Tax revenue effort and aid in fragile states: The case of Comoros

Jose L. Diaz-Sanchez, Abrams Tagem and Joana Mota[1]

This draft: 08th September 2020

Please do not circulate or cite. Comments welcome.

Abstract

This article assesses the impact of aid on tax revenue effort in the context of a fragile state, using the case of Comoros. We estimate a fiscal response model (FRM) within a Cointegrated Vector Autoregressive (CVAR) framework with annual data for Comoros' post-independence period (1984-2017). The data suggest that grants and tax revenue in Comoros had a negative relationship in the long-run that remained stable throughout the post-independence period. Three factors could explain our results. First, grants are a politically less costly source of finance, reducing the urgency of Comoros fiscal planners to expend political and administrative effort on tax collection. Second, budget support grants are considerably lower than project grants in Comoros, with the latter usually spent on projects that donors are supporting (not necessarily on projects aiming on raising tax revenues). And third, large one-off budget support grants received by Comoros from bilateral partners generate significant volatility on revenues, impacting budget credibility and short to medium term fiscal planning, and more critically, often stopping tax reform plans. Being aware of this negative effect is an important step to ensure that the government's tax revenue effort do not slowdown following large one-off budgetary support. In addition, switching progressively to conditional loans and engaging more resources for capacity building tax revenue projects and technical assistance could increase the effectiveness of donor's interventions.

1.   Introduction

The fiscal impact of aid has become one of the most critical issues related to aid effectiveness. A sizable portion of aid flows goes through governments' budgets, directly influencing fiscal aggregates such as tax revenue and public expenditure. Hence, any macroeconomic impact of aid is linked to the behaviour of the public sector, in particular, how decisions on taxation and expenditure are affected by aid flows (Morissey, 2015a). Aid can decrease the country's tax effort if it is viewed by recipients as a politically cheaper source of revenue. Conversely, aid can raise tax revenues if it strengthens revenue administration or supports tax policy reform. This paper looks at the fiscal impact of aid in the context of a fragile state, focusing on Comoros.

The response of fiscal policy to the presence of aid is particularly relevant in the context of fragile states (FS hereafter), as these countries are, on average, more dependent on external financial flows. Additionally, the FS have the highest share of their aid flows in the form of grants (OECD, 2014), which may create additional challenges for fiscal policy. FS also face structural challenges in expanding and sustaining tax revenue as a percentage of GDP, and their tax administration structures are generally weaker.[2] Public revenue in FS is also more vulnerable to exogenous and endogenous shocks, a result of their dependence on undiversified tax revenue sources, as well as their excessive reliance on a few commodity exports. The destruction of infrastructure, the disruption of the administrative and bureaucratic capacity, and the slowdown of economic activity following long periods of political instability all play a role in narrowing the tax revenue base and weakening fiscal discipline. Long periods of political unrest – in the sense of continuity of regime and institutions – also hinder fiscal reform processes and may interrupt technical assistance projects by development partners. Furthermore, it is possible that the political costs of raising taxes are relatively higher in the context of fragile states. In the presence of a significant amount of grants (which do not require repayment), along with weak administrations and low accountability to domestic taxpayers, revenue collection incentives are small.

The current coronavirus pandemic has shone spotlight on the precarity of public finances in fragile states, increasing the importance of the revenue mobilization agenda. This is in a context of dwindling foreign assistance from major bilateral and multilateral donors, their disbursement abilities constrained by the pandemic. Comoros is a suitable case for studying the role of fragility in the dynamics of aid and tax revenues. Tax revenue mobilization in Comoros was extremely weak during the period of higher political instability (1974-2001) - at an average of 6.5% of GDP - and it has increased only slightly to 8.3% of GDP (IMF, 2018b) ever since. Like most fragile states, Comoros's revenues from taxes are undiversified, relying mostly on taxes from trade (about two thirds of total tax revenues). A low level of economic activity, weak administration, different regimes of tax exemptions and a large informal sector all weaken revenue performance. Comoros is also heavily dependent on development assistance, receiving the greatest part of its ODA in the form of grants, which constitutes on average 5.4% of GDP (roughly equivalent to the whole wage bill) and 35% of total revenues since 2001. Comoros' dependence on grants, along with its weak revenue-generating capabilities, is inherently linked to its fragility status. The country has experienced a long period of political instability (mostly

---

[2] The average tax revenue-to-GDP ratio was on average 15 percent during 2005–2014 compared to 19 percent in non-FS (IMF, 2017).

during its post-independence years from 1974 to 2001) and remains vulnerable to inter-island conflict. Furthermore, the relationship with donors has not been smooth and uninterrupted (see section 2).

The cross-country literature on the impact of aid on tax revenue is tenuous, with no consensus view on the direction of effects. The aid-tax revenue relationship at the country level appears, however, to be of more policy significance (Morrisey, 2015a). Thus, a study focusing on a fragile country such as Comoros can shed light on the unique -aid-tax relationship in fragile economies. In this article we estimate a fiscal response model (FRM) within a cointegrated vector autoregressive (CVAR) framework to analyse the long-term impact of aid flows on tax revenue mobilization in Comoros. Fiscal Response Models (FRMs) draw on the seminal work of Heller (1975) and are used to model the dynamic impact of foreign aid on domestic fiscal policy. A number of authors have applied the CVAR for country-specific studies: Osei, Morissey, and Lloyd (2005) use a CVAR for Ghana; Mascagni and Timmis (2017) for Ethiopia; Bwire, Lloyd and Morrissey (2017) for Uganda. While these countries differ in their fiscal and political economy context, the overall results point to a positive association between aid and tax: a result of which may emanate from donor conditionality on fiscal management (including concessional loans), technical assistance and revenue reform. These have led to improved fiscal performance, including higher domestic revenue mobilization in the country studies. Furthermore, aid conditionality appears to have been important in supporting both the decision to reform and the nature of tax reforms. There is also some evidence at the cross-country level on this positive relationship. Crivelli and Gupta (2016) find that conditionality in IMF-programs had a positive impact on tax revenue, in particular, for low-income countries with below-average revenue ratios.

This paper contributes to country-specific FRM literature by adding empirical evidence on the tax revenue effect of aid in the context of a fragile state. To this end, we rely on annual data from the IMF's Government Finance Statistics (GFS) database for Comoros covering most of Comoros' post-independence period (1984-2017). Contrary to the above-cited literature, we focus on grants, excluding loans and other aid allocations from our analysis because a substantial share of aid flows to Comoros (and fragile states in general) is in the form of grants. More importantly, we are interested in seeing how Comoros relates to the existing literature which tends to find that grants reduce tax effort (Gupta 2004; Moss et al., 2008; and Benedek et al., 2012; among others).[3] The tax revenue and grant relationship is a more unambiguous result when compared to studies using overall aid, which stems from the stronger reform disincentives associated with the lack of obligations of repayment of grants.

We find that grants and tax revenue in Comoros appear to have a negative relationship in the long-run. We argue that this negative relationship in Comoros is explained by three factors. First, grants are a politically less costly source of finance, reducing the urgency of Comorian fiscal planners to expend political and administrative effort on tax collection. Second, budget support grants are considerably lower than project grants in Comoros, with the latter usually spent on projects that donors are supporting (not necessarily on projects aiming on raising tax revenues). And third, large one-off budget support grants received by Comoros from bilateral partners generate significant volatility on revenues, impacting budget credibility and short to medium term fiscal planning, and more critically, often stopping tax reform plans.

---

[3] This negative effect has been challenged by a few studies using more recent data (Clist and Morrissey, 2011; Morrissey et al., 2014; Carter, 2013). Clist and Morrissey (2011) show that introducing long lags for the aid term makes the negative association between aid and tax disappear.

Section 2 provides a historical overview of Comoros's tax revenue mobilization and aid flows. Section 3 introduces the conceptual context of fragile states, discusses the political costs of taxation and FRMs. section 4 summarizes the data while section 5 explains the methodology. Section 6 discusses the estimation results. Section 7 presents the concluding remarks.

2. Historical relationship between tax revenues and aid in Comoros

The analysis of aid trends and fiscal policy processes in Comoros is inherently linked to the country's political developments. The tight budgetary envelope and the inter-island disputes over the control of public finances are at the heart of Comoros' political tension, while the reliance on external aid is a challenge for the pursuit of structural reforms. In light of Comoros' political developments over the past 45 years, we distinguish four periods of the country's aid and domestic revenue trajectories. The first period starts after Comoros gained independence from France in 1975 and continues until the adoption of the new constitution in 2001. This time frame is characterized by high political instability, low revenue mobilization, and a fast build-up of foreign debt. During the first 25 years of independence, grants were significantly above revenue from taxes, only decreasing towards the end of the 1990s. In the second period, from 2002 to 2007, Comoros engaged in a lengthy process of political and fiscal decentralization. External grants reached a minimum low, and authorities were pressured to increase domestic revenues. Since 2008 and up to the end of our sample period, the economy benefited from a more stable political environment. Political stability set the ground for the uptake of international aid, while revenue mobilization remained weak. The final period puts the government's burgeoning progress to the test, with two significant shocks (cyclone Kenneth in 2019 and the current coronavirus pandemic) halting the country's progress and exacerbating its tenuous fiscal position.

### 2.1 Political Instability: 1975-2001

During the first two decades of independence, public finances were permanently under pressure due to a narrow revenue base - exacerbated by extensive tax exemptions and evasion - and to a steady expansion of current expenditures. In this period, Comoros turned to France and other donors, including those in the Gulf region, for financial aid. From 1984 up until the secessionist crisis in 1994, grants represented 10.2% of GDP on average, 3.7 percentage points (p.p) higher than tax revenues (see Figure 1). In addition to grants, Comoros also turned to concessional and non-concessional borrowing to finance its oversized civil service and capital-intensive projects which soon resulted in a large and rising external debt. Over this time frame, France prevailed as Comoros's key bilateral donor and its leading supplier of budgetary grants: the latter representing the bulk of Comoros's external aid, while concessional financing was relatively low.

Tax revenue mobilization fluctuated wildly and remained at a low level throughout the period, averaging 6% of GDP. Recurrent spending consisted mostly of salaries for the huge civil service, a group from whom formal sector (income) taxes were collected but were pale in comparison with trade taxes. Additionally, private sector employment was considerably small and the tax base was stagnant. Thus, the overall poor performance in mobilizing revenues reflected weaknesses in tax administration, particularly for taxes on international trade, which generally accounted for two-thirds of Comoros's domestic revenues. Tax exemptions and the accumulation of tax arrears incurred by public companies were also a recurring issue. Following the advice of multilateral partners, the Comorian authorities began to adopt tax reforms in the early 1990s, but the overall outcome fell short of expectations. With

budgetary grants still relatively high, Comoros's efforts in raising domestic revenues remained insufficient, characterized by long delays and important slippages in the implementation of reforms.

The poor track record of the government's commitment to implement projects and reforms along with the persistent accumulation of foreign external payment arrears led to the collapse of aid inflows in the mid-1990s. The decline of international support was further exacerbated by the concurrent escalation of interisland conflict. Grants decreased to 4.2% of GDP during 1995-2001, about 6 p.p below the pre-conflict average. Despite tax raises and measures to strengthen tax administration, domestic revenues also started a downward trend, partly due to the difficulty to track tax revenues collected in Anjouan and Mohéli. As a result, tax revenues decreased from an average of 7.5% of GDP during the pre-conflict period to 5.2% of GDP in 2000.

Figure 1. Historical evolution of grants and tax revenue in Comoros (% GDP)
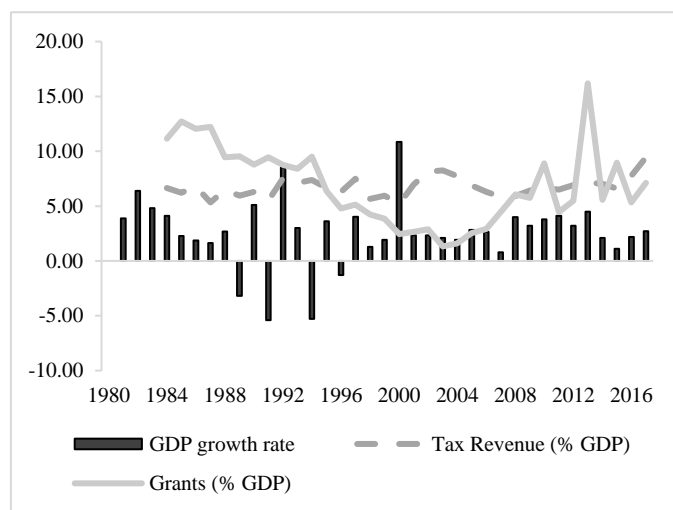
Source: IMF's GFS database

2.2   *Transition: 2002-2007*

Right after the new constitution was adopted, Comoros welcomed the reestablishment of multilateral technical assistance but budgetary grants remained low. In 2001, the government requested the IMF to monitor its economic and financial program. Despite continued assistance through technical assistance programs, the progress on the implementation of structural reforms was slow and hampered by political tension and civil strife. Grants continued in a downward trend (reaching a minimum low of 1.3% of GDP in 2003) and only recovering by 2007.

After a significant rise of tax revenues in the early 2000s to 8.2% of GDP – possibly reflecting the lift of the trade embargo and higher domestic demand in Anjouan – revenues fell back again to its historically low level.   Tax revenue collection was also affected by several episodes of non-implementation of the revenue-sharing agreement. This was the case during the run-up to the 2006 elections, with revenues falling 17% short of the ongoing IMF monitoring program's target. Furthermore, while the authorities pointed to their efforts to reduce tariffs and liberalize trade gradually, little progress was achieved in decreasing Comoros' high dependence on import taxes. With

limited external financing available and a high wage bill, the government introduced a number of customs duties and surtaxes on imports to counterweight limited revenue resources.

2.3 Reconciliation: 2008-2019

From 2008 onwards, Comoros started to finally benefit from a smoother political environment and consequently international support gained momentum. Development partners re-engaged their activities in Comoros through both projects and budget support. Budget support from multilateral partners (in particular) were conditional on the satisfactory performance on fiscal management and domestic revenue targets, which guaranteed the continuation of structural reforms. Comoros also benefited from a revenue mobilization capacity building project that included training and technical support. Furthermore, the progress in consolidating macroeconomic stability enabled Comoros to complete the HIPC Initiative and benefit from extensive irrevocable debt relief in 2013 (although a large share of this was a rescheduling of debt payments).

During the same period, there was also a surge of donor interest from the Gulf region. Over $90 million (or 7.5% of GDP) in one-off budget grants were disbursed up to 2017, earmarked primarily for the repayment of domestic arrears and civil service wage arrears. Saudi Arabia, in particular, has provided over $60 million in one-off budget grants to pay government salaries and finance other expenses. This includes a budget grant in December 2015 of $45 million equivalent to about 80% of the wage bill for that year. Furthermore, from 2010 to 2012, the government more than doubled revenues from non-tax sources thanks to the "economic citizenship program", which involved the sale of Comorian citizenship and passports mostly to Saudi Arabia and Kuwait.

With increased support from bilateral donors, the commitment to programs and projects with development partners has been mixed. In 2015, the government sought to obtain a disbursement under the IMF's Rapid Credit Facility (RCF). However, this was later withdrawn following a large Saudi budget grant. A six-month SMP was also signed in November 2016, but neither of the reviews could be completed. The government later suspended the program unilaterally.

Even though the authorities implemented a number of tax reforms in recent years, tax revenue collection continued to lag expectations and remained at its historically low level for most of the third period. Only since 2016 have tax reforms started to bear fruit with tax revenues reaching 7.8% of GDP. Nonetheless, Comoros's fiscal vulnerabilities remained. Weak revenue administration, coupled with a low level of formal economic activity continued to restrict the revenue base and contributed to the persistent weak domestic revenue performance. Despite continued technical support from multilateral donors, Comoros has not yet been able to raise tax revenues sufficiently to be less dependent on external grants for fiscal equilibrium.

2.4 Relapse: 2019-present

The vulnerability of the Comorian public revenue system was exposed by two significant shocks, one internal and the other one exogenous.

3. Conceptual Context: Fragile States and the Political Costs of Taxation

3.1 Characteristics of Comorian Fragility

Comoros is a peculiar case for considering the role of fragility in permeating the impact of aid on revenue mobilization. First, episodic conflicts in Comoros are largely small-scale and sub-national, stemming from the strained relationship that exists between the three islands and the national government. The causes of Comorian conflict are consistent with the literature on sub-national conflict (World Bank, 2016; Parks, Colletta and Oppenheim, 2013) including: (i) perceptions of state illegitimacy and/or unwillingness to address socioeconomic issues. For example, deprivation, inequality, non-monetary poverty and uneven provision of services across islands exist (World Bank, 2019), and that could drive political instability. (ii) regional, ideological and ethnic-related conflict, including various secession attempts from some islands (such as from Anjouan and Mohéli in 1997, and Anjouan in 2007). (iii) eroded government legitimacy (endemic corruption, impunity of state personnel). Such actions meant that the union government could not always collect the optimal level of tax revenue since some indignant islands did not fully report tax revenue collected.

Second, the country experiences acute revenue-raising challenges which are exacerbated by their weak tax administration (IMF, 2016a, 2018a) and large one-off revenues. IMF (2018b) compares Comoros to other small states[4], with the average tax/GDP ratio and revenue structure composition in the former lower than the average tax/GDP ratio of all other small states except Timor-Leste. While external factors (e.g. commodity price shocks) usually strongly influence tax revenue mobilization and exacerbate tax volatility in other developing countries, such factors are relatively small in Comoros. Tax revenue performance and volatility in Comoros stems from their dependence on one-off sources of income: for example in recent years, the already mentioned one-off large budget support grants mostly coming from Saudi Arabia in 2015 and 2017, the HIPC debt relief in 2013; and revenues obtained from the sale of the telecommunications licence in 2015. Reliance on these one-off flows erodes budget credibility as they are too unpredictable to be used for budgetary planning (i.e. implementing reforms that should help boost revenue performance) and/or result in fiscal vulnerability in the recipient country. Alternatively, dependence on one-off unstable flows may underpin ambitious reforms to strengthen revenue mobilization and support transitions from aid dependence to tax reliance.

3.2 Evaluating the Political Costs of Taxation

In addition to the usual factors explaining the poor revenue performance in developing countries, for instance, the narrow tax bases and lack of diversification; weak revenue administrations (Mascagni et al. 2014; Prichard et al. 2012), political factors also play a role. Developing countries may be taxing as much as is economically and politically feasible, which may not be enough to generate economic gains. The political economy literature argues that increasing taxes is unpopular and agents do not like paying taxes (especially in developing countries where agents do not get good public service in return) so much administrative and political effort is expended on tax collection. Such interactions between agents paying taxes (household and firms) and those in charge of collection (the government) point to political costs of tax collection. These political costs are assessed according to accountability, autonomy and bureaucratic costs of taxation.

---

[4] It is important to point out that these comparator countries are fundamentally different in terms of the level of economic development, economic structure, political development and resilience to economic shocks.

The costs of accountability refer to whom and the extent to which a government must account for its uses of revenue, and the costs are likely to be higher for aid than taxes (Morrissey, 2015a). Donor agencies have to account to their governments on how their aid is used so they implement strong monitoring mechanisms to minimize fungibility. They also attach conditions; and recipients have to expend effort in trying to circumvent the conditions. The costs of autonomy are reflected in a country's (in)ability to make independent policy choices since aid-dependent governments cede some policy influence to donors, and lose leverage in negotiating on policy conditionality (Morrissey and Torrance, 2015). In addition, there are bureaucratic costs of tax and aid. The former relates to the costs of tax administration while the latter, which is a function of the number of donors, refers to the costs of organising, and attending meetings with different donor agencies. The bureaucratic costs of aid are still high, and this is exacerbated by donor proliferation, disbursement heterogeneity, and the changing requirements on monitoring aid.[5]

3.3   *Fiscal Response*

Interest in modelling the dynamic impact of foreign aid on domestic fiscal policy has gained prominence in the development literature. These studies are referred to as Fiscal Response Models (FRMs) and they draw heavily on the seminal work of Heller (1975). The underlying intuition for estimating fiscal response models is public sector decision makers maximising utility given budget and, time constraints. The decision-makers are assumed to be rational and possess homothetic preferences but there is dissension on the precise form the utility function should take (Lloyd *et al.,* 2009). Consequently, FRMs adopt a perfectly symmetric loss function in which overshooting and undershooting targets result in equal losses in utility. This is unrealistic given the nature of expenditure and revenue targets implies that undershooting revenue targets (especially in social sector spending) may be more detrimental than overshooting it (Gang and Khan, 1999).[6]

The FRMs, though important in charting a path for the eventual cross-country and country-specific research on the fiscal effects of aid are fraught with limitations relating to data; the nature of the recipient government's utility function (Feeny, 2006; Feeny and McGillivray, 2010); theory and empirical estimation of revenue and expenditure targets (Feeny and McGillivray, 2010; Franco-Rodriguez *et al.,* 1998); econometric techniques yielding inconsistent results (McGillivray and Morrissey, 2004), and the inherently static nature of FRMs (Lloyd *et al.,* 2009; Morrissey, 2015a).

The primary econometric innovation in estimating FRMs has been the adoption of the Cointegrated Vector Autoregressive (CVAR) approach, which has more advantages than the three-stage least squares (3SLS) adopted in older FRMs. The CVAR adequately captures the Data Generating Process (DGP): that is, it easily encapsulates the budget process and how aid permeates into the process. The benefits of the CVAR and how it relates to pristine FRMs are two-fold. First, the method allows for dynamic interactions across variables over time, allowing for a distinction between long-run

---

[5] Knack and Rahman (2007) discuss the short-term and long-term costs of donor fragmentation: the former relating to unnecessary waste of resources and duplication of country analytic work (such public expenditure reviews and poverty assessment reports), resulting in high transaction costs. The longer-term costs undermine the quality of governance in already weak administrations characterising developing countries; for example, the use of expatriates instead building domestic capacity through 'learning by doing', and funding investment projects with high recurrent costs in future years.

[6] Feeny (2006) proposes a utility function that allows for asymmetries and shows that incorporating those asymmetries has no major econometric implications given that the reduced form and structural equations are similar to those derived from perfect symmetry.

(equilibrium) and short-run (adjustment to equilibrium) dynamics between foreign aid and domestic fiscal aggregates; a re-parameterization coined the Vector Error Correction Mechanism (VECM). Instead of specifying individual equations which depict structural relationships between variables, all equations (long-run and short-run) are encompassed in one common framework.

Second, the CVAR does not impose exogeneity of aid and it treats all other fiscal variables as potentially endogenous, with each variable explained by its own lags and lags of other variables. Additionally, the error correction term and the long-run coefficients are important in determining the exogeneity status of aid and other fiscal variables. Another particularly important feature of the CVAR is that it is an atheoretical approach, but economic theory is often invoked to choose the variables to include in the analysis, select the appropriate normalization and interpret the results (Osei *et al.,* 2005). Discussions and surveys of the literature on the country-specific fiscal effects of aid using the CVAR methodology include Osei, Morrissey and Lloyd (2005) for Ghana; Morrissey, M'Amanja and Lloyd (2007) for Kenya; Martins (2010) and Mascagni and Timmis (2017) for Ethiopia; Bwire, Lloyd and Morrissey (2017) for Uganda.

Below we provide a conceptual framework for the dynamics between foreign aid, taxes, spending and borrowing; based on a government budget identity[7] which could form the basis for testing hypotheses.

In the underlying budget identity all revenues and borrowing must equal all expenditures:

Domestic Revenue + Aid + Borrowing = Expenditures (1)

Where revenue includes tax and non-tax revenues, borrowing includes domestic and foreign borrowing (excluding concessional loans from bilateral and multilateral donors), aid includes grants and concessional loans while expenditures consist of government capital and recurrent expenditures. Equation (1) is based on the underlying accounting identity, which is not predictive of the effects aid might have on domestic fiscal variables. Aid is posited to affect domestic fiscal variables in a manner that can only be determined empirically (Lloyd *et al.,* 2009).

First, aid can influence tax revenue: a negative relationship plausible when aid (especially grants), viewed by recipient countries as a politically cheaper source of revenue crowds out domestic taxation; and a positive relationship plausible when aid strengthens revenue administration or supports tax policy reform through technical assistance, projects, and budget support. Recent cross-country and country-specific research on the impact of aid on taxation provides insights to show how donors can support increasing tax revenue rather than allowing aid to substitute for domestic effort (Tagem, 2017; Clist and Morrissey, 2011; Clist, 2016; Mascagni and Timmis, 2017; Bwire *et al.,* 2017). This is through behavioural effects, gauged by the political costs of aid and tax which offset each other (Morrissey and Torrance, 2015; Morrissey, 2015; Tagem, 2017); the positive impact of transfers of ideas and practices through technical assistance and projects for capacity building (Tagem, 2017; Goldsmith, 2001); and the stability of donor-recipient relations which manifests itself in the stability of foreign aid flows (Tagem, 2017)[8].

---

[7] This is because the fiscal effects of aid estimated from equation (1) can move in different directions as discussed above; with each possible fiscal effect discussed in great detail in different strands of the public finance literature.

[8] Aid commitments are known in advance since donors publicise their aid budgets. When actual disbursements differ from commitments, as is usually the case, it may be a result of macroeconomic uncertainty (such as the consequences of the

Second, aid should have a direct financing impact on the level and composition of government spending (Morrissey, 2015). Aid can also have an indirect impact on spending through donors' policy conditions. Third, due to acute data limitations in the literature domestic borrowing is usually treated as a residual and used for short-term adjustment. This is true for countries with little domestic borrowing (such as Comoros) and other fragile countries. Nonetheless, aid is also expected to influence domestic borrowing. Aid can reduces borrowing when donor conditionality (typically IMF and World Bank) is fully applied (Osei *et al.,* 2005; McGillivray and Morrissey, 2004); by increasing the capacity to service debt thus increasing borrowing (Ouattara, 2006); and by being substituted for borrowing in situations whereby dips in aid result in increased borrowing as governments seek alternative sources of finance for statutory expenditures.

4.   Data

We rely on annual data from the IMF's Government Finance Statistics (GFS) database covering the period 1984 – 2017. The advantages of using national data to estimate the fiscal effects of aid are well documented (see *inter alia* Mascagni and Timmis, 2017; Dom and Roger, 2020), including: national data being the data used for government decision-making; the absence of conversions to meet international standards; and the national data represents what actually flows through the government's accounts. Nonetheless, given the paucity of quality fiscal data in most fragile or conflict-afflicted states we make recourse to international data. The data include grants, government spending (including capital and recurrent spending) and tax revenue. Non-tax revenue is excluded due to its windfall nature: i.e. they represent unsustainable one-off revenues such as from the Economic Citizenship program (which culminated in substantial non-tax revenues in 2013) and the sale of the telecommunications license in 2015 (IMF, 2018b).

Focus is on grants, instead of loans or total aid because grants constitute the bulk of international aid flows to Comoros. Due to the country's historical fragility and level of development, non-concessional loans have not been a suitable financing option (and in most cases, an unavailable option) while concessional loans have not been disbursed with any regularity. Total aid is expansive and has many constituent parts (grants, loans, technical assistance and capital subscriptions) which may or may not have an impact on domestic revenue mobilization. Aid for DRM is available from the OECD Creditor Reporting System (CRS) database but that has only been available for the recent past making it unsuitable for the kind of time series analysis we aim to pursue; and in the case of Comoros such data is simply unavailable. Grants are the best proxy for aid which flows through recipient's budgets and are expected to elicit a behavioural fiscal response.

It is also noteworthy that we exclude all forms of domestic borrowing from the analysis, and also exclude no-tax revenue (except in considering the exploratory analysis in section 6.4). We omit domestic borrowing, so we do not end up estimating a budget identity. Furthermore, there is no data on domestic borrowing for the Comoros and given their level of development and fragility, fiscal planners do not have access to domestic capital markets so domestic borrowing is fairly negligible (although it has been slowly increasing in recent years).

2008 financial crisis); fractious and tenuous relationships between donors and recipients (such as between Comoros and Iran); and instability resulting from pressures in the donor countries and organisations.

5. Methodology

5.1 The Cointegrated VAR (CVAR) model

We estimate an FRM within a cointegrated vector autoregressive (CVAR) framework. The CVAR postulates that there is a relationship between fiscal variables in the system and it lets the data reveal the kind of relationship. The econometric notions of long-run and short-run effects are intuitive when considering the impact of grants on domestic fiscal variables. Grants can either play a long-term financing and budgetary role or merely relax the budget constraint (short-term impact). This economic distinction relates to the econometric notions of stationarity: when grants are nonstationary and at most integrated of order 1, it would imply recipients directly incorporate the level of grants into their budget (plausible given that aid commitments are known some time in advance) and grants form part of the long-run cointegrating relationship (Bwire *et al.,* 2017; Lloyd *et al.,* 2009). Alternatively, if grants are stationary then their impact on other fiscal variables is limited to the short-run, relaxing the budget constraint (probably by substituting for borrowing in concessional markets or from private, non-concessional markets). Furthermore, the exogeneity or endogeneity of grants affects its fiscal impact on the other domestic variables.

Consider an unrestricted 3-dimensional VAR (p) model, of lag length p:

$$Z_t = \varphi_1 Z_{t-1} + \varphi_2 Z_{t-2} + \cdots + \varphi_p Z_{t-p} + \theta W_t + \varepsilon_t \tag{2}$$

Where Z_t is a (n x 1) vector of jointly determined nonstationary variables, W_t is a (q x 1) vector of q deterministic variables (the constant term, linear trend, dummies and other regressors which are considered fixed and non-stochastic), φ_i (i=1, 2,…p) and θ are (n x n) and (n x q) matrices of coefficients to be estimated using a (t=1, 2,…T) sample of data. ε_t is a (n x 1) vector of Gaussian errors which are identically and independently distributed. Provided the variables are integrated of order one (I(1)) and cointegrated, equation (2) also has an unrestricted error correction term in equilibrium, observationally equivalent to the VAR in equation 2 but easing estimation and hypothesis testing as all terms become stationary. The re-parameterization is given by:

$$\Delta Z_t = \alpha \beta' Z_{t-1} + \sum_{i=1}^{p-1} \Omega_i \Delta Z_{t-i} + \theta W_t + \varepsilon_t \tag{3}$$

Where ε_t are independent and identical error terms and ($\alpha, \beta, \Omega_1, \dots, \Omega_{p-1}, \theta$) are freely varying parameters. The ECM above is designed to differentiate between $n - r$ pushing factors: i.e. influences that move equilibria, causing stochastic trends and r pulling factors: influences that correct deviations from equilibrium, giving rise to long-run relations (Juselius, Mϕller and Tarp, 2014; Hoover *et al.,* 2008). Interest in this study is on the pulling factors.

Interpretation of the coefficients of the re-parameterization is critical: the levels effect is summarized in the matrix $\alpha \beta'$ while short-term dynamics are summarised in $\Omega_1, \dots, \Omega_{k-1}$. The columns of β' represent the cointegrating vectors that quantify the equilibrium (long-run) relations between grants and other fiscal variables in the system while the coefficients α indicate the speed of adjustment to equilibrium, following a shock. The coefficients in the Ω_i matrices allow for short-run adjustments between variables; allowing for differences in long-run, short-run and error correcting dynamics. If cointegration tests determine one cointegrating relationship in the data, this relationship can be viewed as a statistical analogue of the budgetary equilibrium among other core fiscal variables, as predicted by

fiscal response theory (McGillivray and Morrissey, 2004). The identification of the long-run relation becomes relatively direct if there exists a single long-run relationship.

Assuming this one cointegrating relationship r, a vector of linear trends restricted to lie in the cointegrating space $(\alpha\beta't)$, and an unrestricted constant, the CVAR takes the form:

$$\begin{bmatrix} \Delta tax_t \\ \Delta grants_t \\ \Delta spending_t \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \end{bmatrix} \begin{bmatrix} \beta'_1 tax_{t-1} \\ \beta'_2 grants_{t-1} \\ \beta'_3 spending_{t-1} \end{bmatrix} + \begin{matrix} \Omega_1 \Delta tax_{t-1} \\ \Omega_2 \Delta grants_{t-1} \\ \Omega_3 \Delta spending_{t-1} \end{matrix} + \theta W_t + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \end{bmatrix} \tag{4}$$

Representing equation (4) in a way that allows testing hypotheses, causality between variables and normalizing on tax revenue, we get:

$$\beta_1 tax + \beta_2 grants + \beta_3 spending = 0 \tag{5}$$

The above equation can be normalized on the tax revenue variable such that setting $\beta_1 = -1$ yields:

$$tax = \beta_2 grants + \beta_3 spending \tag{6}$$

Given that the CVAR describes only the long-run response to a *ceteris paribus* change in each of the variables, there is interest in deciphering the causal links between grants and other variables in the system. Thus, the paper will focus on some long-run parameter restrictions to provide empirical grounding for the structural analysis underlying the causal links between aid and domestic fiscal variables. These include:

- The long-run exclusion test which is evaluated by placing restrictions on β, following the null hypothesis that $\beta_i = 0$. If accepted, it would mean that the variable is superfluous to the long-run relation and so can, at most, have a short-run impact. The test is evaluated by restricting the β coefficient of interest to zero, while the other β coefficients are left unrestricted.

- The long-run weak exogeneity test, that is, a zero row in α restrictions. The test indicates which fiscal aggregates adjust to restore budgetary equilibrium in light of disequilibrium. Johansen (1996) states that the restriction is evaluated as $H_0: \alpha_i = 0$, where, if accepted would insinuate that the variable impacts on the long-run path of other variables of the system, while simultaneously the weakly exogenous variable is not influenced by the other variables in the system. This would imply that the variable is long-run forcing (Lloyd *et al.,* 2009). The test is evaluated by placing a restriction on the α coefficient of interest, while the other α coefficients are left unrestricted.

- The revenue displacement test. As mentioned in section 2, the impact of aid (grants in particular) on taxes may be in opposite directions. There may be positive effects through the influence of technical assistance, revenue-related donor conditionality or through increased efficiency in revenue collection. There are also legitimate concerns that aid grants can discourage tax revenue collection through negative behavioural effects if recipients view grants as a politically less costly source of revenue. Thus, to test the hypothesis that aid displaces tax revenue we leave other β coefficients unrestricted and test that the β coefficients for grants and revenue (β_1 and β_2) are equal and of opposite sign.

6.   Results

6.1   Order of Integration

As a precursor to estimating FRMs it is important to evaluate the order of integration of the variable series. As mentioned in section 5, grants can play a dual role of influencing the long-run budgetary equilibrium (i.e. when it is I(1)) and also relaxing the budget constraint (i.e. I(0) and restricting the impact to the short-run). We apply the ADF test described in Annex A and cannot reject nonstationary in levels for our three main variables (tax revenue, grants and government spending) at conventional levels of significance while the first differenced series of all the variables are stationary. Non-stationarity in levels implies the variables can form a cointegrating relationship, i.e. a budgetary equilibrium between grants and domestic fiscal variables.

6.2   Model Specification

Fitting the cointegrating VECM entails specifying the number of lags to be included, the latter of which is determined by minimising information criteria. The Schwarz and Hannan-Quinn information criteria suggest p=1, the Akaike information criterion suggests p=2 while the likelihood-ratio (LR) test suggests p=4. Going by the information criteria, the appropriate lag-length will be p=1, which implies the fiscal response model reduces to one with the long-run only. However, grants might also have a short-run impact (in addition to the long-run impact if the appropriate lag length is indeed one) in relaxing the budget constraint, making p=1 unrealistic. Alternatively, including p=4 is also unrealistic given that the impact of grants elicits quick adjustment dynamics in the domestic fiscal variables. This points to p=2 being the most preferable choice, also consistent with the standard lag-length used in estimating FRMs in the literature.

Having correctly specified the data generating process, focus shifts to determining the cointegration rank r; the number of cointegrating relationships in the data. This corresponds to the r pulling factors and $p - r$ pushing factors discussed in section 5. We test for cointegration following the Johansen (1988) test procedure: the trace test procedure.

6.3   Long-run estimates of the baseline model

The long-run results in table 1 demonstrate that grants and tax revenue appear to have a negative relationship although it is also evident that an increase in grants has a smaller effect in reducing tax revenue than an increase in tax revenue will have in reducing grants (similar to the findings in Bwire *et al.,* 2017); consistent with the need for grants reducing as domestic revenue increases. Nonetheless, we posit three main reasons for the negative association between grants and tax revenue.

First, it may be the case because grants (without obligations of repayment) may be viewed as a politically less costly source of finance, reducing the fiscal planners' urgency to expend political and administrative effort on tax collection. The evidence suggests that in Comoros, the political costs of taxes may exceed the political costs of aid; evaluated according to accountability and bureaucratic costs. Accountability to domestic taxpayers is typically low in weak administrations, especially in fragile states (see section 2). In the Comorian context it is exacerbated by the strained relationship between the three islands and the national government, resulting in the national government not collecting as much in tax revenue (or total revenue) as is optimal. Factoring in the structural difficulties impinging on developing countries' ability to raise revenue (see Keen and Simone, 2004 for a review), it becomes clear that grants are politically less costly to manage. The fiscal planners will have to account to the

multiple donors on how their grants are being used but in the context of fragile states – states which are generally constrained in their abilities to attract Foreign Direct Investment (FDI) as well as non-concessional finance, and the inherent difficulties in using remittances beyond financing household expenditures – there are not too many financing options available to fragile and conflict-afflicted countries (OECD, 2014). Furthermore, even in the aftermath of the *tournante* and the ensuing relative political stability, the national government struggles for legitimacy and the government's extractive capacity is limited by the unavailability of easy tax handles.

The bureaucratic costs of taxation refer to the costs of tax administration and although reforms to tax administration have been implemented over the years, the revenue (tax and customs) administration in Comoros is still weak (IMF, 2016a, 2018a; World Bank, 2019). The bureaucratic costs of aid, a function of the number of donors involved in the country is also high. However, due to the country' fragility and the resulting inability to attract alternative international or domestic flows (loans), it still receives significant amounts of grants which can dampen revenue collection incentives. Overall, the political calculus demonstrates that the political costs of taxes are higher than those of aid.

Second, budget support grants are considerably lower than project grants. The former is used at the discretion of the domestic fiscal planners although the spending priorities of the planners may have to be aligned with those of the donors to ensure effectiveness (Morrissey, 2015a; Clist, Isopi and Morrissey, 2012). The latter, though, is higher and is usually spent on projects donors are supporting in Comoros (such as in infrastructure, health, education, and water and sanitation) with no immediate (contemporaneous) and direct impact on tax revenue. However, some capacity building projects have been explicitly designed to improve revenue performance albeit with mixed results (see section 2). Furthermore, given the large public sector a considerable amount of budget support grants is used to finance wages and salaries (IMF, 2018b); further eroding the government's extractive capacity and undermining incentives to mobilize revenue through taxes.

Table 1: Estimates of the long-run relationship between variables

	Tax Revenue	Grants	Government Spending	TREND
Annual Data (1984 – 2017, N=34)				
Coefficients of Co-integrating relationship (β')				
	1.000	-0.501***	0.800***	58.850
	(na)	(-5.27)	(7.09)	(0.54)
	-1.996***	1.000	1.596***	117.442
	(-3.31)	(na)	(8.14)	(0.35)
	1.250***	0.626***	1.000	-73.574
	(4.22)	(7.71)	(na)	(0.34)
Adjustment coefficients (α)				
	-0.311**	-1.656**	0.359	
	(-2.13)	(-2.53)	(1.34)	
Test for long-run exclusion				
	15.87 [0.000]	19.45 [0.000]	19.06 [0.000]	
Test for weak exogeneity				

	4.027 [0.045]	6.267 [0.000]	1.700 [0.192]
Test for Granger non-causality	5.230 [0.073]	0.280 [0.869]	5.290 [0.071]
Revenue displacement			
			17.83 [0.000]

Notes: (i) The rows of cointegrating relationships (β') represent alternative normalizations of the one cointegrating relationship and t-ratios are in parentheses. The adjustment coefficients (α) are estimated based on normalization of tax revenue *, **, *** represent significance at 10%, 5% and 1% respectively. (ii) Null hypothesis for long-run exclusion: the variable can be excluded from the cointegrating relations; $x^2(n)$ distribution; p-values indicating at which level the null can be rejected. (iii) The null hypothesis for weak exogeneity: the variable is weakly exogenous; $x^2(n)$ distribution; p-values indicating at which level the null can be rejected.

Third, budget support grants are inherently more volatile than project grants primarily because they consistently represent one-off grants from bilateral partners (see section 2). The stability of budget support grants usually reflects the stability of donor-recipient relations and unlike other aid commitments, one-off budget grants are not always known to recipients in advance. Such volatility impacts on budget credibility and impacts negatively on short to medium-term fiscal planning, and it may also result in fiscal vulnerability which reduces tax revenues. In addition, these large one-off grants have previously stopped reform processes, including tax reforms, as it happened with the last two IMF programs, (see section 2).

The results discussed in table 1 are *ceteris paribus*, partial equilibrium estimates which cannot describe causal links between domestic fiscal variables. The long-run exclusion test demonstrates that all variables enter the system cointegrating space, with the variables having a long-run fiscal impact on themselves. Grants are indeed necessary for the long-run relations and play a significant role in the fiscal equilibrium: unsurprising since grants form part of the domestic revenue package and is directly incorporated into the budget. Tax revenue also enters the system cointegrating space, suggesting that tax revenue has a significant long-run impact on other fiscal variables in the system. Spending is also important for the fiscal equilibrium given budgetary decisions are typically made with spending as the dependent variable: i.e. given the level of spending the government decides to embark on, fiscal planners have to raise revenue (through taxes, non-taxes, grants and borrowing) to cover those expenditures.

Long-run weak exogeneity is rejected for tax revenue and grants but accepted for spending. This is consistent with taxes and grants adjusting to disequilibrium (Bwire *et al.,* 2017; Mascagni and Timmis, 2017). Tax systems are statutory, and the behaviour of policymakers and tax administrations displays considerable inertia (Morrissey and Torrance, 2015). Nonetheless, the Comorian tax system is dominated by customs receipts, a component of the revenue system that can easily adjust contemporaneously. The results for taxes are also consistent with taxes adjusting in response to donor variability in aid disbursement, i.e. aid uncertainty (Lensink and Morrissey, 2001) and unanticipated changes in spending. Grants are also found to be endogenous, reaffirming the results from the long-run exclusion test. The result on grants is consistent with stable donor-recipient relations where Comorian fiscal planners have a target revenue for grants from their main bilateral and multilateral

partners (aid commitments are typically known in advance) and they incorporate this level into fiscal planning, with the extremely high grants disbursements being outliers. Furthermore, it shows that grants adjust to fiscal conditions in Comoros; evident from the budget support grants being used to settle arrears in wage bills and project grants mainly used to finance capital spending (IMF, 2016a, 2018a).

Weak exogeneity is accepted for spending, which reflects the functionality of spending systems in small state fragile states that display current spending rigidity. Since spending policies are typically prepared for the medium to long-term, they are not easily reversed once implemented (Bwire, 2012). This is particularly true for public payroll and/or statutory expenditures: the wage bill in Comoros does not react to fluctuations in tax revenue (IMF, 2018a). Furthermore, spending in Comoros is driven mainly by recurrent expenditures, the bulk of which are wages and salaries, reflecting patronage politics under which Comoros is governed (IMF, 2016a, 2018a; World Bank, 2019). Additionally, IMF (2018a) suggests that reductions in spending are more detrimental to growth than increases in taxes, perhaps strengthening fiscal planners' behaviour.

The theoretical premise from which the CVAR (VECM) is derived is in distinguishing long-run from short-run findings; thus, we also test for the direction of short-run causality in the study. Since the long-run and short-run relationships differ, we can implicitly assume that the direction of causality differs between the long-run and short-run. The tests for the direction of short-run causality (Granger causality) between variables indicate that the granger non-causality can be rejected for taxes and spending, but not rejected for grants. For taxes, the results imply that other fiscal variables (spending and grants) granger cause taxes. Similarly, for spending it implies that other fiscal variables (taxes and grants) have a granger cause spending. For grants, the results demonstrate that domestic fiscal variables do not granger cause grants. This does not imply exogeneity of grants, but that grants do not respond to short-term changes in taxes and spending. Given the negative relationship between grants and tax revenue, we explicitly test if grants displace tax effort: a test for aid substituting for tax revenue (Martins, 2010; Bwire *et al.,* 2017). This is done by normalizing on government spending, and testing that grants and tax revenue are equal and of opposite signs. The hypothesis that grants substitutes for tax revenue (and effort) in a one to one relationship is firmly rejected at the 1 percent level of significance. This suggests that grants do not fully displace revenues in the long-run.

6.4   *Structural Breaks*

The country context in section 2 suggests that we can split the evolution of the fiscal variables into three sub-periods: 1984 – 2001, 2001 – 2007, and 2008 – 2017. It is evident that all the variables picked up after 2001 – 2003 period, a period that coincides with the introduction of the *tournante*. If this shift occurred in a specific series (such as tax revenue) it would imply a structural break in the series. The series move together which suggests that there is no break in the system. Nonetheless, we explicitly test for the impact of a structural break by including a mean shift dummy which takes the value 1 in all periods between 2001 and 2003, and 0 otherwise. The results mimic those from table 1 (albeit with larger magnitudes), the main difference being grants no longer adjusting to disequilibrium. The residual diagnostic tests are similar to the model without the structural break dummy: auto-correlation is rejected but multivariate normality is rejected as well, suggesting that the two models are not statistically different. This would suggest that the dummy variable is redundant in the model so the baseline model from table 1 is still the primary model.

We also test for the presence of a structural break in 2008 following the narrative on section 2 but also to account for the global financial crisis. We include a mean shift dummy which takes the value 1 in 2008 and 0 otherwise; thus, estimating a fiscal response model with two dummies. The results (table 2) are similar to the results with a structural break dummy for 2001 – 2003, again with grants not adjusting to disequilibrium. Furthermore, autocorrelation is rejected at conventional lags while residual multivariate normality is also rejected, making the 2008 dummy equally redundant.

Table 2: Estimates on the long-run relationship between variables

Annual Data (1984 – 2017, N=34)		
Coefficients of Co-integrating relationship (β')		
Tax Revenue	Grants	Government Spending
1.000	-0.403***	0.874***
(na)	(-5.42)	(8.79)
-2.479***	1.000	2.167***
(-4.33)	(na)	(10.50)
1.144***	0.461***	1.000
(5.36)	(8.02)	(na)
Adjustment coefficients (α)		
-0.645***	-0.899	-0.120
(-5.67)	(-1.13)	(-0.40)

Notes: (i) The rows of cointegrating relationships (β') represent alternative normalizations of the one cointegrating relationship and t-ratios are in parentheses. The adjustment coefficients (α) are estimated based on normalization of tax revenue *, **, *** represent significance at 10%, 5% and 1% respectively.

7.   Concluding remarks

Throughout their development process, fragile governments not only deal with socio-economic challenges, but are also exposed to political instability, conflict and political violence. It is not surprising then that according to the World Bank, by 2030, fragile countries will host 46 percent of the world's extreme poor. Given that these governments often lack capacity and financial resources, donors have a key role to play in helping them overcome these obstacles. Recently, the development community started a process of strongly allocating resources towards fragile countries. Nevertheless, attention must be given to the potential unintentional negative effects of such sizeable increase in aid. This paper focused on the particular area of aid and tax revenues in fragile states.

For more than three decades in Comoros' tax and revenue history, little progress was achieved in implementing tax reforms. This paper suggests that political economy factors related to the Comorian fragility, including the high flow of grants (with no repayment obligation), partly explain this result. We

also suggest that the composition of aid in Comoros plays a role. Budget support grants are considerably lower than project grants, with the latter usually spent on projects that donors are supporting (not necessarily on projects aiming at raising tax revenues). Finally, we argue that the episodic large budget grants have the potential of delaying structural reforms by diminishing the political will to enact policy reform.

From the point of view of the Comorian government, being aware of this negative effect is an important step to ensure that tax revenue efforts do not slowdown following large budgetary support from donors. From the donors' point of view, switching progressively to conditional loans and engaging more resources for capacity building tax revenues projects and technical assistance could increase the effectiveness of its interventions.

REFERENCES

African Development Bank. (1996). Portfolio Review Report: Comoros. Oxford University Press.

Bwire, T., Lloyd, T., and Morrissey, O. (2017). Fiscal reforms and the fiscal effects of aid in Uganda. *The Journal of Development Studies*, *53*(7), 1019-1036.

Comoros Risk and Resilience Assessment: World Bank 2018

Crivelli, Ernesto, and Sanjeev Gupta. "Does conditionality in IMF-supported programs promote revenue reform?." International Tax and Public Finance 23.3 (2016): 550-579

Economic Report on Africa (2019). *Fiscal Policy for Financing Sustainable Development in Africa.*

Heller, P.S. (1975). A model of public fiscal behavior in developing countries: Aid, investment, and taxation. *The American Economic Review*, *65*(3), pp.429-445.

International Monetary Fund, (1995). "Comoros". In Comoros: Recent Economic Developments. USA: International Monetary Fund. doi: https://doi.org/10.5089/9781451808995.002

International Monetary Fund,. (1996). "Comoros". In Comoros: Recent Economic Developments. USA: International Monetary Fund. doi: https://doi.org/10.5089/9781451809008.002

IMF 2001. Comoros: Article IV. Washington DC.

IMF 2002. Comoros: Article IV. Washington DC.

IMF 2004. Comoros: Article IV. Washington DC.

IMF 2006. Comoros: Article IV. Washington DC.

IMF 2008. Comoros: Article IV. Washington DC.

IMF 2012. Comoros: Article IV. Washington DC.

IMF 2016a. Comoros: Article IV. Washington DC.

IMF 2018a. Comoros: Article IV. Washington DC.

International Monetary Fund (2018b). Union of Comoros selected issues. *IMF Country Report* No. 18/190. Washington D.C.: International Monetary Fund.

International Monetary Fund (2016b). Union of Comoros selected issues. *IMF Country Report* No. 16/394. Washington D.C.: International Monetary Fund.

International Monetary Fund (2017). Building fiscal capacity in fragile states. *IMF Policy Paper.* Washington D.C.: International Monetary Fund.

Juselius, K. (2006). *The cointegrated VAR model: methodology and applications.* Oxford university press.

Juselius, K., Møller, N. F., and Tarp, F. (2014). The long-run impact of foreign aid in 36 African countries: Insights from multivariate time series analysis. Oxford Bulletin of Economics and Statistics, 76(2):153–184.

Lloyd, T., McGillivray, M., Morrissey, O., and Opoku-Afari, M. (2009). The fiscal effects of aid in developing countries: A comparative dynamic analysis. In *Development Aid* (pp. 158-179). Palgrave Macmillan, London.

McGillivray, M., and Morrissey, O. (2004). Fiscal Effects of Aid'. In T. Addison and A. Roe (eds), Fiscal Policy for Development: Poverty, Reconstruction and Growth. Basingstoke: Palgrave Macmillan for UNU-WIDER.

Martins, P. M. (2010). *Fiscal dynamics in Ethiopia: the cointegrated VAR model with quarterly data* (No. 10/05). CREDIT Research Paper.

Mascagni, G., and Timmis, E. (2017). 'The Fiscal Effects of Aid in Ethiopia: Evidence from CVAR Applications'. *The Journal of Development Studies*, 53(7): 1-20.

Morrissey, O. (2012). *Aid and government fiscal behaviour: What does the evidence say?* (No. 2012/01). WIDER working paper.

Morrissey, O. (2015a). Aid and government fiscal behaviour: Assessing recent evidence. *World Development*, *69*, 98-105.

Morrissey, O. (2015b). 'Aid and domestic resource mobilization with a focus on Sub-Saharan Africa'. *Oxford Review of Economic Policy*, 31(3-4): 447-461.

Morrissey, O., and Torrance, S. (2015), 'Aid and Taxation', ch. 31 in B. M. Avin and B. Lew (eds), *Handbook on the Economics of Foreign Aid*, Cheltenham, Edward Elgar.

OECD. (2014). *Fragile States 2014. Domestic Revenue Mobilisation in Fragile States.* Paris: OECD.

Osei, R., Morrissey, O., and Lloyd, T. (2005). 'The fiscal effects of aid in Ghana'. *Journal of International Development*, 17(8): 1037-1053.

World Bank. 1997. Comoros - Macro-Economic Reform and Capacity Building Project (English). Washington, DC: World Bank.

World Bank (2016) *Special Theme: Fragility, Conflict and Violence*, IDA Resource Mobilization Department (DFiRM) IDA 18. World Bank: Washington DC.

World Bank (2019). *Towards a More United and Prosperous Union of Comoros: Systematic Country Diagnostic.* Washington, DC: World Bank.

APPENDIX

A1.   Order of Integration

As a precursor to estimating FRMs it is important to evaluate the order of integration of the variable series. Standard empirical analyses of time-series data assumes all variables to be stationary. Nonetheless, most macroeconomic time-series are non-stationary so including a mixture of nonstationary and stationary variables in the same regression may result in spurious regressions thereby invalidating inference. Unit root tests are very essential tools in identifying the univariate properties of time series to detect the presence of non-stationarity and make sure the variables have the right stationarity properties. The most commonly used test for determining order of integration and the amount of differencing required to induce stationarity is the Augmented Dickey Fuller (ADF) unit root test (Dickey and Fuller, 1979, 1981). The ADF specification estimated in this paper is given below.

$$\Delta y_t = \mu_i + \beta_i t + (\rho - 1)y_{t-1} + \sum_{j=1}^{p} \delta_{ij}\Delta y_{t-j} + u_t \tag{A1}$$

Where y is the time-series data (tax revenue, grants and government spending), t is the linear time trend; ρ is the maximum number of lags and u_t is the Gaussian error term. Lagged values of the dependent variable are incorporated to curb serial correlation in the error terms, providing unbiased results. The null hypothesis for the unit root test is:

$$H_0: (\rho - 1) = 0$$

Against the alternative that:

$$H_1: (\rho - 1) < 0$$

If the value of the ADF test statistic is greater than the five percent critical value of the ADF statistic, then the null hypothesis of $(\rho - 1) = 0$ cannot be rejected. That is, the series in question is non-stationary and has a unit root. Otherwise, the null hypothesis is rejected and the series is stationary.

Thus, the order of integration $I(h)$ could be interpreted as the number of times (h) a series should be differenced to make it stationary.

Table A1: ADF unit roots tests

	Levels: ADF test with intercept only							
	Tax		Grants		Spending		Non-tax	
Lags	t-stat	5% CV	t-stat	5% CV	t-stat	5% CV	t-stat	5% CV
0	2.570	-2.978	-2.994	-2.978	1.786	-2.978	-2.526	-2.978
1	1.953	-2.980	-1.317	-2.980	1.679	-2.980	-2.007	-2.980
2	2.051	-2.983	-0.668	-2.983	2.341	-2.983	-0.944	-2.983
3	2.761	-2.986	-0.520	-2.986	2.708	-2.986	-1.525	-2.986
4	2.399	-2.989	0.300	-2.989	1.774	-2.989	-0.708	-2.989
	Levels: ADF test with intercept and trend							
	Tax		Grants		Spending		Non-tax	
Lags	t-stat	5% CV	t-stat	5% CV	t-stat	5% CV	t-stat	5% CV
0	0.502	-3.568	-4.035	-3.568	-0.413	-3.568	-3.641	-3.568
1	0.029	-3.572	-2.142	-3.572	-0.419	-3.572	-3.070	-3.572
2	-0.005	-3.576	-1.570	-3.576	0.056	-3.576	-1.628	-3.576
3	1.229	-3.580	-1.481	-3.580	0.590	-3.580	-2.859	-3.580
4	0.791	-3.584	0.401	-3.584	0.280	-3.584	-1.932	-3.584
	Differences: ADF test with drift							
	Tax		Grants		Spending		Non-tax	
Lags	t-stat	5% CV	t-stat	5% CV	t-stat	5% CV	t-stat	5% CV
0	-3.137	-1.697	-11.059	-1.697	-4.812	-1.697	-7.344	-1.697
1	-1.911	-1.701	-6.647	-1.701	-3.886	-1.701	-7.756	-1.701
2	-2.449	-1.706	-4.381	-1.706	-2.994	-1.706	-2.675	-1.706
3	-1.284	-1.711	-3.154	-1.711	-1.655	-1.711	-3.590	-1.711
4	-0.790	-1.717	-0.376	-1.717	-1.513	-1.717	-3.536	-1.717

Notes: t-stat is the ADF test statistic and 5% CV is the 5 per cent critical value.

Table A2: Residual Diagnostic Tests: Baseline Model

Residual normality (p-values)

Multivariate		Univariate	
	Tax	Grants	Spending
0.000	0.257	0.000	0.648

Residual autocorrelation (p-values)

	LM(1)	LM(2)
Autocorrelation	0.692	0.383

Notes: (i) For the normality tests the null hypothesis, H_0, is for normally distributed errors while the alternative hypothesis is of non-normal errors. (ii) For the auto-correlation tests the null hypothesis, H_0, is no serial correlation against the alternative of serial correlation in the errors.

Table A2: Residual Diagnostic Tests: Model with a structural break

Residual normality (p-values)

Multivariate		Univariate	
	Tax	Grants	Spending
0.000	0.020	0.000	0.745

Residual autocorrelation (p-values)

	LM(1)	LM(2)
Autocorrelation	0.778	0.283

Notes: (i) For the normality tests the null hypothesis, H_0, is for normally distributed errors while the alternative hypothesis is of non-normal errors. (ii) For the auto-correlation tests the null hypothesis, H_0, is no serial correlation against the alternative of serial correlation in the errors.