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Effect of Aid-for-Trade Flows on Investment-Oriented Remittance Flows

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Abstract: Despite the voluminous literature on the effect of aid-for-trade (AfT) flows on recipient countries' trade performance, little is known about the relationship between AfT flows and other capital flows to developing countries. This paper contributes to the literature by exploring the effect of AfT inflows on investment-oriented remittance inflows, notably through the channel of trade costs. Using an unbalanced panel data set of 106 countries over the period 2002–2019 and the two-step system generalized method of moments, the empirical analysis establishes several outcomes. AfT flows exert a positive effect on investment-oriented remittance flows, where the magnitude of this positive effect is higher in least-developed countries and in remittance-dependent countries than in other countries. AfT flows stimulate investment-oriented remittance flows in countries that face higher trade costs. The analysis shows that AfT flows could be important leverages for stimulating investment-oriented remittance flows and could promote the development of the private sector in beneficiary countries.

Keywords: aid for trade; investment-oriented remittance flows; trade costs; developing countries

JEL Classification: E22; F24; F35

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1. Introduction

The literature has documented the positive macroeconomic effects of business activities on economic development (e.g., Atems and Shand 2018; Fritsch and Mueller 2008; Neumann 2021) and in particular the role of international trade activities in that regard (e.g., Flach and Unger 2022; Teignier 2018).

Through the supply of development aid from the so-called official development assistance (ODA), donors (including developed countries) contribute to the development of business activities in developing countries. This particularly takes place through the provision of higher aid-for-trade (AfT) flows to developing countries. AfT flows are part of total ODA flows, and they aim to help address the weak participation of developing countries in the global trading system. In fact, at the Ministerial Conference of the WTO held in 2005, members of the World Trade Organization (WTO) launched the aid-for-trade (AfT) initiative, with a view to helping developing countries and notably the least-developed countries[1] (LDCs) among them overcome the structural impediments to secure a share in the international trade market that is commensurate with their economic, financial and development needs. The stated objective of the initiative is reflected in Paragraph 57 of the Hong Kong Ministerial Declaration (WTO 2005), as follows: the AfT initiative is to "help developing countries, particularly LDCs build the supply-side capacity and trade-related infrastructure that they need to assist them to implement and benefit from WTO Agreements and more broadly to expand their trade".

While many studies have considered whether the AfT initiative has been effective in promoting recipient countries' participation in international trade[2], it is also important to explore whether AfT flows help to drive in or deter other capital flows (e.g., FDI inflows,

migrants' remittance inflows and other official flows, in particular other trade-related official flows) in the recipient countries. The rationale for investigating this topic lies in the fact that other capital flows than development aid (e.g., remittances and FDI inflows) can affect recipient countries' participation in international trade (e.g., Anwar and Nguyen 2011; Bayangos and Jansen 2011; Girma et al. 2005; Oberhofer and Pfaffermayr 2012).

In 2019 (prior to the COVID-19 pandemic), remittance flows to low- and middle-income countries (LMICs) were expected to be larger than FDI inflows and official development assistance (ODA) flows to the same countries (World Bank and KNOMAD 2019). The expected trend remained in 2021, as remittance flows to LMICs (excluding China) were expected to surpass the sum of FDI and ODA flows: they represented more than a threefold increase above ODA levels and were more than 50 percent higher than FDI (World Bank and KNOMAD 2021, p. 11).

Migrants' remittances are sent to households in migrants' home countries for multiple motives, including, altruism, exchange, strategic behavior, coinsurance, inheritance and investment (e.g., Lucas and Stark 1985; Rapoport and Docquier 2006). Remittances are used not only for consumption purposes (e.g., food, education and health) but also for savings, credit mobilization, investment in productive assets and entrepreneurship purposes (see, for example, Adenutsi and Ahortor 2021; Yavuz and Bahadir 2022 for a literature review on the matter). The fraction of remittance flows utilized to support the expansion or creation of microenterprises in recipient economies is at the heart of the present study. This category (component) of remittance inflows is henceforth referred to as "investment-oriented remittances" (e.g., Le and Bodman 2011; Saadi 2020).

In fact, the literature has now well documented that the utilization of migrants' remittances by recipient households goes beyond helping families and financing consumption, to supporting entrepreneurial activities, expanding existing businesses and funding the setup of new ventures[3]. Saadi (2020) and Yavuz and Bahadir (2022) have documented the contribution of remittance flows for business investment (i.e., for fostering entrepreneurial activities creating new businesses). Saadi (2020) has even shown that investment-oriented remittance inflows exert a strong positive effect on export complexity (i.e., on export diversity and sophistication), and other studies have pointed out the substantial increase in the multiplier effects of the use of remittances to finance ventures/business activities (e.g., Maimbo et al. 2005; UNCTAD 2010). In the meantime, a wealth of studies has been conducted on the macroeconomic and microeconomic determinants of remittance inflows and on the economic development effects of remittance inflows (e.g., Adenutsi and Ahortor 2021; Adams 2011; Bahadir et al. 2018; European Parliament 2014; Naudé et al. 2017; Piteli et al. 2019).

The existing literature has essentially focused on the effect of AfT flows on FDI flows to recipient countries (e.g., Donaubauer et al. 2016; Gnangnon 2022; Lee and Ries 2016; Ly-My and Lee 2019). In parallel, some studies[4] have considered the effect of development aid on remittance inflows (e.g., Abbas et al. 2021). For example, Abbas et al. (2021) have found that while, in general, foreign aid can substitute for remittances, it can also lead to higher remittance inflows through human capital (i.e., when foreign aid helps to broaden human capital by improving education) and through the migration channel, especially in the least-developed countries (LDCs).

However, to the best of our knowledge, there is no study on the effect of AfT flows on remittance inflows, let alone on the fraction of remittance inflows invested in business activities. The present study aims to fill this void in the literature by investigating the effect of AfT flows on investment-oriented remittance flows. In so doing, it purports to contribute to the literature on the interplay between AfT flows and other capital inflows.

This work is closer in spirit to the studies that have investigated the effect of development aid on private investment (e.g., Herzer and Grimm 2012; Nowak-Lehmann and Gross 2021; Cui and Gong 2008). For example, Herzer and Grimm (2012) have reported empirical evidence that higher foreign aid inflows have resulted in lower private investment, while higher private investment have reduced aid inflows. Nowak-Lehmann and Gross (2021)

have argued that development aid spurs investment in countries that have good institutional quality. In particular, it is ineffective in countries that feature a colonial past, those that are landlocked and those that are highly distant from the markets. Cui and Gong (2008) have found that a permanent increase in foreign aid results in an increase in capital accumulation over the long term.

The present analysis also pertains, to some extent, to the literature on the macroeconomic determinants of entrepreneurship (e.g., Audretsch et al. 2022; Dutta and Meierrieks 2021; Munemo 2022; Nguyen et al. 2021; Thai and Turkina 2014).

We argue that AfT flows can affect investment-oriented remittance flows through their effect on trade costs. The analysis has used an unbalanced panel data set of 106 countries over the period 2002–2019 and the two-step system generalized method of moments estimator. The results have shown that AfT flows are positively associated with investment-oriented remittance flows, where the magnitude of this positive effect is higher in LDCs, as well as in countries with larger populations or in countries with the share of investment-oriented remittance flows higher than 5%. Moreover, the positive effect of AfT flows on investment-oriented remittance flows is greater in countries that face higher trade cost. This suggests that by helping to reduce trade costs for countries that face higher trade costs, AfT interventions contribute to improving the business environment and hence encourage remittance-receiving households to invest a higher fraction of their remittances in business activities. While the total AfT flows are associated with lower investment-oriented remittance flows in countries that face higher degrees of the volatility of the overall trade costs, they boost investment-oriented remittance flows in countries that improve the quality of trade measures.

The remaining part of the paper is organized into five sections. Section 2 lays out a theoretical discussion on the effect of AfT flows on investment-oriented remittance flows, including through the channel of trade costs. Section 3 presents the empirical strategy, including the model specification, data on key variables of interest and the econometric approach adopted in the empirical exercise. Section 4 discusses the empirical results, and Section 5 concludes.

2. Theoretical Discussion on the Effect of AfT Flows on Investment-Oriented Remittance Flows

Discussing the theoretical effect of the total AfT flows on investment-oriented remittances entails considering how each of the three major categories of the total AfT flows (identified in the literature) affect the investment of part of remittances in business activities. These three categories have been defined by the Organization of Economic Cooperation and Development (OECD) (see OECD/WTO 2011) and include AfT for the buildup of economic infrastructure, AfT allocated for the development of productive capacities and AfT related to trade policy and regulation (Appendix A provides more details on the sectoral coverage of each AfT category).

While AfT allocated for the development of economic infrastructure aims to connect domestic markets to the global economy, it does not target any specific sector in the recipient economy. It covers transport and storage, communications, energy generation and supply sectors. It is defined in a broader sense[5], encompassing physical infrastructure as well as trade facilitation measures. AfT flows related to the development of productive capacities aim to contribute to the expansion of the production and export capacity of the recipient countries, and they cover sectors such as banking and financial services, business and other services, mineral resources and mining, agriculture, fishing, industry and tourism. Finally, AfT interventions for trade policy and regulation concern trade-related institutions and have the main objective of helping to enhance the capacity of policymakers in recipient countries to design trade policy, participate in trade negotiations, implement WTO Agreements and develop the requisite institutions and the regulatory framework that would promote trade. This type of AfT intervention directly facilitates the movement of cross-border trade flows not only by lowering administrative costs and regulatory

trade barriers but also by compensating less-productive firms for their losses from trade liberalization (through its trade-related adjustment component). For example, AfT for trade policy and regulation improves border and transport efficiency by streamlining the time, cost and number of documents necessary for export and import procedures.

We submit that AfT flows would affect investment-oriented remittance inflows through their effect on trade costs. According to Anderson and van Wincoop (2004, p. 691), "trade costs, broadly defined, include all costs incurred in getting a good to a final user other than the marginal cost of producing the good itself: transportation costs (both freight costs and time costs), policy barriers (tariffs and nontariff barriers), information costs, contract enforcement costs, costs associated with the use of different currencies, legal and regulatory costs, and local distribution costs (wholesale and retail)". We discuss below how AfT interventions could affect investment-oriented remittance inflows through the trade costs channel.

2.1. Trade Costs Raise Uncertainty and Could Adversely Affect Households' Decisions to Invest Part of Their Remittances on Business Activities

The literature has well established that higher trade costs inhibit countries' participation in international trade (e.g., Anderson and Marcouiller 2002; Bougheas et al. 1999; Brun et al. 2005; Diakantoni et al. 2017; Hoekman and Nicita 2011; Limao and Venables 2001; Noureen and Mahmood 2022; Papalia and Bertarelli 2015; Portugal-Perez and Wilson 2012; Yanase and Tsubuku 2022; Wilson et al. 2003, 2005).

At the same time, trade costs (e.g., transport costs and costs associated with export and import procedures at the border) could matter significantly for private agents' investment decisions. This is because higher trade costs create uncertainty about the profits that firms could derive from investing in productive activities and lead to a wait-and-see behavior of these firms (e.g., Dixit and Pindyck 1994). Deardorff (2014) has argued that trade costs raise the production costs of exported items, which reduce firms' profits, undermine the competitiveness of their goods and services in the international trade market and limit export volumes and values. Thus, lowering the uncertainty brought about by trade costs would result in greater investment in the export sector and higher expected trade volume (e.g., Limão and Maggi 2015). In connection to this, many studies have shown that trade uncertainty undermines private investment (e.g., Ebeke and Siminitz 2018; Handley and Limão 2015, 2022; Novy and Taylor 2020). Tajaddini and Gholipour (2021) have provided empirical evidence that higher levels of economic uncertainty have negative effects on new business formation. It follows that higher trade costs would reduce domestic investment opportunities and discourage households from investing a fraction of the remittances received in productive activities (e.g., entrepreneurial/small businesses), including the ones oriented toward international trade. In other words, trade cost reduction is likely to lead to a greater share of remittance inflows oriented toward business activities.

2.2. AfT Interventions for the Development of Productive Capacities Can Stimulate Investment-Oriented Remittance Inflows

By helping to expand the production of goods and services demanded in the international trade market, AfT interventions for strengthening productive capacities could leverage private investment, including by stimulating households to invest part of the remittance inflows in productive activities. Additionally, part of the AfT flows allocated for productive capacities could be used to relax the foreign exchange constraints faced by aid-recipient countries, given that part of this aid could be used to import the capital goods needed to start or to expand the production of goods and services (see also Herzer and Grimm 2012). It ensues that AfT interventions in favor of strengthening productive capacities could stimulate private investment and, in particular, encourage investment-oriented remittance flows by households.

2.3. AfT Interventions for Economic Infrastructure and the Interventions in Favor of Trade Policy and Regulation Can Boost Households' Remittance-Related Investments on Business Activities through Its Effect on Trade Costs

The literature has shown that AfT interventions for economic infrastructure and AfT interventions related to trade policy and regulation contribute to the expansion of exports by helping to reduce trade costs (e.g., Busse et al. 2012; Calì and te Velde 2011; de Melo and Wagner 2016; Helble et al. 2012; Tadesse et al. 2021; Vijil and Wagner 2012). Additionally, AfT interventions for strengthening productive capacities support the development of the private sector in recipient countries by allowing trading firms to strengthen their productive and competitive capacities so as to meet the demand of goods and services in the international markets (based on their comparative advantages) and to take full advantage of their participation in international trade (e.g., OECD/WTO 2011).

On another note, Gnangnon (2018) has provided empirical evidence of how AfT interventions (including both total AfT and each of its three categories) are associated with greater trade policy liberalization in the recipient countries. On the other side, trade liberalization reduces the costs of the imported intermediate inputs and promotes export upgrading (e.g., Bas and Strauss-Kahn 2015; Defever et al. 2020; Mukherjee and Chanda 2021) and more specifically export complexity (e.g., Saadi 2020), including by facilitating the diffusion of knowledge and the transfer of technology (e.g., Grossman and Helpman 2015). As a result, we can argue that by promoting trade policy liberalization (i.e., reducing trade costs, including both tariffs and trade-related nontariff costs), AfT flows would open-up further opportunities for domestic investment in productive activities (including in trade-related ones) and encourage the investment of a portion of remittance inflows in business activities. The effect of AfT interventions for economic infrastructure and AfT interventions related to trade policy and regulation on investment-oriented remittance inflows could also be considered from the perspective of their effect on entrepreneurship. Munemo (2022) has examined the effect of regulation-induced time delays on export entrepreneurship and empirically found that regulations that lengthen the time delays in moving a standard container of goods from the factory to the seaport significantly reduce export entry rate. In the same spirit, Aparicio et al. (2021) have empirically established that access to communications is a critical factor that explains export-oriented entrepreneurship. As a result, aid-for-trade facilitation, which is part of AfT related to trade policy and regulation, and AfT for economic infrastructure could contribute to spurring investment-oriented remittance inflows.

Against this background, we submit that each of these three categories of AfT can be associated with a rise in the share of the total remittance flows invested in business activities. As a consequence, the total AfT flows are likely to be positively associated with investment-oriented remittance flows.

Additionally, the literature has pointed out that public investment to maintain or develop infrastructure and the supply of goods and services is likely to be complementary to private investment thanks to the positive externalities that they generate, including in terms of increases in the productivity of the capital invested by the private sector (e.g., Abiad et al. 2016; Barbosa et al. 2016; Dreger and Reimers 2016; Ghura and Goodwin 2000; Herzer and Grimm 2012; Mitra 2006). This would particularly be the case when the risks associated with conflicts, terrorism, the preservation of contract viability and the repatriation of profits are low (e.g., Ouédraogo et al. 2020). Nonetheless, investment by the private sector can be crowed out by public investment if the latter competes for the appropriation of scarce physical and human resources that would otherwise be available to the private sector (e.g., Acosta and Loza 2005; Bahal et al. 2018; Farla et al. 2016; Herzer and Grimm 2012; Jongwanich and Kohpaiboon 2008). For example, Bahal et al. (2018) have found that for India public investment has crowded out private investment over the (annual) period 1950–2012. However, the reverse outcome has been obtained when the sample is restricted to the post-1980 period or the analysis carried out using quarterly data over the period 1996–2015 on the aggregate of public and private investment. The

authors have explained the differences in findings by the policy reforms that started during the early 1980s and gained momentum after the 1991 crisis. Acosta and Loza (2005) have also reported a crowding-out effect of public investment on private investment in Argentina. Given the general tendency for a crowding-in effect of public investment on private investment, we can also expect that AfT flows for economic infrastructure (and, to some extent, AfT interventions for strengthening productive capacities) would likely boost private investment and incentivize households to invest part of their remittances in business activities.

2.4. Other Possible Effects of Development Aid, including AfT and Non-AfT Flows on Investment-Oriented Remittance Inflows

As the total AfT flows (including each of its three categories) could dampen the volatility of the real exchange rate (that represents a trade cost) (Gnangnon 2020b), one could expect that higher AfT flows would be associated with a rise in investment-oriented remittance inflows. We can also postulate that development aid, including both AfT flows and non-AfT flows, can affect investment-oriented remittances through their positive effect on the quality of regulatory policies. Gnangnon (2020a) has empirically demonstrated that both AfT flows and non-AfT flows help improve the quality of regulatory policies. On the other hand, poor institutional quality can increase uncertainty about future revenues by acting as a tax that increases the costs of business (e.g., Brunetti and Weder 1998). Therefore, good regulatory policy quality would reduce the uncertainty about potential future revenues from businesses activities and promote entrepreneurship in both the short and the long term (e.g., Baumol and Strom 2007; Chambers and Munemo 2019; Sendra-Pons et al. 2022). Against this background, we can expect higher AfT flows (as well as non-AfT flows) to encourage investment-oriented remittance inflows through their positive effect on regulatory policy quality.

A further justification of the existence of a relationship between development aid (in particular AfT) interventions and investment-oriented remittance inflows can be drawn from the literature on the effect of development aid on entrepreneurship. Jia (2018) has found that aid encourages only necessity-driven early-stage entrepreneurship and benefited low-income entrepreneurs. Moreover, aid allocated for the development of infrastructure boosts entrepreneurship and incentivizes competition with homogeneous products. More recently, Boudreaux et al. (2021) have empirically found that development aid mitigates the adverse effects of natural disasters on entrepreneurship.

In light of the whole discussion provided above, we postulate the following hypothesis (Hypothesis 1):

Hypothesis 1. *AfT interventions, including both the total AfT flows and each of its categories would stimulate investment-oriented remittance inflows by helping to liberalize trade in a broader sense, which involves the reduction of trade costs, including tariffs and nontariff costs.*

We additionally expect AfT flows to exert a higher positive effect on investment-oriented remittances in LDCs than in non-LDCs (i.e., countries that are not in the category of LDCs). This is because compared with non-LDCs, LDCs are characterized by weaker financial and human resources, weaker institutional and governance capacity and an underdeveloped private sector. Thus, as households in these countries receive higher remittance inflows, they could be incentivized to use a portion of these resource inflows for investment in entrepreneurship/business activities (notably those oriented toward international trade), provided that AfT interventions serve as leverage to do so. Many studies in the extant literature have shown that AfT interventions do provide such a leverage in that they exert a positive effect on trade performance in recipient economies.

3. Empirical Strategy

This section first presents the baseline specification to empirically test Hypothesis 1 set out above (Section 3.1). Section 3.2 describes the data on the key variables of interest in the analysis, and the Section 3.3 discusses the econometric method that is suitable for conducting the empirical exercise.

3.1. Model Specification

To perform the empirical analysis concerning the effect of AfT flows on investment-oriented remittance inflows, we draw from existing works on the determinants of domestic private investment (e.g., Chambers and Munemo 2019; Farla et al. 2016; Herzer and Grimm 2012; Jongwanich and Kohpaiboon 2008; Munemo 2022; Nowak-Lehmann and Gross 2021; Sendra-Pons et al. 2022). Specifically, we use a baseline model in which the dependent variable is the share of investment-oriented remittance inflows in GDP and where the AfT variable (i.e., the total AfT or each of its components) is the main variable of interest. The baseline model contains a set of control variables that are expected to influence the effect of AfT flows on investment-oriented remittance inflows. This set of control variables is the real per capita income, which acts as a proxy for the development level, and it is denoted as "GDPC"; the portion of remittance inflows used for other purposes than for investment in business activities is denoted as "RNINV"; other development aid flows than AfT flows are denoted as "non-AfTTOT"; the real effective exchange rate is denoted as "REER"; the level of financial development proxied by the share of domestic credit to private sector by banks in GDP is denoted as "FINDEV"; the terms of trade are denoted as "TERMS"; and the population size is denoted as "POP".

3.1.1. Effect of Noninvestment-Oriented Remittances

Higher noninvestment-oriented remittance flows can be associated with an increase in investment-oriented remittance flows if the former are not used for consumption purposes but are rather invested, for example, in human capital (i.e., education and health) accumulation, which is essential for driving innovation (e.g., Kong et al. 2022; Müller 2021) and stimulating investment in entrepreneurial activities (e.g., Cheng and Smyth 2021; Dutta and Sobel 2018).

3.1.2. Effect of GDP per Capita on Investment-Oriented Remittances

The Harrod–Domar/Samuelson "accelerator" model of investment explains the extent to which an increase in the national income leads to a more-than-proportionate increase in private investment spending. In other words, investment growth is driven by the acceleration in output, as a small change in the aggregate demand has an accelerated effect on investment (e.g., IMF 2015; Jorgenson and Siebert 1968). On the basis of this hypothesis, one may conjecture that a rise in the real per capita income, which is a proxy for the aggregate demand (and also for the development level) would be associated with an increase in investment by private sector agents (e.g., Acosta and Loza 2005) and thus with a rise in investment-oriented remittance flows. Meanwhile, one may also postulate that as advanced developing countries have more sophisticated economies than relatively less-advanced countries, and hence possibly better institutions and governance (Alonso et al. 2020), incentives to investment part of remittance inflows in business activities are likely to be higher in countries with a high real per capita income than in those with a relatively lower real per capita income. This suggests a positive association between an improvement in the real per capita income and investment-oriented remittance inflows. Meanwhile, it is possible that despite their weak regulatory environment, low-income developing countries adopt policies to encourage the development of entrepreneurship, including investment in small businesses. This can provide incentives for financing businesses by using part of remittances. In such a case, a lower real per capita income would be associated with an allocation of a higher portion of the total remittance inflows to investment in business activities.

3.1.3. Effect of Non-AfT Flows

A portion of non-AfT flows could be used to alleviate the tax burden borne by economic agents (e.g., households, domestic firms) (e.g., Herzer and Grimm 2012), thereby reducing distortions in the economy and opening up the opportunity for economic agents to channel more income (or savings) toward productive investments. This could encourage households to invest part of their remittances in productive business activities, as the productivity of private investment is likely to increase. In addition, when a part of non-AfT flows is used to finance investment in human capital accumulation, households would then be able to liberate part of remittances (that would otherwise be used to finance investment in human capital) in favor of investment in productive activities. In this context, we can expect higher non-AfT flows to be positively associated with investment-oriented remittances.

3.1.4. Effect of the Population Size

The population size variable is a proxy for the size of emigrants from a given remittance-receiving country. The rationale for introducing the population size as a control variable is that countries with large populations are likely to have to a high number of emigrants and be larger recipients of the total remittance inflows (e.g., Adenutsi and Ahortor 2021; Freund and Spatafora 2008; Kakhkharova et al. 2017). We expect that countries with larger populations would experience a higher share of the total remittance inflows allocated for financing business activities.

3.1.5. Effect of Financial Development

A well-functioning financial system has the potential of facilitating the allocation of financial resources toward productive investments, by reducing liquidity risks, channeling liquidity to savers, applying corporate discipline and decreasing the cost of resource agglomeration (e.g., Greenwood and Smith 1997). In this context, financial development can positively influence private investment decisions (e.g., Bontempi et al. 2010; Ghura and Goodwin 2000; Misati and Nyamongo 2011) and encourage beneficiaries of remittance inflows to invest part of the latter in business activities. Moreover, Dutta and Meierrieks (2021) have reported empirical evidence of how higher financial development levels generate higher levels of entrepreneurial activity, in the context of sound economic and political institutions. This is also consistent with the finding by Aparicio et al. (2021), where access to credit is one of the critical factors that explain export-oriented entrepreneurship. We, therefore, expect that an improvement in the level of financial development would boost investment-oriented remittance inflows.

3.1.6. Effect of the Real Exchange Rate and Terms of Trade

The effect of the real exchange rate on investment-oriented remittances can be ambiguous. This is because a depreciation in the real exchange rate would increase the price of imported capital and intermediate goods, discourage the import of these goods and reduce households' incentives to invest some portion of remittances in productive activities. On the other hand, a depreciation in the real exchange rate could stimulate private investment and induce higher investment-oriented remittance flows. This is in particular due to the positive effect of the real exchange rate depreciation on exports and export upgrading (e.g., Goya 2020; Nouira et al. 2011) and hence on the returns on investment in exporting activities. Hu et al. (2021) have, nevertheless, reported that the import currency appreciation improves import quality at the firm level, which in turn leads to higher export quality through an input–output linkage. This positive export quality effect is more pronounced for less-productive firms. In this scenario, an appreciation of the real exchange rate can be associated with higher investment-oriented remittance flows.

Finally, we expect the terms of trade improvements to encourage investment in export activities, as investors could expect higher returns on current investments, especially on goods or services that enjoy higher export prices in the world markets.

Given the preceding discussion, we consider the following baseline dynamic model specification:

$$RINV_{it} = \alpha_1 RINV_{it-1} + \alpha_2 AfT_{it} + \alpha_3 \text{RNINV}_{it} + \alpha_4 NonAfTTOT_{it} + \alpha_5 GDPC_{it} + \alpha_6 POP_{it} + \alpha_7 FINDEV_{it} + \alpha_8 REER_{it} + \alpha_9 TERMS_{it} + \alpha_{10} DUMOUT_{it} + \mu_i + \delta_t + \epsilon_{it} \quad (1)$$

The panel data set used to estimate this baseline model (1) and its different variants (presented below) is unbalanced and contains 106 countries over the period 2002–2019. The analysis has utilized nonoverlapping subperiods of a three-year average in order to limit the effect of business cycles on the variables of model (1). There are indeed six subperiods, which are 2002–2004; 2005–2007; 2008–2010; 2011–2013; 2014–2016; and 2017–2019.

The subscript i identifies a given country, and the subscript t refers to a given subperiod. The parameters α_1 to α_{10} are to be estimated. μ_i represent the time-invariant specific characteristic of each country in the panel data set. δ_t are subperiod dummies that capture global shocks that could simultaneously affect the investment-oriented remittance inflows. These dummies help avoid the contemporaneous correlation by eliminating time-related shocks from the error term. ϵ_{it} is a well-behaving error term.

The dependent variable "RINV" is the share of investment-oriented remittance inflows in GDP (not expressed in percentage). It is measured by the share of total remittances received by a given country (in a given year) in GDP, multiplied by the annual investment rate (investment as a share of GDP, not expressed in percentage) (see Le and Bodman 2011; Saadi 2020). The rationale for the computation of this indicator is as follows. Ideally, we would need data on the rate of investment-oriented remittances per country and year so as to calculate the fraction of the total remittances allocated to business investment. However, as these data are unavailable for many countries, we adopt the approach proposed by Le and Bodman (2011) and recently utilized by Saadi (2020) and compute the fraction of the total remittances allocated to business investment activities by relying on the investment rate out of GDP as a proxy for the investment rate out of the total remittance inflows. Data on the annual investment rates (i.e., the share of investment in GDP) are collected from the Penn World Table (version 10.0) (see Appendix A). The one-period lag of the variable "RINV" has been included as an explanatory variable in model (1) in order to account for the persistence of this variable over time. This is because the domestic private investment indicator exhibits a state-dependence path (e.g., Farla et al. 2016; Morrissey and Udomkerdmongkol 2012).

The variable "AfT" is the key regressor of interest. It represents the share of the gross disbursements of AfT flows in GDP (not expressed in percentage). It is measured either by the total AfT flows as a share of GDP ("AfTTOT") or by one of its three main categories, namely the ratio of AfT flows for economic infrastructure to GDP ("AfTINFRA"), the ratio of AfT flows for building productive capacities to GDP ("AfTPROD") and the share of AfT flows related to trade policy and regulation to GDP ("AfTPOL").

All other regressors that are in terms of ratios have not been expressed as percentages but instead have been converted to natural logarithms in order to both obtain estimates on elasticity and address the skewed distributions of many of the regressors. These variables include the indicator of the share of remittance inflows allocated for other purposes than investment activities ("RNINV"), the share of other development aid flows than AfT flows (i.e., non-AfT flows) and the financial development indicator.

The variable "DUMOUT" is a dummy variable that takes the value of 1 for identified outliers and takes 0 otherwise (see Section 3.2, which concerns data analysis). Its introduction in model (1) helps to account for the effect of outliers on the dependent variable.

Appendix A provides the description and source of all variables used in the analysis. Standard descriptive statistics are presented in Appendix B, and the list of the 106 countries contained in the full sample is displayed in Appendix C.

3.2. Preliminary Data Analysis

This section uses the unbalanced panel data set of 106 countries over nonoverlapping subperiods, with a view to providing a first insight into the relationship between AfT indicators and the share of investment-oriented remittances in GDP.

Figures 1 and 2 show how the share of the total AfT flows in GDP and the share of investment-oriented remittances in GDP have evolved over time, respectively in the full sample and the subsamples of LDCs and non-LDCs. For the sake of the graphical analysis in these two figures, the two indicators have been expressed as percentages.

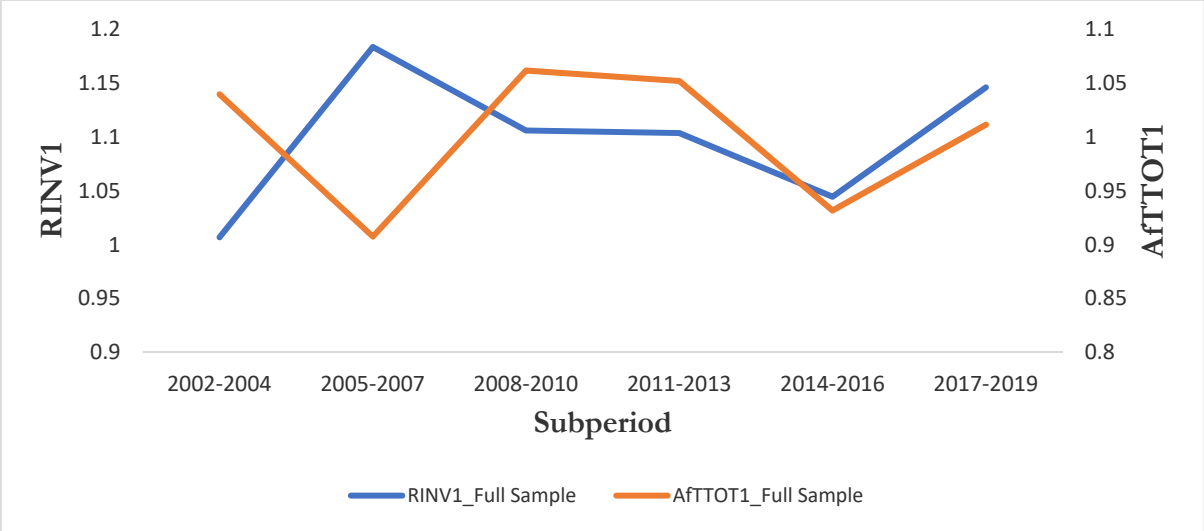

Figure 1. Total AfT flows and investment-oriented remittance flows over the full sample. Source: Author. Note: The variables "RINV1" and "AfTTOT1" are respectively the share of remittance-oriented investment flows in GDP and the share of total AfT flows in GDP, both expressed in percentages, for the sake of the graphical analysis.

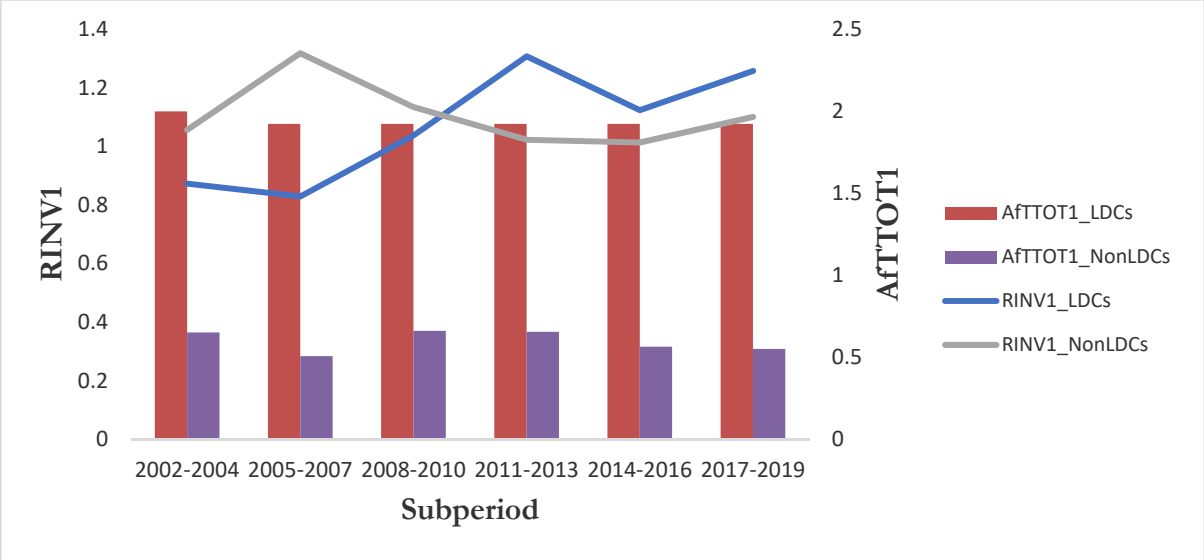

Figure 2. Total AfT flows and remittance-oriented investment flows over the subsamples of LDCs and non-LDCs. Source: Author. Note: The variables "RINV1" and "AfTTOT1" are respectively the share of remittance-oriented investment flows in GDP and the share of total AfT flows in GDP, both expressed in percentages, for the sake of the graphical analysis.

Figure 3 presents, over the full sample, the correlation pattern between AfT flows (both the total AfT flows and of each of its components) and the indicator of the share of investment-oriented remittance inflows. Figure 4 depicts the correlation pattern between the total AfT flows and the indicator of the share of investment-oriented remittance inflows over the subsamples of LDCs and non-LDCs. Note that in Figures 3 and 4, the two indicators have not been expressed in percentages, because they have been logged using the natural logarithm.

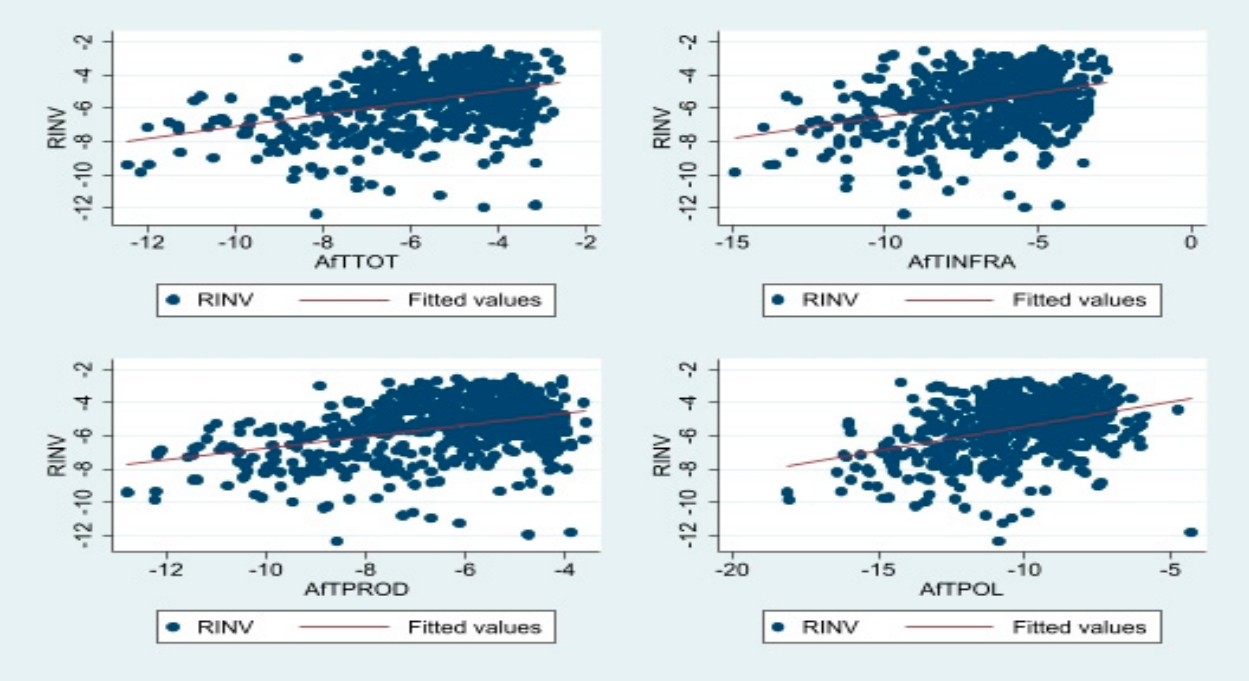

Figure 3. Correlation patterns between AfT flows and investment-oriented remittance flows over the full sample. Source: Author. Note: The variable "RINV" is the natural logarithm of the share of remittance-oriented investment in GDP (not expressed in percentage). AfT variables are the natural logarithm of the share of AfT flows in GDP (not in percentage), where AfT is either total AfT flows or each of its categories.

We note from Figure 1 that while the two indicators moved in opposite directions between 2002–2004 and 2008–2010, they moved in the same direction over the rest of the period. In particular, the share of investment-oriented remittances in GDP substantially increased from 1% in 2002–2004 to 1.18% in 2005–2007 and then fell to 1.11% in 2008–2010. In contrast, the share of the total AfT flows in GDP declined from 1.04% in 2002–2004 to 0.91% in 2005–2007 and then rebounded to 1.06% in 2008–2010. From 2008–2010 to 2014–2016, both indicators fell to reach 1.04% and 0.93%, respectively, for the share of total AfT flows in GDP and the share of investment-oriented remittances in GDP. Both shares then moved upward to reach 1.01% (for the share of total AfT flows in GDP) and 1.15% (for the share of investment-oriented remittances in GDP).

We observe from Figure 2 that the share of total AfT flows in GDP had been far higher in LDCs than in non-LDCs over the full period under analysis. After a slight decline from 2% in 2002–2004 to 1.93% in 2008–2010, it remained stable over the rest of the period (around 1.92%) for LDCs. For non-LDCs, the share of the total AfT flows in GDP declined from 0.65% in 2002–2004 to 0.51% in 2005–2007 and then rebounded to 0.66% in 2008–2010. It subsequently plunged to 0.56% in 2014–2016, from 0.66% in 2011–2013. Between 2014–2016 and 2017–2019, the AfT share remained stable, as it reached 0.55% in 2017–2019.

From 2002–2004 to 2008–2010, the share of investment-oriented remittances in GDP was higher in non-LDCs than in LDCs, and the pattern reversed over the rest of the period, as the LDCs' share outweighed the non-LDCs' share. For LDCs, this share moved upward from 0.83% in 2005–2007 to 1.31% in 2011–2013, after a fall from 0.87% in 2002–2004 to 0.83% in 2005–2007. It then declined to 1.12% in 2014–2016 and again went up to 1.26% in 2017–2019. For non-LDCs, the share amounted to 1.32% in 2005–2007 against 1.06% in 2002–2004. It steadily fell to 1.01% in 2014–2016 and then slightly increased to 1.10% in 2017–2019.

Figure 3 indicates for the full sample that there exist clear positive correlation patterns between AfT variables (i.e., the total AfT and, alternatively, each of its components) and the share of investment-oriented remittances. Nonetheless, the graphs in this Figure show the presence of some outliers that would be taken into account in the empirical analysis.

Figure 4 also indicates the existence of positive correlation patterns between the total AfT flows and the share of investment-oriented remittances in both LDCs and non-LDCs. Not only do the outliers observed in Figure 3 appear here as well, but also the slope of the positive correlation pattern is higher for non-LDCs than for LDCs.

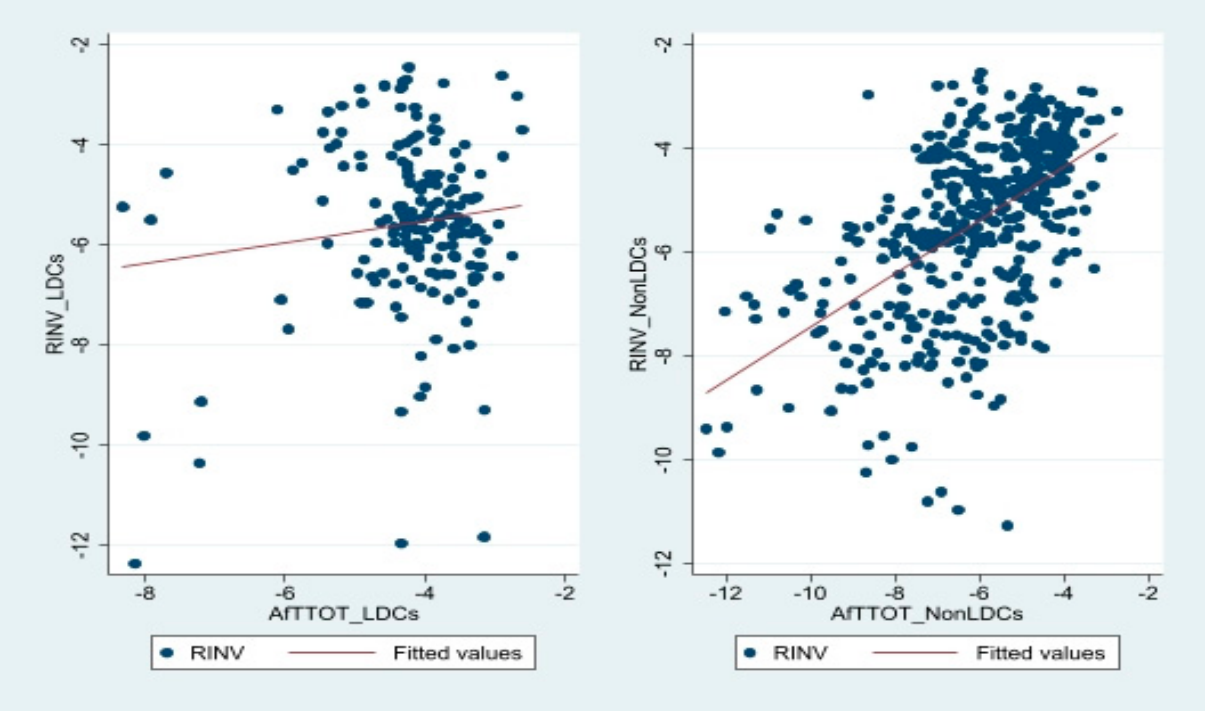

Figure 4. Correlation patterns between AfT flows and investment-oriented remittance flows over the subsamples of LDCs and non-LDCs. Source: Author. Note: The variable "RINV" is the natural logarithm of the share of remittance-oriented investment in GDP (not expressed in percentage). The variable "AfTTOT" is the natural logarithm of the share of total AfT flows in GDP (not expressed in percentage).

3.3. Econometric Approach

The empirical analysis is first conducted by using three standard econometric estimators to estimate the static specification of model (1) (i.e., model (1) without the lagged dependent variable as a regressor). In this model specification, the variable "AfT" is measured only by the share of the total AfT flows in GDP. In particular, we consider the AfT variable with a one-period lag so as to take into account the fact that the expected effects of AfT flows (for example, the effect of AfT for economic infrastructure) may take some time to materialize (see Calì and te Velde 2011)[6] and hence to affect investment-oriented remittance inflows. By proceeding in this way, we also limit the endogeneity problem of the

AfT variable (i.e., reverse causality from the dependent variable to the AfT variable). These estimators are the pooled ordinary least squares (denoted as POLS) estimator, the fixed-effects (denoted as FEs) approach and the feasible generalized least squares (denoted as FGLS) estimator. For the first two estimators, the standard errors of estimates are corrected by using the approach proposed by Driscoll and Kraay (1998), which allows for taking into account the heteroscedasticity, autocorrelation in the error term and the correlation among countries in the error term. The FGLS estimator also allows for taking into account the heteroskedasticity, autocorrelation of the error structure and the correlation across individuals in the idiosyncratic disturbances (contemporaneous correlation) (notably here through the inclusion of time dummies in the regression).

The outcomes arising from the regressions, based on these three estimators, are reported in columns (1) and (3) of Table 1. Even though the use of the one-period lag of the AfT variable helps to limit the endogeneity of this variable, such endogeneity might not be fully eliminated, and additionally, many regressors of the model specification are likely to be endogenous. The endogeneity of the AfT variable could simply be explained by the fact that aid donors may opt for providing higher AfT flows to developing countries that wish to develop their private sector, through investment in business activities, including trade-related ones. All other regressors, with the exception of the population size and terms of trade variables, could be endogenous owing to the reverse causality from the dependent variable to these regressors. The rationale for these different endogeneity problems is as follows. The interplay between the share of total remittances allocated to investment in business activities and the rest of those resources flows (allocated for other purposes) may cause the endogeneity of the variable to capture the share of noninvestment-oriented remittances in GDP. Donors may also provide higher non-AfT flows to developing countries that aim to encourage investment in business activities as such aid could help, inter alia, to enhance human capital (e.g., Birchler and Michaelowa 2016; Kostova et al. 2021; Kotsadam et al. 2018), which is essential for the development of the private sector. The real per capita income may also be affected by the share of investment-oriented remittance flows in GDP because the literature has established that the total remittance flows affect economic development in recipient countries (e.g., Le 2011; Piteli et al. 2019). The real exchange rate can be affected by the dependent variable because of the potential Dutch disease effect of remittance flows on the real exchange rate (e.g., Acosta et al. 2009; Amuedo-Dorantes and Pozo 2004; Ratha and Moghaddam 2020). Finally, as the total remittance inflows can affect financial development (e.g., Gupta et al. 2009), one may also expect that the portion of these resource inflows devoted to investment in productive capacities could also promote financial development. This is further exemplified by the fact, on the one hand, that investment-oriented remittance flows affect economic complexity (Saadi 2020) and, on the other hand, that export diversification, which is an important aspect of economic complexity, promotes financial development (e.g., Gnangnon 2019; Ramcharan 2006).

In light of these endogeneity problems, and given the likely persistence of the share of investment-oriented remittances in GDP over time[7], we employ the two-step system generalized method of moments (GMM) estimator (see Arellano and Bover 1995; Blundell and Bond 1998). This estimator is appropriate for dynamic panel data sets (such as the one used in the present analysis) with a small time dimension and a large cross-sectional dimension. In addition, to address the endogeneity concerns raised above, as well as correct the biases introduced by the omission of variables and measurement errors, it is also more efficient than the difference GMM estimator (developed by Arellano and Bond 1991) when the time series display strong persistence over time (e.g., Alonso-Borrego and Arellano 1999; Bond 2002). Compared with the difference GMM estimator, the two-step system GMM estimator uses additional moment conditions (e.g., Blundell and Bond 1998) that contribute to reducing the imprecision and potential bias associated with the difference GMM estimator.

Table 1. Effect of total AfT flows on investment-oriented remittance flows. Estimators: POLS, FEs, FGLS and two-step system GMM.

	Static Model Specification			**Dynamic Model Specification**		
Variables	**POLS RINV (1)**	**FEs RINV (2)**	**FGLS RINV (3)**	**POLS RINV (4)**	**FEs RINV (5)**	**Two-Step System GMM RINV (6)**
$RINV_{t-1}$				0.330 ***	0.0931 ***	0.193 ***
				(0.0197)	(0.0243)	(0.0104)
$AfTTOT_{t-1}$	0.0208 ***	0.0197 ***	0.0261 ***			
	(0.00713)	(0.00748)	(0.00739)			
AfTTOT				0.00470	0.00865	0.0848 ***
				(0.00480)	(0.0144)	(0.0148)
RNINV	0.852 ***	0.882 ***	0.899 ***	0.573 ***	0.833 ***	0.523 ***
	(0.0209)	(0.0115)	(0.00820)	(0.0240)	(0.0166)	(0.0157)
Non-AfTTOT	0.108 ***	0.0578 ***	0.0947 ***	0.0707 **	0.0322	0.0584 ***
	(0.0302)	(0.0214)	(0.0128)	(0.0341)	(0.0214)	(0.0127)
GDPC	0.215 ***	0.191 ***	0.231 ***	0.0871	0.109 *	0.163 ***
	(0.0727)	(0.0655)	(0.0240)	(0.0529)	(0.0632)	(0.0187)
POP	0.0326	−0.318	0.00643	0.0104	−0.363	−0.0252 **
	(0.0233)	(0.284)	(0.0105)	(0.0227)	(0.274)	(0.0113)
FINDEV	0.206 ***	0.177 ***	0.220 ***	0.156 ***	0.160 ***	0.205 ***
	(0.0178)	(0.0328)	(0.0194)	(0.0125)	(0.0330)	(0.0250)
REER	−0.00838	−0.127 **	0.0752 **	−0.109 ***	−0.139 ***	−0.180 ***
	(0.0587)	(0.0570)	(0.0381)	(0.0411)	(0.0410)	(0.0503)
TERMS	0.0936 ***	0.212 ***	0.0903 ***	0.0936 ***	0.183 **	0.134***
	(0.0199)	(0.0746)	(0.0239)	(0.0276)	(0.0763)	(0.0335)
DUMOUT	−0.521 ***	−0.315 ***	−0.346 ***	−0.412 ***	−0.262 ***	−1.044 ***
	(0.0564)	(0.0564)	(0.0434)	(0.0824)	(0.0768)	(0.0557)
Constant	−3.262 ***	2.923	−3.179 ***	−1.068 *	4.478	
	(0.622)	(4.418)	(0.357)	(0.548)	(4.133)	
Observations–Countries	510–106	510–106	510–106	505–106	505–106	505–106
R-squared/within R-squared	0.927	0.8245		0.946	0.8167	
Pseudo-R-squared			0.9626			
AR1 (*p*-value)						0.0073
AR2 (*p*-value)						0.2017
OID (*p*-value)						0.5144

Note: * *p*-value < 0.1; ** *p*-value < 0.05; *** *p*-value < 0.01. Robust standard errors are in parenthesis. The pseudo-R2 has been calculated for FGLS-based regression (with panel-specific first-order autocorrelation), as the correlation coefficient between the dependent variable and its predicted values. In the regressions based on the two-step system GMM approach, the variables "DUMOUT", "AfTTOT", "RNINV", "non-AfTTOT", "GDPC" and "FINDEV" and the interaction variable have been treated as endogenous. The variables "TERMS" and "POP" have been considered as exogenous. Time dummies have been included in the regressions. All variables (except for the outlier dummy) are expressed in natural logarithms.

The estimation of model (1)'s specifications (described below) using the two-step system GMM estimator entails estimating a system of equations, comprising an equation with variables in first differences and an equation with variables in levels. This system uses the lags of the variables taken in first differences as instruments in the equation in levels, and the lags of the variables in levels, as instruments in the first-difference equation.

To assess whether the different specification of model (1) displayed below have been correctly specified when estimated by the two-step system GMM estimator, we use the Arellano–Bond test of the presence of first-order serial correlation in the first-differenced error term (AR (1)); the Arellano–Bond test of the absence of second-order autocorrelation in the first-differenced error term (denoted AR (2)); and the Sargan/Hansen test of overidentifying restrictions (OID). For the AR (1) and AR (2) tests, we expect that at the 10% level, the *p*-values associated with the relevant statistics would be respectively lower than

0.10 and higher than 0.10. As for the OID test, the *p*-value related to the statistic should be higher than 0.1 at the 10% level.

We additionally evaluate the correctness of these model specifications by checking whether the estimate associated with the one-period lag of the dependent variable obtained from estimating the relevant model specification using the two-step system GMM estimator ranges between the coefficient of the same dependent variable arising from estimating the model by using the FEs estimator and the coefficient of the same dependent variable obtained from estimating the model by using the POLS estimator (see Bond et al. 2001). To check this, we estimate the dynamic model (1) by using the POLS and FEs estimators (here the AfT variable has not been lagged), bearing in mind that the endogeneity concerns raised above are fully at play here. The outcomes of these estimates are presented in columns (4) and (5) of Table 1.

Finally, we have avoided the proliferation of instruments by capping the lags of instrumental variables to two. This helps to meet the rule of thumb whereby the number of instruments should be lower than the number of countries if the abovementioned tests were to be powerful (e.g., Roodman 2009).

The empirical exercise based on the two-step system GMM estimator is conducted as follows. Column (6) of Table 1 presents the outcomes arising from the estimation of the dynamic model (1) by means of the two-step system GMM estimator. Note that the variable "AfT" is measured here by the share of the total AfT flows in GDP.

Table 2 displays the outcomes obtained by estimating three variants of model (1), where the variable "AfT" is measured by using alternatively each of the three components of the total AfT flows.

Table 2. Effect of the components of total AfT flows on investment-oriented remittance flows. Estimator: Two-step system GMM.

Variables	RINV (1)	RINV (2)	RINV (3)
$RINV_{t-1}$	0.202 ***	0.203 ***	0.225 ***
	(0.0115)	(0.0113)	(0.00947)
AfTINFRA	0.0529 ***		
	(0.00765)		
AfTPROD		0.0876 ***	
		(0.0132)	
AfTPOL			0.0369 ***
			(0.00778)
RNINV	0.533 ***	0.509 ***	0.473 ***
	(0.0156)	(0.0138)	(0.0166)
Non-AfTTOT	0.0387 ***	0.0633 ***	0.111 ***
	(0.0143)	(0.0134)	(0.0178)
GDPC	0.0864 ***	0.135 ***	0.0872 ***
	(0.0219)	(0.0236)	(0.0273)
POP	−0.0624 ***	−0.0171	−0.0161
	(0.0129)	(0.0127)	(0.0132)
FINDEV	0.206 ***	0.238 ***	0.271 ***
	(0.0222)	(0.0222)	(0.0246)
REER	−0.178 ***	−0.160 ***	−0.312 ***
	(0.0455)	(0.0573)	(0.0670)
TERMS	0.155 ***	0.120 ***	0.104 ***
	(0.0460)	(0.0307)	(0.0399)
DUMOUT	−1.041 ***	−0.923 ***	−1.094 ***
	(0.0666)	(0.0552)	(0.0436)
Observations–countries	505–106	505–106	495–106
AR (1) (*p*-value)	0.0079	0.0049	0.0054
AR (2) (*p*-value)	0.1121	0.3034	0.10
OID (*p*-value)	0.5133	0.4793	0.3229

Note: *** *p*-value < 0.01. Robust standard errors are in parenthesis. The components of total AfT flows; the variables "DUMOUT", "AfTTOT", "RNINV", "non-AfTTOT", "GDPC" and "FINDEV"; and the interaction variable have been treated as endogenous. The variables "TERMS" and "POP" have been treated as exogenous. All variables (except for the outlier dummy) are expressed in natural logarithms.

Table 3 reports outcomes that allow for investigating the effect of AfT flows (the total AfT flows and each of the components of the latter) on investment-oriented remittances in LDCs versus those in non-LDCs. These outcomes are obtained by estimating other specifications of model (1), in which we include the dummy variable "LDC" (which takes the value of 1 for LDCs and takes 0 otherwise) and its interaction with the relevant AfT variable.

Table 3. Effect of AfT flows on investment-oriented remittance flows across countries in the full sample, as well as in LDCs versus non-LDCs. Estimator: Two-step system GMM.

Variables	RINV (1)	RINV (2)	RINV (3)	RINV (4)
$RINV_{t-1}$	0.197 ***	0.203 ***	0.193 ***	0.213 ***
	(0.0127)	(0.0123)	(0.0129)	(0.0120)
AfTTOT	0.0566 ***			
	(0.0145)			
AfTTOT × LDC	0.118 ***			
	(0.0177)			
AfTINFRA		0.0301 ***		
		(0.00921)		
AfTINFRA × LDC		0.124 ***		
		(0.0137)		
AfTPROD			0.0999 ***	
			(0.0117)	
AfTPROD × LDC			−0.0245	
			(0.0155)	
AfTPOL				0.0450 ***
				(0.0128)
AfTPOL × LDC				−0.0234
				(0.0149)
LDC	0.923 ***	1.091 ***	0.309 **	0.246 *
	(0.123)	(0.102)	(0.138)	(0.145)
RNINV	0.566 ***	0.584 ***	0.549 ***	0.535 ***
	(0.0153)	(0.0137)	(0.0144)	(0.0159)
Non-AfTTOT	0.0617 ***	0.0406 **	0.0592 ***	0.114 ***
	(0.0157)	(0.0194)	(0.0180)	(0.0227)
GDPC	0.349 ***	0.292 ***	0.338 ***	0.297 ***
	(0.0453)	(0.0479)	(0.0443)	(0.0415)
POP	0.00340	−0.0348 **	0.0193	0.00703
	(0.0143)	(0.0176)	(0.0163)	(0.0164)
FINDEV	0.163 ***	0.183 ***	0.229 ***	0.264 ***
	(0.0318)	(0.0316)	(0.0316)	(0.0298)
REER	−0.232 ***	−0.227 ***	−0.215 ***	−0.346 ***
	(0.0566)	(0.0619)	(0.0482)	(0.0649)
TERMS	0.0911 **	0.119 **	0.0957 **	0.147 ***
	(0.0448)	(0.0472)	(0.0429)	(0.0511)
DUMOUT	−0.979 ***	−0.892 ***	−0.901 ***	−0.975 ***
	(0.0441)	(0.0499)	(0.0478)	(0.0415)
Observations–countries	505–106	505–106	505–106	495–106
AR (1) (*p*-value)	0.0128	0.0186	0.0065	0.0073
AR (2) (*p*-value)	0.3398	0.2997	0.2960	0.10
OID (*p*-value)	0.4860	0.4372	0.3763	0.4930

Note: * *p*-value < 0.1; ** *p*-value < 0.05; *** *p*-value < 0.01. Robust standard errors are in parenthesis. The components of total AfT flows; the variables "DUMOUT", "AfTTOT", "RNINV", "non-AfTTOT", "GDPC", "FINDEV" and "REER"; and the interaction variables have been treated as endogenous. The variables "TERMS" and "POP" have been treated as exogenous. Time dummies have been included in the regressions. All variables (except for the outlier dummy) are expressed in natural logarithms.

The estimates provided in Table 4 allow us to analyze the effect of the total AfT flows (as a share of GDP) on investment-oriented remittance inflows in remittance-dependent

countries versus less-remittance-dependent countries. As indicated in Section 2, the population size could reflect the level of emigration from a given country, as countries with large populations are likely to have a high number of emigrants, and potentially be large recipients of remittance inflows. Such countries may be more likely (than countries with relatively lower populations) to be inclined to spend a higher fraction of the total remittance inflows on business activities. Thus, we could expect the total AfT flows to induce a higher positive effect (if any at all) on investment-oriented remittances in countries with larger populations than in countries with relatively smaller populations. To test this hypothesis, we estimate a variant of model (1) (where the variable "AfT" is measured by the share of the total AfT in GDP) that includes the interaction between the AfT variable and the variable capturing the population size. The results of the estimation of this model are presented in column (1) of Table 4.

Table 4. Effect of AfT flows on investment-oriented remittance flows. Estimator: Two-step system GMM.

Variables	RINV (1)	RINV (2)
$RINV_{t-1}$	0.200 ***	0.195 ***
	(0.00932)	(0.0171)
AfTTOT	−0.258 ***	0.101 ***
	(0.0865)	(0.0254)
AfTTOT × POP	0.0193 ***	
	(0.00555)	
AfTTOT × DUMRINVSUP5		0.235 ***
		(0.0818)
DUMRINVSUP5		1.759 ***
		(0.422)
RNINV	0.523 ***	0.544 ***
	(0.0161)	(0.0231)
Non-AfTTOT	0.0610 ***	0.117 ***
	(0.0129)	(0.0277)
GDPC	0.138 ***	0.305 ***
	(0.0203)	(0.0425)
POP	0.0773 **	0.00689
	(0.0372)	(0.0200)
FINDEV	0.212 ***	0.132 ***
	(0.0217)	(0.0481)
REER	−0.226 ***	−0.0685
	(0.0455)	(0.0767)
TERMS	0.108 ***	0.124 **
	(0.0298)	(0.0552)
DUMOUT	−1.031 ***	−1.091 ***
	(0.0533)	(0.0698)
Observations–countries	505–106	505–106
AR (1) (*p*-value)	0.0061	0.0085
AR (2) (*p*-value)	0.1812	0.3221
OID (*p*-value)	0.4569	0.5049

Note: ** *p*-value < 0.05; *** *p*-value < 0.01. Robust standard errors are in parenthesis. The components of total AfT flows; the variables "AfTTOT", "DUMRINVSUP5", "DUMOUT", "RNINV", "non-AfTTOT", "GDPC", "FINDEV" and "REER"; and the interaction variables have been treated as endogenous. The variable "TERMS" and "POP" have been treated as exogenous. Time dummies have been included in the regressions. All variables (except for the outlier dummy) are expressed in natural logarithms. "DUMRINVSUP5" is a dummy variable taking the value 1 when the ratio of investment-oriented remittances to GDP is higher than 5% and takes 0 otherwise. Note that in the full sample, the values of the ratio of remittance-oriented investment to GDP (expressed in percentage) range between 0.00043 and 8.634.

We additionally test the effect of AfT flows on investment-oriented remittance flows in remittance-dependent countries, by estimating another variant of model (1) that includes both a dummy variable (capturing countries with large remittances) and the interaction

between this dummy variable and the AfT variable. The dummy variable is denoted as "DUMRINVSUP5", and it takes the value of 1 when the ratio of investment-oriented remittances[8] to GDP is higher than 5% and takes 0 otherwise. The outcomes of these estimations are reported in column (2) of Table 4.

Next, we test whether the effect of the total AfT flows on investment-oriented remittance flows genuinely takes place through the trade costs channel. To that effect, we need an indicator of trade costs. We use an indicator of the average overall trade costs (denoted as "TRCOST") and alternatively its two components, namely the average tariff costs (denoted as "TARIFF") and the average nontariff costs (denoted as "NTARIFF"), collected from the UNESCAP-World Bank Trade Costs Database. The latter provides cross-country international bilateral trade costs on goods (agriculture and manufacturing goods) for over 180 countries over the period 1995–2019. Data on the bilateral comprehensive (overall) trade costs have been computed as the average tariff-equivalent costs for the total exports of agricultural and manufactured goods, following the approach[9] proposed by Novy (2013) and by relying on the definition of trade costs by Anderson and van Wincoop (2004). Trade costs are captured in their wider sense, including not only international transport costs and tariffs but also other trade cost components, such as direct and indirect costs associated with differences in languages and currencies, and cumbersome import or export procedures (see Arvis et al. 2012, 2016). The database also includes the two main components of trade costs on goods, including tariff costs and nontariff costs, computed over the same set of countries and the same period. The tariff costs are the geometric average of the tariffs imposed by the two partner countries on each other's imports (Arvis et al. 2012, 2016). The nontariff cost indicator is the comprehensive trade costs excluding tariffs, and it encompasses all additional costs other than tariff costs involved in trading goods bilaterally rather than domestically.

Using this data set, we have computed our indicator of the "average" overall trade costs (denoted as "TRCOST") for a given country in a given year as the average of the bilateral overall trade costs across all trading partners of this country. Higher values of the indicator of average overall trade costs reflect higher overall trade costs. Similarly, our indicator of average tariff costs (denoted as "TARIFF") has been calculated for a given country in a given year as the average of the bilateral comprehensive tariff costs (for the total exports of agricultural and manufactured goods) across all trading partners of this country. Higher values of this indicator reflect a rise in tariff costs. We have computed the average nontariff costs, which represents the second main component of the comprehensive trade costs (denoted as "NTARIFF") for a given country in a given year, as the average of the bilateral comprehensive nontariff costs (i.e., the comprehensive trade costs, excluding the tariff costs) across all trading partners of this country. The average comprehensive nontariff cost indicator covers agricultural and manufactured goods. Higher values of this index indicate an increase in nontariff costs.

We test the effect of the total AfT flows on investment-oriented remittance flows through the trade costs channel by considering other variants of the baseline model (1) in which we include both the indicator of trade costs and the interaction between this indicator and the variable measuring the total AfT flows (% GDP). Column (1) of Table 5 displays the outcomes obtained by estimating the variant of model (1), i.e., model (1) to which we add the indicator of the overall trade costs. The objective of doing so is to examine whether the estimate associated with the trade cost indicator is negative (as expected) and, additionally, whether the inclusion of this indicator in model (1) reduces the magnitude of the estimates associated with the "AfT" variable or eventually renders it nonsignificant. In this scenario, we could conclude that the effect of the total AfT flows on investment-oriented remittances works through the trade cost channel. Columns (2)–(4) contain the estimates stemming from estimating other variants of the baseline model (1) in which we include (once) the indicator of trade costs (indicator of overall trade costs and each of its components) and the interaction between this indicator and the variable measuring the total AfT flows (% GDP).

Table 5. Effect of AfT flows on investment-oriented remittance flows for varying levels of trade costs. Estimator: Two-step system GMM.

Variables	RINV (1)	RINV (2)	RINV (3)	RINV (4)
$RINV_{t-1}$	0.185 ***	0.182 ***	0.244 ***	0.192 ***
	(0.0128)	(0.0103)	(0.0143)	(0.00905)
AfTTOT	0.0434 **	−0.766 ***	−0.0430	−0.363 **
	(0.0195)	(0.119)	(0.0365)	(0.153)
TRCOST	−0.724 ***	0.446 ***		
	(0.129)	(0.173)		
AfTTOT × TRCOST		0.143 ***		
		(0.0210)		
AfTTOT × TARIFF			1.042 ***	
			(0.373)	
TARIFF			5.469 **	
			(2.255)	
AfTTOT × NTARIFF				0.0702 **
				(0.0273)
NTARIFF				−0.125
				(0.158)
RNINV	0.641 ***	0.636 ***	0.560***	0.626 ***
	(0.0200)	(0.0145)	(0.0178)	(0.0122)
Non-AfTTOT	−0.0310	0.00136	0.0144	0.0186
	(0.0219)	(0.0180)	(0.0223)	(0.0194)
GDPC	−0.0497	0.0235	0.150 ***	0.0113
	(0.0399)	(0.0373)	(0.0462)	(0.0373)
POP	−0.108 ***	−0.100 ***	−0.0140	−0.0796 ***
	(0.0169)	(0.0174)	(0.0158)	(0.0131)
FINDEV	0.112 ***	0.116 ***	−0.0126	0.120 ***
	(0.0312)	(0.0265)	(0.0436)	(0.0242)
REER	0.0166	0.0481	−0.0632	−0.0339
	(0.0801)	(0.0630)	(0.0398)	(0.0636)
TERMS	0.0408	0.0800 *	0.0176	0.0372
	(0.0482)	(0.0476)	(0.0356)	(0.0386)
DUMOUT	−0.670 ***	−0.719 ***	−0.878 ***	−0.717 ***
	(0.0599)	(0.0516)	(0.0570)	(0.0464)
Observations–countries	470–103	470–103	475–100	455–100
AR (1) (*p*-value)	0.0228	0.0129	0.0155	0.0466
AR (2) (*p*-value)	0.1733	0.1716	0.2249	0.2822
OID (*p*-value)	0.3481	0.4091	0.4618	0.4884

Note: * *p*-value < 0.1; ** *p*-value < 0.05; *** *p*-value < 0.01. Robust standard errors are in parenthesis. The variables "AfTTOT", "DUMOUT", "TRCOST", "TARIFF", "NTARIFF", "RNINV", "non-AfTTOT", "GDPC", "FINDEV" and "REER" and the interaction variables have been treated as endogenous. Time dummies have been included in the regressions. All variables (except for the outlier dummy) are expressed in natural logarithms. The variable "TERMS" has been treated as exogenous.

4. Empirical Outcomes

This section discusses the estimations' outcomes, as reported in Tables 1–5. We note from columns (1)–(3) of Table 1 that the higher total AfT flows in subperiod t − 1 is associated with a greater share of investment-oriented remittances in GDP in the subsequent subperiod. This is because the coefficient of the lagged AfT variable is positive and significant at the 1% level across the three columns of the table. Interestingly, the estimates are quite similar across these three columns of the table. In columns (1) and (2), we find that a 1.0-percentage increase in the share of total AfT flows in GDP is associated with a 0.02-percentage increase in the share of investment-oriented remittances in GDP. For the results based on the FGLS approach, a 1.0-percentage increase in the share of the total AfT flows in GDP generates a 0.026-percentage increase in the share of investment-oriented remittances in GDP. These findings support Hypothesis 1, although, as noted above, they should be taken cautiously given that the use of the lagged total AfT flows

might not fully eliminate the possible endogeneity concern and that other regressors may also be endogenous in the regressions. Concerning the control variables in these first three columns of Table 1, we find that at the 1% level, the share of investment-oriented remittances in GDP is positively and significantly driven by higher noninvestment-oriented remittance inflows, higher non-AfT flows, a rise in the real per capita income, a higher level of financial development, a depreciation in the real exchange rate[10] and an improvement in the terms of trade. All these outcomes are consistent with our theoretical expectations. The population size appears to exert no significant effect on investment-oriented remittance flows. The outlier dummy exhibits a negative and significant (at the 1% level) estimate, thereby indicating the share of investment-oriented remittances in GDP for outliers is lower than for nonoutlier countries in the sample. The same outcomes are obtained for this dummy in all other tables where the dependent variable is "RINV", whose results will be discussed below.

For the outcomes based on the dynamic model (1) (see columns (4) to (6) of Table 1), we find in both columns (4) and (5) (results based on the POLS and FEs estimators) that there is no significant effect (at the conventional significance levels) of the total AfT flows on the share of investment-oriented remittances in GDP. Concerning control variables in columns (4) and (5) of Table 1, we find that at the 5% level, the share of investment-oriented remittances in GDP is positively driven by a rise in the share of noninvestment-oriented remittances in GDP, higher non-AfT flows (see results in column (4), as in column (5), the estimate is not significant at the 10% level), an improvement in the level of financial development, a depreciation in the real exchange rate and an improvement in terms of trade. The population size does not significantly affect the ratio of investment-oriented remittances to GDP, and at the 5% level, there is no significance of the real per capita income on the share of investment-oriented remittances in GDP.

We now consider the results based on the two-step system GMM estimator (see column (6) of Table 1, and see Tables 2–5), which are the most reliable ones in the analysis. Before interpreting these results, it is worth considering the outcomes of the diagnostic tests that help check the correctness of the model specifications whose outcomes are reported in these tables. We note from all these tables that the estimates associated with the lagged dependent variable are positive and significant at the 1% level. This underlines the importance of considering model (1) in a dynamic form. Additionally, in line with the suggestion by Bond et al. (2001), the coefficients of the lagged dependent variable (in column (6) of Table 1 and in Tables 2–5) are between 0.093 (which is the estimate of the same variable from the regression based on the FEs estimator in column (5) of Table 1) and 0.33 (which is the estimate of the same variable from the regression based on the POLS estimator in column (4) of Table 1). In addition, the variants of model (1) whose estimations' outcomes are presented in column (6) of Table 1 and in Tables 2–5 are all correctly specified. This is because the *p*-values of the AR (1) test are lower than 0.1, and the *p*-values of the AR (2) test and the OID test are all higher than or equal to 0.10. On the basis of these outcomes, we conclude that the two-step system GMM approach is suitable for the empirical exercise.

As for the estimates in column (6) of Table 1, we find that an increase in the share of the total AfT flows in GDP exerts a positive and significant effect (at the 1% level) on the share of investment-oriented remittances in GDP. A 1.0-percentage increase in the ratio of the total AfT flows to GDP generates a rise in the share of investment-oriented remittances in GDP by 0.085%. While this finding also supports Hypothesis 1, the coefficient here is far higher than the ones in columns (1)–(3) of Table 1 (which range between 0.02 and 0.026), where the AfT variable has been considered with a one-period lag. This positive effect of the total AfT flows on investment-oriented remittances supports Hypothesis 1. The estimates concerning the majority of the control variables in column (6) of Table 1 meet our theoretical expectations. We find that the share of investment-oriented remittances in GDP is positively and significantly (at the 1% level) affected by an increase in the share of noninvestment-oriented remittances in GDP, a higher share of non-AfT flows in GDP, an improvement in the real per capita income, a higher level of financial development, a

depreciation in the real exchange rate and an improvement in the terms of trade. Outcomes concerning these control variables in Tables 2–5 are largely consistent with those in column (6) of Table 1. However, we observe from column (6) of Table 1 that at the 5% level, there is a negative and significant effect of the population size on investment-oriented remittance flows. It is possible that this outcome reflects the existence of an interplay between the AfT variable and the population size variable in affecting the share of investment-oriented remittances. In other words, this outcome may indicate, as we expected in theoretical discussion provided in Section 3, that the effect of AfT flows on investment-oriented remittance flows is likely to be dependent on the population size. We will consider this hypothesis by examining the outcomes reported in Table 4.

The results in Table 2 confirm the finding in column (6) of Table 1 concerning the positive effect of the total AfT flows on investment-oriented remittances by showing that all three components of the total AfT flows are positively and significantly (at the 1% level) associated with investment-oriented remittance flows. In particular, a 1.0-percentage increase in the share of AfT flows for economic infrastructure in GDP generates a 0.053-percentage increase in the share of investment-oriented remittances in GDP. A 1.0-percentage increase in the share of AfT flows for productive capacities in GDP is associated with a 0.088-percentage increase in the share of investment-oriented remittances in GDP. Finally, a 1.0-percentage increase in the share of AfT flows for trade policy and regulation in GDP generates a 0.037-percentage rise in the share of investment-oriented remittances in GDP. It therefore appears that AfT flows for productive capacities exert the highest positive effect on investment-oriented remittance flows, followed by AfT for economic infrastructure and AfT for trade policy and regulation.

The outcomes in column (1) of Table 3 show that the total AfT flows exert a higher positive effect on investment-oriented remittance flows in LDCs than in non-LDCs. This is because the coefficient of the interaction variable "AfTTOT*LDC" is positive and significant at the 1% level. At the same time, the coefficient of the variable "AfTTOT" is also positive and significant at the 1% level. Therefore, we conclude that the net effect of the total AfT flows on investment-oriented remittances is 0.175 (=0.0566 + 0.118). A 1.0-percentage increase in the share of the total AfT flows in GDP is associated with a 0.175-percentage rise in the share of investment-oriented remittances in LDCs and a 0.057-percentage increase in the share of investment-oriented remittances in GDP in non-LDCs. The same pattern of outcomes is found for AfT flows for economic infrastructure (see the results in column (2) of Table 3), as the effect of this type of AfT intervention on investment-oriented remittance flows in LDCs and non-LDCs respectively amount to 0.154 (=0.0301 + 0.124) and 0.03. Concerning the two other components of the total AfT flows, we observe positive and significant coefficients (at the 1% level) of the variables "AfTPROD" and "AfTPOL", but no significant coefficients of the interaction terms (at the 10% level) related to relevant interaction variables (see, respectively, columns (3) and (4) of Table 3). Hence, a 1.0-percentage increase in the share of AfT flows for productive capacities in GDP is associated with a 0.1-percentage rise in the share of investment-oriented remittance flows in GDP in LDCs and non-LDCs alike. Similarly, a 1.0-percentage increase in the share of AfT flows for trade policy and regulation in GDP leads to a 0.045-percentage rise in the share of investment-oriented remittance flows in GDP in both LDCs and non-LDCs.

In a nutshell, the key message conveyed by Table 3 is that while the total AfT flows (including its AfT for the economic infrastructure component) exert a higher positive and significant effect on investment-oriented remittance inflows in LDCs than in non-LDCs, the effects are positive and of equal magnitude for the two other components of the total AfT flows, i.e., AfT interventions for enhancing productive capacities, and AfT for trade policy and regulation.

The results in Table 4 are quite interesting. Column (1) of this table shows that the coefficient of the interaction variable (AfTTOT*POP) is positive and significant at the 1% level, while the coefficient "AfTTOT" is negative and significant also at the 1% level. We deduce that the effect of the total AfT flows on investment-oriented remittance flows depends

on the population size. In particular, this effect is positive (once the population size has exceeded a certain level) and increases in magnitude as the population size rises. The level of the population size above which the total AfT flows exert a positive effect on investment-oriented flows is given by 639,138 habitants (=exponential (0.258/0.0193)). We recall here that in the full sample, the values of the population size range from 70,698 habitants to 1390 million habitants. We conclude that countries with larger populations (i.e., those with population sizes higher than 639,138 habitants) experience a positive effect of the total AfT flows on investment-oriented remittance flows, and the magnitude of this effect increases as the population size rises. Conversely, countries with relatively lower populations (i.e., those with population sizes less than 639,138 habitants) experience a negative effect of the total AfT flows on investment-remittance inflows, where the magnitude of this negative effect rises as the population size becomes lower. We note that over the last subperiod of the panel data (i.e., 2017–2019), no country had a population size lower than 639,138 habitants, as the country with the lowest population size (i.e., 70,110 habitants) was Dominica. We can conclude that, on average, over the last subperiod of the panel data set, the effect of the total AfT flows on investment-oriented remittances is always positive and increases as the population size rises. Figure 5 provides, at the 95% confidence intervals, the marginal impact of the total AfT flows on investment-oriented remittance flows conditioned on the population size. We note that this marginal impact increases as the population size rises, but it is statistically significant only for values of a population size higher than 1674 million. For these values of the population size, the marginal effect of the total AfT flows on investment-oriented remittance inflows is positive and significant, and additionally, it increases as the population size rises. In other words, countries whose population size exceeds 1674 million experience a positive effect of the total AfT flows on investment-oriented remittance inflows, and the larger the population size, the greater the magnitude of the positive effect of the total AfT flows on investment-oriented remittance inflows.

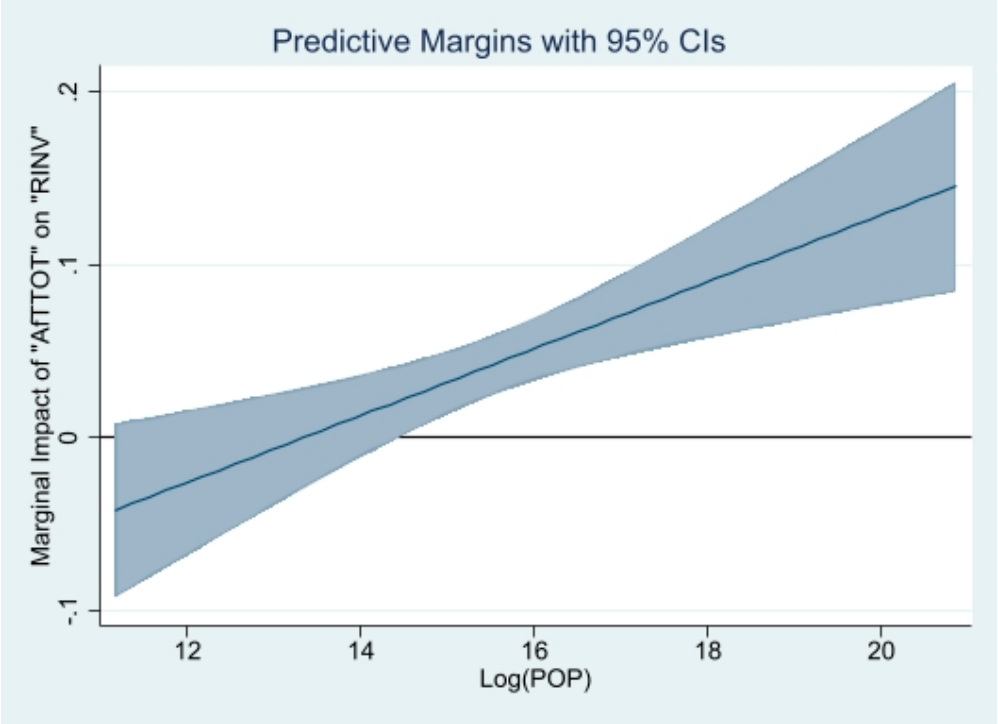

Figure 5. Marginal impact of "AfTTOT" on "RINV" for varying population sizes. Source: Author.

Overall, these outcomes confirm our theoretical hypothesis that as countries with larger populations are likely to have a high number of emigrants and hence be larger recipients of remittances, the total AfT could exert a positive effect on investment-oriented remittances in these countries than in countries with relatively smaller populations.

The estimates presented in column (2) of Table 4 indicate that the variable "AfTTOT" and the interaction variable "(AfTTOT*DUMRINVSUP5)" have coefficients that are all positive and significant at the 1% level. We, therefore, conclude that countries that enjoy a share of investment-oriented remittances higher than 5% experience a higher positive effect of per cent total AfT flows on investment-oriented remittance flows than countries with a share of investment-oriented remittances lower than 5%.[11] In terms of magnitudes of these effects, the net effects of the share of per cent total AfT flows in GDP on the share of investment-oriented remittance flows in GDP in remittance-dependent countries and in other countries are, respectively, 0.336 (=0.101 + 0.235) and 0.101. Thus, a 1.0-percentage rise in the share of per cent total AfT flows in GDP is associated with a 0.336-percentage increase in the share of investment-oriented remittance flows in GDP in countries that have high investment-related remittance inflows and with a 0.10-percentage rise in the share of investment-oriented remittance flows in GDP in the other countries.

These findings in column (2) of Table 4 are closer in spirit to those in column (1) of the same table.

We now consider estimates in Table 5, which allow us to investigate whether (and, if so, the extent to which) the effect of per cent total AfT flows on investment-related remittance flows depends on the level of trade costs prevailing in the country. We note from column (1) of this table that the coefficient of the variable capturing the overall trade costs is negative and significant at the 1% level. This finding confirms our hypothesis that by generating higher uncertainty, trade costs discourage remittance-receiving households from investing part of their remittances in business activities. At the same time, the coefficient of the variable "AfTTOT", which amounted to 0.085 in column (6) of Table 1, falls to 0.043 in column (1) of Table 5, thereby suggesting that the introduction of the trade cost variable has altered[12] (in particular reduced) the magnitude of the estimate associated with the variable capturing the total AfT flows in Table 1. This finding allows us to conclude that trade costs could be considered as a channel through which the total AfT flows affect investment-oriented remittance flows.

The results in columns (2)–(4) of Table 5 indicate that the coefficients of the interaction variable between the share of the total AfT flows in GDP and each of the relevant trade cost indicators (i.e., the overall trade costs and each of its components, namely tariff costs and nontariff costs) are all positive and significant at least at the 5% level. We may, therefore, be tempted to deduce that the total AfT flows exert a higher positive effect on investment-oriented remittances in countries that experience higher trade costs. Concurrently, the coefficients of the variable "AfTTOT" across columns (2) to (4) of Table 5 are negative and significant, respectively, at the 1% level and at the 5% level, while it is not significant at the conventional significance levels in column (3) of the same table. Taken together, all these outcomes suggest the following interpretations: First, the effect of the total AfT flows on investment-oriented remittance inflows genuinely works through the trade cost channel. Second, the total AfT flows appear to exert a higher positive effect on investment-oriented remittance inflows in countries that experience higher trade costs. In particular, the effect of the total AfT flows on investment-oriented remittance flows is positive in countries that experience levels of overall trade costs higher than 212 (=exponential (0.766/0.143)), those that experience levels of nontariff costs higher than 176 (=exponential (0.363/0.0702)) and for all levels of tariff costs. The values of the indicator of the overall trade costs range from 150.24 to 467.27, while those of the indicator of nontariff costs range from 128.5 to 433.4. Thus, countries with levels of the overall trade costs higher than 212 (and those with levels of nontariff costs higher than 176) experience, on average, a positive effect of the total AfT flows on investment-oriented remittances, where the magnitude of this effect increases as the level of the overall trade costs (or of nontariff costs) increases. For the other countries

(i.e., with the levels of overall trade costs lower than 212/the levels of nontariff costs lower than 176), the total AfT flows exert a negative effect on investment-oriented remittances, where the magnitude of this effect declines as the level of these trade costs move downward. Concurrently, the rise in the share of the total AfT flows in GDP consistently leads to an improvement in the share of investment-oriented remittances in GDP for all levels of tariff costs, and the magnitude of this positive effect moves up as the level of tariff costs rises. We display in Figures 5–7, at the 95% confidence intervals, the marginal impact of the total AfT flows on investment-oriented remittance flows conditioned, separately, on the levels of the overall trade costs, tariff costs and nontariff costs. We note from the three figures that while the marginal impact of the total AfT flows on investment-oriented remittance inflows is not always statistically significant, it increases as countries face higher trade costs (overall trade costs, tariff costs and nontariff costs). Specifically, the figures indicate that the total AfT flows lead to higher investment-oriented remittance flows in countries whose levels of the overall trade costs are higher than 259 (see Figure 6); notably in countries whose levels of tariff costs exceed 1.08 (see Figure 7) (otherwise, the marginal effect is not significant); and those whose levels of nontariff costs are higher than 260.12 (see Figure 8) (otherwise, the marginal effect is not significant). Countries whose overall trade costs are lower than the value of 259 experience either a negative and significant effect of the total AfT flows on investment-oriented remittance inflows (especially when the levels of the overall trade costs are lower than 164.5) or a statistically nil effect of the total AfT flows on investment-oriented remittance inflows (for values of the overall trade costs ranging from 164.5 to 259). Overall, the outcomes in Table 5 suggest that by reducing trade costs in countries that face high levels of trade costs, AfT interventions encourage remittance-receiving households to invest part of their remittances in business activities and hence boost investment-oriented remittance inflows.

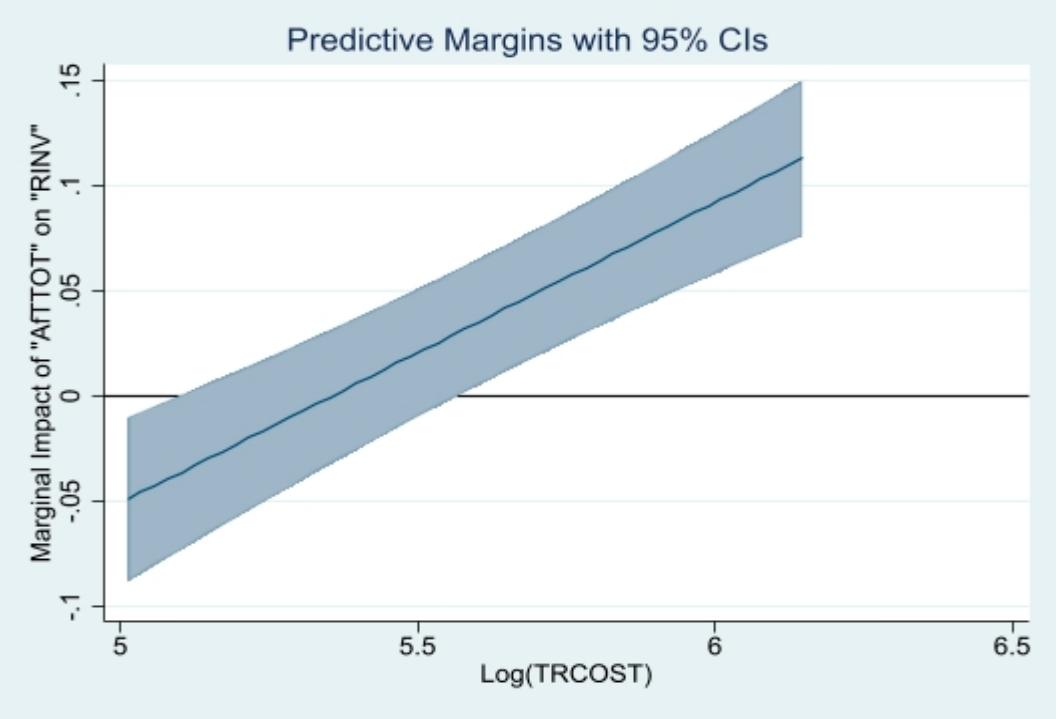

Figure 6. Marginal impact of "AfTTOT" on "RINV" conditioned on the level of the overall trade costs. Source: Author.

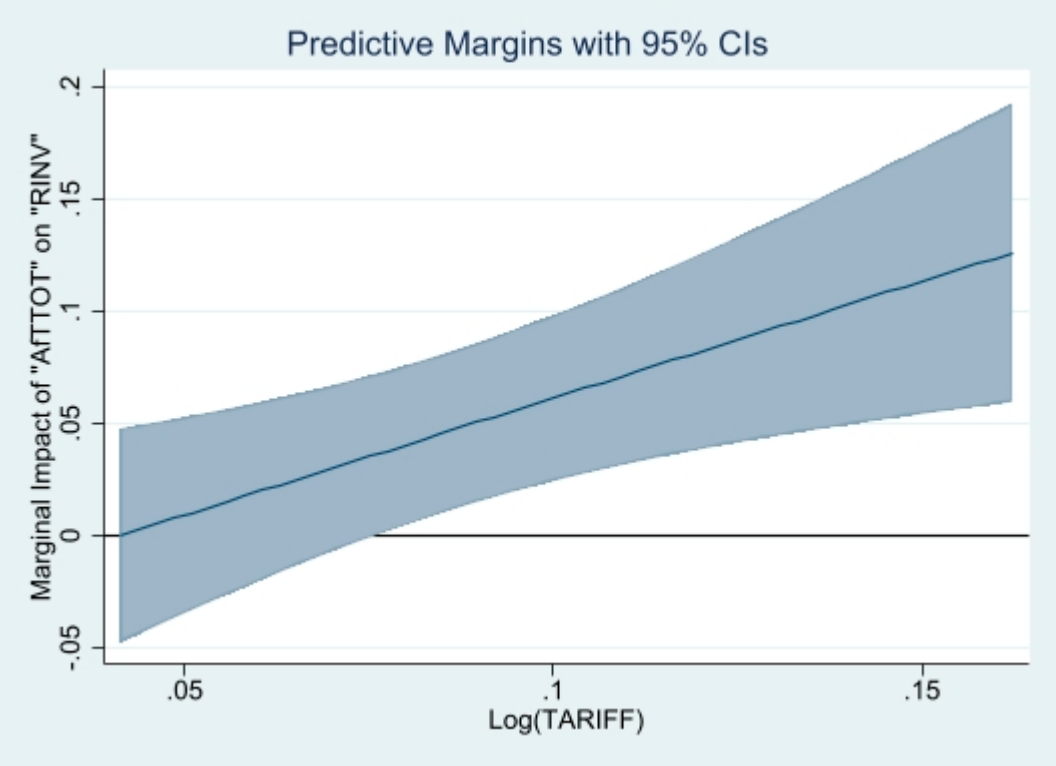

Figure 7. Marginal impact of "AfTTOT" on "RINV" for varying levels of tariff costs. Source: Author.

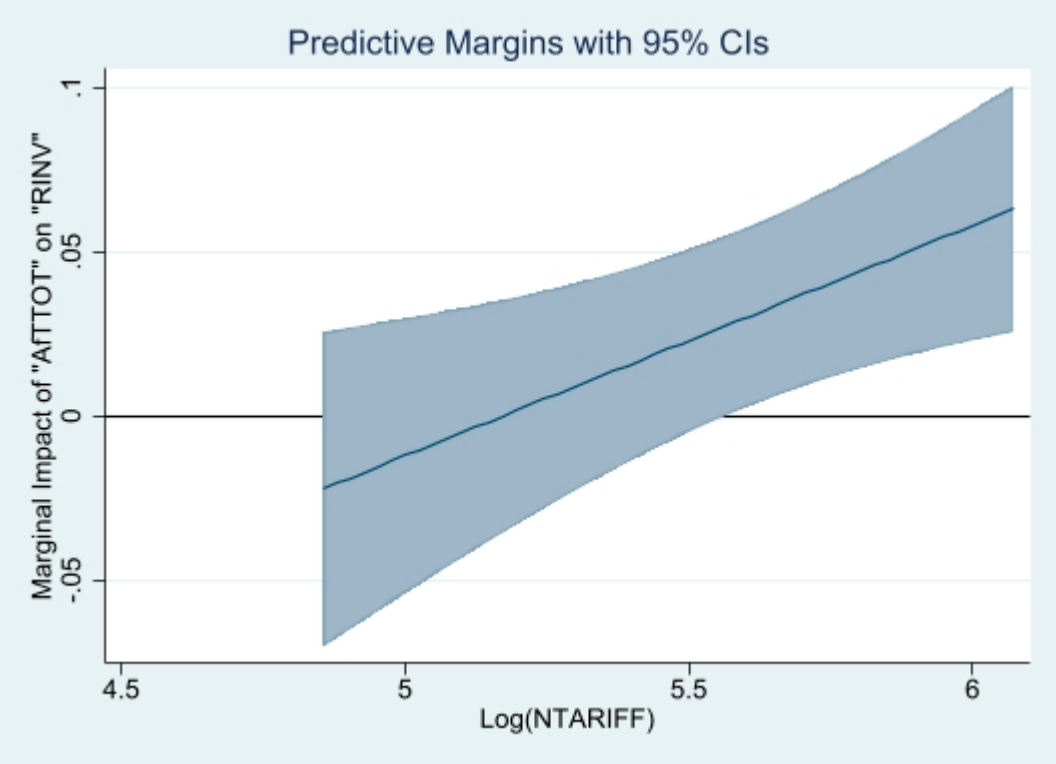

Figure 8. Marginal impact of "AfTTOT" on "RINV" for varying levels of nontariff costs. Source: Author.

5. Conclusions

The literature has investigated the interplay between AfT flows and other capital flows by focusing mainly on the effect of AfT flows on FDI inflows. The present analysis contributes to the literature by examining the effect of AfT flows on investment-oriented remittance flows, including through the channel of trade costs. It has revealed several outcomes.

First, AfT flows (including the total AfT flows and each of its three categories) stimulate investment-oriented remittance inflows.

Second, the higher total AfT flows induce a higher share of investment-oriented remittance flows in LDCs than in non-LDCs.

Third, an increase in the share of the total AfT flows in GDP induces a higher share of investment-oriented remittance flows in remittance-dependent countries, notably those with larger population sizes or those with a share of investment-oriented remittances in GDP higher than 5%.

Fourth, the total AfT flows generate higher investment-oriented remittance inflows in countries that experience higher trade costs. This suggests that by helping to reduce trade costs in countries that face high trade costs, AfT flows encourage remittance-receiving households to invest a higher portion of their remittances in business activities.

Overall, the analysis undertaken in this paper has pointed out that not only have AfT interventions been effective in eventually driving FDI inflows (as shown by previous works), but they are also important drivers of investment-oriented remittance inflows, and in this regard, they play a critical role in the development of the private sector in recipient countries. However, the supply of higher AfT flows to developing countries is highly desirable, given their potential impact on investment-oriented remittance inflows in these countries, but at the same time, concerted efforts should be made by developing countries (i.e., AfT recipient countries) and other countries, including donor countries, to reduce the costs of sending remittances. This would further enhance the positive effect of AfT flows on the portion of received remittances that are invested in business activities.

We hope that the present article has opened avenues for future research on the determinants, including macroeconomic determinants, of investment-oriented remittance inflows.

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Conflicts of Interest: I hereby confirm that there is no actual or potential conflict of interest including any financial, personal or other relationships with other people or organizations within three years of beginning the submitted work that could inappropriately influence, or be perceived to influence, the work.

Appendix A

Table A1. Definition and source of variables.

Variables	Definition	Source
RINV	This is the share of remittance-oriented investment in GDP. It is not expressed in percentage. It has been computed as the share of total remittances received by a given country (in a given year) in GDP multiplied by the annual investment rate (investment as a share of GDP, not expressed in percentage).	Author's calculation based on data on the share of total remittances received in GDP collected from the from the World Development Indicators (WDI) and data on annual investment rate (investment as a share of GDP) drawn from the Penn World Table (version 10.0).
RNINV	This is the difference between the share of total remittances received in GDP and the share of remittance-oriented investment in GDP.	Author's calculation based on data on the investment-oriented remittances computed above.
AfTTOT, AfTINFRA, AfTPROD, AfTPOL	"AfTTOT" is the total real gross disbursements of total aid for trade. "AfTINFRA" is the real gross disbursements of aid for trade allocated to the buildup of economic infrastructure. "AfTPROD" is the real gross disbursements of aid for trade for building productive capacities. "AfTPOL" is the real gross disbursements of Aid allocated for trade policies and regulation. All four AfT variables are expressed as a share of GDP (not in percentage).	Author's calculation based on data extracted from the OECD statistical database on development, in particular the OECD/DAC-CRS (Organization for Economic Cooperation and Development/Donor Assistance Committee)-Credit Reporting System (CRS). Aid-for-trade data cover the following three main categories (the CRS codes are in brackets): aid for trade for economic infrastructure ("AfTINFRA"), which includes transport and storage (210), communications (220) and energy generation and supply (230); aid for trade for building productive capacity ("AfTPROD"), which includes banking and financial services (240), business and other services (250), agriculture (311), forestry (312), fishing (313), industry (321), mineral resources and mining (322), and tourism (332); and aid-for-trade policy and regulations ("AfTPOL"), which includes trade policy and regulations and trade-related adjustment (331).
TRCOST	This is the indicator of the average comprehensive (overall) trade costs. We have calculated the average overall trade costs for a given country in a given year as the average of the bilateral overall trade costs on goods across all trading partners of this country. Data on bilateral overall trade costs have been computed by Arvis et al. (2012, 2016) by following the approach proposed by Novy (2013). Arvis et al. (2012, 2016) have built on the the definition of trade costs by Anderson and van Wincoop (2004) and considered bilateral comprehensive trade costs as all costs involved in trading goods (agricultural and manufactured goods) internationally with another partner (i.e., bilaterally) relative to those involved in trading goods domestically (i.e., intranationally). Hence, the bilateral comprehensive trade cost indicator captures trade costs in its wider sense, including not only international transport costs and tariffs but also other trade cost components discussed in Anderson and van Wincoop (2004), such as direct and indirect costs associated with differences in languages, currencies and cumbersome import or export procedures. Higher values of the indicator of average overall trade costs indicate higher overall trade costs. Detailed information on the methodology used to compute the bilateral comprehensive trade costs can be found in Arvis et al. (2012, 2016), as well as in the short explanatory note accessible online at https://www.unescap.org/sites/default/d8files/Trade%20Cost%20Database%20-%20User%20note.pdf. (accessed on 1 January 2022).	Author's computation using the ESCAP-World Bank Trade Cost Database. Accessible online at https://www.unescap.org/resources/escap-world-bank-trade-cost-database. (accessed on 1 January 2022).

Table A1. Definition and source of variables.

Variables	Definition	Source
TARIFF	This is the indicator of the average tariff costs. It is the tariff component of the average overall trade costs. We have computed it, for a given country in a given year, as the average of the bilateral comprehensive tariff costs across all trading partners of this country. Data on the bilateral tariff cost indicator have been computed by Arvis et al. (2012, 2016). As the bilateral tariff cost indicator is (like the comprehensive trade costs) bidirectional in nature (i.e., include trade costs to and from a pair of countries), Arvis et al. (2012, 2016) have measured it as the geometric average of the tariffs imposed by the two partner countries on each other's imports (of agricultural and manufactured goods). Higher values of the indicator of the average tariff costs show an increase in the average tariff costs. Detailed information on the methodology used to compute the bilateral tariff costs can be found in Arvis et al. (2012, 2016), as well as in the short explanatory note accessible online at https://www.unescap.org/sites/default/d8files/Trade%20Cost%20Database%20-%20User%20note.pdf. (accessed on 1 January 2022).	Author's computation using the ESCAP-World Bank Trade Cost Database. Accessible online at https://www.unescap.org/resources/escap-world-bank-trade-cost-database. (accessed on 1 January 2022).
NTARIFF	This is the indicator of the average nontariff costs. It represents the second component (i.e., nontariff component) of the comprehensive trade costs. This is the indicator of the comprehensive trade costs, excluding the tariff costs. We have computed it, for a given country in a given year, as the average of the bilateral comprehensive nontariff costs (i.e., the comprehensive trade costs, excluding the tariff costs) across all trading partners of this country. Data on the bilateral nontariff cost indicator have been computed by Arvis et al. (2012, 2016) by following Anderson and van Wincoop (2004). Comprehensive trade costs, excluding tariffs, encompass all additional costs other than tariff costs involved in trading goods (agricultural and manufactured goods) bilaterally rather than domestically. Higher values of the indicator of average nontariff costs reflect a rise in nontariff costs. Detailed information on the methodology used to compute the bilateral tariff costs can be found in Arvis et al. (2012, 2016), as well as in the short explanatory note accessible online at https://www.unescap.org/sites/default/d8files/Trade%20Cost%20Database%20-%20User%20note.pdf. (accessed on 1 January 2022).	Author's computation using the ESCAP-World Bank Trade Cost Database. Accessible online at https://www.unescap.org/resources/escap-world-bank-trade-cost-database. (accessed on 1 January 2022).
Non-AfTTOT	This is the measure of the development aid allocated to other sectors in the economy than the trade sector. It has been computed as the difference between the gross disbursements of total ODA and the gross disbursements of total aid for trade (both being expressed in constant prices 2019, USD).	Author's calculation based on data extracted from the OECD/DAC-CRS database.
GDPC	Real per capita gross domestic product (constant 2015 USD).	United States Department of Agriculture (UNDA)'s Economic Research Service. See online at https://www.ers.usda.gov/data-products/international-macroeconomic-data-set/international-macroeconomic-data-set/. (accessed on 1 January 2022).

Table A1. Definition and source of variables.

Variables	Definition	Source
REER	This is the measure of the real effective exchange rate (CPI-based) (REER), computed using a nominal effective exchange rate based on 66 trading partners. An increase in the index indicates an appreciation in the real effective exchange rate, i.e., an appreciation in the home currency against the basket of currencies of trading partners.	Bruegel data sets (see Darvas 2012a, 2012b). The data set can be found online at: http://bruegel.org/publications/datasets/real-effective-exchange-rates-for-178-countries-a-new-database/. (accessed on 1 January 2022).
TERMS	This is the indicator of terms of trade, measured by the net barter terms of trade index (2000 = 100). This indicator is not expressed in percentage.	Author's calculation based on terms of trade data extracted from the WDI.
FINDEV	This is a proxy for financial development and is measured by the share of domestic credit to the private sector by banks, in GDP (not expressed in percentage).	WDI
POP	Total population	WDI
INST	This is the variable capturing institutional quality. It has been computed by extracting the first principal component (based on factor analysis) of the following six indicators of governance. These indicators are political stability and the absence of violence/terrorism; regulatory quality; the rule of law; government effectiveness; voice and accountability; and corruption. 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" variables have been extracted from World Bank Governance Indicators developed by Kaufmann et al. (2010) and updated recently. See online at https://info.worldbank.org/governance/wgi/. (accessed on 1 January 2022)

Appendix B

Table A2. Descriptive statistics on variables used in the analysis of the effect of AfT flows on investment-remittance flows.

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
RINV	505	0.011	0.014	0.0000043	0.086
RNONINV	505	0.046	0.058	0.000018	0.388
AfTTOT	505	0.010	0.012	0.0000039	0.074
AfTINFRA	505	0.006	0.008	0.00000033	0.062
AfTPROD	505	0.004	0.004	0.0000028	0.027
AfTPOL	495	0.000	0.001	0.000000014	0.014
TRCOST	470	319.536	56.167	150.2395	467.268
TARIFF	475	1.096	0.022	1.042	1.176
NTARIFF	455	279.107	52.329	128.532	433.378
Non-AfTTOT	505	0.037	0.059	0.00008	0.675
FINDEV	505	0.383	0.298	0.0213	1.594
TERMS	505	1.240	0.449	0.48395	4.537
GDPC	505	4247.006	3791.610	280.6682	18,663.550
POP	505	53,200,000	184,000,000	70,698.33	1,390,000,000

Appendix C

Table A3. List of the 106 countries used in the full sample, 30 of which are LDCs.

Full Sample			
Albania	Dominican Republic	Liberia **	Sudan **
Algeria	Ecuador	Madagascar **	Suriname
Angola **	Egypt, Arab Rep.	Malaysia	Syrian Arab Republic
Antigua and Barbuda	El Salvador	Maldives	Tajikistan
Argentina	Eswatini	Mali **	Tanzania **
Armenia	Ethiopia **	Mauritius	Thailand
Azerbaijan	Fiji	Mexico	Togo **
Bangladesh **	Gabon	Moldova	Tunisia
Belarus	Gambia **	Mongolia	Turkey
Belize	Georgia	Morocco	Uganda **
Benin **	Ghana	Mozambique **	Ukraine
Bhutan **	Grenada	Namibia	Uruguay
Bolivia	Guatemala	Nepal **	Uzbekistan
Bosnia and Herzegovina	Guinea **	Nicaragua	Venezuela, RB
Botswana	Guinea-Bissau **	Niger **	Vietnam
Brazil	Guyana	Nigeria	Zambia **
Burkina Faso **	Haiti **	North Macedonia	
Burundi **	Honduras	Pakistan	
Cabo Verde	India	Panama	
Cambodia **	Indonesia	Paraguay	
Cameroon	Iran, Islamic Rep.	Peru	
Chile	Iraq	Philippines	
China	Jamaica	Rwanda **	
Colombia	Jordan	Senegal **	

Table A3. *Cont.*

Full Sample		
Congo, Dem. Rep **	Kazakhstan	Serbia
Congo, Rep.	Kenya	Seychelles
Costa Rica	Kyrgyz Republic	Sierra Leone **
Côte d'Ivoire	Lao PDR **	South Africa
Djibouti **	Lebanon	Sri Lanka
Dominica	Lesotho **	St. Vincent and the Grenadines

Note: Least-developed countries (LDCs) are marked with "**".

Notes

1 The category of LDCs includes countries that are considered by the United Nations as the poorest and most vulnerable countries (in the world) both to exogenous economic and financial shocks and to environmental shocks. Further information on this group of countries can be obtained online at https://www.un.org/ohrlls/content/least-developed-countries (Access to the link on 1 March 2022).

2 Benziane et al. (2022) have provided a recent literature review on the effects of AfT flows in recipient countries.

3 See, for example, Amuedo-Dorantes and Pozo (2006); Buckley and Hofmann (2012); Haas (2005); Le (2011); Le and Bodman (2011); Mohapatra et al. (2011); Martinez et al. (2015); Saadi (2020); Shapiro and Mandelman (2016); Vaaler (2011, 2013); Woodruff and Zenteno (2007); Yang (2008, 2011); and Zheng and Musteen (2018).

4 This is one of the scarce studies that have investigated the effect of remittances on aid dependency rather than the effect of aid on remittances (Kpodar and Le Goff 2012).

5 According to Portugal-Perez and Wilson (2012, p. 1296), hard infrastructure encompasses highways, railroads, ports, etc., while soft infrastructure entails transparency, customs efficiency and institutional reforms.

6 Calì and te Velde (2011) have recognized the arbitrary choice of the lag with which AfT flows could affect exports in recipient countries. For this reason, they have used two lags (one-period lag and two-period lag) for the AfT variables in their analysis. In the present study, we present the estimates associated with only one lag of the share of the total AfT flows in GDP. The outcomes with a two-period lag of this variable are qualitatively similar to the ones with a one-period lag of the AfT variable and can be obtained upon request.

7 The likely state-dependence nature of the dependent variable that would require the estimation of dynamic model (1) would yield biased estimates if the estimation were performed using the fixed-effects estimator. This is because the lagged dependent variable will be correlated with the fixed effects in the error term, and the bias of this correlation would increase because the time dimension of the panel data set is small (this is the so-called Nickel bias—Nickell 1981).

8 Chami et al. (2008) have considered that remittance-dependent countries are those whose ratio of remittances to GDP is equal to or higher than 5%. The present analysis focuses on the countries' dependence on investment-oriented remittance inflows.

9 As well noted by Hou et al. (2021), the methodology adopted by Arvis et al. (2012, 2016) for computing trade cost parameters is theoretically well grounded in the gravity model (Anderson and van Wincoop 2004), the Ricardian model (Eaton and Kortum 2002) and the heterogeneous firms model (Melitz and Ottaviano 2008).

10 This result concerns the estimate obtained from the FEs estimator, as for the result in column (1), the estimate is not significant at the conventional significance levels.

11 We obtained outcomes that are qualitatively similar to these ones when we examined whether the effect of each of the components of the total AfT flows on investment-oriented remittance flows depends on the population size. In other words, the effects of each of these components of total AfT flows are positive and increase with the population size. The results on these estimates can be obtained upon request.

12 The other expected option was for the introduction of the trade cost indicator to cancel out the significance of the coefficient of the variable capturing the total AfT flows, at the 10% level.

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