

Aid for Trade and Comparative Advantage Following (CAF) Development Strategy

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This article analyses whether Aid for Trade (AfT) interventions are associated with the adoption of the Comparative Advantage Following (CAF) development strategy or the Comparative Advantage Defying (CAD) development strategy in recipient-countries. An empirical exercise is performed using a panel dataset of 75 countries over the period 1996-2016. The findings show that AfT interventions tend to be associated with the adoption of the CAF strategy, particularly in countries that experience a relatively low level of trade policy liberalization, a high education level, low inflation rates, a low dependence on natural resources, and a relatively low volume of FDI inflows.

Keywords: Aid for trade flows, Comparative Advantage Following (CAF) development strategy, Developing countries

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INTRODUCTION

The development thinking literature has evolved significantly since the 1950s. From the 1950s to early 1970s, development policies, including import substitution policies (Radosevic, 1999) were influenced by the old structuralism (e.g., Lewis, 1954; Prebisch, 1959; 1960). This development literature argued that as low-income countries do not experience the same problems¹ as more industrialized countries, they would likely fail to secure a share in the world market for manufacturing export products if they rely on their traditional comparative advantage, i.e., export of primary commodities (including natural resources). The orthodox, classical economics development approach had put forth a different argument. According to orthodox economists, differences in labor productivity (i.e., the amount of capital per unit of labor) explain differences in development levels among advanced and developing countries. In particular, they have argued that countries that endeavor to remove policy distortions and follow their comparative advantage would experience a rise in their real per capita income (see for example Bruno et al., 2015).

Due to the debt crises in many developing economies during the 1980s, the development thinking approach based on the import substitution strategies radically changed (e.g., UNCTAD, 2012), replaced with neoclassical development strategies based on the Washington Consensus (e.g., Williamson, 1990; 2004) and later on the “augmented Washington Consensus”. Through these development approaches, countries were required by the Bret-

¹In the context of the present analysis, problems of low-income countries include, for example, the high concentration of their exports in primary commodities, which makes them highly vulnerable to external shocks. This is in contrast with industrialized countries whose export products are of high value addition, and make them less vulnerable than low-income countries to external shocks.

ton Woods institutions (the International Monetary Fund and the World Bank) to implement reforms involving balanced budgets, privatization, deregulation, liberalization of interest rates, as well as institutional reforms such as anti-corruption policies, flexible labor market policies etc. (see Bruno et al. 2015). However, the effectiveness of these policies in promoting rapid and sustainable growth and development has been called into question. This was because while many of the countries that have implemented *stricto sensu* these policies imposed by the Washington and “Augmented” Washington Consensus have not really enjoyed sustainable growth. In contrast, other countries such as the Asian Tigers that instead pursued mixed and gradual interventionist and liberal policies did achieve sustained and rapid growth.

Recently, New Structural Economics has emerged in the development thinking literature as an alternative approach to development. It has particularly received great attention since the 2008 global financial crisis and the ensuing global recession (see Lin, 2011). This development approach is a mixture of the structural economics and the neoclassical approach (e.g., Lin, 2011; 2012; 2015). It considers economic development as a dynamic process entailing structural changes, and involving industrial upgrading and corresponding improvements in hard (or tangible) and soft (or intangible) infrastructure at each level (see Lin, 2011, pp. 194-195). The New Structural Economics approach relies on the idea that the economic structure of an economy is endogenous to the structure of its factor endowments, and the basic mechanism for effective resource allocation is the market. State intervention should be limited to the provision of information about new industries, the coordination related investments across different firms in the same industries, the compensation for information externalities, and the nurturing of new industries by incubating and encouraging foreign direct investment inflows (see Lin, 2011, p. 206). These involve a development strategy based on comparative advantage following (CAF) as opposed to a development strategy based on comparative advantage defying (CAD). These two strategies are further discussed in the next section. Nevertheless, opponents to the New Structural Economics have argued that this approach has a strong neoclassical anchoring, and rests on restrictive assumptions².

On another note, developing countries are beneficiaries of development aid inflows, and in particular, part of this capital inflow is allocated to the development of their trade sector – referred in the jargon of economists as to “Aid for Trade”. The definition of a specific category of development aid devoted to the trade sector in developing countries arises from the realization by Members of the World Trade Organization (WTO) that developing countries, and in particular, the Least Developed Countries (LDCs) among them, face structural impediments to their participation in international trade and greater integration into the global trading system. The AfT Initiative was launched by Members of the WTO at the 2005 Hong Kong Ministerial Conference, with a view to helping developing countries, particularly LDCs, to build the supply-side capacity and trade-related infrastructure that they need to assist them to implement and benefit from the Agreements of the WTO and more broadly to expand their trade (see World Trade Organization Secretariat document WT/MIN(05)/DEC). Given the huge financial resource needs of governments to develop the trade sector in developing countries, and in light of the limited domestic public resources available to these governments, we argue on the one hand that Aid for Trade (AfT) flows provided by donor-countries (as part of the overall official development assistance) could help recipient-country governments adopt the CAF development strategy. On the other hand, it is also possible that these AfT flows contribute to the implementation of an industrial policy involving the development of industries that defy current comparative advantage, and promote the development of new comparative advantages.

The current article investigates whether AfT interventions genuinely help recipients’ governments adopt the CAF development strategy. To the best of our knowledge, this is the first study³ on the effect of AfT interventions on the CAF/CAD development strategy proposed in the New Structural Economics framework. The relevance of assessing the effect of AfT interventions on the CAF/CAD strategy lies in the fact that these interventions

²See Singh (2011) and Fine and Van Waeyenberge (2013) for a well-argued discussion of the theoretical anchoring of the New Structural Economics.

³It is worth noting that in a recent paper, Gnangnon (2020) has examined how countries’ CAF development strategy interacts with Aid for Trade interventions in influencing the extent of structural change in production.

could help reduce trade costs, enhance productive capacity, including in industries that challenge comparative advantages, and ultimately reinforce recipient-countries' trade competitiveness in the global market. In so doing, these capital inflows may help develop new comparative advantages. Therefore, this study adds to the bulk of existing studies on the effect of AfT interventions, notably vis-à-vis recipient-countries' export performance (e.g., Cali and te Velde, 2011; Busse et al., 2012; Helble et al. 2012; Vijil and Wagner, 2012; Cirera and Winters, 2014; Hühne et al. 2014, Hynes and Holden, 2016; Gnangnon and Roberts, 2017; Martínez-Zarzoso et al., 2017; Gnangnon, 2018; 2019a). The empirical analysis relies on a panel dataset of 75 countries over the period 1996-2016, and a the two-step system Generalized Methods of Moments (GMM) approach. It has shown that AfT interventions are associated with the implementation of the CAF development strategy in recipient-countries, in particular for relatively less advanced countries among recipients of AfT flows. Additionally, the effect of AfT flows on the adoption of a CAF/CAD strategy could depend on recipient-countries' economic features, notably the level of trade policy liberalization, the level of education, the prevailing inflation rate, the size of foreign direct investment (FDI) inflows, the financial development depth, and the dependence on natural resources.

The rest of the analysis is structured as follows. Section 2 discusses the effect AfT interventions on the CAF/CAD development strategy in recipient-countries. Section 3 presents the model specification that would help respond to the question posed in the article. Section 4 presents some data analysis. Section 5 lays out the econometric strategy, while Section 6 interprets empirical outcomes. Section 7 concludes.

AID FOR TRADE INFLOWS AND CAF/CAD DEVELOPMENT STRATEGY

According to Lin (2014), the implementation of the CAF development strategy (i.e., following countries' comparative advantage) when promoting industries enhances countries' competitiveness in the domestic and world markets, and allows them to enjoy the largest possible market shares. Proponents of the CAF development strategy have also argued that this strategy contributes to a faster upgrade of countries' structure of factor endowments and allows enterprises to acquire industrial and technological innovations from developed countries that match with their new comparative advantage. In contrast, the implementation of the CAD development strategy involves promoting the development of advanced capital-intensive (heavy) industries that are not consistent with countries' comparative advantage, the latter being determined by countries' factor endowments. For example, by providing firms with subsidies (e.g., through fiscal transfers) and protections, the CAD development strategy generates non-viable industries in open and competitive markets (Lin, 2011). Rodrik (2011) has noted his agreement with Lin's (2011) New Structural Economics approach on many areas. However, he has also underlined some differences of views in several other areas – differences that he qualified as “methodological”, and perhaps even just “terminological” (see Rodrik, 2011, p. 229) as they might have little practical impact. While the NSE approach favors the CAF strategy over the CAD strategy, some studies have provided support for the relevance of the CAD development strategy in developing countries. One argument has been that developing countries that are endowed with abundant cheap-labor-intensive industries, can compete in the global market of these industries (see for example, UNCTAD, 2016). Another argument states that a CAF strategy would lead countries (including developing countries) to specialize in sectors of static comparative advantage, that is, low-value added and low-productivity sectors (e.g., Fine and Van Waeyenberge, 2013). This is particularly the case for resource-rich developing countries (for example, poor countries that are highly dependent on the production and export of primary commodities); the development strategy in these countries often hinges on their “static” comparative advantages in their primary commodities (including natural resource) sector. Such comparative advantages hinder the human and capital accumulation needed to structurally transform their economies and promote sustainable economic development. In connection to this, Chang (1994) has noted that industrial policy involves building comparative advantages and creating entirely new sectors and industries rather than following static comparative advantages. As a result, industrial policy should help countries promote and discover their dynamic comparative advantage (see UNCTAD, 2016). Fine and Van Waeyenberge (2013) have argued that the New

Structural Economics approach is flawed and represents an incoherent application of neoclassical economics. The debate between Lin and Chang (2009) rests on the conformity versus non-conformity of a country's development strategy with its comparative advantages. Chang has emphasized the importance of non-conformity, as comparative advantages are useful only when they serve as a guideline for structural change in production, and provide information on the sacrifice induced by infant protection industries. This is in line with the experience of Western economies that have implemented interventionist policies (i.e., a CAD strategy) in their development process. In contrast, Lin has held the view that a country's development strategy should conform to its comparative advantages (see Lin and Chang, 2009). Despite the lack of agreement in the theoretical literature on which of the development strategies (CAF or CAD) is most appropriate for developing countries, some existing empirical studies have reported a positive macroeconomic effect for the CAF development strategy. For example, Bruno et al. (2015) and Lin (2012) have shown that the CAF development strategy promotes economic growth. Lin (2004) and Lin (2012) have respectively reported a positive effect of the CAF development strategy on inclusive growth, and a negative effect of this strategy on economic growth volatility. Chen and Lin (2008) have shown the negative effect of the CAF development strategy on inequality, and Siddique (2015) has provided empirical evidence that this strategy helps reduce poverty. In light of these empirical findings⁴ and given the advantages of the CAF development highlighted above, we might be tempted to support the relevance of the CAF development strategy in developing countries.

As also noted above, the role assigned to governments that implement the CAF strategy in the NSE framework is to upgrade and improve hard and soft infrastructure, as well as compensate for information externalities, so as to complement the role of the market mechanism in achieving effective resource allocation. AfT flows could help in this endeavor. According to the Organization for Economic Cooperation and Development, AfT⁵ has three major components: AfT flows for building economic infrastructure, AfT flows for strengthening productive capacity, and AfT flows related to trade policies and regulations. Thus, the theoretical discussion on the effect of AfT interventions on the CAF/CAD strategy (as proposed in the New Structural Economics framework) would examine how each component of total AfT flows influences this development strategy. From the theoretical perspective, we argue that AfT interventions that allow building economic infrastructure do not directly target a specific sector, and might therefore exert a neutral effect on the structural change underpinning the CAF/CAD strategy (Cirera and Winters, 2015). Thus, AfT interventions for the build-up of economic infrastructure can be associated with the implementation of a horizontal industrial policy. However, such AfT interventions could exert an indirect effect on the CAF/CAD strategy by facilitating trade and reducing production costs (for example, the costs associated with imported intermediate inputs used in the production process of final goods and services (Lima and Venables, 2001; Anderson and Marcouiller, 2002; Wilson et al., 2003, 2005; Cali and TeVelde, 2011; Busse et al., 2012; Portugal-Perez and Wilson, 2012)). As a result, AfT interventions to build economic infrastructure could help countries produce goods in line with their comparative advantage, and that match with the demands in the international trade markets. Cirera and Winters (2015) have noted that in the absence of large sector distortions, AfT for economic infrastructure flows may favor sectors of comparative advantage. In this context, we expect higher AfT flows for economic infrastructure to help governments implement the CAF development strategy so as to better integrate into the international trade market. Meanwhile, AfT interventions in favor of economic infrastructure could also lead governments of recipient countries to implement a vertical industrial policy (that targets specific sectors) in favor of industries that defy the existing comparative advantages, and promote the development of new sectors of comparative advantages. In this scenario, this type of AfT interventions would be associated with the implementation of the CAD development strategy. Concerning AfT for enhancing productive capacity, it is not clear whether it would promote the adoption of the CAF or

⁴The empirical analysis on the economic effects of the CAF/CAD development strategy is still at its infancy.

⁵Using these categories of AfT, we have compiled data on total AfT as well as on total Official Development Aid (ODA) from the OECD statistical database, and obtained that in 2017, the share (%) of total AfT in total ODA amounted to 26.6% in 2017, against 14.3% in 2006 (i.e., the first year after setting up the AfT initiative) and 12.8% in 2002.

CAD strategy in recipient countries. In fact, AfT interventions to enhance productive capacity is directed toward specific sectors in the recipients, including in line with the country's export development strategy. In particular, AfT interventions aim to strengthen capacity in sectors such as banking and financial services, business and other services, agriculture, fishing, industry, mineral resources and mining, and tourism. However, the effect of AfT flows for strengthening productive capacity on the adoption of the CAF/CAD in recipient-countries would depend on how governments of these countries utilize these capital inflows. If they use these inflows to enhance productive capacity in sectors of comparative advantage, then AfT for enhancing productive capacity would exert a positive effect on the CAF development strategy. In contrast, if AfT flows for building productive capacity are used for investments in (capital-intensive) heavy manufacturing industries that are not consistent with their comparative advantage, then these AfT interventions would be associated with the CAD development strategy. Finally, Aid for Trade policy and regulation aims to help policymakers of developing countries build their capacity to devise trade policies that are consistent with both their commitments at the WTO and their export development strategy. Part of this type of AfT interventions also helps recipients deal with the costs of adjustments of trade liberalization, such as compensation for those who loose from greater trade liberalization. According for example to Busse et al. (2012) and Cali and TeVelde (2011), Aid for Trade flows for policy and regulations allow reducing administrative costs and regulatory bottlenecks to trade. As a result, they could promote either CAF or CAD development strategy depending on the government's willingness to pursue policies that rely on sectors of comparative advantage or defy the comparative advantage of their economies.

Overall, it is difficult at this stage of the analysis to conclude whether AfT interventions would promote the CAF or CAD development strategy in recipient-countries. This issue is ultimately an empirical one.

EMPIRICAL MODEL

Ideally, the empirical model on the effect of AfT flows on the CAF/CAD development strategy should be grounded on a theoretical framework. However, there is no theoretical framework on the determinants of the adoption of CAF/CAD development strategy. Therefore, we adopt a pragmatic approach by drawing from the few existing studies on the macroeconomic determinants of structural change (e.g., Dabla-Norris et al. 2013⁶; McMillan et al. 2014; Jha and Afrin, 2017; and Martins, 2018). Thus, apart from the AfT variables that are of key interest in the analysis, model (1) features the following control variables: the level of trade policy liberalization ("TP"); the real per capita income ("GDPC"), which represents the development level, and also captures the domestic demand pattern; the education level ("EDU"); the size of foreign direct investment (FDI) inflows; the financial development depth (denoted "FINDEV"); the inflation rate ("INFL"), which captures macroeconomic stability (lower inflation rate reflects greater macroeconomic stability); countries' physical fundamentals, such as the natural resource endowments, captured here through the share of natural resource rents in percentage of GDP, denoted ("RENT"); the population size ("POP"); and the institutional and governance quality ("INST"). Appendix 1 contains the description of all of these variables.

To discuss the expected effects of many of these control variables, we will draw many insights from Lin (2011). As the import-substitution strategy advocated by the old structuralism approach has generated significant distortions in economies that have implemented this strategy, the New Structural Economics approach (see Lin, 2011) has recommended that countries adopt a gradualist approach to trade policy liberalization. This entails the implementation of some temporary protection to industries that are not consistent with a country's comparative advantage, while concurrently liberalizing entry to other more competitive sectors that were controlled and repressed in the past (Lin, 2011, p. 312). Therefore, it would be difficult to anticipate theoretically the direction of the effect of the trade policy variable on the indicator of CAF/CAD strategy (presented below), given that over the full period, countries may have applied both protectionist and liberalization measures in line with their

⁶Dabla-Norris et al. (2013) have examined the determinants of structural change in production by using countries' fundamentals as well as policy and institutional factors to explain the differences in output structures.

CAF or CAD development strategy. Nevertheless, as imports of high-tech goods – with their associated positive spillovers in terms of knowledge and technology diffusion (e.g., Baldwin et al. 2005) – could be necessary for countries' development strategies (whether CAF or CAD), countries may be inclined to reduce trade barriers that affect the imports of these goods. Even in this context, it is not clear whether such trade policy liberalization has been implemented to promote the CAF or the CAD development strategy. With respect to the effect of the development level on the choice of the CAF/CAD development strategy, we expect that relatively advanced developing economies would likely implement policies in favor of the CAF development strategy, as they are probably more equipped in terms of resources (including human, physical and financial resources) than less advanced economies. On another note, the accumulation of human capital is essential for economic development (e.g., Becker, 1975; Romer, 1990; Rocha et al. 2017). However, Lin (2011, p. 213) has argued that the enhancement of human capital should align with the country's accumulated physical capital and the degree of upgrading in the economy. The rationale for this is that the progressive accumulation of human capital would facilitate the upgrade of industries and lay the ground for the full use of the resources in the economy when industries would need them. In this context, we hypothesize that if the country aims to pursue a CAF development strategy, it would upgrade incrementally its human capital in line with the demand by existing industries.

While financial development helps share risks and facilitate resource allocation across the economy (Levine, 2005), a high degree of financial development could hurt economies (e.g., Law and Singh, 2014; Arcand et al. 2015). Lin (2011) has postulated that in the context of the New Structural Economics framework, the optimal financial structure for a given country (i.e., at a given development level) may be determined by a number of parameters that are endogenous to the factor endowments of the country at that development level. These parameters include the existing industrial structure, the average size of firms, and the type of risks that these firms usually face. This signifies for example that “low-income countries should choose small, local banks as the backbone of their financial systems, instead of trying to replicate the financial structure of advanced industrialized countries” (Lin, 2011, p. 210). As countries upgrade their industries through increasing reliance on capital-intensive industries, the financial structure would adapt to the new upgraded industries, including through the development of a more sophisticated financial system. Against this background, we postulate that greater financial development depth would be associated with the adoption of the CAF development strategy.

Let us turn to the effect of the institutional quality on the CAD/CAF development strategy. Iqbal and Daly (2014) have noted that weak institutions divert resources from productive sectors to unproductive sectors, and hence promote rent seeking activities. Along the same lines, Faruq (2011) has underlined that widespread corruption, inefficient bureaucracy, and a high risk of expropriation of private property by the government can create uncertainty among producers and discourage investments and innovations over the long term. In light of these, we expect countries with better institutional and governance quality to be incentivized to adopt the CAF development strategy. However, it is still possible that in the context of a better institutional and governance quality, policymakers are incentivized to implement a CAD strategy if they wish to take advantage of the improved business environment (associated with the improved institutional and governance quality) by promoting the development of existing sectors of comparative advantage.

The size of the population aims to capture possible scale effects that can affect the choice of CAF/CAD development strategy. Incidentally, we expect that countries that are highly endowed with natural resources might be much more willing to engage in a CAD strategy than countries that are less dependent on natural resources, even though this might not be the right policy to adopt.

Finally, Lectard and Rougier (2018) have shown that inward FDI influences significantly countries' distance to comparative advantage on productive transformation. They concluded that a strategy that involves defying comparative advantage by attracting FDI inflows is risky in the long run because it tends to induce only partial and artefact industrialization, with manufacturing exports increasing while the manufacturing value-added actually decreases. Freund and Moran (2017) have documented that to defy their comparative advantage (i.e., to modify the structure of their exports), weakly diversifying economies can choose to rely on vertical FDI, even though

they had not previously developed the productive capacities that enable export upgrading. In light of this finding, we expect that FDI inflows could be associated with the implementation of the CAF strategy, in particular if foreign firms are located in the sectors of existing comparative advantages in the host country. Against this background, we posit the following model:

$$TCI_{it} = \varphi_0 + \varphi_1 TCI_{it-1} + \varphi_2 AfT_{it} + \varphi_3 TP_{it} + \varphi_4 EDU_{it} + \varphi_5 GDPC_{it} + \varphi_6 INFL_{it} + \varphi_7 FINDEV_{it} + \varphi_8 FDI_{it} + \varphi_9 POP_{it} + \varphi_{10} RENT_{it} + \varphi_{11} INST_{it} + \vartheta_i + \omega_t + \varepsilon_{it} \quad (1)$$

where i represents a country's index; t denotes the time-period.

The one-period lag of the dependent variable has been introduced in model (1) as a regressor in order to take into account the initial level of TCI as well as its persistence over time. Model (1) features countries' fixed effects (ϑ_i) and time effects (ω_t). Time effects aim to capture global shocks that could affect all countries' implementation of a CAF/CAD development strategy. φ_0 to φ_{11} are parameters to be estimated. ε_{it} is an error term. The panel dataset is unbalanced and contains 75 AfT recipients over the period 1996-2016. Data on variables has been averaged over non-overlapping sub-periods of 3-year average so as to reduce the influence of business cycles on variables, as well as to obtain medium term effects of regressors on the dependent variable. The sub-periods include 1996-1998; 1999-2001; 2002-2004; 2005-2007; 2008-2010; 2011-2013; and 2014-2016. All variables contained in model (1) have been standardized so as to avoid unit of measurements problems associated with the variables, but also to facilitate the comparison of estimates. The standardization procedures involve calculating for each variable the ratio of the difference between the concerned variable and its mean (average) over the standard deviation of this variable. As we will see later, this procedure also helps eliminate eventual outliers.

The dependent variable "TCI" is the technology choice index, which acts as a proxy for the development strategy based on comparative advantage (i.e., CAF or CAD) adopted by a given country (see for example Lin and Liu, 2004; Bruno et al. 2015). Following for example Lin and Liu (2004) and Bruno et al. (2015), we calculate

TCI using the formula: $TCI_{it} = \frac{AVM_{it}/LM_{it}}{GDP_{it}/L_{it}}$, where AVM_{it} is the added value of manufacturing industries of a given country i , at time t ; GDP_{it} is the total added value of the country i ; LM_{it} stands for the labor in the manufacturing industry, and L_{it} is the total labor force. For a given country, a rise in the values of the TCI indicator reflects the adoption by that country of a CAD development strategy through investment in heavy (capital-intensive) manufacturing industries. Declining values of this index indicate that the country follows a CAF development strategy. The numerator of TCI (i.e., AVM_{it}/LM_{it}) is relatively larger when manufacturing firms experience large market shares due to government's intervention (with access to subsidized credit and inputs, and very high profits leading to higher investment into capita), and as a result, where the value added generated by the sector is above what would be generated otherwise. Concurrently, as such a strategy leads to a distorted sector where capital-intensive technologies are the priority of the government, the sector would employ less labor. As noted by Bruno et al. (2015, p. 134), the TCI indicator reflects a situation where a government tries to kick-start economic growth through policies supporting a capital-intensive manufacturing sector.

The variable "AfT" represents the measure of real gross disbursements AfT flows. It could either be the real total gross disbursements AfT flows (constant US dollar 2016 prices), which is denoted "AfTTOT" or its components, namely the real gross disbursements Aid for Trade for infrastructure flows (constant US dollar 2016 prices) denoted "AfTINFRA", the real gross disbursements Aid for Trade flows for building productive capacity (constant US dollar 2016 prices) denoted "AfTPROD", and the real gross disbursements Aid for Trade flows allocated for trade policies and regulations (constant US dollar 2016 prices) denoted "AfTPOL". Data on the gross disbursements AfT variables is available in OECD/CRS database from 2002 onwards. However, we follow the approach used by Selaya and Sunesen (2012, p. 2158) as well as Clemens et al. (2012), Thiele et al. (2006) and the AfT data so that it covers now the period 1996-2016 (see Appendix 2 for details on the methodology used to expand AfT data). This would help get much more information and obtain coefficients in terms of medium

terms. The descriptive statistics on all variables (non-standardized, i.e., normal variables) included in model (1) are presented in Appendix 3a, and the pairwise correlations among these variables are displayed in Appendix 3b. Appendix 4 shows the list of countries used in the analysis.

DATA ANALYSIS

We use non-overlapping sub-periods of 3-year average data to perform some graphical analysis in this section. We present in Figure 1 the evolution of total AfT flows (denoted “AfTTOT”) and the TCI indicator over the period 1996-2016 (using the 3-year average non-overlapping data) and the full sample. Figure 2 shows the scatter plot of these two variables over the same period over the full sample. We observe in Figure 1 that, on average, total AfT flows have declined from US\$ 395.9 million in 1996-1998 to US\$ 117.8 million in 2002-2004. These capital inflows have then exhibited a rising trend over the rest of the period to reach US\$ 361.2 million in 2014-2016. These patterns indicate that AfT flows have substantially increased after the launch of the AfT Initiative (as empirically shown by Gnangnon, 2019b). On the other hand, TCI has fluctuated over the entire period: it has moved from the value 5.5 in 1996-1998 to 9.3 in 1999-2001, which reflects an increasing adoption of the CAD development strategy by countries. TCI has then declined to reach the value 5.2 in 2005-2007 (this reflects the adoption of the CAF development strategy), after which it has rebounded to reach the value of 9 in 2011-2013. It

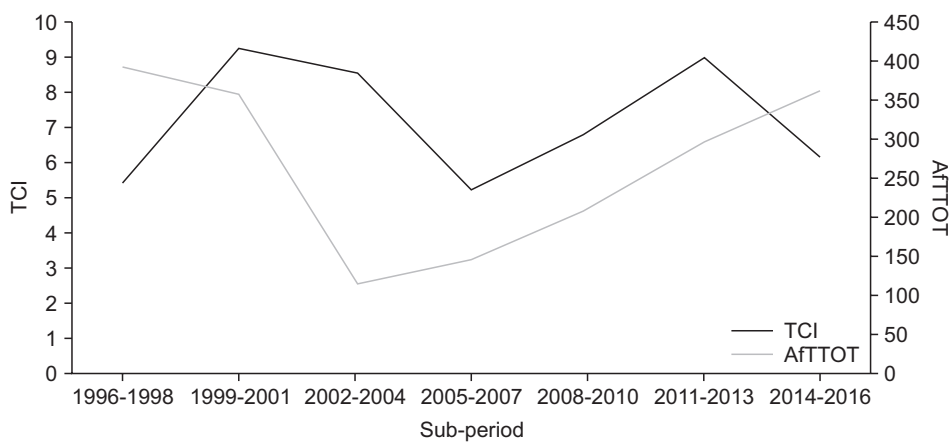


Fig. 1. Evolution of TCI and AfTTOT. Source: Author. Note: Total Aid for Trade (AfTTOT) is expressed in Millions of US Dollars, constant 2016 prices.

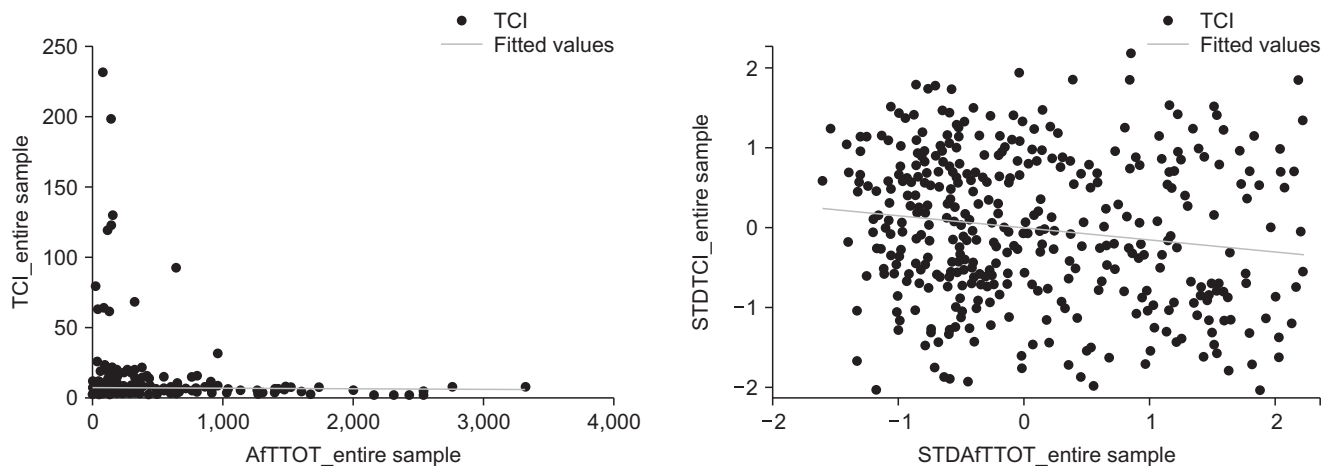


Fig. 2. Correlation pattern between TCI and AfTTOT_Full sample. Source: Author. Note: the variable “AfTTOT” is expressed in Million US Dollars, constant 2016 prices. The variables “TCI” and “STDAfTTOT” represent respectively the standardized variables “TCI” and “AfTTOT”.

has subsequently declined to the value of 6.3 in 2014-2016, which shows that on average, countries have adopted the CAF development strategy between 2011-2013 and 2014-2016. Turning to Figure 2, we note from the left-hand side graph (based on non-standardized variables) that there is no clear-cut relationship between TCI and total AfT flows over the full sample. Additionally, this graph shows the existence of some outliers. In contrast, the right-hand side graph (based on standardized variables) indicates a negative correlation pattern between TCI and total AfT flows over the full sample. Interestingly, using the standardized variables help eliminate outliers in the graph. Relying on standardized variables, Figure 3 shows a negative correlation pattern between total AfT flows and TCI in LICs, LMICs and UMICs. However, this correlation pattern turns out to be positive for HICs.

ECONOMETRIC STRATEGY

At the outset, we estimate a static specification of model (1) (i.e., the model without the one-period lag of the dependent variable as a regressor) using standard estimators, including the fixed effects estimator (denoted “FE⁷”) and the feasible generalized least squares estimator (denoted “FGLS”), which accounts for heteroscedasticity and

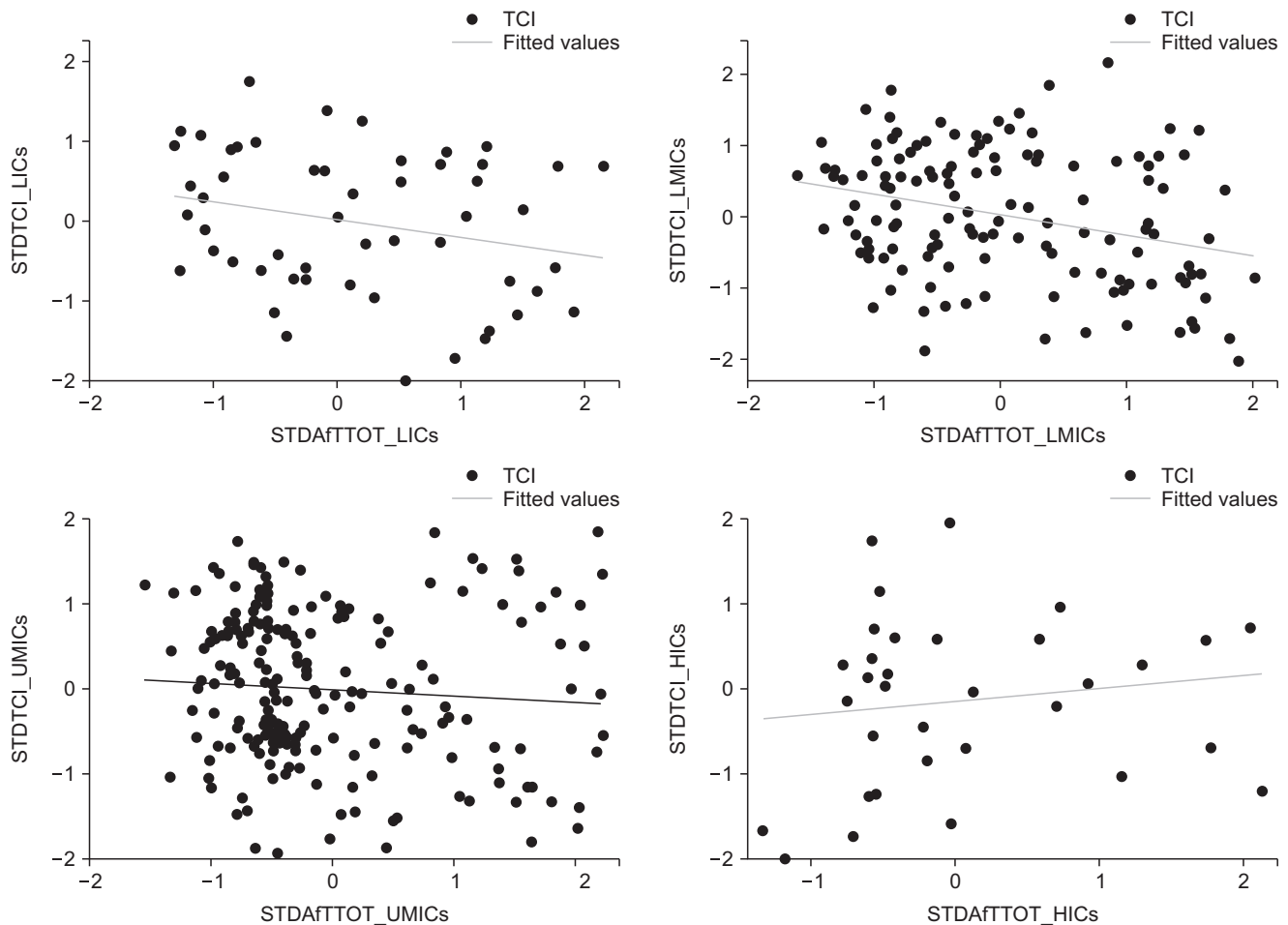


Fig. 3. Correlation pattern between TCI and AfTTOT over sub-samples. Source: Author. Note: The variables “STDTCI” and “STDAFTTOT” represent respectively the standardized variables “TCI” and “AfTTOT”; “INTER” measures the interaction between the standardization measures of the real per capita income and the total AfT flows.

⁷The Driscoll and Kraay (1998) technique that helps correct standard errors for heteroscedasticity, autocorrelation and cross-sectional dependence has been applied when using the FE estimator.

Table 1. Effect of AfT on the CAF/CAD strategy *Estimators:* FE and FGLS

Variables	FE	FGLS with panel-specific AR (1)
	TCI (1)	TCI (2)
AfTTOT	−0.102* (0.0532)	−0.129*** (0.0288)
TP	0.0241 (0.0287)	0.0608 (0.0388)
EDU	−0.235*** (0.0497)	−0.156*** (0.0217)
GDPG	−0.132 (0.102)	−0.132** (0.0637)
INFL	−0.186*** (0.0529)	−0.175*** (0.0299)
FDI	0.298*** (0.0534)	0.285*** (0.0602)
FINDEV	−0.126*** (0.0370)	−0.161*** (0.0467)
RENT	0.0461*** (0.0170)	0.119*** (0.0284)
POP	−0.138*** (0.0212)	−0.124** (0.0564)
INST	−0.0290 (0.0449)	−0.00426 (0.0401)
Constant	0.0238 (0.0499)	0.0272 (0.0370)
Observations/Countries	378/75	376/73
Within R-squared	0.1291	
Pseudo R-squared		0.3084

Note: *p-value < 0.1; **p-value < 0.05; ***p-value < 0.01. Robust Standard errors are in parenthesis. The Pseudo R² has been computed for the regression based on the FGLS estimator as the correlation coefficient between the dependent variable and its predicted values. The regressions have used standardized variables.

autocorrelation in the residuals. Table 1 contains the outcomes of the estimations of this model specification by means of these two estimators. As some regressors – including the AfT variables, the trade policy, the education level, the financial development depth and the real per capita income – could be considered as endogenous due to the bi-directional causality, the estimates reported in Table 1 could be biased. In addition, estimating a static version of model (1) could generate an omitted variable bias due in particular to the lack of the one-period lag of the dependent variable, which in fact might be important in the model. These lead us to consider the dynamic model (1), and to find an appropriate estimator that could help tackle the aforementioned endogeneity problems.

The two-step system Generalized Methods of Moments (GMM) estimator (see Arellano and Bover, 1995; Blundell and Bond, 1998) can be a good candidate. Despite the criticisms addressed to this estimator, in particular with respect to the exogeneity of the GMM-type instruments, this estimator has been widely used in the empirical literature for many reasons: it has superior small sample properties compared to the first difference-GMM

approach of Arellano and Bond (1991); and the one-step system GMM approach, in particular when variables display a strong persistence over time (see Blundell et al., 2001). Second, it helps address the endogeneity issues related to the bi-directional causality of the variables highlighted above, and also allows tackling the endogeneity bias related to the correlation between the unobserved country-specific effects and the lag of the dependent variable (e.g., Nickell, 1986;). The use of the two-step system GMM approach entails estimating a system of equations, including a level-equation and a first-difference equation, where lagged values are used as instruments for the first-differenced regressors, and first-differences are used as instruments for the equation in levels to address endogeneity concerns.

We have implemented an endogeneity test for all variables in model (1) (except the population size variable, which is considered as exogenous) that could be suspected as endogenous. These variables include AfT variables, as well as the variables “TP”, “EDU”, “GDPC”, “INFL”, “FINDEV”, “FDI”, “RENT”, and “INST”. To implement the endogeneity test, we first regress each suspected endogenous variable against other variables, and then extract the residual from this regression. The residual is subsequently introduced in a second regression of the dependent variable (i.e., the indicator of CAF/CAD strategy) on all variables. The suspected endogenous variable would be genuinely endogenous if the coefficient of the residual variable is significantly different from zero at the conventional levels. Otherwise, this variable could be considered as exogenous. In the present analysis, the coefficient of the residual variable appears to be statistically non-significant (at the conventional levels, i.e., with p-values higher than 0.10) for the AfT variables as well as the variables “TP”, “GDPC”, “FINDEV”, “RENT” and “INST”. However, for the three other variables, i.e., “EDU”, “INFL” and “FDI”, the coefficient of the residual variable is significant at the conventional level, and the related p-values amount respectively to 0.004; 0.006; and

Table 2. Effect of AfT on development strategy *Estimator:* Two-step system GMM

Variables	TCI (1)	TCI (2)	TCI (3)	TCI (4)
TCI _{t-1}	0.624*** (0.0230)	0.627*** (0.0228)	0.636*** (0.0248)	0.617*** (0.0253)
AfTTOT	-0.0497*** (0.0190)			
AfTINFRA		-0.0467** (0.0198)		
AfTPROD			-0.0200 (0.0280)	
AfTPOL				-0.0557*** (0.0192)
TP	0.0340 (0.0303)	0.0441 (0.0302)	0.0351 (0.0313)	0.0547* (0.0299)
EDU	-0.223*** (0.0413)	-0.202*** (0.0415)	-0.218*** (0.0386)	-0.248*** (0.0460)
GDPC	-0.384*** (0.0840)	-0.390*** (0.0815)	-0.381*** (0.0788)	-0.378*** (0.0868)
INFL	-0.217*** (0.0509)	-0.244*** (0.0517)	-0.243*** (0.0496)	-0.215*** (0.0511)
FINDEV	-0.157*** (0.0431)	-0.149*** (0.0424)	-0.178*** (0.0437)	-0.163*** (0.0455)
FDI	0.193*** (0.0685)	0.195*** (0.0676)	0.214*** (0.0650)	0.201*** (0.0498)
RENT	0.0491 (0.0326)	0.0611* (0.0329)	0.0589* (0.0329)	0.0432 (0.0329)
POP	0.0486 (0.0664)	0.0346 (0.0636)	0.0111 (0.0620)	0.0238 (0.0587)
INST	0.0722*** (0.0230)	0.0618*** (0.0236)	0.0661*** (0.0223)	0.0484** (0.0223)
Constant	0.130*** (0.0232)	0.121*** (0.0226)	0.133*** (0.0231)	0.134*** (0.0216)
Observations/Countries	304/75	304/75	304/75	297/71
Number of Instruments	55	55	55	55
AR1 (p-value)	0.0012	0.0013	0.0010	0.0012
AR2 (p-value)	0.7264	0.6940	0.7136	0.8002
AR3 (p-value)	0.4493	0.4441	0.4243	0.8001
Sargan (p-value)	0.1437	0.1401	0.1523	0.1782

Note: *p-value < 0,1; **p-value < 0,05; ***p-value < 0,01. Robust Standard errors are in parenthesis. All variables used in the regressions have been standardized. The variables “INFL”, “FDI” and “EDU”, have been considered as endogenous. The regressions have used a maximum of 3 lags of the dependent variable as instruments, and 2 lags of endogenous variables as instruments.

0.014. Therefore, we conclude that at the conventional levels, there is no evidence of endogeneity of each of AfT variables, the variables “TP”, “GDPC”, “FINDEV”, “RENT” and INST variables, while “EDU”, “INFL” and “FDI” are considered as endogenous. On another note, the variable capturing the population size is considered as exogenous.

To assess the suitability of the two-step system GMM estimator for estimating the dynamic model (1) and its variants, we rely on three standard diagnostic tests, including the test of the presence of first-order serial correlation in the error term (AR(1)), the test of absence of second-order serial correlation in the error term (AR(2)) and the Sargan test for over-identification, which is expected to show a p-value higher than 10%. Additionally, we present the outcomes of the test of third-order serial correlation in the error term (AR(3)) for which we expect that the p-value associated with the relevant statistic would exceed the 10% level of statistical significance. Although not required, the latter test helps ensure that there is no serial correlation in the error term at the 10% level. The number of instruments used in the regressions is also reported because the rule of thumb requires a lower number of instruments than the number of countries ensures that the results of the diagnostic tests are reliable (e.g., Roodman, 2009). To meet these requirements of the two-step system GMM approach, we have used, in the regressions, a maximum of 3 lags of the dependent variable as instruments, and a maximum of 2 lags of endogenous variables as instruments.

Table 3. Effect of AfT on the CAF/CAD strategy *Estimator*: Two-step system GMM

Variables	TCI (1)	TCI (2)	TCI (3)	TCI (4)
TCI _{t-1}	0.618*** (0.0229)	0.616*** (0.0223)	0.631*** (0.0260)	0.616*** (0.0253)
AfTTOT	-0.0343* (0.0198)			
AfTTOT*GDPC	0.0680** (0.0269)			
AfTINFRA		-0.0494** (0.0203)		
AfTINFRA*GDPC		0.0987*** (0.0256)		
AfTPROD			-0.00364 (0.0288)	
AfTPROD*GDPC			0.0734** (0.0325)	
AfTPOL				-0.0561*** (0.0195)
AfTPOL*GDPC				-0.0607*** (0.0224)
TP	0.0425 (0.0308)	0.0466 (0.0320)	0.0455 (0.0358)	0.0633** (0.0294)
EDU	-0.246*** (0.0402)	-0.234*** (0.0418)	-0.242*** (0.0399)	-0.253*** (0.0461)
GDPC	-0.423*** (0.0843)	-0.397*** (0.0822)	-0.411*** (0.0767)	-0.379*** (0.0848)
INFL	-0.182*** (0.0492)	-0.199*** (0.0476)	-0.214*** (0.0479)	-0.213*** (0.0493)
FINDEV	-0.128*** (0.0446)	-0.130*** (0.0435)	-0.144*** (0.0437)	-0.170*** (0.0468)
FDI	0.190*** (0.0642)	0.195*** (0.0672)	0.194*** (0.0606)	0.218*** (0.0505)
RENT	0.0496 (0.0308)	0.0603** (0.0304)	0.0518 (0.0316)	0.0437 (0.0320)
POP	0.0421 (0.0650)	0.00712 (0.0626)	0.0340 (0.0607)	0.00949 (0.0595)
INST	0.0786*** (0.0216)	0.0627*** (0.0220)	0.0705*** (0.0212)	0.0502*** (0.0229)
Constant	0.133*** (0.0247)	0.117*** (0.0231)	0.141*** (0.0257)	0.136*** (0.0213)
Observations/Countries	304/75	304/75	304/75	297/71
Number of Instruments	56	56	56	56
AR1 (p-value)	0.0014	0.0016	0.0014	0.0011
AR2 (p-value)	0.7382	0.7014	0.7198	0.7787
AR3 (p-value)	0.3728	0.3145	0.4957	0.8795
Sargan (p-value)	0.1687	0.1615	0.1474	0.1713

Note: *p-value < 0,1; **p-value < 0,05; ***p-value < 0,01. Robust Standard errors are in parenthesis. All variables used in the regressions have been standardized. The variables “INFL”, “FDI” and “EDU”, have been considered as endogenous. The regressions have used a maximum of 3 lags of the dependent variable as instruments, and 2 lags of endogenous variables as instruments.

Table 4. Does the effect of AfT on the CAF/CAD strategy depend on countries' structural economic and institutional characteristics *Estimator*: Two-step system GMM

Variables	TCI (1)	TCI (2)	TCI (3)	TCI (4)	TCI (5)	TCI (6)	TCI (7)
TCIt ₋₁	0.618*** (0.0228)	0.616*** (0.0278)	0.600*** (0.0202)	0.622*** (0.0240)	0.624*** (0.0175)	0.627*** (0.0234)	0.622*** (0.0242)
AfTTOT*TP	0.0891*** (0.0284)						
AfTTOT*EDU		-0.0588 (0.0359)					
AfTTOT*INFL			0.229*** (0.0456)				
AfTTOT*FINDEV				-0.0241 (0.0346)			
AfTTOT*RENT					0.0541** (0.0228)		
AfTTOT*FDI						0.103*** (0.0257)	
AfTTOT*INST							0.00649 (0.0244)
AfTTOT	-0.0417** (0.0195)	-0.0476** (0.0204)	0.0533* (0.0275)	-0.0488** (0.0193)	-0.0213 (0.0142)	-0.0322* (0.0175)	-0.0487** (0.0193)
TP	0.0665** (0.0328)	0.0298 (0.0312)	0.0622*** (0.0210)	0.0479* (0.0271)	0.0525** (0.0215)	0.0466 (0.0310)	0.0323 (0.0301)
EDU	-0.247*** (0.0401)	-0.245*** (0.0436)	-0.341*** (0.0352)	-0.228*** (0.0414)	-0.219*** (0.0186)	-0.260*** (0.0381)	-0.223*** (0.0406)
GDPG	-0.422*** (0.0846)	-0.342*** (0.0835)	-0.385*** (0.0486)	-0.390*** (0.0858)	-0.460*** (0.0576)	-0.467*** (0.0885)	-0.380*** (0.0823)
INFL	-0.169*** (0.0499)	-0.236*** (0.0531)	-0.208*** (0.0269)	-0.217*** (0.0516)	-0.215*** (0.0277)	-0.163*** (0.0497)	-0.214*** (0.0505)
FINDEV	-0.136*** (0.0458)	-0.166*** (0.0439)	-0.187*** (0.0347)	-0.166*** (0.0464)	-0.115*** (0.0284)	-0.132*** (0.0446)	-0.160*** (0.0435)
FDI	0.175*** (0.0646)	0.198*** (0.0669)	0.264*** (0.0368)	0.204*** (0.0680)	0.192*** (0.0338)	0.225*** (0.0685)	0.195*** (0.0682)
RENT	0.0366 (0.0316)	0.0530* (0.0320)	0.0381* (0.0216)	0.0458 (0.0322)	0.0545*** (0.0176)	0.0512* (0.0308)	0.0470 (0.0331)
POP	0.0731 (0.0631)	0.0279 (0.0658)	0.00607 (0.0459)	0.0358 (0.0657)	0.113** (0.0524)	0.0545 (0.0620)	0.0451 (0.0677)
INST	0.0812*** (0.0221)	0.0670*** (0.0231)	0.0321** (0.0132)	0.0799*** (0.0199)	0.0508*** (0.0155)	0.0871*** (0.0201)	0.0711*** (0.0230)
Constant	0.134*** (0.0248)	0.129*** (0.0221)	0.146*** (0.0215)	0.130*** (0.0233)	0.127*** (0.0187)	0.132*** (0.0250)	0.132*** (0.0238)
Observations/Countries	304/75	304/75	304/75	304/75	304/75	304/75	304/75
Number of Instruments	56	56	65	56	65	56	56
AR1 (p-value)	0.0011	0.0016	0.0010	0.0013	0.0015	0.0013	0.0012
AR2 (p-value)	0.8082	0.7310	0.8423	0.6986	0.7736	0.7793	0.7234
AR3 (p-value)	0.3999	0.4394	0.3619	0.4577	0.5434	0.4154	0.4476
Sargan (p-value)	0.1569	0.1435	0.3770	0.1476	0.2957	0.1971	0.1479

Note: *p-value < 0.1; **p-value < 0.05; ***p-value < 0.01. Robust Standard errors are in parenthesis. All variables used in the regressions have been standardized. The variables "INFL", "FDI" and "EDU", have been considered as endogenous. The regressions have used a maximum of 3 lags of the dependent variable as instruments, and 2 lags of endogenous variables as instruments.

Tables 2 to 5 contain results of the estimations based on the two-step system GMM approach. The estimates arising from the estimation of the dynamic specification of model (1) where the “AfT” variable is measured by total AfT flows, or by each of its components, are reported in Table 2. In Table 3, we display the outcomes of the estimation of the specification of model (1) that allows examining how the effect of AfT flows on CAF/CAD development strategy changes for varying values of the real per capita income (used as a proxy for the development level). The results contained in this Table are obtained by estimating several variants of model (1) (associated with each AfT variable) that includes the interaction between the relevant AfT variable and the real per capita income variable. Table 4 reports the outcomes of the estimation of several other specifications of model (1) that whether the effect of total AfT flows on the adoption of the CAF/CAD development strategy depends on recipient-countries’ economic and institutional characteristics. The latter are captured through the variables capturing respectively trade policy, education, inflation, financial development, size of FDI inflows, dependence on natural resources (proxied by the share of natural resource rents in GDP) and the institutional quality. To perform this empirical analysis, we estimate several other specifications of model (1) (associated with each AfT variable) in which we introduce the interaction between each AfT variable each of the afore-mentioned countries’ economic and institutional variables. The analysis (performed using total AfT flows) and whose results are reported in Table 4, is also carried out using each of the components of total AfT flows. To save space, we present in Table 5 the main estimates of interest arising from this analysis (the entire regressions’ results are available upon request).

INTERPRETATION OF EMPIRICAL RESULTS

The estimates reported in column [1] (results arising from the FE estimates) of Table 1 show a negative and significant effect (only at the 10% level) of total AfT flows on the TCI indicator, while results based on the FGLS estimator (results in column [2] of Table 1) indicate a negative and significant effect (at the 1% level) of total AfT flows on TCI. These suggest that total AfT flows are associated with the adoption of the CAF strategy in recipient-countries. Results concerning the goodness-of-fit of the estimations using each of the two standard estimators (see the bottom of Table 1) show lower values of the within R-squared (in column [1]) compared to the value of the Pseudo R-squared (in column [2]). These likely highlight the dominance⁸ of the between variation over the within variation in the variables, in particular for the TCI indicator, and therefore indicate the relevance of results based on the FGLS estimator compared to those of the FE estimator.

Table 5. Does the effect of the components of total AfT on the CAF/CAD strategy depend on countries’ structural economic and institutional characteristics *Estimator*: Two-step system GMM

	VAR						
	TP	EDU	INFL	FINDEV	FDI	RENT	INST
AfTINFRA*VAR	0.122*** (0.0289)	−0.0115 (0.0254)	0.157*** (0.0438)	−0.0257 (0.0262)	0.108*** (0.0223)	0.0453** (0.0186)	0.0254 (0.0258)
AfTPROD*VAR	0.0343 (0.0411)	0.0173 (0.0402)	0.274*** (0.0525)	0.0737* (0.0379)	0.106*** (0.0338)	0.00682 (0.0221)	0.0556 (0.0360)
AfTPOL*VAR	−0.0306 (0.0262)	−0.0759** (0.0368)	0.258*** (0.0377)	−0.0141 (0.0306)	−0.0659** (0.0277)	0.0559*** (0.0193)	−0.0451** (0.0230)

Note: *p-value < 0.1; **p-value < 0.05; ***p-value < 0.01. Robust Standard errors are in parenthesis. All variables used in the regressions have been standardized. The variables “INFL”, “FDI” and “EDU”, have been considered as endogenous. The regressions have used a maximum of 3 lags of the dependent variable as instruments, and 2 lags of endogenous variables as instruments. “VAR” is one the economic and institutional factors characterizing a country.

⁸This is exemplified by the descriptive statistics on the within and between variations of the variables. These statistics have not been reported here to save space, and are available upon request.

Estimates concerning control variables arising from the FGLS-based estimation indicate that the implementation of the CAF development strategy is driven by a higher education level, a rise in the real per capita income, a higher inflation rate, a greater financial development depth, a lower size of FDI inflows, a rise in the population size, and a higher natural resource endowment. The coefficients of the other variables are not statistically significant at the 10% level. As noted in the previous section, these results might be biased due to endogeneity concerns. Therefore, results in Tables 2 to 5 (based on the two-step system GMM estimator) are much more reliable and relevant. Across all columns of Tables 2 to 5 (as noted above, for Table 5, the full results can be obtained upon request), the coefficient of the one-period lag of the dependent variable is positive and statistically significant at the 1% level, thereby indicating that the TCI indicator displays a strong persistence over time. This justifies the use of a dynamic specification of model (1), i.e., with the one-period lag of the dependent variable as a regressor. As for the diagnostic tests that help check the appropriateness of this estimator (see the bottom of all columns of Tables 2 to 5), we observe that the AR(1) test shows p-values lower than 1%, while the AR(2) and AR(3) tests indicate p-values higher than the 10% level of statistical significance. Additionally, the p-value of the Sargan test is always higher than 10% across all columns, and the requirement of the rule of thumb is met, as the number of instruments used in the regressions is always lower than the number of countries. All these confirm the appropriateness of the two-step system GMM estimator for conducting the empirical exercise. We can now interpret the estimates presented in Tables 2 to 5.

The outcomes in column [1] of Table 2 show that on average, over the full sample, total AfT flows are associated with the adoption of the CAF development strategy in recipient-countries. This is exemplified by the negative and significant (at the 1% level) coefficient of the variable “AfTTOT”: a 1 standard deviation increase in total AfT flows is associated with a 0.05 standard deviation decrease in the values of the TCI indicator. As argued above, this outcome can suggest that AfT interventions tend to help countries upgrade and improve hard and soft infrastructure, as well as compensate for information externalities, so as to complement the role of the market mechanism in achieving effective resource allocation. In turn, these contribute to the development of new comparative advantages, including through the adoption of a CAF strategy. Considering the estimates of the components in other columns of the Table, we note that, at least at the 5% level, AfT for economic infrastructure and Aid for Trade policies and regulations are conducive to the adoption of the CAF development strategy in recipient-countries. In contrast, at the conventional levels, AfT for productive capacity building exerts no significant effect on the adoption of the CAF/CAD development strategy. The findings, therefore, indicate that on average over the full sample, the positive CAF strategy effect of total AfT flows essentially reflects a positive CAF strategy effect of AfT for economic infrastructure and AfT for trade policies and regulations, but a non-significant effect of AfT for productive capacity building on the adoption of the CAF/CAD development strategy. These findings are in line with our hypothesis in Section 2 that through *inter alia* their trade costs reduction effects and the devise of appropriate trade policies, AfT interventions for economic infrastructure and AfT interventions for trade policy and regulation help recipient-countries promote competitive industries, including those in new sectors of comparative advantages, and ultimately contribute to the adoption of a CAF strategy. In terms of the magnitude of the effect, we note that a 1 standard deviation rise in AfT flows for economic infrastructure induces a fall by a 0.047 standard deviation of the TCI indicator; and, a 1 standard deviation rise in AfT flows for trade policies and regulations is associated with a 0.056 standard deviation decrease in the TCI indicator. Control variables exhibit similar results across the four columns of Table 2. In particular, the CAF development strategy is positively driven by a higher education level, a higher real per capita income, a rise in the financial development depth, and lower FDI inflows (which means that greater FDI inflows induce the adoption of a CAD strategy). Higher inflation rates appear to be positively associated with the CAF development strategy. This result can be interpreted by the fact that countries tend to adopt a CAF development strategy when they experience higher inflation rates, i.e., in the context of macroeconomic instability. This positive effect of inflation on the adoption of the CAF development strategy represents an average effect across all countries in the full sample, and might also reflect differentiated effects across countries in the full sample. Finally, institutional and governance quality is positively

associated with the CAD development strategy. Dependence on natural resources and the population size exert no significant influence on CAF/CAD strategy. To compare estimates, we take up results in column [1] of Table 2, and observe that the real per capita income is the most important contributor to countries' adoption of the CAF strategy. This variable is followed by the education level, the inflation rate, the size of FDI inflows, the financial development depth, the institutional and governance quality, and total AfT flows.

Turning now to estimates displayed in columns [1] to [3] of Table 3, we observe that the interaction terms related to the interaction between total AfT flows (as well as of AfT for economic infrastructure and AfT for productive capacity) and the real per capita income variable are negative and significant at least at the 5% level. In addition, only the coefficients of the variables "AfTINFRA" and "AfTPROD" are significant at least at the 5% level, and the coefficient of "AfTTOT" is not significant at the 5% level. Taken jointly, these outcomes tend to indicate that as the real per capita income rise, total AfT flows (as well as of AfT for economic infrastructure and AfT for productive capacity) tend to be associated with the adoption of a CAD strategy. The coefficients of "AfTPOL" and ["AfTPOL*GDPC"] are both negative and significant respectively at the 1% level. These suggest that in contrast with the two other components of total AfT flows, AfT related to trade policy and regulation induces the adoption of the CAF development strategy, and this positive CAF strategy effect of this type of AfT intervention rises (in magnitude) as countries experience a rise in real per capita income.

In Figures 4 and 5, we illustrate graphically the marginal effect of each AfT variables on TCI for varying values of real per capita income at the 95 per cent confidence intervals. The statistically significant marginal impacts at the 95 per cent confidence intervals are those encompassing only the upper and lower bounds of the confidence interval that are either above or below the zero line.

Figure 4 shows that the marginal impact of total AfT flows on TCI increases as countries' real per capita income rises, and can additionally take positive and negative values. However, it is not always statistically significant, and is in particular significant only for negative values, i.e., when the standardized value of the real per capita income is lower than 0.00386⁹ (which is equivalent to an unstandardized value amounting to US\$ 4983 [= 0.00386*(5282.3) + 4962.6]) (US\$ 5282.3 and US\$ 4962.6 represent respectively the standard deviation and the mean of "GDPC" - see Appendix 3a). Thus, countries whose real per capita income is lower than US\$ 4983 enjoy a positive effect of total AfT flows on the CAF strategy, and the lower the real per capita income (i.e., the poorer the country), the greater the positive effect of total AfT flows on the adoption of the CAF strategy. In contrast, in countries whose real per capita income is higher than US\$ 4983, there is no significant effect of total AfT flows

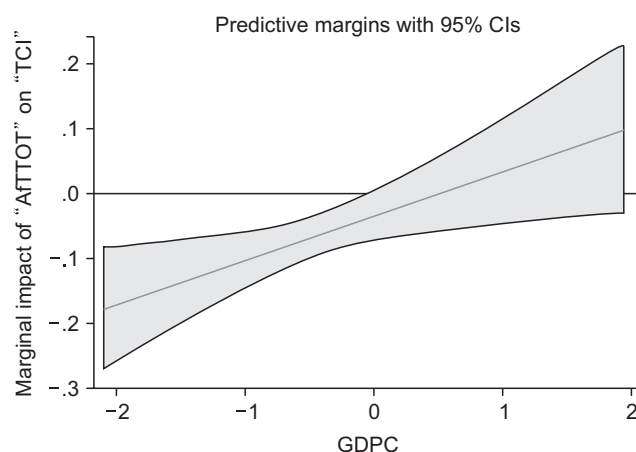


Fig. 4. Marginal Impact of "AfTTOT" on "TCI", for varying levels of real per capita income. Source: Author.

⁹This number is derived from the Stata software when drawing up Figure 4.

on the CAF/CAD strategy.

Figure 5 shows the marginal impact of AfT for economic infrastructure on TCI for varying levels of real per capita income. The pattern in this figure is similar to the one in Figure 4, with the difference being that the marginal impact can be negative and significant, or positive and significant. It is not statistically significant for standardized values of real per capita income lower than 0.08466 and 1.2966, and equivalently unstandardized¹⁰ values of real per capita income ranging between US\$ 5409.8 and US\$ 11811.6. In other words, countries whose real per capita income is lower than US\$ 5409.8 experience a positive effect of AfT for economic infrastructure on the CAF strategy, whereas countries with a real per capita income higher than US\$ 11811.6 enjoy a positive effect of this type of AfT on the CAD strategy. Thus, in relatively less advanced economies, AfT interventions in favor of economic infrastructure relatively tend to be associated with the adoption of the CAF strategy, and in relatively advanced AfT recipient-countries, AfT for economic infrastructure induces the adoption of the CAD strategy.

Figure 6 displays a similar pattern to Figures 4 and 5. Specifically, it shows that the marginal impact of AfT interventions for productive capacity is significant only for negative values, including when the standardized val-

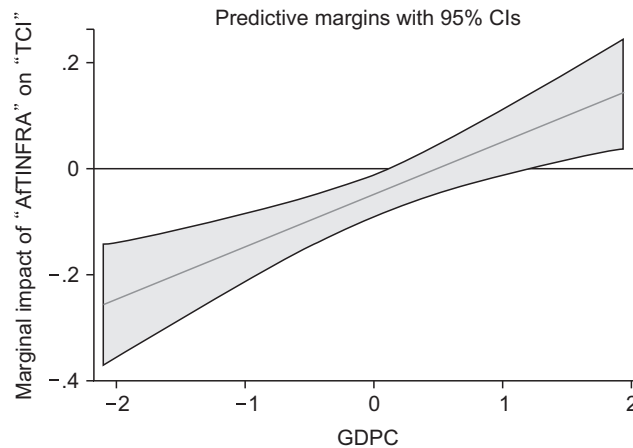


Fig. 5. Marginal Impact of "AftINFRA" on "TCI", for varying levels of real per capita income. Source: Author.

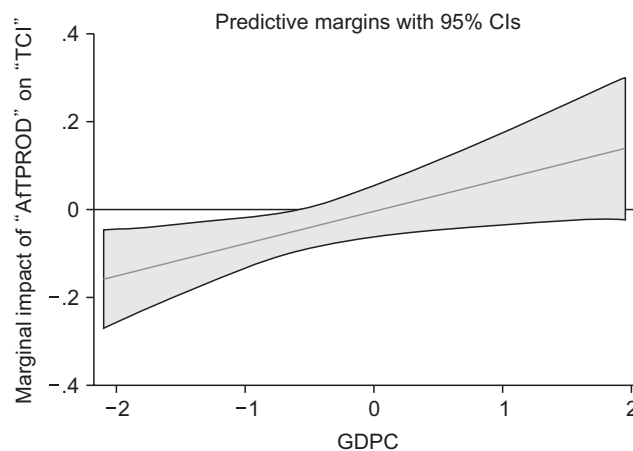


Fig. 6. Marginal Impact of "AftPROD" on "TCI", for varying levels of real per capita income. Source: Author.

¹⁰These values have been obtained as follows: US\$ 5409.8 [= 0.08466*(5282.3) + 4962.6]) and US\$ 11811.6 [= 1.2966*(5282.3) + 4962.6]).

ues of real per capita income is lower than -0.56173 , or equivalently when the unstandardized value of the real per capita income is lower than US\$ 1995.4 $[= -0.56173 \cdot (5282.3) + 4962.6]$. In other words, in countries with a real per capita income lower than US\$ 1995.4 experience a positive effect of AfT for productive capacity on the adoption of the CAF strategy, and among this set of countries, those with a lower real per capita income enjoy a higher positive effect of AfT for productive capacity on the adoption of the CAF strategy than other countries. Countries with a real per capita income higher than US\$ 1995.4 experience no significant effect of AfT for productive capacity on the adoption of the CAF/CAD strategy.

Figure 7 shows a pattern that is the inverse of the ones observed in Figures 4 to 6. We note that the marginal impact of AfT for trade policy and regulation on TCI decreases and is significant only when it takes negative values. It is significant for standardized values of real per capita income is lower than -0.2385 , or equivalently when the unstandardized value of the real per capita income is lower than US\$ 3702.8 $[= -0.2385 \cdot (5282.3) + 4962.6]$. Hence, countries whose real per capita income is below US\$ 3702.8 experience no significant effect of AfT for trade policy and regulation on the adoption of CAF/CAD strategy. For the other countries (i.e., whose real per capita income exceeds US\$ 3702.8), AfT for trade policy and regulation influences positively the adoption of CAF strategy, and the magnitude of this positive effect rises with the real per capita income.

Turning to results in Table 4, we find respectively in columns [2], [4] and [7] that the coefficients of the variables “AfTTOT*EDU”, “AfTTOT*FINDEV” and “AfTTOT*INST” are not statistically significant at the conventional levels. This suggests that the effect of total AfT flows on CAF/CAD strategy depends on TCI, and does not depend on the education level, the depth of financial depth, and the institutional and governance quality. Estimates reported in columns [1], [3], [5] and [6] show that the interaction terms related to the variables “AfTTOT*TP”, “AfTTOT*INFL”, “AfTTOT*RENT” and “AfTTOT*FDI” are statistically significant at the 1% level. These outcomes tend to indicate that total AfT flows would be positively associated with the adoption of the CAD strategy (in particular if sometimes, total AfT flows exceed a certain threshold) as countries experience greater trade policy liberalization, higher inflation rates, a higher dependence on natural resources, and a rise in FDI inflows.

Figures 8 to 14 show, at the 95 per cent confidence intervals, the marginal effect of total AfT on TCI for varying levels of respectively “TP”, “EDU”, “INFL”, “FINDEV”, “RENT”, “FDI” and “INST”. Figure 8 shows that total AfT flows exert a positive effect on the adoption of CAF strategy, with the magnitude of this effect diminishing as countries further liberalize their trade policy regimes, and becomes statistically non-significant when the level of trade policy liberalization exceeds the threshold¹¹ $67.7 [= 0.0024 \cdot (12.726) + 67.643]$. Figure 9 shows that total

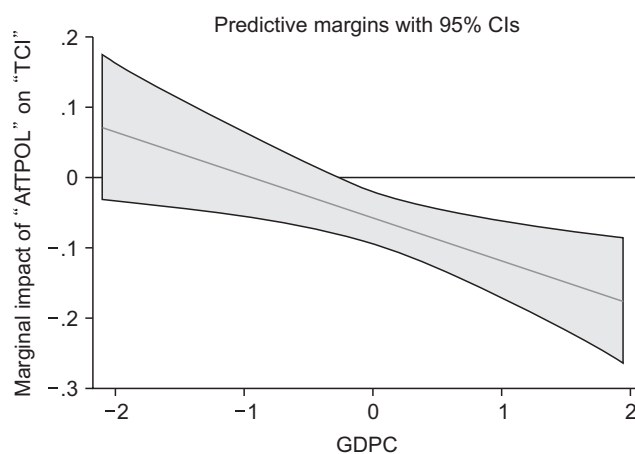


Fig. 7. Marginal Impact of “AfTPOL” on “TCI”, for varying levels of real per capita income. Source: Author.

¹¹12.726 and 67.643 are respectively the standard deviation, and mean of the variable “TP”.

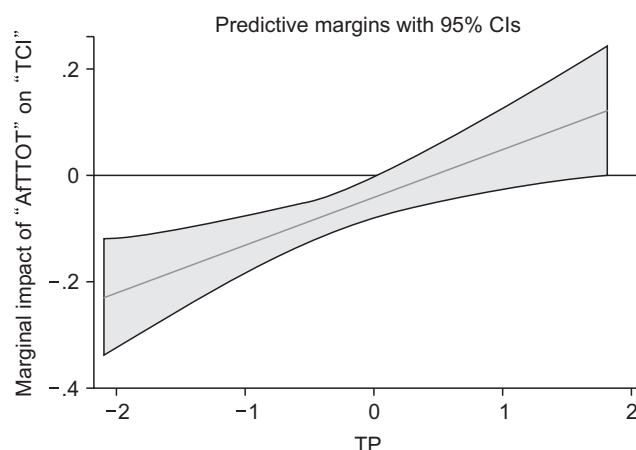


Fig. 8. Marginal Impact of "AftTOT" on "TCI", for varying degrees of trade policy liberalization. Source: Author.

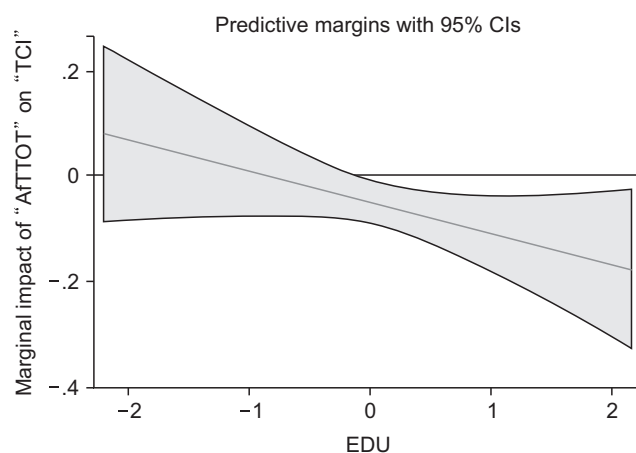


Fig. 9. Marginal Impact of "AftTOT" on "TCI", for varying levels of education. Source: Author.

AfT flows exert a positive and significant effect on the adoption of the CAF strategy as the education level rises, but only when this level exceeds the threshold 68.2 [= $-0.1049 \cdot (20.263) + 70.357$]). Thus, for education level higher than the threshold 68.2, total AfT exerts a positive effect on the adoption of the CAF strategy, with the magnitude of this positive effect rising with the level of education. Figure 10 indicates that for inflation rates¹² ranging between -11.6% and 11.7% , there is no significant effect of total AfT flows on the adoption of CAF/CAD strategy. Nevertheless, it appears that the value (-11.6%) is lower than the minimum value of inflation rate (-2.7%) in the full sample (see Appendix 3a). Therefore, we conclude that for inflation rates lower than 11.7% , there is no significant effect of total AfT flows on the adoption CAF/CAD strategy. However, when the inflation rate is higher than 11.7% , total AfT flows tend to be positively associated with the adoption of the CAD strategy, and the magnitude of this positive effect rises with the inflation rate. Figure 11 indicates that total AfT flows induces the CAF development strategy only when financial development depth¹³ ranges between 24.6% and 57.1% ; otherwise, there is no significant effect of total AfT flows on the adoption of the CAF/CAD strategy.

¹²The two inflation rates have been calculated as follows: -11.63 [= $-0.3561 \cdot (67.11) + 12.267$]) and 11.74 [= $-0.0079 \cdot (67.11) + 12.267$]). The numbers -0.3561 and -0.0079 have been extracted from the Stata software when constructing Figure 10.

¹³The two thresholds of financial development depth have been calculated as follows: 24.6% [= $-0.4095 \cdot (32.005) + 37.71$]) and 57.1% [= $0.6053 \cdot (32.005) + 37.71$]).

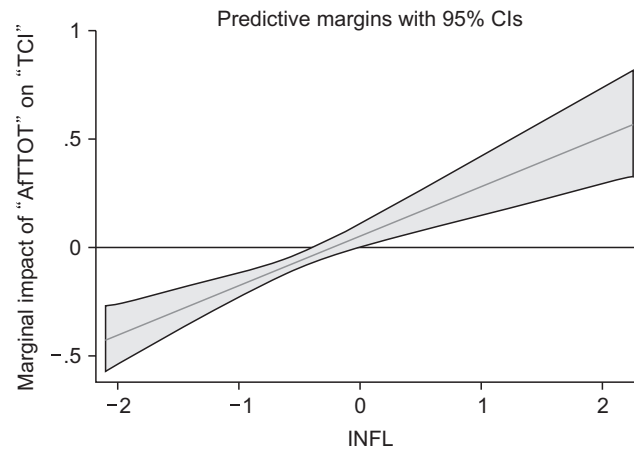


Fig. 10. Marginal Impact of "AFTTOT" on "TCI", for varying levels of inflation. Source: Author.

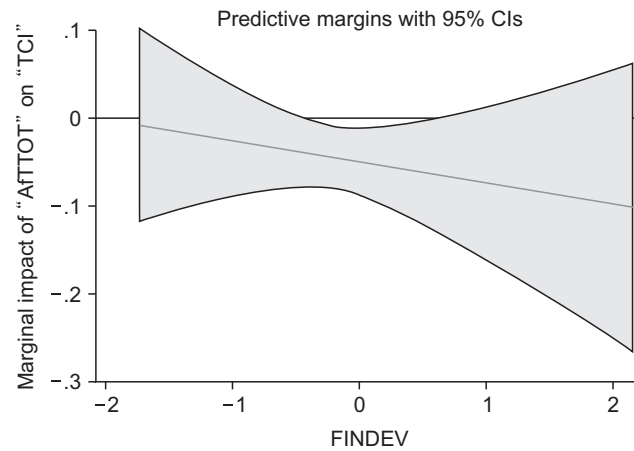


Fig. 11. Marginal Impact of "AFTTOT" on "TCI", for varying degrees of financial development. Source: Author.

On another note, as far as the share of natural resource rents in GDP is lower than 7.4 [= $-0.0686 \cdot (10.065) + 8.096$]), total AfT flows induce the adoption of the CAF strategy (see Figure 12): the lower this share, the greater the positive effect of total AfT flows on the adoption of the CAF strategy. However, when the share of natural resource rents in GDP is higher than 7.4, there is no significant effect of total AfT flows on the CAF/CAD strategy. Figure 13 shows that total AfT flows are associated with the adoption of the CAF development strategy when the amount¹⁴ of FDI inflows US\$ 4050 billion (the maximum and minimum amount of FDI inflows are respectively US\$ 1.38 billion and US\$ 98800 billion). However, for the size of FDI inflows amounting¹⁵ to US\$ 13710 billion, total AfT flows interventions lead to the adoption of the CAD strategy. Finally, Figure 14 shows that total AfT flows promotes the adoption of the CAF strategy only when the level¹⁶ of institutional and governance quality is comprised between -1.58 and 0.35 . For other values of the institutional and governance quality, there is no sig-

¹⁴This amount is obtained using the formula: US\$ 4,050 billion [= $-0.0154 \cdot (9.73e + 12) + 4.20e + 12$]), with the number -0.0154 being extracted from the Stata software.

¹⁵This amount is obtained using the formula: US\$ 13710 billion [= $0.9774 \cdot (9.73e + 12) + 4.20e + 12$]), the number 0.9774 being extracted from the Stata software.

¹⁶The values of the institutional and governance quality have been computed as follows: -1.58 [= $-0.6043 \cdot (1.375) - 0.7525$]) and 0.35 [= $0.8021 \cdot (1.375) - 0.7525$]]. The numbers -0.6043 and 0.8021 are extracted from the Stata software.

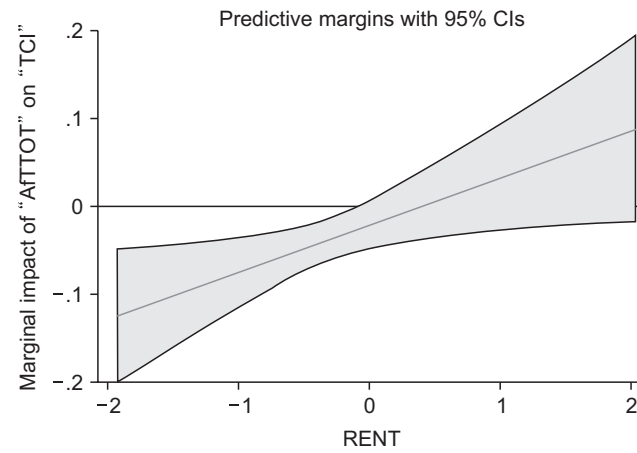


Fig. 12. Marginal Impact of "AftTOT" on "TCI", for varying levels of countries' dependence on natural resources. Source: Author.

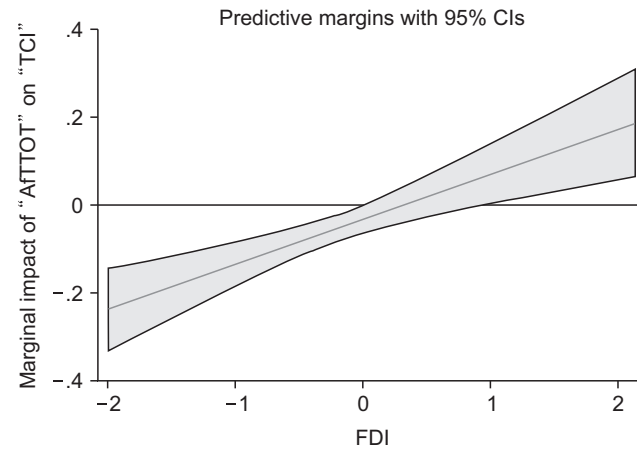


Fig. 13. Marginal Impact of "AftTOT" on "TCI", for varying sizes of FDI inflows. Source: Author.

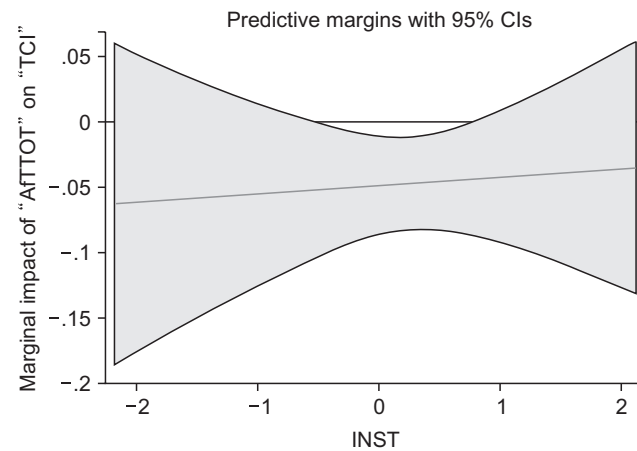


Fig. 14. Marginal Impact of "AftTOT" on "TCI", for varying levels of institutional quality. Source: Author.

nificant effect of total AfT flows on the adoption of CAF/CAD strategy.

Results in Table 5 indicate that among the components of total AfT flows, only AfT for economic infrastructure tends to be associated with the adoption of the CAD strategy when the degree of trade policy liberalization increases (the other two components of total AfT do not matter for the CAF/CAD strategy as the values of “TP” evolve). Similarly, only AfT for trade policy influences positively the adoption of the CAD strategy as the level of education rises, or the quality of institutions and governance improves (there is no significant effect of the other two components of total AfT flows on the CAF/CAD strategy as these two factors change). All three components tend to be consistently associated with the adoption of the CAD strategy as the inflation rises. At the 5% level, there is no significant association of AfT interventions (i.e., any of the AfT components) with the CAF/CAD strategy as the financial development level changes. Both AfT for economic infrastructure, and AfT for productive capacity induce the adoption of the CAD strategy as the size of FDI inflows rises. In contrast, AfT flows for trade policy and regulation are associated with the adoption of the CAF strategy as the size of FDI inflows increases. As the share of the natural resource rents in GDP rises, only AfT for economic infrastructure and AfT for trade policy and regulation induce the adoption of the CAD strategy (there is no significant effect of AfT flows for productive capacity).

Results related to control variables in Tables 2 and 4 are similar to those in Table 1.

CONCLUSION

This article tests the effect of AfT interventions on the adoption by recipient-countries of the CAF/CAD development strategy (as theorized in the New Structural Economics framework). The objective of the analysis is not to consider whether adopting the CAF strategy is better from a development perspective than the adoption of the CAD development strategy (or vice versa). Rather, the analysis draws on the existing studies that have recommended the adoption of the CAF development strategy, and tests whether AfT interventions are conducive to the CAF development strategy. The analysis has been conducted using a panel dataset of 75 countries over the period 1996-2016. Empirical results indicate that over the full sample, total AfT flows tend to be associated with the adoption of the CAF development strategy. Interestingly, looking at the components of total AfT flows, this effect appears to be essentially driven by AfT flows for economic infrastructure and AfT flows for trade policy and regulation. Furthermore, the positive effect of total AfT flows (as well as that of AfT for economic infrastructure and AfT for productive capacity) on the CAF strategy rises as countries experience a lower development level, and is not statistically significant for real per capita income higher than US\$ 4983. Similar patterns have been observed for AfT flows for economic infrastructure and AfT flows for building productive capacity. However, AfT flows for trade policy and regulation tend to be (significantly) associated with the adoption of the CAF strategy only when the real per capita income exceeds US\$ 3702.8. Finally, the effect of AfT interventions (i.e., both total AfT flows and each of its three components) on the adoption of the CAF/CAD strategy depends on countries’ characteristics, notably the level of trade policy liberalization, the education level, the inflation rate, the dependence on natural resources, and the size of FDI inflows.

Summing-up, these findings suggest that the supply by donors of higher amounts of total AfT flows would lead recipient-countries to adopt the CAF development strategy by recipient-countries. At the same time, the genuine effect of AfT interventions on the adoption of the CAF/CAD strategy by policymakers in recipient-countries depends on these countries’ economic characteristics and policies.

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Appendix 1. Definitions and sources of variables

Variable	Definition	Source
TCI	This is the Technology Choice Index, which is a proxy for the CAF/CAD strategy adopted by a given country.	Author's calculation based on the formula described in Section 3. Data on the added value of manufacturing industries ($4VM_{it}$) as well as data on the labor in the manufacturing industry (LM_{it}) are collected from the database of the United Nations Industrial Development Organization (https://www.unido.org/researchers/statistical-databases). Data on total added value (GDP) and total labor force (L_{it}) is obtained from the World Development Indicators (WDI) of the World Bank.
AfTTOT, AfTINFRA, AfTIPROD, and AfTPOL	"AfTTOT" is the total AfT gross disbursements (in constant 2016 US dollars). "AfTINFRA" is the gross disbursements AfT allocated to Economic Infrastructure (in constant 2016 US dollars). "AfTIPROD" is the gross disbursements AfT allocated to Productive Capacity Building (in constant 2016 US dollars). "AfTPOL" is the gross disbursements AfT related to Trade Policies and Regulations (in constant 2016 US dollars).	Author's calculation based on sectoral development aid data collected from the OECD/DAC-CRS (Organization for Economic Cooperation and Development/Donor Assistance Committee)-Credit Reporting System (CRS). The AfT gross disbursements data covers the following three categories: Economic Infrastructure; Building Productive Capacity; and Trade policy and regulations.
INFL	This is the annual inflation rate (%). It is based on the consumer price index -CPI- (annual %) where missing values has been replaced with values of the GDP deflator (annual %).	Authors' calculation based on data from the WDI.
GDPC	GDP per capita (constant 2010 US\$)	World Development Indicators (WDI), 2018
TP	This variable represents the measure of trade policy. The trade policy index is indeed the "Freedom to international trade" score used as a major component of the Economic Freedom Index. It is composite measure of the absence of tariff and non-tariff barriers that affect imports and exports of goods and services. Its computation is based on two components: trade-weighted average tariff rate and non-tariff barriers (NTBs), the extent of latter having been determined on the basis of quantitative and qualitative available information. NTBs include quantity restrictions, price restrictions, regulatory restrictions, investment restrictions, customs restrictions, and direct government interventions. This score is graded on a scale of 0 to 100, with a rise indicating lower trade barriers, i.e., higher trade liberalization, while a decrease reflects rising trade protectionism.	Heritage Foundation (see Miller et al., 2017)
EDU	Average of the gross rate of primary, secondary and tertiary school enrollment (%)	Author's calculation based on data from the WDI
FINDEV	This is the measure of the depth of financial development. It is measured by the domestic credit to private sector (% of GDP), where missing values have been replacing with the domestic credit to private sector by banks (% of GDP).	WDI
RENT	This is the total natural resources rents (% of GDP)	WDI
POP	Total population	WDI
FDI	The variable "FDI" represents the total inward Foreign Direct Investment stock (constant US\$ 2010 prices). It has been calculated as by multiplying the inward Foreign Direct Investment stock (% of GDP) by the real GDP (constant 2010 US\$) (e.g., Nagel et al., 2015 and Herzer, 2011).	Author's calculation based on data on Foreign Direct Investment inflows (in percentage of GDP) from the UNCTAD database, and real GDP extracted from the WDI.

Appendix 1. Continued

Variable	Definition	Source
INST	This variable represents the quality of institutions and governance in a given AfT recipient-country. It has been calculated by extracting the first principal component (based on factor analysis) of the following six indicators of governance. These indicators include a measure of political stability and absence of violence/terrorism; a measure of regulatory quality policy; an indicator of Rule of Law; a measure of Government Effectiveness; an indicator of Voice and Accountability; and finally, a measure of corruption. It is worth noting that higher values of the index "INST" are associated with better governance and institutional quality, while lower values reflect worse governance and institutional quality.	Data on the components of "INST" has been extracted from World Bank Governance Indicators developed by Kaufmann, Kraay and Mastruzzi (2010) and updated in 2018.

Appendix 2. Description of the methodology used to expand AfT database

We rely on AfT commitment data that covers the period 1995 onwards, and adopt the approach used in Selaya and Sunesen (2012, p. 2158) to expand our AfT data so that it covers now the period 1996-2016 (this approach has also been used in Clemens et al., 2012 and Thiele et al., 2006). The approach assumes that the proportion of AfT actually disbursed to sector x (AfT_x) (for example, AfT disbursed for economic infrastructure, productive capacity building, and trade policies and regulations) during a given period is equal to the proportion of aid committed to sector x during this period, and is given by $AfT_x = \frac{Commit_x}{\sum_x Commit_x} \sum_x AfT_x$, where $Commit_x$ stands for the amount of real AfT commitments (constant US dollar 2016 prices) to sector x ; $\sum_x AfT_x$ is the total amounts of AfT commitments and disbursements (constant US dollar 2016 prices) received during each period respectively. While because of differences in definitions and statistical records, there may be some concerns about the approximation of sectoral disbursements with sectoral commitments (see Clemens et al. 2012 for more details), Odedokun (2003) and Clemens et al. (2012) have noted that this problem is likely to be small since disbursements and commitments (both on the aggregate and sectoral levels) are highly correlated. Using this formula and based on AfT commitments and disbursements (constant US dollar 2016 prices) data extracted from the OECD/CRS database (see Appendix 1 for more details), we have calculated, for each country in the sample, and for each year over the period 1996 to 2001, data on the following: gross disbursements of AfT for economic infrastructure; the gross disbursements of AfT for productive capacity building; and the gross disbursements of AfT trade policies and regulations. This data has been merged with the available dataset on OECD/CRS database on these three types of AfT flows over the period 2002-2016, so as to obtain the dataset of 75 countries over the period 1996-2016, used in the current analysis.

Appendix 3a. Descriptive statistics on variables

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
TCI	423	7.303	19.749	0.475	231.683
AfTTOT	495	2.70e + 08	4.61e + 08	67837.2	3.65e + 09
AfTINFRA	494	1.57e + 08	3.03e + 08	17984.67	3.04e + 09
AfTPROD	495	1.09e + 08	1.93e + 08	43864.5	1.96e + 09
AfTPOL	448	4668446	1.50e + 07	201.366	2.64e + 08
GDP	524	4962.631	5282.336	194.926	24892.79
INFL	523	12.267	67.11	-2.724	1490.523
TP	507	67.643	12.726	13.467	89.2
EDU	515	70.35666	20.263	4.199	111.962
FINDEV	515	37.71061	32.005	0.186	155.407
POP	524	6.17e + 07	1.99e + 08	264269.3	1.37e + 09
RENT	522	8.096	10.065	0	55.139
FDI	515	4.20e + 12	9.73e + 12	1.38e + 09	9.88e + 13
INST	522	-0.7524839	1.375	-4.223	3.022

Appendix 3b. Pairwise correlation statistics among variables

	TCI	AfTTOT	AfTINFRA	AfTPROD	AfTPOL	GDP	INFL
TCI	1.0000						
AfTTOT	-0.0115	1.0000					
AfTINFRA	-0.0252	0.9522*	1.0000				
AfTPROD	0.0097	0.8793*	0.6933*	1.0000			
AfTPOL	-0.0034	0.2007*	0.1495*	0.1707*	1.0000		
GDP	-0.2153*	-0.2347*	-0.2162*	-0.2116*	-0.1323*	1.0000	
INFL	-0.0402	-0.0256	-0.0224	-0.0249	-0.0219	-0.0609	1.0000
TP	-0.1205*	-0.2507*	-0.2037*	-0.2778*	-0.0786	0.3178*	-0.1786*
EDU	-0.3435*	-0.0972*	-0.1053*	-0.0699	-0.0351	0.3892*	-0.1128*
FINDEV	-0.2056*	0.1813*	0.2142*	0.0914*	0.0414	0.3781*	-0.1003*
POP	-0.0168	0.5274*	0.5047*	0.4622*	0.0543	-0.0879*	-0.0220
INST	-0.2319*	-0.0721	-0.0634	-0.0700	-0.0532	0.6090*	-0.1574*
RENT	0.0918*	-0.1259*	-0.1100*	-0.1248*	-0.0237	0.0825*	0.1627*
FDI	-0.0841*	0.2223*	0.2282*	0.1698*	0.0134	0.2281*	-0.0326
	TP	EDU	FINDEV	POP	INST	RENT	FDI
TP	1.0000						
EDU	0.3443*	1.0000					
FINDEV	0.1870*	0.3294*	1.0000				
POP	-0.2326*	-0.0975*	0.2451*	1.0000			
INST	0.2225*	0.3719*	0.4794*	-0.0507	1.0000		
RENT	-0.0505	-0.2487*	-0.1980*	-0.0827*	-0.2949*	1.0000	
FDI	0.0763*	0.1301*	0.4113*	0.6014*	0.1233*	-0.0476	1.0000

Note: *p-value < 0.1.

Appendix 4a. List of countries used in the analysis

Entire sample		
Albania	Guatemala	Niger
Algeria	India	Oman
Angola	Indonesia	Pakistan
Argentina	Iran, Islamic Rep.	Panama
Armenia	Jamaica	Papua New Guinea
Azerbaijan	Jordan	Paraguay
Bahrain	Kazakhstan	Peru
Belarus	Kenya	Philippines
Bolivia	Korea, Rep.	Saudi Arabia
Botswana	Kyrgyz Republic	Senegal
Brazil	Lesotho	Slovenia
Burundi	Macedonia, FYR	South Africa
Cameroon	Madagascar	Sri Lanka
Chile	Malawi	Suriname
China	Malaysia	Tajikistan
Colombia	Maldives	Tanzania
Costa Rica	Mauritius	Thailand
Croatia	Mexico	Trinidad and Tobago
Ecuador	Moldova	Tunisia
Egypt, Arab Rep.	Mongolia	Turkey
Eritrea	Montenegro	Uganda
Ethiopia	Morocco	Ukraine
Fiji	Mozambique	Uruguay
Georgia	Myanmar	Vietnam
Ghana	Nepal	Yemen, Rep.

Appendix 4b. List of countries contained in the sub-samples used in Figure 3

LICs	LMICs	UMICs	HICs
Burundi	Armenia	Albania	Bahrain
Eritrea	Bolivia	Algeria	Chile
Ethiopia	Cameroon	Angola	Croatia
Madagascar	Egypt, Arab Rep.	Argentina	Korea, Rep.
Malawi	Ghana	Azerbaijan	Oman
Mozambique	Guatemala	Belarus	Saudi Arabia
Nepal	India	Botswana	Slovenia
Niger	Indonesia	Brazil	Trinidad and Tobago
Senegal	Kenya	China	Uruguay
Tanzania	Kyrgyz Republic	Colombia	
Uganda	Lesotho	Costa Rica	
	Moldova	Ecuador	
	Mongolia	Fiji	
	Morocco	Georgia	
	Myanmar	Iran, Islamic Rep.	
	Pakistan	Jamaica	
	Papua New Guinea	Jordan	
	Philippines	Kazakhstan	
	Sri Lanka	Macedonia, FYR	
	Tajikistan	Malaysia	
	Tunisia	Maldives	
	Ukraine	Mauritius	
	Vietnam	Mexico	
	Yemen, Rep.	Montenegro	