. Especially in SSA's context, it would benefit to determine whether private capital flows and ODA could indeed induce a shift toward higher productivity sectors, and which sectors are generally affected by these investments.

4. Data and models

4.1. Data and data transformations

Annual time series data for the period ranging 1977-2016 are used for a sub-sample of 8 SSA counties. It should be noted that even though data is available for years as early as 1960, the starting point of this analysis is 1977 to avoid the large amounts of omitted data for a variety of countries in these early years. Due to limited detailed data on structural change in African countries (limited in terms of the amount of countries), we are restricted to a limited amount of countries within this regard. The following 8 SSA countries are included in the analysis: Botswana, Ethiopia, Ghana, Kenya, Malawi, Mauritius, Nigeria and Zambia (see Appendix F). In this thesis, the data on structural change comes from the Africa Sector Database (De Vries, Timmer and de Vries, 2016). Specifically, two structural change measures are used. First, structural change terms have been obtained as introduced by Rodrik and McMillan (2014): $\sum_{i=1} y_{i,t}\Delta\theta_{i,t}$. This is the summed product of sectoral productivity $y_{i,t}$ and sectoral employment. This measure can only be used in aggregates, i.e. in the analysis on SSA as a whole (discussed later). Second, structural change is measured by employment data over time, i.e. $\theta_{i,t}$ (the share of people engaging in activities that fall within a certain sector). All data on these two measures are obtained from De Vries et al. (2016). De Vries et al. (2016) note that even though their dataset is limited with respect to the amount of countries included, the dataset still provides employment data over a long period (since 1960) using detailed ISIC (International Standard Industrial Classification of All Economic Activities), the countries included represent each region of Sub-Saharan Africa, and the countries comprise around 70% of Sub-Saharan African aggregate economy. To assess the pace of structural change, employment fluctuations across four major sectors have been distinguished and identified based on ISIC Rev 3.1. These major sectors include agriculture, mining, manufacturing and services. For a full overview of the industries that are included in each major sector see Appendix B. Instead of solely focussing on

agriculture vis-à-vis manufacturing, this distinction is adhered to in order to clearly display the whole economy. Furthermore, this distinction prevents from overlooking other sector that may be of particular interest to SSA, such as the mining industries (which would have been omitted when comparing agriculture to manufacturing).

Finally, data on ODA, (the components of) private capital flows (FDI, Portfolio equity investments, and personal remittances) are taken from the World Bank World Development Indicators (WDI) database. To allow for a sound economic interpretation, it can be assumed that all variables have been log-transformed throughout the analysis.

4.2. VAR Model

As mentioned prior, a Vector Autoregressive Model (VAR) will be implemented throughout this thesis. This model departs from conventional structural models within econometric practices, as no distinction regarding the exogeneity of variables needs to be made a priori. This is a rather distinguished feature that can be argued to address the contentious endogeneity problem associated with aid studies (see section 3.2).

The following (abbreviations for) variables are used frequently throughout the empirical analysis.

sagri= share employment agricultural activities
smin= share employment mining activities
smanuf= share employment manufacturing activities
sserv= share employment services activties
GDP = Gross Domestic Product
ODA = Official Development Assistance
PCF = Private capital flows

That begin said, the following relationship is of particular interest:

(Δshare employment sector 'i')= f(GPD, ODA, PCF) **(1)**
for i={agri, min, manuf, serv}

This relationship can be expressed in the following general VAR(k) model:

$$\boldsymbol{y_t} = \boldsymbol{c} + \sum_{i=1}^{K} \boldsymbol{\Gamma_i} \boldsymbol{y_{t-i}} + \boldsymbol{\epsilon_t} \quad \textbf{(2)}$$

, where $\boldsymbol{y_t}$ is a *n* x *1* vector of relevant variables, $\boldsymbol{c}$ is a *n* x *1* vector of constants, each $\boldsymbol{\Gamma_i}$ is a *n* x *n* matrix and $\boldsymbol{\epsilon_t}$ is a *n* x *1* vector of error terms. Thus, this equation represents a system of equations that will be simultaneously determined (see Appendix A for elaboration). It dictates each variable as a function of their own (k) lagged variables and the lagged variables of other (possibly) exogenous variables. Note that throughout this thesis this equation pertains to first differences, i.e. growth rates or changes (see following section).

Unit root tests

In order to make predictions, one needs to ensure that the time series being analysed are stationary. Non-stationary series could lead to spurious regressions, which would ultimately impose a threat for causal inference and estimation. To formally test this, unit root tests have been conducted to determine whether the time series in our analysis exhibit unit roots or not, i.e. whether the time series are stationary or non-stationary. Specifically, stationarity has been tested for the time series in levels and first differences to determine the order of integration. Table X in Appendix C shows results of the Augmented Dickey Fuller (ADF) test. The models for which unit root has been tested were derived by a testing-down procedure, i.e. starting with a comprehensive equation and stepwise excluding insignificant variables to ultimately obtain the parsimonious equations displayed in the table. Using a 5%-significance level, we cannot reject the null hypothesis of unit roots for all time series in log-levels. On the other hand, the null hypothesis is also not rejected for all time series in first differences (see Appendix C for full test results). Hence, additional Phillips-Perron and KPSS tests have been conducted to test for the robustness of results. After incorporating all three tests, it becomes clear that the time series are all *I*(1) (integrated of order 1), i.e. the series in (log) levels do exhibit a unit root (are non-stationary) whereas the first differences of those series do.

Co-integration

Before proceeding to estimate, it bears to be seen whether there exists a linear combination between the *I*(1) series that is *I*(0), i.e. whether the series used in the analysis are co-integrated (Engle & Granger, 1987). In that case:

$$\theta_1 \mathrm{agri}_t + \theta_2 \mathrm{min}_t + \theta_3 \mathrm{manuf}_t + \theta_4 \mathrm{serv}_t + \theta_5 \mathrm{GDP} + \theta_6 \mathrm{ODA}_t + \theta_7 \mathrm{PCF}_t = \mu_t \sim I(0) \quad (3)$$

For the aggregate analysis using SSA as a whole, this pertains to the following co-integration relationship:

$$\theta_1 \mathrm{sc}_t + \theta_2 \mathrm{GDP} + \theta_3 \mathrm{ODA}_t + \theta_4 \mathrm{PCF}_t = \mu_t \sim I(0) \quad (4)$$

, where sc_t represents the aggregate structural change term as introduced by Rodrik and McMillan (2014): $\sum_{i=1} y_{i,t} \Delta\theta_{i,t}$

In essence, this allows one to determine whether the time series under consideration move together in the long run, i.e. there is an equilibrium relationship between the variables in the long-run that the economy returns to whenever deviations from this equilibrium occurs ('error correction'). Whenever this is the case, an error-correction model may be applied that allows for these long-run equilibrium relationships while simultaneously having a dynamic short-run component (Engle & Granger, 1987, p. 252).

To test for this, the Johansens test of co-integration has been applied in table 3. It should be noted that the Engle-Granger test for co-integration is not compatible with this dataset as this test can only detect one co-integration relationship. Instead, one would like to generalize this testing procedure to allow for a co-integration vector. The Johansens test of co-integration

allows for this (Johansen, 1991). This test is of particular interest for this thesis, as a co-integration relationship would allow to study long-run relationships between private capital flows and structural change, and ODA and structural change respectively (and in some instances long-run relationships between the two types of flows). To determine the presence of a co-integrated relationship between the time series, lag length k of the underlying VAR(k) models (see equation 2) has to be determined. Throughout this thesis it can be assumed that lag length has been decided upon using Information criteria (with respect to data size). Furthermore, we opted for testing for co-integration relationships in models that suggest the least amount of restrictions. In this case, these are models that allow constants to be nonzero and account for long-run trends. In essence, the latter accounts for technological change over time.

Based on the Johansen test of Co-integration, the presence of co-integration has been determined for each country in the analysis individually. Due to the large amount of data output, table 1 merely provides the conclusions that are drawn from the test results.

Table 1. Johansens co-integration test results

Country	Co-integration relationships	Model of estimation	Lag length
SSA	At most 2	VEC	4
BWA	At most 4	VEC	2
ETH	At most 4	VEC	2
GHA	At most 4	VEC	2
KEN	0	VAR	3
MWI	0	VAR	3
MUS	0	VAR	3
NGA	At most 3	VEC	2
ZMB	At most 5	VEC	2

Note: Countries include Sub-Saharan Africa (SSA), Botswana (BWA), Ethiopia (ETH), Ghana (GHA), Kenya (KEN), Malawi (MWI), Mauritius (MUS), Nigeria (NGA) and Zambia (ZMB)

As mentioned above, time series that are co-integrated entail a long run equilibrium relationship and need to be estimated accordingly by error correction models. To account for these found co-integration relationships and trends, a so-called co-integrating vector $\boldsymbol{\alpha}$ will be added to the general VAR(k) model of equation 2. All the above considered, (in cases where this applies) ultimately the following estimated general Vector Error Correction Model VECM(k) would be estimated:

$$\boldsymbol{y_t = c + \alpha(\beta y_{t-1} + \gamma + \rho t) + \sum_{i=1}^{K} \Gamma_i y_{t-i} + \epsilon_t} \quad (4)$$

, where $\boldsymbol{\alpha}$ is a *n* x *r* matrix (*r* is the number of co-integration relationships) of so-called 'error correction terms' (ECTs) representing the speed at which is disequilibrium is corrected, $\boldsymbol{\beta}$ is a co-integration vector dictating the long-run dynamics between the series, $\boldsymbol{\gamma}$ is a *n* x *1* vector of constants, and $\boldsymbol{\rho t}$ is a *n* x *1* vector accounting for trends.
Of particular interest for these VEC models is the long-run relationship or co-integration equation $\boldsymbol{(\beta y_{t-1} + \gamma + \rho t).}$ These present the long-run dynamics between the variables and will be discussed separately later on.

To ensure model validity, normality and autocorrelation tests have been performed throughout. Results of these tests are presented in Appendix E.

5. Empirical results

In this section, the effects of ODA and PCF on structural change are estimated. First the
First, the dynamics between structural change and the two financial flows have been determined for the average of the countries included in the analysis (SSA, henceforth). Specifically, this particular relationship studies how the structural change term for SSA ($\sum_{i=1} y_{i,t}\Delta\theta_{i,t}$) behaves against ODA flows and PCF flows over time. Subsequently, a multi-country analysis has been performed to assess the mechanisms behind the reallocation of labour across sectors. In this particular analysis, the structural change term is disaggregated to assess the dynamic behaviour of changes in employment shares in particular countries ($\Delta\theta_{i,t}$) to changes in ODA and PCF, respectively. Finally, results from these two analyses will be discussed and contrasted. Short and long-run dynamics will be discussed throughout.

5.1. Sub-Saharan Africa

Table 2a below displays the VEC(4) estimates of the short-run effects of ODA and PCF, respectively, on (the pace of) structural change. In specification (1), the equation is obtained in which the (change in) structural change term appears on the left-hand side. In this specification, it is shown that ODA does not display any effects on the pace of structural change in the short-run as would be expected based theory. Even when taking into account the idea that these particular types of investments take time to develop, insignificant results are found. In particular growth in ODA up until three years prior (i.e. $\mathbf{ODA_{t-3}}$) show no significant positive effects on the speed of structural change. Private capital flows on the other hand do positively affect the speed of structural change in the short run. A 1%-point increase in PCF growth is associated with a 0.59%-point increase in the speed of structural change. This result indicates that, on average, private capital flows indeed lead to investments and job opportunities in higher productivity sectors. Furthermore, this suggests that SSA should create their development

policies around attracting more private capital flows in an effort to foster structural change. At least in the short run, that is.

That being said, specification (2) shows results obtain from the equation with GDP growth on the left-hand side. Here, we find that ODA actually negatively affects economic growth in the short run (for the 1st and 3rd lag). This is an interesting finding, particularly given the fact that no effects of ODA have been found on structural change in the short run. This indicates that ODA is not so much associated with the allocation of workers (at least in the short run), but more so affects economic output, albeit through other channels besides structural change. Possible explanations for this negative effect could be the misallocation of resources. This is an often-cited explanation for the negative effects of foreign aid (especially in the African context of poor governance). The results suggest that Dutch Disease type effects do not appear to be the case. If it was indeed the case that ODA inflows led to a shrinkage in tradable sectors, one would expect to see ODA inflows affect employment shifts (and thus, structural change) at least to some extent. As far as PCF goes, a positive effect (0.013%) has been found in the 3rd lag, albeit lower than its effect on structural change. Specifically, a 1%-point increase in the PCF 3-periods prior affects economic growth by 0.05%-points. The latter result is suggestive of PCF enabling economic growth through its effect on structural change in the short run.

All in all, the results comply with the underlying theory. The null hypothesis that private capital flows do not positively affect structural change in the short run can be rejected. Furthermore, the results also indicate that ODA is not particularly effective in the short-run. This is also in conjunction with the prescribed theory discussed earlier. The effects on the long run however, remain to be seen.

Table 2a. Vector Error Correction Model results, SSA

VARIABLES	(1) ΔStructural change term	(2) ΔGDP	(3) ΔODA	(4) ΔPCF
Correction error 1	-1.537**	0.0425	-0.146	-2.742***
	(0.748)	(0.0379)	(0.117)	(0.991)
Correction error 2	-2.542**	0.0489	-0.165	-5.603***
	(1.144)	(0.0579)	(0.178)	(1.516)
	(4.352)	(0.220)	(0.679)	(5.768)
ΔODA_{t-1}	0.513	-0.291***	0.145	3.209
	(2.068)	(0.105)	(0.322)	(2.741)
ΔODA_{t-2}	2.621	0.102	0.168	-1.047
	(1.895)	(0.0960)	(0.296)	(2.512)
ΔODA_{t-3}	-0.192	-0.409***	0.173	4.967**
	(1.677)	(0.0850)	(0.262)	(2.223)
ΔPCF_{t-1}	0.599***	0.00555	-0.00683	0.467
	(0.217)	(0.0110)	(0.0338)	(0.287)
ΔPCF_{t-2}	0.213	0.0110	0.00398	0.129
	(0.159)	(0.00806)	(0.0248)	(0.211)
ΔPCF_{t-3}	0.165	0.0133**	-0.00699	-0.0742
	(0.113)	(0.00571)	(0.0176)	(0.149)
Constant	-0.0183	0.0516**	0.0976	0.00588
	(0.519)	(0.0263)	(0.0809)	(0.688)
Observations	31	31	31	31

Note: structural change here represents the structural change term as introduced by Rodrik and McMillan (2014), i.e. $\sum_{i=1} y_{i,t} \Delta\theta_{i,t}$. Hence, the dependent variable pertains to the *pace* of structural change

Long-run dynamics

Long run dynamics are obtained from the co-integration results displayed in table 2b below. Two long-run relationships are obtained. From specifications (1) and (2) the following long-run relationships can be obtained, respectively:

ln(structural change) = 119.367 -6.959ln(ODA) +1.112ln(PCF) +0.081ln(trend)

ln (GDP) = -24.368 +3.044ln(ODA) -0.912ln(PCF) +0.206ln(trend)

From these long-run dynamics it can be inferred that ODA is negatively related to structural change in the long run. This means that increases in ODA flows toward SSA actually induce structural change in the undesired direction, i.e. toward lower productivity sectors. Which would be the case when ODA flows fail to fully address structural problems, and would not induce employment in higher productivity sectors. On the other hand, private capital flows toward SSA induce structural change in the desired direction in the long run, i.e. toward higher productivity sectors. This result enforces the short run findings, conforming that, indeed, private capital flows either managed to finance investments or created new opportunities in higher productivity sectors. The results on GDP on the other hand display conflicting results. In the long run, private capital flows appear to be negatively related to GDP (yet positively related to structural change). Furthermore, ODA is positively related to GDP (yet negatively related to structural change). Different explanations are possible for the found results. First, it should be noted that the informal sector and unemployed are not included in the structural change term. Therefore, it may be the case that because ODA has a tendency to focus on fundamentals, it not only facilitates employment shifts from low to high productivity sectors, but also shifts informal labour or the unemployed into low productivity sectors. Hence, increases in, say, agricultural employment are to some extent not necessarily associated with flows out of higher productivity sectors. Consequently, production will rise while positive structural change into higher productivity sectors will not occur. Furthermore, it may after all suggest the presence of Dutch Disease-type effects. In similar vein, private capital flows may positively affect both short and long run structural change through investments and creation of opportunities in higher productivity sectors. On the other hand, undesirable structural features of a (still) rather underdeveloped SSA may not transform these positive effects into higher GDP.

These results would lead us to believe that although ODA positively affects GDP in the long run, this effect is not obtained through its effect on structural change (which is negative). Similarly, although PCF negatively affects GDP in the long-run, this effect is not obtained through its effect on structural change (which is positive). These contrasting findings unequivocally call for a more in-depth analysis of the reallocation of labour taking place across sectors and in particular countries (see the following section). Also, it should be noted that the aggregate analysis here does not allow a clear display of variation in each country. Thus, a country-analysis would provide a richer analysis. Either way, one cannot reject the null hypothesis that ODA positively affects structural change in the long run based on these results.

Table 2b. Cointegration equation: long-run dynamics

Cointegration Equation	Correction Error1	Correction Error2
Structural change	1.000	.
GDP	0 (omitted)	1.000
ODA	6.959*** (1.166)	-3.044*** (0.687)
PCF	-1.112*** (0.323)	0.912*** (0.190)
Trend	-0.081 (0.107)	-0.206*** (0.063)
Constant	-119.367	24.368

5.2. Country Analysis

The analysis above calls for a country-specific analysis to uncover the relationships between external financial flows and structural change. Of particular interest is how the different investment types are responsible for changes in labour per sector. In this section, the structural change term has been disaggregated and the only variable of interest are employment changes per sector per country ($\Delta\theta_{i,t}$).

Given that two types of models have been estimated depending on the structure of the time series for each country, results will be discussed based on the model of estimation.
First, the short run dynamics obtained from the VAR models for Ethiopia, Ghana, Kenya, Malawi will be discussed. Second, the short-run and long-run dynamics obtained from the VEC models for Botswana, Ethiopia, Ghana, Nigeria and Zambia will be discussed separately. Due to the large amounts of regression output, only summary tables of the most relevant results are provided in these sections to allow for a clear over view. Other relationships have purposely been omitted for readability. More detailed regression results are provided in tables in Appendix D (all findings discussed here are derived from results presented in those particular tables).

Short-run analysis

A. Impulse Response Functions (VAR Models)

Tables 3(a)-3(c) below present short-run impulse response functions (IRF) results for the VAR models of the countries for which no co-integration relationship has been found. Only significant results have been presented. Because VAR models are a simultaneously model where each variable appears at least once on the left hand side, regular output are not as easily interpretable. In fact an increase in, say, ODA or PCF will by default influence all other variables in the analysis and therefore it would be difficult to determine the effect of a one-unit increase of

a change in one of the financial flows on changes in employment activity. Therefore, this section discusses VAR results by means of impulse response functions, where one can trace the dynamic response of an (one-unit) independent shock in one variable.

Kenya

Table 3a shows the IRF results for Kenya. From the table it becomes clear that ODA appears to be conducive to structural change in the short run. A one-standard deviation shock to ODA negatively affects agriculture employment growth with -0.1%, and positively affects mining, manufacturing and services growth with 4.4%, 0.3%, and 0.2% respectively. In particular, growth in mining employment shares appears to be most affected by shocks to ODA growth. The extent to which manufacturing and services employment growth is spurred remains quite small in comparison. The results pertaining to the mining sector, however, should be interpreted with caution. Even though the mining sector appears to be highly productive, this sector is unable to sustain large inflows of workers and as such cannot be considered to foster structural change (e.g. less than 1% of workers is employed in the Kenyan mining sector). Instead, more focus should be put on (labour-intensive) manufacturing and services. That being said, no effects for private capital flows on structural change have been found in the short-run. Private capital flows do, however, positively affect GDP in the short-run.

Malawi

In table 3b, IRF results for Malawi are presented. Similar results are found in comparison to the results found for Kenya. First, ODA also appears to be conducive to structural change as a one standard-deviation shock in ODA negatively affects agriculture employment growth with -2.7% over a thirteen-year period. Furthermore, growth in services is also negatively affected by -1.1%. On the other hand, both mining and manufacturing growth appears to be spurred by ODA shocks with 3.5% and 3.2% respectively. Interestingly, the response of manufacturing employment growth to ODA shocks appears to take up to 7 years. Again, mining employment activities appear to be most sensitive to shocks in ODA. As far as private capital flows goes, there appears to be positive effects on structural change. Private capital flows have the most influence on growth in the manufacturing sector. A shock in private capital flows appears to increase manufacturing growth by 1.3%. Furthermore, private capital flow shocks also affect growth in agriculture by 0.1% and growth in service by -0.7%. These results paint a rather positive picture for structural change, driven by both financial flows. Notably, Malawi's manufacturing sector has been noted to be receiving considerable FDI inflows as far as non-resource-based sectors go (UNCTAD, 2011, p.94). As such, it appears that these investments in the manufacturing sector are paying off.

Mauritius

Table 3c displays IRF results for Mauritius. A one standard deviation shock to ODA flows is associated with changes in employment that appear to be somewhat conducive to structural change. Specifically, shocks to ODA increase manufacturing employment growth by 2.4% over a seven-year period. Furthermore, growth in services employment is affected by -1.1% and growth in agriculture employment by 1.3%. In contrast to the findings for Malawi, we find no positive evidence on the effects of private capital flows one structural change in the case of Mauritius. Despite that a one std. dev. shock in private capital flows change suppresses growth in

agricultural employment by -1.9% over a three-year period, growth in the manufacturing is also negatively affected by -3% (over a five-year period). Furthermore, a one std. shock in private capital flow growth increases growth in mining and services with 0.9% and 0.8% respectively. Again, growth in mining employment appears to be most volatile. That being said, Mauritius is one of the most developed countries among our set of countries. Its economic structure over time period considered is significantly different from that of Kenya and Malawi, e.g. the majority of people employed in Mauritius engage in services (74%) and manufacturing (20%).

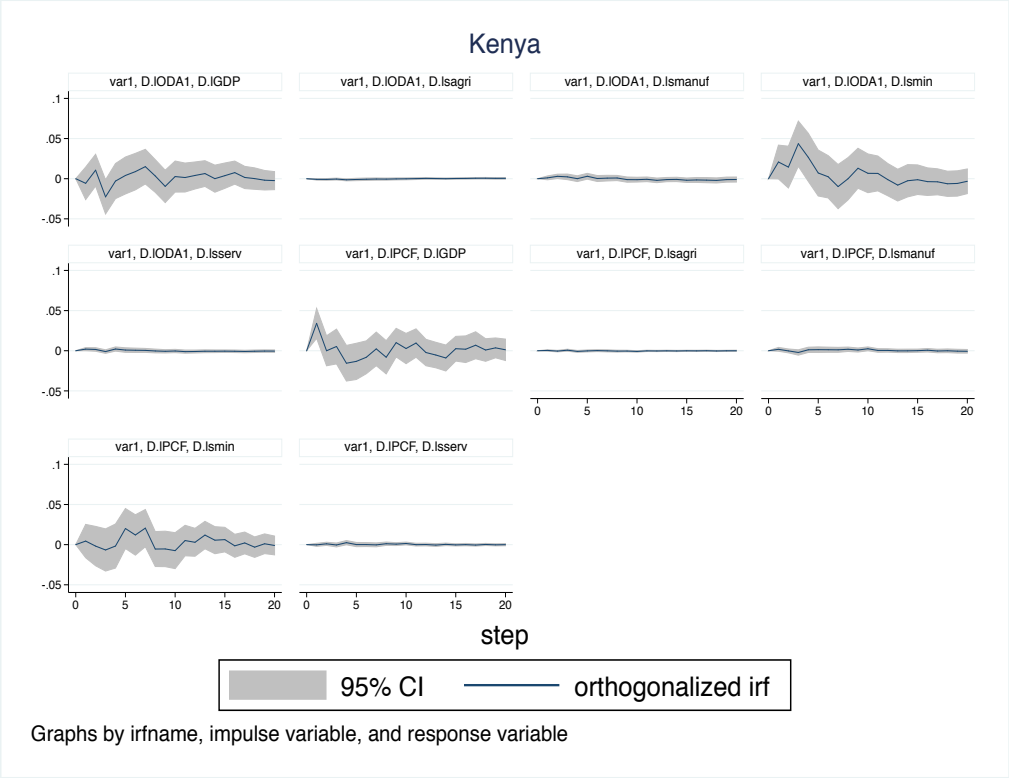
Generally, the results coincide with economic theory in a variety of ways. First, it seems to be the case that shocks in financial flows affect growth in mining sectors the most (i.e. most volatile), suggesting that these sectors still play a distinctive role in the African countries. Furthermore, it appears to be the case that it takes growth in sectors a relatively long time to respond to shocks in ODA. E.g. it takes up to 13 years for shocks in ODA to suppress growth in Malawi's agricultural sector. For ODA shocks to induce growth in manufacturing sectors this may take up to 7 years (as is the case for Mauritius and Malawi). These results suggest that where ODA does display to induce employment patterns of structural change, a longer time frame is witnessed for these investments to realize. This indicates that ODA indeed has a positive effect that spans multiple decades, through its effect on fundamentals. In the case of shocks in private capital flows, these patterns appear to emerge on a much shorter time frame. These findings are suggestive of private capital flows indeed having a more direct effect, whereas ODA has much more of an indirect effect on structural change (see discussion in chapters 2 and chapter 3).

Furthermore, the results found in this section may also hint at when employment patterns of structural change are induced. In the least developed economy (Malawi), both shocks in financial flows appear to positively affect employment growth in manufacturing sectors to a large extent (up to 4.5% combined). In Kenya (another underdeveloped country), such positive feedback is only found from shocks in ODA to growth in manufacturing sectors. Furthermore, this has been to a much smaller degree of 0.3%. In that sense, a clear positive stimulus from these financial flows toward changes in higher productivity activities appear to exist in highly underdeveloped countries. In the case of a more developed country such as Mauritius, however, results are more puzzling. ODA appears to induce growth in both (high productivity) manufacturing and (low productivity) agricultural employment activities. Furthermore, ODA also suppresses growth rates in (high productivity) services sectors. Private capital flows, on the other hand, do not appear to foster structural change at all. In fact, growth in manufacturing employment is negatively affected by shocks in private capital flows by 3%. Of course, these patterns are only suggestive of least developing countries having highest returns to investments. A more conclusive analysis would include a comparison encompassing a multitude of countries. Furthermore, this hypothesis would have to be tested among different sets of groups. E.g. it may be that Malawi and Kenya display different characteristics that could explain the effectiveness of financial flows on structural change. It need not necessarily be the case that it is their level of development that dictates these results.

Table 3a. IRF Kenya

Effect	period	effect	Lower bound	Upper bound
ΔODA → ΔGDP	3	-0.022635	-0.043979	-0.00129
ΔODA → ΔPCF	1	-0.187588	-.29202	-0.083156
ΔODA → ΔAgriculture employment share	4	-0.001389	-0.002622	-0.000155
ΔODA → ΔMining employment share	3	0.043593	0.015439	0.071747
ΔODA → ΔManufacturing employment share	2	0.002933	0.000248	0.005617
ΔODA → ΔServices employment share	1	0.001991	0.00006	0.003921
ΔPCF → ΔGDP	1	0.034066	0.015421	0.05271
ΔPCF → ΔODA	1	0.036199	0.010188	0.062211

α=0.05

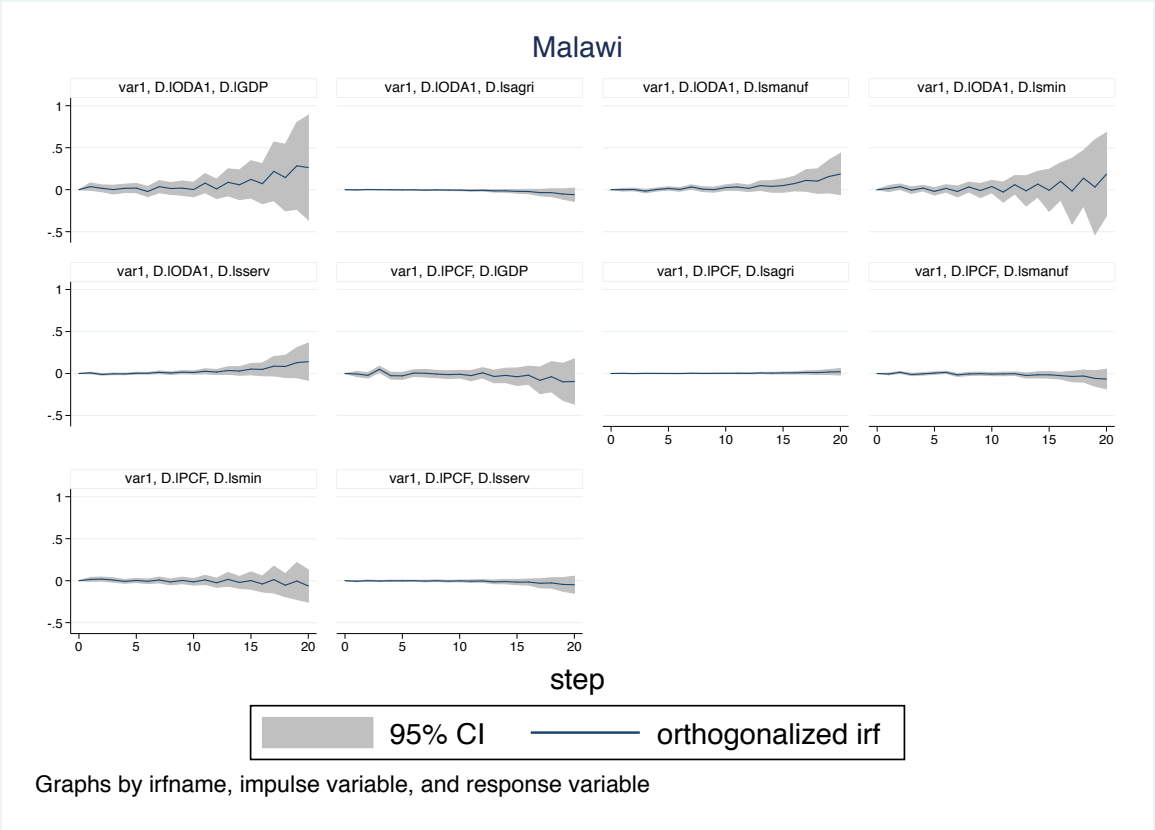


Note: D.lODA1, D.lPCF, D.lgdp, D.lagri, D.lmin, D.lmanuf, D.lserv stand for first differences of ODA, Private capital flows, GDP, agricultural employment share, mining employment share, manufacturing employment share and services employment share respectively (all in logarithms)

Table 3b. IRF Malawi

Effect	period	effect	Lower bound	Upper bound
ΔODA → ΔAgriculture employment share	1	-0.001879	-0.003701	-0.000056
	7	-0.005515	-0.009594	-0.001435
	11	-0.00555	-0.011507	-0.000829
	13	-0.014188	-0.027898	-0.000477
ΔODA → ΔMining employment share	2	0.03547	0.003735	0.067206
ΔODA → ΔManufacturing employment share	7	0.032491	0.007102	0.057881
ΔODA → ΔServices employment share	2	-0.010785	-0.01944	-0.002129
ΔPCF → ΔGDP	3	0.049829	0.013321	0.086336
ΔPCF → ΔAgriculture employment share	1	0.001343	0.000163	0.002523
ΔPCF → ΔManufacturing employment share	2	0.013428	0.002131	0.024725
ΔPCF → ΔServices employment share	1	-0.006561	-0.012836	-0.000286

α=0.05

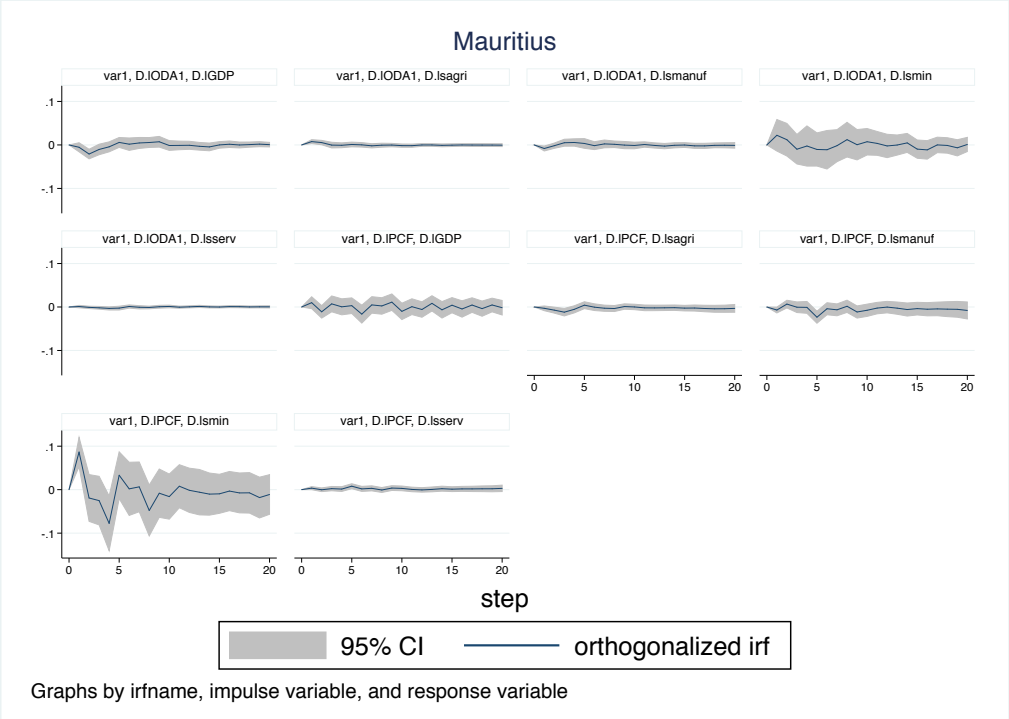


Note: D.lODA1, D.lPCF, D.lgdp, D.lagri, D.lmin, D.lmanuf, D.lserv stand for first differences of ODA, Private capital flows, GDP, agricultural employment share, mining employment share, manufacturing employment share and services employment share respectively (all in logarithms)

Table 3c. IRF Mauritius

Effect	period	effect	Lower bound	Upper bound
ΔODA → ΔGDP	2	-0.020939	-0.031985	-0.009894
ΔODA → ΔPCF	3	0.137807	0.001207	0.274407
ΔODA → ΔAgriculture employment share	1	0.007679	0.003218	0.012141
	2	0.005464	0.000425	0.010504
ΔODA → ΔManufacturing employment share	1	-0.008191	-0.013865	-0.002517
	7	0.032491	0.007102	0.057881
ΔODA → ΔServices employment share	2	-0.010785	-0.01944	-0.002129
ΔPCF → ΔODA	1	0.082787	0.4415	0.121423
	2	-0.1099	-0.173493	-0.046308
ΔPCF → ΔAgriculture employment share	2	-0.00718	-0.014044	-0.000316
	3	-0.011888	-0.020489	-0.003287
ΔPCF → ΔMining employment share	1	0.086491	0.052662	0.120319
	4	-0.077574	-0.140567	-0.014581
ΔPCF → ΔManufacturing employment share	1	-0.006973	-0.013678	-0.000239
	5	-0.023464	-0.037293	-0.009636
ΔPCF → ΔServices employment share	5	0.007966	0.002284	0.013648

α=0.05



Note: D.lODA1, D.lPCF, D.lgdp, D.lagri, D.lmin, D.lmanuf, D.lserv stand for first differences of ODA, Private capital flows, GDP, agricultural employment share, mining employment share, manufacturing employment share and services employment share respectively (all in logarithms)

B. Vector Error Correction Model results

This section proceeds to discuss the results found for the VEC models. In particular, long-run dynamics are discussed here. Due to space constraints regression outputs are presented in Appendix D.

Botswana
In the short-run it can be shown that both ODA and PCF appear to show effects on sectoral employment. However, no conclusive evidence on can be found for structural change. Specifically, a 1%-point increase in PCF growth decreases growth in agricultural employment with -0.027%. On the other hand, a 1%-point increase in PCF growth affects growth in services by 0.02%. Furthermore, a 1%-point increase in ODA positively affects growth in mining employment activities with 0.2%. Manufacturing employment growth, however, appears to be unaffected by either flows.

In the long run the following relationships have been found:

$$\ln(GDP) = 20.939 + 0.070\ln(ODA) + 0.009\ln(PCF) + 0.054\ln(Trend)$$
$$\ln(Agriculture\ share) = -1.974 + 0.008\ln(ODA) + 0.021\ln(PCF) - 0.001\ln(Trend)$$
$$\ln(Mining\ share) = -1.400 + 0.071\ln(ODA) - 0.160\ln(PCF) - 0.013\ln(Trendd)$$
$$\ln(Manufacturing\ share) = 1.599 - 0.372\ln(ODA) + 0.263\ln(PCF) - 0.048\ln(Trend)$$

These results indicate that there indeed exists a pattern of employment change conducive to structural change. At least for private capital flows, it appears to be the case that mainly opportunities are created in the manufacturing sector. A 1%-point increase in private capital flows appears to be associated with a 0.26%-point increase in manufacturing employment. Furthermore, agriculture employment is also positively related to private capital flows (although to a smaller extent, more than ten-fold to be exact). Furthermore, increases in private capital flows are negatively related to mining employment activities. A 1%-point increase in PCF decreases mining with -0.16%. For ODA, the reserve seems to hold. A 1%-point increase in ODA decreases manufacturing employment with -0.37%, whereas mining increases with 0.07%. Note that no insights are provided on the services sector and therefore are excluded from this particular analysis.

Ethiopia
In the case of Ethiopia, only one short run effect can be identified. In particular, private capital flows are the only type of flows affecting sectoral employment in the short run. A A 1%-point increase in private capital flows decreases agricultural sector employment with -0.028%.

In the long run the following relationships has been found:

$$\ln(GDP) = 12.418 + 0.651\ln(ODA) + 0.082\ln(PCF) - 0.097\ln(Trend)$$
$$\ln(Agriculture\ share) = -0.300 + 0.023\ln(ODA) - 0.002\ln(PCF) + 0.003\ln(Trend)$$
$$\ln(Mining\ share) = 2.094 - 1.016\ln(ODA) - 0.211\ln(PCF) + 0.295\ln(Trend)$$
$$\ln(Manufacturing\ share) = -2.982 + 0.142\ln(ODA) + 0.035\ln(PCF) - 0.003\ln(Trend)$$

In the long run, it appears that both financial flows spur employment patterns of structural change. A 1%-point in ODA and private capital flows increases manufacturing employment with 0.142% and 0.035% respectively. That being said, both financial flows induce an outflow of workers in mining sectors. Furthermore, ODA and PCF both seem to have different effects as it pertains to agricultural employment. A 1% point increase in the former increases agricultural employment, whereas the latter has a negative effect. Either way, the effects are on a smaller scale as has been found for the effects on the manufacturing and mining sector

Ghana
In contrast to results found prior, it appears that ODA dominates the short-run effects whereas no effects are found for private capital flows. In particular, a 1%-point increase in short-run private capital flows are associated with a -0.03% decrease in manufacturing employment activities.

In the long run, the following relationships have been found:

$$\ln(GDP) = 22.485 + 0.043\ln(ODA) + 0.205\ln(PCF) - 0.064\ln(Trend)$$
$$\ln(Agriculture\ share) = -1.394 - 0.011\ln(ODA) - 0.005\ln(PCF) + 0.006\ln(Trend)$$
$$\ln(Mining\ share) = -3.699 - 0.138\ln(ODA) - 0.072\ln(PCF) + 0.122\ln(Trend)$$
$$\ln(Manufacturing\ share) = -3.248 + 0.105\ln(ODA) - 0.014\ln(PCF) - 0.017\ln(Trend)$$

In the long run, the view on structural change is unclear. First, it appears that private capital flows negatively impact employment activities in across all sectors (services not included). On the other hand, it appears again that ODA dominates effects in the long run. Especially, ODA appears to induce employment patterns of structural change. A 1%-point increase in ODA is associated with a 0.105% increase in manufacturing. Mining employment activities, however, decrease by -0.138% when ODA increases with 1%-point.

Nigeria
In the short run, PCF induces patterns of structural change. Not only are increases in PCF growth negatively related to growth in agricultural employment services (-0.004%), increases in PCF growth positively affect manufacturing employment growth by 0.02%. On the other hand, growth in ODA positively affects growth in mining. Although, no effects are found on manufacturing sectors. In the long run, no long-run relationships have been found that could conclude structural change for either type of flows.

Zimbabwe
In the short run, private capital flows dominate the effects. Furthermore, the effects appear not to be conducive to structural change. In fact, a 1%-point increase in private capital flow growth increases growth in agriculture with 0.0006% and decreases services employment growth with -0.003%. No effects have been found for ODA.

The following long run relationships have been found:

$$ln(GDP) = 94.636 - 3.482ln(ODA) - 0.228ln(PCF) + 0.256ln(Trend)$$
$$ln(Agriculture\ share) = -2.386 + 0.094ln(ODA) + 0.018ln(PCF) - 0.010(Trend)$$
$$ln(Mining\ share) = 27.790 - 1.491ln(ODA) - 0.060ln(PCF) + 0.048ln(Trend)$$
$$ln(Manufacturing\ share) = 8.690 - 0.570ln(ODA) - 0.025ln(PCF) + 0.020ln(Trend)$$
$$ln(Services\ share) = -0.135 - 0.052ln(ODA) - 0.049ln(PCF) + 0.024ln(Trend)$$

In the case of Zimbabwe, growth-reducing structural change patterns appear to occur. Both ODA and PCF appear to decrease manufacturing and services employment activities. On the other hand, ODA and PCF are also positively related to agricultural employment activities. Furthermore, ODA's effects exceed those of PCF in the long run

A few general lessons can be inferred from the performed analysis. First, it appears that ODA dominates effects in the long run. Especially in comparison to private capital flows, it can be shown that effects associated with a 1%-increase in either flows favour ODA in terms of magnitude. Private capital flow (which are more volatile) display smaller results on long run outcomes. This result may indicate that in the long run, indeed, effects of ODA matter more on the process of structural change. I.e. in the long run, it is detrimental for ODA to address structural problems in order to spur structural change. As such, ODA may be seen to indirectly affect structural change. Either way, it also appears to be the case that both flows have a tendency to spur structural change, although this is highly dependent on the time frame considered. In the short run, it appears that private capital flows more frequently display significant results (whether positive or negative) on structural change (in the cases of Malawi, Mauritius, Ethiopia, Nigeria and Zimbabwe). ODA short run effects on the other hand are either non-existent, or take a long time to invoke responses as has been concluded in the short run analysis.

6. Conclusion

In this thesis, a dynamic analysis using multivariate time series models has been used to conduct to determine the effects of external financial flows on structural change in SSA.
All in all it appears to be the case that external financial flows geared toward SSA are paying-off in terms of their ability to finance investments and spur structural change. For SSA as a whole, private capital inflows appear to increase the (speed of) structural change in the short and long-run. These results are consistent with the hypothesis that private capital flows have a short-run, i.e. direct, positive effect on structural change. Furthermore, it is consistent with theories prescribing private capital flows (namely, FDI) to be conducive to job creation and enterprise development in the African continent. The results also suggest that claims of SSA making a concerted effort to attract foreign investments to industrialize are fruitful. Either way, there does not appear to be a long-run positive effect of said flows on GDP, leading to conflicting results in the short and long-run. In contrast to the results for private capital flows, average ODA flows appear to affect SSA structural change only in the long-run. Indicating that ODA flows have more of an indirect effect on structural change as is suggested by theory. Nevertheless, it is found that ODA flows induce undesirable structural change, i.e. employment shifts toward lower productivity sectors, in the long-run. As such, the results are not consistent with the hypothesis that ODA flows positively affect structural change in the long-run. ODA flows do, however, positively affect GDP. The mechanisms behind these conflicting effects cannot be conclusively determined in this thesis. A more in-depth country analysis confirms that private capital flows have a direct affect on structural change, whereas ODA flows have a more indirect effect. Specifically, it is shown that the responses to shocks in ODA can last up to 13 years. More

importantly, such long-run effects of ODA appear to be generally conducive to positive structural change, i.e. spurring employment activities in manufacturing sectors (in the case of Kenya, Malawi, Mauritius, Ethiopia and Ghana), contrary to the results found in the average case. On the other hand, the result on private capital flows only show to spur structural change in the short run for Malawi, Botswana and Nigeria.

In the end, interesting results have been found that call for further research. Even though external financial flows and structural change has been linked in this thesis, much of the mechanisms behind structural change and external flows remains uncovered. A thorough understanding of structural change as a non-automatic process would require such an analysis in future research.

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APPENDIX A. VECTOR AUTOREGRESSIVE (VAR) AND VECTOR ERROR CORRECTION MODELS

Vector Autoregressive Models (VAR) models are models in which there is true simultaneity among a set of variables, i.e. no distinction is made between endogenous and exogenous variables a priori (Gujarati, 2003, p.848). These models are used for multivariate time series.

That said, these models are simultaneous-equation models. Thefollowing hypothetical system of equations represents a VAR(1) model:

$$y_{1t} = c_1 + \pi_{11}^1 y_{1t-1} + \pi_{12}^1 y_{2t-1} + \varepsilon_{1t}$$
$$y_{2t} = c_2 + \pi_{21}^1 y_{1t-1} + \pi_{22}^1 y_{2t-1} + + \varepsilon_{1t}$$

In each equation, both y1 and y2 appear on the left-hand side. As such, both are considered endogenous.

A pre-requisite for estimation is that all variables are integrated of the same order, and that series are stationary. A series is stationary whenever its mean and variance do not change systematically over time (Gujarati, 2003, p.367). More specifically, the following properties need to be satisfied:

$$\mathrm{E}(y_t) = \mu$$
$$\mathrm{Var}(y_t) = \mathrm{E}(y_t - \mu)^2 = \sigma^2$$
$$\mathrm{Covar(k)} = \mathrm{E}[(y_t - \mu)(\, y_{t+k} - \mu)]$$

Then, time series are stationary whenever the mean, variance and covariance (at various lags) are time invariant (Gujarati, 2003, p.798).

Unit root tests can be conducted to determine whether series are stationary. In case series have unit roots (i.e. series are non-stationary), a stationary relationship can still be estimated whenever there is a co-integration relationship. In such cases, Vector Error Correction models can be estimated of the following form:

$$\Delta y_{1t} = c_1 + \pi_{11}^1 \Delta y_{1t-1} + \pi_{12}^1 \Delta y_{2t-1} + \alpha(y_{1t-1} - \beta_0 - \beta_1 y_{2t-1}) + \varepsilon_{1t}$$
$$\Delta y_{2t} = c_2 + \pi_{21}^1 \Delta y_{1t-1} + \pi_{22}^1 \Delta y_{2t-1} + \alpha(y_{1t-1} - \beta_0 - \beta_1 y_{2t-1}) + \varepsilon_{1t}$$

which represents a VEC(1) model. In essence, this represents a VAR model with an addition Error Correction (EC) term, i.e. VEC=VAR+EC. The VAR-part of the equation then represent short-run dynamics, while the long-run dynamics are found in the latter part of the equation, i.e. $(y_{1t-1} - \beta_0 - \beta_1 y_{2t-1})$

APPENDIX B. ISIC REV 3.1. INDUSTRY CONVERSION TABLE

ISIC Rev. 3.1. Code	**Sector**	**Four major industries**
AtB	Agriculture	Agriculture
C	Mining	Mining
D	Manufacturing	Manufacturing
E	Utilities	Services
F	Construction	
G+H	Trade services	
I	Transport services	
J+K	Business services	
70	Dwellings	
L, M, N	Government services	
O, P	Personal services	

APPENDIX C. UNIT ROOT TESTS: AUGMENTED DICKEY-FULLER

H0: time series have unit root

BOTSWANA

Variable	Lags	Specification	ADF Test Statistic	5% Critical value	Conclusion	Obs.
Agriculture share	1	Intercept	I-2000I	I-2.975I	Cannot reject H0	34
Δ Agriculture share	3	Intercept & trend	I-3.647I	I-3.576I	Reject H0	31
Mining share	1	Intercept & trend	I-2.002I	I-3.564I	Cannot reject H0	34
ΔMining share	1	Intercept	I-4.755I	I-2.978I	Reject H0	33
Manufacturing share	1	No intercept	I-1.811I	I-1.950I	Cannot reject H0	34
ΔManufacturing share	1	Intercept	I-4.037I	I-2.978I	Reject H0	33
Services share	4	Intercept	I-2.628I	I-2.983I	Cannot reject H0	31
ΔServices share	1	No intercept	I-2.270I	I-1.950I	Reject H0	33
Private capital flows	1	Intercept	I-2.406I	I-2.966I	Cannot reject H0	37
ΔPrivate capital flows	1	Intercept	I-4.855I	I-2.972I	Reject H0	35
ODA	1	Intercept	I-2.870I	I-2.958I	Cannot reject H0	40
ΔODA	1	Intercept	I-4.608I	I-2.961I	Reject H0	39
GDP	2	Intercept	I-2.345I	I-2.961I	Cannot reject H0	39
ΔGDP	4	Intercept	I-4.282I	I-2.969I	Reject H0	36

Note: Note the discrepancy in agriculture employment share. Phillips-Perron test does not lead to conclusive results either. KPSS robustness check finds first differenced series to be trend stationary

ETHIOPIA

Variable	Lags	Specification	ADF Test Statistic	5% Critical value	Conclusion	Obs.
Agriculture share	1	No intercept	I1.790I	I-1.950I	Cannot reject H0	28
Δ Agriculture share	1	Intercept & trend	I-2.940I	I-3.592I	Cannot reject H0	27
Mining share	4	Intercept	I-1.543I	I-3.000I	Cannot reject H0	25
ΔMining share	3	Intercept	I-4.352I	I-3.000I	Reject H0	25
Manufacturing share	1	Intercept & trend	I-2.158I	I-3.588I	Cannot reject H0	28
ΔManufacturing share	1	Intercept	I-3.940I	I-2.994I	Reject H0	27
Services share	1	Intercept & trend	I-1.585I	I-3.588I	Cannot reject H0	28
ΔServices share	1	No intercept	I-2.443	I-1.950I	Reject H0	27
Private capital flows	3	Intercept & trend	I-2.663I	I-3.572I	Cannot reject H0	32
ΔPrivate capital flows	1	Intercept	I-6.177I	I-2.978I	Reject H0	33
ODA	3	Intercept & trend	I-3.038I	I-3.572I	Cannot reject H0	32
ΔODA	1	No intercept	I-3.201I	I-1.950I	Reject H0	33
GDP	1	No intercept	I1.583I	I-1.950I	Cannot reject H0	34
ΔGDP	1	No intercept	I-2.451I	I-1.950I	Reject H0	33

Note: Note the discrepancy in agriculture employment share. Phillips-Perron test does not lead to conclusive results either. KPSS robustness check finds first differenced series to be trend stationary

GHANA

Variable	Lags	Specification	ADF Test Statistic	5% Critical value	Conclusion	Obs.
Agriculture share	1	Intercept & trend	I-0.881I	I-3.564I	Cannot reject H0	34
ΔAgriculture share	1	Intercept & trend	I-3.729I	I-3.568I	Reject H0	33
Mining share	4	Intercept	I-2.750I	I-2.983I	Cannot reject H0	31
ΔMining share	1	No intercept	I-2.422I	I-1.950I	Reject H0	33
Manufacturing share	4	Intercept & trend	I-3.895I	I-3.567I	Reject H0	31
ΔManufacturing share	4	Intercept	I-3.615I	I-2.986I	Reject H0	30
Services share	5	Intercept	I2.072I	I-2.986I	Cannot reject H0	30
ΔServices share	4	Intercept & trend	I-4.386I	I-3.580I	Reject H0	30
Private capital flows	1	Intercept & trend	I-3.412I	I-3.560I	Cannot reject H0	35
ΔPrivate capital flows	1	Intercept	I-4.965I	I-2.975I	Reject H0	34
ODA	1	Intercept	I-1.879I	I-2.958I	Cannot reject H0	40
ΔODA	1	No intercept	I-4.222I	I-1.950I	Reject H0	39
GDP	1	Intercept & trend	I-1.576I	I-3.540I	Reject H0	40
ΔGDP	1	Intercept	I-3.833I	I-2.961I	Reject H0	39

Note: note the discrepancy in manufacturing employment share. Double checking the results using the Phillips Perron test leads to conclude that manufacturing employment share is indeed *I*(1).

KENYA

Variable	Lags	Specification	ADF Test Statistic	5% Critical value	Conclusion	Obs.
Agriculture share	1	Intercept & trend	I-2.580I	I-3.564I	Cannot reject H0	34
ΔAgriculture share	1	Intercept	I-2.178I	I-2.978I	Cannot reject H0	33
Mining share	1	Intercept & trend	I-2.298I	I-3.564I	Cannot reject H0	34
ΔMining share	1	No intercept	I-2.353I	I-1.950I	Reject H0	33
Manufacturing share	3	Intercept	I-2.500I	I-2.980I	Cannot reject H0	32
ΔManufacturing share	2	Intercept & trend	I-0.604I	I-3.572I	Cannot reject H0	32
Services share	1	No intercept	I-3.085I	I-1.950I	Cannot reject H0	34
ΔServices share	1	Intercept	I-3.249I	I-2.987I	Reject H0	33
Private capital flows	1	Intercept & trend	I-3.306I	I-3.540I	Cannot reject H0	40
ΔPrivate capital flows	5	Intercept	I-4.578I	I-2.972I	Reject H0	35
ODA	2	Intercept & trend	I-2.563I	I-3.544I	Cannot reject H0	39
ΔODA	1	No intercept	I-2.771I	I-1.950I	Reject H0	39
GDP	3	No intercept	I1.003I	I-2.964I	Reject H0	38
ΔGDP	2	Intercept	I-4.336I	I-2.964I	Reject H0	38

Note: note the discrepancy in agriculture employment share and manufacturing employment share. Phillips Perron tests for these series do not lead to conclusive evidence on the order of integration. Testing with KPSS on the other hand, shows that first differenced manufacturing employment share is level stationary; first differenced agriculture employment share is level stationary.

MALAWI

Variable	Lags	Specification	ADF Test Statistic	5% Critical value	Conclusion	Obs.
Agriculture share	2	Intercept	I3.608I	I-2.783I	Reject H0	33
ΔAgriculture share	4	No intercept	I-4.265I	I-3.576I	Cannot reject H0	30
Mining share	1	No intercept	I-0.375I	I-1.950I	Cannot reject H0	34
ΔMining share	1	No intercept	I-3.284I	I-1.950I	Reject H0	33
Manufacturing share	1	No intercept	I-0.356I	I-1.950I	Cannot reject H0	34
ΔManufacturing share	1	No intercept	I-4.240I	I-1.950I	Reject H0	33
Services share	4	Intercept & trend	I-2.709I	I-3.576I	Cannot reject H0	34
ΔServices share	1	Intercept & trend	I-4.608I	I-3.568I	Reject H0	31
Private capital flows	1	Intercept & trend	I-4.232I	I-3.540I	Reject H0	40
ΔPrivate capital flows	2	No intercept	I-6.359I	I-1.950I	Reject H0	38
ODA	1	Intercept & trend	I-2.783I	I-3.540I	Cannot reject H0	40
ΔODA	1	Intercept	I-4.941I	I-2.961I	Reject H0	39
GDP	1	Intercept & trend	I-3.011I	I-3.540I	Cannot reject H0	40
ΔGDP	1	Intercept	I-5.259I	I-2.961I	Reject H0	39

Note: note the discrepancies in agriculture employment share and private capital flows. Using Phillips-Perron test first differenced agriculture employment share shows to be *I*(1). Private capital flows on the other hand show no conclusive evidence. Using KPSS first differenced private capital flows can be shown to be trend stationary.

MAURITIUS

Variable	Lags	Specification	ADF Test Statistic	5% Critical value	Conclusion	Obs.
Agriculture share	1	Intercept & trend	I-2.369I	I-3.568I	Cannot reject H0	33
ΔAgriculture share	1	Intercept	I-4.422I	I-2.980I	Reject H0	32
Mining share	2	No intercept	I-0.864I	I-1.950I	Cannot reject H0	32
ΔMining share	1	No intercept	I-5.777I	I-1.950I	Reject H0	32
Manufacturing share	5	Intercept	I-2.248I	I-2.989I	Cannot reject H0	29
ΔManufacturing share	1	Intercept & trend	I-4.159I	I-3.572I	Reject H0	32
Services share	1	Intercept & trend	I-1.209I	I-3.568I	Cannot reject H0	33
ΔServices share	1	Intercept & trend	I-4.467I	I-3.572I	Reject H0	32
Private capital flows	4	Intercept	I-1.951I	I-2.969I	Cannot reject H0	36
ΔPrivate capital flows	5	No intercept	I-0.832I	I-1.950I	Cannot reject H0	34
ODA	3	Intercept	I-2.276I	I-2.966I	Cannot reject H0	37
ΔODA	1	No Intercept	I-5.555I	I-1.950I	Reject H0	38
GDP	4	Intercept & trend	I-2.924I	I-3.556I	Cannot reject H0	36
ΔGDP	4	Intercept	I-3.079I	I-2.972I	Reject H0	35

Note: note the discrepancies in agriculture employment share and private capital flows. Using Phillips-Perron test first no conclusive evidence is found. Using KPSS first differenced private capital flows can be shown to be trend stationary.

NIGERIA

Variable	Lags	Specification	ADF Test Statistic	5% Critical value	Conclusion	Obs.
Agriculture share	1	Intercept & trend	I-0.296I	I-3.564I	Cannot reject H0	34
ΔAgriculture share	1	Intercept & trend	I-4.548I	I-3.568I	Reject H0	33
Mining share	1	Intercept & trend	I-2.735I	I-3.564I	Cannot reject H0	34
ΔMining share	1	No intercept	I-3.996I	I-1.950I	Reject H0	33
Manufacturing share	3	Intercept & trend	I-2.339I	I-3.572I	Cannot reject H0	32
ΔManufacturing share	1	Intercept	I-4.534I	I-2.978I	Reject H0	33
Services share	1	Intercept & trend	I-0.365I	I-3.564I	Cannot reject H0	34
ΔServices share	1	Intercept & trend	I-5.821I	I-3.568I	Reject H0	33
Private capital flows	1	Intercept & trend	I-2.702I	I-3.540I	Cannot reject H0	40
ΔPrivate capital flows	1	Intercept	I-5.602I	I-2.961I	Reject H0	39
ODA	1	Intercept	I-2.498I	I-2.958I	Cannot reject H0	40
ΔODA	1	No Intercept	I-4.610I	I-1.950I	Reject H0	39
GDP	1	Intercept & trend	I-2.424I	I-3.540I	Cannot reject H0	40
ΔGDP	1	Intercept	I-4.732I	I-2.961I	Reject H0	39

ZAMBIA

Variable	Lags	Specification	ADF Test Statistic	5% Critical value	Conclusion	Obs.
Agriculture share	3	Intercept	I-1.955I	I-2.980I	Cannot reject H0	32
ΔAgriculture share	2	No intercept	I-2.102I	I-1.950I	Reject H0	32
Mining share	1	Intercept	I-1.682I	I-2.975I	Cannot reject H0	34
ΔMining share	1	No intercept	I-3.938I	I-1.950I	Reject H0	33
Manufacturing share	1	No intercept	I0.489I	I-1.950I	Cannot reject H0	34
ΔManufacturing share	1	No intercept	I-2.762I	I-1.950I	Reject H0	33
Services share	1	Intercept	I-2.189I	I-2.975I	Cannot reject H0	34
ΔServices share	1	No intercept	I-3.103I	I-1.950I	Reject H0	33
Private capital flows	1	Intercept & trend	I-4.801I	I-3.540I	Reject H0	40
ΔPrivate capital flows	5	Intercept & trend	I-14.061I	I-3.560I	Reject H0	35
ODA	1	Intercept	I-2.888I	I-2.958I	Cannot reject H0	40
ΔODA	1	No Intercept	I-4.698I	I-1.950I	Reject H0	39
GDP	1	Intercept & trend	I-1.958I	I-3.540I	Cannot reject H0	40
ΔGDP	1	No intercept	I-3.491I	I-1.950I	Reject H0	39

Note: note the discrepancies in private capital flows. Using Phillips-Perron test first no conclusive evidence is found. Using KPSS first differenced private capital flows can be shown to be level stationary.

SSA

Variable	Lags	Specification	ADF Test Statistic	5% Critical value	Conclusion	Obs.
Structural change term	4	No intercept	I-0.964I	I-1.950I	Cannot reject H0	30
ΔStructural change term	3	No intercept	I-6.080I	I-1.950I	Reject H0	30
Private capital flows	1	Intercept & trend	I-5.029I	I-3.540I	Reject H0	40
ΔPrivate capital flows	4	Intercept & trend	I-17.291I	I-3.556I	Reject H0	36
ODA	1	Intercept & trend	I-2.656I	I-3.540I	Cannot reject H0	40
ΔODA	1	Intercept	I-4.554I	I-2.961I	Reject H0	39
GPD	1	Intercept & trend	I-1.397I	I-3.540I	Cannot reject H0	40
ΔGDP	1	Intercept & trend	I-4.608I	I-3.568I	Reject H0	31

Note: note the discrepancies in private capital flows. Using Phillips-Perron test no conclusive evidence can be found. Private capital flows on the other hand show no conclusive evidence. Using KPSS first differenced private capital flows can be shown to be level stationary.

APPENDIX D. VEC MODEL RESULTS

VEC MODEL RESULTS (*Botswana, Mauritius, Nigeria, Zambia)*

BOTSWANA (BWA)

(VAR eq.)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	ΔGDP	Δsagri	Δsmin	Δsmanuf	Δsserv	ΔODA	ΔPCF
Correction Error 1	-0.678***	-0.0686	0.413**	0.0313	-0.0172	-0.511	-1.122
	(0.182)	(0.0456)	(0.166)	(0.258)	(0.0535)	(0.995)	(1.129)
Correction Error 2	-2.703***	-0.886***	0.575	1.462	0.554**	-8.343*	-4.838
	(0.857)	(0.215)	(0.783)	(1.217)	(0.252)	(4.690)	(5.323)
Correction Error 3	-0.0106	-0.00765	-0.626***	0.0439	0.0831	2.298*	-2.981**
	(0.218)	(0.0547)	(0.199)	(0.309)	(0.0641)	(1.193)	(1.354)
Correction Error 4	0.0294	-0.0518***	-0.175***	0.0566	0.0405**	-0.457	-0.732**
	(0.0556)	(0.0139)	(0.0508)	(0.0789)	(0.0163)	(0.304)	(0.345)
ΔGDP_{t-1}	0.344*	-0.0794*	-0.0303	-0.0611	0.105**	0.217	-0.0349
	(0.176)	(0.0441)	(0.161)	(0.250)	(0.0517)	(0.962)	(1.092)
$\Delta sagri_{t-1}$	7.009***	0.0873	0.0689	0.364	-0.293	-7.801	-2.748
	(2.519)	(0.632)	(2.301)	(3.575)	(0.741)	(13.78)	(15.65)
$\Delta smin_{t-1}$	0.470	0.0341	-0.110	-0.00116	-0.0591	-3.227*	0.906
	(0.305)	(0.0765)	(0.279)	(0.433)	(0.0897)	(1.668)	(1.894)
$\Delta smanuf_{t-1}$	1.092***	0.0184	0.114	0.0185	-0.0582	0.398	0.820
	(0.360)	(0.0902)	(0.328)	(0.510)	(0.106)	(1.967)	(2.233)
$\Delta sserv_{t-1}$	7.531***	-0.335	-0.386	1.166	-0.0134	-8.839	-7.611
	(2.898)	(0.727)	(2.647)	(4.113)	(0.853)	(15.86)	(18.00)
ΔODA_{t-1}	-0.0831**	0.00745	0.154***	-0.0102	-0.00868	-0.0978	-0.0240
	(0.0393)	(0.00987)	(0.0359)	(0.0558)	(0.0116)	(0.215)	(0.244)
ΔPCF_{t-1}	-0.0372	-0.0275***	0.0345	-0.0312	0.0199**	-0.174	-0.188
	(0.0336)	(0.00843)	(0.0307)	(0.0477)	(0.00989)	(0.184)	(0.209)
Constant	-0.00575	0.00584	-0.00735	-0.000531	-0.0109	-0.000548	0.000814
	(0.0311)	(0.00781)	(0.0284)	(0.0442)	(0.00916)	(0.170)	(0.193)
Observations	34	34	34	34	34	34	34

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Cointegration Equation	Correction Error1	Correction Error2	Correction Error3	Correction Error4
GDP	1.000	.	.	.
Agriculture share	.	1.000	.	0 (omitted)
Mining share	.	.	1.000	.
Manufacturing share	.	0 (omitted)	0 (omitted)	1.000
Services share	-1.678***	0.777***	-0.372**	-2.032***
	(0.2453)	(0.038)	(0.159)	(0.758)
ODA	-0.070	-0.008	-0.071**	0.372***
	(0.043)	(0.007)	(0.010)	(0.133)
Private Capital Flows	-0.009	-0.021***	0.160***	-0.263*
	(0.050)	(0.008)	(0.032)	(0.155)
Trend	-0.054***	0.001	0.013	0.048**
	(.006)	(0.001)	(0.004)	(0.020)
Constant	-20.939	1.974	1.400	-1.599

Note: sagri, smin, smanuf, sserv stand for the employment shares in the agricultural, mining, manufacturing and services sectors respectively.

ETHIOPIA (ETH)

(VAR eq.) VARIABLES	(1) ΔGDP	(2) Δsagri	(3) Δsmin	(4) Δsmanuf	(5) Δsserv	(6) ΔODA	(7) ΔPCF
Correction Error 1	-0.764***	0.00965	-0.329	-0.157	-0.0848	-1.599	7.403
	(0.239)	(0.0167)	(0.801)	(0.193)	(0.108)	(0.998)	(9.078)
Correction Error 2	16.68***	1.053***	5.945	-8.429**	-8.614***	26.90	579.5***
	(4.916)	(0.344)	(16.49)	(3.979)	(2.215)	(20.54)	(186.8)
Correction Error 3	-0.565**	-0.00938	-0.674	-0.130	0.0820	-1.909*	-10.66
	(0.235)	(0.0164)	(0.788)	(0.190)	(0.106)	(0.982)	(8.924)
Correction Error 4	-0.408	0.0117	-3.309	-1.103	-0.0101	-5.138	12.14
	(0.835)	(0.0584)	(2.801)	(0.676)	(0.376)	(3.490)	(31.74)
ΔGDP_{t-1}	-0.112	-0.0212	0.204	0.125	0.170*	-0.253	-27.67***
	(0.228)	(0.0159)	(0.765)	(0.185)	(0.103)	(0.953)	(8.662)
$\Delta sagri_{t-1}$	-80.63***	2.344	-8.880	-10.68	-11.86	-142.7	-1.772
	(24.86)	(1.737)	(83.34)	(20.12)	(11.20)	(103.8)	(944.2)
$\Delta smin_{t-1}$	0.188	0.0321***	0.0847	-0.223	-0.215***	1.539**	13.92**
	(0.169)	(0.0118)	(0.567)	(0.137)	(0.0762)	(0.706)	(6.423)
$\Delta smanuf_{t-1}$	-1.376***	0.0315	0.662	0.246	-0.206	-0.166	-58.74***
	(0.463)	(0.0323)	(1.551)	(0.374)	(0.208)	(1.933)	(17.57)
$\Delta sserv_{t-1}$	-10.17***	0.193	-3.632	-0.898	-0.701	-21.42	113.0
	(3.430)	(0.240)	(11.50)	(2.776)	(1.545)	(14.33)	(130.3)
ΔODA_{t-1}	-0.204***	-0.00507	-0.177	0.0706	0.0441	-0.749**	-0.654
	(0.0712)	(0.00497)	(0.239)	(0.0576)	(0.0321)	(0.297)	(2.703)
ΔPCF_{t-1}	-0.000163	0.000434*	-0.000118	-0.00393	-0.00256	0.0260*	0.391***
	(0.00374)	(0.000261)	(0.0125)	(0.00303)	(0.00168)	(0.0156)	(0.142)
Constant	0.0418	-0.00462**	0.0294	0.0322	0.0308**	-0.0276	0.000712
	(0.0334)	(0.00234)	(0.112)	(0.0271)	(0.0151)	(0.140)	(1.271)
Observations	28	28	28	28	28	28	28

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Cointegration Equation	Correction Error1	Correction Error2	Correction Error3	Correction Error4
GDP	1.000	0 (omitted)	.	.
Agriculture share	.	1.000	0 (omitted)	.
Mining share	.	.	1.000	.
Manufacturing share	.	.	.	1.000
Services share	-1.539**	0.284***	5.598***	1.885***
	(0.769)	(0.030)	(1.710)	(0.311)
ODA	-0.651***	-0.023***	1.016***	-0.142**
	(0.152)	(0.030)	(0.338)	(0.061)
Private Capital Flows	-0.082***	0.002***	0.211***	-0.035***
	(0.014)	(0.001)	(0.031)	(0.006)
Trend	0.097***	-0.003***	-0.295***	0.003
	(0.016)	(0.001)	(0.035)	(0.006)
Constant	-12.418	0.300	-2.094	2.982

Note: sagri, smin, smanuf, sserv stand for the employment shares in the agricultural, mining, manufacturing and services sectors respectively.

GHANA (GHA)

VARIABLES	(1) ΔGDP	(2) Δsagri	(3) Δsmin	(4) Δsmanuf	(5) Δsserv	(6) ΔODA	(7) ΔPCF
Correction Error 1	-0.887***	-0.00250	0.284	-0.0381	0.00548	-1.260**	0.261
	(0.299)	(0.0177)	(0.179)	(0.0379)	(0.0252)	(0.593)	(0.938)
Correction Error 2	-11.96	2.053**	-3.608	-5.530**	-2.555*	-20.19	-173.0***
	(17.29)	(1.023)	(10.35)	(2.188)	(1.456)	(34.26)	(54.16)
Correction Error 3	-0.722***	0.0595***	0.141	-0.0613*	-0.0481**	-0.796	0.505
	(0.278)	(0.0165)	(0.167)	(0.0352)	(0.0235)	(0.552)	(0.872)
Correction Error 4	-1.970	0.260*	0.0311	-1.229***	-0.194	-0.795	-24.19***
	(2.431)	(0.144)	(1.456)	(0.308)	(0.205)	(4.818)	(7.618)
$\Delta \mathrm{GDP}_{t-1}$	0.715**	0.0105	-0.219	-0.0358	-0.00366	0.395	0.659
	(0.283)	(0.0168)	(0.169)	(0.0358)	(0.0238)	(0.561)	(0.887)
$\Delta \mathrm{sagri}_{t-1}$	2.207	-1.262*	6.446	3.406**	0.384	-12.66	63.78*
	(12.02)	(0.711)	(7.194)	(1.521)	(1.012)	(23.81)	(37.65)
$\Delta \mathrm{smin}_{t-1}$	1.004	-0.0669*	0.125	0.140*	0.0234	0.629	1.507
	(0.616)	(0.0364)	(0.369)	(0.0779)	(0.0518)	(1.220)	(1.929)
$\Delta \mathrm{smanuf}_{t-1}$	-0.362	-0.209	0.664	0.877***	-0.00268	-1.889	-5.119
	(2.183)	(0.129)	(1.307)	(0.276)	(0.184)	(4.326)	(6.840)
$\Delta \mathrm{sserv}_{t-1}$	2.196	-0.641	4.638	2.105**	0.158	-5.839	70.53***
	(7.872)	(0.466)	(4.713)	(0.996)	(0.663)	(15.60)	(24.66)
$\Delta \mathrm{ODA}_{t-1}$	-0.192*	0.00409	0.0813	-0.0323**	0.00204	-0.573***	-0.578*
	(0.110)	(0.00651)	(0.0658)	(0.0139)	(0.00926)	(0.218)	(0.345)
$\Delta \mathrm{PCF}_{t-1}$	0.00666	-0.00527	-0.00468	0.000769	0.00758	-0.185	0.674**
	(0.0955)	(0.00565)	(0.0572)	(0.0121)	(0.00805)	(0.189)	(0.299)
Constant	-0.0106	-0.00205	-0.000624	0.0333***	0.000192	0.00607	-0.00106
	(0.0992)	(0.00587)	(0.0594)	(0.0126)	(0.00836)	(0.197)	(0.311)
Observations	29	29	29	29	29	29	29

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Cointegration Equation	Correction Error1	Correction Error2	Correction Error3	Correction Error4
GDP	1.000	0 (omitted)	.	.
Agriculture share	.	1.000	0 (omitted)	.
Mining share	.	0 (omitted)	1.000	.
Manufacturing share	.	0 (omitted)	0 (omitted)	1.000
Services share	-3.327***	0.913***	1.640***	-0.578***
	(0.790)	(0.022)	(0.393)	(0.127)
ODA	-0.043	0.011***	0.138***	-0.105***
	(0.103)	(0.003)	(0.051)	(0.017)
Private Capital Flows	-0.205***	0.005***	0.072***	0.014*
	(0.049)	(0.001)	(0.024)	(0.008)
Trend	0.064***	-0.006***	-0.122***	0.017***
	(0.027)	(0.001)	(0.008)	(0.003)
Constant	-22.485	1.394	3.699	3.248

Note: sagri, smin, smanuf, sserv stand for the employment shares in the agricultural, mining, manufacturing and services sectors respectively.

NIGERIA

VARIABLES	(1) ΔGDP	(2) Δsagri	(3) Δsmin	(4) Δsmanuf	(5) Δsserv	(6) ΔODA	(7) ΔPCF
Correction Error 1	-0.578***	0.0214*	-0.128*	-0.0396	0.00282	1.052***	3.672
	(0.182)	(0.0118)	(0.0675)	(0.0540)	(0.0300)	(0.325)	(3.092)
Correction Error 2	-7.134	-0.383	3.335	3.385	-0.893	62.37***	413.9***
	(7.616)	(0.497)	(2.829)	(2.265)	(1.256)	(13.64)	(129.7)
Correction Error 3	-0.0999	0.0195***	0.00157	-0.0803***	0.000767	0.0798	-4.203***
	(0.0682)	(0.00444)	(0.0253)	(0.0203)	(0.0112)	(0.122)	(1.161)
ΔGDP_{t-1}	0.118	-0.0143	0.139	0.0507	-0.0117	-0.0234	-6.261
	(0.237)	(0.0154)	(0.0879)	(0.0704)	(0.0390)	(0.424)	(4.029)
$\Delta sagri_{t-1}$	8.879	0.538	4.346	0.165	-2.250	-40.19**	-209.6
	(10.64)	(0.693)	(3.950)	(3.163)	(1.754)	(19.05)	(181.1)
$\Delta smin_{t-1}$	0.150	-0.110***	-0.176	0.359**	0.150*	0.0413	-11.27
	(0.479)	(0.0312)	(0.178)	(0.142)	(0.0790)	(0.858)	(8.154)
$\Delta smanuf_{t-1}$	1.893	0.0490	0.655	0.219	-0.309	-4.976	-21.50
	(2.188)	(0.143)	(0.812)	(0.651)	(0.361)	(3.917)	(37.24)
$\Delta sserv_{t-1}$	0.0542	0.252	0.0286	-0.918	-0.181	-7.410	-71.99
	(3.387)	(0.221)	(1.258)	(1.007)	(0.559)	(6.065)	(57.66)
ΔODA_{t-1}	0.00356	0.00310	0.0671**	-0.00722	-0.000416	0.634***	1.335
	(0.0893)	(0.00582)	(0.0332)	(0.0266)	(0.0147)	(0.160)	(1.520)
ΔPCF_{t-1}	0.00776	-0.00356***	-0.00225	0.0151***	0.000179	-0.0332	0.0676
	(0.0127)	(0.000826)	(0.00471)	(0.00377)	(0.00209)	(0.0227)	(0.216)
Constant	0.0273	0.00162	-0.0506**	-0.0341*	0.0136	0.00704	0.000137
	(0.0650)	(0.00424)	(0.0241)	(0.0193)	(0.0107)	(0.116)	(1.106)
Observations	34	34	34	34	34	34	34

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Cointegration Equation	Correction Error1	Correction Error2	Correction Error3
GDP	1.000	0 (omitted)	.
Agriculture share	.	1.000	.
Mining share	0 (omitted)	0 (omitted)	1.000
Manufacturing share	-1.000	0.193***	5.866***
	(0.639)	(0.013)	(1.122)
Services share	-4.192***	0.465***	-0.271
	(0.500)	(0.010)	(0.878)
ODA	0.216**	-0.020***	-1.087***
	(0.101)	(0.002)	(0.041)
Private Capital Flows	-0.049**	0.001**	0.409***
	(0.023)	(0.001)	(0.041)
Trend	-0.069*	0.003***	0.346***
	(0.039)	(0.001)	(0.068)
Constant	-36.144	1.907	27.247

Note: sagri, smin, smanuf, sserv stand for the employment shares in the agricultural, mining, manufacturing and services sectors respectively.

ZIMBABWE (ZMB)

VARIABLES	(1) ΔGDP	(2) Δsagri	(3) Δsmin	(4) Δsmanuf	(5) Δsserv	(6) ΔODA	(7) ΔPCF
Correction Error 1	-0.602**	-0.0171*	0.144	0.0408	0.0317	-0.158	-6.217
	(0.253)	(0.00907)	(0.134)	(0.0592)	(0.0289)	(0.528)	(5.069)
Correction Error 2	-24.80	-0.722	-1.640	4.723	-0.0156	5.433	-433.3
	(19.94)	(0.714)	(10.59)	(4.661)	(2.278)	(41.57)	(399.1)
Correction Error 3	0.553	-0.00952	-0.645**	0.102	0.0294	-0.288	-5.122
	(0.567)	(0.0203)	(0.301)	(0.133)	(0.0648)	(1.182)	(11.34)
Correction Error 4	-0.844	0.0144	0.569	0.0264	-0.191	1.733	-14.16
	(1.098)	(0.0393)	(0.583)	(0.257)	(0.125)	(2.289)	(21.98)
Correction Error 5	-6.535	-0.205	-0.908	1.327	0.00908	1.933	-149.5
	(5.875)	(0.210)	(3.120)	(1.373)	(0.671)	(12.25)	(117.6)
ΔGDP_{t-1}	0.288	0.0172**	-0.00177	0.0665	-0.0736***	0.176	6.170
	(0.228)	(0.00816)	(0.121)	(0.0533)	(0.0260)	(0.475)	(4.562)
$\Delta sagri_{t-1}$	-11.75	0.905	27.41**	-3.858	-3.935	-26.82	1,486***
	(24.68)	(0.884)	(13.11)	(5.768)	(2.819)	(51.44)	(493.9)
$\Delta smin_{t-1}$	-0.441	0.0297	1.113**	0.0391	-0.177*	-0.312	23.73
	(0.823)	(0.0295)	(0.437)	(0.192)	(0.0940)	(1.716)	(16.47)
$\Delta smanuf_{t-1}$	-0.103	0.0219	1.008	-0.300	-0.0340	-4.145	63.60**
	(1.583)	(0.0567)	(0.841)	(0.370)	(0.181)	(3.300)	(31.68)
$\Delta sserv_{t-1}$	-2.159	0.200	8.890**	-1.510	-0.955	-10.55	423.6***
	(7.856)	(0.281)	(4.172)	(1.836)	(0.897)	(16.37)	(157.2)
ΔODA_{t-1}	-0.104	-0.00110	0.0613	0.0318	-0.00928	-0.173	0.634
	(0.125)	(0.00447)	(0.0662)	(0.0292)	(0.0142)	(0.260)	(2.496)
ΔPCF_{t-1}	-0.00205	0.000646**	0.00211	0.00229	-0.00250**	-0.00856	0.266
	(0.00915)	(0.000328)	(0.00486)	(0.00214)	(0.00105)	(0.0191)	(0.183)
Constant	0.000296	-0.00212	0.000477	0.00124	0.00162	0.000167	-5.19e-06
	(0.0801)	(0.00287)	(0.0425)	(0.0187)	(0.00915)	(0.167)	(1.602)
Observations	34	34	34	34	34	34	34

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Cointegration Equation	Correction Error1	Correction Error2	Correction Error3	Correction Error4	Correction Error5
GDP	1.000	.	.	.	.
Agriculture share	.	1.000	.	.	.
Mining share	0 (omitted)	.	1.000	.	.
Manufacturing share	0 (omitted)	0 (omitted)	0 (omitted)	1.000	
Services share	.	.	.	.	1.000
ODA	3.482***	-0.094***	1.491***	0.570***	0.052
	(0.792)	(0.020)	(0.401)	(0.170)	(0.101)
Private Capital Flows	0.228**	-0.018***	0.060	0.025	0.049***
	(0.094)	(0.002)	(0.048)	(0.020)	(0.012)
Trend	-0.256***	0.010***	-0.048	-0.020	-0.024***
	(0.072)	(0.002)	(0.036)	(0.015)	(0.009)
Constant	-94.636	2.386	-27.790	-8.690	0.135

Note: sagri, smin, smanuf, sserv stand for the employment shares in the agricultural, mining, manufacturing and services sectors respectively.

APPENDIX E. POST ESTIMATION DIAGNOSTICS: NORMALITY AND AUTOCORRELATION TESTS

SUB-SAHARAN AFRICA

Normality test

Test	Chi2	Prob > chi2	Conclusion
Jarque-Bera	14.767	0.00071	Non-normality
Skewness	3.298	0.05117	Normality
Kurtosis	11.470	0.00164	Non-normality

Langrange-multiplier test (autocorrelation)

Lag	Chi2	Prob > chi2
1	21.3006	0.16724
2	6.7877	0.97714
3	12.4370	0.71339
4	23.9295	0.09105

H0: no autocorrelation at lag order

BOTSWANA

Normality test

Test	Chi2	Prob > chi2	Conclusion
Jarque-Bera	14.767	0.00071	Non-normality
Skewness	3.298	0.05117	Normality
Kurtosis	11.470	0.00164	Non-normality

Langrange-multiplier test (autocorrelation)

Lag	Chi2	Prob > chi2
1	33.4562	0.95604
2	34.0709	0.94810

H0: no autocorrelation at lag order

ETHIOPIA

Normality test

Test	Chi2	Prob > chi2	Conclusion
Jarque-Bera	5.930	0.96823	Normality
Skewness	5.157	0.64082	Normality
Kurtosis	0.773	0.99771	Normality

Langrange-multiplier test (autocorrelation)

Lag	Chi2	Prob > chi2
1	50.3725	0.41893
2	62.0168	0.10032

H0: no autocorrelation at lag order

GHANA

Normality test

Test	Chi2	Prob > chi2	Conclusion
Jarque-Bera	16.315	0.29451	Normality
Skewness	4.163	0.76082	Normality
Kurtosis	12.152	0.09567	Normality

Langrange-multiplier test (autocorrelation)

Lag	Chi2	Prob > chi2
1	58.4669	0.16671
2	43.8233	0.68245

H0: no autocorrelation at lag order

KENYA

Normality test

Test	Chi2	Prob > chi2	Conclusion
Jarque-Bera	12.078	0.60000	Normality
Skewness	9.404	0.22492	Normality
Kurtosis	2.674	0.91342	Normality

Langrange-multiplier test (autocorrelation)

Lag	Chi2	Prob > chi2
1	55.7686	0.23538
2	45.0689	0.63321
3	40.2344	0.80951

H0: no autocorrelation at lag order

NIGERIA

Normality test

Test	Chi2	Prob > chi2	Conclusion
Jarque-Bera	14.767	0.39424	Normality
Skewness	3.298	0.85618	Normality
Kurtosis	11.470	0.11940	Normality

Langrange-multiplier test (autocorrelation)

Lag	Chi2	Prob > chi2
1	50.7309	0.40515
2	38.0965	0.87012

H0: no autocorrelation at lag order

MALAWI

Normality test

Test	Chi2	Prob > chi2	Conclusion
Jarque-Bera	31.453	0.00479	Non-normality
Skewness	14.292	0.04622	Normality
Kurtosis	17.161	0.01639	Normality

Langrange-multiplier test (autocorrelation)

Lag	Chi2	Prob > chi2
1	50.9624	0.39634
2	53.0221	0.32181
3	54.8338	0.26298

H0: no autocorrelation at lag order

MAURITIUS

Normality test

Test	Chi2	Prob > chi2	Conclusion
Jarque-Bera	20.860	0.10528	Non-normality
Skewness	12.656	0.08094	Normality
Kurtosis	8.203	0.31499	Normality

Langrange-multiplier test (autocorrelation)

Lag	Chi2	Prob > chi2
1	49.8961	0.43751
2	48.5308	0.49206
3	56.7857	0.20758

H0: no autocorrelation at lag order

ZIMBABWE

Normality test

Test	Chi2	Prob > chi2	Conclusion
Jarque-Bera	14.080	0.44375	Non-normality
Skewness	6.687	0.46216	Non-normality
Kurtosis	7.393	0.38914	Non-normality

Langrange-multiplier test (autocorrelation)

Lag	Chi2	Prob > chi2
1	48.8369	0.47969
2	53.4177	0.30839

H0: no autocorrelation at lag order

APPENDIX F. COUNTRIES INCLUDED IN THE ANALYSIS

Botswana
Ethiopia
Ghana
Kenya
Malawi
Mauritius
Nigeria
Zambia