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CONTENTS

Potential and Actual FDI Spillovers in Global Value Chains

The Role of Foreign Investor Characteristics, Absorptive Capacity and Transmission Channels

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ABSTRACT

Using unique survey data on direct supplier-multinational linkages in Chile, Ghana, Kenya, Lesotho, Mozambique, Swaziland, and Vietnam, this paper first evaluates how foreign investors differ from domestic producers in terms of their potential to generate positive spillovers for local suppliers. It finds that foreign firms outperform domestic producers on several indicators, but have fewer linkages with the local economy and offer less supplier assistance, resulting in offsetting effects on the spillover potential. The paper also studies the relationship between foreign investor characteristics and linkages with the local economy as well as assistance extended to local suppliers. It finds that foreign investor characteristics matter for both.

Additionally, this paper examines the role of suppliers' absorptive capacities in determining the intensity of their linkages with multinationals. The results indicate that several supplier characteristics matter, but these effects also depend on the length of the supplier relationship. Finally, the paper assesses whether assistance or requirements from the multinational influence spillovers on suppliers. The results confirm the existence of positive effects of assistance (including technical audits, joint product development, and technology licensing) on foreign direct investment spillovers, while we find no evidence for demand effects.

JEL Classification: F1, F2

Keywords: Foreign direct investment, vertical spillovers, linkages, global value chains, foreign firm characteristics, absorptive capacity, transmission channels, agri-business, apparel, mining.

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1. INTRODUCTION

1.1. Motivation

Typically coordinated by lead firms, global value chains (GVCs) involve international trade flows within their networks of foreign affiliates, contractual partners, and arm's-length external suppliers (UNCTAD 2013). GVCs "unbundle" factories by offshoring firm-specific know-how along the stages of production, and those international flows of know-how are a key reason why GVCs offer unprecedented development opportunities to participating countries. Developing countries can now industrialize by joining GVCs without the need to build their own value chain from scratch, as Japan and the Republic of Korea had to do in the twentieth century (Baldwin 2012). That enables developing countries to focus on specific tasks in the value chain rather than producing the entire product, thereby lowering the threshold and costs for industrial development. Developing countries can benefit from foreign-originated intellectual property; trademarks; operational, managerial, and business practices; marketing expertise; and organizational models. Countries can join GVCs either by facilitating domestic firms' entry or by attracting foreign investors. The foreign direct investment (FDI) option includes more direct access to foreign know-how and technology (Taglioni and Winkler 2016).

In this context, many developing countries devote considerable attention and resources to attracting foreign investment from GVC lead firms as a means to enter GVCs. This is done in the hope not only of generating benefits like jobs, foreign exchange, tax revenues, but more importantly of realizing dynamic knowledge "spillovers" to the domestic economy, especially when there is too little domestic private capital to stimulate growth. These spillovers generally refer to productivity improvements resulting from knowledge diffusion from multinational affiliates to domestic firms – both in the form of unintentional transmission or intentional transfer if the multinational is not compensated for by the domestic firm – encompassing both technology and all forms of codified and 'tacit knowledge' related to production, including management and organizational practices. It also includes the benefits that can accrue to local participants when they link into the global networks of multinational investors.

A vast set of empirical evidence has been amassed over the past decade on the existence and direction of FDI-generated horizontal and vertical productivity spillovers. Numerous econometric studies show ambiguous effects of FDI on domestic firm productivity within the same sector, also known as horizontal spillovers (see, e.g., extensive literature reviews in Görg and Greenaway 2004, Lipsey and Sjöholm 2005, Smeets 2008, among others). Other studies have shifted the focus to vertical spillovers to domestic firms in upstream and downstream sectors (see, e.g., seminal contributions by Javorcik 2004 and Blalock and Gertler 2008). The increasing number of studies has encouraged researchers to quantitatively synthesize the empirical results in meta-analyses (e.g. Görg and Strobl 2001; Meyer and Sinani 2009; and Havranek and Irsova 2011). The most recent and largest meta-analysis, for instance, takes into account 3,626 estimates from 55 studies on FDI spillovers and finds evidence for positive and economically important backward spillovers from multinationals on local suppliers in upstream sectors and smaller positive effects on local customers in downstream sectors. However, the authors reject the existence of horizontal FDI spillovers (Havranek and Irsova 2011). This paper focuses on backward spillovers from multinationals to local suppliers.

Significant research gaps remain, as identified in a recent survey of the empirical literature (Javorcik 2009). Among the gaps identified, there is the need to (i) determine the conditions under which spillovers are likely to materialize; (ii) understand more specifically the mechanisms behind the observed patterns; and (iii) extend the scope of investigations beyond the manufacturing sector (Javorcik 2009). The second research gap is also a function of the FDI measure being used. The econometric studies above, for example, measure FDI only at the broad sectoral level, but don't

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include direct supplier relationships with multinational firms which are based on survey data and could reveal the exact underlying mechanisms (Javorcik and Spatareanu 2009).

Theoretical contributions in this field include the models by Rodríguez-Clare (1996), Markusen and Venables (1999), Lin and Saggi (2007), and Carluccio and Fally (2013). The theoretical models show that FDI leads to positive and negative backward, forward, and horizontal spillovers via several transmission channels, such as the variety, competition, and delinkage effects. In addition, the models underline that foreign investor characteristics matter for the extent of welfare effects from multinational entry. Finally, the theoretical literature review also shows that domestic firms' absorptive capacity influences the direction of FDI spillovers.

For policy makers in developing countries, this means that not all FDI generates the same potential for spillovers. In many lower-income countries, FDI attraction happens through export-processing zones (EPZs), which can provide a way for the country not only to attract FDI, but also to connect the local labor force to established GVCs and to increase exports. Within the framework of GVCs, EPZs have a clear rationale, but empirical research also shows that their ability to generate development yields mixed results, as they often fail to connect to the rest of the economy. Therefore, attracting the "right" foreign investors under the right conditions matters strongly. At the foreign investor level, several characteristics have shown to influence the spillover potential of multinationals, including their degree of foreign ownership, length of foreign presence, technology intensity, sourcing strategy, and FDI motive, among others (Farole, Staritz, and Winkler 2014; Taglioni and Winkler 2016).[2]

Similarly, not all domestic firms benefit from FDI spillovers to the same extent. Studies have identified several domestic firm characteristics which determine their absorptive capacity to internalize FDI spillovers. These include their technology gap, research and development (R&D), human capital, firm size, export behavior, and firm location. Finally, it is important to identify the transmission channels through which knowledge and productivity gains spill-over from multinationals to domestic firms. These include demand, assistance, diffusion, availability and quality effects. Insights into the conditions and mechanisms help policy makers in developing countries maximize the gains from GVC participation by targeting foreign investors more strategically, putting in place policies that prepare local firms to better to absorb knowledge spillovers, and optimizing the functioning of the transmission channels between them (Farole, Staritz, and Winkler 2014; Taglioni and Winkler 2016).

1.2. Contribution

Using newly collected survey data on direct supplier-multinational linkages in Chile, Ghana, Kenya, Lesotho, Mozambique, Swaziland, and Vietnam, this paper addresses these research gaps as follows. First, we evaluate how foreign investors differ from domestic producers in terms of their overall performance, linkages with the local economy, and supplier assistance which all influence their potential to generate productivity spillovers. In a developing country context, it could be expected that multinationals show a higher spillover potential, in particular in terms of their technological level. We find that while foreign investors outperform domestic producers in many relevant aspects, they have fewer linkages and seem to offer less assistance to local suppliers which both can limit the positive impact from FDI.

Second, we also study the relationship between foreign investor characteristics and linkages with the local economy as well as assistance extended to local suppliers. In sum, we find that foreign investor characteristics matter for FDI linkages and supplier assistance, but the size and

[2] In an early attempt to determine the role of foreign investor characteristics in China, Tian (2007) identified variables at the multinational firm level that influence the extent of FDI spillovers. The variables in his study include the type of asset (tangible versus intangible), product (new versus traditional), consumer (exports versus domestic consumption), and employment (skilled vs. less-skilled workers). Positive FDI spillovers were generated through tangible assets, traditional products, domestically-consumed products, and less-skilled workers.

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direction of the relationship depends on the measure of FDI spillover potential being used. Third, we shift the focus to domestic suppliers and examine the role of supplier firm characteristics (absorptive capacities) for their linkages with multinationals. The results indicate that several supplier characteristics matter for FDI linkages, which in turn increases the FDI spillover potential.[3]

Fourth, focusing on assistance and demand effects, we assess how factors within the transmission channels between multinationals and local suppliers affect FDI spillovers. While the former effect increases domestic supplier productivity through direct assistance from multinationals, the latter effect focuses on spillovers through the demand of multinationals for better and/or more diverse inputs. The results confirm that several transmission channels matter for backward FDI spillovers. In sum, we find evidence for the existence of positive assistance effects in GVCs, while demand effects do not have any impact. We also study which types of assistance are most effective in generating positive FDI spillovers in our data sample.

Fifth, while the majority of studies focuses on FDI spillovers in manufacturing sectors, this paper addresses this knowledge gap by also covering two natural resources-intensive industries, namely agribusiness and mining (besides apparel), in our sample. Sixth, much of the empirical evidence on FDI spillovers focuses on the transition economies of Central and Eastern Europe and China. Only few empirical studies focus on developing countries, including India, Indonesia, Mexico, Uruguay and Venezuela. The reason for this small country coverage is probably limited data availability, as firm-level data are rarely existent in developing countries, especially smaller ones.

Finally, our paper contributes to the low number of studies on FDI spillovers that focus on direct supplier-multinational linkages based on foreign investor or supplier survey data. Focusing on foreign affiliates in five transition economies, Giroud, Jindra and Marek (2012) find that foreign firm characteristics have a positive impact on backward FDI linkages and spillovers. Javorcik and Spatareanu (2009) find evidence for "learning-by-supplying" for a sample of Czech manufacturing firms, although there is also evidence for self-selection into supplying due to a higher productivity ex ante. Jordaan (2011) also confirms the existence of positive backward spillovers on manufacturing suppliers in Mexico. Specifically, positive spillovers are facilitated through supplier firms' absorptive capacities and the level of support from the multinational. Studying the Polish automotive sector, Gentile-Lüdecke and Giroud (2012) examine the mechanisms behind knowledge spillovers of suppliers. While the authors don't find evidence for a supporting role of suppliers' absorptive capacities on knowledge acquisition, they find evidence for a supportive role on performance improvement and new knowledge creation.

This paper is structured as follows. The next section provides a review of the theoretical and empirical literature on FDI spillovers. It discusses the main transmission channels through which FDI spillovers can be generated, and identifies major foreign investor characteristics and domestic firms' absorptive capacities which can influence FDI spillovers. Section 3 compares foreign investors and domestic producers in terms of their potential to generate productivity spillovers and also studies the role of foreign investor characteristics for their FDI spillover potential. Section 4 then evaluates the role of suppliers' absorptive capacities for FDI linkages, while section 5 analyzes various factors within the transmission channels between suppliers and multinationals that increase FDI spillovers. Section 6 concludes.

[3] Note that while the data are not suited to measure actual spillovers, the extent of linkages and supplier assistance seem to be appropriate proxies for spillover potential. Driffield, Munday, and Roberts (2002), for example, find that the intensity of linkages between foreign and domestic firms have an impact on productivity growth in domestic manufacturing industries.

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2. LITERATURE REVIEW

2.1. Theoretical Background

This section reviews the small theoretical literature on the welfare effects of FDI in the host country, discusses the underlying transmission channels, and identifies how foreign investor and domestic firm characteristics influence FDI spillovers in these models.

The earliest model by Rodríguez-Clare (1996) assumes a developing country context in which multinational and domestic producers source specialized inputs from the upstream sector in the host country. The domestic upstream sector is characterized by monopolistic competition. Other assumptions include (i) the love of variety for inputs in the production of final goods, (ii) high transportation costs for specialized inputs, and (iii) increasing returns in the firms' production.[4] Foreign entry raises the demand for inputs from the domestic upstream sector via backward linkages which, in turn, increases the variety of inputs due to monopolistic competition. The larger variety of upstream inputs creates a positive externality in the form of productivity gains to domestic final good producers which could be considered positive backward spillovers (variety effect).

Rodríguez-Clare (1996) specifically takes into account characteristics of the multinational which influence the extent of backward spillovers. In the model, the strength of the multinational-domestic supplier linkages depends on (i) the communication costs between the multinational's headquarters and the production plant in the host country, (ii) the complexity of the production process, and (iii) the levels of development in the home and host countries which determine the variety of upstream inputs that are available in the host country. The backward linkage effect is stronger when communication costs are higher, the production process of multinationals is more complex, and the host country is more developed. The model also allows for the existence of forward linkages (which could be considered positive forward spillovers), as the expansion of specialized input production enables firms to produce more complex goods at competitive costs (availability effect). In sum, the model shows that foreign investor characteristics such as the complexity of the production process or the development gap between the host and home country mediate the extent of backward and forward spillovers.

The theoretical model by Markusen and Venables (1999) examines the effects of multinational entry on the host economy in a similar setup, and differentiates between two effects. The first is an increased product market competition between multinationals and domestic producers, driving out some domestic firms within the same sector (competition effect). This effect is absent in the model by Rodríguez-Clare (1996) due to the assumption that the final good is only produced by the multinational. The second is a backward linkage effect on local suppliers in the upstream sector. The backward linkage effect, in turn, could benefit domestic final producers via forward linkages, through the entry of input suppliers, raising local production and lowering input prices. The extent of the positive backward linkage effect depends on the multinational's intensity of sourcing local inputs compared to domestic producers. Again, this model shows that foreign investor characteristics, such as the local sourcing intensity in the host country, matter.

Integrating technology transfer from multinationals to domestic suppliers and exclusive contracts into their model, Lin and Saggi (2007) show that multinational entry can also lead to negative forward linkage effects. The model allows for the possibility for selected local suppliers to benefit from technology transfer by a multinational, but only if the suppliers contractually agree to exclusively supply inputs to the latter.[5] For the multinational firm, exclusivity has two

[4] While access to foreign inputs is a common motivation for lead firms in GVCs, the model's assumption of high transportation costs for specialized inputs is less realistic given falling transportation and trade costs in many countries.

[5] The exclusive contractual agreement between local suppliers and the multinational in this model exemplifies a captive governance structure. Gereffi, Humphrey and Sturgeon (2005) distinguish between five governance structures that can exist between lead firms and suppliers in GVCs – market, modular, relational, captive, and hierarchical – which increase in their degree of explicit coordination by the lead firm and power asymmetry between the lead firm and its suppliers.

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advantages: (i) Technology transfer lowers production costs, but only of those selected local suppliers, via backward linkages. (ii) And exclusivity reduces the amount of local suppliers that sell to domestic producers (delinkage effect), thereby reducing their competition and raising their production costs (forward linkage effects). The delinkage effect emphasizes that multinationals displace existing linkages between local suppliers and producers, while the forward linkage effect focuses on the welfare implications for domestic producers.

Three variables determine whether selected suppliers benefit from this contractual agreement: (i) the number of other local suppliers that sell exclusively to the multinational, (ii) the extent of technology transfer, and (iii) the demand for upstream inputs by domestic producers. The gains for exclusive suppliers are higher if the number of selected suppliers is smaller (as their competition declines, while the competition of suppliers selling to domestic producers increases), if the extent of technology transfer is sufficiently large, and if demand for upstream inputs by domestic producers is smaller (as the additional demand created by multinational entry is more likely to offset the negative forward linkage effect). The model confirms that foreign investor characteristics, such as the extent of technology transfer, matter for the overall welfare impact of multinational entry.

While Carluccio and Fally (2013) also allow for the possibility of a negative forward linkage effect, this externality can be reversed for domestic producers with a high absorptive capacity. Their model setup allows for firm heterogeneity, free entry, and free technological choice for all types of firms. Multinational entry reorganizes the domestic upstream sector, as multinationals require different types of inputs compared to domestic producers due to technological differences. The more efficient the foreign technology is with regard to the domestic technology (i.e. the higher the technology gap), the larger is the share of local suppliers that wants to produce for multinationals, and the smaller are relative input costs for these suppliers. This, in turn, raises the demand for inputs from these suppliers and encourages them to increase the variety of their inputs (variety effect).

These spillovers affect the adoption of foreign technology in the downstream sector. Only those domestic producers that are capable to adopt the foreign technology benefit from multinational entry, while lower-productivity domestic producers maintain their technology gap and face negative welfare effects. While the model confirms the mediating role of foreign firm characteristics, such as the technology gap, on welfare, it introduces another important feature, namely that domestic firm characteristics matter for FDI spillovers. In the model, only the most productive local producers are capable to adopt the foreign technology and thus benefit from the variety effect. In other words, the welfare effects of multinational entry also depend on the domestic firms' absorptive capacity[6].

In summary, the theoretical models show that FDI leads to positive and negative backward, forward, and horizontal spillovers via several transmission channels, such as the variety, competition, and delinkage effects. In addition, the models underline that foreign investor characteristics matter for the extent of welfare effects from multinational entry. Such characteristics include the complexity of the production process, the development gap between the host and home country, the local sourcing intensity, the extent of technology transfer, and the technology gap between foreign and local firms. Finally, the theoretical literature review also shows that domestic firms' absorptive capacity such as their capability to adopt foreign technology influences the direction of FDI spillovers.

[6] Grünfeld (2006) explicitly models the concept of absorptive capacity in a three-stage Cournot duopoly model in which multinational firms decide whether they serve foreign markets via exports or via an affilicate in the host country. While the model focuses on an industrialized country context where host country R&D spillovers are the main FDI motive for the multinational, it shows that the extent of R&D spillovers is influenced by the multinational's own R&D investments.

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2.2. Factors that Shape FDI Spillovers

This section reviews empirical studies on FDI spillovers that explicitly take into account the mediating role of foreign investor characteristics and local firms' absorptive capacity. We deliberately focus on studies only that are undertaken in a developing or emerging country context, as some findings could be expected to be different in a developed country setting. Much of the empirical evidence focuses on the transition economies of Central and Eastern Europe and China. Only few empirical studies focus on developing countries, including India, Indonesia, Mexico, Uruguay and Venezuela. The reason for this small country coverage seems to be limited data availability, as firm-level data are rarely existent in developing countries, especially smaller ones. The findings are therefore not suited to be generalized, but can be used to be compared against each other. Before reviewing the relevant empirical literature, we summarize the various transmission channels through which FDI spillovers can materialize.[7]

Transmission Channels

Understanding the transmission channels and mechanisms through which FDI spillovers can be generated in the first place is important when exploring how such spillovers are shaped by mediating factors. In the FDI literature, several channels for spillovers are identified (Hoekman and Javorcik 2006; Crespo and Fontoura 2007; among many others). These can be categorized in three main channels: (i) changing market forces (i.e. competition and demonstration effect), (ii) labor turnover, and (iii) value chains (i.e. demand and assistance effect, diffusion effect, availability and quality effect). The focus of this paper is on value chains.

Spillovers through GVCs emerge, e.g., when local firms become input or service suppliers of multinational firms. Specifically, FDI spillovers can be generated through the demand of multinationals for better and/or more diverse inputs (*demand effect*). Hereby, multinational affiliates might help local producers to upgrade their technological capabilities directly through sharing of production techniques and product design and assisting with technology acquisition (*assistance effect*) (Paus and Gallagher 2008). Spillovers to supplying industries may also be generated through personnel training, advance payment, leasing of machinery, provision of inputs, help with quality assurance and organization of product lines (Lall 1980; Crespo and Fontoura 2007; Javorcik 2008).

While the demand and assistance effects are intentional, unintentional knowledge spillovers can occur, e.g., through technology leakages to other supplying firms in the sector (*diffusion effect*). Finally, while the previously described effects refer to backward spillovers from multinationals to suppliers, there is also the case where a multinational firm supplies to a local producer in downstream sectors. This increases the availability, variety, and reliability of higher-quality inputs (*availability and quality effects*) (Javorcik 2008). Or there could be the case – as modelled in the theoretical literature above – that the variety of local inputs in upstream sectors increases due to multinational entry, which indirectly benefits domestic producers in downstream sectors. Given our data sample which covers surveys of suppliers that produce inputs for multinationals, we are only able to examine demand and assistance effects in our empirical analysis.

Foreign Investor Characteristics

The degree of *foreign ownership* affects local firms' potential to absorb FDI spillovers in developing and emerging countries. A higher share of foreign ownership, and, thus, larger control over management and lower potential for knowledge leakages, correlates positively with the parent firm's incentive to transfer knowledge, e.g., in the form of technology which has been

[7] While some of the transmission channels and mediating factors have already been identified in the theoretical models above, the aim of this section is to give a more comprehensive picture following the conceptual framework by Farole, Staritz, and Winkler (2014).

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confirmed by an empirical study for Indonesia (Taaki 2005). On the other hand, a larger domestic ownership share could also be beneficial for local firms, since the foreign investor's interests are less-well protected making technology leakages more likely (demonstration effect). A larger domestic participation might further increase the likelihood to rely on domestic suppliers (Crespo and Fontoura 2007). Toth and Semjen (1999) confirm that a larger domestic ownership share led to more inter-sectoral linkages in Hungary (reported in Crespo and Fontoura 2007).

Empirical studies controlling for different *structures of foreign ownership* tend to support the more positive spillover effects of joint ventures, especially in emerging economies. Explanations include the possibility of more vertical linkages as well as stronger technology leakages for partially-owned foreign firms (Javorcik and Spatareanu 2008). For example, Javorcik (2004) for Lithuania and Javorcik and Spatareanu (2008) for Romania find a positive vertical spillover effect on domestic firms in supplying industries from multinationals with partial foreign ownership, but not from multinationals with full foreign ownership. Abraham et al. (2010) find for a sample of Chinese manufacturing firms that foreign ownership in a domestic firm's sector only results in positive horizontal spillovers when foreign ownership is organized as a joint-venture. By contrast, the presence of fully-owned foreign firm is found to have a negative impact on local firms, due to technology intensity of multinationals crowding-out local producers within the same sectors (Abraham et al. 2010).

In addition, the *length of foreign presence* of a multinational in the host country also influences FDI spillovers. Focusing on FDI spillovers from old versus new firms in 17 Central and Eastern Europe transition economies, Turkey and the Commonwealth of Independent States, Gorodnichenko, Svejnar, and Terrell (2007), for example, find significantly positive forward and horizontal FDI spillovers from older firms (i.e. firms that were established before 1991), while these effects cannot be confirmed for newer firms (i.e. firms that were established in or after 1991).

FDI spillovers also depend on the *technology intensity* of the multinational's goods produced in the host country which has been studied in the context of China. More technology- or R&D-intensive products generally contain a greater element of knowledge and broader set of skills. However, the production of high-tech products might also involve low-tech processes which could offset this effect (Paus and Gallagher 2008). Focusing on FDI in technology-intensive industries, Buckley, Wang, and Clegg (2007) find positive spillovers on Chinese firms to be stronger if originated by Western-owned multinationals compared to affiliates from Taiwan, Hong Kong, and Macau which they relate to the higher technology intensity in Western-owned affiliates. Analogously, Lin, Liub, and Zhanga (2009) confirm the positive horizontal and vertical spillovers on Chinese firms for FDI from other countries, while FDI from Taiwan, Hong-Kong, and Macao, results in positive forward FDI spillovers only, but in no backward spillovers and negative horizontal FDI spillovers. This is also explained with the more labor-intensive nature of foreign affiliates from Taiwan, Hong-Kong, and Macao (Lin et al. 2009).

Related to the previous is the *FDI home country* which may have an effect on the production strategy pursued and on the technologies used in host countries, but may also have other effects on the spillover potential. Buckley, Clegg, and Wang (2007), for instance, confirm a curvilinear spillover effect in China from multinationals from overseas Chinese Kong, Macau and Taiwan, but not from Western multinationals which is more strongly pronounced in low-tech industries. The home country of FDI influences managerial practices and cultures which are related to differences in the use of expatriate workers, attitudes and strategies to the training of local workers and general skills development. Further, end market segmentation – closely linked to FDI home countries through historical, cultural and language ties, as well as trade policies – is a common practice. In the apparel sector, for example, European-owned firms in the apparel sector in Mauritius and Madagascar largely export to Europe whereas Asian owned firms serve the U.S. market (Gibbon 2003, 2008; Staritz and Morris 2012). These patterns impact on spillover potential, as buyer

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sourcing requirements and practices can vary considerably by market. Moreover, production for one specific market may bring a firm set up and an overhead structure that is uncompetitive for other markets (Gibbon 2003, 2008).

Analogously, a multinational firm's *sourcing strategy* may affect the FDI spillover potential. If a multinational firm sources on a global scale, it may follow a co-sourcing strategy, resulting in an increased reliance on imported inputs from established suppliers abroad. Alternatively, a multinational firm might follow co-location strategies requiring an established foreign input supplier to also enter the host country. Both could render the entrance of new local suppliers more difficult. This is particularly common for multinationals in the clothing, footwear, electronics and automotive sector (Paus and Gallagher 2008). Moreover, the share of intermediates sourced locally by multinationals is likely to increase with the distance between the host and the source economy. It is also likely to be larger for multinationals originating in countries outside the preferential trade agreement to which the host country belongs, as it makes imports from the home country less attractive (e.g. Javorcik and Spatareanu 2011 for Romania).

Different *motivations* for undertaking FDI are likely to mediate spillover potential. Dunning's famous OLI (Ownership, Location, and Internationalization) framework discusses different motives which determine where multinationals locate, including market-seeking, efficiency-seeking, resource-seeking, and asset-seeking (Dunning 1977).[8] The conventional wisdom is that resource-seeking FDI has less potential for spillovers, due to its capital and technology intensity and limited time horizons. By contrast, it is often considered that FDI in the manufacturing sector has higher spillover potential as it is largely driven by efficiency-seeking motives. Indeed, the more labor-intensive nature of manufacturing investment, its requirements for a broad range of goods and services inputs, and the lower barriers to domestic forward linkages (relative to resource-seeking FDI), make it a strong candidate for contributing spillovers. Market-seeking FDI, in particular in retail, is also considered as providing higher spillover potential as retailers tend to source from local producers, in particular for food and other perishable products. However, evidence remains ambiguous, suggesting that the situation may be context-specific. Moreover, FDI can encompass several motives simultaneously, as shown in the taxonomy by Driffield and Love (2007). Multinationals may seek to source foreign technology abroad (resource-seeking) not because they are technologically inferior, but because technology may be cheaper (efficiency-seeking).

Absorptive Capacities

The *technology gap* of domestic firms has been identified as one of the most important mediating factors for FDI spillovers[9] in developing countries. Views on the role of the technology gap for FDI spillovers conflict. Some studies argue that a large technology gap is beneficial for local firms since their catching-up potential increases (Findlay 1978; Wang and Blomström 1992; Smeets 2008). Other studies find that local firms might not be able to absorb positive FDI spillovers if the technology gap between the multinational and local firms is too big or too small (e.g. Kokko 1994 for Mexico; Kokko, Tansini, and Zejan 1996 for Uruguay; Blalock and Gertler 2009 for Indonesia).

There are also studies confirming the supportive role of *R&D* in domestic firms for developing or emerging countries, including the Czech Republic (Kinoshita 2001), India (Kanturia 2000, 2001, 2002), Hungary and Slovakia (Damijan, Knell, Majcen, and Rojec 2003), and Indonesia

[8] Dunning acknowledges that his distinction was borrowed from Behrman (1972) and extended (see, e.g., Dunning and Lundan 2008).

[9] The technology gap is usually measured as a domestic firm's productivity level relative to a benchmark productivity level within the same sector – often of the leading firms (Griffith, Redding, and Simpson 2002; Girma 2005; Girma and Görg 2007) or of foreign firms (Castellini and Zanfei 2003).

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(Blalock and Gertler 2009) among others. One exception is Damijan et al. (2003) finding a negative role of firm-level R&D on FDI spillovers for Estonia and Latvia (reported in Crespo and Fontura 2007). Gentile-Lüdecke and Giroud (2012) find no impact of suppliers' R&D intensity on their knowledge acquisition from multinationals, but on local suppliers' new knowledge creation in terms of new products, services and technologies for Poland.

A domestic firm's ability to absorb foreign technology might also be positively related to its share of *skilled labor* which could be particularly relevant in a developing country context. Blalock and Gertler (2009), for example, find that the proportion of employees with college degrees significantly increases domestic firms' productivity gains from FDI in Indonesian manufacturing. By contrast, Sinani and Meyer (2004) find for a sample of Estonian firms that a larger share of human capital reduces the positive spillover effects for domestic firms, but increases it for large firms. Their explanation for this contradicting result is that the competition effect might reduce workers' possibility to extract additional rents from local firms, since multinationals tend to pay better wages. The competition effect might also enable larger firms to keep skilled workers compared to smaller firms who might lose skilled workers to foreign firms.

Views on the role of *firm size* differ. Firm size has been positively related to a domestic firm's capacity to absorb FDI spillovers in developing countries (e.g. Jordaan 2011 for Mexico). Larger firms may be better positioned to compete with multinationals and to imitate their tools (Crespo and Fontoura 2007). Analogously, larger firms may pay better wages and therefore find it easier to attract workers employed by multinational firms. Larger firms might also be more visible, e.g. organized in associations, and, thus, more likely selected as local suppliers by foreign firms. While Aitken and Harrison (1999) find negative spillovers from FDI on domestic plants in Venezuela, these effects are only significant for firms with less than 50 employees. This suggests that smaller firms are less competitive and less capable of absorbing positive spillover effects. In contrast, other studies on emerging countries find that small and medium-sized firms benefit more strongly from FDI spillovers, especially those firms with a higher proportion of skilled labor (e.g. Sinani and Meyer 2004 for Estonia). Gentile-Lüdecke and Giroud (2012) also find evidence for a negative effect of firm size on knowledge acquisition from multinationals for suppliers in the Polish automotive sector.

Exporting has been linked to a domestic firm's absorptive capacity for at least two reasons. First, local exporting firms are generally characterized by a higher productivity, be it via learning-by-exporting or self-selection into exporting, rendering them more competitive to bear up against negative rivalry effects created by multinationals (Crespo and Fontoura 2007). Second, the more a local firm exports, the lower will competitive pressures from multinational firms be felt (assuming that the multinational firm does not enter the same export market), hence, the incentive to improve, which lowers the extent of positive FDI spillovers. However, studies show no clear evidence whether exporting increases or lowers the productivity gains from FDI. Several studies find evidence for lower productivity gains for exporters (e.g. Blomström and Sjöholm 1999 for Indonesia, Ponomareva 2000 for Russia, Sinai and Meyer 2004 for Estonia, Abraham et al. 2010 and Du, Harrison, and Jefferson 2011 for China). In contrast, some studies find that the gains from FDI are larger for exporting firms (e.g., Schoors and van der Tol 2002 for Hungary, Lin at al. 2009 for China, Jordaan 2011 for Mexico).

Several aspects of domestic firm *location* have shown to be important for the extent of productivity spillovers from FDI. The co-location of foreign and domestic firms in the same region in developing and emerging countries can reduce the benefits from FDI on domestic firms. For example, Sjöholm (1999) confirms positive spillover effects when FDI is measured at the country-sector level in Indonesia, but finds negative spillovers when foreign presence is measured at the region-sector level. Aitken and Harrison (1999) find similar results for Venezuela and Yudaeva, Kozlov, Malentieva, and Ponomareva (2003) for Russia.

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Besides agglomerations, studies focused on other aspects of location. Firm location in special economic zones, for example, can have a negative impact on FDI spillovers if the zone focuses on export processing combined with a high percentage of imported inputs (e.g. Abraham et al. 2010 for China). More regional development seems to have a positive effect (e.g. Ponomareva 2000 for Russia, Torlak 2004 for the Czech Republic).

3. WHICH FOREIGN INVESTOR CHARACTERISTICS INCREASE THE FDI SPILLOVER POTENTIAL?

This section focuses on the role of foreign investor characteristics for the FDI spillover potential. Section 3.1 presents the dataset being used in this section. Section 3.2 evaluates the differences between foreign investors and domestic producers in terms of their potential to generate positive spillovers. Section 3.3 examines if there are differences in the extent of FDI spillover potential between different groups of foreign investors, depending on their characteristics.

3.1. Data

The surveys, which form the basis for this paper, have been developed as part of a project by the International Trade Department of the World Bank which aims to assist low-income countries (LICs), particularly from Sub-Saharan Africa (SSA), to take better advantage of spillovers from FDI within the context of GVCs. Specifically, the project aims to identify the critical factors for the realization of FDI-related spillovers – including dynamic interactions between FDI and local suppliers.

Acknowledging that the extent and nature of potential FDI-generated spillovers differ importantly by sector and FDI motive, the project focuses not exclusively on manufacturing but includes, besides light manufacturing (apparel) two natural resources-based sectors which are particularly relevant for SSA LICs: mining and agribusiness. Given the share of FDI that goes into natural resources-intensive sectors, particularly in developing countries, understanding better the unique dynamics of FDI linkages and spillovers in sectors like agribusiness and mining represents an important opportunity. In addition, the study includes benchmark countries for these two sectors – Chile (for mining) and Vietnam (for agribusiness) – to be compared with the SSA countries.

Between March and October 2012, three different types of firms have been surveyed by various consultants, namely (i) national suppliers, i.e. firms with a national ownership of at least 75 percent that supply to multinationals in the country, (ii) foreign investors, i.e. firms that have a foreign ownership share of at least 25 percent, and (iii) national producers, i.e. domestic firms that are final goods producers and have a national ownership of at least 75 percent. In cases where reported data seemed unlikely, either consultants or the firms themselves were contacted again to make sure we obtained the correct numbers.

The focus of this section is on foreign investors, but we also compare their characteristics with domestic producers. The foreign investors' surveys cover 87 firms in Chile (5), Ghana (16), Kenya (20), Lesotho (15), Mozambique (10), Swaziland (11) and Vietnam (10). Table 1 shows that the majority of foreign investors are in apparel (43), followed by agribusiness (30) and mining (14). Domestic producers' surveys cover 64 firms in Chile (5), Ghana (10), Kenya (26), Mozambique (6) and Vietnam (17). The majority of these firms are in agribusiness (46), followed by apparel (13) and mining (5).

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Table 1.
Number of Firms by Type of Firm and Sector

Type	Sector	No. of firms	%
Foreign investor	Agribusiness	30	34.5%
Foreign investor	Apparel	43	49.4%
Foreign investor	Mining	14	16.1%
Foreign investor	All sectors	87	100.0%
Domestic producer	Agribusiness	46	71.9%
Domestic producer	Apparel	13	20.3%
Domestic producer	Mining	5	7.8%
Domestic producer	All sectors	64	100.0%

3.2. Differences between Foreign Investors and Domestic Producers

In this section, we assess the differences between foreign investors and domestic producers in terms of their potential to generate positive spillover effects for domestic suppliers. Foreign firms tend to make greater use of skills, know-how, capital and technology which is a major driver for developing countries to attract foreign investors (specifically from industrialized countries) as a means to participate in GVCs (Taglioni and Winkler 2016). In the following, we look at three types of indicators that all influence the spillover potential, namely the firms' overall performance, their linkages with the local economy, and supplier assistance.

Performance Indicators

Table 2 (column 1) shows the mean differences, controlling for country-sector fixed effects. Column (2) additionally controls for employment, since firm size may also explain some of the differences between multinationals and domestic producers. All variables refer to FY 2012. The summary statistics for both foreign investors and domestic producers can be found in Appendix A.

The results indicate that multinationals sell significantly more than domestic suppliers (ln*sales*), although the effect becomes smaller when controlling for firm size. Foreign firms are also more productive (ln*labprod*), and this effect is slightly larger when we additionally control for firm size. They also have a smaller technology gap (*tech*) to the leading domestic competitor (i.e. domestic producers generally lag further behind the domestic leader in the sector) which could be the result of being more productive.

The positive coefficient sign on the share of workers with tertiary education (*emp_ter*) and the negative coefficient sign on the share of workers with secondary education (*emp_sec*) seem to indicate that foreign firms have a labor force that is more skilled, although the effects are not significant. Foreign firms are more likely to export (*exporting*). The share of direct exports is clearly higher for foreign firms (*expsh_dir*), while the share of direct exports shows a negative coefficient sign, but has no statistically significant impact.

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Table 2.
Performance Indicators, Foreign Investors vs. Domestic Producers (Mean Difference)

Variable	Definition	Difference	Additional controls for ln*emp*
		(1)	(2)
ln*sales*	Firm's sales (USD) in natural logarithms	2.5893*** (0.000)	2.1162*** (0.000)
ln*age*	Number of years since firm has started operations in natural logarithms	-0.1429 (0.389)	-0.2192 (0.233)
ln*emp*	Firm's number of employees in natural logarithms	0.3410 (0.270)	n.a n.a.
ln*labprod*	Firm's sales per number of employees (USD) in natural logarithms	1.9528*** (0.000)	2.1162*** (0.000)
tech	Technology gap between firm and its leading domestic competitor in the same sector, where 1 means "not existent" and 4 means "large"	-0.4982*** (0.003)	-0.6094*** (0.000)
emp_ter	Percentage of workers with tertiary education in the firm's workforce	6.5680 (0.262)	8.9122 (0.106)
emp_sec	Percentage of workers with secondary education in the firm's workforce	-6.7298 (0.315)	-7.8271 (0.225)
export	Dummy taking the value of 1 if a firm exports, and 0 otherwise	0.6418** (0.025)	0.5233* (0.083)
expsh_dir	Percentage of direct exports of firm's total sales	35.7146*** (0.000)	33.3476*** (0.000)
expsh_ind	Percentage of indirect exports of firm's total sales	-1.6483 (0.681)	-4.8535 (0.206)

Note: Variables refer to FY 2012. All regressions control for country-sector fixed effects. Standard errors are robust to heteroscedasticity.

Source: Own calculations. $p^{*} < 0.1$, $p^{**} < 0.05$, $p^{***} < 0.01$ (p-values in parentheses).

In sum, we find that foreign investors tend to outperform domestic producers in terms of sales, firm size, productivity, technology gap, exporting behaviour, and direct export share. This finding implies a higher knowledge and productivity spillover potential of foreign investors compared to domestic firms which has served as justification for investment promotion measures in developing countries to enter GVCs.

Linkages with the Local Economy

In order for foreign investors to contribute to sustained economic development, however, they have to be linked to the rest of the economy. Table 3 compares foreign investors' and domestic producers' linkages with the local economy. Linkages are measured in terms of the share of domestic inputs and workers as well as a firm's percentage of sales going to the domestic market. All are expected to increase the potential of positive spillovers for local suppliers (see section 2.2). We also examine differences between types of inputs and workers. We follow the specification of the previous section. All variables refer to FY 2012. The summary statistics for both foreign investors and domestic producers are shown in Appendix B.

Foreign investors source a lower share of their total inputs from domestic suppliers (*inp_dom*) compared to domestic producers. We also evaluate if foreign investors and domestic producers differ in terms of their sourcing patterns. Foreign investors source a significantly lower share of raw

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materials (*inp_dom_mat*) and equipment and machinery (*inp_dom_equip*) as percentage of their total domestic inputs compared to domestic producers. On the other hand, their share of technical services (*inp_dom_tech*) as well as transport, security, cleaning, catering, and other services (*inp_dom_oth*) is significantly larger in comparison with domestic producers.

We now focus on the firms' use of local workers. Foreign firms clearly employ a lower share of domestic workers (*emp_dom*) than domestic producers. The differences are slightly larger when we control for firm size (column 2). These differences are no longer statistically significant if we differentiate between types of workers by educational level. As could be expected, foreign investors significantly make less use of domestic managers (*man_dom*) compared to domestic producers. While the coeffient signs are consistently negative for supervisors (*super_dom*) and technical positions (*tech_dom*), they narrowly miss the threshold of statistical significance.

Finally, we also look at forward linkages, measured as a firm's percentage of sales going to the domestic market (*market*). The results show unambiguously that foreign investors sell a lower percentage to the local market than domestic producers.

In sum, foreign investors are characterized by fewer linkages with the local economy, as they make less use of domestic workers and inputs and also sell a lower share of their output to the domestic market. The reason could be that many developing countries have established "competitive spaces"—enclave locations such as special economic zones and export processing zones, where the rules of business are different from those that prevail in the national territory and the costs of factors of production are lower. The problem is that, by their nature, they resist such links for several reasons.[10] Most studies of the backward links of firms in such spaces find the links to be minimal, with domestic trade remaining very low and technology spillovers rare (e.g., Milberg and Winkler 2013). However, the findings also show that certain service inputs, namely technical services and transport, security, cleaning, catering, and other services, show a higher potential for linkages.

Table 3.
Linkages, Foreign Investors vs. Domestic Producers (Mean Difference)

Variable	Definition	Difference	Additional controls for ln*emp*
		(1)	(2)
Inputs			
inp_dom	Percentage of inputs sourced from domestic suppliers in the firm's total inputs	-16.0734*** (0.008)	-12.4843** (0.043)
inp_dom_mat	Percentage of raw materials from domestic firms of firm's total input purchases from domestic firms	-16.1221*** (0.002)	-12.4158** (0.029)
inp_dom_comp	Percentage of parts and components from domestic firms of firm's total input purchases from domestic firms	-0.1020 (0.938)	-0.3504 (0.807)
inp_dom_pack	Percentage of packaging from domestic firms of firm's total input purchases from domestic firms	3.7895 (0.331)	5.6411 (0.201)
inp_dom_equip	Percentage of equipment and machinery from domestic firms of firm's total input purchases from domestic firms	-5.0125** (0.025)	-5.0252** (0.041)
inp_dom_bus	Percentage of business services from domestic firms of firm's total input purchases from domestic firms	0.7942 (0.693)	-0.1636 (0.940)

[10] Many foreign firms may follow a co-sourcing strategy, relying on imported inputs from established suppliers abroad, or they may follow co-location strategies that require established foreign input suppliers to enter the country as well.

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Variable	Definition	Difference	Additional controls for ln*emp*
		(1)	(2)
inp_dom_tech	Percentage of technical services from domestic firms of firm's total input purchases from domestic firms	3.7713** (0.018)	3.7013** (0.031)
inp_dom_oth	Percentage of transport, security, cleaning, catering, and other services from domestic firms of firm's total input purchases from domestic firms	13.9780*** (0.000)	9.5439*** (0.001)
Labor			
emp_dom	Percentage of domestic workers in the firm's total workforce	-4.0758*** (0.002)	-4.4249*** (0.002)
emp_ter_dom	Percentage of domestic workers with tertiary education in the firm's workforce	2.8700 (0.613)	4.1928 (0.445)
emp_sec_dom	Percentage of domestic workers with secondary education in	-7.6005 (0.261)	-8.0573 (0.225)
emp_oth_dom	Percentage of other domestic workers in the firm's workforce	-0.1145 (0.986)	-0.7786 (0.906)
man_dom	Percentage of domestic managers of firm's total managers	-15.5842*** (0.000)	-16.4872*** (0.000)
super_dom	Percentage of domestic supervisors of firm's total supervisors	-6.6335 (0.181)	-8.5360 (0.100)
tech_dom	Percentage of technical positions of firm's total technical positions	-5.9357 (0.159)	-5.8431 (0.185)
Output			
market	Percentage of sales to domestic market of firm's total sales	-34.0663*** (0.000)	-28.4941*** (0.001)

Note: Variables refer to FY 2012. All regressions control for country-sector fixed effects. Standard errors are robust to heteroscedasticity.

Source: Own calculations. $p^{*} < 0.1$, $p^{**} < 0.05$, $p^{***} < 0.01$ (p-values in parentheses).

Supplier Assistance

Finally, we also assess if there are differences between foreign investors and domestic producers in terms of their supplier assistance, as assistance increases the FDI spillover potential (as discussed in section 2.2). For each indicator we measure the probability of assisting suppliers, which takes the value of 1 if a firm offers assistance, and 0 otherwise. The data don't allow us to identify when and how often supplier assistance took place. The summary statistics for both foreign investors and domestic producers can be found in Appendix C.

The negative coefficient signs in Table 4 suggest that foreign investors seem to offer less assistance to local suppliers than domestic producers, although the effects are only significant for five types of assistance, namely (i) help with organization of production lines (*assist_orga*), (ii) help with quality assurance (*assist_qual*), (iii) help with the supplier's business strategy (*assist_strat*), (iv) help with finding export opportunities (*assist_exp*) which is only significant if we control for firm size (column 2), and (v) help with implementing health, safety, environmental, and/or social conditions (*assist_hse*).

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Table 4.
Supplier Assistance, Foreign Investors vs. Domestic Producers (Mean Difference)

Variable	Definition	Difference	Additional controls for ln*emp*
		(1)	(2)
assist	Dummy taking the value 1 if firm offered assistance to domestic suppliers, and 0 otherwise	-0.1725 (0.636)	-0.2994 (0.437)
assist_pay	Advance payment	-0.4019 (0.203)	-0.2117 (0.523)
assist_impr	Provision of financing for improvements	-0.3675 (0.155)	-0.4821 (0.081)
assist_funds	Support to get funds from other sources	-0.0831 (0.747)	-0.1474 (0.587)
assist_plan	Financial planning	-0.1670 (0.522)	-0.1160 (0.669)
assist_inp	Provision of inputs	-0.1683 (0.509)	-0.1846 (0.496)
assist_sourc	Support for sourcing raw materials	-0.2125 (0.405)	-0.1645 (0.544)
assist_train	Training of workers	0.0801 (0.760)	0.0111 (0.968)
assist_equip	Lending/leasing of machines or equipment	-0.0590 (0.827)	0.0247 (0.931)
assist_tech	Product or process technologies	-0.1584 (0.546)	-0.3123 (0.302)
assist_maint	Repair/maintenance of machines	-0.1376 (0.620)	-0.1472 (0.619)
assist_license	Licensing of patented technology	-0.0022 (0.994)	0.0006 (0.999)
assist_orga	Help with organization of production lines	-0.5224** (0.046)	-0.6778** (0.024)
assist_qual	Help with quality assurance	-0.5166* (0.060)	-0.5547* (0.057)
assist_invent	Help with inventory control	0.0303 (0.907)	0.0262 (0.925)
assist_audit	Help with audits	-0.1651 (0.536)	-0.1779 (0.538)
assist_strat	Help with business strategy	-0.6606** (0.012)	-0.7690*** (0.007)
assist_exp	Help with finding export opportunities	-0.4629 (0.101)	-0.5017* (0.089)
assist_hse	Help with implementing health, safety, environmental, and/or social conditions	-0.6467** (0.017)	-0.6589** (0.024)

Note: All regressions control for country-sector fixed effects. Standard errors are robust to heteroscedasticity.

Source: Own calculations. $p^{*} < 0.1$, $p^{**} < 0.05$, $p^{***} < 0.01$ (p-values in parentheses).

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In sum, foreign investors outperform domestic producers in terms of sales, firm size, productivity, exporting behaviour, and direct export share. While this would imply a higher knowledge and productivity spillover potential compared to domestic firms, foreign investors have fewer linkages with the local economy in terms of using domestic inputs and workers. There is also some evidence that foreign firms offer less assistance to local suppliers. Fewer linkages and less supplier assistance both can limit the positive impact from FDI.

3.3. Premia by Foreign Investor Characteristics

The analysis in the previous section treated foreign firms as homogenous. The literature survey in section 2, however, showed that certain types of FDI seem to be more beneficial than others since actual FDI spillovers also depend on foreign firm characteristics. It is possible that certain types of foreign investors are more likely to build linkages with the local economy or offer supplier assistance which has important implications for policy makers. In this section, we therefore split the foreign investors into several groups to investigate if firms with certain characteristics have a larger FDI spillover potential than others.

We estimate the following equation:

$$potential_{isc} = \alpha_0 + FC_{isc} + D_{cs} + \varepsilon_{isc} \quad (1)$$

where subscript i stands for firm, s for the firm's sector, and c for country. α_0 designates the constant, D_{cs} country-sector fixed effects, and ε_{isc} the idiosyncratic error term. FC is a vector representing several foreign firm characteristics which take the value of 1 if a foreign investor fulfils a certain characteristic, and 0 otherwise. *potential* is our measure of FDI spillover potential. Building on the theoretical discussion in section 2.1 and empiricial findings in section 2.2, we include the foreign investor characteristics shown in Table 5. The summary statistics are presented in Appendix D.

We apply four FDI spillover potential measures related to a foreign firm's linkages with and assistance to domestic suppliers, as these are the categories where foreign firms lag behind domestic producers: (i) the percentage of purchased goods and services sourced from domestic suppliers (*inp_dom*), (ii) the percentage of domestic workers in the firm's total workforce (*emp_dom*), (iii) the percentage of sales to the domestic market (*market*), and (iv) the likelihood of supplier assistance (*assist*). While foreign investor characteristics refer to FY 2012, we don't know when supplier assistance took place. However, it is relatively safe to assume that major foreign characteristics remained constant over time.

Table 6 shows the descriptive statistics. Each line represents a foreign investor characteristic, *FC*, using different thresholds, while columns 1 to 4 refer to our four measures of FDI spillover potential. Each panel in a column is estimated as a separate regression.

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Table 5.
Foreign Investor Characteristics, Definition

Variable	Definition
own	A firm's percentage of foreign ownership
age_fdi	Number of years since a multinational has started its operations in the host country
tech	A foreign firm's technology gap with its leading domestic competitor in the same sector, where 1 means "not existent" and 4 means "large"
origin_SSA	Dummy taking the value of 1 if the largest foreign investor's region of origin is SSA, and 0 otherwise
origin_Asia	Dummy taking the value of 1 if the largest foreign investor's region of origin is Asia (including South Asia) and 0 otherwise
motive_market	Importance of access to (local and regional) markets, where 1 means "not important" and 4 means "very important"
motive_cost	Importance of access to reduced labor and non-labor related costs, where 1 means "not important" and 4 means "very important"
motive_res	Importance of access to raw materials and specific inputs, where 1 means "not important" and 4 means "very important"
motive_asset	Importance of access to skills and technology, where 1 means "not important" and 4 means "very important"

The share of foreign ownership (*own*) matters for the FDI spillover potential. Multinationals with a foreign ownership share of at least 50 and less than 100 percent source more inputs locally compared to other firms, and this effect is even slightly higher for firms with full foreign ownership (column 1). This confirms the hypothesis that a higher share of foreign ownership correlates positively with the parent firm's incentive to transfer knowledge (e.g., Taaki 2005). However, we don't find any effects on alternative measures of FDI spillover potential.

A multinational's presence in the host country (*age_fdi*) is negatively associated with the share of domestically sourced inputs if the firm has been in the country for at least 20 years (column 1), but positively related with the percentage of domestic workers (column 2). A presence in the host country of at least 10 but less than 20 years is also positive related with the probability to offer supplier assistance (column 4). The results seem to suggest that the likelihood of supplier assistance and employment of local workers is higher for older firms, while the extent of local sourcing intensity is smaller.

If a foreign firm has a moderate technology gap (*tech*) to the leading domestic competitor in the same sector, it is more likely to offer supplier assistance (column 4). This confirms the positive role of a technology gap between the multinational and local firms which is not too big nor too small (e.g. Kokko 1994; Kokko, Tansini, and Zejan 1996; Blalock and Gertler 2009).

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Table 6.
Premia by Foreign Investor Characteristics

Variable	Thresholds foreign investor = 1 if … and 0 otherwise	Measure of FDI Spillover Potential (1) *inp_dom*	(2) *emp_dom*	(3) *market*	(4) *assist*
own	50 >= *own* < 100%	19.3783* (0.053)	0.8246 (0.751)	18.4457 (0.533)	0.7381 (0.433)
	own = 100%	20.1105*** (0.006)	0.5891 (0.769)	15.6657 (0.575)	1.0395 (0.185)
age_fdi	5 >= *age_fdi* < 10	-4.1679 (0.518)	1.1154 (0.730)	-5.3242 (0.707)	-0.4357 (0.638)
	10 >= *age_fdi* < 20	6.3996 (0.176)	1.9615 (0.403)	-6.8739 (0.487)	1.5076* (0.080)
	age_fdi >= 20	-13.8976* (0.055)	6.9023** (0.040)	-0.8358 (0.965)	0.9591 (0.210)
tech	*tech* = 2	0.6802 (0.945)	0.7089 (0.784)	20.1645 (0.133)	6.1271*** (0.000)
	tech = 3	-1.2057 (0.924)	0.8178 (0.705)	9.5329 (0.487)	. .
origin	*origin* = SSA	2.6070 (0.739)	-1.2141 (0.800)	31.4395*** (0.000)	4.5044*** (0.000)
	origin = Asia	-1.1053 (0.890)	-7.1175 (0.171)	30.3003*** (0.001)	-1.5248* (0.072)
motive_market	*motive_market* = 2	0.0312 (0.998)	-4.1798* (0.075)	16.9894 (0.290)	. .
	motive_market >= 3	-0.4772 (0.926)	-2.2504 (0.252)	26.7538*** (0.000)	1.1809** (0.040)
motive_cost	*motive_cost* = 2	2.3507 (0.770)	-12.0948** (0.050)	3.0408 (0.786)	-1.6694* (0.051)
	motive_cost >= 3	-0.9970 (0.877)	-3.6712 (0.109)	8.7955 (0.440)	-0.0534 (0.940)
motive_res	*motive_res* = 2	-10.0951 (0.223)	-4.0206 (0.292)	3.0942 (0.810)	-5.3253*** (0.000)
	motive_res >= 3	10.3145 (0.274)	-2.0761 (0.509)	-33.1588** (0.023)	-10.5863*** (0.000)
motive_asset	*motive_asset* = 2	3.7012 (0.682)	2.9197 (0.369)	4.6732 (0.688)	. .
	motive_asset >= 3	-5.4219 (0.669)	2.6393 (0.485)	2.5715 (0.814)	-0.6596 (0.458)

Note: All variables except for *assist* refer to FY 2012. Each panel in a column is estimated as a separate regression. All regressions control for country-sector fixed effects. Standard errors are robust to heteroscedasticity. No observations for *tech* = 4. Missings indicate variables that were dropped from the regressions.

Source: Own calculations. $p^{*} < 0.1$, $p^{**} < 0.05$, $p^{***} < 0.01$ (p-values in parentheses).

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The region of origin (*origin*) also matters for the FDI spillover potential. Interestingly, foreign firms with the largest investor from SSA are more likely to assist domestic suppliers compared to other firms (column 4). In addition, they sell a higher share of their output to the local market (column 3). Firms with their largest foreign investor from Asia (including South Asia) also sell a significantly larger share of output to the local market, but offer significantly less assistance to their domestic suppliers (columns 3 and 4).

In a next step, we evaluate how the FDI motive influences the extent of FDI linkages. As could be expected, market-seeking FDI (*motive_market*) is positively correlated with the share of sales to the host country (column 3). It is also positively correlated with the probability of supplier assistance (column 4). However, firms where market-seeking FDI is moderate make significantly less use of local workers (column 2).

Cost-seeking FDI (*motive_cost*) is negatively correlated with the share of local workers (column 2) as well as the probability of offering supplier assistance (column 4) if this motive has a moderate importance for multinationals. Resource-seeking FDI (*motive_res*) clearly shows a negative correlation with the share of sales going to the host country if this motive is important (column 3). Moreover, it is also negatively associated with supplier assistance, regardless of the importance of this motive (column 4). The results confirm the negative spillover potential of resource-seeking FDI, while the negative effect of cost-oriented FDI is somewhat unexpected, but could be explained by the sectoral composition of our data sample including two non-manufacturing sectors (agribusiness and mining).

4. WHICH ABSORPTIVE CAPACITIES FACILITATE FDI LINKAGES?

This section focuses on the role of domestic supplier characteristics for FDI linkages. Economic upgrading in GVCs can be achieved by improving the capacity of firms to internalize productivity spillovers. A firm's absorptive capacity includes the skill intensity and know-how of the workforce[11], technological capacity of the capital stock, and productivity in existing GVC tasks. Upgrading skills, capital, and process, thus, equip local firms to maximize the gains from FDI (Taglioni and Winkler 2016).

In section 4.1, we present the data, while section 4.2 introduces the empirical model where we relate absorptive capacities with FDI linkages. While the data are not suited to measure actual FDI spillovers, the extent of FDI linkages seems to be a good proxy for local suppliers' potential to absorb FDI spillovers. Section 4.3 examines if there are differences in the extent of FDI linkages between different groups of suppliers, depending on their absorptive capacities. Section 4.4 describes the regression results.

4.1. Data

The focus of sections 4 and 5 is on national suppliers (see section 3.1 for a description of our dataset). The national suppliers' surveys cover 148 firms in Chile (18), Ghana (26), Kenya (29), Mozambique (36) and Vietnam (39). More than half of the suppliers (88) supply to multinationals in agribusiness, followed by mining (48) and apparel (12). These suppliers produce a variety of inputs across the value chain, as shown in Table 7, ranging from chemicals, to equipment, to food and food processing, to business, technical, and other services, among others.

[11] Studies on the food and vegetable and apparel value chains suggest that workfoce development contains a high potential for countries to maintain and upgrade their positions in the GVCs (see, e.g., Gereffi 1999; Fernandez-Stark, Bamber, and Gereffi 2011; Fernandez-Stark, Frederick, and Gereffi 2011).

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Table 7.
Distribution of Suppliers by Sector

Sector	No. of firms	%
Apparel accessories	4	2.7%
Chemicals	22	14.9%
Equipment	22	14.9%
Food and food processing	24	16.2%
Inputs to mining	8	5.4%
Packaging	10	6.8%
Seeds	11	7.4%
Business services	17	11.5%
Technical services	20	13.5%
Other services	10	6.8%
All sectors	148	100.0%

4.2. Empirical Model

We define the following equation:

$$linkage_{isc} = \alpha_0 + AC_{isc} + D_{cs} + \varepsilon_{isc} \tag{2}$$

AC is a vector denoting supplier-specific absorptive capacities which facilitate FDI linkages, and *linkage* is our measure of FDI linkages. Building on the theoretical and empirical discussion in section 2, we include the following absorptive capacities, as defined in Table 8:

$$\begin{aligned} outp_{isc} = \alpha_0 + gap_{isc} + soph_{isc} + emp\_ter_{isc} + emp\_sec_{isc} + \ln exper_{isc} + man\_educ_{isc} + \\ + man\_exper_{isc} + \ln emp_{isc} + export_{isc} + \ln dist_{isc} + D_{cs} + \varepsilon_{isc} \end{aligned} \tag{3}$$

Due to lacking data on R&D activity, we use *soph* as a proxy. *emp_ter* and *emp_sec* serve as our direct measures of worker skills. *exper* measures a supplier's experience and thus serves as an indirect measure of skills. We also include characteristics related to the skills and experience of the general manager, *man*, namely *man_educ* and *man_exper*. *emp* captures firm size, *export* export activity, and *dist* firm location. We also include a measure of technology gap (rather than firm-level productivity per se), *gap*, as has been outlined in the literature.

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Table 8.
Definition of Supplier Characteristics

Variable	Definition
gap	Technology gap to the leading domestic competitor's technology in the firm's sector, ranging from 1 to 4, where 1 means "no difference" and 4 means "large difference
soph	Degree of sophistication of the firm's production process, ranging from 1 to 4, where 1 means "standardized" and 4 means "highly sophisticated"
emp_ter	Percentage of workers with tertiary education in the firm's workforce
emp_sec	Percentage of workers with secondary education in the firm's workforce
exper	Number of years since firm has started operations in country
man_educ	Highest level of education of the general manager, ranging from 1 to 3, where 1 means "primary education (without vocational education)", 2 means "secondary education (vocational education and training)" and 3 means "tertiary education (college or university degree)"
man_exper	Dummy taking the value of 1 if the general manager has previous work experience in a foreign firm in the country or abroad, and 0 otherwise
export	Dummy taking the value of 1 if a firm exports, and 0 otherwise
dist	Geographical distance of firm to foreign client in km

Since the supplier characteristics refer to the survey year (2012), we are constrained to use a *linkage* measure of the same year. We use the percentage of a supplier's output to foreign customers (*outp*). While *outp* does not capture direct productivity gains or other FDI spillovers, a higher share of output to foreign customers makes positive spillovers, for instance via assistance or requirements from the multinational, more likely. The summary statistics are shown in Appendix E.

4.3. Supplier Premia by Absorptive Capacity

In this section, we split suppliers into several groups to investigate if suppliers with certain characteristics benefit from larger FDI linkages than others. Modifying the specification of equation (2), we assign a dummy taking the value of 1 for suppliers with a certain absorptive capacity, AC, and 0 for all other suppliers in the sample and estimate the impact on the percentage of a supplier's output to foreign customers (*outp*).

Table 9 shows the descriptive statistics. Each line represents a supplier's absorptive capacity, AC, applying different thresholds. Each panel is estimated as a separate regression. A highly sophisticated production process (*soph*) has a significantly positive impact on suppliers' output to foreign firms. Moreover, FDI linkages tend to increase with a more sophisticated production process, as can be seen by the growing coefficient signs on *soph* and the decreasing p-values.

Firms with a share of workers with secondary education (*emp_sec*) of at least 20 and below 50 percent supply a significantly higher share to foreign investors than other firms. This effect becomes slightly smaller for suppliers employing at least 50 but less than 80 percent of workers with secondary education. However, the effect is no longer significant for suppliers with a share of workers with secondary education of at least 80 percent. The results imply that multinationals in our sample source inputs from domestic suppliers that are somewhat but not too skill-intensive. The somewhat unexpected result is likely related to the choice of our dependent variable – the percentage of a supplier's output to foreign customers. While skills play a major role for economic upgrading in GVCs, i.e. productivity and value added gains, they seem to matter less strongly for the extent of GVC linkages.

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Table 9.
Supplier Premia by Absorptive Capacity

Variable	Thresholds	Measure of FDI Linkage: *outp*	
	supplier = 1 if … and 0 otherwise	Difference	p-value
gap	*gap* = 2	-7.2833	(0.448)
	gap >= 3	-2.8160	(0.713)
soph	*soph* = 2	0.7105	(0.941)
	soph = 3	5.7639	(0.516)
	soph = 4	23.1604*	(0.072)
emp_ter	20% >= *emp_ter* < 50%	12.6626	(0.112)
	50% >= *emp_ter* < 80%	-5.5474	(0.541)
	emp_ter >= 80%	-8.9682	(0.526)
emp_sec	20% >= *emp_sec* < 50%	18.2152**	(0.042)
	50% >= *emp_sec* < 80%	15.5753*	(0.095)
	emp_sec >= 80%	8.4187	(0.484)
exper	3 >= *exper* < 10	20.9871	(0.139)
	10 >= *exper* < 20	14.4016	(0.296)
	20 >= *exper* < 30	6.4514	(0.647)
	exper >= 30	27.5507*	(0.080)
man_educ	*man_educ* = 2	3.3842	(0.841)
	man_educ = 3	-10.1846	(0.493)
man_exper	*man_exper* = 1	7.3526	(0.314)
emp	10 >= *emp* < 50	-18.1670	(0.157)
	50 >= *emp* < 250	-24.1310*	(0.072)
	emp >= 250	-23.7696	(0.118)
export	*export* = 1	9.8261	(0.121)
dist	20 >= *dist* < 100	-19.9154*	(0.056)
	100 >= *dist* < 500	-18.0726*	(0.057)
	dist >= 500	-26.1891***	(0.005)

Note: All variables refer to FY 2012. Each panel is estimated as a separate regression. All regressions control for country-sector fixed effects. Standard errors are robust to heteroscedasticity.

Source: Own calculations. $p^{*} < 0.1$, $p^{**} < 0.05$, $p^{***} < 0.01$ (p-values in parentheses).

Firm size also has an influence on the extent of FDI linkages. Suppliers with at least 50 but less than 250 employees have a significantly lower output share than other suppliers. The effect is also negative for alternative threshold levels, but misses the levels of statistical significance narrowly.

Finally, geographical location also matters. FDI linkages are significantly lower for suppliers that are located more than 500 km from their foreign clients (*dist*), but the negative effect levels

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off for suppliers that are located closer to their foreign client. Given the existence of premia for several supplier groups, we assess the impact of supplier characteristics on the extent of FDI linkages in the next section.

4.4. Regression Results

Overall Results

Table 10 reports the regression results based on the specification of equation (3). Given the differences between supplier sectors and countries, all regressions control for country-sector fixed effects. Standard errors are robust to heteroscedasticity. A more sophisticated production process (*soph*) has a significantly positive impact on suppliers' output to foreign firms, supporting the positive role of R&D for local firms in the literature. Firm location also matters for FDI linkages. A larger distance to the foreign firm (ln*dist*) reduces the supplier's output share going to foreign clients. A larger size (ln*emp*) seems to be negatively associated with FDI linkages, while exporting (*exp*) seems to have a positive impact, although both narrowly miss the 10 percent threshold of statistical significance. Including all absorptive capacities simultaneously (column 9) confirms the findings only for firm size (ln*emp*) and distance to the foreign firm (ln*dist*).

Table 10.
The Effect of Suppliers' Absorptive Capacity on Output Share to Foreign Firms, OLS

Dependent variable: $outp_{isc}$									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
gap_{isc}	-1.6276								-1.0695
	(0.609)								(0.800)
$soph_{isc}$	5.9014*								6.4544
	(0.094)								(0.120)
emp_ter_{isc}		-0.1314							-0.2208
		(0.317)							(0.234)
emp_sec_{isc}			0.1005						0.0037
			(0.396)						(0.980)
ln$exper_{isc}$				1.4755					4.7960
				(0.744)					(0.450)
man_educ_{isc}					-10.0299				-6.3287
					(0.142)				(0.412)
man_exper_{isc}					6.0535				9.7105
					(0.419)				(0.283)
lnemp_{isc}						-3.4974			-6.7818*
						(0.106)			(0.051)
$export_{isc}$							9.8261		10.2026
							(0.121)		(0.296)
ln$dist_{isc}$								-4.0871**	-2.9573*
								(0.014)	(0.069)
$constant_{isc}$	48.7270**	63.7402***	54.2755***	54.3062**	83.3056***	70.1656***	56.2935***	69.4351***	80.0081***
	(0.013)	(0.001)	(0.002)	(0.013)	(0.000)	(0.000)	(0.001)	(0.000)	(0.003)
Country – sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.31	0.32	0.31	0.29	0.33	0.33	0.30	0.34	0.48
Observations	109	107	107	109	112	107	110	105	93

Note: All variables refer to FY 2012. All regressions control for country-sector fixed effects. Standard errors are robust to heteroscedasticity.

Source: Own calculations. p*<0.1, p**<0.05, p***<0.01 (p-values in parentheses).

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Results for Established Suppliers

It is likely that firms with a longer supplier experience show different absorptive capacities compared to firms that just started supplying to a foreign client, especially as structural changes (such as changes in the supplier's capacity, sophistication of production processes or skill levels) may happen early on during their relationship. We therefore rerun the regressions for supplier firms that have a supplier relationship of at least three years (see Table 11).

Table 11.
The Effect of Suppliers' Absorptive Capacity with Supplier Relationship of at Least Three Years on Output Share to Foreign Firms, OLS

Dependent variable: $outp_{isc}$									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
gap_{isc}	-3.1899								-3.4042
	(0.341)								(0.412)
$soph_{isc}$	6.9340*								6.8075
	(0.055)								(0.102)
emp_ter_{isc}		-0.2337*							-0.2822
		(0.067)							(0.105)
emp_sec_{isc}			0.1797						-0.0169
			(0.179)						(0.911)
ln$exper_{isc}$				-2.2745					-0.0370
				(0.709)					(0.996)
man_educ_{isc}					-14.2539**				-13.6016
					(0.048)				(0.176)
man_exper_{isc}					5.5674				10.0019
					(0.469)				(0.265)
lnemp_{isc}						-2.3064			-4.5781
						(0.302)			(0.200)
$export_{isc}$							10.8120		7.7413
							(0.114)		(0.414)
ln$dist_{isc}$								-3.7772**	-2.5183*
								(0.025)	(0.097)
$constant_{isc}$	49.5283**	67.6262***	50.7481***	65.6000**	95.1645***	66.2781***	56.0470***	68.6250***	113.8197***
	(0.015)	(0.001)	(0.008)	(0.014)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
Country – sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.33	0.36	0.34	0.30	0.35	0.33	0.32	0.36	0.54
Observations	1092	100	100	102	105	100	103	99	87

Note: All variables refer to FY 2012. All regressions control for country-sector fixed effects. Standard errors are robust to heteroscedasticity.

Source: Own calculations. $p^{*} < 0.1$, $p^{**} < 0.05$, $p^{***} < 0.01$ (p-values in parentheses).

While the positive impact of a more sophisticated production process (*soph*) and the negative impact of a larger distance to the foreign firm (ln*dist*) can be confirmed, we also find a significantly negative impact of the share of workers with tertiary education (*emp_ter*) on the supplier's share of output going to foreign firms. A higher educational level of the general manager (*man_educ*) also reduces FDI linkages. While our focus here is on the suppliers' output share to foreign

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firms and not on FDI spillovers, our findings can be related to those by Sinani and Meyer (2004) who find that a larger share of human capital leads to negative FDI spillovers (see section 2.2), although the underlying mechanisms may be different. It may be possible that suppliers with highly educated managers supply a larger share of inputs to firms abroad, for instance, because they may have fewer language barriers. In the overall sample (column 9), however, only distance to the foreign firm (ln*dist*) shows a significant effect.

5. WHICH FACTORS WITHIN TRANSMISSION CHANNELS SUPPORT FDI SPILLOVERS?

5.1. Supplier Premia by Factors within Transmission Channel

In this section, we evaluate whether suppliers that benefited from any demand or assistance effects are characterized by higher FDI linkages than suppliers that don't. Table 12 shows the supplier premia by transmission channel (see Appendix E for summary statistics). Firms that received assistance from the foreign customer to make improvements (*assist*) supply a significantly higher share of their output to foreign clients than firms that don't.

Table 12.
Supplier Premia by Factors within Transmission Channel

Variable	Definitions	Measure of FDI linkage: *outp*	
		Difference	p-value
audit	Dummy taking the value of 1 if supplier received technical audits before or after signing a contract with the foreign customer, and 0 otherwise	-0.6666	(0.909)
impr	Dummy taking the value of 1 if the foreign customer required the supplier to make improvements before or after signing the contract, and 0 otherwise	1.9031	(0.796)
assist	Dummy taking the value of 1 if supplier received assistance from the foreign customer to meet any requirements before or after signing the contract, and 0 otherwise.	16.5684**	(0.013)
dev	Dummy taking the value of 1 if supplier developed product jointly with the foreign customer, and 0 otherwise.	10.7522	(0.129)
license	Dummy taking the value of 1 if supplier licensed technology from the foreign customer, and 0 otherwise.	5.1151	-0.498

Note: All regressions control for country-sector fixed effects. Standard errors are robust to heteroscedasticity.

Source: Own calculations. $p^{*} < 0.1$, $p^{**} < 0.05$, $p^{***} < 0.01$ (p-values in parentheses).

5.2. Empirical Model

In this second exercise, we focus on the role of transmission channels for FDI spillovers:

$$spillover_{isc} = \alpha_0 + TC_{isc} + D_{cs} + \varepsilon_{isc} \quad (4)$$

TC is a vector relating to various factors within transmission channels through which multinationals influence national suppliers and thus make FDI spillovers more likely, and *spillover* is our measure of FDI spillover.

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We specify the following transmission channels, as defined in section 5.1:

$$spillover_{isc} = \alpha_0 + audit_{isc} + impr_{isc} + assist_{isc} + dev_{isc} + license_{isc} + D_{cs} + \varepsilon_{isc} \quad (5)$$

impr captures demand effects in GVCs, while *audit*, *assist, dev,* and *license* represent assistance effects. We use *exp_start* as our spillover measure (see section 5.1. for a definition).

5.3. Regression Results

Overall Results

Table 13 follows the specification of equation (5) and uses *exp_start* as our FDI spillover measure, which is a dummy taking the value of 1 if the firm started exporting as a consequence of supplying to a foreign customer, and 0 otherwise. The results confirm that several transmission channels matter for backward FDI spillovers. Suppliers receiving technical audits before or after signing the contract (*audit*), suppliers receiving assistance from their foreign clients (*assist*), suppliers with joint product development with their customers (*dev*), and suppliers licensing technology from their foreign client (*license*) are more likely to export as a result of their supplier-relationship. In the combined sample (column 6), we can confirm the significantly positive effects of technical audits (*audit*) and assistance by foreign customers (*assist*). Interestingly, requirements to improve (*impr*) do not have any impact.

Table 13.
The Effect of Factors within Transmission Channels on the Probability of Starting to Export, Probit

Dependent variable: exp_start_{isc}						
	(1)	(2)	(3)	(4)	(5)	(6)
$audit_{isc}$	0.8551** (0.049)					0.9166* (0.071)
$impr_{isc}$		0.3366 (0.468)				-0.1203 (0.827)
$assist_{isc}$			1.3256*** (0.008)			1.4075*** (0.008)
dev_{isc}				1.2506*** (0.006)		0.8537 (0.138)
$license_{isc}$					1.2387** (0.014)	0.8975 (0.105)
$constant_{isc}$	-6.9418*** (0.000)	-6.4233*** (0.000)	-6.0867*** (0.000)	-7.3373*** (0.000)	-6.0867*** (0.000)	-7.7367*** (0.000)
Country – sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R2[1)]	-0.219	-0.267	-0.161	-0.172	-0.197	-0.121
Observations	55	55	55	55	55	55

[1)] McFadden's adjusted pseudo R2.

Note: All regressions control for country-sector fixed effects. Standard errors are robust to heteroscedasticity.

Source: Own calculations. $p^* < 0.1$, $p^{**} < 0.05$, $p^{***} < 0.01$ (p-values in parentheses).

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In sum, we find evidence for the existence of positive assistance effects (including technical audits, joint product development, and technology licensing) in GVCs, while demand effects (measured as requirements to improve) do not have any impact.

Results by Types of Requirements

The non-existence of demand effect, i.e. spillovers from a customer's requirements to improve (*impr*), raises the question whether only specific types of requirements to improve may be relevant to FDI spillovers. Using the specification of equation (4), we substitute 13 sub-indicators[12] for *impr* which take the value of 1 if the foreign customer required the supplier to make improvements before or after signing the contract, and 0 otherwise. Of the 13 sub-indicators of *impr*, none shows a significant impact (results available upon request). In sum, the regression results give evidence of strong assistance effects in GVCs, but no evidence of demand effects.

Results by Types of Assistance

In this section, we study in more detail which types of assistance are most effective in generating positive FDI spillovers in our data sample. Table 12 shows the definitions of the different sub-indicators of *assist* available in the dataset, while Appendix F shows the summary statistics. Again, assistance is measured as a dummy taking the value of 1 if a supplier obtains assistance from the multinational, and 0 otherwise. Tables 14 and 15 report the results using the specification of equation (5) substituting various types of assistance for *assist* and using the likelihood to start exporting due to a supplier-relationship with a foreign customer (*exp_start*) as the dependent variable.

Ten types of assistance significantly increase the likelihood to start exporting as a consequence of supplying to foreign firms, namely (i) advance payment (*assist_pay*), (ii) provision of financing for improvements (*assist_impr*), (iii) support for sourcing raw materials (*assist_sourc*), (iv) training of workers (*assist_train*), (v) product or process technologies (*assist_tech*), (vi) licensing of patented technology (*assist_license*), (vii) help with the organization of production lines (*assist_orga*), (viii) help with quality assurance (*assist_qual*), (ix) help with finding export opportunities (*assist_exp*), and (x) help with implementing health, safety, environmental, and/or social conditions (*assist_hse*). Overall, all types of assistance show a positive coefficient sign, and many miss the threshold level of statistical significance only narrowly. In sum, we find strong evidence of assistance effects in GVCs for FDI spillovers.

[12] These include requirements to reorganize the product lines, to invest in new equipment and/or technology, to improve product quality, quality control, productivity, timeliness of delivery, inventory management, business management, health, safety, environmental, and/or social conditions, to increase volume of production, to cut waste, to acquire ISO 9000 or 14000, and to train employees.

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Table 14.
The Effect of Assistance on the Probability of Starting to Export due to Relationship with Foreign Firm, Part 1, Probit

Dependent variable: exp_start_{isc}									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$audit_{isc}$	0.9181*	0.9638*	0.9207*	0.9022*	0.8890*	1.0122*	0.9072*	0.9092*	0.9766*
	(0.070)	(0.055)	(0.071)	(0.071)	(0.077)	(0.062)	(0.073)	(0.068)	(0.051)
$impr_{isc}$	-0.2019	0.2380	-0.0289	0.0364	-0.1210	-0.1012	-0.1148	0.0158	-0.0980
	(0.712)	(0.659)	(0.955)	(0.945)	(0.817)	(0.845)	(0.824)	(0.976)	(0.853)
dev_{isc}	0.6726	0.4277	0.7549	0.8038	0.9490*	0.8419	0.8734*	0.7910	0.3870
	(0.221)	(0.458)	(0.185)	(0.127)	(0.061)	(0.102)	(0.084)	(0.130)	(0.509)
$license_{isc}$	0.8968*	0.5970	0.8004	0.7349	0.6149	0.8788*	0.5805	0.6898	0.7940
	(0.097)	(0.324)	(0.159)	(0.191)	(0.277)	(0.092)	(0.305)	(0.223)	(0.187)
$assist\_pay_{isc}$	1.1684**								
	(0.024)								
$assist\_impr_{isc}$		1.7908**							
		(0.026)							
$assist\_funds_{isc}$			0.8546						
			(0.286)						
$assist\_plan_{isc}$				0.9034					
				(0.210)					
$assist\_inp_{isc}$					0.9644				
					(0.143)				
$assist\_sourc_{isc}$						1.1450*			
						(0.083)			
$assist\_train_{isc}$							1.2032*		
							(0.067)		
$assist\_equip_{isc}$								0.9497	
								(0.160)	
$assist\_tech_{isc}$									1.6031**
									(0.020)
$constant_{isc}$	-7.4756***	-7.7162***	-7.7334***	-7.8291***	-7.8037***	-7.8395***	-7.7525***	-7.8026***	-7.3524***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Country – sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R2[1)]	-0.159	-0.163	-0.205	-0.202	-0.197	-0.179	-0.184	-0.199	-0.163
Observations	55	55	55	55	55	55	55	55	55

[1)] McFadden's adjusted pseudo R2.

Note: All regressions control for country-sector fixed effects. Standard errors are robust to heteroscedasticity.

Source: Own calculations. $p^{*} < 0.1$, $p^{**} < 0.05$, $p^{***} < 0.01$ (p-values in parentheses).

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Table 15.
The Effect of Assistance on the Probability of Starting to Export due to Relationship with Foreign Firm, Part 2, Probit

Dependent variable: exp_start_{isc}									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$audit_{isc}$	0.8834*	0.9558*	0.8693*	0.7906*	0.8267*	0.8267*	0.8751*	0.7924*	1.0472*
	(0.079)	(0.061)	(0.075)	(0.099)	(0.087)	(0.087)	(0.079)	(0.099)	(0.053)
$impr_{isc}$	0.0178	0.0100	-0.1796	0.0824	-0.1168	-0.1168	-0.1327	-0.1387	-0.1363
	(0.973)	(0.985)	(0.740)	(0.875)	(0.826)	(0.826)	(0.802)	(0.794)	(0.798)
dev_{isc}	0.8849*	0.8012	0.6690	0.8825*	0.9440*	0.9440*	0.8656*	0.8684*	0.6131
	(0.081)	(0.134)	(0.236)	(0.091)	(0.065)	(0.065)	(0.089)	(0.099)	(0.258)
$license_{isc}$	0.6547	0.7734	0.7828	0.6869	0.6901	0.6901	0.7473	0.5457	0.7957
	(0.254)	(0.141)	(0.179)	(0.236)	(0.228)	(0.228)	(0.185)	(0.330)	(0.136)
$assist\_maint_{isc}$	0.6738								
	(0.260)								
$assist\_license_{isc}$		1.4250**							
		(0.016)							
$assist\_orga_{isc}$			0.8546						
			(0.286)						
$assist\_qual_{isc}$				1.0160**					
				(0.041)					
$assist\_invent_{isc}$					0.6007				
					(0.387)				
$assist\_audit_{isc}$						0.6007			
						(0.387)			
$assist\_strat_{isc}$							0.6723		
							(0.145)		
$assist\_exp_{isc}$								1.2943**	
								(0.027)	
$assist\_hse_{isc}$									1.4993**
									(0.014)
$constant_{isc}$	-7.8728***	-7.8537***	-7.4454***	-7.8423***	-7.7406***	-7.7406***	-7.6948***	-7.6089***	-7.6106***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Country – sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R2[1)]	-0.204	-0.150	0.183	-0.183	-0.209	-0.209	-0.199	-0.179	-0.139
Observations	55	55	55	55	55	55	55	55	55

[1)] McFadden's adjusted pseudo R2.

Note: All regressions control for country-sector fixed effects. Standard errors are robust to heteroscedasticity.

Source: Own calculations. $p^{*} < 0.1$, $p^{**} < 0.05$, $p^{***} < 0.01$ (p-values in parentheses).

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6. SUMMARY AND CONCLUSIONS

6.1. Summary of Results

Developing countries can now industrialize by joining GVCs without the need to build their own value chain from scratch (Baldwin 2012). That enables developing countries to focus on specific tasks in the value chain rather than producing the entire product, thereby lowering the threshold and costs for industrial development. Countries can join GVCs either by facilitating domestic firms' entry or by attracting foreign investors. The FDI option includes more direct access to foreign know-how and technology via productivity spillovers (Taglioni and Winkler 2016). In this context, many developing countries devote considerable attention and resources to attracting foreign investment from GVC lead firms as a means to enter GVCs and benefit from productivity spillovers. However, not all FDI generates the same potential for spillovers. Similarly, not all domestic firms benefit from FDI spillovers to the same extent. Finally, it is important to understand the functioning of the transmission channels through which knowledge and productivity gains spill-over from multinationals to domestic firms.

Using newly collected survey data on direct supplier-multinational linkages in Chile, Ghana, Kenya, Lesotho, Mozambique, Swaziland, and Vietnam, this paper evaluated how foreign investors differ from domestic producers in terms of their overall performance, linkages with the local economy, and supplier assistance which all influence the firms' potential to generate productivity spillovers. Besides apparel, the firms in our sample cover two natural resources-intensive industries, namely agribusiness and mining. We found that foreign investors outperform domestic producers in terms of sales, firm size, productivity, exporting behaviour, and direct export share. While this would imply a higher knowledge and productivity spillover potential compared to domestic firms, foreign investors have fewer linkages with the local economy in terms of using domestic inputs and workers. However, the findings also show that certain service inputs, namely technical services and transport, security, cleaning, catering, and other services, show a higher potential for linkages. There is also some evidence that foreign firms offer less assistance to local suppliers. Fewer linkages and supplier assistance both can limit the positive impact from FDI.

In a next step, we studied the relationship between foreign investor characteristics and the FDI spillover potential. In sum, we found that foreign investor characteristics matter for FDI linkages and supplier assistance, but the size and direction of the relationship depends on the measure of FDI spillover potential we used. For example, a multinational's presence in the host country is negatively associated with the share of domestically sourced inputs if the firm has been in the country for at least 20 years, but positively related with the percentage of domestic workers. Other foreign firm characteristics, on the other hand, show a less ambiguous picture. Market-seeking FDI, for example, shows a positive relationship with the share of sales to the host country as well as the probability of supplier assistance. And suppliers with the largest investor from SSA are associated with a larger share of sales to the local market and a higher likelihood of supplier assistance. Suppliers with the largest investor from Asia also sell a significantly larger share of output to the local market, but offer significantly less assistance to their domestic suppliers.

The second part of this paper first examined the role of supplier firms' absorptive capacities for FDI linkages. These firms supply to multinationals in agribusiness, mining, and apparel, but produce a variety of inputs across the value chain. The results indicated that several supplier characteristics matter for FDI linkages, measured as the share of output going to multinationals, which in turn increases the FDI spillover potential. A more sophisticated production process has a significantly positive impact on FDI linkages, whereas a larger geographical distance to the foreign client shows a negative effect. The descriptive statistics also showed that firms with a share of workers with secondary education of at least 20 percent supply a significantly higher share to

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foreign investors than other firms. While this effect could not be confirmed by the regression results covering the full sample, we found a significantly negative impact of the share of workers with tertiary education on FDI linkages when we focus on suppliers with a supplier relationship of at least three years. The general manager's educational level also has a negative effect. Overall, these findings suggest that a larger share of human capital leads to reduced FDI linkages in supplier firms. One possible explanation for this unexpected result could be that suppliers with highly educated managers supply a larger share of inputs to firms abroad, for instance, because they may have fewer language barriers. Finally, we also found evidence that a higher number of employees reduce the supplier's share of output to foreign firms.

In a next step, we assessed whether factors within the transmission channels between multinationals and suppliers influence FDI spillovers, focusing on assistance and demand effects. We used exporting as a consequence of supplying to a foreign customer as our spillover measure. The results confirmed that several transmission channels matter for backward FDI spillovers. Suppliers receiving technical audits before or after signing the contract, suppliers receiving assistance from their foreign clients, suppliers with joint product development with their customers, and suppliers licensing technology from their foreign client are more likely to export as a result of their supplier-relationship. In sum, we find evidence for the existence of positive assistance effects (including technical audits, joint product development, and technology licensing) in GVCs, while demand effects (measured as requirements to improve) do not have any impact.

Finally, we also studied which types of assistance are most effective in generating positive FDI spillovers in our data sample. Ten types of assistance significantly increase the likelihood to start exporting as a consequence of supplying to foreign firms, namely advance payment, provision of financing for improvements, support for sourcing raw materials, training of workers, product or process technologies, licensing of patented technology, help with the organization of production lines, help with quality assurance, help with finding export opportunities, and help with implementing health, safety, environmental, and/or social conditions.

6.2. Policy Conclusions

Our findings suggest that the FDI spillover potential via GVCs depends on the extent, durability, and quality of linkages between foreign investors and the local economy. Investment promotion alone is not sufficient to benefit from FDI spillovers. It is important to embed foreign investors into the local economy to increase the amount and quality of linkages, and therefore the possibility for supplier assistance and the potential for FDI spillovers in the long-term. In order to integrate foreign investors into local value chains, government agencies could identify potential domestic suppliers, and encourage foreign investors to participate in supplier development and assistance, and give incentives to multinationals to collaborate with local universities, research institutes or other firms which would improve the local skill and innovation capacity (Potter 2002).

Policies that aim at increasing FDI linkages will be more targeted if foreign firm characteristics and the absorptive capacities of domestic suppliers are taken into account. Our results have shown, for example, that the foreign investor's origin and investment motive as well as the share of foreign ownership matter for FDI linkages and supplier assistance. In addition, policies should aim at strengthening absorptive capacities that have shown to increase FDI linkages, including the degree of sophistication of suppliers' production processes. Policies should also target some of the obstacles to FDI linkages, such as large geographical distances between suppliers and their foreign clients. Removing barriers to natural agglomeration, for example, through investments in infrastructure, the provision of social services, or regional integration arrangements, could reduce geographical distances between suppliers and multinationals and thus increase the FDI spillover potential.

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Finally, researchers should focus more strongly on understanding better the transmission channels leading to FDI spillovers. While our paper focused on assistance and demand effects, other transmission channels in value chains include diffusion, availability, and quality effects. Besides transmission channels in value chains, research also needs to explore better the effect of changing market forces (demonstration and competition effects) and labor turnover. This will help guide policies designed to remove barriers within transmission channels, enabling the FDI spillover potential to translate into actual FDI spillovers.

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APPENDIX

A. Summary Statistics, Performance Indicators, Foreign Investors vs. Domestic Producers

Variable	Obs.	Mean	Std. Dev.	Min	Max
Foreign Investors					
ln*sales*	65	16.38186	2.512822	4.941642	22.13425
ln*age*	84	2.445032	0.743037	0.693147	4.330733
ln*emp*	61	4.707492	1.782078	1.098612	7.880048
ln*labprod*	49	11.44877	2.538011	1.722767	15.21508
tech	64	1.9375	0.663684	1	3
emp_ter	56	25.72391	27.66972	0	100
emp_sec	54	39.66316	31.66977	0	100
export	80	0.8875	0.317974	0	1
expsh_dir	80	66.7125	42.24587	0	100
expsh_ind	80	15.2375	32.88386	0	100
Domestic Producers					
ln*sales*	61	14.12134	2.875685	6.899886	21.35878
ln*age*	64	2.717949	0.88649	0.693147	4.174387
ln*emp*	61	4.079635	1.548334	0	7.201916
ln*labprod*	59	10.00994	2.606257	3.808844	15.28303
tech	61	2.311475	0.940585	1	4
emp_ter	60	21.62548	22.2074	0	100
emp_sec	59	47.1937	32.36794	0	99
export	64	0.59375	0.495015	0	1
expsh_dir	64	28.5	36.01455	0	100
expsh_ind	64	8.6875	22.53313	0	100

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B. Summary Statistics, Linkages with the Local Economy, Foreign Investors vs. Domestic Producers

Variable	Obs.	Mean	Std. Dev.	Min	Max
Foreign Investors					
inp_dom	82	23.45122	31.71289	0	100
inp_dom_mat	71	19.66197	28.90227	0	97
inp_dom_comp	71	5.866197	8.557352	0	40
inp_dom_pack	71	13.66197	21.56117	0	100
inp_dom_equip	71	4.647887	10.00014	0	50
inp_dom_bus	71	11.75352	13.27346	0	50
inp_dom_tech	71	8.323944	10.99191	0	40
inp_dom_oth	71	31.26761	29.93897	0	100
emp_dom	53	94.8098	8.372224	50	100
emp_ter_dom	57	18.84145	24.28294	0	100
emp_sec_dom	59	41.4293	34.03931	0	100
emp_oth_dom	55	38.71246	38.97893	0	98.67625
man_dom	77	67.76623	32.88973	0	100
super_dom	76	86.28289	24.95227	0	100
tech_dom	75	81.88	28.89869	0	100
market	80	18.05	34.76391	0	100
Domestic Producers					
inp_dom	61	56.11475	37.29884	0	100
inp_dom_mat	61	47.92254	25.45926	0	100
inp_dom_comp	61	6.217231	6.652131	0	25
inp_dom_pack	61	11.6986	13.90248	0	100
inp_dom_equip	61	10.15503	13.04946	0	75
inp_dom_bus	61	8.680931	9.005137	0	45
inp_dom_tech	61	5.014548	4.373453	0	20
inp_dom_oth	61	6.655383	6.648983	0	25
emp_dom	58	99.06956	2.881322	83.33334	100
emp_ter_dom	61	20.71564	22.0243	0	100
emp_sec_dom	61	48.30881	32.71255	0	99
emp_oth_dom	58	31.51797	32.04285	0	100
man_dom	60	95.3	15.87269	5	100
super_dom	59	95.45763	18.0596	0	100
tech_dom	59	93.64407	19.42249	5	100
market	64	62.8125	38.28916	0	100

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C. Summary Statistics, Assistance, Foreign Investors vs. Domestic Producers

Variable	Obs.	Mean	Std. Dev.	Min	Max
Foreign Investors					
assist	66	0.696970	0.463090	0	1
assist_pay	66	0.606061	0.492366	0	1
assist_impr	66	0.303030	0.463090	0	1
assist_funds	66	0.363636	0.484732	0	1
assist_plan	66	0.272727	0.448775	0	1
assist_inp	66	0.333333	0.475017	0	1
assist_sourc	65	0.415385	0.496623	0	1
assist_train	66	0.409091	0.495434	0	1
assist_equip	66	0.257576	0.440650	0	1
assist_tech	66	0.348485	0.480142	0	1
assist_maint	66	0.333333	0.475017	0	1
assist_license	66	0.196970	0.400757	0	1
assist_orga	66	0.272727	0.448775	0	1
assist_qual	66	0.439394	0.500117	0	1
assist_invent	66	0.363636	0.484732	0	1
assist_audit	66	0.272727	0.448775	0	1
assist_strat	65	0.200000	0.403113	0	1
assist_exp	65	0.184615	0.391005	0	1
assist_hse	65	0.415385	0.496623	0	1
Domestic Producers					
assist	62	0.919355	0.274512	0	1
assist_pay	61	0.868853	0.340363	0	1
assist_impr	60	0.583333	0.497167	0	1
assist_funds	62	0.516129	0.503819	0	1
assist_plan	62	0.467742	0.503032	0	1
assist_inp	62	0.580645	0.497482	0	1
assist_sourc	62	0.677419	0.471280	0	1
assist_train	62	0.483871	0.503819	0	1
assist_equip	62	0.387097	0.491062	0	1
assist_tech	62	0.564516	0.499868	0	1
assist_maint	62	0.467742	0.503032	0	1
assist_license	61	0.262295	0.443533	0	1
assist_orga	62	0.596774	0.494550	0	1
assist_qual	61	0.770492	0.424006	0	1
assist_invent	62	0.532258	0.503032	0	1
assist_audit	62	0.403226	0.494550	0	1
assist_strat	62	0.532258	0.503032	0	1
assist_exp	62	0.435484	0.499868	0	1
assist_hse	62	0.725807	0.449749	0	1

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D. Summary Statistics, Foreign Investor Characteristics

Variable	Obs.	Mean	Std. Dev.	Min	Max
own	87	93.77356	15.74507	30	100
age_fdi	74	14.55405	14.81774	2	89
tech	64	1.9375	0.663684	1	3
origin_SSA	87	0.149425	0.358574	0	1
origin_Asia	87	0.471264	0.502067	0	1
motive_market	83	2.433735	1.380993	1	4
motive_cost	85	2.329412	1.028038	1	4
motive_res	84	2.130952	1.172268	1	4
motive_asset	85	1.717647	0.917577	1	4

E. Summary Statistics, Suppliers

Variable	Obs.	Mean	Std. Dev.	Min	Max
FDI Linkage and Spillover Measures					
outp	113	39.34513	29.13539	0	100
exp_start	78	0.410256	0.495064	0	1
Absorptive Capacities					
gap	144	2.145833	1.127958	1	4
soph	142	2.197183	1.06684	1	4
emp_ter	138	30.83214	29.49302	0	100
emp_sec	138	40.31338	29.34871	0	100
ln*exper*	120	2.308353	0.876459	0	4.49981
man_educ	147	2.782313	0.503644	1	3
man_exper	147	0.496599	0.501698	0	1
ln*emp*	138	3.471092	1.701048	0	8.050385
export	141	0.595745	0.492497	0	1
ln*dist*	116	4.59394	2.105027	0	9.615806
Transmission Channels					
audit	124	0.620968	0.487114	0	1
impr	124	0.395161	0.490869	0	1
assist	124	0.282258	0.451924	0	1
dev	124	0.290323	0.455753	0	1
license	126	0.238095	0.427618	0	1
iso	134	0.052239	0.223343	0	1

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F. Summary Statistics, Suppliers, Assistance

Variable	Obs.	Mean	Std. Dev.	Min	Max
assist_pay	124	0.225807	0.419809	0	1
assist_impr	124	0.120968	0.327413	0	1
assist_funds	124	0.088710	0.285478	0	1
assist_plan	124	0.104839	0.307588	0	1
assist_inp	124	0.120968	0.327413	0	1
assist_sourc	124	0.129032	0.336596	0	1
assist_train	124	0.145161	0.353692	0	1
assist_equip	124	0.104839	0.307588	0	1
assist_tech	124	0.137097	0.345345	0	1
assist_maint	124	0.104839	0.307588	0	1
assist_license	124	0.129032	0.336596	0	1
assist_orga	124	0.137097	0.345345	0	1
assist_qual	124	0.177419	0.383573	0	1
assist_invent	124	0.080645	0.273394	0	1
assist_audit	124	0.088710	0.285478	0	1
assist_strat	124	0.120968	0.327413	0	1
assist_exp	123	0.105691	0.308699	0	1
assist_hse	124	0.169355	0.376587	0	1

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Good Practices in Empirical Corporate Finance and Accounting Research

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ABSTRACT

This paper presents the risks of quantitative research pertaining to corporate finance and accounting. These is followed by a survey-like catalogue of good practices in modelling. All considerations are rooted in financial microeconometrics, the field for examining both practical and theoretical questions of applying econometric techniques in corporate finance and accounting research based on the use of microdata (Gruszczyński 2018a).

Two major parts of the paper include: (1) discussion of the typical drawbacks in applying regression-type models, like causality vs. correlation, selection of explanatory variables and endogeneity, and (2) list of good practices in microeconometric applications to corporate finance and accounting research, based on Faff (2017), Kennedy (2002), Adams (2017), Hyndman (robjhyndman.com/) and author's own experience.

Catalogue of good practices in microeconometric applications to corporate finance and accounting may serve as the checklist for students and researchers.

JEL classification: C50, C58, G30, M40

Keywords: financial microeconometrics; empirical corporate finance; applied accounting; good practices in research

1. INTRODUCTION

Quantitative research in corporate finance and accounting commonly uses microdata on companies, their activities, legal facts, social behavior etc. Typical examples are financial statements, legal registers, statistical reports, always from a possibly large number of companies, like hundreds or thousands. Microdata help to quantify various hypotheses we construct around questions in corporate finance and accounting research.

Well prepared samples of microdata enter the statistical-econometric models and take part in their estimation and verification. The methodology is mainly rooted in microeconomerics. If applied to research problems in corporate finance and accounting it is known as financial microeconometrics (for further discussion see Gruszczyński 2012, 2018a).

Purpose of this paper is to indicate dangers of deficient practices in quantitative research and, most of all, to advocate good practices of quantitative modelling in corporate finance and

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accounting. This paper is founded on many thoughts expressed in another author's paper published in Polish (Gruszczynski 2018b).

The discipline of finance has very quantitative background and a number of solid theories. However, as with other social science disciplines, theories are often far from current realities, their endurance is low and they have limited validity across countries and across the financial orders. Similarly, research in corporate finance and accounting frequently yields inconclusive and/or dissimilar results, depending on market, sample, observation period etc. (Gruszczyński 2012). It should be accepted that the research result is limited to "here and now" and is not general like mathematical theorem.

Therefore, it is of vital importance to have some common understanding about research methodology of statistical-econometric origin applied to corporate finance and accounting. The obvious starting point is always the world literature survey where one always finds major stream of the hypotheses in question. The core are papers in leading A-journals, mostly papers of quantitative (statistical) edge. Most papers use databases of microdata on financials.

The structure if this paper is as follows. Section 2 discusses the regression model as prevailing tool for researchers in corporate finance and accounting. Section 3 aims at showing several views on what can be regarded as good practice in applying quantitative (econometric) methodology. Section 4 concludes the paper.

2. REGRESSION MODEL AND ITS DRAWBACKS

Researcher in corporate finance and accounting typically believes in the power of regression model, i.e. the equation where we have a left-hand side variable *Y* (explained, endogenous) and a number of right-hand side variables *X* (explanatory, exogenous). Model can have many forms but idea remains the same: there are some determinants (explanatory variables) which explain behavior (variability) of the explained variable. And, when one shows – with some care – that "statistically" model is correct then this constitutes the "proof" of validity of the examined relationship.

Yes, this might be the case but usually it isn't. Why? There is a number of aspects, controls, questions that such model should answer. If we do not follow certain "checklist" of those items, model may seem to be formidable but in fact is not correct or appropriate.

2.1. Causality and selection of variables

First question concerns the type of hypothesis one aims at verifying. Using regression we commonly seek to show that some activity represented by exogenous variable *X* is (or not) the determinant of behavior of *Y* variable. This is OK as long as by "determinant" we understand *X* being associated, correlated with *Y*. To prove that *X* is the "cause" of *Y* we need more than regression model and – even so – the proof is not very much general.

Their survey paper on causality in empirical corporate finance research Atanasov and Black (2016) begin with following paragraph: *"Much corporate finance research is concerned with causation – does a change in some input cause a change in some output? Does corporate governance affect firm performance? Does capital structure affect firm investments? How do corporate acquisitions affect the value of the acquirer, or the acquirer and target together? Without a causal link, we lack a strong basis for recommending that firms change their behavior or that governments adopt specific reforms."*

In order to prove the validity of this type of questions for data representing a particular time and space setting it is necessary to use techniques other than regression. They are based on "treatment effects" approach, i.e. on understanding that there is a treatment variable like "new

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governance order in company" and the effect variable like "company's financial performance". For examining causal relationships most appropriate are methods of counterfactual analysis, such like matching techniques (including propensity score matching), difference-in-differences methods, regression discontinuity approach and other.

These methodological approaches are appealing, however not easy to correctly apply. Atanasov and Black (2016) suggest comprehensive list of conditions to be met in order to accept analyses based on counterfactual approach. Authors have studied 13 thousand articles from 22 leading journals of economics, finance, law and management in 2001–2011. Among them, 863 papers focused on the relationship between corporate governance and companies' performance and out of this number 74 papers were using *shock-based research* approach (with 40 different shocks/treatments). Authors concentrate on examining three very good papers and on showing that – even in such cases – there are doubts as to all stages of research process, especially to techniques aimed at proving causality effects.

Summing up: techniques for properly verify causality effects are not trouble-free solutions to questions which are not resolved by regression analysis.

Knowing that, is it worth to use regressions in corporate finance and accounting research? The answer is the obvious "yes". Regression analyses are valuable, especially when there is no other choice. Their outcomes are often close to ascertaining causality, particularly when we use panel regression techniques. Common regression (correlation) technique based only on observational data has no ability to evidence causality. However, it has valuable interpretative value, especially when the sample includes companies properly fit to each other.

Major question in setting up the regression analysis is the choice of explanatory variables. Solutions are more or less the same for linear regression as for more complicated nonlinear models. For example, in logit or probit model the explanatory variables enter the linear combination of regressors in the same way as in linear models. Selection of explanatory variables (regressors) to the models shall be based on theory, relevance and the experience of other researchers in the same field. In the framework of big-data and more operational approach, the process of selection of regressors may be more technical and (therefore) atheoretical.

2.2. Endogeneity

Now comes weightier element at the finale of discussing regression analysis and its drawbacks for corporate finance research. It is the problem of endogeneity, today more than fashionable, at least in asking questions about the quality of research reviewed. What it is about? Technically, this is the situation when the explanatory (exogenous, regressor) variable in regression model is correlated with its error term, i.e. correlated with another regressor which has not been included in the model. Well, this is just technical explanation that "most corporate financial decisions are determined endogenously in a complex network of relationships" (Li 2016).

The following example is taken from Li (2016). Assume that the performance of a company (endogenous variable) is explained by CEO "power" and by other explanatory (exogenous) variables. CEO power is expressed by means of index showing the "salary distance" between CEO and the no. 2 person in the company [i.e. (CEO compensation – no. 2 person compensation)/(CEO compensation)]. This index is called *GAP*. Financial performance of the company is represented by Tobin's *Q*. How *GAP* can be endogenous in the model explaining company's performance (*Q*)? There are two possibilities: "either causality runs from *Q* to the *GAP*, or causality runs both ways. A random shock that enters the regression model through the error term affects *Q*. Because *Q* affects the *GAP*, *GAP* will be correlated with the error term, generating a biased coefficient on the *GAP*. The second situation is that the *GAP* and *Q* have no direct effect on each other, but they are spuriously correlated through some third variable. If we do not

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explicitly control for the third variable, the error term will absorb the effect of this variable. Thus, the error term will be correlated with the GAP, causing biased and inconsistent estimates".

So, in the regression model we have the left-hand side variable Q and the right-hand side variable *GAP*. To address the possible endogeneity of *GAP* one can use various techniques. Li (2016) uses instrumental variables approach, fixed effects model (firm and year effects), lagged dependent variables and control variables. All this resulted in significant change of the regression coefficient by *GAP* variable: from positive when the endogeneity effect is not addressed to negative when the techniques of accounting for endogeneity are applied. In another words: more power of the CEO is associated with poorer company's performance.

Question of attending to endogeneity in a model is never simple. Investigating the relationship between managerial ownership and corporate performance Coles, Lemmon and Meschke (2012) found that "in the ownership–performance context, the use of proxy variables, fixed effects, and instrumental variables does not generally provide a reliable solution to the endogeneity problem. One prominent reason is that nonlinear regression specifications are likely to be appropriate. Another is that some remedies do not address endogeneity arising from the joint time-series (within-firm) variation of performance, size, and contract design"

Thus, it will be continuously the challenge of how to deal with endogeneity in the specific model. In the context of empirical corporate finance it is worth to refer to an excellent paper by Roberts and Whited (2013). They indicate two groups of techniques as remedies for endogeneity. First are those which take into account the source of variability of exogenous variable: instrumental variables approach, estimators differences-in-differences and also the regression discontinuity design. Second group of techniques makes use of the endogeneity in the modeling itself: e.g. use of panel data or matching estimation.

Today we know that addressing endogeneity in regression-type models may give inconclusive results, depending on the research setup, the researcher's creativity etc. Nevertheless, it is advocated to always consider this question. Atanasov and Black (2016) comment on that: « We share neither the perspective of some researchers, whose view can be caricatured as "endogeneity is everywhere, one can never solve it, so let's stop worrying about it"; nor the "endogeneity police", whose attitude is that "if causal inference isn't (nearly) perfect, a research design is (nearly) worthless"; nor that of authors who know they have an endogeneity problem, but say little or nothing about it in their paper, hoping the referee won't notice, or else use a weak instrument to address endogeneity and hope the referee won't object. Our anecdotal sense is that paper acceptance and rejection decisions often turn on which position – endogeneity is everywhere, endogeneity police, or our middle ground – best describes the referee and the editor ».

The deficiencies of regression analysis indicated above, such as inference about causality or the endogeneity problem and the proposed remedies are not the common knowledge among econometricians, unfortunately. Angrist and Pischke (2017) comment on that in a survey of undergraduate syllabi of econometrics in the leading US universities.

3. GOOD PRACTICES

Statistical-econometric methodology in contemporary corporate finance and accounting research is dominated by techniques based on the use of microdata. In typically proposed regression-type models the techniques of microeconometrics and advanced data analysis are prevailing. Variety of research questions and proposals how to solve them might certainly entertain some standard or good practice rules or suggestions to follow.

Good practices in microeconometric modeling are proposed on the basis of author's own experience and on the survey articles of similar type. Important inspiration is the paper by Renée Adams (2017) for researchers in corporate governance topics. We have used also papers of

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Kennedy (2002) on ten commandments of applied econometrics as well as the page of Rob Hyndman (robjhyndman.com/). Invaluable was also the pitching template by Robert Faff (2017).

And now the good practices.

1. Dedicate reasonable share of your time for this[1]:
   - formulate major features of your research question in one sentence,
   - identify sources (papers) of the scientific mainstream being modern foundation of your topic,
   - write in one paragraph the motivation for your intended research, indicating the "puzzles" you are going to solve; avoid questions which are wrong, remember that "an approximate answer to the right question is worth a great deal more than a precise answer to the wrong question",
   - identify fundamental idea that "drives intellectual content" of your research topic, along with major research hypothesis,
   - determine the key explained variable in your model as well as the principal explanatory variables; consider the possibilities of endogeneity and the viable remedies,
   - carefully explore the availability and quality of your data,
   - discuss major steps in your research schedule and the choice of (quantitative) methodology,
   - clarify again the originality of the intended research; how will you argue that it is really novel?,
   - answer the question: "So what?"; why your topic is reasonable? "how will major decisions/ behaviour/activity etc be influenced by the outcome of this research?".
2. Once you decide to apply the econometric/ microeconometric model, remember about the following[2]:
   - propose your model on the basis of relevant theory (if possible), make use of the results of other researchers, and apply a lot of common sense,
   - if you employ microdata do not forget that they have low level of aggregation; due to this the classical linear relations are rarely applied; for example, this is the reason why goodness-of-fit measures, like R-squared, have low values; possible substantial heterogeneity of units (companies) should be taken into account,
   - samples of microdata in corporate finance and accounting research are typically not random; do not avoid questions about sample biases; most research uses samples of large public companies, commonly the best on the market; remember that the investigation results pertain only to companies in the sample,
   - use the rule of KISS: *Keep It Sensibly Simple* (but not *Keep It Simple, Stupid*); this rule of simplicity may mean many things (see: Kennedy 2002); we advocate the following: do not include too many explanatory variables into your model (e.g. if you have five profitability ratios use only 1 or 2); your explanatory variables shall have some merit; avoid adding new variables unless you are sure that they belong to the model (otherwise you quickly switch to data-minig exercise),
   - in most models, also non-linear ones, the explanatory variables enter in the form of linear combination (i.e. as the sum of products of each variable by its parameter); it is advisable that in such linear combination we shall minimize effects of multicollinearty, i.e. high mutual correlation of explanatory variables; this might be done e.g. by selecting to the model the variables that are not very much correlated with each other,
   - make sure that the estimation result can be sensibly interpreted: that the signs of parameter estimates are as expected / fit to theory (sometimes: are the same as sings of simple correlations[3]), that the variables which are important are also statistically

[1] Following Faff (2017) and Faff et al. (2017); also Kennedy (2002) and Hyndman (robjhyndman.com/).

[2] Following Kennedy (2002), Gruszczyński (2012).

[3] Gruszczyński (2012, p. 82).

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significant[4]; do not forget that small values of estimates are not the symptom of their "lesser validity" (all is decided by statistical tests),
- do not forget that in order to show the causality we need to use special techniques (see section 2 above); otherwise the only interpretation shall be using terms: "correlation", "association",
- carefully use the potential of data-mining; strategy of modelling in econometrics is rooted in theory as the inspiration for specifying model equations; once we employ data-mining in order to find model that "best fits to the data" then the result may not be correct, especially when appropriate theory exists; however, the data-mining exercises may reveal regularities that can "be seen in the data", and this may constitute a good hint for further modelling; sometimes the modelling target is not about revealing relationships between explanatory and explained variables but about predicting (*ex post*) the values of explained variable, in such case the data-mining techniques are also appropriate.

3. Quantitative research in corporate finance and accounting as reported in published papers, especially in good quality journals, is carefully scrutinized by reviewers. Here is the excerpt from the set of "good practices" formulated by prof. R. Adams (2017)[5]:
   - remember about your assumptions; most papers are rejected because of critical reviews concerning the choice of instrumental variables or treatment effects approach – without discussing assumptions necessary for model identification; key element is also the proper description of institutional set-up concerning the investigated issue of corporate finance or accounting (e.g. the legal framework),
   - clarity and transparency of the text is important to the same extent as research result itself; follow the literature and avoid preparing the article already written by someone else; in the same time, do not believe everything which has been published, question what you read; do not forget about visualization of your thoughts (a must when you use difference-in-differences and regression discontinuity techniques),
   - if you intend to demonstrate the causal effects, it is necessary to show relevant strategy of identifying those effects; this is not simple; most papers ignore such discussion, other employ incorrect identification techniques; e.g. popular technique of difference-in-differences is usually not very appropriate (e.g. in corporate governance topics it is difficult to find a set-up corresponding to a proper medical-type experiment); also, matching techniques are usually not applied correctly; obviously, neglecting discussion about causality is not advisable; if identification of causal effects is not feasible then the best solution is to apply regression and correlation techniques – with deep analysis of possible biases in the results (for this, prof. Adams advocates paper by Miller, 2013),
   - good dataset is crucial for the results; for researchers in corporate finance and accounting the everyday headache are various deficiencies like holes in the data, limited availability of data for "soft" variables, not unified data for quantitative variables, data incomparable between companies, etc.; on the other hand, the availability of more data is not always positive for modelling (prof. Adams points out that in some corporate governance research the cross-sectional data fare much better than panel data),
   - it is advisable to consider all "classic" econometric topics like: correction for heteroscedasticity, use of fixed effects (if possible), OLS as the benchmark for more advanced techniques, etc.; however, the question of statistical significance of variables is not very important since for large datasets it is almost always assured – more important is interpretation and feasibility of the result,
   - important is the replicability of your outcomes; more and more often the journals require to supply your dataset along with the paper; sometimes, your dataset is placed online.

[4] Gruszczyński (2012, p. 67).

[5] Adams (2017); prof. Adams reports her hints and suggestions in the form of "Adams' alphabet" – from A to Z; we show here only few items.

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Finally, it is worth to mention Winston Churchill and his confidential memo, dated August 9, 1940, entitled *Brevity* (to be found in internet). It is devoted to eliminating unnecessary jargon and concentrating on the intended message: "discipline on setting out the real points concisely will prove an aid to clearer thinking".

4. CONCLUSION

Corporate finance and accounting research calls for applying modern statistical-econometric methodology, with the extensive use of sets of microdata on companies. For this purpose it is advisable to use several "good practices" in order to avoid unnecessary efforts leading to incorrect results. The research projects in corporate finance and accounting applying the techniques of microeconometrics are exposed to a number of risks, most of them connected with uncertainties about relevant methodological approach.

The financial microeconometrics topics emerge as the field for examining both practical and theoretical questions about applying econometric techniques in corporate finance and accounting research based on the use of microdata. This paper offers a short survey on recommendations concerning quantitative research in corporate finance and accounting. Thoughts of Faff (2017), Kennedy (2002), Adams (2017) and Hyndman (robjhyndman.com/) are supplemented by the author's own experience. The catalogue of good practices is by no means exhaustive although it may serve as the starting point for considerations about new research projects in corporate finance and accounting.

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Sustainability and Equity Challenges to Pension Systems: The Case of Lebanon[1]

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ABSTRACT

Reform of Lebanon's pension system is indispensable. The country already faces fiscal sustainability risks, which will be compounded in the future by significantly higher pension- related spending and liabilities, mainly reflecting adverse demographics. In addition to sustainability issues, the pension system also suffers from equity shortcomings – Lebanon is the only MENA country that does not offer social security for retirees in the private sector. While several reform proposals have been formulated since the early 2000s, none has been implemented to date. Costs mount with every year of delay, so action is required soon to address these challenges.

JEL classification: E62, H55, J11

Key words: ageing, demographics, equity, pensions, pension reform, fiscal policy, sustainability

INTRODUCTION

Pension reform is an important policy challenge in many emerging markets (EM). Public pension expenditure averages around 6 percent of GDP in EM. While this is significantly lower than in some advanced economies, it nonetheless presents an important challenge looming on the horizon (IMF, 2014). Population aging and projected demographics make current pension systems unaffordable in the future, with risks to fiscal sustainability. At the same time, low pension coverage in many EM economies might leave large segments of the population without adequate income in old age and at risk of falling into poverty – thus raising important equity concerns.

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The challenge in Lebanon is even more pronounced. Although public pension expenditure for Lebanon currently amounts to 3 percent of GDP – about half the level in other EMs – consideration needs to be given to pension reform. Lebanon's population is ageing the fastest among Middle East and North Africa (MENA) countries and its social safety net for the elderly is considered highly inadequate by international standards (Pallares-Miralles and others, 2012; Rached, 2012). Beyond aging, the starting fiscal position and sustainability outlook for Lebanon are already weak, with public debt at above 130 percent of GDP in 2014 and projected to exceed 140 percent by 2020 (IMF, 2015).

Numerous proposals to reform the pension system in Lebanon have been considered, though they have been unsuccessful so far. Among them, three proposals put forward in the 2000s are worth noting. The 2004 proposal that the authorities attempted to implement in close collaboration with the World Bank aimed at integrating the public and private pension schemes into one modern fully-funded defined contribution scheme (World Bank, 2005). The 2011 proposal, prepared in close collaboration with the World Bank and the International Labor Organization, expanded on the 2004 proposal to offer medical insurance after retirement and a non-contributory pension scheme to all citizens funded by taxes (Rached, 2012). The most recent proposal that is currently under study within parliamentary committees envisages reforming the private pension scheme so that it provides lifetime health insurance and pension allowance, along with other important reform features.

However, as these initiatives were not implemented, the pension scheme has remained essentially unchanged since its introduction in the 1960s.

Lebanon is a country that faces significant challenges associated with demographic trends – it exhibits one of the worst trends in the MENA region. Based on the various policy simulations, the country faces fiscal sustainability risks associated with the generous public sector pension system and equity shortcomings due to low coverage. With respect to policy reform proposals whether partial or complete, Lebanon can provide very useful insights on how to tackle both sustainability and equity challenges. This paper provides an assessment of the fiscal risks associated with Lebanon's sustainability and equity challenges and reiterates the need for reforms. Building on the database compiled by Pallares-Miralles and others (2012), the paper presents underlying demographic trends for Lebanon and MENA countries that demonstrate the importance of the aging factor. These trends underpin projections of pension expenditures for public and private sector schemes under a no reform scenario. Having assessed the importance of the sustainability and equity challenges, the paper outlines key reform options, building on previous reform proposals formulated by the authorities in cooperation with international organizations. The paper however does not cover the issue of the broad macroeconomic impact of pension system reform.

The remainder of the paper is organized as follows. Section II describes the current pension system in Lebanon. Section III presents underlying demographic trends for Lebanon and MENA countries, followed by analyses of sustainability and equity of the current system. Section IV offers reform options, while Section V concludes.

THE CURRENT PENSION SYSTEM

Lebanon's pension system is based on separate schemes for public- and private-sector employees. The public sector schemes cover civil service and military personnel, while the private sector scheme only covers private sector and contractual government employees.

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Public Sector Schemes

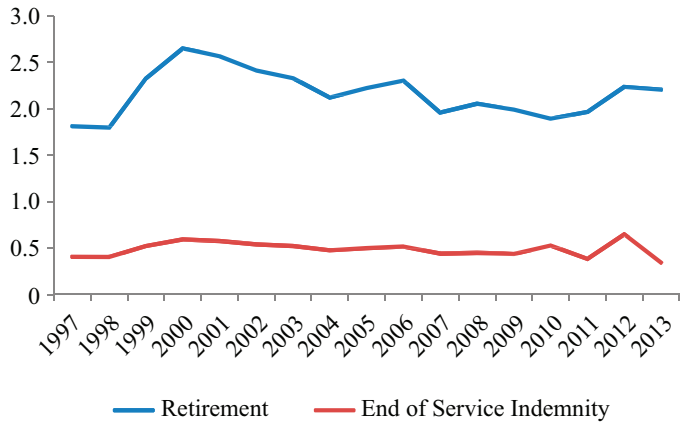
Public-sector employees and military personnel have traditional defined-benefit schemes. Established in the early 1960s, they both grant an assured pension income, based on a pay-as-you-go system (Appendix Table A1).[2]

Both schemes are generous. The effective replacement rate is high and often close to 100 percent.[3] The system does not enforce a minimum retirement age, so that the accrual rate is high with respect to the retirement age and the contribution rate.[4] In addition, the schemes are distorted by ad hoc and costly additional benefits – such as an extra lump-sum payment for retirees who complete 40 years of service, and the crediting of additional years of service for the military. Moreover, variations in pension payments are high as they are based only on the last salary level earned, which render them sensitive to career paths and wage histories.

Finally, the pension payments are indexed to changes in public sector salaries, making the system potentially vulnerable to large salary adjustments.[5]

Benefits are particularly generous to surviving heirs of retirees. Surviving wives and heirs of retirees retain the full pension of the deceased employee. Unmarried, divorced and widowed daughters of retirees keep the pension benefits for life. Taking these extended beneficiaries into consideration, calculations that account for life expectancy for men and women, standard age difference between husbands and wives, and daughters' claims on pensions show that pensions are drawn for an average of 30 years after a particular public servant's retirement – compared to an average lifetime career of 40 years (Daher, 2012).

Retirement and EOSI payments (percent of GDP)



Despite their multiplicity, end-of-service-indemnity (EOSI) lump-sum disbursements in the public sector have historically been much lower than pension payments (text chart). These payments are mandatory for forced terminations and for teachers who have served less than 25 years (20 years for administrative staff and female teachers who resign for marriage purposes); for teachers (administrative staff) who serve 25 (20 years) or above, lump-sum indemnity would be optional. For the military, terminated employees and officers who serve less than 20 years

[2] The pension scheme for public servants follows the 1959 Public Servants System Legislative Decrees; that of the military follows a 1961 legislative decree.

[3] The replacement rate is 85 percent, pensions are tax exempt, and public sector retirees do not contribute to the pension scheme.

[4] The accrual rate, normally a function of retirement age, life expectancy at retirement, and the contribution rate, is the percentage of the income that the worker receives for each year of contribution.

[5] Salary scale adjustments are irregular but very large when they occur. A substantial increase of public sector wages has been debated since 2012. If approved, it is expected to add more than 1 percent of GDP to the annual wage bill. It includes three components: (i) an increase in the minimum wage to $448 from $332 – a minimum wage increase for the private sector was last implemented in 2008 – it raised the minimum wage from $199 to $332; (ii) the application of a cost of living adjustment last granted for the public sector in 1999 and (iii) the adoption of a new salary scale – last updated in 1998.

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(10 years for non-officers) are only eligible for a lump-sum indemnity; those who serve 20 years (10 years) or more have a choice between pension and lump-sum payments.

Public sector employees who serve for more than 40 years receive a lump-sum top up worth 85 percent of the last monthly basic salary times three months for each year of service that exceeds 40 years. Most men choose pension payments while many women choose lump-sum payments because if both are public sector employees the latter would inherit their husband's pension for life.

Private Sector Scheme

Private sector employees predominantly rely on a defined-contribution scheme. The main scheme is administered by the National Social Security Fund (NSSF), an independent institution established in 1963 under the Ministry of Labor. An EOSI offers a lump-sum cash benefit upon retirement – equivalent to the accumulated contributions associated with past employers, and one month of earnings for each year of service with final employer (up to 20 years, with half a month for each year in excess of 20 years, for those aged more than 60, Appendix Table A2). Aside from the scheme administered by the NSSF, other schemes exist for universities, syndicates and private sector teachers (Box 1).

Benefits are very limited. As all benefits are terminated with a single lump-sum payment upon retirement, employees lose all benefits post-retirement – when they need them the most. There are no further pension or health coverage benefits after retirement. Furthermore, NSSF coverage is provided only to private-sector and contractual government employees, leaving out the elderly.[6]

Box 1. Other Private Sector Schemes

Universities: The public university and private universities require contributions ranging between 5 and 11 percent of the employee's earnings to finance their pension schemes. The schemes offer mostly defined benefits that depend on the last earned salary and the number of years of service; the investment of the funds is delegated to private insurance companies. Many universities offer life insurance and disability benefits and pay funeral expenses for their members, as well as education allowances. They also offer health insurance.

Private syndicates: Lawyers, engineers, physicians, and pharmacists offer their own social security schemes that provide regular pension payments upon retirement as well as health coverage. These defined contribution schemes are optional and extend to family members.

Private schools: Private sector teachers have their own optional pension scheme offering an indemnity that can be converted into a regular pension as well as health insurance coverage. The indemnity is a lump sum worth one month salary for each of the first 10 years, two months for each of the following 20 years, and three month salary for each year beyond the first 30 years. The pension scheme provides regular pension payment worth 85 percent of the last salary for members who serve at least 30 years. The plan is financed by a contribution of 6 percent of the member's salary topped by a similar amount by the school.

[6] The NSSF was supposed to include an optional contributory and subsidized scheme for the elderly – not activated to date – requiring a contribution of 6 percent of the minimum monthly wage by each subscriber.

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SUSTAINABILITY AND EQUITY

This section presents key challenges that Lebanon is facing to ensure the pension system's sustainability while providing social protection. The analysis is underpinned by pension expenditure projections based on demographic trends under a no reform scenario.

Methodology

To project pension expenditure, a basic identity decomposing the drivers of pension expenditure (PE) into three main categories is used: the replacement rate (ratio of average pensions divided by average wages); aging (measured by the old age dependency ratio); and the coverage (the number of pensioners as a proportion of the population 65 and older).[7]

$$\frac{PE}{GDP} = \underbrace{\frac{Expenditure}{Pensioners} / \frac{GDP}{WAP}}_{\text{Replacement rate}} * \underbrace{\frac{Pensioners}{WAP}}_{\substack{\text{Old-age}\\ \text{dependency}\\ \text{ratio}}} * \underbrace{\frac{Pensioners}{Old\ age\ population}}_{\text{Coverage}}$$

WAP is working age population. Using this identity, it is possible to calculate the change in pension spending as a share of GDP between two years (t1 and t2). For any year t, let O(t) be the old-age dependency ratio, C(t) be the coverage ratio, R(t) be the replacement rate.

Assuming a constant total compensation share in GDP over time yields:

$$\frac{PE}{GDP}(t_2) = \frac{PE}{GDP}(t_1) * \frac{O(t_2) * C(t_2) * R(t_2)}{O(t_1) * C(t_1) * R(t_1)}.$$

Assuming further that replacement rate and coverage remain constant over time, the main focus of the analysis becomes assessing the impact of aging.

Underlying Demographic Trends

Significant demographic challenges are looming on the horizon for Lebanon.

- *Life expectancy*. Lebanon has the highest life expectancy in the MENA region, around 80 years as of 2012, which is projected to increase by more than 6 years by 2050.
- *Fertility*. At the same time, Lebanon has the lowest fertility rate in the MENA region. While the fertility rate is around 1.5 children per female as of 2012, the average for the MENA region is 2.7. Going forward, Lebanese fertility is expected to develop broadly in line with the MENA region
- *Dependency ratio*. The dependency ratio is defined as the population 65 and older, relative to the working age population. With greater life expectancy and lower fertility, the ratio is projected to exceed 30 percent for Lebanon by 2050. This would be the highest in the MENA region, for which the average is around 20 percent.

[7] The framework used was designed by the IMF's Fiscal Affairs Department. Projections based on this framework are subject to certain caveats that include uncertainty regarding demographic assumptions and a simplifying assumption of consistency of the demographics of examined population with total population.

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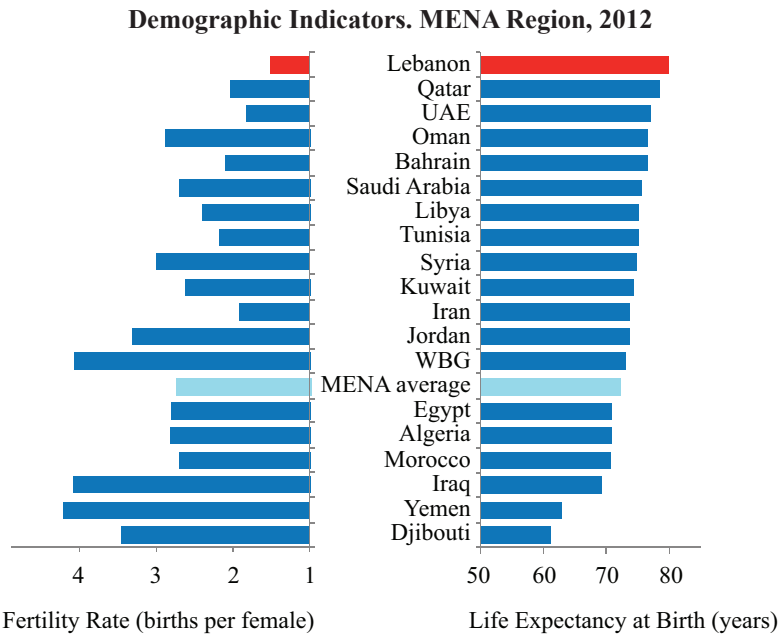
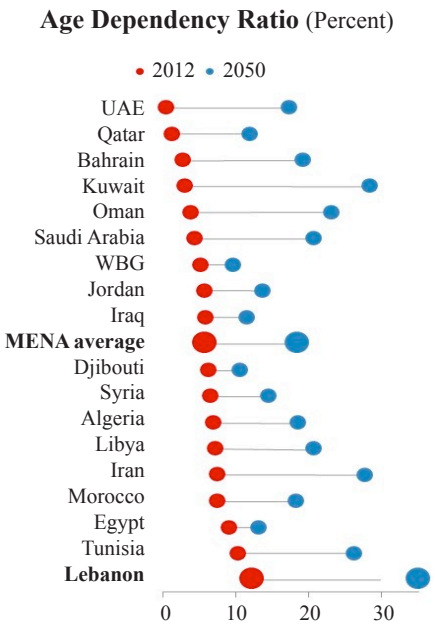


Source: World Development Indicators



Source: World Development Indicators, UN

Sustainability

Given the already challenging fiscal sustainability outlook and identified unfavorable demographics, it is important to quantify the extent to which pension expenditure might add to this issue. Since there are separate schemes for public and private sector employees, the analysis is split to account for this feature.

Public sector schemes

The projected path of public pension expenditure is explosive. With the above demographic trends, expenditure would increase from around 3 percent of GDP in 2014 to 5.2 percent in 2030, and accelerate significantly after that, reaching around 9 percent of GDP in 2050. This is high by international standards, where the average projected pension expenditure for emerging market countries is estimated at 8 percent of GDP by 2050. The cumulative cost of this projected increase is substantial, as illustrated by the present discounted value (PDV) of increased spending over 2014–2050, estimated at almost 80 percent of 2015 GDP. This is again high by emerging market standards, for which the projected increase in PDV is estimated at around 25 percent of 2015 GDP (Table 1).

Table 1.
Pension Expenditures on Public Sector Schemes

	Pension Expenditure (% of GDP)						2014–2030			2014–2050		
							Expenditure Increase		Accrued Pension Liability (% of GDP)	Expenditure Increase		Accrued Pension Liability (% of GDP)
	2014	2015	2020	2025	2030	2050	Percentage Points	Present Discounted Value (% of GDP)		Percentage Points	Present Discounted Value (% of GDP)	
Lebanon	3.0	3.0	3.3	4.2	5.2	9.1	2.2	12.6	53.4	6.1	76.9	109.7
Emerging Average	5.8	5.8	5.9	6.2	6.5	8.0	0.7	3.7	90.9	2.1	24.3	147.4

Source: UN, Staff calculations

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Assuming no reform, projected pension spending will undermine fiscal sustainability. The projected increase of 6 percentage points of GDP in nominal terms and of 77 percentage points in PDV terms by 2050 pose significant challenges to fiscal policy. In particular, the projected increase in PDV terms essentially implies taking on (and financing) 77 percent of additional debt, on top of an already-very high debt burden. The accrued pension liability – estimated at close to 110 percent of GDP in 2050 – also suggests significant fiscal risks.

Private sector scheme

While the projected pension expenditure for the private scheme increases in line with that for the public sector, the magnitude is much smaller. Under the same demographic dynamics, spending increases from 0.5 percent of GDP in 2014 to almost 1 percent in 2030, accelerating significantly to 1.5 percent of GDP in 2050 (Table 2). Estimates of the projected increase in PDV terms confirm the relatively small impact on expenditure over the long term.

Table 2.
Pension Expenditures on Private Sector Scheme

	Pension Expenditure (% of GDP)						2014–2030			2014–2050		
							Expenditure Increase		Accrued Pension Liability (% of GDP)	Expenditure Increase		Accrued Pension Liability (% of GDP)
	2014	2015	2020	2025	2030	2050	Percentage Points	Present Discounted Value (% of GDP)		Percentage Points	Present Discounted Value (% of GDP)	
Lebanon	0.5	0.5	0.6	0.7	0.9	1.5	0.4	2.1	8.9	1.0	12.8	18.3

Source: UN, Staff calculations

In contrast to the public schemes, the private-sector increase does not threaten fiscal sustainability. The projected increase of 1 percentage points of GDP in nominal terms and of more than 10 percentage points of GDP in PDV terms by 2050 could be offset by fiscal adjustment and/or running down NSSF reserves. But, if revenues were held steady as a share of GDP, and spending increased in line with demographic trends, the overall NSSF balance would be reduced to almost zero by 2050 (Table 3). In addition, the lack of a transparent link between subscriber contributions and benefits could give rise to additional liabilities. Though these are not covered by the NSSF and would be the obligation of the final employer, they are nonetheless a contingent liability as the latter might not be able to pay.

Table 3.
Simulation of Sustainability of Private Sector Scheme

	End of service idemnity (percent of GDP)				
	2015	2020	2025	2030	2050
Revenue	1.9	1.9	1.9	1.9	1.9
Expenditure	0.5	0.5	0.7	0.9	1.5
Overall balance	1.4	1.4	1.2	1.0	0.4

Source: UN, Staff calculations

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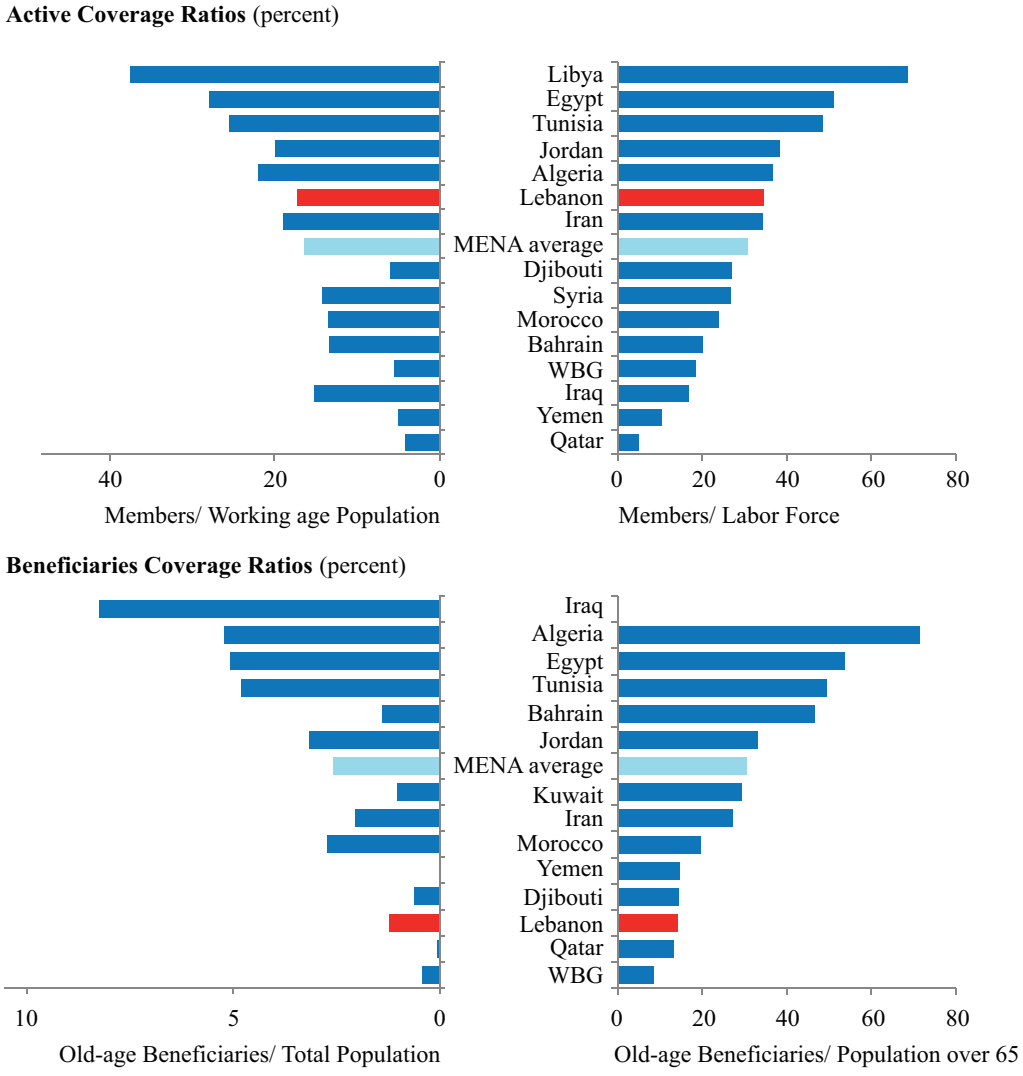
Equity

Coverage of the pension system is limited. While broadly in line with the MENA average – when measured as the share of *members* relative to the labor force or working age population – coverage for both public and private schemes is somewhat low by international standards. At the same time, these indicators do not completely capture the nature of Lebanon's private-sector pension system, which provides only a lump-sum and not a pension per se. As a result, focusing on *beneficiary* coverage indicators results in low coverage by MENA standards. Specifically, both old-age beneficiaries and total beneficiaries are well below the MENA average, as a fraction of total population.

Pension System Coverage. MENA Region, 2012



Source: World Bank.

Coverage modalities differ across the public and private schemes, increasing their inequity.

- The public sector schemes offer to the average full-career worker a pension equivalent to around 85 percent of pre-retirement income, combined with no income tax and continued healthcare insurance cover. In contrast, the private sector scheme offers a much lower equivalent of pre-retirement income (paid as a lump-sum); and retirees lose access to health coverage.

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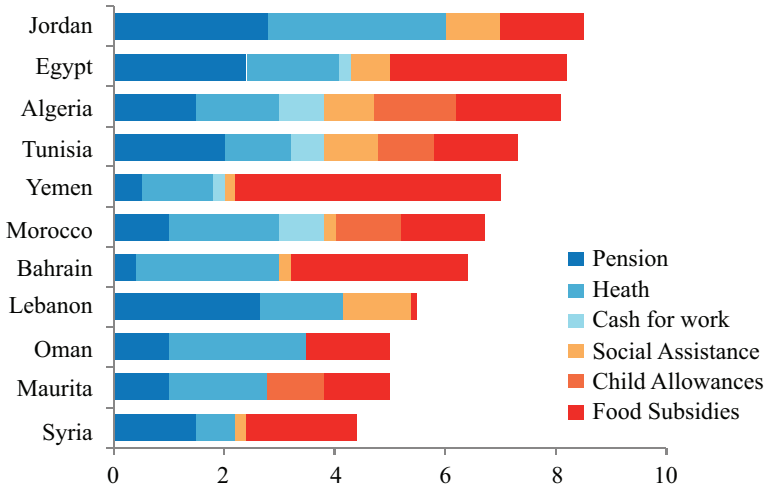
- Financial and longevity risks differ. Under the private scheme, employers face financial risk because the final employer is supposed to pay the difference between the dues to the employee and the actual amount of money in his/her account. In addition, employers face longevity risk as the increased life expectancy can result in payouts higher than originally envisaged. This is in sharp contrast to the public pension schemes where both financial and longevity risk are assumed by the government.

Beyond coverage, there is however a broader issue of a social safety net for the elderly in Lebanon. In general, spending on social protection in Lebanon is low by MENA standards. On top of that, Lebanon is the only country in MENA that does not offer social security for retirees in the private sector, so the most vulnerable elderly are left without any formal lifetime pension coverage. Furthermore, Lebanon has the highest percentage of older adults who continue to work beyond the age 60 – suggesting that most of these workers would be self-employed or employed in the informal sector with no access to any type of old age pension (Yount and Sibai, 2008).

Public Spending for Social Protection, 2013
(percent of GDP)



Source: IMF staff calculations based on Loewe, 2013

REFORM OPTIONS

Various options could help address sustainability and equity challenges. In this section, we explore options that include partial reforms and a transition to a unified pension system.

Partial Reforms

Given sustainability concerns, both public and private sector schemes should be reformed. Building on World Bank (2005), selected parametric options include: (i) increasing retirement age; (ii) containing benefits; and (iii) increasing social contributions.

Public sector schemes

- *Retirement age*. A higher retirement age would be warranted by Lebanon's relatively high life expectancy, along with the fact that the effective retirement age is significantly lower than the statutory retirement age. An increase by 4 years by 2030 could lower pension expenditure by 1.1 percent in 2030 and by 1.8 percent in 2050.

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- *Benefits*. Another option would be to delink pensions from wages in the public sector and reduce some of the current benefits.
  - *Indexation of benefits*. The current indexation formula exposes the pension schemes to potentially high and unexpected wage adjustments. Delinking pensions from wages and indexing them instead to inflation can potentially save 0.7 percent by 2030 and 1.6 percent by 2050.
  - *Benefit reduction*. The replacement ratio – effectively close to 100 percent – could also be reduced. Eliminating allowances and lump-sums for individuals who opt for pensions could reduce benefits by around 5 percent, which could in turn potentially reduce pension expenditures by 0.4 percent of GDP by 2050.
- *Social contributions*. The current contribution rate is only 6 percent. Increasing social contributions by 4 percent could bring down pension expenditures by 1 percent of GDP by 2050.

Table 4.
Reform Options for Public Sector Schemes

	Expenditure Increase			
	2014–2030		2014–2050	
	Percentage Points	Present Discounted Value (% of GDP)	Percentage Points	Present Discounted Value (% of GDP)
Baseline Projection	2.2	12.6	6.1	76.9
Retirement Age Increase	-1.1	-8.2	-1.8	-30.1
Indexation of Benefits	-0.7	-4.2	-1.6	-21.6
Benefit Reduction	-0.1	-0.8	-0.4	-4.6
Increase Social	-1.0	-15.7	-1.0	-31.1
Baseline + Reforms Contributions (offset)	-0.7	-16.3	1.4	-10.5

Source: UN, Staff calculations

Private sector scheme

Different reform options may be required for the private sector scheme. Its lump-sum nature, which leaves retirees unprotected in many respects, could be to a certain extent addressed by annuitization. As benefits are limited, the following parametric reform options could be considered:

- *Retirement age*. As for the public sector schemes, the retirement age could be increased. An increase by 5 years by 2030 could result in a decrease in pension expenditure by 0.2 percent of GDP in 2030 and by 0.4 percent of GDP in 2050.
- *Social contributions*. Building on the assumption of annuitization, private sector employees could contribute to a lifetime pension system in line with the employees of the public sector. Private sector employees are currently subject to a zero contribution rate because they are not entitled to any post-retirement benefits, but to be consistent with the public sector schemes, a contribution of 10 percent could be considered. As a result, pension expenditures could be reduced by 2.5 percent of GDP 2050, which would generate surpluses.

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Table 5.
Reform Options for Private Sector Scheme

	Expenditure Increase			
	2014–2030		2014–2050	
	Percentage Points	Present Discounted Value (% of GDP)	Percentage Points	Present Discounted Value (% of GDP)
Baseline Projection	0.4	2.1	1.0	12.8
Retirement Age Increase	-0.2	-1.7	-0.4	-6.2
Increase Social Contributions (offset)	-2.5	-39.3	-2.5	-77.8
Baseline + Reforms	-2.4	-38.8	-1.8	-71.1

Source: UN, Staff calculations

The most recent proposal that is more comprehensive in nature, but is still under study within parliamentary committees, envisages reforming the private pension scheme so that it provides lifetime health insurance and pension allowance, along with other important reform features (Box 2).

Box 2. Current Proposal for Reform in Private Sector Scheme

The most recent draft law on pension and social security (LEA, 2014) that aims at reforming the private sector scheme is currently under study within parliamentary committees. This law proposes amending some of the articles of the NSSF law to replace the existing EOSI system. The proposal entails the establishment of a pension and social security system – the Retirement, Disability and Death Fund – that will fully substitute the EOSI and that will provide three allowances: pension, disability and survivors benefits. It is envisaged to maintain the current health and maternity benefits. The proposed law would ensure lifetime health insurance as well as pension allowance – at a floor of 80 percent of the minimum wage – and cap the wages subject to contributions at seven times the minimum wage. It will also regulate contributions of employers to the social security system and will facilitate mobility as it would make it easier for employees to transfer liabilities when workers change jobs and secure full retirement rights of employers throughout their careers. The new law provides pension for all retirees between the ages of 64 and 68 and regulates early retirement for employees aged 60 whose membership period is at least twenty year.[1]

[1] The draft law also describes the sources of funding of the new system and provides regulations for the transitory period. Some recommendations from an actuarial study conducted by the ILO on the draft proposal (ILO, 2013) included adding a notional interest rate linked to inflation to individual accounts, gradually increasing retirement age in line with increasing life expectancy, setting the minimum pension at 75 percent of the minimum wage, correctly calculating the starting balance of existing EOSI individual accounts that will be shifted to the new system, and investing the funds of the system in tradable long-term treasury bills.

Unified System

Addressing *sustainability* as well as *equity* aspects would require a transition to a unified pension system. Key reform initiatives have included:

- *The 2004 proposal*. The authorities, with technical assistance from the World Bank, embarked on a pension reform program in 2004 that aimed at integrating the public and private

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pension schemes into one modern fully-funded defined contribution (FF-DC) scheme. The integrated system was supposed to include: a minimum pension guarantee (MPG) to those who had contributed sufficiently; a flat indemnity to individuals who had not made enough contributions; and preservation of acquired rights under the existing system. Private sector workers, new civil servants and military personnel would join the new FF-DC system, while contributors to the current civil and military schemes could choose to move to the new system on a voluntary basis. Coverage under the new system would be extended to the informal sector, the self-employed and casual workers with limited saving capacity by allowing optional enrollment and providing better enrollment incentives. To date, the proposal has not been implemented.

- *The 2011 proposal*. A more recent proposal entailed the adoption of a "Notional Defined Contribution" plan following advice from the World Bank and International Labor Organization (World Bank and ILO, 2011).[8] In this proposal, working individuals would pay contributions from their salaries to fund benefits received by the retired population. The system would grant a 2 percent annual rate of return and an annual inflation-proofing measure. The pension would guarantee at least 40 percent of the last salary for someone with 30 years of contributions, with a reduced pension available after 15 years of contributions. While similar to the 2004 proposal with respect to annuitizing the lump-sum payment and offering a minimum pension guarantee, the 2011 scheme would also include: extension of medical insurance after retirement, the provision of a contributory minimum wage, and a non-contributory pension scheme to all citizens to be funded by taxes.

CONCLUSIONS

Lebanon will likely face significant demographic challenges in the future. The country faces the least favorable demographics among MENA countries, with the highest life expectancy and the lowest fertility rate, translating into the highest current and projected dependency ratio in the MENA region.

Reform of Lebanon's pension system is indispensable. Sustainability considerations suggest the need for early and gradual reform before pension dynamics drastically deteriorate. As demonstrated by the projections, the longer adjustment is delayed, the costlier it becomes – all indicators worsen markedly beyond 2020, with exponential increases beyond 2030. Despite these unfavorable trends, no reform has been implemented so far, notwithstanding the concrete reform proposals prepared by the authorities in collaboration with international organizations since the early 2000s. Guided by these proposals, it would be useful to consider at least partial reforms in selected parameters of the schemes to help contain fiscal sustainability risks. For the public and private sectors these could include an increase in retirement age – particularly relevant given the country's relatively high life expectancy – as well as an increase in social contributions. Reforms in the public scheme could also include indexing benefits to inflation rather than keeping them linked to wages; and eliminating additional lump-sum payments.

In addition to sustainability issues, equity shortcomings are also a concern. The low number of beneficiaries, in the context of Lebanon's already weak social safety net and aging population, call for action – drawing again from the extensive work done by the authorities in collaboration with international organizations. The most recent draft proposal to reform the private sector scheme is an important effort to reduce inequity by providing lifetime health insurance and pension allowance.

[8] Such plan differs from the funded system in two important ways: (i) the interest rate is set by the government and not set by the market; and (ii) the accumulation is only notional so the system is not fully funded and may be equivalent to a pay-as-you-go scheme.

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Tackling both sustainability and equity would however require a unified pension system, with related transition costs, not included in this paper. Important aspects of a unified system would be a minimum pension guarantee, flat indemnity, wider coverage, extension of medical insurance after retirement, the provision of a contributory minimum wage, and a tax-funded non-contributory pension scheme for all citizens. These are difficult reforms that require political consensus. While the latter is currently lacking, continued inaction will only turn a difficult problem into an intractable issue.

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APPENDIX

Table A1.
Key Parameters of the Public Sector and Military Pension Schemes

	Civil Servants	Military
Retirement Age	No requirement. Maximum retirement age 64. Female teachers can generally retire after 20 years of service; male teachers after 25 years.	No requirement. Maximum retirement age 58–64 depending on rank.
Benefit Rate	Less than 20 years of service: end-of-service compensation. At least 20 years of service: choice between lifetime pension or end-of-service lump-sum. More than 40 years of service: a combination of a lifetime pension and end-of-service compensation.	Credited years of service up to three years per effective year depending on the security alert level.
	End-of-service compensation: 85 percent of last monthly basic salary[1] times one month for each year of service for the first 10 years; two months for each year of service in excess of 10 years but less than 20 years; and three months for each year of service in excess of 20 years.	Same as civil servants.
	Lifetime pension: accrual factor of 2 1/8th percent of the last monthly basic salary for each year of service and fractions thereof up to a maximum of 85 percent.	Same as civil servants.
	Combined lifetime pension and end-of-service compensation (for more than 40 years of service): 85 percent of the last monthly basic salary as a life-pension and an end-of-service compensation at 85 percent of last monthly basic salary times three months for each year of service that exceeds 40 years.	Same as civil servants
Contribution Rate	6 percent of basic salary;[2] retirees do not contribute.	Same as civil servants.
Pension Indexation	Ad hoc basis. The last pension increase was granted in 2012 based on the 2008 salary categories.	Same as civil servants.
Other Benefits	Survivor benefits for employees who die during service; disability pension for employees who qualify.	Same as civil servants.

[1] The last monthly basic salary is the pay scale, except for teachers, where special allowances are included in calculating the pension amount.
[2] The 2003 budget included a request to increase the contribution rate to 8 percent starting in FY2003 but it was not approved by parliament.

Source: World Bank (2005).

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Table A2.
Key Parameters of the End of Service Indemnity (EOSI)

Retirement age	Maximum age 64. Beyond that no accruals to the EOSI despite continued coverage under other benefits.
Benefit Rate	Share of entitlements if the employee completed at least 20 years of service,[1] reached age 60 or older; in case of marriage (during the first year and for females only), death (prior to retirement with at least six months of service), and disability (subject to a minimum of 20 times the monthly earnings). The monthly earnings used to determine the EOSI is equal to one-twelfth of the taxable earnings in the year preceding the date of entitlement. If the individual resumes work subsequent to the pre-age 60 liquidation, he or she can only liquidate subsequent accrual upon reaching age 60, death, or disability.
Contribution Rate[2]	None from the employee. Employers contribute on behalf of each employee at the rate of 8.5 percent of the individual's taxable income (of which 0.5 percentage points to the NSSF administration). However, effective employer contribution rates are higher since the last employer pays the shortfall between the employee's entitlement with the last employer and the accumulated contributions with interest corresponding to the same employment period.
Coverage	Private sector employees, contractual government employees, taxi drivers, newspaper and magazine vendors, local councilors and voluntary self-employed subscribers.
Investment	Contributions are collected in individual accounts and accrue an interest rate determined by NSSF investments – usually the rate on government bonds as most of NSSF investments are in treasury paper.
Other Benefits	Upon claim of indemnity, employers add one month of salary for every year the employee has spent with them (up to 20 years), and 1.5 months for every year after that. Accumulated contributions are managed by the NSSF.

[1] Employees with less than 20 years of contributions are subject to a reduction schedule of entitlements as follows: less than 5 years contribution, 50 percent reduction; between 5 and 10 years contribution, 35 percent reduction; between 10 and 15 years contribution, 25 percent reduction; between 15 and 20 years contribution, 15 percent reduction.

[2] The total social security contribution is set at 23.5 percent (21.5 percent paid by the employer and 2 percent paid by the employee). The employer pays 6 percentage points to the health insurance, 6 percentage points to the family allowances, and 8.5 percentage points to the EOSI. The employees' share only covers health insurance.

Source: World Bank (2005)

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Sovereign Debt Restructurings in Grenada: Causes, Processes, Outcomes, and Lessons Learned

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ABSTRACT

This paper documents the two debt restructurings that Grenada undertook in 2004–06 and 2013–15. Both restructurings emerged as a consequence of weak fiscal and debt situations, which became unsustainable soon after external shocks hit the island economy. The two restructurings provided liquidity relief, with the second one involving a principal haircut. However, the first restructuring was not able to secure long-term debt sustainability. Grenada's restructuring experience shows the importance of (1) establishing appropriate debt restructuring objectives; (2) committing to policy reforms and maintaining ownership of the restructuring goals; and (3) engaging closely and having clear communications with creditors.

JEL classification: F34, G15, H63

Key words: Sovereign Debt; Sovereign Defaults; Sovereign Debt Restructurings; Serial Debt Restructurings; Serial Defaults; Grenada; Disaster Clause

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1. INTRODUCTION

Grenada experienced a second sovereign debt restructuring during 2013–15, about a decade after its first restructuring during 2004–06, which was triggered by Hurricane Ivan. This paper analyzes several issues pertinent to Grenada's two sovereign debt restructurings, such as the causes, the processes, and the outcomes. The paper focuses on three key aspects: (1) why did the country restructure its debt? What macroeconomic indicators signaled the vulnerability of policies that ultimately led to the debt restructurings?; (2) how did the debtor-creditor relationship develop? What were the modalities and length of negotiation and communication with private, official bilateral and multilateral creditors (including an IMF-supported program)? Are there any legal and operational characteristics that might have influenced the renegotiation process?; and (3) did the restructurings fully address debt sustainability concerns? What was the impact on the liquidity and solvency conditions after each restructuring? [2] What is the creditor loss, along with the prospects for future market re-access?

Sovereign debt restructurings take place at times of acute financial and fiscal distress for the sovereign and usually involve a "haircut" in terms of a debt reduction in present value (PV) terms. Most restructurings occur after a default, but some are preemptive, that is, they are implemented without any missed payments (Asonuma and Trebesch, 2016). The main determinants of restructurings, as well as defaults, are over-indebtedness (debt-to-GDP ratio) and cash illiquidity, resulting in the government's inability to service the debt (rollover risks). Factors such as political instability and external shocks, in particular commodity price shocks and interest rate hikes, can exacerbate the adverse effects of these determinants. Market risk indicators, such as bond spreads, credit default swap (CDS) spreads, and rating changes can generally be viewed as predictors of the risk of a debt restructuring and default. Restructurings often follow or precede banking and currency crises and are associated with a decline in output, trade, and capital inflows Asonuma et al. (2016, 2018).

The IMF's Debt Sustainability Analysis (DSA) is an important tool to assess the potential need and scope of a sovereign debt restructuring. The public DSA analyzes the conditions under which a government's primary balance (the budget balance excluding interest payments) is sufficiently high to stabilize or reduce the public debt-to-GDP ratio. The external DSA assesses the same with respect to current account balance to stabilize or reduce the external debt-to-GDP ratio. Two key variables drive the DSA results: real interest rate (borrowing costs) and real growth rate. The larger the interest-growth differential, the higher the primary budget or current account balance needed to stabilize the debt-to-GDP ratios. Other indicators that may inform the DSA are, for instance, gross financing needs, debt structure and macro-realism.

Risk spillovers to and from the financial sector can play a major role in the decision for a sovereign debt restructuring. Sovereign debt restructurings can imply "top-down" risk spillovers, and cause losses to banks and investment funds, including pension funds, domestically and across borders, especially when they hold government debt or if they have sold (that is, have taken a short position on the country's bonds) sovereign CDSs. In this regard, some countries have launched a financial sector stability fund prior to their sovereign debt restructurings (for example, Jamaica 2010; St. Kitts and Nevis 2011–12) to possibly provide liquidity to financial institutions suffering losses from the exchange.

The scope of haircuts (creditor losses in PV terms) in bond restructurings has varied substantially, ranging from under 10 percent (for example, Uruguay in 2003, Dominican Republic in 2004–05) to over 80 percent (for example, Dominica in 2004, Ecuador in 2008–09, Seychelles in 2008–10, Cote D'Ivoire in 2000–10, and Greece in 2011–12). Evidence has shown

[2] IMF (2013) defines solvency concerns as those such that a debtor country is no longer able to meet the present value of its debt obligations without indefinitely accumulating debt, and liquidity concerns as those such that the debtor country's liquidity assets and available financing are insufficient to meet or roll over its maturing obligations.

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that the size of the haircut in a restructuring is positively correlated with years of exclusion from capital markets and post-restructuring borrowing costs. In particular, higher haircuts (lower recovery values) are associated with longer periods of market exclusion and higher spreads after a crisis (Das et al., 2012; Cruces and Trebesch, 2013). [3]

In general, debt renegotiations have become quicker and less disputed since the 1990s. Most bond exchanges have been completed within one or two years, although sovereign bondholders tend to be dispersed. Consultations with creditor committees—normally comprised of groups of five to 20 representative bondholders—have been useful in tailoring an exchange offer that suited both creditor and debtor demands and increased participation (Asonuma and Joo, 2017). High participation rates (of more than 90 percent) have been featured in recent sovereign bond exchanges. [4] Further, offering a menu of debt exchange options—in line with creditors' objectives and needs—has proven effective in past exchanges, as it has allowed creditors to choose their preferred type of new instrument, thereby incentivizing participation.

Among contractual issues, Collective Action Clauses (CACs) have been contained in the majority of international bonds by emerging market sovereigns, in particular those issued under New York and English law. While CACs can facilitate the restructuring process, their presence is no guarantee for a quick debt exchange with high participation. Other legal provisions and exchange characteristics can play an important role as well, in particular exit consents, aggregation clauses, and minimum participation thresholds. The problem of creditor holdouts in bond restructurings is less pervasive than commonly thought. In recent years, there have been only two exchanges with a large share of holdouts: Argentina (2005) and Dominica (2004). Further, litigation in the context of emerging market bond restructurings remains rare, except in the case of Argentina, while new evidence shows that the number of successful attachments of sovereign assets, that is, court-ordered asset seizures, is small compared to the number of cases filed.

Also, domestic bond restructurings are similar to foreign bond restructurings in many respects (Asonuma and Papaioannou, 2016). One difference lies in the creditor structure, as financial institutions in the debtor country may be the group most affected by a domestic restructuring. However, contrary to what is commonly believed, domestic investors were also heavily involved in a number of recent foreign bond restructurings. In Argentina (2005) and Uruguay (2003), domestic financial institutions constituted the main holders of the government's international bonds. On average, domestic bond exchanges could be implemented quicker than related external debt restructurings. A likely explanation is that debtor countries can set domestic regulatory incentives to convince domestic banks or investment funds to participate. Despite this, creditor participation was lower, on average, compared to external debt restructurings, while the size of haircuts was similar in most cases.

The rest of the paper is organized as follows. Section 2 briefly overviews both the debt issues in the Caribbean and the literature of sovereign debt restructurings. Sections 3 and 4 investigate the causes, processes, IMF engagement, and outcomes of the two debt restructurings in 2004–06 and 2013–15, respectively. Section 5 compares key elements between Grenada's 2004–06 and 2013–15 restructurings. The paper draws lessons from Grenada's experience in Section 6. Finally, conclusions are presented in Section 7.

[3] Asonuma (2016) also shows that higher NPV haircuts (smaller recovery rates) at renegotiation are associated with larger (smaller) increases in yield spreads, reflecting trade-offs of the sovereign debtors and the creditors.

[4] This may also be due to the acceptance of sovereign debtors' and independent advisers' proactive engagement with creditors.

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2. BRIEF LITERATURE REVIEW

Several recent studies have focused on the policy debate relating to debt sustainability and debt restructurings in the Caribbean.[5] The IMF (2013) provides a general overview of IMF policies and practices based on recent experiences from sovereign debt restructurings in the Caribbean.[6] Jahan (2013) demonstrates some common features and differences in three prominent debt restructurings in the Caribbean.[7,8] Diaz-Cassou et al. (2008) and Erce (2013) examine the role played by the IMF during sovereign debt restructurings in the region. Focusing on country-specific issues over longer horizons, Asonuma et al. (2017) discuss Belize's two sequential debt restructurings and debt sustainability considerations without IMF-supported programs. The present paper fills a gap in the literature of sovereign debt restructurings by focusing specifically on Grenada's two sequential restructurings with IMF-supported programs.

More broadly, a number of sovereign debt restructuring episodes have been analyzed during the past decade.[9] Among these relevant studies, Sturzenegger and Zettelmeyer (2006) presents detailed histories of the defaults implemented and debt crises in seven emerging markets during 1998–2005, examining, in particular, surrounding political events, policy actions, IMF-supported programs, and incurred creditor losses.[10] Based on an enlarged sample of debt restructurings over 1950–2010, Das et al. (2012) present some new stylized facts on the outcome and process of debt restructurings, including on the size of net present value (NPV) haircuts, creditor participation, and legal aspects. Our paper adds to the existing literature by covering, in the context of Grenada's two restructuring episodes, details of both private (external and domestic) and official external debt restructurings and associated IMF-supported programs.

Our study on Grenada's two recent restructurings relates to empirical and theoretical literature on serial sovereign debt restructurings (for example, Reinhart et al., 2003; Reinhart and Rogoff, 2005; Eichengreen et al., 2005a, 2005b; Catao et al., 2009; and Asonuma, 2016). In the empirical sphere, Reinhart et al. (2003) and Reinhart and Rogoff (2005) explore empirically the role of past credit history in debt intolerance.[11] Catao et al. (2009) and Asonuma (2016) show that past defaulters are more likely to default relative to non-defaulters—countries that have not experienced either defaults or restructurings. Among recent theoretical studies, Catao et al. (2009) indicate that a vicious cycle in sovereign credit events arises from output persistence combined with asymmetric information about output shocks. In contrast, Asonuma (2016) shows that outcomes of previous debt restructurings influence the creditworthiness of sovereigns through increased borrowing costs. We contribute to the strand of literature on case studies of serial sovereign debt restructurings by analyzing in depth Grenada's two serial debt restructurings with regard to their causes, processes, and outcomes.

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5 See Schipket et al. (2013).

6 Belize (2006–07 and 2012–13), the Dominican Republic (2004–05), Grenada (2004–06), Jamaica (2010, 2013), and St. Kitts and Nevis (2011–12).

7 Belize (2006–07), the Dominican Republic (2004–05), and Jamaica (2010).

8 Okwuokei and Van Selm (2017) provide an overview of selective recent restructurings in the region.

9 See Reinhart and Rogoff (2009), Sturzenegger and Zettelmeyer (2006), Finger and Mecagni (2007), Diaz-Cassou et al. (2008), Panizza et al. (2009), Das et al. (2012), Duggar (2013), Erce (2013), Cruces and Trebesch (2013), Asonuma and Trebesch (2016), and survey by Tomz and Wright (2013).

10 In a similar approach, Diaz-Cassou et al. (2008), Finger and Mecagni (2007), and Erce (2013) review recent sovereign debt restructurings and IMF-supported programs in the late-1990s and 2000s.

11 Eichengreen et al. (2005a, 2005b) explain that countries with "original sin" must pay an additional risk premium when they borrow and increase their solvency risks, since the financial market acknowledges that their inability to repay is a source of financial fragility.

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3. GRENADA'S 2004–06 DEBT RESTRUCTURING[12]

The 2004–06 debt restructuring achieved liquidity relief in a preemptive, collaborative, broadly transparent manner, but left solvency concerns unresolved.[13] Prior to the debt restructuring, Grenada experienced a period of fiscal expansion and was hit by Hurricane Ivan in September 2004, which resulted in a substantial contraction in GDP. A "weakly preemptive" private debt restructuring—completed outside an IMF-supported program—was considered as relatively comprehensive and fair, enabling the authorities to reach agreements with both domestic and external creditors, despite broad creditor structure. Although the debt restructuring provided Grenada with substantial liquidity relief through maturity extension and coupon reduction over the short term, underlying debt sustainability concerns were not addressed.

3.1. Background

Grenada's growth decelerated and its volatility increased in the early 2000s after experiencing a relatively robust trend over the two and a half decades since its independence in 1974. Growth averaged 4½ percent over 1980–99—shifting the country to the upper-middle income group —supported by preferential access to EU markets for its agricultural products and the country's initial entry into the North American and European tourism markets. However, average economic growth slowed to 4 percent over 1999–2004 and the variability of growth rate increased: in 2001, the economy experienced contraction with the growth rate at 2 percent of GDP, followed by high growth in 2002 and 2003 at 3½ and 9½ percent, respectively, and again a negative growth of 1 percent in 2004, increasing uncertainty. The erosion of trade preferences with Europe, terms of trade shocks, reduced fiscal space, excessive real wage growth, and emigration of skilled labor triggered the slowdown. While the tourism sector has been the dominant engine of growth, the concentration in this sector also made growth volatile and vulnerable due to the heavy reliance on imports and susceptibility to global shocks, particularly a decline in tourist arrivals from advanced countries.

Expansionary fiscal policy to counteract slowing growth led to a rapid buildup of debt by 2002. While the additional spending was mainly on capital projects, the impact on growth was limited, reflecting the low fiscal multiplier effect. The increased capital expenditure was financed by both external and domestic borrowing, leading to an elevation of interest payments (doubled in 2002 over 1999). Total public debt increased from 35 to 80 percent of GDP between 1999 and 2002. The rise in indebtedness severely reduced fiscal buffers to counteract shocks and put a further drag on growth.

Facing increasing financing needs, the government issued a US$100 million international bond in June 2002 (nearly 25 percent of GDP). The 10-year US$-denominated international bond yielded 9.5 percent and was priced at 475 basis points above the 10-year US Treasury's. The proceeds were used to retire more expensive debt (including financial leases), clear arrears, and finance high-priority investment projects. The bond issuance was at odds with the government's debt management strategy, which prioritized concessional borrowing from multilateral and official bilateral sources, strictly controlling the granting of debt guarantees to public enterprises and the private sector, and continued adherence to the policy of prior approval by the Ministry of Finance for any borrowing by the public enterprises. As a result, external debt rose by over 20 percentage points of GDP to 62 percent at end-2002. Standard & Poor's (S&P) rated Grenada's foreign currency debt at BB-, with a stable outlook in March 2002, and reaffirmed the rating in June 2004.

[12] Grenada's 2004–06 debt restructuring refers to the private debt restructuring completed in November 2005 and official debt restructuring completed in May 2006.

[13] Asonuma and Trebesch (2016) define Grenada's 2004–06 private debt restructuring as "weakly preemptive," as some payments were missed, but only temporarily and after the start of formal or informal negotiations with creditor representatives (no unilateral default).

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Although in smaller amounts, Grenada also tapped the domestic market over 2003–04. In late 2003, Grenada issued EC$15 million in 91-day Treasury bills (T-bills) at 5.5 percent on the Regional Government Securities Market (RGSM). This was replaced with a EC$24 million 365-day T-bill issuance at 5.5 percent in the following year, resulting in a net borrowing in the RGSM of EC$9 million. In addition, in December 2002, the government issued a EC$15 million domestic bond with coupon rate of 9.75 percent and maturity of 11 years and in February 2004 a US$5.5 million bond with coupon rate of 7.5 percent and maturity of 10 years. Both bonds were placed through domestic merchant banks.

Two devastating hurricanes, Ivan in 2004 and Emily in 2005, hit Grenada and caused unprecedented damages. In particular, Hurricane Ivan—one of the strongest storms ever recorded in the Caribbean—resulted in damages estimated at US$900 million, equivalent to 200 percent of GDP, according to the Organization of Eastern Caribbean States (OECS) assessment. About two-thirds of this amount was to the housing stock, of which only 30 percent had some form of insurance coverage. Tourism and agriculture, the two major sources of export earnings, were also severely impacted, with the hurricane wiping out the entire nutmeg crop. Public debt stood at 130 percent of GDP at end-2004, while the IMF had projected that it would continue its upward dynamics, reaching nearly 150 percent by 2010.

3.2. Process

3.2.1. Private Debt Restructuring (Domestic and External)[14]

On October 1, 2004, the government announced its intention to solve debt sustainability concerns and seek "the cooperation of creditors." The announcement informed the need for major reconstruction and rehabilitation efforts requiring considerable external assistance. The government also sought assistance from multilateral creditors—the Caribbean Development Bank (CDB), the IMF, and the World Bank—and initiated discussions with all official bilateral creditors. The stated objective was to return Grenada to a position of economic stabilization and debt sustainability.

The restructuring was undertaken preemptively, with subsequent arrears occurring due to suspension of coupon payments during the negotiation stage. Prior to its announcement in October 2004, the government had remained current on its debt obligations until the interest payments on the international bond were missed in December. Immediately following the missed payments, Grenada was downgraded to "selective default" (SD) by S&P. In January 2005, the government contracted legal and financial advisors to assist in the formulation of a comprehensive debt reduction strategy that would ensure the sovereign's interests during the negotiation.[15]

The authorities targeted both external and domestic private debt, discriminating against external official creditors and holders of T-bills (Figure 1). The authorities sought to restructure all of the government's bond indebtedness, external commercial loans, and guaranteed debt. The government approached its bilateral creditors, asking them for full debt forgiveness or —at a minimum—for relief on comparable terms with commercial creditors. However, bilateral creditors preferred to have an IMF-supported program proceeding with a debt relief operation (IMF, 2005). T-bills were excluded from the debt restructuring because they were needed to enable financing the daily government operations during the negotiations. Burden sharing by multilateral creditors was expected through commitment of new credit.[16,17]

[14] In the case of Grenada, classifications of domestic and external debt at the time of debt exchange in November 2005 are on a residence basis (Grenada Ministry of Finance, 2005).

[15] Cleary Gottlieb Steen and Hamilton LLP acted as the legal advisors, and Bear Sterns & Co. Inc. was hired as the financial advisor (Grenada Ministry of Finance, 2005, p. 95).

[16] Grenada Ministry of Finance (2005, p. 2).

[17] Multilateral claims are considered senior to other claims and are excluded from the exchange.

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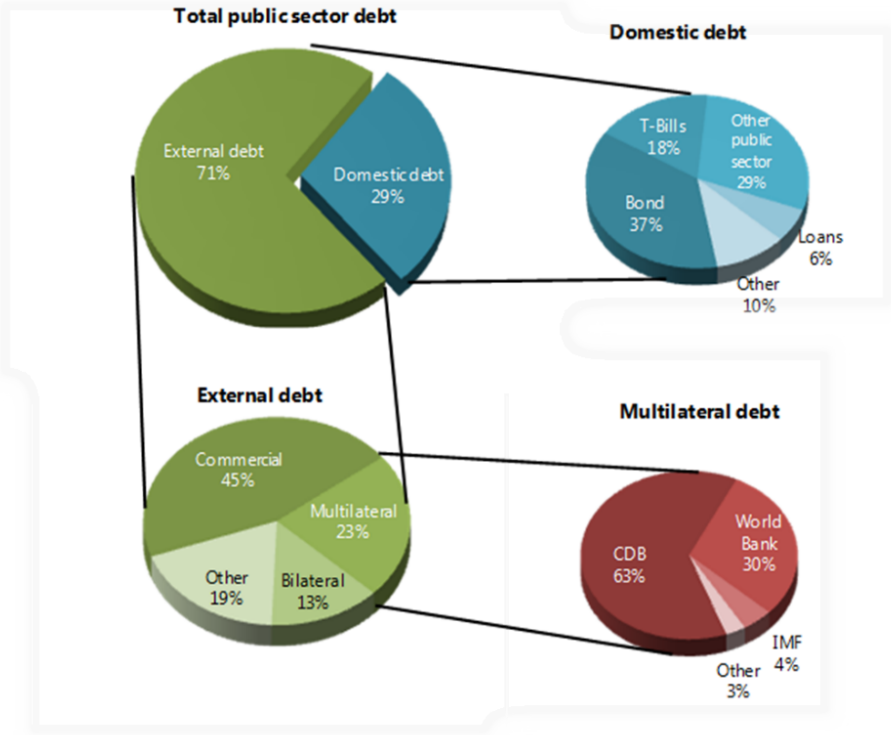
Figure 1
Grenada's Public Debt, June 2004



Source: IMF (2004).

The existence of a broad-based creditor committee and the authorities' effective communication strategy facilitated the negotiation process.[18] In April 2005, a creditor committee representing a majority of Grenada's commercial debt obligations was formed that accounted for about 70 percent of the eligible commercial external debt (equivalent to US$171.6 million).[19] The authorities engaged in open dialogue with the creditor committee and maintained transparency in the dissemination of all relevant macroeconomic data. The focus of the negotiations was mainly near-term cash flow relief, reflecting the large reconstruction needs. In May 2005, the authorities released their debt sustainability analysis (DSA) showing financing gaps through the medium term, broadly in line with the IMF staff assessment.

With an IMF-supported program envisaged in the medium-term forecast, the authorities' DSA showed that public debt was on a sustainable path. Under the program scenario, public debt was expected to decline from 120 percent of GDP in 2005 to 60 percent of GDP in 2015. A large part of this adjustment was to be achieved during the program period, so that by end-2008 the public debt would amount to less than 95 percent of GDP. The expected decline was largely a function of the sharp improvement in the primary balance during 2006–08 and a pickup in GDP growth. However, accomplishment of both fiscal and growth objectives were crucial. Failure to adhere to program targets could rapidly result in an unsustainable debt trajectory, and a significant external shock, such as another major hurricane, could have a similar adverse effect.

On September 9, 2005, after intensive dialogue with private creditors, a debt-restructuring proposal was launched.[20] Commercial debt eligible for the exchange comprised of (1) domestic

[18] The creation of the creditor committee differs from those formed in the 1980s and 1990s in certain aspects: establishing certain criteria for formation of committee and its procedural rules and incorporating elements that enhanced dialogue and participation among creditors in past restructurings cases (Buchheit, 2009; Li et al. 2010).

[19] See Jahan (2013) for further details.

[20] The debt exchange operation was initially scheduled to close on October 7, 2005, and later extended to October 14, 2005.

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claims of US$76.8 million (US$5.5 million US$-denominated claims and US$71.0 million EC$-denominated claims)[21]; (2) external claims of US$171.6 million (US$155.7 million in US$-denominated claims and US$16 million EC$-denominated claims).[22] These claims include the capitalization of past-due interest accrued over the 10 months prior to the restructuring. The restructuring was executed through an exchange, with two instruments, EC$-denominated bond for most of the domestic claims and US$-denominated bond for most of the external claims. The EC$-denominated bond was issued under domestic law, and the US$-denominated bond was issued under foreign law (New York law). Both bonds were par-bonds (that is, no principal haircut) with a final maturity in 2025, with amortization starting in 2020, and a step-up coupon structure starting in 2011 (Table 2). Given this step-up coupon structure, the government anticipated increases in debt services in 2012 (Figure 3).

On November 15, 2005, the commercial debt restructuring was concluded, covering the equivalent of approximately 47 percent of the total public debt. The details of financial and legal terms at the exchange were the following (Table 1):

- ***No principal haircut.*** Approximately US$248 million of new EC$-denominated and US$-denominated bonds (excluding those for guaranteed loans) were issued without face-value reduction.
- ***Capitalization of past-due interest.*** Past-due interest on any eligible claims is included as a portion of tendered eligible claims.
- ***Coupon rate reduction.*** Due to a step-up coupon structure, average coupon rates of the new bond over the life of the bond are lowered by 2.3 percent. Coupon rates for new instruments are 1 percent until 2008, 2.5 percent until 2011, 4.5 percent until 2013, 6 percent until 2015, 8 percent until 2017, 8.5 percent until 2018, and 9 percent until maturity.
- ***Maturity extension and change in repayment structure.*** Maturity was extended by 11.7 years on average. Contrary to payments due at maturity for all old instruments (100 percent of total outstanding), the new bond is an amortizing bond commencing in September 2020 (constant share of remaining outstanding).
- ***NPV and market haircuts.***[23] Using a discount rate of 8.9 percent, the NPV haircut was 38.4 percent, while the market haircut was 40.5 percent. There was only a marginal difference (3 percent) in NPV haircuts between domestic and external creditors (Figure 2).[24]
- ***No use of CACs and exit consent.*** Contrary to other restructuring cases in the Caribbean, for instance Belize and the Dominican Republic, no CACs were triggered and no exit consent was used.[25]
- ***Minimum participation requirement.*** The exchange offer specified the minimum level of overall participation requirement as at least 85 percent of total principal outstanding amount of eligible claims.

[21] Domestic US$-denominated claims comprised one bond, whereas EC$-denominated claims comprised nine bonds, six commercial loans, and one guaranteed claim.

[22] External US$-denominated claims comprised five bonds, two commercial loans, and four guaranteed claims, whereas EC$-denominated claims comprised two bonds.

[23] NPV haircut is defined as (1 - Present value of new debt/Present value of old debt), as in Sturzenegger and Zettelmeyer (2006, 2008). Present value of new debt and old debt is computed with the same discount rate. Following Sturzenegger and Zettelmeyer (2006, 2008), we use the exit yield at the completion of exchange. On the contrary, market haircut is defined as (1 - Present value of new debt/Face value of old debt).

[24] Asonuma et al. (2017a) find haircuts on shorter-term debt tend to be larger than those on longer-term debt in Grenada 2004–05 private debt restructuring.

[25] See Asonuma et al. (2017b) for the Belize debt restructurings in 2006–07 and 2012–13, and Das et al. (2012) and Jahan (2013) for the Dominican Republic and St. Kitts and Nevis restructurings.

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Table 1
Grenada's Commercial Debt Restructuring, 2004–06: Deal Structure

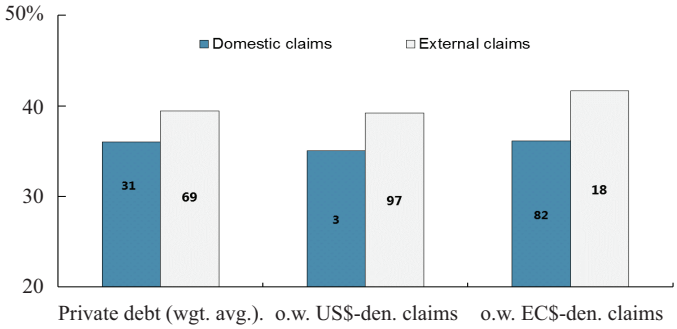
	Old instruments				New Instrument
Domestic or External	External		Domestic		External / Domestic
US$ or EC$ denominated	US$	EC$	US$	EC$	US$ / EC$
Instruments	Bonds/Bank loans	Bonds	Bonds	Bonds/Bank loans	Bonds
Face value (US$ mil.)	155.7	16.0	5.5	71.3	248.5
Face value haircut	0%	0%	0%	0%	–
Maturity	2006–14	2012–15	2014	1998–2018	2025
Grace period (years)	N/A	N/A	N/A	N/A	15
Remaining maturity (years)	4.7	8.9	9.0	4.3	20
Coupon[1)]	Fixed 4.8–10%	Fixed 8.85–10%	Fixed 7.5%	Fixed 6–10%	Step-up coupon
Repayment style	Bullet	Bullet	Bullet	Bullet	Amortizing
Present value on 12/2005[2) 3)]	98%	102%	92%	94%	59%
NPV haircut[4) 5)]	39%	42%	35%	36%	–

[1)] Coupon rates for new instruments are 1% until 2008, 2.5% until 2011, 4.5% until 2013, 6% until 2015, 8% until 2017, 8.5% until 2018, 9.0% until maturity.
[2)] Discount rate of 8.9 percent which was exit yield at completion of exchange (on 12/30/2005—the first transaction dayyields were recorded after completion of exchange).
[3)] Weighted average of all instruments following in the category based on outstanding as of 9/2005.
[4)] NVP is defined as 1—Present value of new debt/Present value of old debt as in Sturzenegger and Zettelmeyer (2005, 2007). Present value of new debt and old debt is computed with the same discount rate.
[5)] Weighted average of all instruments following in the category based on outstanding as of 9/2005.

Sources: Grenada authorities and authors' calculations.

The debt exchange achieved 91 percent participation of eligible debt owed to private creditors. The participation rate was 93 percent on the external claims and 86 percent on the domestic claims. Although the participation rate in the debt exchange offer was high, there were holdouts. Despite concerns about future debt distress, creditors were motivated to accept the offer because (1) the return profile was rewarding enough based on a risk-adjusted assessment of the positive outlook of Grenada's economy and the then-favorable global environment; (2) potential costs of holding out were high and it was less attractive to take legal actions, even with the expectation of an ultimate success; and (3) the original bonds had become illiquid, and thus any outright sales would be difficult.

Figure 2
Grenada's Private Debt Restructuring, 2004–06: NPV Haircuts[1) 2)]



[1)] Using a discount rate of 8.9 percent, which was the exit yield of EC$ bonds on December 30, 2005.
[2)] Figures on bars represent shares of claims in the corresponding category.

Source: Authors' calculations based on Grenadian statistics.

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Grenada continued to negotiate effectively and efficiently with the creditors that did not participate in the debt exchange (IMF, 2006).[26] Grenada determined that it did not want to repudiate debt held by nonparticipating creditors. However, neither did it have the resources to pay untendered eligible claims on the original terms. Therefore, the authorities decided to follow the example of the Dominican debt restructuring.[27] Further, despite a large variety of restructured instruments with variations in NPV haircuts, the exchange to two single bonds did not raise significant inter-creditor equity issues.

Five guarantees were eligible for the debt restructuring, of which four were exchanged for the new central government bonds with guarantees discharged. Because these guarantees did not constitute central government direct debt, the government could not restructure them unless they were called. The government therefore took the following approach:[28] (1) beneficiaries were given the option to call the guarantee prior to the expiration of the exchange offer. The face value of the called guarantee would then be exchange for the new bond; (2) a beneficiary calling a guarantee in these circumstances was required to subrogate Grenada to all of the beneficiary's claims against the primary obligor and any collateral securing the debt of the underlying project; and (3) if the beneficiary decided not to call, any subsequent call on the guarantee would be discharged by the delivery of the exchanged bonds on terms comparable to those reflected in the exchange offer. The last condition was designed to discourage guaranteed bondholders from attempting to ride out the restructuring in the hope that the guarantees could be called and would be fully paid after the exchange offer closed. It was also intended to achieve a parity of treatment among creditors.

3.3.2. Official Debt Restructuring

Parallel with the negotiation with private creditors, the authorities approached their bilateral official creditors (IMF, 2005). The authorities requested full debt forgiveness or—at a minimum—relief on comparable terms with commercial creditors. However, some Paris Club creditors preferred to have an IMF-supported program in place before they would consider a comprehensive debt relief.

On May 12, 2006, subsequent to the private debt exchange, the Paris Club agreed to a debt treatment of its US$16 million claims (as of January 2006).[29] The agreement comprised (1) the treatment of arrears as of December 31, 2005, and (2) the treatment of maturities falling due between January 1, 2006, and December 31, 2009 (over the duration of the IMF's PRGF arrangement, 2006–08).

The treatment under Classic terms consisted of the following:

(1) Repayment of non-ODA credits over 12 years with a five-year grace period.

(2) Repayment of ODA credits over 12 years with a five-year grace period.

Losses to Paris Club creditors were substantially smaller than those to private sector creditors. NPV haircuts on Paris Club loans were estimated at 13.2 percent using a discount rate of 5.6 percent, which was the market rate prevailing at the time of the exchange (OECD Commercial

[26] About half of the nonparticipating eligible external claims pertained to a single creditor with whom the authorities had established contact and who they continued to offer a settlement on the same terms as the participants in the exchange had received. The other half pertained to about 5 percent of holders of a US$100 million international bond issued in 2002. In this case, the identity of the nonparticipating creditors was unknown and the authorities were making efforts to find and engage these creditors.

[27] In the case of Dominica, the authorities instructed the ECCB to open a special escrow account for debt payments. While the Dominican authorities continued to work constructively with the remaining creditors, the purpose of the new ECCB account was to receive deposits of interest earnings on claims held by creditors that had not yet participated in the restructuring exercise (on the assumption that they would eventually participate). For such creditors, interest accrued up to June 11, 2004 (the original closing date), under the original terms. Thereafter, the Dominican authorities treated the outstanding principal amounts as if they had been converted into the bond envisaged under the exchange offer and, as payments fell due, made payments into the escrow accounts under the restructured terms.

[28] See Buchheit and Karpinski (2006).

[29] Paris Club (2006).

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Interest Reference Rate).[30] In general, the terms of the treatment offered to official creditors under Paris Club agreements were more favorable (to creditors) than that received by private creditors (IMF, 2015).[31]

The government, however, could not reach an agreement with its largest bilateral creditor, the Export-Import Bank of Taiwan Province of China (Ex-Im Bank).[32] In March 2006, the Ex-Im Bank filed a complaint against Grenada for the unpaid principal of US$28 million in loans extended to Grenada (about a quarter of Grenada's total bilateral debt). In 2007, the Ex-Im Bank won a court ruling that included a court judgment for pre- and post-judgment interest and attorney's fees.

3.3. IMF Engagement

Hurricane Ivan created large fiscal and balance of payments financing needs and severely complicated fiscal efforts in September 2004. Prior to the hurricane, the authorities were making progress in addressing the fiscal and debt imbalances. Following Ivan, however, the government was deeply financially constrained to meet current fiscal obligations, including wage payments, and the overall fiscal deficit was anticipated to rise sharply. The loss of foreign exchange receipts from tourism alone was projected at over 8 percent of GDP. To meet their immediate financing needs, the authorities relied on external assistance, mainly grants. In the difficult circumstances, the authorities responded swiftly to mitigate the impact of the hurricane on the population and began to address the macroeconomic imbalances in a transparent manner.

The IMF responded to Grenada's financial needs after the hurricane through the Emergency Assistance for Natural Disasters Initiative (approved in November 2004, SDR 2.93 million or 25 percent of quota). Moreover, immediately after Hurricane Ivan, the authorities requested IMF support for their intention to formulate an appropriate medium-term adjustment program that combined fiscal consolidation, steps to restore growth, and a commitment to reach a cooperative solution with Grenada's creditors to reduce the country's debt burden (IMF 2005a).

In the debt restructuring with private sector creditors in 2004–06, the IMF played its role as an independent party to provide a debt sustainability assessment and cash flow analysis. It maintained close contact with both the authorities and their financial advisors, but not with creditors, during the restructuring process. In May 2004, the IMF mission released a statement acknowledging that the fiscal efforts were unlikely to be sufficient to achieve debt sustainability and that there was a need to pursue a comprehensive approach comprising fiscal adjustment, growth enhancing structural reforms, and debt management (IMF, 2004). At the request from the authorities of Grenada, the IMF issued an assessment letter to the international financial community on July 20, 2005, before the launch of the exchange offer (IMF, 2005b). The letter noted that achieving a high degree of participation in the proposed exchange offer would contribute to improving debt dynamics toward sustainability and achieving "an orderly process of financial and external adjustment."

Negotiation with the IMF on an IMF-supported program was prolonged due to several factors. After the two hurricanes, in 2004 and 2005, the authorities' efforts and limited resources were focused on relief, rehabilitation, and reconstruction activities. As such, they were not in a position to finalize the specifics of an IMF-supported program. Moreover, the authorities were also finalizing the lengthy commercial debt restructuring process. Since the debt discussions

[30] IMF (2015c). The 2 percent coupon rate on ODA loans is based on a simple average of concessional terms provided by Paris Club creditors to a sample of HIPC debt restructuring episodes. The coupon rate on non-ODA loans is assumed to be market based and is calculated as the six-month average of the Commercial Interest Reference rates (CIRR) as published by the OECD.

[31] Classic terms are the standard terms applied to a debtor country coming to the Paris Club. Credits (whether ODA or non-ODA) are rescheduled at the appropriate market rate, with a repayment profile negotiated on a case-by-case basis.

[32] Taiwan Province of China is a non-Paris Club creditor. Grenada severed its diplomatic relations with Taiwan Province of China, the largest bilateral creditor at the time of the restructuring in December 2004, and established diplomatic relations with the People's Republic of China.

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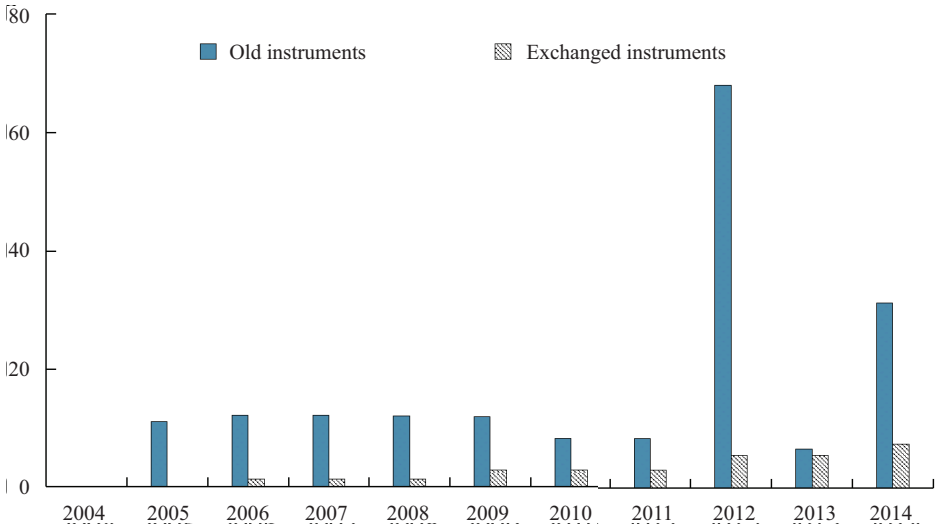
were protracted, the debt exchange with commercial creditors took place outside the context of an IMF arrangement. Furthermore, the authorities planned to undertake several fiscal measures in conjunction with the 2006 budget. As a result, an Extended Credit Facility arrangement (previously called the Poverty Reduction and Growth Facility) for 90 percent of quota was agreed upon in April 2006. The ECF arrangement helped stabilize the economy through various channels: (1) limiting the fiscal deficit, (2) paving the way for a Paris Club debt rescheduling in 2006, and (3) catalyzing additional financing from multilateral donors.

3.4. Outcomes

The debt restructuring with private sector creditors provided significant liquidity relief in NPV terms, but Grenada's debt sutainability remained precarious, for a host of reasons. These include lower-than-expected growth rates in the period following the restructuring due to adverse shocks, which in turn led to the government's expansionary policy response and subsequently deterioration in the debt ratio. This clearly suggests that the first restructuring did not provide enough of a cushion for fiscal and growth slippages. If the program assumptions had been realized, it would have been adequate. Otherwise, face value cuts should have been needed to create such a cushion. Meanwhile, the average maturity of public external debt was extended from 8.3 years before the exchange to 20 years, which resulted in a substantial decline in debt service in the short run (Figure 3). Debt service relief amounted to US$22.4 million (including the missed interest payments) in 2005 (3.2 percent of GDP) and about US$18.9 million (2.5 percent of GDP) per year from 2006 to 2010. However, with no nominal haircut, the outstanding debt remained high, at 87.7 percent of GDP in 2005, declining only temporarily from 95 percent of GDP in 2004 and remaining high, around 90 percent of GDP, thereafter.

Figure 3
Grenada's Private Debt Restructuring, 2004–06: Debt Service[1)] (in millions of US dollars)



[1)] Debt service for old instruments excludes debt service of guaranteed debt.

Source: Grenadian authorities and authors' calculations.

Despite a substantial NPV haircut, Grenada enjoyed an immediate but small improvement in its forward-looking credit ratings: S&P raised Grenada's credit rating to B- and to B- on its local currency and foreign currency debt from SD on November 18, 2005. These ratings, however, fell short of Grenada's B+ and B+ ratings before the announcement of restructuring in October

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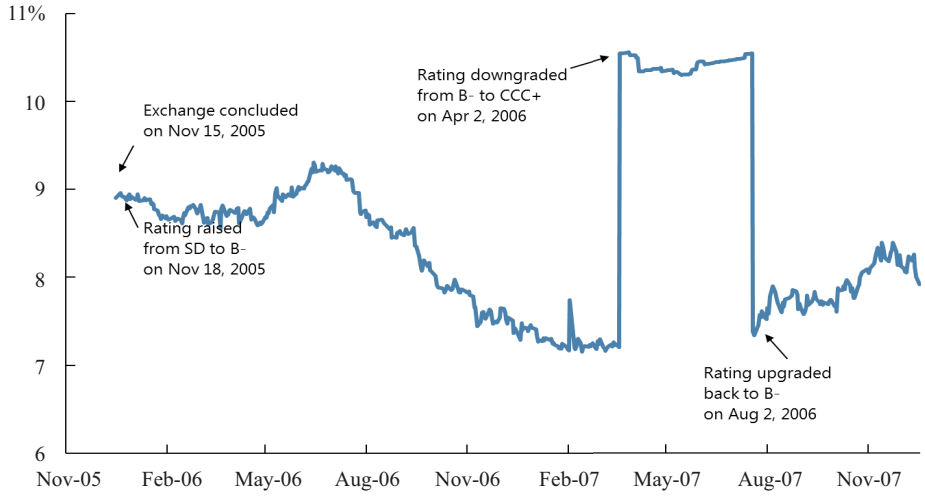
2004.[33] On April 2, 2007, the rating was downgraded to CCC+, with a stable outlook on foreign currency, and C on local currency debt following the late debt service payment to a local bank and mounting fiscal pressures in the first quarter of 2007.

On August 2, 2007, the rating was again uplifted to B-, due to the rectifying steps taken by the government to improve the management of debt repayments. Since completion of the exchange, the bond yields had been below 10 percent for 12 months (Figure 4).

Grenada did not issue new bonds other than in the RGSM and in the domestic market. Both the global financial crisis of 2007–08 and reoccurrence of debt restructurings in the Caribbean (Section VI) raised the risk aversion of private sector creditors, preventing new external commercial debt issuances. Grenada relied largely on official project financing from bilateral and multilateral creditors, including a budget support in the amount of US$16.5 million from Trinidad and Tobago. Domestically, T-bills were issued through domestic private placements and in the RGSM; a EC$30 million (equivalent to US$11.1 million) domestic bond was issued in October 2007 under domestic law for the first time since the completion of private debt restructuring. The domestic bond was issued with maturity of five years and coupon rate of 7 percent.

Figure 4
Grenada's Private Debt Restructuring, 2004–06: Bond Yields and Credit Ratings



Source: Bloomberg.

4. Grenada's 2013–15 Debt Restructuring[34]

The 2013–15 debt restructuring involved debt relief and, more directly, addressed solvency issues. Prior to the debt restructuring, Grenada experienced a subdued post-hurricane economic recovery and accumulated large fiscal imbalances through countercyclical fiscal policies. The authorities proceeded with restructurings on private debt and followed with negotiations with official creditors under an IMF-supported program. A post-default restructuring with private creditors was relatively comprehensive, but was delayed due to broad creditor structure and a holdout from a major non-Paris Club creditor. While the Grenadian authorities received a substantial debt relief (face-value reductions), future market re-access remained uncertain.

[33] Neither Moody's nor Fitch assigns ratings to Grenada.

[34] Grenada's 2013–15 debt restructuring refers to the private debt restructuring completed in November 2015 and official debt restructuring completed in November 2015.

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4.1. Background: Over 2005–13

The global financial crisis reversed the already weak post-hurricane recovery and contributed to a deep economic crisis in Grenada by 2011–12. Grenada's economy was severely affected by the global financial crisis as the tourism and construction sectors collapsed, with the economic activity declining by over 8 percent from peak to trough (2008–12) before it had a chance to fully recover from the devastating Hurricane Ivan in 2004. This compares to a 1⅓ percent decline in emerging markets and a 5⅓ percent decline in the tourism-based Caribbean countries over the same period. An IMF-supported ECF program that started in 2010 went off track only after the first review because of the government's decision to resort to expansionary policy response.

Countercyclical policies during the economic crisis led to large fiscal imbalances. With no effective independent monetary and exchange rate policy toolkit, given the quasi-currency-board setup of the ECCU, the government resorted to fiscal policy as an attempt to counteract the negative impacts of the global financial crisis on Grenada. However, positive spillover of the expansionary policy was limited due to small fiscal multipliers of the small open island economy and longstanding competitiveness challenges. As a result, fiscal imbalances widened without a commensurate increase in economic growth, which contributed to an unsustainable fiscal situation, with public debt increased to over 100 percent of GDP by end-2012. The government's cash flows also came under severe pressure with growing financing constraints as multilateral financing dried up and domestic banks limited their exposure to the government. This in turn led to an accumulation of the government's arrears to domestic suppliers. At the start of the IMF-supported program in 2014, the public debt ratio was projected to reach over 134 percent of GDP by 2020 without fiscal adjustment and debt restructuring (IMF 2014a).

Despite some adjustments, persistent large current account deficits remained a significant risk to Grenada's external sustainability. Weak domestic demand during the economic crisis helped narrow the current account deficits, which, however, have been increasingly financed by debt, creating flows as foreign direct investments declined. As a result, Grenada's external debt (public and private) had increased by about 40 percent of GDP since 2007, to almost 150 percent of GDP in 2012, reflecting in part large accumulation of foreign liabilities of domestic banks through nonresident deposits and borrowing by foreign-owned banks from their headquarters.[35]

Grenada had not regained market access since the 2005 debt exchange. External financing was limited to multilateral and bilateral official sources with no new external commercial debt issued since the 2005 debt restructuring. On the domestic front, Grenada rolled over the existing 365-day T-bill on the RGSM, but it was not until 2007 and again in 2009 and 2010 that they were able to raise meaningful net financing from the RGSM (Section V.D). It also issued a new serial bond (totaling EC$11.5 million), with a coupon rate of 6 percent and portions issued throughout 2011.[36] The bond was sold mostly to the National Insurance Scheme (NIS) and domestic insurance companies through private placements.

4.2. Process

4.2.1. Private Sector Debt Restructuring

On March 8, 2013, Grenada announced its intention to pursue a new "comprehensive and collaborative" debt restructuring. The announcement stated that debt issued in the RGSM and multilateral debt would be excluded from the restructuring. It stated that Grenada's intention was not to make coupon payments due on March 15, 2013, on the US$ and EC$ 2025 bonds. Prior to the announcement, Grenada had delayed the coupon payment due on September 15, 2012,

[35] There are no official statistics for private sector external debt. IMF staff estimates are based on balance of payments statistics for the banking and non-bank private sectors.

[36] This bond was approved by Parliament in 2010.

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although it was eventually paid shortly before the expiration of the grace period. Financing to pay for the coupon was obtained from local sources on a short-term basis, but further borrowing was no longer a viable option. S&P lowered Grenada's foreign currency credit ratings to SD/SD from B-/B and local currency ratings to CCC+/C from B-/B on October 8, 2012. Subsequent to the delayed September 15, 2012, coupon payment, the foreign currency rating was raised to CCC+/C, with a negative outlook on October 16, 2012. On March 12, 2013, the foreign and local currency ratings were again lowered to SD/SD.

Immediately following the announcement, the government contracted financial and legal advisors to assist them in the restructuring process.[37] With the help of the financial and legal advisors, the government initiated discussions and maintained close contact with the creditor groups, including the creditor representative committee. The authorities also reached out to the bilateral official creditors and domestic creditors, and sought comparable treatment with the private sector creditors.

By April 2013, a bondholder's group was formed comprising a steering committee and an ad-hoc committee. The steering committee consisted of six of the largest bondholders (with reported approximate exposure of US$168 million), and the ad-hoc committee (with reported approximate exposure of US$32 million) represented a broader group of bondholders, together holding just over 75 percent of the outstanding US$ and EC$ 2025 bonds. The bondholder's group controlled almost 90 percent of the US$ 2025 bond. The bondholders contracted Broadspan Capital to represent them in the restructuring negotiations.

Multilateral institutions provided the bulk of the new financing in 2014 and 2015. Disbursed loans from the CDB, the IMF, and the World Bank (WB) totaled more than US$30 million annually in 2014 and 2015. In addition, disbursements of contracted but undisbursed loans from the WB and the CDB to finance ongoing projects provided the necessary liquidity to the government.

The standstill on debt service after the debt-restructuring announcement alleviated some of the financing pressures. Debt arrears accumulated through the nonpayment of interest on debt owed to private sector creditors, holders of privately placed T-bills (that is, not listed on the RGSM), Paris Club bilateral official creditors, and non-Paris Club bilateral official creditors. The government also accumulated arrears to domestic suppliers, public bodies, and membership fees to regional and international organizations. By end-2013, overall arrears increased to 15.3 percent of GDP, of which 10.7 percentage points were on external obligations and about 4.6 percentage points on domestic obligations.

One year after the announcement of the debt restructuring, in March 2014, Grenada published its initial financing estimates. The significant delay of the announcement was caused by a protracted negotiation for an IMF-supported program. It immediately followed the announcement of the staff level agreement on March 14, 2014, which would form the backbone of the anticipated Extended Credit Facility (ECF) arrangement. The publication discussed Grenada's homegrown reform program, which encompassed fiscal consolidation, overhaul of the fiscal framework legislation, structural reforms, and measures to strengthen financial system stability. Together with a comprehensive restructuring of the public debt, they aimed to place Grenada's public finances firmly on a sustainable footing. The publication reported medium-term macroeconomic projections and financing, including the financing gap that still needed to be filled after taking into account fiscal consolidation, but before debt restructuring. It also made clear that Grenada's public and publicly guaranteed debt owed to both private and official sector creditors—with the exception of the T-bills listed on the RGSM, overdraft facilities, and multilateral claims—would fall within the scope of the debt restructuring.

In April 2014, Grenada published two indicative debt restructuring options as background for future discussions with holders of its EC$2025 bond (Table 2). The publication noted that

[37] Clearly Gottlieb Steen & Hamilton LLP was appointed to act as the legal advisor and White Oak Advisory as the financial advisor.

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the indicative options did not constitute an offer, but rather was intended as an indication of the type of restructuring terms that Grenada believed to be required to bridge the multiyear financing gap identified in the initial financing estimate published in March 2014. The IMF Staff Report published in July 2014 indicated that the published debt restructuring scenarios were consistent with achieving debt sustainability and reducing near-term debt servicing obligations.[38] The same indicative options were presented to the Ex-Im Bank of Taiwan, along with a proposal on the treatment of outstanding arrears—despite ongoing litigation against Grenada, the Ex-Im Bank indicated its willingness in principle to participate in the debt restructuring.

Table 2
Grenada's Debt Restructuring, 2013–15: Indicative Scenarios, April 2014

	Indicative Scenarios	
Option	Option 1	Option 2
Face value haircut	60%	50%
Grace period (years)	0	2
Final maturity (years)	15	20
Coupon	6.5%	5%
Repayment style	Equal installments	Increasing installments
Interest arrears	60% reduction, 40% capitalized	50% reduction, 50% capitalized

Source: Grenadian authorities.

In March 2015, the Government of Grenada reached financial agreements with private creditors on the US$ and EC$ bonds (Table 3. Due to delays in the preparation of the legal documentation, the final launch of the debt exchange did not take place until October 5, 2015, when the offering memorandum of the new bonds was circulated.[39] On November 12, 2015, Grenada announced the formal closing of the exchange offer involving the US$ and EC$ 2025 bonds. Tenders representing 94 percent of the US$ 2025 bond and 100 percent of the EC$ 2025 bond outstanding and eligible to vote for the exchange were received before the expiration date of the offer. Consistent with the CAC in the US$ and EC$ 2025 bonds (Box1), the entirety of those bonds were exchanged for new Grenada US$ and EC$ bonds due 2030 (the "2030 bonds"). The details of financial and legal terms at the exchange were the following (Table 3):

- ***Face-value reduction of 50 percent and 0 percent.*** Both external and non-NIS domestic bonds were issued with 50 percent face value reduction, but NIS domestic bonds were issued without face-value reduction.
- ***Capitalization of past-due interest.*** Past-due interest due on any eligible claims was included as a portion of tendered eligible claims.
- ***Changes in coupon structure.*** Coupon rates for new instruments were fixed at 7 percent for external and non-NIS domestic bonds and 3 percent for NIS domestic bonds.
- ***Maturity extension.*** Maturity was extended by five years for external and non-NIS domestic bonds and 10 years for NIS domestic bonds on average.
- ***NPV haircuts.*** Using a discount rate of 13.9 percent, the NPV haircuts were (1) 49 percent for external and non-NIS domestic bonds and (2) 59 percent for NIS domestic bonds.
- ***Use of CACs and no exit consent.*** CACs on US$-denominated bonds were triggered, and no exit consent was used.

[38] IMF (2014a).

[39] Grenada Ministry of Finance (2015).

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- ***Minimum participation requirement.*** The exchange offer specified the minimum level of overall participation requirement as at least 75 percent of the total principal outstanding amount of eligible claims.
- ***Hurricane clause and Citizenship by Investment Program revenue sharing clause (Appendix 1).*** These were two important innovations introduced in the new bond contract.

Table 3
Grenada's Private Debt Restructuring, 2013–15: Deal Structure

	Old Instrument			New Instrument	
Domestic or External	External	Domestic Non-NIS	Domestic, NIS	External / Domestic, Non-NIS	Domestic
US$ or EC$ denominated	US$	EC$	EC$	US$ / EC$	EC$
Instruments	Bonds	Bonds	Bonds	Bonds	Bonds
Face value (US$ mil.)[1)]	193.5	34.0	34.1	143.3 (215.2)	37.4
Face-value haircut[2)]	50% (25%)	50% (25%)	0%	–	–
Maturity	2025	2025	2025	2030	2040
Grace period (years)	15	15	15	0.5	10
Remaining maturity (years)	10	10	10	15	25
Coupon[3)]	Step-up coupon	Step-up coupon	Step-up coupon	7%	3%
Repayment style	Amortizing	Amortizing	Amortizing	Amortizing	Amortizing
Present value in 11/2015[4)]	75%	75%	75%	39%	31%
NPV haircut[4) 5)]	49%	49%	59%	–	–
Pre-CACs participation rate (%)	94	100	N/A	–	–
Post-CACs participation rate (%)	100	-	N/A	–	–
CACs triggered	Yes	No	N/A	–	–

1) Face value of new instruments includes capitalized interest arrears on old instruments, with face value of new US$- and non-NIS EC$-denominated bonds showing both face values after the completion of the IMF-supported program reviews in June 2017 and in November 2015 (in parenthesis).
2) Face-value haircut of US$- and non-NIS EC$-denominated bonds shows both face-value haircuts after the completion of the IMF-supported program reviews in June 2017 and in November 2015 (in parentheses).
3) Coupon rates for old instruments: 1 percent until 2008, 2.5 percent until 2011, 4.5 percent until 2013, 6 percent until 2015, 8 percent until 2017, 8.5 percent until 2018, and 9 percent until maturity.
4) Discount rate of 13.9 percent is used, which was the first transaction-day yield after the completion of the exchange (on 11/18/2015).
5) NPV is defined as (1 - present value of new debt/present value of old debt) (Sturzenegger and Zettelmeyer 2006, 2008). The present values of new debt and old debt are computed with the same discount rate.

Sources: Bloomberg, Grenadian authorities, and authors' calculations.

Both domestic and external private creditors suffered substantial losses in NPV terms (Figure 5). Using a discount rate of 13.9 percent, the NPV haircut was 50.3 percent on average, while the market haircut was 62.5 percent. Both the US$ and EC$ 2025 bonds (excluding the EC$ holdings by the NIS) were treated symmetrically with a NPV haircut of 49.0 percent. In contrast, despite no face-value reductions, domestic NIS holders of the EC$ 2025 experienced a NPV haircut of 58.7 percent.[40]

[40] Restructuring agreements were signed on several other domestic debt instruments (including with banks and on T-bills), including NPV haircuts similar to those of the commercial bonds deal.

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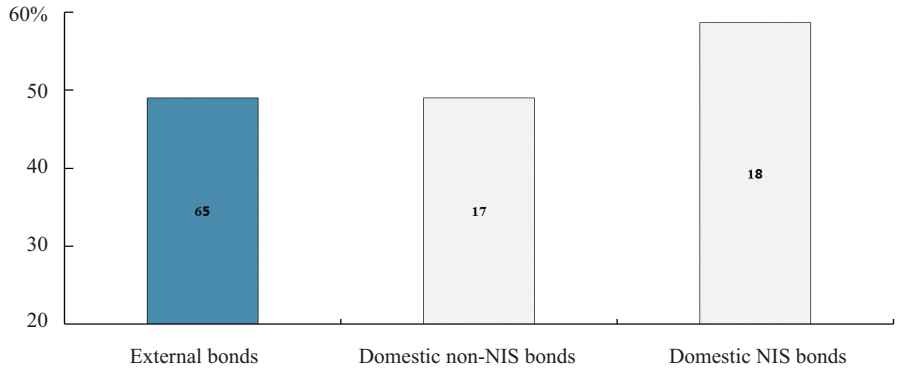
Figure 5
Grenada's Private Debt Restructuring, 2013–15: NPV Haircuts[1) 2)]



[1)] Using a discount rate of 13.9 percent, which was the exit yield of EC$ bonds on November 18, 2015.
[2)] Figures on bars represent shares of claims in total eligible claims.

Source: Authors' calculations based on Grenadian statistics.

4.2.2. Official Sector Debt Restructuring

4.2.2.1 Ex-Im Bank of Taiwan Province of China

On March 4, 2013, The Ex-Im Bank filed a lawsuit in a New York federal court. The filing sought (1) specific performance of the *pari passu* provision contained in defaulted loans the bank had extended to Grenada and (2) an order preventing payment on outstanding bond debt unless Grenada simultaneously made payments on the defaulted loans. The claim was that Grenada was in violation of the *pari passu* clause in defaulted loans owed to the Ex-Im Bank. Grenada asked the US District Court to dismiss the suit on grounds that prior litigation precluded raising the *pari passu* issue for the first time. In May, several bondholders intervened, stating that Grenada's legal arguments were incorrect and that Grenada would prevail on merits based on the facts of the case. In August, the US District Court agreed with these arguments and ordered "discovery" to move forward to a judgment based on specific facts of the case to recover an unpaid judgment worth US$32 million against Grenada.

On January 7, 2015, the government announced that an agreement had been reached to restructure US$36.6 million in debt owed to the Ex-Im Bank. The announcement contained the original amounts owed, including arrears and capitalized past interest due. The agreement resulted in a 50 percent nominal principal reduction, with 47 percent reduction taking effect at closing and 3 percent upon the successful conclusion of the IMF-supported program in 2017. Under the terms of the agreement, the post-haircut balance on the loan will be repayable over 15 years —which includes a grace period of three and a half years—at an interest rate of 7 percent. The agreement also included a hurricane clause (Appendix 1), which would allow Grenada to defer payments for a predetermined period should a natural disaster compromise the government's ability to service debt in a timely manner in the future. The restructuring resulted in a NPV haircut of 62 percent and a decline in the public debt stock of 1.8 percent of GDP. In addition, the Ex-Im Bank withdrew its court case, putting an end to the lawsuit against the Grenadian government on the basis of the *pari passu* contractual clause included in the loan agreement. The withdrawal had a significant impact on the debt restructuring with other creditors, as the *pari passu* clause would have prevented payments to other creditors until full payment to the Ex-Im Bank was made.

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4.2.2.2 Paris Club

On November 19, 2015, the Paris Club agreed to a debt rescheduling of US$7.7 million.[41] This comprised (1) the treatment of arrears as of October 31, 2015 (US$5.7 million), and (2) the treatment of maturities falling due (US$ 2.0 million) from November 1, 2015, to June 30, 2017 (when the IMF's Extended Credit Facility is expected to end). The total claims by the Paris Club equaled US$11 million as of November 1, 2015. The difference between US$11 million and US$7.7 million comprises maturities due after 2017.

The treatment under Classic terms consisted of the following:

(1) Repayment of non-ODA credits over 15 years, with an eight-year grace period;

(2) Repayment of ODA credits over 20 years, with a seven-year grace period.

Similar to the previous experience of the debt restructuring in 2004–06, losses to official sector creditors are substantially lower than those to private creditors. NPV haircuts on official loans are estimated to be 3.2 percent using a discount rate of 2.8 percent, which is the market rate prevailing at the time of the exchange (OECD Commercial Interest Reference Rate).[42] As in the previous official debt restructuring in May 2006, there is no principal reduction.[43]

The Paris Club deal also included a hurricane clause (Appendix 1). This is the first time Paris Club creditors agreed to such a provision. The clause provides the opportunity for creditors "to consider" further debt relief, such as a deferral of debt service in the event of a natural disaster based on an independent assessment of damage and "imminent default." The benefit is that it allows for "consideration" of cash flow relief. However, neither automaticty nor specifics were provided in the Agreed Minute, for example, about the independent assessment of a qualifying disaster, or who or how an assessment of "imminent default" would be made. When compared to the hurricane clause in the private creditor or Ex-Im Bank deal, which provides automatic deferral of debt service for two periods of debt service following a qualifying hurricane, the hurricane clause in the Paris Club agreement is relatively weak.

4.3. IMF Engagement

Following the general elections in 2013, the new government started discussions with the IMF on a potential IMF-supported program. The New National Party came to power in February 2013 after a sweeping win during the elections. Strong parliamentary support, following the victory, later proved critical for enabling the government to pursue and implement difficult yet important fiscal consolidation and structural reforms. The new administration subsequently declared default and announced its intention for a comprehensive restructuring of the country's public debt in March 2013. Soon after, discussions started on a potential IMF arrangement to support the authorities' Home Grown Structural Adjustment Program (HGSAP).

A staff-level agreement was reached in March 2014, followed by the Board approval of a three-year ECF-supported program in June 2014. After nearly 12 months of discussions and three negotiating missions (and a technical staff meeting during the IMF Annual Meetings in fall 2013), the authorities and the IMF staff finally reached agreement on the program parameters and the importance of restoring fiscal substantiality while creating supportive conditions for high-quality growth. In this respect, the ECF arrangement was aimed at endorsing and supporting the authorities' comprehensive policy agenda under their HGSAP, which sought to (1) enhance competitiveness to promote private sector growth and employment through the implementation of structural reform; (2) secure fiscal and debt sustainability through fiscal adjustment, fiscal

[41] Paris Club (2015).

[42] IMF (2015). The 2 percent coupon rate on ODA loans is based on a simple average of concessional terms provided by Paris Club creditors to a sample of HIPC debt restructuring episodes. The coupon rate on non-ODA loans is assumed to be market based and is calculated as the six-month average of the Commercial Interest Reference rates (CIRR) as published by the OECD.

[43] As of July 2017, the Grenadian authorities were still in restructuring discussions with their non-Paris Club bilateral creditors.

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legislative reforms, and debt restructuring, while protecting social safety nets; and (3) strengthen financial sector stability by enhancing regulation and supervision. A local Homegrown Programme Monitoring Committee was established with representatives from unions, churches, the private sector, and civil society and put in charge of holding the government accountable for its program and policy commitments.

The design of the IMF program envisaged ambitious fiscal adjustment, anchored by the regional debt target of 60 percent of GDP. The fiscal consolidation effort contemplated under the authorities' HGSAP totaled 7½ percent of GDP over three years, 2014–16, and was balanced between revenue and expenditure measures. To quickly turn around the fiscal position, the programmed adjustment was frontloaded. However, despite the significant fiscal consolidation, a complementary debt restructuring was deemed necessary to restore long-term debt sustainability by putting public debt on a firmly downward path toward achieving the regional target by 2020. This would indeed be a notable achievement.

To fortify the fiscal adjustment effort, the program also envisaged a comprehensive structural reform agenda. These important reforms were supported by technical assistance (TA) from Grenada's development partners, including the IMF (from headquarters and the regional TA office in Barbados [CARTAC]), and the World Bank, and were monitored by structural conditionality (benchmarks) under the program. These conditions were aimed at strengthening the country's long-term fiscal prudence with a rules-based legislated fiscal policy framework, public financial management improvements, a broadened tax base, limits to leakage through improved revenue administration, and leveling the playing field for investors through a transparent and rules-based tax incentives system.

Priority was also given to strengthening Grenada's public debt management to avoid a repeat of the debt crisis. In the context of the financing assurance assessments mandated for the program, the IMF team worked closely with the Debt Management Unit (DMU) and its independent financial advisor in debt sustainability analysis and medium-term financing and cash flow forecasts. The IMF team also maintained close contact with the financial advisor for the country's restructuring negotiations to ensure consistency in financing assumptions and to confirm that the restructuring terms were in line with authorities' program parameters. Meanwhile, a considerable amount of technical assistance was provided by the IMF, WB and the Canada Eastern Caribbean Debt Management Advisory Service (CANEC DMAS) Project in strengthening the legislative framework for public debt management and the capacity of the DMU.[44] Grenada approved a Medium-Term Debt Management Strategy in 2016, with the support of the IMF and WB TA missions.

The authorities also agreed with the IMF team on the importance of prudent management of the Citizenship-by-Investment (CBI) receipts. The authorities revived Grenada's CBI program in 2013, which had been suspended since 2001, in the hope of boosting government revenues and promoting private sector investments. The CBI program offers two options: (1) a donation to the National Transformation Fund (NTF, a special account under the government's Consolidated Fund), and (2) an investment in approved projects along with a fee paid to the government (IMF, 2014b).[45] The NTF and the government fees are essentially public resources that require prudent and transparent management in a sustainable manner to avoid negative impacts on the government's fiscal position. In this respect, the authorities passed the regulations for NTF, which stipulate that the public sources should be prioritized for debt reduction and contingency savings (for example, to build resilience to natural disasters) and refrain from funding recurrent government expenditure.

[44] The CANEC DMAS Project is a Canadian International Development Agency (CIDA) funded debt management project, which commenced operations at the Eastern Caribbean Central Bank (ECCB) in 2009.

[45] See IMF (2014b) Annex II for details.

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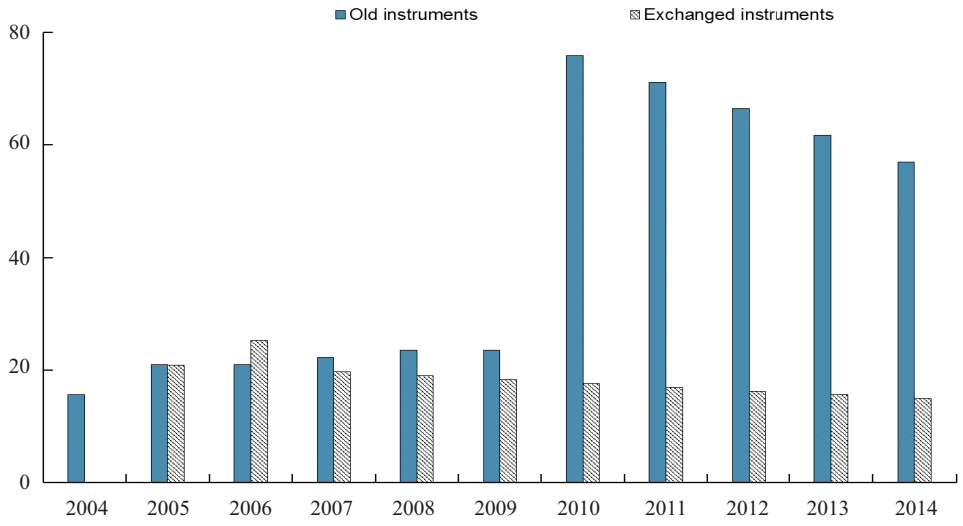
4.4. Outcomes

The debt restructurings provided a significant reduction in debt service and put the public debt dynamic onto what seems to be a sustainable trajectory. Owing to sizable face-value reductions (50 percent in two steps for the US$ and non-NIS EC$ 2025 bonds), debt service was reduced drastically over the medium term, particularly from 2021 onward, when the old instruments were scheduled to be amortized and coupon rates would have been at their highest step-up level (Figure 6). However, because of the short grace period, the new 2030 bonds have comparable debt service obligations with the old 2025 bonds in the near term. Significant near-term cash flow relief in turn is provided by the exchange of the EC$ 2025 bond held by the NIS, and by the restructurings with the Ex-Im Bank and Paris Club. The combined cash flow relief provided by the private creditors over the period 2016–20 totaled US$8 million. Together with a total fiscal adjustment of more than 8½ percent of GDP over the three years of the ECF-supported program, the savings from these restructurings (stock reductions from face-value cuts and cash flow reliefs from interest rate reductions) are expected to contribute to reducing Grenada's public debt to 85 percent of GDP by end-2016, and to below 60 percent of GDP by 2020 (IMF 2016b). This will be a notable achievement and departure from Grenada's track record.

Figure 6
Grenada's Private Debt Restructuring, 2013–15: Debt Service of External Old Instruments and Exchanged Instruments (in millions of US dollars)



Source: Grenadian authorities and authors' calculations.

As of January 2017, on private external debt, Grenada had not yet had a reassignment of its credit ratings or had not issued in the international market. The credit ratings on Grenada's local currency and foreign currency debt remain NR, as assigned by S&P in October 2014. Prior to reallocation to NR rating, S&P had assigned SD to Grenada since March 2013, when coupon payments were missed. Nevertheless, the bond price has recovered from 27 (pre-restructuring) to 55–60 cents on the dollar (Figure 7). However, Grenada has not yet returned to the international market for new financing, partly because the financing needs have been reduced by fiscal surpluses achieved during the adjustment program. On external debt to non-Paris Club creditors, Grenada still has some debt that has not been restructured.[46]

[46] Grenada was classified as "debt distress" by IMF DSA (IMF, 2016a) due to the non-completion of all debt restructuring steps and the clearance of arrears to all official creditors.

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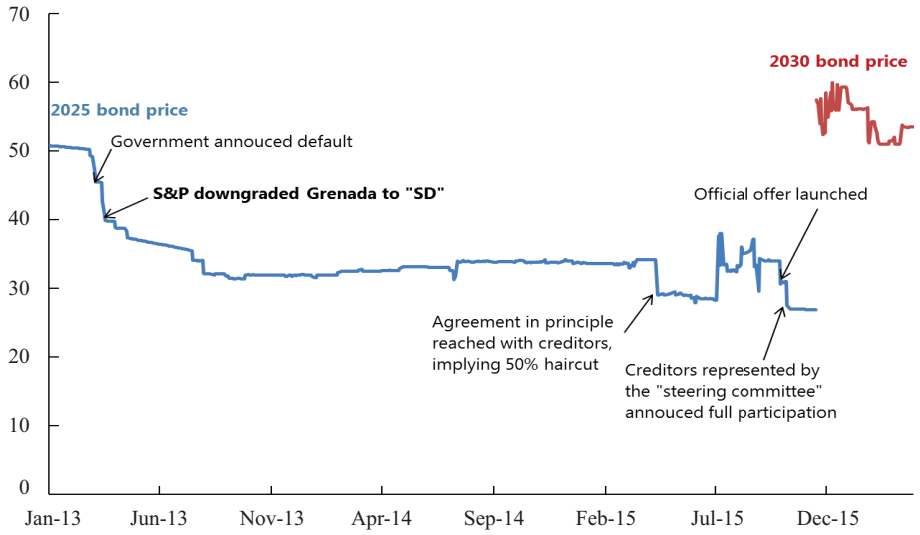
Figure 7
Grenada's Private Debt Restructuring, 2013–15: Bond Prices and Credit Ratings



Source: Bloomberg and S&P.

4.4.1. Post-Restructuring Debt Redemption Profile

Guided by the government's new Medium-Term Debt Management Strategy, an effort was made in the 2013–15 restructuring to improve the post-restructuring redemption profile. The 2013–15 debt restructuring significantly reduced the refinancing risk of the government debt portfolio, due to (1) a sizable face-value haircut on its commercial debt (the original 2025 EC$ and US$ bonds) and loans from the Ex-Im Bank, which reduced the principal repayments over the medium term, and (2) significant lengthening of maturities of its domestic debt (Figure A1 in Appendix 2).

However, refinancing risk could rapidly increase unless the government takes active steps to lengthen the average maturity of its domestic debt. Further, interest rates on 12 percent of the total debt portfolio would reset within the next year. Unless the practice of issuing only T-bills in the domestic and regional market was discontinued, interest rate risk would again increase, as maturing debt would be refinanced at new interest rates, which would remain uncertain. Future variable-rate debt from multilateral institutions could also increase interest rate risk in an environment of rising global interest rates. Despite a high share (about 60 percent) of the total debt portfolio being denominated in foreign currency, the exchange rate risk was expected to be moderate, as the exchange rate peg had been maintained since 1976. Devaluation was considered a low-probability event with large impacts, hence the risk to the debt portfolio could not be entirely ignored and reliance on external borrowing should gradually have been reduced.

5. COMPARISON OF KEY ELEMENTS BETWEEN GRENADA'S 2004–06 RESTRUCTURING AND 2013–15 RESTRUCTURING

From our analysis of the restructuring events in sequence, we now proceed one step further to explore key elements in the 2004–06 and 2013–15 restructuring episodes.[47] Sections 3 and 4 analyze Grenada's 2004–06 and 2013–15 in chronological order and shed light on causes, processes, IMF-supported programs, and outcomes for each restructuring. This section complements our discussion by contrasting key elements in the two restructurings, in particular

[47] Appendix III compares Grenada's experience with other debt restructuring episodes in the Caribbean.

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with regard to (1) cash flow relief; (2) debt sustainability implications; (3) fiscal consolidation; and (4) financing during the debt restructurings.

Figure 4
Comparison between 2004–06 and 2013–15 Private Debt Restructurings

	2004–06	2013–15
Domestic or external	Domestic / External	Domestic / External
Face-value haircut	0%	50% (0%)
NPV haircut	38%	50%
Maturity extension (years)	11.7	5 (10)
CACs triggered	No	Yes

Sources: Authors' calculations based on Grenadian statistics.

5.1. Cash Flow Relief

The 2004–06 restructuring achieved a large frontloaded cash flow relief and substantial maturity extenion.[48] The 2004–06 private debt restructuring provided US$93 million in cash flow relief over the first five years compared to the original obligations existing prior to the restructuring. In contrast, the cash flow relief obtained over the first five years following the 2013–15 debt restructuring was only US$8 million, while the bond exchange achieved a large face-value haircut. The average time to maturity of the 2004–06 restructured debt was 18 years, and the weighted average coupon rate was 6 percent, whereas for the 2013–15 restructuring, the average time to maturity was only eight years and the coupon rate was a flat 7 percent.

Table 5
Cash Flow Relief from the 2004–06 and 2013–15 Debt Restructurings of the US$ and EC$ Commercial Bonds (in US$ million)

Debt Restructuring	1	2	3	4	5	6	7	8	9	10
2004–06	22.0	21.9	21.7	17.7	10.4	10.4	124.1	1.5	46.7	-4.5
2013–15	0.1	-4.4	2.6	4.5	5.2	58.2	54.2	50.2	46.1	42.1

Note: Cash-flow relief is calculated as the difference between the principal and interest payments for the original and the restructured debt obligations.

Sources: Authors' calculations based on Grenadian statistics

5.2. Debt Sustainability Implications of the Debt Restructurings

Cash flow relief without a nominal principal reduction can restore debt sustainability under limited circumstances. The only way a debt restructuring without a nominal principal reduction could contribute to restoring sustainability is if the future rate of real economic growth were higher than the real rate of interest. This in turn leaves the assessment highly sensitive to the robustness of the growth and interest rate assumptions. In principle, debt restructurings should be

[48] It could be noted that while 'NPV loss' calculations provide an indication of investor losses, they do not necessarily offer a good summary of the solvency relief acquired by a sovereign. Hence a given NPV haircut could be achieved with substantial cash flow/liquidity relief but little solvency relief, as in the first restructuring, or with major solvency relief but less impact on immediate cash flows (the second restructuring). If faced with a choice, political economy considerations may encourage a sovereign facing substantial near-term financing needs (as in Grenada 2004–06) to opt for liquidity relief, when a more prudent analysis would recognize that a solvency operation is required. In this context, the 'back loaded' nature of fiscal adjustment following the 2004–06 restructuring was considered problematic. However, the paper does not look whether a 'frontloaded' adjustment would have been feasible in the immediate aftermath of Hurricane Ivan.

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designed in such a way that they are reasonably robust to key economic and financial assumptions. When optimistic assumptions about future prospects are made, and the outturn results indicate a significant downside deviation, the country could return to an unsustainable position. The analysis below examines the debt sustainability implications of the two debt restructurings.[49]

Simulated debt trajectories suggest that the first restructuring was not robust to growth and fiscal policy assumptions (Asonuma et al. 2017c). It is assumed that, at the start, debt is valued at 100, and the denominator representing the capacity to repay, that is, GDP, is also 100.[50] The nominal debt trajectories are based on the terms of the debt restructurings as described in the previous sections (Tables 1 and 3). To ensure comparability between debt structures, any principal repayments and interest payments for the 2025 and 2030 bonds are assumed to be financed and added back to the stock of debt, using three alternative financing cost assumptions (2, 5, and 7 percent). Using the debt trajectory in the numerator under alternative refinancing rate assumptions and a GDP index based on the various GDP growth projections and outcomes (-0.6, 2.5, and 5 percent), the debt trajectories are generated for the 10 years immediately after the debt restructurings. In 2005, annual GDP growth was projected at 4.5 percent over the medium term, compared to the 10-year historical average of 3.2 percent. However, with a realized average growth rate of -0.6 percent during 2005–15, a rate significantly lower than the real effective interest rate on government debt, the public debt ratio explodes after the restructuring despite the large NPV haircut.[51]

In contrast, the 2013–15 debt restructuring involving principal reduction is expected to result in a more durable and sustainable debt position. Simulations show that the debt trajectory remains below its original level under all assumptions except for an extreme adverse growth shock (averaged at -0.6 percent) combined with high financing costs (at 7 percent). Although the debt ratio is still projected to rise (after the two-step haircut) when the growth rate falls below the refinancing interest rate and will rise more rapidly when the differential is larger, the upfront stock reduction through principal haircut provides a comfortable cushion to absorb these potential setbacks.

Simulation results also suggest that a maturity extension and a step-up coupon structure have beneficial effects only under limited conditions. In particular, if the problem facing the government is liquidity shortage, maturity extension and step-up coupons with initially below-market interest rates could provide the government with breathing space to implement fiscal consolidation and restore market confidence, while implementing structural reforms that would transform the economic structure to generate and sustain higher economic growth. However, if GDP growth is not higher than the weighted average implied interest rate on the restructured (step-up coupon) debt, the debt ratio will increase.

5.3. Fiscal Consolidation and Debt Sustainability

The phasing of fiscal adjustment mattered. With regard to medium-term fiscal adjustment by the authorities, the adjustment path was backloaded during and following the 2004–06 restructuring, whereas it was frontloaded during and following the 2013–15 restructuring. The authorities' 2006 IMF-supported program aimed at a 4½ percentage points of GDP improvement in the primary balance (excluding grants) to be "phased-in through 2008—consistent with the need to avoid fiscal retrenchment becoming a drag on the recovery and accommodate the large capital spending needs in 2006 and 2007 to rehabilitate public infrastructure and buildings." With a 2½

[49] To facilitate the analysis, comparison is made only for the EC$ and US$ 2025 bonds and the 2030 bonds.

[50] In this exercise, the starting point for the first restructuring is 2005 and that for the second restructuring is 2015. The debt ratio created is a hypothetical index with a starting point of 1. It extracts from the primary balance, additional interest and principal repayments arising from other existing and new debt. The actual DSA is discussed in the next section.

[51] The refinancing rate makes little difference to the debt ratio for the 2005 debt restructuring because, by construction, the cash flows in the earlier period are limited.

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percent primary surplus target thereafter and long-term growth of 4 percent, the projection was that this would enable the debt-to-GDP ratio to decline to 60 percent by 2015. Instead, the actual outturn was an average primary deficit of 3 percent of GDP between 2006 and 2012, resulting in a debt-to-GDP ratio of 110 percent at end-2013. In contrast, the 2014 IMF-supported program envisioned a fiscal consolidation of 7¾ percent points of GDP targeted over three years, with three quarters of the effort to be undertaken in the first two years of the program. This adjustment would bring the debt-to-GDP ratio to 89 percent by 2020, which would then be complemented by a comprehensive debt restructuring to achieve the 60 percent regional debt-to-GDP target.

5.4. Financing during the Debt Restructurings

To continue their operations during debt restructuring, governments require some form of continuous financing. During a debt restructuring, burden sharing often takes the form of (1) new credit from some creditors who are not subject to the restructuring; (2) accumulation of arrears to suppliers and creditors; or (3) raising revenues and reducing nonessential expenditures to generate primary surpluses. With an IMF-supported program in place, other multilateral institutions and official bilateral creditors may provide fresh credit to support the government to achieve macroeconomic stabilization, fill the financing gap, and restore debt sustainability. Under an IMF-supported program, new arrears to suppliers are generally not allowed, while the IMF is willing to tolerate arrears to private creditors only when prompt support is considered essential for the successful implementation of the member's adjustment program; and the member is pursuing appropriate policies and is making a good faith effort to reach a collaborative agreement with its creditors.[52] Domestic T-bills also often play a role in filling the financing gap during a restructuring.

During both debt restructurings of Grenada, multilateral institutions and bilateral official creditors provided fresh credit to support the authorities. During 2004–06, multilateral institutions provided US$15 million in net new credit, two thirds of which was from the CDB, to support the government in its reconstruction efforts in the aftermath of Hurricane Ivan. The IMF-supported program that started after the completion of the debt exchange provided Grenada with additional SDR10.5 million in support of its economic and financial policies. Also, bilateral creditors provided US$20 million in net new loans, with over half being financed by the government of Trinidad and Tobago, and Belgium providing a good part of the remainder. During the period of 2013–15, the World Bank, the CDB, and the IMF provided US$57 million in new credit. Bilateral credit, on the other hand, experienced a net repayment, as the government had entered into an arrears clearance agreement with the government of Kuwait ahead of the restructuring. However, the Kuwait Fund, the OPEC Fund, Trinidad and Tobago, and Venezuela provided new credit in 2012, prior to the announcement of the debt restructuring. Since the government was likely to refrain from future external market access for some time after the debt restructuring, continued reliance on multilateral and bilateral creditors was expected.

T-bills played a critical role during the debt restructuring of 2013–15 but not during 2004–06 (Table 6). The last 91-day T-bill issued on the RGSM was in November 2003, and was not rolled over when it matured in February 2004. A 365-day T-bill was issued in July 2004, before Hurricane Ivan hit in September and before the October announcement of the restructuring. This 365-day T-bill was rolled over in July 2005 and in subsequent years. In effect, there was zero net financing from T-bills during the 2004–06 debt restructuring period. In contrast, net financing through the 91-day and 365-day T-bills issued on the RGSM remained robust during the 2013–15 period, with a cumulative net financing of EC$29 million and EC$12 million, respectively, or a cumulative total T-bills contribution of EC$41 million.

[52] IMF Lending into Arrears Policy.

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Table 6
Treasury Bill Issuances and Redemptions on the Regional Government Securities Market
(in millions of East Caribbean dollars)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
91-day T-bills													
New issuance	15	0	0	0	0	0	0	0	34	24	39	59	54
Redemption	0	-15	0	0	0	0	0	0	0	-34	-24	-39	-59
Net issuance	15	-15	0	0	0	0	0	0	0	-10	15	19	-5
365-day T-bills													
New issuance	0	24	21	23	34	35	46	55	56	47	49	56	58
Redemption	0	0	-24	-21	-23	-34	-35	-46	-55	-56	-47	-49	-56
Net issuance	0	24	-3	2	11	0	12	8	1	-9	3	7	2
Total T-bills													
New issuance	15	24	21	23	34	35	46	55	90	71	89	115	112
Redemption	0	-15	-24	-21	-23	-34	-35	-46	-55	-90	-71	-89	-115
Net issuance	15	9	-3	2	11	0	12	8	35	-19	18	26	-3

Sources: Authors' calculations based on Grenadian statistics.

6. LESSONS LEARNED

While our analysis focuses on two restructuring episodes in one country, Grenada, driven predominantly by country-specific facors, we can draw lessons for consideration in future debt restructurings.[53] Grenada's debt restructuring experience suggests the importance of establishing clear objectives and a clear perimeter for the claims eligible for a debt restructuring; commitment and ownship of the policy and structural reforms; and close engagement and clear communication with creditors. Nevertheless, we acknowledge that case-specific outcomes will need to take into account the country-specific external and internal constraints, and the complex nature of debt restructuring negotiations.

- ***1. Setting appropriate objectives***

The government needs to set out appropriate objectives which regard to what it expects to achieve from a debt restructuring. In particular, it should present its views on whether there is a liquidity or a solvency problem and the underlying cause of the problem (Appendix 3). During the 2004–06 restructuring episode, the fiscal crisis faced by Grenada was perceived by the authorities as more of a liquidity problem, which led to the eventual outcome of a more frontloaded cash flow relief with limited debt stock reduction as compared to the 2013–15 debt restructuring.

- ***2. Setting a clear perimeter for the debt under restructuring and renegotiation***

Experience shows that clarity with respect to the perimeter of the debt restructuring is essential for an efficient resolution. The government needs to make clear which part of its debt will be subject to debt restructuring, casting as wide a perimeter as possible to promote evenhandedness, while avoiding cutting off new sources of financing needed to fund day-to-day operations of the

[53] See IMF (2013) for more general lessons and IMF (2014c, 2015c, 2015d) for concrete proposals. Moreover, see also Brookings-CIEPR (2013) and Erce (2013) for further policy discussions.

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government. Whereas the Grenada 2004 debt-restructuring announcement was not clear about the debt subject to "cooperation of its creditors," the 2013 announcement was clear about coverage. It conveyed the government's intent to seek collaborative and comprehensive debt restructuring, explicitly excluding debt to multilateral institutions and T-bills issued in the RGSM—accounting for about 30 percent of public debt in 2013. T-bills issued on the RGSM were excluded from the restructuring, as that would have had broader implications for the regional market. Credit from international financial institutions (IFIs) was also excluded, and this enabled the IFIs to provide new credit to the government while it implemented reforms and negotiated debt restructuring.

- ***3. Taking policy and reform actions to anchor policy credibility and strengthen fiscal prudence and growth prospects***

Fair burden sharing between a sovereign debtor and creditors, as well as among creditors, is important in facilitating an effective voluntary debt restructuring agreement. Creditors tend to agree to a debt restructuring only if the government lays out a comprehensible and credible set of measures to restore imbalances that have led to a situation requiring a debt restructuring. In particular, fiscal measures that reduce expenditures and strengthen revenue collection, while protecting the vulnerable sectors, and measures that enhance external competitiveness and promote growth, including structural measures, are considered key factors to achieve and sustain the necessary adjustments. The latter is particularly important for long-term creditors who are expected to continue investing in the country beyond the short and medium terms. Strong ownership of economic policies by the government against risks of economic contractions and exogenous shocks is critical in securing the support of creditors and international development partners.

The IMF can play a pivotal role as an independent assessor of the economic health of the country, providing views on reform actions needed to restore investor confidence and economic growth, market access, and debt sustainability. This can be done in the context of the annual Article IV surveillance. However, an IMF-supported program cannot proceed if the Fund assesses that debt is not sustainable under existing policies. In such cases, the authorities may determine that they need to undertake a debt restructuring in order to achieve sustainability objectives, subject to IMF policies.[54] The IMF will develop with the authorities the appropriate fiscal adjustment path, as well as the structural reform measures needed to ensure that risks to future debt sustainability are reduced, thus providing a credible anchor for creditors to base their decisions. The 2004–06 debt restructuring was completed before the IMF-supported program began, while the 2013–15 debt restructuring took place within the context of an IMF-supported program. In the 2013–15 debt restructuring, creditors anchored the second nominal principal reduction to the successful completion of the IMF-supported program, ensuring incentive compatibility of a successful completion of the program with the reward given as a debt restructuring by private creditors. Other IFIs that provide fresh credit during a debt restructuring may also set conditions requiring the government to implement reforms that address risks to debt sustainability and promote growth.

- ***4. Designing robust debt restructuring scenarios and legal clauses***

To ensure a durable exit from an unsustainable debt situation, the authorities should present robust restructuring scenarios and simulations. When developing alternative debt restructuring scenarios, it would be useful to conduct scenario analysis by varying future borrowing costs to refinance debt service obligations, as well as growth assumptions.[55] Hence, step-up coupons may appear attractive at the beginning, but unless economic growth is higher than the coupon rates, the debt level will rise again as soon as the relationship is reversed. This will ensure that the restructuring will have material impact on future debt sustainability. In this respect, early realization of the need

[54] The relevant policies that come into play include: non-toleration of arrears to official creditors, lending into arrears to private creditors, financing assurances, and public debt limits in IMF-supported programs.

[55] The IMF DSA could be used as a means of producing and examining such scenarios.

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for a principal reduction could lessen the possibility of a future restructuring. Professional debt advisors are typically used to strengthen countries' negotiating position.

In both of Grenada's restructuring episodes, the authorities, in consultation with their financial advisors, prepared several restructuring scenarios, which they shared with creditors during negotiations. In addition, there could be downside risk to fiscal projections and exogenous shocks, including natural disaster shocks—thus the introduction of the hurricane clause in the exchanged bonds of Grenada in 2015. In the case of the country's 2013–15 restructuring, the analysis was abstracted from possible exchange rate risk, but robustness to exchange rate shocks should also be assessed.

- ***5. Engaging creditors in close and effective communication***

Effective communication of the government's economic policy and strategy is crucial to the success of a debt restructuring. During the 2013–15 restructuring, the Grenada authorities explained clearly to bondholders the economic situation and options available, along with the cost of each option. The credible economic program they proposed provided a framework for debt restructuring negotiations and helped build creditor confidence as debt sustainability was restored.

Maintaining good contact and sharing of relevant data with creditors is also important in maintaining constructive discussions. Continuous engagement with creditor groups, providing the information that includes recent updates on economic conditions and policies implemented, could help lead to an efficient resolution. Further, to support the case for a debt restructuring, the government needs to provide relevant data about, for example, the fiscal accounts and balance of payments, along with financing assumptions. This will enable creditors to independently assess the country's debt sustainability situation. To the extent possible, this should be provided on the government's website to ensure equal treatment of creditors. However, some assumptions might need to be shared under a nondisclosure agreement. The authorities maintained close relations with creditors in both of Grenada's restructurings, and shared information relevant to DSA in the second restructuring.[56]

The financial and legal advisors are typically external experts who communicate with creditors with, or on behalf of, the government. They help the government: (1) gather the necessary information and make it available to creditors, and (2) analyze the information and propose alternative debt restructuring strategies, as was mentioned above in the case of Grenada's restructurings.

7. CONCLUSION

Sovereign debt restructurings are undertaken to provide cash flow relief and/or help restore debt sustainability. Grenada's two restructurings discussed in this paper are not exceptions. Both the 2004–06 and 2013–15 debt crises and restructurings were the consequence of debt service payments and elevated public debt levels that were not sustainable caused by excessively expansionary fiscal policies. The crises in each case were triggered or exacerbated by large external shocks. The IMF is unable to lend to a sovereign when, under the most realistic and sophisticated assumptions and projections for growth and financing, the level of debt is deemed unsustainable. In such cases, a sovereign may choose to undergo a debt restructuring to achieve sustainability.

The main lesson from Grenada's 2004–06 restructuring is that, while effective in providing liquidity, it did not provide enough buffer to safeguard debt sustainability. Two years after the restructuring, the public debt ratio began to shoot up while the country faced adverse shocks from

[56] See http://www.gov.gd/debt_restructuring.html.

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the global financial crisis. An optimistic growth assumption had led to the belief that the country would eventually grow its way out of the debt crisis. In hindsight, the impact of potential adverse shocks on debt dynamics, the failure to recognize and resolve the underlying macro imbalances and unsustainable debt outlook facing the country eventually led Grenada to another restructuring just 10 years later.

Grenada drew on many of the lessons from the previous experience. The 2013–15 debt restructuring targeted and achieved substantial outright principal reductions through the debt exchange. These principal reductions would directly reduce Grenada's public sector debt by more than 10 percent of GDP and indirectly lower debt service payments going forward. Strong ownership by the government of its structural adjustment program, particularly its decisive actions in correcting fiscal imbalances and strengthening the fiscal policy framework, helped put public finances on a sustainable path and the economy on track to regain investor confidence and build resilience to external shocks. Time will tell if the debt relief and restructuring together with the new policy framework that instills fiscal prudence will be enough to preclude it from happening again.

Grenada's 2013–15 restructuring also brought a new perspective to the sovereign debt restructuring framework with the important innovations discussed. To review, the special features in the 2013–15 restructuring include: (1) the two-step principal haircuts, with the first half implemented upon exchange and the remaining half contingent on the completion of Grenada's three-year ECF-supported program in 2017; (2) the inclusion of special warrants related to Grenada's Citizenship by Investment (CBI) Program in the new bonds, which entitle bondholders to receive a capped portion of the CBI revenues that may be generated above certain thresholds following the successful completion of the ECF-supported program; and (3) the inclusion of the hurricane clause in the new bonds, allowing Grenada to capitalize interest and defer principal maturities due on the bonds for a specified period in the event of a qualifying natural disaster.

Finally, fiscal vigilance is again stressed as the main paragon to avoid a repetition of history. Building resilience and policy buffers are especially important for small countries facing frequent external shocks, for example, natural disasters. An early warning exercise could help identify and regularly monitor external vulnerabilities. Further, fiscal policy should aim to be countercyclical and be prudent to avoid spending overruns that risk jeopardizing fiscal and debt sustainability.

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APPENDIX 1.

Hurricane Clause and Citizenship by Investment Program Revenue Sharing Clause in the Exchange Offer in the 2013–15 Restructuring

Appendix 1.1. Hurricane Clause[57]

The hurricane clause included in Grenada's recent sovereign debt bond contracts enables changes to the scheduled debt service payments upon the realization of an exogenous natural disaster event. Since the changes to the scheduled debt service payments are pre-defined in a contract, this reduces the probability that another debt restructuring will be triggered. The hurricane clause is designed to provide cash flow relief at a critical moment after a natural disaster event, when financing needs are greatest and new sources are scarce. Therefore, it enables Grenada to redirect funds intended for debt service to more immediate needs, reducing the economic impact of the natural disaster.

Key features of the hurricane clause include (Table A1):

– *Verifiable trigger event measured by an independent entity*: Grenada is a member of the Caribbean Catastrophic Risk Insurance Facility (CCRIF) SPC and has purchased insurance against the risks of tropical cyclones, earthquakes, and excess rainfall. The event is triggered based on parametric measures. If the insurance is triggered, as determined by the CCRIF, the hurricane clause in the bond contract is also triggered.

– *Changes to the cash flow*: The clause provides for deferred payments for up to two payment periods, and there is no nominal principal or interest rate reduction. The deferred interest payment is capitalized and the deferred principal payment is distributed equally on top of the scheduled payments until final maturity.

– *Maximum number of triggers*: The contract allows the trigger to be invoked for up to three times.

The cash flow relief that may result from the hurricane clause is equivalent to the probable maximum loss of an event that occurs once every 25 years in Grenada. Depending on the timing of the event, a one-off trigger of the hurricane clause could provide a cash flow relief of up to 2.6 percent of GDP. This compares with about 1.5 percent of GDP for the probable maximum loss from an event that occurs once every 25 years in Grenada, and the average annual loss experienced in Grenada of 9.87 percent of GDP. If three events are triggered, the total cash flow relief could be as much as 7.4 percent of GDP. The charts illustrate the scheduled debt service payments and the payments under a scenario where the hurricane clause is triggered at end-2024.

The hurricane clause in a debt contract is inherently a liquidity relief instrument. A debt being a fixed-income instrument, the maximum cash flow relief in a debt contract will be the amount originally due. For a catastrophic event such as Hurricane Ivan, which caused an estimated damage of 200 percent of GDP, the cash flow relief from the hurricane clause cannot be expected to match the potential financing needs. An instrument such as the catastrophe bond or insurance would be more appropriate.

[57] Grenada Ministry of Finance (2015).

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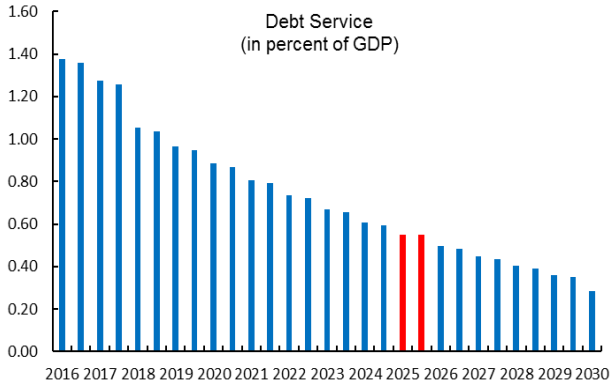
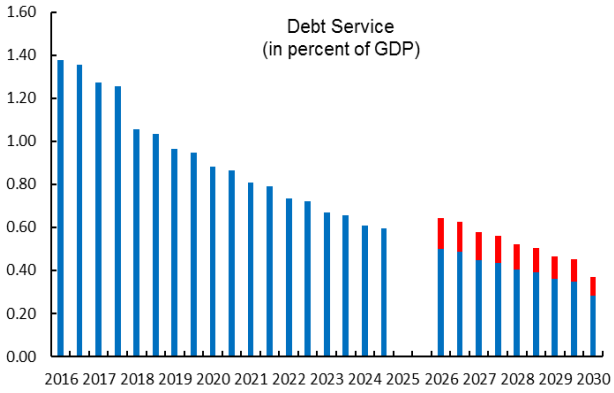
Scheduled Debt Service: 2030 Bonds and Taiwan



Debt Service after a Hypothetical Call on Hurricane Clause in 2024: 2030 Bonds and Taiwan



Source: Authors' calculations based on Grenadian statistics.

The hurricane clause defines an "event" as clearly distinct from an "event of default." The clarity of the definition of the natural disaster event in a bond contract ensures that the nonpayment of the scheduled debt service does not trigger an event of default, which could cause S&P to downgrade the bond to SD.

Appendix A1.2. Citizenship program revenue sharing clause[58]

To sweeten the deal, the exchange offer provides holders of the new 2030 bonds an opportunity to receive a portion of eligible revenues received by Grenada under its Citizenship-by-Investment (CBI) program after the completion of its current program with the IMF. Certain conditions have to be met to trigger the clause, including: (1) the second step haircut has occurred; (2) more than US$15 million in eligible CBI revenues has been received by Grenada in any given year; and (3) the cumulative limit (NPV of cumulative CBI revenue sharing cannot exceed 35 percent of the face value of the new 2030 bonds) for CBI payment amounts has not been reached.

[58] Citizenship-by-Investment programs, which offer citizenships to foreign nationals in exchange for qualified donations or investments, exist in several Caribbean countries, including Antigua and Barbuda, Dominica, Grenada, and St. Kitts and Nevis. Details of the clause can be found in the Offering Circular to exchange Grenada's 2025 bonds (Grenada Ministry of Finance, 2015).

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Table A1
Details of Grenada's Hurricane Clause

	Private Bondholders	Taiwan	**Paris Club**
Event	Hurricane insured under CCRIF Parametric Insurance Contract dated June 1, 2015	Hurricane, earthquake, excess rainfall insured under CCRIF Parametric Insurance Contract dated June 1, 2012	**"Hurricanes" understood in the wider meaning of the word (including for example tropical storm) but causing serious damage**
Trigger	CCRIF SPC modelled losses exceeding US$15 million	CCRIF SPC modelled losses exceeding US$15 million	**Assessment to be made on a case-by-case basis with no pre-defined set of indicators**
Independent Body	CCRIF SPC	CCRIF SPC	**"Independent assessments" by IFIs, regional institutions or any organization that the PC Creditors, with the help of the Secretariat, will judge relevant, including the IMF, World Bank. CCRIF SPC, the CDB and the National Hurricane Center**
Debts Affected	Principal and accrued interest due on the deferral dates	Principal and accrued interest due on the deferral dates	**Principal and accrued interest. Creditors will have the choice to decide on a bilateral basis whether or not to participate in a debt relief.**
Deferral Dates	– Up to 6 months or one payment date (if CCRIF SPC payout is greater than US$15 million and less than US$30 million) – Up to 12 months or two payment dates (if CCRIF SPC payout is greater than US$30 million)	12 months (two payment dates)	**Unspecified**
Repayments Terms	– Principal deferred and accrued interest deferred and capitalized – Both repayable in equal semi-annual installments over the remaining term of the loan	– Principal deferred and accrued interest deferred and capitalized – Both repayable in equal semi-annual installments over the remaining term of the loan	**Unspecified**
Conditions	Policy payout by CCRIF SPC and submission of the deferral claim	Policy payout by CCRIF SPC and submission of the deferral claim	**Considerable damage and formal request**
Maximum Numbers of Triggers	Three	Three	**Not stated**
Reporting	Progress reports on post-event relief, recover and reconstruction programs	Progress reports on post-event relief, recover and reconstruction programs	**Not stated**

Sources: Grenadian authorities and Paris Club data.

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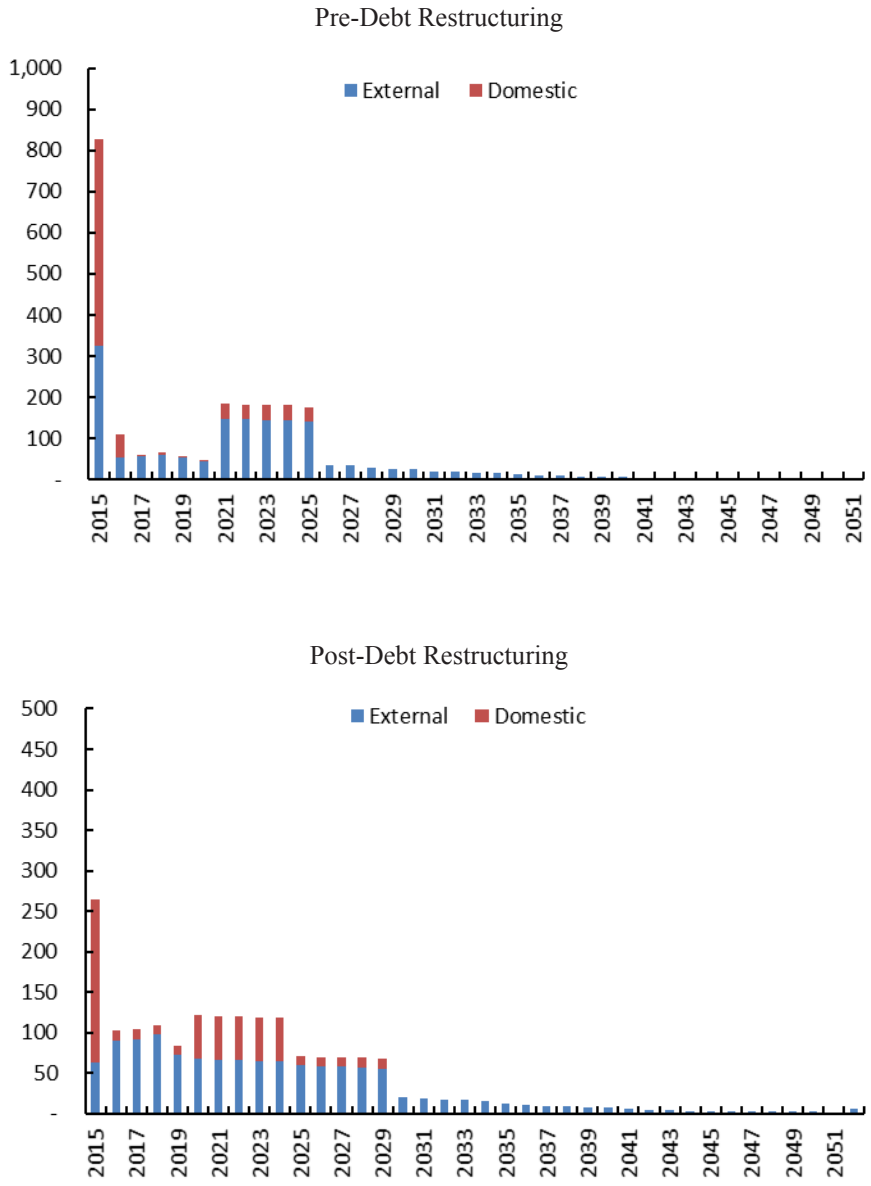
APPENDIX 2.

Grenada's Redemption Profile Pre- and Post-Debt Restructuring

Figure A1
Grenada's Redemption Profile Pre- and Post-Debt Restructuring
(in millions of East Caribbean dollars)



Sources: Authors' calculations based on Grenadian statistics.

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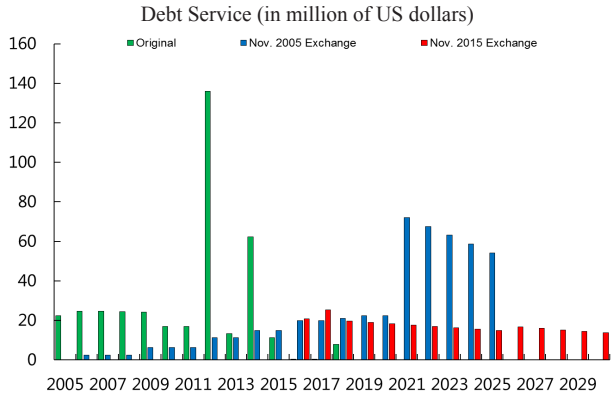
APPENDIX 3.

Was Grenada's 2004–06 Debt Restructuring "Too Little, Too Late"?

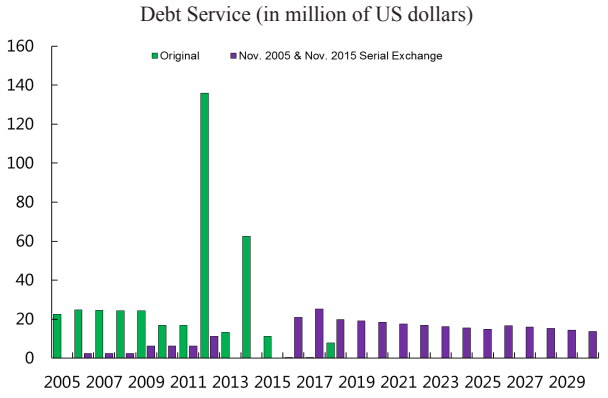
Was Grenada's 2004–06 debt restructuring in fact "too little, too late"? Could it have been designed differently to prevent the second restructuring a decade later?[59]

First, we assess the NPV of the haircut that had to be indifferent between the two restructurings and one (hypothetical) deeper restructuring in 2004–06. By examining this counterfactual, we can determine the loss experienced by a bondholder who held the original debt in 2005 and subsequently underwent the two restructurings. To this end, the cash flow of the original debt before the 2004–06 debt restructuring and the cash flow of the combined 2004–06 and 2013–15 debt restructurings are compared. In the illustrative analysis below, only the debt restructurings of the commercial debt are compared. The panel charts below shows the cash flows of (1) the original debt that was restructured in November 2005 (in green); (2) the 2004–06 debt restructuring representing the 2025 bonds (in blue); and (3) the 2013–15 debt restructuring representing the 2030 bonds (in red). The actual cash payments made in (2), explained below, and the new cash flows in (3) will be referred to as the combined debt restructuring and represent the cash flows of a hypothetical bondholder who underwent both debt restructurings (in purple).[60]

Original, Nov. 2005 Exchange, and Nov. 2015 Exchange



Original and Combined Nov. 2005 and Nov. 2015 Exchanges



Sources: Authors' calculations based on Grenadian statistics.

Comparing the original cash flow of the pre-2004–06 debt restructuring (in green) with the cash flow of the combined debt restructuring (in purple) allowed us to assess the restructuring terms needed in November 2005 to having an equivalent outcome to the two debt restructurings. We compared the present values of the two cash flows as of November 2005. Using the exit yield at the time of the 2004–06 debt restructuring (8.9 percent), the NPV haircut for the original 2004–06 debt restructuring was 35 percent. For the combined debt restructuring, using the same exit yield, the NPV haircut was 51 percent. In other words, to have possibly avoided the second restructuring (or to equalize the combined NPV haircuts), a NPV haircut of 51 percent with a principal reduction would have been needed in November 2005, instead of the 35 percent with only maturity extension and early coupon relief that creditors gave to Grenada at the time.[61] In fact, a principal reduction similar to that of the 2013–15 restructuring may have required less NPV reduction than the combined NPV haircut. This analysis illustrates that the first restructuring may have been "too little, too late," necessitating the second debt restructuring.

[59] See IMF (2013) for a discussion on "too little, too late." See also the analysis comparing the two debt restructurings in this appendix, where it is shown that an early reduction of the principal could lead to a sustained and robust reduction in the debt trajectory.

[60] To construct the combined debt restructuring cash flow, only the actual payments for (2) are taken, as only coupon payments were made between 2006 and September 2012 (before the announcement of the default in March 2013), based on the terms of the 2005 debt restructuring in a step-up fashion, with amortization scheduled not to start until 2021. Payments (interest plus principal on an amortizing schedule) on the new 2030 bonds began in May 2016.

[61] Using the exit yield prevailing at the time of the 2015 restructuring (13.9 percent), the NPV reduction of the combined debt restructuring was 69 percent.

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APPENDIX 4.

Comparison of Debt Restructurings in the Caribbean

Several Caribbean countries have experienced sovereign debt restructurings over the past 10 years. This Appendix reviews debt restructuring episodes in the region: Antigua and Barbuda in 2008–12, Belize in 2006–07 and 2012–13, Dominica in 2004, Dominican Republic in 2004–05, Jamaica in 2010 and 2013, and St. Kitts and Nevis in 2012–13 (see Table A1 for details of debt restructurings). We then compare Grenada's two debt restructurings in 2004–06 and 2013–15 with the general restructuring pattern in the region.

Fiscal policy slippages and output losses related to external shocks, including hurricanes, are two dominant drivers of debt accumulation to "unsustainable levels."[62] The lack of effective monetary policy under a fixed exchange rate regime in most of these countries has frequently led to a countercyclical fiscal policy response that led to a rapid accumulation of debt. Grenada's two debt restructurings are a representative case in the region.

Most debt restructurings in the Caribbean are implemented in a preemptive, collaborative manner and are generally completed over a short duration. Three restructurings went against the trend, as negotiations started after missed debt service payments (default): Antigua and Barbuda in 2008–12, Dominican Republic's restructuring on external bank loans in 2004–05, and Grenada's 2013–15 restructuring. Similarly, Antigua and Barbuda's 2008–12 and Grenada's 2013–15 restructurings involved protracted negotiations that lasted over more than 2.5 years. This was because of litigation over disputed claims in the US court system (Antigua and Barbuda) and of the need for a deep principal reduction to restore debt sustainability (Grenada).

The majority of countries, with the exception of Belize, Dominica, and Jamaica, have had both private and official sector debt restructurings in sequence, alongside an IMF-supported program. Only the episodes in Belize in 2006–07 and 2012–13, Dominica in 2003–04, and Jamaica in 2010 and 2013 were stand-alone private debt restructurings without official external debt restructurings. Against the pattern in the region, the restructurings in Belize in 2006–07 and 2012–13 and in Grenada in 2004–06 were completed outside an IMF-supported program.

A third of these restructurings included sizable face-value reductions (resulting in higher NPV haircuts), while others do not. Antigua and Barbuda's restructuring in 2008–12, Dominica's in 2003–04, Grenada's in 2013–15, and St. Kitts and Nevis's in 2011–12 included face-value reductions resulting in NPV haircuts above 50 percent. In contrast, the remaining cases were associated with treatments of maturity extension and coupon rate reduction.

Debt sustainability concerns remained unresolved for most debt restructurings (Asonuma et al. 2017c), while most countries had difficulty regaining market access. Despite settlements with private external creditors, and subsequently with official debt restructurings, public debt has remained elevated even after the completion of exchange in most cases. Associated with this, countries have remained excluded from the international capital market for protracted periods. In this respect, the Dominican Republic's restructuring in 2004–05 was exceptional in that the country regained market access after only five to ten months.

Grenada's 2013–15 restructuring incorporated some original, innovative features. These innovations included: (1) a two-step nominal haircut in the commercial bond deal, with half of the 50 percent haircut executed at the time of the exchange (2015) and the remainder contingent on successful completion of the IMF-supported program in 2017. The first nominal haircut can be reversed in the event Grenada does not complete the IMF-supported program; (2) a hurricane clause, introduced first in the Ex-Im Bank restructuring and also in the commercial bond deal and Paris Club agreements, to provide the debtor with temporary debt service relief in the event of qualifying natural disasters; and (3) to make the deal more attractive to promote participation, the commercial bond agreement included a clause to "claw back" some of the proceeds (up to a certain threshold) from the CBI program—an upside potential for NPV recovery. The third innovation was first introduced in the St. Kitts and Nevis restructuring, while Grenada was the first to introduce the first and second tools in its 2013–15 deal.

[62] IMF (2013) also emphasizes an additional factor, that is, the fear of contagion may generate delay in the authorities' policy action to debt sustainability.

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Table A1
Details of Debt Restructurings in the Caribbean

	Private Debt Restructurings													
	Domestic / External[1)]	Preemptive / Post-Default[2)]	Start of Restructuring[3)]	End of Restructuring[3)]	Total Duration (Months)[3)]	Debt Exchanged in US$ bn[4)]	Cut in Face Value[5)]	NPV Haircut[6)]	CACs	Participation Rate	Number of Litigation	Holdouts	Official Debt Restructurings[7)]	IMF-Supported Programs[8)]
Dominica (Bonds)	Domestic / External	Weakly Preemptive	Jul-03	Jun-04	11	0.10	15.0%	54.0%	n.a.	72%	1	Yes[11)]	None	PRGF (2003-06)
Dominican Republic (Ext. Bonds)	External	Strictly Preemptive	Apr-04	May-05	13	1.10	0.0%	4.7%	No	94%	0	Yes[11)]	Apr-04 / Oct-05	SBA (2003-05, 2005-08)
Dominican Republic (Loans)	External	Post-Default	Apr-04	Oct-05	18	0.18	0.0%	11.3%	n.a.	n.a.	n.a.	n.a.	Apr-04 / Oct-05	SBA (2003-05, 2005-08)
Grenada (Bonds/Loans)	Domestic / External	Weakly Preemptive	Oct-04	Nov-05	13	0.21	0.0%	33.9%	No	91%	1	Yes[11)]	May-06	None
Belize (Ext. Bonds/Loans)	External	Weakly Preemptive	Aug-06	Feb-07	6	0.52	0.0%	23.7%	Yes	98%	No	Yes	None	None
Antigua and Barbuda (Dom. Loan)	Domestic	Post-Default	Dec-08	Dec-09	12	0.01	0.0%	-2.7%	n.a.	n.a.	n.a.	n.a.	None	None
Antigua and Barbuda (Ext. Loan)	External	Post-Default	Dec-08	Mar-12	39	0.03	100.0%	100.0%	n.a.	n.a.	n.a.	n.a.	Sep-10	SBA (2010-2013)
Antigua and Barbuda (Dom. Loan)	Domestic	Post-Default	Jan-10	May-10	4	0.02	0.0%	13.0%	n.a.	n.a.	n.a.	n.a.	Sep-10	SBA (2010-2013)

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	Private Debt Restructurings													
	Domestic / External[1]	Preemptive / Post-Default[2]	Start of Restructuring[3]	End of Restructuring[3]	Total Duration (Months)[3]	Debt Exchanged in US$ bn[4]	Cut in Face Value[5]	NPV Haircut[6]	CACs	Participation Rate	Number of Litigation	Holdouts	Official Debt Restructurings[7]	IMF-Supported Programs[8]
Jamaica (Dom. Bonds)	Domestic	Strictly Preemptive	Jan-10	Feb-10	1	7.80	0.0%	n.a.	n.a.	n.a.	n.a.	n.a.	None	SBA (2010-12)
St. Kitts and Nevis (Bonds/Loans)	Domestic / External	Weakly Preemptive	Jun-11	Apr-12	10	0.14	31.8%	68.4%	Yes	100%	No	No	May-12	SBA (2011-14)
Belize (Ext. Bonds)	External	Weakly Preemptive	Aug-12	Mar-13	7	0.55	10.0%[9]	29.2%	Yes	100%	No	No	None	None
Jamaica (Dom. Bonds)	Domestic	Strictly Preemptive	Feb-13	Feb-13	0	8.90	0.0%[10]	24.2%	n.a.	n.a.	n.a.	n.a.	None	SBA (2013-17)
Grenada (Bonds)	Domestic / External	Post-Default	Mar-13	Nov-15	32	0.26	43.5%	50.3%	Yes	100%	No	No	Nov-15	PRGF (2014-17)

1) Classification of domestic and external debt is based on jurisdiction, except for Grenada (2004-05) that is based on creditors' residence.
2) Classification of preemptive or post-default restructuring is based on Asonuma and Trebesch (2016).
3) According to Asonuma and Trebesch (2016), the start of a restructuring process is whenever (i) the government misses the first payment to private external creditors beyond the grace period (default month) or (ii) whenever a key member of government publicly announces a debt restructuring. The end of a restructuring is defined (i) as the month in which either an official signing ceremony took place (in the case of bank debt restructurings), or (ii) as the month in which the debt was ultimately exchanged in the market (in the case of bond restructurings). Duration of a restructuring is defined as the number of months from the start to the end of the restructuring.
4) Total eligible debt to be restructured in the debt operation.
5) Figures do not include past due interest.
6) NPV haircuts for Dominica and Dominican Republic are from Cruces and Trebesch (2013); NPV haircuts for Belize 2006-07 and 2012-13 are from Asonuma et al. (2017b); NPV haircuts for Saint Kitts and Nevis and Jamaica 2013 are from Asonuma et al. (2017a); NPV haircuts for remaining cases are the authors' calculations.
7) Indicates whether a private restructuring accompanies at least one official debt (Paris Club) restructuring over the period from 1 year prior to the start of the restructuring to 1 year after the end of the restructuring.
8) Indicates whether a private restructuring accompanies an IMF-supported program over the period from the start of the restructuring to the end of the restructuring.
9) Missed coupon payments were added to the face value of the new bond (approximately 7 percent of the original principal), resulting in a net face-value haircut of about 3 percent.
10) The exchange was a par for par exchange, except for fixed rate notes (20 percent face-value reduction targeted to state-owned enterprises).
11) Indicates settlement with holdout creditors.

Sources: Antigua and Barbuda (2011), Asonuma et al. (2017a, 2017b), Asonuma and Trebesch (2016), Cruces and Trebesch (2013), Das et al. (2012), various IMF staff reports, and authorities' websites.

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Comparison on Efficiency of Foreign and Domestic Banks Evidence from Algeria

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ABSTRACT

The study investigates the differences in technical, pure technical, and scale efficiencies of domestic and foreign banks in Algeria over the period of 2000–2012. The study uses annual data of 10 foreign banks and 05 domestic banks operated in Algeria. The input-oriented Data Envelopment Analysis model is used to measure the banks' efficiency score. In addition, a set of parametric and non-parametric tests are used for investigating the differences in efficiency between foreign and domestic banks. The findings reveal that the banks in Algeria could improve their technical efficiency by 23%. In addition, it seems that banks in Algeria suffer from the scale inefficiency. On the other hand, the foreign banks are more technically efficient than domestic banks. The superiority of foreign banks in technical efficiency is due to their superiority in the scale efficiency.

JEL classification: C14, G21, G28

Key words: Algeria, Data Envelopment Analysis, Efficiency, Domestic banks, Foreign banks

1. INTRODUCTION

The last two decades, the financial systems in numerous countries have witnessed radical changes. Thus, the financial industry has become more globalized, which fosters the competitions in this industry. In light of these changes, banking sectors in the developing countries, as the case of Algeria, have witnessed a series of reforms in order to enhance the banks' performance. For this purpose, the governments have endeavored to liberalize the banking sector by reducing the control and intervention of the state, remove the interest rate ceilings, reduce restrictions on the entry of foreign banks, and privatize the state-owned banks.

From an economic viewpoint, there is a strong relationship between the banks' performance and the economic development. Herring and Santomero (2000) suggested that the well

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functioning banking sector contributes to the economic development through its role in facilitating transactions, mobilizing savings and allocating funds for the economic agents across time and space. However, the majority of studies have focused on the resource mobilization, resource allocation and enhancing the economic development as the main functions of any banking sector.

The bank's performance analysis helps to understand the process of the banking production and determining the best and worst performers. However, in the literature, the researchers have used the efficiency as a performance indicator, because the efficiency is a simple and clear concept. Thus, the efficiency examines the banks' ability to maximize their outputs without additional inputs or minimizing their inputs without reducing their inputs. Moreover, most studies have focused on the efficiency concept instead effectiveness concept as a performance indicator because in practice the effectiveness evaluation is more difficult regarding lack of information and methods to determine the firm's objectives. It is worthy to note that an efficient firm is not necessarily effective firm, the efficiency is a necessary condition for effectiveness, but it is not a sufficient condition (Mouzas, 2006).

The efficiency analysis determines why and how improving the bank performance, either by controlling inputs by improving cost efficiency using better information technology and managerial practices, or by improving outputs by improving profit efficiency through marketing and pricing strategies. On the other hand, efficiency helps managers compare the performance of their banks with the competitors through the benchmarking analysis.

Many studies have tried evaluating the entry of the foreign banks by highlighting the effect of the foreign banks' existence on the banking sector performance and comparing the efficiency of the foreign and domestic banks. Therefore, some studies such as (Karas, Schoors, and Weill, 2010; Kobeissi and Sun, 2010; Krafta, Hoflerb, and Paynec, 2006) found a strong relationship between the bank ownership and efficiency; moreover, they suggested that the foreign banks outperform the domestic bank in terms of efficiency.

The banking sector in Algeria has witnessed many reforms over the last two decades in order to improve its performance. The reforms' purpose was liberating the banks' activities and opening the banking sector to the foreign investment. As a result, the number of the foreign banks operating in Algeria reached 13 banks in, 2013. The purpose of this study is examining the efficiency of the banks in Algeria after the reforms and making a comparison between the foreign and domestic banks in terms of efficiency during the period of 2000–2012.

2. REFORMS IN ALGERIA'S BANKING SYSTEM

The banking system in Algeria has passed through many stages since the independence 1962. After that, the Algerian government has planned to establish an Algerian banking system to finance the development programs with different aspects (economic, social..etc). For this end, new state-owned banks were created; in addition, the Algerian government has nationalized the foreign banks operating in Algeria since the colonial period. During the period of 1962–1985, the banking sector was completely controlled by the state. BenBitour (1998) suggested that the treasury of the state was the principal institution in the Algerian financial system; it managed the financial resources of the country, while the banks were just a channel that distributes these resources according to the government policies.

In 1986, the Algerian economy has witnessed a severe crisis caused by a drastic fall in the oil prices, which led to the contraction of the exportation revenue and curbed the economic growth. In light of this fact, it was necessary adopting a set of reforms that reformulate the Algerian economy and mainly the banking sector. Therefore, the Law on Money and Credit (LMC)[2] was

[2] Law of money and credit, N° 90-10, April 1990, The Official Journal.

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issued in 1990, in which it aimed to construct a modern banking system that it is able to meet the requirements of the market economy. The main objectives of this law were moving from the directed credit banks to market-determined credit banks and enhancing the modernization and competitions in the banking sector. Thus, the Algerian authorities have started withdrawing gradually the treasury for financing the state-owned enterprises and transferred this role to the banks. Moreover, the role of the central bank in financing the deficit of the treasury has been reduced by determining a specific ceiling in financing the deficit.

For the first time, the law allowed opening the banking sector to the private investment to increase the competition level in the banking sector and improving the banks' performance. For this purpose, the authorities have removed the entry constraints in order to encourage the foreign banks to operate in the Algerian markets. On the other hand, authorities have offered the privatization of some state-owned banks by selling them to the foreign investors. As a result, the first private bank (Baraka Bank) has been established in 1990, which is a joint venture between banks from Algeria and Saudi Arabia. After that, the entry of the foreign banks has intensified since 1997. Thus, several international banks have started operating in Algeria such as; B.N.P Paribas Bank, Société Générale, Natixis Bank, Arab Banking Corporation… etc... The process of opening the banking sector to the private and foreign investment has continued with an increased pace, where in 2001, the Algerian banking system is composed of more than twenty banks and financial institutions vary between public, private, and foreign. Unfortunately, no public bank has been privatized regarding the unserious offers and the effects of the international financial crisis, in addition to the heavy bureaucratic system of the evaluation procedures in Algeria. However, foreign banks as Société Générale, B.N.P Paribas, and H.S.B.C banks have chosen to enter the Algerian market by establishing new banks instead to buy Algerian banks.

As a result of the reforms, Algeria had six public commercial banks (state-owned) and thirteen foreign commercial banks in 2013. Hence, the public banks hold 86% of the total assets of the banking sector in Algeria with 1091 branches, while the foreign banks had only 304 branches (CBA, 2013). However; the largest part of the deposits is collected by the public banks, where in 2012 the public banks collected 87.1% of the total deposits. On the other hand, the public banks dominate the credit market in Algeria, where in 2012 87% of loans granted to the economy are provided by the public banks, and this is due to the dominance of the public banks on the exclusivity for financing the public enterprises. In addition, the volume of the non-performing loans at the public banks is very high, especially in 2007, which reached the maximum with 680 billion DZD. In contrary, the non-performing loans of the foreign banks remain low, where, it didn't exceed 30 billion DZD (CBA, 2013).

3. LITERATURE REVIEW

Several studies have addressed the subject of the efficiency comparison between domestic and foreign banks. The studies have been conducted in different countries and applied several methods. However, the studies didn't find decisive results; while many studies have confirmed the proposition of foreign banks are more efficient than domestic banks, others found that domestic banks (publics) outperformed the foreign banks. Recently, Kamarudina, Sufian, Loong, and Aina, (2017) have assessed the efficiency of 23 domestic Islamic banks and 6 foreign Islamic banks in selected Southeast Asian countries over the period of 2006–2014. Data Envelopment Analysis (DEA) was used to measure the efficiency and t-Test, Mann-Whitney [Wilcoxon], and Kruskal-Wallis to test the difference in efficiency between foreign and domestic banks. The results indicated that foreign Islamic banks displayed technical efficiency equals 0.71. In addition, domestic Islamic banks exhibited higher technical, pure and scale efficiencies than foreign banks in Malaysia, Indonesia, and Brunei.

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Wong and Deng, (2016) examined the efficiency of 39 banks in ASEAN countries during the period of 2000-2012. The study used DEA under the intermediation approach. The study found that the technical efficiency of the government banks is higher than the non-government banks. In terms of scale efficiency government and non-government banks behaved in a similar manner. In addition, government banks are higher than non-government banks in terms of cost and allocative efficiencies. Sufian and Habibullah (2012) have examined the technical, pure technical and scale efficiencies of the banking sector in Malaysia during the Asian financial crisis of 1997. The efficiency scores were estimated using DEA model, and it assumed that the bank is an intermediary between the savers and borrowers. The findings indicated that during the period of the study, the foreign banks have achieved high efficiency comparing to the domestic banks. Further analysis revealed that the scale inefficiency is the source of banks technical inefficiency rather than the pure technical inefficiency. The foreign banks tend to display high pure technical efficiency regarding their abilities to control their costs.

Karas, Schoors, and Weill, (2010) attempted comparing the efficiency of foreign and public banks in Russia in 2002 and 2006. The study used two stage DEA analysis, where in the first stage, the banks' efficiency scores were measured, and in the second stage, the mean of efficiency is regressed on a set of determinants (public ownership, foreign ownership, activity) using Tobit regression. The results indicated that foreign banks are more efficient than domestic private banks and domestic private banks are not more efficient than public banks. Cook, Hababou and Liang (2005) have examined the effect of the financial liberalization on the efficiency of the Tunisian banking system. The study was based on data from ten individual banks (five public and five private) from 1992 to 1997. The banks' efficiency has assessed using DEA model. The study findings indicated that the technical efficiency score varied between the different banks' types, where, public banks have achieved (45.5%), private banks (64.1%), foreign banks (59.1%) and local banks (43.9%). In addition, private banks have outperformed the public banks, in which the public banks display greater inefficiency in both interest and non-interest expenses compared to the private banks. They have suggested that the financial reforms led to improving the performance of banks with different effects on various banks categories. However, the reforms have failed in closing the efficiency gap between public, domestically owned private, foreign owned banks.

This study contributes to the literature by comparing the foreign banks and domestic banks in Algeria in term of technical efficiency, pure technical efficiency, and scale efficiency. Although there have been several studies that investigate the efficiency of foreign and domestic banks in the developed countries, the empirical studies on the comparison between the efficiency of foreign and domestic banks in the North Africa countries are relatively scarce especially in Algeria. Furthermore, examining the efficiency of foreign and domestic banks in the Algerian economy, which is in transition, is important due to the crucial role of the banking system in the market-driven economy. On the other hand, most studies those analyzed the performance of the Algerian banks focused on the domestic banks (State-Owned) due to the fact that the domestic banks dominate the Banking sector and the foreign banks are still in infancy stage because their entry in the Algerian market was in the Nineties. Therefore, the present study seeks to fill up these gaps through shedding light on the efficiency of the foreign and domestic banks.

4. METHODOLOGY

4.1. Efficiency Estimation

The Data Envelopment Analysis (DEA) is a non-parametric method for measuring the efficiency of each Decision Making Unit (DMU). The originality of DEA model is backed to (Charnes, Cooper, and Rhodes, 1978) which built a model on the efficiency's approach of (Farrel,

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1957). Farrel has attempted to develop methods for evaluating productivity for any productive organization. After that, he generalized his work to address the concept of efficiency.

DEA measures the efficiency of DMU based on its position relative to the frontier of the best DMUs performance, calculated mathematically by the ratio of the weighted sum of outputs to the weighted sum of inputs of DMUs (Thanassoulis, 2001).DEA is commonly used to evaluate the efficiency of a number of producers and each producer uses a set of inputs and produces a set of outputs. Hence, the main feature of DEA is its ability to measure the efficiency of firms with multiple inputs and outputs.

Liu, Lu, Lu and Lin (2013) have conducted a survey on DEA applications from 1978 to 2010. They found that there is a pattern of a technology-adoption process by researchers in DEA application, as they tend to adopt developed models. They revealed that DEA models have been applied mainly in banking and health care fields for the efficiency evaluation. Sherman and Gold (1985) are the first those applied the DEA in the banking field.

Charnes et al., (1978) presupposed the CCR model under the Constant Returns to Scale assumption (CRS). The CRS assumption considers that all DMUs operate at the optimal size and they are automatically scale efficient. Thus, if CRS is retained when all DMUs are not operating at optimal scale, Technical Efficiency (TE) score will be infected by scale inefficiency. The effect of the scale on efficiency score appears when a change in input levels leads to a non-equal proportionate change in output levels. Therefore, CRS assumption does not allow differentiating between the efficiency resulted from the operation's scale and the efficiency resulted from the management abilities. Thus, to overcome this shortcoming, CRS assumption should be relaxed by assessing efficiency under Variable Returns to Scale (VRS) as advocated by many studies (Afriat, 1972; Balk, 2001; Banker, Charnes, and Cooper, 1984; Fare, Grosskopf and Logan, 1983).

Banker et al. (1984) developed the BCC model that relaxed the CRS assumption by taking into account (VRS) situations. They assumed that there are N DMUs ($j = 1, 2, \ldots, N$) use m inputs to produce n outputs. DMUj use amount xij of input i to produce amount yrj of output r, where $xij \geq 0$, $yij \leq 0$, and each DMU has at least one positive input and one positive output value. The BCC is expressed as follows:

$$\theta^* = \min \theta$$

Subject to

$$\sum_{j=1}^{N} x_{ij}\lambda_j \leq \theta x_{io}, \qquad i = 1, 2, \ldots, m$$

$$\sum_{j=1}^{N} y_{rj}\lambda_j \geq y_{ro}, \qquad r = 1, 2, \ldots, n$$

$$\sum_{j=1}^{N} \lambda_j = 1$$

$$\lambda_j \geq 0, \qquad j = 1, 2, \ldots, N \tag{1}$$

Where θ is the efficiency score and λ is the weight of DMU_j. When the linear programming problem (1) is solved N times the efficiency score of each DMU is obtained. DMUs with $\theta < 1$ are inefficient units, while DMUs with $\theta = 1$ are efficient units (Farrell 1957).

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Banker et al. (1984) have differentiated between Pure Technical Efficiency (PTE) and Scale Efficiency (SE). PTE measures technical efficiency that is free from any scale efficiency. SE provides information about DMU's efficiency difference between the optimal size and the current size. SE allows determining the obtained gains from adjusting the scale size by operating at optimal size. In other words, SE expresses how close the DMU current size to the optimal size. Thus, SE is calculated indirectly by decomposing TE into two components; PTE and SE (Sufian and Abdul Majid, 2007).

4.2. Data and Sample

The Sample of the study includes 15 commercial banks operating in Algeria between 2000 and 2012. It consists of 10 foreign (all private) and 05 domestic (all public). The sample represents over 81% of the commercial banking assets in Algeria. The period of the study covers 12 years. In this period, the banking sector in Algeria has witnessed numerous changes among these changes the entry of the foreign banks. In addition, the most necessary data of the study are available in this period. The bank data were collected from the financial statements published by Bank-scope database. The dataset is unbalanced in the sense that the data are not all available during the period of the study.

4.3. Input and Outputs Selection

The selection of the banks' inputs and outputs depends on the definition of the bank and its activities, and the availability of data on the inputs and outputs. Following among others Aghimien, Kamarudin, Hamid, and Noordin (2016); Dell'Atti and Mazzarelli (2015); Johnes, Izzeldin and Pappas (2014); Yahya, Muhammad, and Abdul Hadi, (2012), this study adopts the intermediation approach. This approach considers the bank as a financial intermediary between depositors and borrowers that transforms deposits (inputs) to loans and other assets (outputs). Therefore, two inputs and three outputs are used. The inputs are (X_1) Total deposits and (X_2) Interest expenses. The outputs are (Y1) Total loans composed of loans to customers, loans and advances to banks, (Y2) Interest income, and (Y3) Non-interest income. Table (1) provides descriptive statistics of the banks' inputs and outputs during the period of the study.

Table 1
Descriptive Statistics of Inputs and Outputs (measured in millions of Algerian Dinar (DZD))

Type	Descriptive Statistics	X_1	X_2	Y1	Y2	Y3
Domestic Banks	Mean	617839.741	8232.878	497988.576	23259.643	6957.945
	S.D	531840.651	4669.116	488505.896	11669.202	7109.709
	Max	2198064.10	21902.70	2069932.80	52787.80	36202.10
	Min	84451.00	2673.00	37964.00	2874.00	244.90
Foreign Banks	Mean	31263.183	419.838	31740.358	2268.739	1511.010
	S.D	36801.167	553.610	35597.947	2480.974	1760.856
	Max	156429.14	2669.10	142602.28	9421.70	7499.49
	Min	453.20	0.01	214.50	0.01	0.01

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5. EMPIRICAL RESULTS

5.1. Efficiency Results

The banks' efficiency is measured based on the inputs-orientation following the studies of Ataullah and Le (2006); Johnes et al. (2014), Yahya et al. (2012). In effect, the input-orientation efficiency model reflects the behavior of the majority of banks because they endeavor to increase their efficiency by reducing the amount of inputs used in their process. On the other hand, the banks' efficiency is measured in each year in order to capture the change of the efficiency over the period of the study. DeYoung and Hasan (1998) suggested that estimating the efficiency by constructing an annual frontier to each year is more appropriate than estimating a single multi-year frontier for the study period.

Table 2
Technical Efficiency Scores

Year	Type	Number of Banks	Number of Efficient Banks	Mean of TE Scores
2000	Domestic Banks	5	0	0.64
	Foreign Banks	2	2	1
	All Banks	7	2	0.74
2001	Domestic Banks	5	2	0.86
	Foreign Banks	2	2	1
	All Banks	7	4	0.90
2002	Domestic Banks	5	0	0.74
	Foreign Banks	2	2	1
	All Banks	7	2	0.81
2003	Domestic Banks	4	0	0.67
	Foreign Banks	5	4	0.92
	All Banks	9	4	0.81
2004	Domestic Banks	5	0	0.72
	Foreign Banks	7	4	0.91
	All Banks	12	4	0.83
2005	Domestic Banks	5	0	0.65
	Foreign Banks	7	5	0.97
	All Banks	12	5	0.84
2006	Domestic Banks	5	0	0.56
	Foreign Banks	9	5	0.94
	All Banks	14	5	0.81

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Year	Type	Number of Banks	Number of Efficient Banks	Mean of TE Scores
2007	Domestic Banks	5	0	0.48
	Foreign Banks	9	2	0.73
	All Banks	14	2	0.64
2008	Domestic Banks	5	0	0.38
	Foreign Banks	10	3	0.73
	All Banks	15	3	0.61
2009	Domestic Banks	5	0	0.43
	Foreign Banks	9	4	0.89
	All Banks	14	4	0.72
2010	Domestic Banks	5	1	0.57
	Foreign Banks	10	3	0.80
	All Banks	15	4	0.72
2011	Domestic Banks	5	1	0.56
	Foreign Banks	10	4	0.76
	All Banks	15	5	0.69
2012	Domestic Banks	2	1	0.70
	Foreign Banks	8	4	0.84
	All Banks	10	5	0.81
All years	Domestic Banks	61	5	0.61
	Foreign Banks	90	44	0.88
	All Banks	151	49	0.77

Table (2) presents TE scores of the domestic and foreign banks. TE's mean of the banks as a whole ranges between 0.61 (2008) and 0.9 (2001) with an average equals 0.77 during the period of the study, suggesting that banks in Algeria have wasted 23% of their inputs when transforming them to outputs. This means that they could use only 77 % of total deposits and interest expenses to produce the same level of total loans, interest income, and non-interest income.

The comparison between the domestic and foreign banks reveals that the mean of TE of domestic banks ranges between 0.38 (2008) and 0.86 (2001) with an average equals 0.61. While TE mean of the foreign banks ranges between 0.73 (2008) and 1 (2000) with an average equals 0.88. Noteworthy is that among 151 bank's observations during the period of the study, foreign banks are technically efficient 44 times, while only 05 times domestic banks are technically efficient. Therefore, it is clear that the foreign banks are more technical efficiency than the domestic banks during all the period of the study.

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Table 3
Pure Technical Efficiency Scores

Year	Type	Number of Banks	Number of Efficient Banks	Mean of PTE Scores
2000	Domestic Banks	5	2	0.78
	Foreign Banks	2	2	1
	All Banks	7	4	0.84
2001	Domestic Banks	5	3	1
	Foreign Banks	2	2	0.88
	All Banks	7	5	0.91
2002	Domestic Banks	5	3	0.92
	Foreign Banks	2	2	1
	All Banks	7	5	0.94
2003	Domestic Banks	4	3	0.95
	Foreign Banks	5	4	0.95
	All Banks	9	7	0.95
2004	Domestic Banks	5	4	0.96
	Foreign Banks	7	5	0.94
	All Banks	12	9	0.95
2005	Domestic Banks	5	4	0.98
	Foreign Banks	7	6	0.99
	All Banks	12	10	0.98
2006	Domestic Banks	5	3	0.93
	Foreign Banks	9	6	0.97
	All Banks	14	9	0.96
2007	Domestic Banks	5	3	0.94
	Foreign Banks	9	5	0.88
	All Banks	14	8	0.9
2008	Domestic Banks	5	4	0.97
	Foreign Banks	10	8	0.97
	All Banks	15	12	0.97
2009	Domestic Banks	5	4	0.96
	Foreign Banks	9	9	1
	All Banks	14	13	0.98
2010	Domestic Banks	5	3	0.94
	Foreign Banks	10	9	0.99
	All Banks	15	12	0.97

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Year	Type	Number of Banks	Number of Efficient Banks	Mean of PTE Scores
2011	Domestic Banks	5	5	1
	Foreign Banks	10	8	0.97
	All Banks	15	13	0.98
2012	Domestic Banks	2	2	1
	Foreign Banks	8	7	0.99
	All Banks	10	9	0.99
All years	Domestic Banks	61	43	0.94
	Foreign Banks	90	73	0.97
	All Banks	151	116	0.94

In order to identify the source of the banks' inefficiency in Algeria, TE is decomposed into PTE and SE. Table (3) reports the banks' PTE scores. The overall Banks in Algeria have displayed a high level of PTE during the period of the study. Thus, PTE's mean has been on an increasing trend, starting from 0.84 (2000) to reach 0.99 (2012) with an exception in 2007. On average, PTE's average equals 0.94, meaning that the waste in the resources equals 6%. Foreign banks have exhibited 0.97 of PTE, on average, and they were pure technically efficient 73 times from 151 bank observations, while, domestic banks have displayed 0.94 of PTE, on average, and they were 43 times pure technically efficient. Therefore, foreign banks have realized high PTE compared to domestic banks, meaning that the foreign banks utilize their inputs more efficient than the domestic banks.

Table 4
Scale Efficiency Scores

Year	Type	Number of Banks	Number of Efficient Banks	Mean of SE Scores
2000	Domestic Banks	5	0	0.81
	Foreign Banks	2	2	1
	All Banks	7	2	0.87
2001	Domestic Banks	5	3	0.97
	Foreign Banks	2	2	1
	All Banks	7	5	0.98
2002	Domestic Banks	5	0	0.80
	Foreign Banks	2	2	1
	All Banks	7	2	0.86
2003	Domestic Banks	4	0	0.71
	Foreign Banks	5	4	0.97
	All Banks	9	4	0.86

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Year	Type	Number of Banks	Number of Efficient Banks	Mean of SE Scores
2004	Domestic Banks	5	0	0.76
	Foreign Banks	7	5	0.94
	All Banks	12	5	0.87
2005	Domestic Banks	5	0	0.66
	Foreign Banks	7	6	0.98
	All Banks	12	6	0.85
2006	Domestic Banks	5	0	0.61
	Foreign Banks	9	5	0.97
	All Banks	14	5	0.84
2007	Domestic Banks	5	0	0.51
	Foreign Banks	9	2	0.82
	All Banks	14	2	0.71
2008	Domestic Banks	5	0	0.39
	Foreign Banks	10	3	0.75
	All Banks	15	3	0.64
2009	Domestic Banks	5	0	0.45
	Foreign Banks	9	4	0.89
	All Banks	14	4	0.73
2010	Domestic Banks	5	1	0.6
	Foreign Banks	10	3	0.80
	All Banks	15	4	0.74
2011	Domestic Banks	5	1	0.56
	Foreign Banks	10	4	0.78
	All Banks	15	5	0.71
2012	Domestic Banks	2	1	0.70
	Foreign Banks	8	4	0.85
	All Banks	10	5	0.82
All years	Domestic Banks	61	6	0.65
	Foreign Banks	90	46	0.90
	All Banks	151	52	0.80

Table (4) presents SE scores, it reveals that SE of the banks in Algeria equals 0.8, on average, and it has been on a decreasing trend starting from 2002 (0.86) reaching 0.71 in 2011. Foreign banks displayed SE score equals 0.9, on average, it ranges between 0.75 (2008) and 1 (2000), while domestic banks displayed a low level of SE equals 0.65, and ranges between 0.39 (2008) and 0.97 (2001).

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The results indicate that the banks in Algeria suffer from scale inefficiency mainly the domestic banks. This implies that banks inefficiency in Algeria is mainly attributed to the scale inefficiency rather than the pure technical inefficiency. In effect, scale inefficiency reveals that banks fail to operate at the optimal size of operations.

5.2. Parametric and Non-parametric Tests

The study conducts a series of parametric and non-parametric tests for examining the difference in efficiency between foreign and domestic banks. These tests are used to test the significance of the following null hypotheses:

$H0_1$: There is no significant difference in the TE scores between domestic and foreign banks.
$H0_2$: There is no significant difference in the PTE scores between domestic and foreign banks.
$H0_3$: There is no significant difference in the SE scores between domestic and foreign banks.

Table 5
Results of Parametric and Non-Parametric Tests (Domestic Vs Foreign Banks)

		Parametric Test		Non-Parametric Test		
		t-Test		Mann-Whitney [Wilcoxon Rank-Sum] Test		Kolmogorov-Smirnov [K-S] Test
		Mean	T value	Mean Rank	Z value	K-S value
TE	Domestic Banks	0.611	-7.831	47.52	-6.713	2.968
	Foreign Banks	0.853	(0.000)	95.31	(0.000)	(0.000)
PTE	Domestic Banks	0.938	-2.118	70.19	-1.818	1.010
	Foreign Banks	0.972	(0.037)	79.94	(0.069)	(0.259)
SE	Domestic Banks	0.655	-7.366	48.98	-6.384	2.968
	Foreign Banks	0.875	(0.000)	94.32	(0.000)	(0.000)

Table (5) provides the tests' results. It is observed that for the TE null hypothesis is rejected at the 0.05 levels of significance for three tests (t-Test, Mann-Whitney and Kolmogorov-Smirnov). Therefore, it implies that foreign banks are relatively more technically efficient than domestic banks (0.85 > 0.61). Alternatively, the null hypothesis for PTE is not rejected under the Non-Parametric tests (Mann-Whitney and Kolmogorov-Smirnov) at the 0.05 level of significance, but this result is not confirmed by the parametric test (t-Test). Thus, it seems there is no significant difference between foreign and domestic banks, and the two types have relatively the same PTE. On the other hand, it is observed that foreign banks have exhibited a higher SE compared to domestic banks (0.87 > 0.65) and this is statistically significant at 0.05 level for the Parametric and Non-parametric tests. These findings consist with many studies' results such as (Hasan and Marton, 2003; Karas, Schoors, and Weill, 2010; Krafta, Hoflerb, and Paynec, 2006; Nikiel and Timothy, 2002). In the literature, foreign banks in the developing countries are generally more efficient than domestic banks contrary to the developed countries the foreign banks are less efficient.

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The results indicate that the fundamental problem of domestic banks (all public) in Algeria is the scale efficiency. This problem may be explained by the fact that the banking reforms have necessitated the public banks increase their operation's size by opening more branches in order to cover all the territory of the country and increase the bancarisation rate, which may make the domestic banks operate at inappropriate scale. Furthermore, Burki and Niazi (2006) revealed that after the reforms' period and as a consequence of competition, the public banks will respond to the excess demand of financial services by producing more than their optimal scale. On the other hand, the superiority of foreign banks in terms of efficiency may be due to their advanced technologies, better corporate governance and good management practices.

6. CONCLUSION

The banking system in Algeria was exposed to several reforms in order to accompany the economic reforms. The main objectives of these reforms were liberalizing the banks' activities and allowing the entry of foreign banks to increase the competition and develop the banking sector in Algeria. This study attempts evaluating the efficiency of banks in Algeria and comparing the efficiency of foreign and domestic banks (all public) over the period of 2000–2012. The study used input-oriented DEA model to estimate three types of efficiency; technical, pure technical and scale efficiencies. Moreover, a set of parametric and non-parametric tests are conducted to examine the difference in TE, PTE, and SE between foreign and domestic banks.

The results show that banks in Algeria have realized TE score equals 0.77 on average during the period of the study implying that they could improve their TE by 23%. Over the same period, domestic banks have exhibited 0.61 on average of TE, and foreign banks have exhibited 0.88 on average of TE. The decomposition of TE into PTE and SE revealed that banks in Algeria have realized an increasing trend of PTE with an average equals 0.94. On the other hands, SE has been on a decreasing trend from 0.97 (2001) to 0.71 (2011). It is clear that the fundamental problem of banks' efficiency in Algeria is the scale inefficiency meaning that the banks in Algeria have operated at the non-optimal size.

The comparison of efficiency between foreign and domestic banks reveals that foreign banks are more technically efficient than domestic banks. The superiority of foreign banks in TE can be explained by their superiority in SE, where they have realized higher SE compared to domestic banks. Concerning PTE the two types have displayed relatively the same level. Therefore, in order to improve SE which consequently improves TE of domestic banks, they should be liberalized from the dominance of the government and choose their credit policies respecting the banks' profitability and performance. In addition, they should reduce the level of the non-performing loans mainly those allocated to the state-owned companies. Moreover, domestic banks should benefit from the existence of the foreign banks through acquiring advanced IT technologies and adopting new management practices.

For future research, this study could be extended by making a comparison on efficiency between foreign and domestic banks across many countries (region) such as Maghreb, North Africa, and the Middle East. Moreover, make a comparison between foreign and domestic banks in terms of other types of efficiency such as profit, revenue and allocative efficiencies. Furthermore, evaluate the impact of foreign banks' entry on the banks' efficiency in Algeria by comparing the banks' efficiency in the pre-entry period with the post-entry period.

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