

# **Hide and seek: IMF intervention and the shadow economy**

## **An empirical investigation**

Michael Chletsos <sup>1</sup>, Andreas Sintos<sup>2</sup>

<sup>1</sup> Michael Chletsos, University of Piraeus, Department of Economics, 80, Karaoli and Dimitriou Str, 18534 Piraeus, Greece, e-mail: mchletsos@unipi.gr

<sup>2</sup> Andreas Sintos, University of Ioannina, Department of Economics, University Campus, 45110 Ioannina – Greece, e-mail: a.sintos@uoi.gr

### **Abstract**

This study investigates the effect of IMF intervention on the size of the shadow economy. Using a panel of 141 countries from 1991 to 2014 we examine the impact of both IMF participation and conditionality on the informal economy. Following a recent methodological approach our analyses address sources of endogeneity related to, first the IMF participation decision and, second, the conditions included within the program. The empirical findings suggest that both IMF program participation and conditionality increase the size of the shadow economy. When we differentiate IMF conditions into structural and quantitative, we show that only structural conditions are significantly related to a larger shadow economy. Financial development can reduce the size of the shadow economy; however, it cannot reverse the detrimental effect from IMF intervention. Our initial results are found to be robust across alternative empirical specifications.

**Keywords:** Shadow economy, IMF programs, Conditionality

**JEL codes:** O17, F53, F33

## 1 Introduction

The size of the shadow economy<sup>1</sup> worldwide is alarming (Buehn and Schneider, 2012). Although in the last years the size of the underground economy has decreased (based on the overall estimates of Medina and Schneider (2018), the average decline of the shadow economy from 1991 to 2015 is 5.3 percentage points), it remains a widespread and complex economic phenomenon in developed and developing world to varying degrees (Elgin and Oztunali, 2012; Medina and Schneider, 2018; Torgler and Schneider, 2009).

There is not a universal way to provide a complete picture of the size of the informal economy. However, there are different approaches which attempt to estimate the informal activity (previous studies point out three basic categories of approaches, namely (a) the direct, (b) indirect and (c) model approaches).<sup>2</sup>

The literature has identified several factors affecting the size and development of the underground economy. Among others, tax burden (Gërzhani, 2004; Johnson et al., 1997; Loayza et al., 2009; Schneider and Enste, 2000) and the quality of institutions (which consists of a variety of sub-factors e.g., good governance, control of corruption, bureaucratic quality, rule of law, political instability, etc. (Dreher and Schneider, 2009; Dreher et al., 2009a; Elbahnasawy et al., 2016; Torgler and Schneider, 2009)) are some of the main drivers of the spread of the shadow economy. In addition, other determinants such as economic freedom (Berdiev and Saunoris, 2018; Berdiev et al., 2018), financial development (Berdiev and Saunoris, 2016; Capasso and Jappelli, 2013), and the cost of doing business (Goel and Saunoris, 2019; Loayza, 1996) have also documented. Analysing and identifying factors of the underground economy is still ongoing (Friedman et al., 2000; Goel and Nelson, 2016; Goel et al., 2019), however based on the well-established

---

<sup>1</sup> Also mentioned as informal, unofficial, hidden, black, parallel, second or underground economy (or sector) (e.g., Bagachwa and Naho, 1995; Capasso and Jappelli, 2013; Contini, 1981; Elgin and Oyvat, 2013; Giles, 1999; Ihrig and Moe, 2004; La Porta and Shleifer, 2009; Thomas, 1999).

<sup>2</sup> For a review of existing methods for estimating the size of the shadow economy see Schneider and Buehn (2018) and Dybka et al. (2019).

studies in this field we examine the effect of IMF intervention on the size of the unofficial economy.

The International Monetary Fund (IMF) along with the World Bank and regional development banks are singled out as the most powerful agents of economic reform (Kentikelenis and Seabrooke, 2017; Stone, 2011; Steinwand and Stone, 2008). Since the early 1970s, the main role of the IMF is to uphold global financial stability, which places the Fund acting as a lender of last resort to governments in fiscal crises (Daoud et al., 2019). In exchange for low-cost financing, the IMF requires governments to implement a set of IMF-designed policy reform packages – or ‘conditionality’ – administered through a lending program. These signed programs can have a duration of six months to three years and the ability of countries to draw on the loan funds in pre-specified intervals depends upon the implementation of policy reforms.<sup>3</sup>

The literature regarding the effect of IMF intervention on countries’ shadow economy is rather inconclusive. Only few studies focus specifically on the link between IMF programs and the size of the informal economy, and their results are mixed (Blanton et al., 2018; Hunter and Biglaiser, 2020; Reinsberg et al., 2019b).

Our study advances with the recent stand of the literature (e.g., Daoud and Reinsberg, 2019; Forster et al., 2019a; Kern et al., 2019; Reinsberg et al., 2019a, 2019b; Stubbs et al., 2018) by examining both the effect of IMF program participation and conditionality, previous studies treat IMF programs as homogenous and therefore are unable to distinguish specific mechanisms between IMF participation and conditionality on the outcome variables.<sup>4</sup> Using new data on IMF conditionality (Kentikelenis et al., 2016) to

---

<sup>3</sup> For more details about IMF lending programs see, e.g., IMF (2012, 2019) and Chletsos and Sintos (2020).

<sup>4</sup> Conditions differ between loan programs (e.g. 122 conditions for Serbia in 2005, while 4 conditions for Morocco in 2013), and conditionality is a key mechanism through which IMF lending works. Therefore, IMF loan programs should have varying effect, which previous literature fails to account as it treats IMF programs as being identical and expect them to have a single, constant effect on the eligible countries-borrowers (Rickard and Caraway, 2019).

capture the impact of various types of policy reforms (conditions) that borrowing countries have to implement in order to continue draw on the IMF credit and cross-national data capturing the size of the shadow economy, overall we find that both IMF program participation and conditionality exert a significant positive impact on the informal economy in a sample of 141 countries. By categorizing IMF conditions, we provide some evidence that this significant positive impact does not hold for quantitative conditions. Additionally, we show that financial development can reduce the size of the shadow economy, however this negative effect is not enough to reverse the detrimental effect from IMF conditions.

The rest of the paper is structured as follows: in the following section, we identify the relationship between IMF intervention and the size of the unofficial economy. Section 3 analyses our data and the empirical methodology used. Section 4 reports the results. Finally, Section 5 offers some concluding remarks.

## **2 The relationship between IMF intervention and the size of the shadow economy**

The role of international financial institutions (IFIs) in the context of the shadow economy is still ongoing in the literature. With their novel research, Blanton et al. (2018) investigates the effect of IMF programs on the shadow economy.<sup>5</sup> The study indicates that economic openness reduces the size of the shadow economy, shedding some light on an ongoing literature that connects countries' economic openness and the prevalence of the shadow economy (e.g., Berdiev et al., 2018; Berdiev and Saunoris, 2018), while IMF participation and structural conditionality are related to a larger shadow economy. Despite the important contribution of the study, the techniques applied to account for

---

<sup>5</sup> This paper examines the effect of IMF programs and conditionality (only considering structural conditions) on the growth of shadow economies separately.

endogeneity,<sup>6</sup> and additionally the individual examination of IMF participation and structural conditions, raise our concerns for the model identification and the estimated procedure used.<sup>7</sup> Hunter and Biglaiser (2020) examine the connection between IMF loan arrangements and domestic terrorism (also including a proxy for the shadow economy). They incorporate only a binary indicator for IMF program participation (not a count for conditionality) and their techniques do not account for endogeneity issues. Regarding the effect on the informal economy, they show that IMF loans are negatively associated with the size of the shadow economy when the borrowers are democracies, arguing that a decline in the informal economy supports fewer domestic terrorist attacks. The study of Reinsberg et al. (2019b), which account for both endogeneity issues of IMF program participation and conditionality, shows no significant effect of IMF labour conditions on the shadow economy, arguing that while IMF labour conditions can reduce labour rights for ‘labour market insiders’, they are unable to affect the labour rights of ‘labour market outsiders’ (e.g., to get jobs in the formal economy).<sup>8</sup>

Moreover, the literature lacks a systematic empirical foundation to evaluate the role played by powerful international financial institutions (IFIs) – the IMF, the World Bank, and regional development banks – in establishing policy reforms related to the shadow economy. As the social, economic and political effects of IMF interventions have been

---

<sup>6</sup> To account for endogeneity, Blanton et al. (2018) use a GMM estimator (Arellano and Bond 1991; Arellano and Bover 1995). Despite its advertised flexibility in dealing with endogeneity, GMM estimation carries stringent assumptions (Roodman, 2009b); that are, in most cases, untenable and the estimates are too sensitive to arbitrary changes in the model to inspire confidence (Stubbs et al., 2018). Additionally, they apply a 2SLS estimation using United Nations General Assembly (UNGA) voting similarities with US as an instrument for IMF participation. However, the instrument used does not appear to be valid.

<sup>7</sup> By examining the effect of IMF participation and structural conditions separately, Blanton et al. (2018) lack to differentiate the effects of structural conditionality from other pathways of program influence, outside of the conditionality channel. As Stubbs et al. (2018) mention, both IMF program participation (with a binary indicator) and a measure of conditionality should be included in the model to distinguish effects of conditionality from other aspects of IMF programs.

<sup>8</sup> Reinsberg et al. (2019b) include in their analysis both IMF program participation and conditionality, however they examine only the effect of a policy area of conditions related to labour (IMF labour conditions).

well-documented (e.g., Baro and Lee, 2005; Crivelli and Gupta, 2015; Dreher, 2006; Forster et al., 2019a; Gunaydin, 2018; Reinsberg et al., 2019a; Rickard and Caraway, 2019; Stubbs et al., 2018), we are able to linkage the IMF and the shadow economy.

We assume two basic pathways linking IMF intervention to the size of the shadow economy. IMF policy reforms – conditionalities that force countries to implement a series of reforms in order to draw on the loan funds. The other one refers to IMF operations outside of the conditionality channel.

What matters is how IMF mandate is put in practice. Not all the conditions follow the same rhetoric.<sup>9</sup> Thus, following previous studies and the IMF’s own classificatory schema, we are able to categorize between “structural conditions” and “quantitative conditions”<sup>10</sup> (e.g., Bird, 2009; Stubbs et al., 2018). Structural conditions concern a wider range of reforms in the domestic economy (microeconomic reforms) and afford governments less flexibility (Kentikelenis et al., 2016). In contrast, quantitative conditions take the form of quantitative targets that countries have to meet and provide governments more flexibility; examples include specific targets on the stock of short-term external debt outstanding, the net international reserves of the central bank, public external arrears, or the net domestic assets of the banking system (Kentikelenis et al., 2016).

As discussed above, structural conditions refer to specific conditions requiring the overhaul of the state administration and restructuring of the domestic economy. Structural conditions can affect the size of the shadow economy in different ways. As it is pointed out, structural conditions lower the ability of the state to attract or retain qualified personnel through cut deeply into public sector entitlements, including working

---

<sup>9</sup> For instance, to reduce public external arrears, governments are allowed to choose between different policy reforms (e.g., increase taxes, reduce expenditures, or a combination of both). While, other conditions afford government less flexibility (Kentikelenis et al., 2016).

<sup>10</sup> Quantitative conditions are also mentioned as “stabilization conditions” (e.g., Reinsberg et al., 2019a; Vreeland, 2007; Woo, 2013).

conditions, social security, average pay and additional benefits (Reinsberg et al., 2019a). Reduced state capacity may increase individual's willingness of doing business in the shadow economy. This can occur through two pathways. The "paralyzed" state administration will be an obstacle for citizens and businesses to interact with regulatory agencies – increasing the transaction costs of complying with government policies.<sup>11</sup> The new working conditions may also lead state regulators to be less willing to enforce regulations that are labour-intensive to implement (i.e., tax collection, financial audits) (Blanton et al., 2018).

Furthermore, the enforced austerity measures reduce the employment opportunities in the formal sector, consequently individuals may seek for job outside of the official economy (Campbell, 2005). In addition, fiscal consolidation decreases wage income shares due to cuts in public sector wages and increases long-term unemployment resulting from declined economy activity (Ball et al., 2013). Both these consequences may affect the poor because wages are their main source of income and they are most susceptible to layoffs, respectively (Forster et al., 2019a); and potentially steer low-income households into the shadow economy.

Structural reforms that require privatizations of state-owned enterprises may also affect the decision of individuals into the shadow economy. On the one hand, privatization may help governments accomplish more economic efficiency by eliminating public enterprises with poor performance and generate more revenue to finance their fiscal deficits (Detraz and Peksen, 2015).<sup>12</sup> On the other hand, workers' layoffs from privatization may lead individuals to go underground, as the formal labour market has been damaged and job opportunities are closed due to the economic downturn.

---

<sup>11</sup> Friedman et al. (2000) show that bureaucracy and the shadow economy are positively related.

<sup>12</sup> However, Crivelli (2013) shows that fiscal consolidation through privatizations may not be beneficial for budget balances and tax revenue.

Another highlighted effect of structural conditions is their negative impact on the level of labour rights (e.g., Abouharb and Cingranelli, 2007; Blanton et al., 2015, 2016; Burgess 2010; Gunaydin, 2018; Reinsberg et al., 2019b). Promoting labour laws that legalize temporary work contracts, extend probation periods, and reduce the cost of firing workers; all imposed by structural conditions undermine worker rights. For firms restrictive or burdensome labour market regulations encourage entry into the shadow, as the literature points out they increase the cost of employers to operate in the formal economy (Schneider and Enste, 2000). However, the protection of labour rights is an important requirement for workers seeking jobs in the formal sector. The flexibility and sometimes transient nature of informal work may attract workers which avoid working in the formal economy – which provides declined labour rights due to the imposed reforms and prefer to work in the unofficial sector (Blanton et al., 2018).

Quantitative conditions expressed as general macroeconomic targets and other objectives that governments have to meet and maintain throughout the program (Kentikelenis et al., 2016). Unlike structural conditions, quantitative conditions do not oblige governments to enact specific reforms but leave them with some discretion in how to achieve economic policy objectives through conditionality (Reinsberg et al., 2019a).

Under fiscal balance pressures, countries took different strategies depending on their relationship with the Fund. Although some studies suggest that IMF program participation improves fiscal outcomes (e.g., Dreher and Vaubel, 2004; Easterly, 2005), Brun et al. (2011) conclude that IMF programs had a negative impact on total revenues in Sub-Saharan Africa during the 1984-2007 period. Our argument is that adjusting tax policy to improve fiscal outcomes with increased taxation makes countries less competitive in the global economy because taxes increase the cost of doing business, which may induce some firms to the shadow sector (Gërkhani, 2004; Herwartz et al., 2011; Schneider and Enste, 2000). Nevertheless, Goel and Nelson (2016) show that not the burdensome taxation but tax complexity matters for the prevalence of the shadow



economy. Thus, the design of tax policy is very crucial for the size of the shadow economy.

The literature provides some studies analysing the socio-economic consequences of quantitative conditions (e.g., Dreher and Walter 2010; Przeworski and Vreeland 2000; Stubbs et al., 2018; Stubbs and Kentikelenis, 2018). However, the effect of these conditions may translate different for the shadow economy. For instance, the decreased governments expenditures combined with limited regulations and more economic freedom may encourage economic agents to transition from the informal sector to the formal sector (e.g., Johnson et al., 1998; Saunoris and Sajny, 2017; Schneider and Enste, 2000). Likewise, the policymaking of these conditions may drive agents' decision to participate or not in the informal economy.

The flexibility of this type of conditions has to use properly from governments to become a useful tool for economic development and not an economic “trap”. Thus, for quantitative conditions, their effect on the size of the shadow economy depend on the degree of flexibility and the design of these conditions.<sup>13</sup>

IMF arrangement programs can have highly pernicious effects on a country's domestic political environment. A variety of studies have shown that countries are more likely to experience protests (Auvinen, 1996; Sidell, 1988), civil war (Hartzell et al., 2010), government and currency crises (Dreher and Gassebner, 2012; Dreher and Walter, 2010), and the risk of a coup (Casper, 2015) when participating on an IMF program. Additionally, the likelihood of a re-election prospect (Dreher, 2004), if an IMF program is in active, and the interruption of an IMF arrangement (Dreher, 2003), if an election

---

<sup>13</sup> The measurement of the flexibility and the design of quantitative conditions, although interesting and significant, are beyond the scope of this paper. For quantitative conditions, we assume that the degree of flexibility provided to governments could work negatively for the size of the shadow economy.

is on the horizon, may increase. All in all, this bad economic and political climate can work positively for the rise of the underground economy (Elbahnasawy et al., 2016).

### 3 Empirical strategy and data

#### 3.1 Data

This study uses panel data for 141 countries across the world to investigate the effect of IMF intervention on the shadow economy over the period 1991 to 2014. Table A1 of the Appendix lists all countries included in the study.<sup>14</sup> Our main variable of interest is the size of the shadow economy (% of official GDP). Data on the shadow economy,<sup>15</sup> which is our measure of within-country size of the shadow economy and the dependant variable, are from Medina and Schneider (2018). They estimate the size of the shadow economy<sup>16</sup> using a multiple indicators and multiple causes (MIMIC) approach. The MIMIC method has been quite popular in this literature.<sup>17</sup> Medina and Schneider (2018) apply for first time the light intensity approach instead of GDP<sup>18</sup> and calibrate their models using predictive mean matching, avoiding the problems arising from GDP being quite often used as a cause and indicator variable.

For our key explanatory variables, we use a new dataset of IMF conditionality based on original coding of loan agreements between the Fund and its borrowers (Kentikelenis et al., 2016).<sup>19</sup> This database provides detailed information on the conditions included in loans and their implementation sourced directly from internal IMF documents. First,

---

<sup>14</sup> The sample includes both program and nonprogram years, as well as countries with no programs.

<sup>15</sup> In general, the measurement of the shadow economy is inherently difficult due to its secretive nature (Schneider and Buehn, 2018).

<sup>16</sup> Medina and Schneider (2018) define the shadow economy as follows: “The shadow economy includes all economic activities which are hidden from official authorities for monetary, regulatory, and institutional reasons.”

<sup>17</sup> See, e.g., Chaudhuri et al. (2006), Dell’Anno et al. (2007), Mai and Schneider (2016), Schneider (2005), Schneider and Buehn (2018), and Schneider et al. (2010).

<sup>18</sup> The use of GDP as an indicator and causal variable as well as the calibration techniques of the MIMIC method have been criticized (see, e.g., Breusch 2016; Schneider 2016).

<sup>19</sup> IMF conditionality dataset (Kentikelenis et al., 2016), available at: <http://www.imfmonitor.org/datasets.html>

IMF program participation is a binary variable, taking the value of one if an IMF program is in use for at least five months in a specific year, and zero otherwise (Dreher, 2006). Second, for IMF conditionality, we include the total number of binding IMF conditions applicable to a country in a given year.<sup>20</sup>

Control variables are a set of economic and political determinants of the shadow economy. Following standard practice, we lag all control variables by one period to allow for some delay in their associated effects on the size of the shadow economy. Economic conditions are controlled for by the growth rate of output, denoted GDP growth. We also control for trade openness (imports and exports in terms of GDP). The removal of barriers to trade and increasing levels of international trade is likely to reduce the shadow economy (Blanton et al., 2018; Goel et al., 2019). Moreover, we account for investments (capital formation, share of GDP), as the accumulation of investments could be related with a decline in the shadow sectors (Blanton et al., 2018). Government balance as a share of GDP measures the difference of general government revenue and general government total expenditure. Government expenditures could reflect the size of government. Previous studies have shown a positive correlation with the size of the shadow economy as a result of a dissatisfaction of public preferences for the size of government spending (for example, in presence of unnecessary or irrational government spending), and additionally the existence of ‘more State’ in the market, and subsequently an increase in regulation, tend to increase the size of the unofficial sector (Dell’Anno and Schneider, 2003; Schneider et al., 2010). In addition, government revenues could be negatively associated to the informal activity as a result of increased audits (Fleming et al., 2000; Johnson et al., 1997, 1998). We also include mineral rents as a percentage of

---

<sup>20</sup> Binding conditions known as ‘prior actions’ or ‘performance criteria’ (Stubbs et al., 2018). Loan disbursal is directly determined by the binding conditions and should be scheduled in order to continue the IMF program. Following Stubbs et al. (2018), in robustness checks, we use alternative measures of conditionality: an implementation-corrected count (which subtracts conditions waived by the IMF); an implementation-discounted count (which discounts conditions during program suspensions); and a combined binding and non-binding condition count.

GDP to capture country’s richness in natural resources, and the age dependency ratio as a share of working-age population to account for the share of dependants up to 15 years of age. Our main political variable is the level of democracy (Teorell et al., 2016). The extent of the informal economic activity might be higher in mixed regimes than consolidated democracies (Teobaldelli and Schneider, 2013) and authoritarian regimes (Elbahnasawy et al., 2016). These are the baseline control variables.<sup>21</sup> Table 1 and 2 provide definitions and summary statistics of the variables, respectively.

**Insert Table 1 and 2 about here**

### 3.2 Empirical identification

Our analysis follows the methodological approach proposed by Stubbs et al. (2018). The main assumption of this process is that countries select into both IMF participation and conditionality. First, with respect to IMF program participation, an issue arises from this context is selection bias. Participation into an IMF program is not randomly assigned, as the circumstances of countries participating in IMF programs are systematically different from those not participating. Taking into account economic and political variables that have been well documented (e.g., Moser and Sturm, 2011; Sturm et al., 2005; Steinwand and Stone, 2008) to be related with IMF participation, as well as country and year fixed effects, mitigate the problem of endogeneity in the outcome equation to a certain extent. However, unobserved time-variant factors that potentially correlated with IMF participation and the outcome variable, such as political willingness or trust (Vreeland, 2003), reduce the precision of regression estimates.

In a same perspective, IMF conditionality may be endogenous and affect the validity of our analysis. The endogeneity issue of conditionality can arise from three sources (Forster et al., 2019a). First, a country’s selection in IMF conditionality in a given year is not

---

<sup>21</sup> In robustness checks, we increase the vector of control covariates with variables that have been also found to be related with the size of the shadow economy.

randomly assigned.<sup>22</sup> As a result, endogeneity may arise from the systematic differences between countries that receive more IMF conditions and those that receive fewer conditions, thus uncorrected estimates would underestimate the true effect of conditionality on the outcome variable. The second issue of endogeneity rely on omitted variable bias (Woolridge, 2002, 2006). It is possible that IMF staff design lending arrangements based on unobserved factors, e.g., on the economic outlook of the eligible country. Additionally, preferences of government authorities and IMF staff for policy making may be different, as the former may have the willingness to reduce the size of the shadow economy (or even to neglect the size and growth of the informal economy in a view of upcoming elections (Skouras and Christodoulakis, 2013)). Eligible countries that select into conditionality may implement policy reforms that have an impact on the size of the shadow economy. In this case, the omitted variable (unobserved) government preferences – is correlated with the selection into conditionality and the size of the shadow economy, as a result the validity of uncorrected estimates is violated. The third issue of endogeneity arises from measurement error of the explanatory variables (IMF program and conditionality). If measurement error exists in the explanatory variables, which are measured with noise and are correlated with the error term, an estimation which does not account for the issue of measurement error yields to attenuation bias (Woolridge, 2009).

To mitigate potential issues arise from endogeneity of the explanatory variables (IMF participation and conditionality) we use an instrumental variable approach. Instruments are hard to find, but we are able to draw on an instrumental technique which uses a

---

<sup>22</sup> The decision of IMF staff regarding the selection of conditionality depends on country's political environment. For example, the Fund recognises that new elected governments face additional policymaking constraints, as well as in a view of upcoming elections – political stability is decreased; entails less conditionality (Rickard and Caraway, 2014; Stone, 2008). With regard to the shadow economy, the selection of conditionality may depend on the type of conditions. For example, conditions which force countries to adopt specific excise taxes based on volume for tobacco, alcohol and petroleum products – directly associated with a larger informal sector size (Gërkhani, 2004; Neck et al., 2012), are possible not be selected.

compound instrument to account for endogeneity. This methodological approach has been popularized in political research, especially in aid effectiveness (e.g., Dreher and Langlotz, 2017; Dreher et al., 2019; Nunn and Qian 2014), and recently used to evaluate the effects of IMF participation and conditionality (e.g., Daoud and Reinsberg, 2019; Forster et al., 2019a; Lang, 2016; Reinsberg et al. 2019a, 2019b; Stubbs et al., 2018).

Following Lang (2016) and Stubbs et al. (2018), we use two separate compound instruments to account for endogeneity of IMF program participation and conditionality. The compound instruments are constructed as follows:

- a) For selection into IMF programs, we interact the within-country average of IMF program participation across period of interest with the Fund’s budget constraint, approximated by the natural log of the IMF liquidity ratio (Lang, 2016; Nelson and Wallace, 2017; Stubbs et al., 2018) – calculated as liquid resources divided by liquid liabilities.
- b) Similarly, for conditionality, we interact the within-country average of the number of conditions across period of interest with the natural log of the IMF liquidity ratio (Stubbs et al., 2018).<sup>23</sup>

---

<sup>23</sup> Lang (2016) and Stubbs et al. (2018) provide a robust defence of the instrument’s excludability, for IMF participation and conditionality respectively. The use of  $(\overline{IMF}_i \times Budget_t)$  as an instrument for IMF participation is relevant because the Fund can provide more new lending programs in times of high liquidity ratios, and vice versa (Lang, 2016). In a same view, the instrument for IMF conditionality  $(\overline{Cond}_i \times Budget_t)$  is appropriate, if the demand for financial assistance increases, the Fund’s budget constraint becomes binding and assigns a higher number of conditions to borrowing countries to balance the increased demand in a view of limited resources (Forster et al., 2019a; Lang, 2016; Stubbs et al., 2018). The interaction of an endogenous variable (i.e., the mean number of country-specific IMF program participation or the mean number of conditions) with an exogenous variable (i.e. the Fund’s budget constraint, approximated by the natural log of the IMF liquidity ratio) can be interpreted as being exogenous. For econometric details on this point, see Bun and Harrison (2018) and Nizalova and Murtazashvili (2016). Even if there were endogeneity between the time-variant budget constraint and the size of the shadow economy, the exclusion restriction would only be violated if the unobserved variables driving this relation were correlated with the mean number of country-specific IMF participation/conditionality (see, e.g., Forster et al., 2019a; Lang, 2016; Stubbs et al., 2018; Reinsberg et al., 2019a, and for analytical proofs see, e.g., Bun and Harrison, 2018; Nizalova and Murtazashvili, 2016).

Our identification strategy is the following:

$$\widehat{IMF}_{it} = i_0 + i_1(\overline{IMF}_i \times Budget_t) + i_2 Z_{it} + i_3 X_{it} + \kappa_i + \delta_t \quad (1)$$

$$\widehat{Cond}_{it} = c_0 + c_1(\overline{Cond}_i \times Budget_t) + c_2 X_{it} + \mu_i + \delta_t \quad (2)$$

$$S_{it} = \beta_0 + \beta_1 \widehat{IMF}_{it} + \beta_2 \widehat{Cond}_{it} + \beta_3 X_{it} + \mu_i + \delta_t + \varepsilon_{it} \quad (3)$$

Equation (3) is the outcome equation, where  $S$  is the outcome of interest, the size of the shadow economy;  $\widehat{IMF}$  is the fitted value for IMF program participation derived from Equation (1);  $\widehat{Cond}$  is the fitted value for the total number of conditions derived from Equation (2).  $X$  denotes a vector of control variables;  $\mu$  and  $\delta$  represents country and year fixed effects, respectively and  $\varepsilon$  is the error term. Subscript  $i$  indexes individual countries, whereas  $t$  indexes time.

Equation (1) is a probit model predicting IMF program participation as a function of the compound instrument,  $(\overline{IMF}_i \times Budget_t)$ , the vector of controls from the outcome equation,  $X$ , and the vector of explanatory variables specific to selection into IMF programs,  $Z$ . This vector includes: GDP per capita to capture for the macroeconomic conditions (Gündüz, 2016), the count variable of counties under programs, as program participation is affected by the extent to which the Fund has resources available, which depends on the current number of program countries (Vreeland, 2003), a variable for past IMF participation, as previous exposure is a reliable predictor of current and future participation (Bird et al., 2004), and two political variables, regime durability – the number of years that the current political order has survived since the last transformation – and execute elections since these influence IMF programs as well (Rickard and Caraway, 2014). We further include regional fixed effects,  $\kappa$ , and year fixed effects,  $\delta$ .

Equation (2) instruments for the number of conditions using the compound instrument,  $\overline{Cond}_i \times Budget_t$ , and includes the vector of explanatory variables from Equation (3),  $X$ , country fixed effects,  $\mu$ , and year fixed effects,  $\delta$ .

To estimate the system of three equations we use maximum likelihood estimation (MLE),<sup>24</sup> combining an instrumental variable approach to address endogeneity of IMF participation with an instrumental variable approach to address endogeneity of conditionality (Stubbs et al., 2018).

## 4 Empirical results

### 4.1 Baseline results

In Table 3, we present the results of our baseline quantitative analyses. Specification in column 1 only accounts for the control variables and is estimated using simple OLS. Results on the coefficients of controls variables largely conform to established previous studies. GDP growth ( $p < 0.01$ ), trade openness ( $p < 0.01$ ), and investments ( $p < 0.05$ ) are all negatively correlated with the size of the shadow economy. The effect of government balance on the shadow sector is negative; however, the coefficient is statistically insignificant. Likewise, the coefficient on democracy, although negative, is statistically insignificant and sensitive to the model specification. Finally, the coefficient on dependency ratio is positive, while the coefficient on mineral rents is negative, but both are statistically insignificant.

Specification 2 incorporates the IMF participation variable, but again is estimated using simple OLS without any endogeneity corrections. The control variables remain unchanged. The coefficient on the binary IMF variable is positive ( $p < 0.01$ ), indicating that IMF programs overall increase the size of the shadow economy. In Specification 3, we correct for endogeneity of program participation using compound instrumentation: the interaction of the within-country average of IMF program participation across period of interest with the natural log of the IMF liquidity ratio. A similar result holds, the IMF participation remains positive, higher in magnitude and significant ( $p < 0.01$ ). Also,

---

<sup>24</sup> MLE can be implemented using the command *cmp* in STATA (see Roodman, 2011). For further assumptions and technical details on the estimation procedure, see Roodman (2009a).



the coefficient on government balance ( $p < 0.10$ ) is negative as expected and now statistically significant.

Next, in Specification 4, 5 and 6, we additionally control for the count of conditions, employing the preferred identification strategy. We begin with Specification 4, using simple OLS, the estimated coefficient on the total number of conditions is positive and significant ( $p < 0.05$ ), but close to zero, which is consistent with the sources of bias discussed above. Specification 5 only corrects for the endogeneity of program participation. We find similar results, the coefficient on conditionality is positive, significant ( $p < 0.01$ ), but close to zero. In Specification 6, we use compound instrumentation for the total number of conditions and program participation. The number of total conditions is positive, higher in magnitude and statistically significant ( $p < 0.01$ ). For one additional binding condition, the size of the shadow economy increases by 0.1233, *ceteris paribus*. At the mean number of binding conditions, 8.5999, this corresponds to an average increase of the shadow economy by 1.06 ( $= 0.1233 \times 8.5999$ ) percentage points, all other factors held constant.

Outside of the conditionality channel, the sign of IMF program participation remains positive, significant and its magnitude depends on the model specification. An increase in IMF participation by one standard deviation (specification 6) results in an increase in the shadow economy by 0.3380 ( $= 0.9890 \times 0.3418$ ) which corresponds to approximately 2.6% of its standard deviation. Results on the control variables maintain their direction effects, with slight changes in the significance level, and we refrain from discussing these from now on. Diagnostic statistics show that the compound instrument for program participation is strong across Specification 3 and 5 (Kleibergen-Paap statistics of 151.82 and 149.76, respectively).<sup>25</sup> In Specification 6, where we use compound instrumentation for program participation and conditionality, Kleibergen-Paap statistics confirm the

---

<sup>25</sup> Staiger and Stock (1997) suggest that F-statistics of instrumental variables should be larger than ten to ensure that the maximum bias in IV estimators to be less than 10% (Staiger-Stock rule of thumb).

validity of compound instruments (37.54 for conditionality instrument and 134.69 for participation instrument). Also, the instruments are jointly relevant, F-statistic of 177.88.<sup>26</sup>

In the selection model (specifications 3, 5 and 6), the compound instrument for IMF participation is highly significant ( $p < 0.01$ ) with a positive sign. This means that given the budget constrain of the Fund (approximated by the liquidity ratio), a higher mean exposure to IMF programs makes future participation more likely (Forster et al., 2019b). Most of the variables are insignificant at standard thresholds, nevertheless, one determinant of IMF participation is past IMF programs ( $p < 0.01$ ). Higher GDP per capita is significantly linked to a lower probability of obtaining an IMF program. We also find evidence that democratic regimes are more likely to sign an IMF arrangement ( $p < 0.05$ , specifications 3 and 5). Turning to IMF conditionality equation (specification 6), we find that the compound instrument is strongly correlated with the number of conditions.

**Insert Table 3 about here**

## 4.2 Further analyses

---

<sup>26</sup> As further test of robustness, we examine our main results using alternative instruments for IMF participation. The alternative instrumental variables include United Nations General Assembly (UNGA) voting similarity with the US (as it is documented, all else equal, countries that vote similarly to the US are more likely to participate in IMF programs (Dreher and Gassebner, 2012; Steinwand and Stone, 2008; Woo, 2013)), United Nations Security Council (UNSC) temporary membership (UNSC membership can certainly affect IMF's decision to extend a program to a country (Caraway et al., 2012; Chwioroth, 2015; Dreher and Jensen, 2007; Dreher et al., 2015; Nelson, 2014; Woo, 2013)) and a compound instrument that is the interaction of the within-country average of IMF program participation across period of interest with the Fund's budget constraint, approximated by the number of countries with an IMF program in a given year (Forster et al., 2019a; Vreeland, 2003) (as it is highlighted if the IMF need to assist more countries, its liquid resources become more constrained and so it tends to sign fewer new lending programs (Dreher and Vaubel, 2004; Lang, 2016; Vreeland, 2003)). Using these alternative instruments to account for the endogeneity of IMF participation do not substantively alter the results, however only the compound instrument appears to be valid. The results are reported in Table A2 of the Appendix.

In this part of our analyses we examine the effect of IMF intervention on the shadow economy using alternative conditionality variables, presented in Table 4.<sup>27</sup> In some cases, the Fund’s executive board can waive certain conditions in order to help countries pass the staff review without program terminations (Babb and Carruthers, 2008) and the eligible country can continue draw on the loan funds in pre-specified intervals (Pop-Eleches, 2009; Stone, 2004). To account for this, we use an implemented-corrected count of conditions, which subtracts conditions waived by the IMF. As shown in Specification 1, the estimated coefficients on IMF participation and conditions remain positive and significant. Next, we consider an implementation-discounted binding condition count, which discount conditions during the interruption period in case of delayed program review.<sup>28</sup> In Specification 2, the results adopting an implementation-discounted measure of conditions remain substantively the same. In Specification 3, we perform the same analysis using a combined (binding and non-binding) measure of conditions. The estimated coefficient on combined conditions remains positive and significant ( $p < 0.05$ ); however, the coefficient declines in magnitude.<sup>29</sup> Diagnostic statistics across all specifications indicate that our compound instruments remain strong.

Furthermore, we conduct our analyses based on the quantitative-structural divide of conditionality, comparing the effect of two different conditionality types on the size of the unofficial economy. In Figure 1, we visualize the total count of structural and quantitative conditions per year in our sample. As we include two IMF conditionality variables in the model, compound instrumentation for each conditionality profile is the interaction of the within-country average of the conditionality type with the year-on-year IMF budget constraint (Stubbs et al., 2018), while for IMF participation we use

---

<sup>27</sup> All specifications of Table 2 use our preferred identification strategy (IV estimates for program participation and conditionality), addressing the endogeneity issues.

<sup>28</sup> Using implementation corrected and discounted conditions our sample period is slightly reduced, since these counts of conditions are not available beyond 2009.

<sup>29</sup> As it is pointed out by Stubbs et al. (2017), the inclusion of non-binding conditions may introduce noise to the analysis.

the same compound instrumentation as above. In Specification 4, the estimated coefficient on structural conditions is positive and statistically significant, one structural condition increases the shadow economy by 0.3083 percentage points ( $p < 0.01$ ), all else equal; quantitative conditions do not have a significant impact. At the mean number of structural conditions, 1.6738, the predicted change in the size of the shadow economy is 0.5160 ( $= 0.3083 \times 1.6738$ ). Diagnostic statistics show that this instrumentation strategy is valid.<sup>30</sup>

**Insert Figure 1 about here**

**Insert Table 4 about here**

In Table 5, we augment our models by including additional explanatory variables in separate specifications.<sup>31</sup> We control for political stability, omitted in the baseline models due to concerns of multicollinearity with democracy. As we argue in Section 2, it is expected to be negatively correlated with the shadow economy (e.g., Elbahnasawy et al., 2016; Torgler and Schneider, 2009). Further, we account for the cost of bureaucracy, higher bureaucracy costs may lead individuals to go underground (Friedman et al., 2000). In addition, we add to the vector of controls a variable which is related with the enforcement of the law, namely the rule of law. As previous studies have shown, a weaker legal environment is associated with a larger unofficial economy (e.g., Berdiev et al., 2018; Friedman et al., 2000; Torgler and Schneider, 2009). We include the cost of starting a business, according to Goel et al. (2016), greater startup costs increase entry of shadow

---

<sup>30</sup> We replicate our findings using an alternative proxy for the shadow economy from Elgin and Oztunali (2012) who estimate the size of the shadow economy (% of GDP) by employing a two-sector dynamic general equilibrium model. Using this alternative proxy for the shadow economy, we show that, while IMF participation (binary variable) is found to be statistically insignificant throughout, IMF binding conditions (specification 1), implemented-corrected conditions (specification 2), implemented-discounted conditions (specification 3), binding and non-binding conditions (specification 4), and structural conditions (specification 5) all have a positive and statistically significant coefficient. The results of this exercise are reported in Table A3 of the Appendix.

<sup>31</sup> A description of these variables is also provided in Table 1 and summary statistics are reported in Table 2.

entrepreneurs. Finally, we account for the top marginal tax rate, high taxes increase the cost of doing business, which may induce some firms to the shadow sector (Gërxhani, 2004; Herwartz et al., 2011; Schneider and Enste, 2000).<sup>32</sup> Recall that these variables are excluded from the baseline analyses since they block potential pathways we aim to measure. For instance, by controlling for bureaucracy costs, we do not allow for IMF programs to affect the size of the shadow economy through the hollowing out of state capacity (Reinsberg et al., 2019a).

The inclusion of political stability, bureaucracy costs, rule of law and top income tax rate do not affect any of our analyses. When we include the cost of starting a business (specification 4), the variable of IMF program participation turns insignificant, however, the coefficient on IMF conditions remains positive and statistically significant ( $p < 0.01$ ). Political stability (specification 1) and the rule of law (specification 3) are important (and statistically significant ( $p < 0.05$ )) predictors of the shadow economy, and as we expected they both have a negative sign. Nonetheless, the results remain substantively the same and statistically significant compared to our baseline analyses (Table 3), with the exception of the specification 4 where we include the cost of starting a business and the variable of IMF participation turns insignificant.

#### **Insert Table 5 about here**

Finally, we examine how financial development with IMF conditions co-determines the shadow economy (Table 6). It is documented that the financial sector can have a direct effect on the informal economy (e.g., Antunes and Cavalcanti, 2007; Beck and Hoseini, 2014; Beck et al., 2014; Dabla-Norris et al., 2008; Ellul et al., 2015). Specifically, financial development is found to reduce the size of the shadow economy, as the development of financial sector decreases the barriers attaining capital, facilitate entrepreneurs access to needed credit, increases the opportunity cost of producing in the underground economy,

---

<sup>32</sup> Inclusion of the additional variables in separate specifications reduces the number of observations.

which in turn, encourage economic agents to transition from the informal sector to the formal sector where they can make productive investments (e.g., Berdiev and Saunoris, 2016; Blackburn et al., 2012; Bose et al., 2012; Capasso and Jappelli, 2013; Straub, 2005).

Having this in mind, we use data from Svirydzenka (2016), who constructed an index of financial development,<sup>33</sup> and we provide evidence on the relationship between IMF intervention, financial development and the shadow economy by including in our analysis the index of financial development and the interaction term of financial development with IMF conditions. We do this not only to examine the impact of financial development, but also to test the effect of IMF conditions on the size of the shadow economy conditional upon financial development. We find that financial development has a negative effect on the size of the shadow economy ( $p < 0.10$ ). The coefficient on IMF conditions remains positive and statistically significant ( $p < 0.01$ ). The interaction term is negative, but statistically insignificant. We then examine the marginal effect of the interaction term (L. IMF conditions \* L. Financial development) for different values of financial development index (results for the marginal effects are provided at the bottom of Table 6). Our results indicate that as the value of financial development is increasing the marginal effects of IMF conditions slightly decrease, however, the sign of the reported marginal effects remains positive for all different values of financial development, indicating that, while a higher level of financial development leads to a smaller shadow economy, financial development is unable to reverse the adverse effect from IMF conditions.

**Insert Table 6 about here**

---

<sup>33</sup> The index of financial development is a relative ranking of countries composed of eight sub-indexes that summarize how developed financial markets and financial institutions are along three dimensions (depth, access, and efficiency) using a large number of indicators. It ranges between 0 and 1 (higher values more developed).

## 5 Concluding remarks

In this paper we provide new insights regarding the impact of IMF program participation and conditionality on the size of the informal economy using a world sample over the 1991-2014 period. Our baseline results suggest that both IMF participation and IMF-mandated conditions increase the size of the shadow economy after controlling for politico-economic factors and endogeneity. Once we differentiate IMF conditions, we show that structural conditions are significantly related to a larger shadow economy, nevertheless quantitative conditions have no significant effect on the size of the shadow economy. Finally, financial development, a crucial factor of the underground activities, is negatively linked to the informal economy, however it cannot reverse the detrimental effect of IMF conditionality.

Our results have important policy implications. As it is already mentioned, quantitative conditions, those conditions which provide countries with a form of flexibility in the construction of policy reforms, do not exert a significant effect on the size of the shadow economy. Therefore, with respect to quantitative conditions, recipient countries have to properly choose a combination of policy reforms which, on the one hand, can reduce the multi-dimensional phenomenon of shadow economy and on the other hand, those reforms that have the least (or no) negative effects on the well-functioning of country's economy. In addition, the Fund's process for selecting lending conditions should follow a new policy agenda, the core policy strategies should be designed with the involvement of country's authorities and civil society, which aims to reduce the size of the informal sector (recommended policies may include e.g. improving regulation and institutional quality, tax administration improvements, labour market reforms and policy actions to develop human capital (Kelmanson et al., 2019)). We believe that these specialized policy reforms could effectively moderate the large size of the informal economy, taking into consideration country-specific characteristics and avoiding one-size-fits-all policies in diverse country settings.

## References

- Abouharb, M. R., & Cingranelli, D. (2007). Human rights and structural adjustment. Cambridge University Press. <http://dx.doi.org/10.1017/CBO9780511551055>
- Antunes, A. R., & Cavalcanti, T. V. de V. (2007). Start up costs, limited enforcement, and the hidden economy. *European Economic Review*, 51(1), 203–224. <http://dx.doi.org/10.1016/j.euroecorev.2005.11.008>
- Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies*, 58(2), 277–297. <https://doi.org/10.2307/2297968>
- Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, 68, 29–51. [https://doi.org/10.1016/0304-4076\(94\)01642-d](https://doi.org/10.1016/0304-4076(94)01642-d)
- Auvinen, J. Y. (1996). IMF intervention and political protest in the third world: a conventional wisdom refined. *Third World Quarterly*, 17(3), 377–400. <https://doi.org/10.1080/01436599615425>
- Babb, S. L., & Carruthers, B. G. (2008). Conditionality: forms, function, and history. *Annual Review of Law and Social Science*, 4, 13–29. <https://doi.org/10.1146/annurev.lawsocsci.4.110707.172254>
- Bagachwa, M. S. D., & Naho, A. (1995). Estimating the second economy in Tanzania. *World Development*, 23(8), 1387–1399. [https://doi.org/10.1016/0305-750x\(95\)00055-h](https://doi.org/10.1016/0305-750x(95)00055-h)
- Ball, L., Furceri, D., Leigh, D., & Loungani, P. (2013). The Distributional Effects of Fiscal Austerity. IMF Working Paper 13/151 (Washington: International Monetary Fund).



- Barro, R. J., & Lee, J.-W. (2005). IMF programs: Who is chosen and what are the effects? *Journal of Monetary Economics*, 52(7), 1245–1269. <https://doi.org/10.1016/j.jmoneco.2005.04.003>
- Beck, T. & Hoseini, M. (2014). Informality and access to finance: evidence from India. CentER Discussion Paper Series No. 2014-052. Available at SSRN: <https://ssrn.com/abstract=2491466> or <http://dx.doi.org/10.2139/ssrn.2491466>
- Beck, T., Lin, C., & Ma, Y. (2014). Why do firms evade taxes? The role of information sharing and financial sector outreach. *The Journal of Finance*, 69(2), 763–817. <http://dx.doi.org/10.1111/jofi.12123>
- Berdiev, A. N., & Saunoris, J. W. (2016). Financial development and the shadow economy: A panel VAR analysis. *Economic Modelling*, 57, 197–207. <http://dx.doi.org/10.1016/j.econmod.2016.03.028>
- Berdiev, A. N., & Saunoris, J. W. (2018). Does globalisation affect the shadow economy? *The World Economy*, 41(1), 222–241. <https://doi.org/10.1111/twec.12549>
- Berdiev, A. N., Saunoris, J. W., & Schneider, F. (2018). Give Me Liberty, or I Will Produce Underground: Effects of Economic Freedom on the Shadow Economy. *Southern Economic Journal*, 85(2), 537–562. <https://doi.org/10.1002/soej.12303>
- Bird, G. (2009). Reforming IMF conditionality: From “streamlining” to “major overhaul.”. *World Economics*, 10(3), 81–104.
- Blackburn, K., Bose, N., & Capasso, S. (2012). Tax evasion, the underground economy and financial development. *Journal of Economic Behavior & Organization*, 83(2), 243–253. <http://dx.doi.org/10.1016/j.jebo.2012.05.019>

- Blanton, R. G., & Peksen, D. (2016). Economic liberalisation, market institutions and labour rights. *European Journal of Political Research*, 55(3), 474-491.  
<https://doi.org/10.1111/1475-6765.12137>
- Blanton, R. G., Blanton, S. L., & Peksen, D. (2015). The impact of IMF and World Bank programs on labor rights. *Political Research Quarterly*, 68(2), 324-336.  
<https://doi.org/10.1177/1065912915578462>
- Blanton, R. G., Early, B., & Peksen, D. (2018). Out of the shadows or into the dark? Economic openness, IMF programs, and the growth of shadow economies. *The Review of International Organizations*, 13(2), 309-333.  
<https://doi.org/10.1007/s11558-018-9298-3>
- Bose, N., Capasso, S., & Andreas Wurm, M. (2012). The impact of banking development on the size of shadow economies. *Journal of Economic Studies*, 39(6), 620-638.  
<https://doi.org/10.1108/01443581211274584>
- Breusch, T. (2016). Estimating the underground economy using MIMIC models. *Journal of Tax Administration* 2:1-29.  
<http://jota.website/index.php/JoTA/article/view/70>
- Brun J.-F., Chambas G. & Laporte B. (2011). IMF Programs and Tax Effort What Role for Institutions in Africa?. *CERDI Etudes et Documents*, 2010.33.
- Buehn, A., & Schneider, F. (2012). Shadow economies around the world: novel insights, accepted knowledge, and new estimates. *International tax and public finance*, 19(1), 139-171. <https://doi.org/10.1007/s10797-011-9187-7>
- Bun, M. J. G., & Harrison, T. D. (2018). OLS and IV estimation of regression models including endogenous interaction terms. *Econometric Reviews*, 1-14.  
<https://doi.org/10.1080/07474938.2018.1427486>

- Burgess, K. (2010). Global pressures, national policies, and labor rights in Latin America. *Studies in Comparative International Development*, 45(2), 198-224. <https://doi.org/10.1007/s12116-010-9063-y>
- Campbell, E. (2005). Formalizing the informal economy: Somali refugee and migrant trade networks in Nairobi. In *Global migration perspectives 47*. Geneva: Global Commission on International Migration.
- Capasso, S., & Jappelli, T. (2013). Financial development and the underground economy. *Journal of Development Economics*, 101, 167–178. <https://doi.org/10.1016/j.jdeveco.2012.10.005>
- Caraway, T. L., Rickard, S. J., & Anner, M. S. (2012). International Negotiations and Domestic Politics: The Case of IMF Labor Market Conditionality. *International Organization*, 66(01), 27–61. <https://doi.org/10.1017/s0020818311000348>
- Casper, B. A. (2015). IMF Programs and the Risk of a Coup d'état. *Journal of Conflict Resolution*, 61(5), 964–996. <https://doi.org/10.1177/0022002715600759>
- Chaudhuri, K., Schneider, F., & Chattopadhyay, S. (2006). The size and development of the shadow economy: An empirical investigation from states of India. *Journal of Development Economics*, 80(2), 428–443. <http://dx.doi.org/10.1016/j.jdeveco.2005.02.011>.
- Chletsos, M., & Sintos, A. (2020). The Effects of IMF Conditional Programs on the Unemployment Rate. Available at SSRN 3515996. <https://doi.org/10.2139/ssrn.3515996>
- Chwiero, J. M. (2015). Professional ties that bind: how normative orientations shape IMF conditionality. *Review of International Political Economy*, 22(4), 757-787. <https://doi.org/10.1080/09692290.2014.898214>

- Contini, B. (1981). Labor Market Segmentation and the Development of the Parallel Economy: The Italian Experience. *Oxford Economic Papers*, 33(3), 401–412. <https://doi.org/10.1093/oxfordjournals.oep.a041515>
- Crivelli, E. (2013). Fiscal impact of privatization revisited: The role of tax revenues in transition economies. *Economic Systems*, 37(2), 217–232. <https://doi.org/10.1016/j.ecosys.2012.11.003>
- Crivelli, E., & Gupta, S. (2015). Does conditionality in IMF-supported programs promote revenue reform? *International Tax and Public Finance*, 23(3), 550–579. <https://doi.org/10.1007/s10797-015-9379-7>
- D’Hernoncourt, J., & Méon, P.-G. (2012). The not so dark side of trust: Does trust increase the size of the shadow economy? *Journal of Economic Behavior & Organization*, 81(1), 97–121. <https://doi.org/10.1016/j.jebo.2011.09.010>
- Dabla-Norris, E., Gradstein, M., & Inchauste, G. (2008). What causes firms to hide output? The determinants of informality. *Journal of Development Economics*, 85(1-2), 1–27. <https://doi.org/10.1016/j.jdeveco.2006.05.007>
- Daoud, A., & Reinsberg, B. (2019). Structural adjustment, state capacity and child health: evidence from IMF programmes. *International journal of epidemiology*, 48(2), 445–454. <https://doi.org/10.1093/ije/dyy251>
- Daoud, A., Reinsberg, B., Kentikelenis, A. E., Stubbs, T. H., & King, L. P. (2019). The International Monetary Fund’s interventions in food and agriculture: An analysis of loans and conditions. *Food policy*, 83, 204–218. <https://doi.org/10.1016/j.foodpol.2019.01.005>
- Dell’Anno, R., & Schneider, F. (2003). The shadow economy of Italy and other OECD countries: What do we know? *Journal of Public Finance and Public Choice*, 31, 97–120. <http://dx.doi.org/10.1332/251569203X15668905422009>

- Dell'Anno, R., Gómez-Antonio, M., & Pardo, A. (2007). The shadow economy in three Mediterranean countries: France, Spain and Greece. A MIMIC approach. *Empirical Economics*, 33(1), 51-84. <https://doi.org/10.1007/s00181-006-0084-3>
- Detraz, N., & Peksen, D. (2015). The Effect of IMF Programs on Women's Economic and Political Rights. *International Interactions*, 42(1), 81-105. <https://doi.org/10.1080/03050629.2015.1056343>
- Dreher, A. (2003). The influence of elections on IMF programme interruptions. *Journal of Development Studies*, 39(6), 101-120. <https://doi.org/10.1080/00220380312331293597>
- Dreher, A. (2004). The Influence of IMF Programs on the Re-election of Debtor Governments. *Economics and Politics*, 16(1), 53-76. <https://doi.org/10.1111/j.1468-0343.2004.00131.x>
- Dreher, A. (2006). IMF and economic growth: The effects of programs, loans, and compliance with conditionality. *World Development*, 34(5), 769-788. <https://doi.org/10.1016/j.worlddev.2005.11.002>
- Dreher, A., & Gassebner, M. (2012). Do IMF and World Bank Programs Induce Government Crises? An Empirical Analysis. *International Organization*, 66(02), 329-358. <https://doi.org/10.1017/s0020818312000094>
- Dreher, A., & Jensen, N. M. (2007). Independent Actor or Agent? An Empirical Analysis of the Impact of U.S. Interests on International Monetary Fund Conditions. *The Journal of Law and Economics*, 50(1), 105-124. <https://doi.org/10.1086/508311>
- Dreher, A., & Langlotz, S. (2017). Aid and growth: New evidence using an excludable instrument. Discussion Paper No. 635. Heidelberg. <https://doi.org/10.11588/heidok.00023147>

- Dreher, A., & Schneider, F. (2009). Corruption and the shadow economy: an empirical analysis. *Public Choice*, 144(1-2), 215–238. <https://doi.org/10.1007/s11127-009-9513-0>
- Dreher, A., & Vaubel, R. (2004). The causes and consequences of IMF conditionality. *Emerging Markets Finance and Trade*, 40(3), 26-54. <https://doi.org/10.1080/1540496X.2004.11052571>
- Dreher, A., & Walter, S. (2010). Does the IMF help or hurt? The effect of IMF programs on the likelihood and outcome of currency crises. *World Development*, 38(1), 1-18. <https://doi.org/10.1016/j.worlddev.2009.05.007>
- Dreher, A., Fuchs, A., & Langlotz, S. (2019). The effects of foreign aid on refugee flows. *European Economic Review*, 112, 127-147. <https://doi.org/10.1016/j.eurocorev.2018.12.001>
- Dreher, A., Sturm, J. E., & Vreeland, J. R. (2015). Politics and IMF conditionality. *Journal of Conflict Resolution*, 59(1), 120-148. <https://doi.org/10.1177/0022002713499723>
- Dreher, A., Kotsogiannis, C., & McCorriston, S. (2009a). How do institutions affect corruption and the shadow economy?. *International Tax and Public Finance*, 16(6), 773. <https://doi.org/10.1007/s10797-008-9089-5>
- Dreher, A., Sturm, J.-E., & Vreeland, J. R. (2009b). Development aid and international politics: Does membership on the UN Security Council influence World Bank decisions? *Journal of Development Economics*, 88, 1–18. <https://doi.org/10.1016/j.jdeveco.2008.02.003>
- Dybka, P., Kowalczyk, M., Olesiński, B., Torój, A., & Rozkrut, M. (2019). Currency demand and MIMIC models: towards a structured hybrid method of measuring the

- shadow economy. *International Tax and Public Finance*, 26(1), 4-40.  
<https://doi.org/10.1007/s10797-018-9504-5>
- Easterly, W. (2005). What did structural adjustment adjust?: The association of policies and growth with repeated IMF and World Bank adjustment loans. *Journal of development economics*, 76(1), 1-22. <https://doi.org/10.1016/j.jdeveco.2003.11.005>
- Elbahnasawy, N. G., Ellis, M. A., & Adom, A. D. (2016). Political Instability and the Informal Economy. *World Development*, 85, 31-42.  
<https://doi.org/10.1016/j.worlddev.2016.04.009>
- Elgin, C., & Oyvat, C. (2013). Lurking in the cities: Urbanization and the informal economy. *Structural Change and Economic Dynamics*, 27, 36-47.  
<https://doi.org/10.1016/j.strueco.2013.06.003>
- Elgin, C., & Oztunali, O. (2012). Shadow economies around the world: model based estimates. *Bogazici University Department of Economics Working Papers*, 5(2012), 1-48.
- Ellul, A., Jappelli, T., Pagano, M., & Panunzi, F. (2015). Transparency, Tax Pressure, and Access to Finance. *Review of Finance*, 20(1), 37-76.  
<https://doi.org/10.1093/rof/rfv005>
- Fleming, M., Roman, J., & Farrell, G. (2000). The Shadow Economy. *Journal of International Affairs*, 53:387-409. <https://hdl.handle.net/2134/642>
- Forster, T., Kentikelenis, A. E., Reinsberg, B., Stubbs, T. H., & King, L. P. (2019a). How structural adjustment programs affect inequality: A disaggregated analysis of IMF conditionality, 1980-2014. *Social science research*, 80, 83-113.  
<https://doi.org/10.1016/j.ssresearch.2019.01.001>

- Forster, T., Kentikelenis, A. E., Stubbs, T. H., & King, L. P. (2019b). Globalization and health equity: The impact of structural adjustment programs on developing countries. *Social Science & Medicine*, 112496. <https://doi.org/10.1016/j.socscimed.2019.112496>
- Friedman, E., Johnson, S., Kaufmann, D., & Zoido-Lobaton, P. (2000). Dodging the grabbing hand: the determinants of unofficial activity in 69 countries. *Journal of Public Economics*, 76(3), 459–493. [https://doi.org/10.1016/s0047-2727\(99\)00093-6](https://doi.org/10.1016/s0047-2727(99)00093-6)
- Gërxxhani, K. (2004). The Informal Sector in Developed and Less Developed Countries: A Literature Survey. *Public Choice*, 120(3/4), 267–300. <https://doi.org/10.1023/B:PUCH.0000044287.88147.5e>
- Giles, D. E. A. (1999). Measuring the Hidden Economy: Implications for Econometric Modelling. *The Economic Journal*, 109(456), 370–380. <https://doi.org/10.1111/1468-0297.00440>
- Goel, R. K., & Nelson, M. A. (2016). Shining a light on the shadows: Identifying robust determinants of the shadow economy. *Economic Modelling*, 58, 351–364. <https://doi.org/10.1016/j.econmod.2016.06.009>
- Goel, R. K., & Saunoris, J. W. (2019). Does variability in crimes affect other crimes? The case of international corruption and shadow economy. *Applied Economics*, 51(3), 239–258. <https://doi.org/10.1080/00036846.2018.1494378>
- Goel, R. K., Saunoris, J. W., & Schneider, F. (2019). Drivers of the underground economy for over a century: A long term look for the United States. *The Quarterly Review of Economics and Finance*, 71, 95–106. <https://doi.org/10.1016/j.qref.2018.07.005>



- Gunaydin, H. (2018). Who Can Reform the Labor Market? IMF Conditionality, Partisanship, and Labor Unions. *International Interactions*, 44(5), 888-918. <https://doi.org/10.1080/03050629.2018.1448807>
- Gwartney, J. D., Lawson, R. A., Hall, J., & Murphy, R. (2019). Economic Freedom Dataset, published in *Economic Freedom of the World: 2019 Annual Report*. Fraser Institute. Available at: [www.fraserinstitute.org/economic-freedom/dataset](http://www.fraserinstitute.org/economic-freedom/dataset)
- Hartzell, C. A., Hoddie, M., & Bauer, M. (2010). Economic Liberalization via IMF Structural Adjustment: Sowing the Seeds of Civil War? *International Organization*, 64(02), 339. <https://doi.org/10.1017/s0020818310000068>
- Herwartz, H., Schneider, F., & Tafenau, E. (2011). Regional patterns of the shadow economy: modelling issues and evidence from the European Union". In F. Schneider (Ed.), *Handbook on the shadow economy*, Cheltenham: Edward Elgar. <http://dx.doi.org/10.4337/9780857930880.00013>
- Hunter, L. Y., & Biglaiser, G. (2020). The Effects of the International Monetary Fund on Domestic Terrorism. *Terrorism and Political Violence*, 1–25. <https://doi.org/10.1080/09546553.2019.1709448>
- Ihrig, J., & Moe, K. S. (2004). Lurking in the shadows: the informal sector and government policy. *Journal of Development Economics*, 73(2), 541–557. <https://doi.org/10.1016/j.jdeveco.2003.04.004>
- IMF. (2012). IMF lending. Available from <http://www.imf.org/external/np/exr/facts/howlend.htm>
- IMF. (2016). World Economic Outlook Data: April 2016 Edition. Retrieved February 5, 2016, from <https://www.imf.org/external/pubs/ft/weo/2016/01/weodata/index.aspx>

- IMF. (2019). IMF Policy Paper - 2018 Review of Program Design and Conditionality. USA: INTERNATIONAL MONETARY FUND. <https://doi.org/10.5089/9781498315715.007>
- Johnson, S., Kaufmann, D. & Zoido-Lobaton, P. (1998). Regulatory Discretion and the Unofficial Economy. *The American Economic Review*, 88(2): 387–392.
- Johnson, S., Kaufmann, D., & Shleifer, A. (1997). The unofficial economy in transition. *Brookings Papers on Economic Activity*, 2, 159–239. <http://dx.doi.org/10.2307/2534688>
- Kaufmann, D., Kraay, A., & Mastruzzi, M. (2010). The worldwide governance indicators: A summary of methodology. *Data and Analytical Issues*, World Bank Policy Research Working Paper, 5430. <https://doi.org/10.1596/1813-9450-5430>
- Kelmanson, B., Kirabaeva, K., Medina, L., Mircheva, B., & Weiss, J. (2019). IMF Working Paper - Explaining the Shadow Economy in Europe: Size, Causes and Policy Options. USA: INTERNATIONAL MONETARY FUND. <https://doi.org/10.5089/9781513520698.001>
- Kentikelenis, A. E., & Seabrooke, L. (2017). The Politics of World Polity: Script-writing in International Organizations. *American Sociological Review*, 82(5), 1065–1092. <https://doi.org/10.1177/0003122417728241>
- Kentikelenis, A., Stubbs, T., & King, L. (2016). IMF conditionality and development policy space, 1985-2014. *Review of International Political Economy*, 23(4), 543–582. <http://dx.doi.org/10.1080/09692290.2016.1174953>
- Kern, A., Reinsberg, B., & Rau-Göhring, M. (2019). IMF conditionality and central bank independence. *European Journal of Political Economy*, 59, 212-229. <https://doi.org/10.1016/j.ejpoleco.2019.03.002>

- La Porta, R., & Shleifer, A. (2009). The Unofficial Economy and Economic Development. *Brookings Papers on Economic Activity*, 2008(2), 275–363. <https://doi.org/10.1353/eca.0.0016>
- Lang, V. F. (2016). The economics of the democratic deficit: The effect of IMF programs on inequality. Discussion Paper No. 617. Heidelberg. <https://doi.org/10.11588/heidok.00021875>
- Loayza, N. V. (1996). The economics of the informal sector: a simple model and some empirical evidence from Latin America. *Carnegie-Rochester Conference Series on Public Policy*, 45, 129–162. [https://doi.org/10.1016/S0167-2231\(96\)00021-8](https://doi.org/10.1016/S0167-2231(96)00021-8)
- Loayza, N. V., Servén, L., & Sugawara, N. (2009). Informality in latin america and the caribbean. No. 4888. Washington, DC: The World Bank. <https://doi.org/10.1596/1813-9450-4888>
- Mai, H., & Schneider, F. (2016). Size and development of the shadow economies of 157 worldwide countries: Updated and new measures from 1999 to 2013. *Journal of Global Economics*, 4(3), 1-15. <https://doi.org/10.4172/2375-4389.1000218>
- Medina, L., & Schneider, F. (2018). Shadow economies around the world: what did we learn over the last 20 years? *International Monetary Fund working papers*, African Department, Washington, DC. <http://dx.doi.org/10.5089/9781484338636.001>
- Moser, C., & Sturm, J.-E. (2011). Explaining IMF lending decisions after the Cold War. *The Review of International Organizations*, 6(3-4), 307–340. <https://doi.org/10.1007/s11558-011-9120-y>
- Neck, R., Wächter, J. U., & Schneider, F. (2012). Tax avoidance versus tax evasion: on some determinants of the shadow economy. *International Tax and Public Finance*, 19(1), 104-117. <https://doi.org/10.1007/s10797-011-9197-5>

- Nelson, S. C. (2014). Playing Favorites: How Shared Beliefs Shape the IMF's Lending Decisions. *International Organization*, 68(02), 297–328. <https://doi.org/10.1017/s0020818313000477>
- Nelson, S. C., & Wallace, G. P. R. (2017). Are IMF lending programs good or bad for democracy? *Review of International Organizations*, 12(4), 523–558. <https://doi.org/10.1007/s11558-016-9250-3>.
- Nizalova, O. Y., & Murtazashvili, I. (2016). Exogenous Treatment and Endogenous Factors: Vanishing of Omitted Variable Bias on the Interaction Term. *Journal of Econometric Methods*, 5(1). <https://doi.org/10.1515/jem-2013-0012>
- Nunn, N., & Qian, N. (2014). US food aid and civil conflict. *American Economic Review*, 104(6), 1630–1666. <https://doi.org/10.1257/aer.104.6.1630>
- Pop-Eleches, G. (2009). Public goods or political pandering: Evidence from IMF programs in Latin America and Eastern Europe. *International Studies Quarterly*, 53(3), 787–816. <https://doi.org/10.1111/j.1468-2478.2009.00556.x>
- Przeworski, A., & Vreeland, J. R. (2000). The effect of IMF programs on economic growth. *Journal of development Economics*, 62(2), 385–421. [https://doi.org/10.1016/S0304-3878\(00\)00090-0](https://doi.org/10.1016/S0304-3878(00)00090-0)
- Reinsberg, B., Kentikelenis, A., Stubbs, T., & King, L. (2019a). The World System and the Hollowing Out of State Capacity: How Structural Adjustment Programs Affect Bureaucratic Quality in Developing Countries. *American Journal of Sociology*, 124(4), 1222–1257. <https://doi.org/10.1086/701703>
- Reinsberg, B., Stubbs, T., Kentikelenis, A., & King, L. (2019b). The political economy of labor market deregulation during IMF interventions. *International Interactions*, 1–28. <https://doi.org/10.1080/03050629.2019.1582531>

- Rickard, S. J., & Caraway, T. L. (2019). International demands for austerity: Examining the impact of the IMF on the public sector. *The Review of International Organizations*, 14(1), 35-57. <https://doi.org/10.1007/s11558-017-9295-y>
- Rickard, S., & Caraway, T. L. (2014). International negotiations in the shadow of national elections. *International Organization*, 68(3), 701–720. <https://doi.org/10.1017/S0020818314000058>
- Roodman, D. (2009a). Estimating Fully Observed Recursive Mixed-Process Models with Cmp. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.1392466>
- Roodman, D. (2009b). How to do Xtabond2: An Introduction to Difference and System GMM in Stata. *The Stata Journal: Promoting Communications on Statistics and Stata*, 9(1), 86–136. <https://doi.org/10.1177/1536867x0900900106>
- Roodman, D. (2011). Fitting Fully Observed Recursive Mixed-process Models with cmp. *The Stata Journal: Promoting Communications on Statistics and Stata*, 11(2), 159–206. <https://doi.org/10.1177/1536867x1101100202>
- Ross, M., & Mahdavi, P. (2015). Oil and gas data, 1932-2014. *Harvard Dataverse*, 2. <http://dx.doi.org/10.7910/DVN/ZTPW0Y>
- Saunoris, J. W., & Sajny, A. (2017). Entrepreneurship and economic freedom: cross-country evidence from formal and informal sectors. *Entrepreneurship & Regional Development*, 29(3-4), 292-316. <https://doi.org/10.1080/08985626.2016.1267806>
- Schneider, F. (2005). Shadow economies around the world: what do we really know?. *European Journal of Political Economy*, 21(3), 598-642. <https://doi.org/10.1016/j.ejpoleco.2004.10.002>
- Schneider, F. (2016). Comment on Feige’s paper “Reflections on the meaning and measurement of unobserved economies: What do we really know about the ‘shadow

- economy'?"'. *Journal of Tax Administration* 2:82–92.  
<http://jota.website/index.php/JoTA/article/view/108>
- Schneider, F., & Buehn, A. (2018). Shadow Economy: Estimation Methods, Problems, Results and Open questions. *Open Economics*, 1(1), 1-29.  
<https://doi.org/10.1515/openec-2017-0001>
- Schneider, F., & Enste, D. (2000). Shadow economies: size, causes, and consequences. *Journal of Economic Literature*, 38, 77–114. <https://doi.org/10.1257/jel.38.1.77>
- Schneider, F., Buehn, A., & Montenegro, C. E. (2010). New estimates for shadow economies all over the world. *International Economic Journal*, 24(4), 443–461.  
<https://doi.org/10.1080/10168737.2010.525974>
- Sidell, S. (1988). *The IMF and Third-world Political Instability: Is There a Connection?* New York: St. Martin's Press. <http://dx.doi.org/10.1007/978-1-349-09053-2>
- Skouras, S., & Christodoulakis, N. (2013). Electoral misgovernance cycles: evidence from wildfires and tax evasion in Greece. *Public Choice*, 159(3-4), 533–559.  
<https://doi.org/10.1007/s11127-013-0071-0>
- Staiger, D., & Stock, J. H. (1997). Instrumental variables regression with weak instruments. *Econometrica*, 65(3), 557. <https://doi.org/10.2307/2171753>
- Steinwand, M. C., & Stone, R. W. (2008). The International Monetary Fund: A review of the recent evidence. *The Review of International Organizations*, 3(2), 123–149.  
<https://doi.org/10.1007/s11558-007-9026-x>
- Stone, R. W. (2004). The political economy of IMF lending in Africa. *American Political Science Review*, 98(4), 577–591. <https://doi.org/10.1017/S000305540404136X>
- Stone, R. W. (2008). The scope of IMF conditionality. *International Organization*, 62(4), 589–620. <https://doi.org/10.1017/S0020818308080211>

- Stone, R. W. (2011). Controlling institutions: International organizations and the global economy. New York: Cambridge University Press.  
<https://doi.org/10.1017/CBO9780511793943>
- Straub, S. (2005). Informal sector: The credit market channel. *Journal of Development Economics*, 78(2), 299–321. <https://doi.org/10.1016/j.jdeveco.2004.09.005>
- Stubbs, T., & Kentikelenis, A. (2018). Targeted social safeguards in the age of universal social protection: The IMF and health systems of low-income countries. *Critical Public Health*, 28(2), 132–139. <https://doi.org/10.1080/09581596.2017.1340589>
- Stubbs, T., Kentikelenis, A., Stuckler, D., McKee, M., & King, L. (2017). The impact of IMF conditionality on government health expenditure: A cross-national analysis of 16 West African nations. *Social Science & Medicine*, 174, 220–227.  
<https://doi.org/10.1016/j.socscimed.2016.12.016>
- Stubbs, T., Reinsberg, B., Kentikelenis, A., & King, L. (2018). How to evaluate the effects of IMF conditionality. *The Review of International Organizations*.  
<https://doi.org/10.1007/s11558-018-9332-5>
- Sturm, J.-E., Berger, H., & de Haan, J. (2005). Which variables explain decisions on IMF credit? An extreme bounds analysis. *Economics and Politics*, 17(2), 177–213.  
<https://doi.org/10.1111/j.1468-0343.2005.00151.x>
- Svirydzienka, K. (2016). IMF Working Paper: Introducing a New Broad-based Index of Financial Development. USA: INTERNATIONAL MONETARY FUND.  
<https://doi.org/10.5089/9781513583709.001>
- Teobaldelli, D., & Schneider, F. (2013). The influence of direct democracy on the shadow economy. *Public Choice*, 157(3-4), 543–567. <https://doi.org/10.1007/s11127-013-0098-2>

- Teorell, J., Dahlberg, S., Holmberg, S., Rothstein, B., Khomenko, A., & Svensson, R. (2016). The Quality of Government Standard Data: Version January 2016. Retrieved February 28, 2016, from <http://qog.pol.gu.se/data/datadownloads/qogstandarddata>
- Thomas, J. (1999). Quantifying the Black Economy: “measurement Without Theory” Yet Again? *The Economic Journal*, 109(456), 381–389. <https://doi.org/10.1111/1468-0297.00441>
- Torgler, B., & Schneider, F. (2009). The impact of tax morale and institutional quality on the shadow economy. *Journal of Economic Psychology*, 30(2), 228–245. <https://doi.org/10.1016/j.joep.2008.08.004>
- Voeten, E., Strezhnev, A., & Bailey, M. (2016). United Nations General Assembly Voting Data: April 2016. Retrieved June 6, 2016, from <http://hdl.handle.net/1902.1/12379>
- Vreeland, J. (2007). *The International Monetary Fund: Politics of Conditional Lending*. London: Routledge. <http://dx.doi.org/10.4324/9780203962787>
- Vreeland, J. R. (2003). *The IMF and economic development*. Cambridge: Cambridge University Press. <https://doi.org/10.1017/CBO9780511615726>
- Woo, B. (2013). Conditional on Conditionality: IMF Program Design and Foreign Direct Investment. *International Interactions*, 39(3), 292–315. <https://doi.org/10.1080/03050629.2013.782303>
- Woolridge, J. M. (2002). *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: The MIT Press.
- Woolridge, J. M. (2006). *Introductory Econometrics: A Modern Approach*. 3rd edn. Mason, OH: Thomson-South Western.



Woolridge, J. M. (2009). Introductory Econometrics: A modern approach. 4rd edn.  
South-Western, Michigan State University, 378, 57.

World Bank. (2018). World Development Indicators. Retrieved January 11, 2019, from  
<http://data.worldbank.org>

**Table 1** Definition of variables, sources and coverage

Variable name	Definition	Source	Year coverage
Shadow (Medina and Schneider, 2018)	Size of the shadow economy measured as a percentage of official GDP, based on the multiple indicators, multiple causes (MIMIC) method.	Medina and Schneider (2018)	1991-2014 (All)
Shadow (Elgin and Oztunali, 2012)	Size of the shadow economy (% of GDP) calculated by employing a two-sector dynamic general equilibrium model.	Elgin and Oztunali (2012)	Ends 2009
IMF participation	Dummy variable: equals to 1 if IMF program active for 5 or more months in a year, 0 otherwise.	Kentikelenis et al. (2016)	All
All conditions (binding)	Total count of binding conditions in IMF program.	Kentikelenis et al. (2016)	All
Implementation corrected conditions	An implementation-corrected count (which subtracts conditions waived by the IMF) of conditions in IMF program.	Kentikelenis et al. (2016)	Ends 2008
All conditions, non-binding included	Total count of binding and non-binding conditions in IMF program.	Kentikelenis et al. (2016)	All
Implementation discounted conditions	An implementation-discounted count (which discounts conditions during program suspensions) of conditions in IMF program.	Kentikelenis et al. (2016)	Ends 2008
Structural conditions	Total count of disaggregated (structural) binding conditions concern a wider range of reforms in the domestic economy and afford governments less flexibility.	Kentikelenis et al. (2016)	All
Quantitative conditions	Total count of disaggregated (quantitative) binding conditions concern quantitative targets that countries have to meet and often maintain throughout the program period.	Kentikelenis et al. (2016)	All
IMF liquidity ratio (ln)	IMF liquid resources divided by liquid liabilities (ln).	Lang (2016)	Ends 2013
Countries under program	Number of countries participating in an IMF program (for at least five months in a given year).	Authors' calculation using Kentikelenis et al. (2016)	All
Financial development	Summarizes how developed financial markets and financial institutions are along three dimensions (depth, access, and efficiency) by country and year. It ranges between 0 and 1 (higher values more developed).	Svirydzenka (2016)	All
GDP growth	GDP growth (annual %).	World Bank (2018)	All
GDP per capita (ln)	ln GDP per capita (constant 2005 US\$).	World Bank (2018)	All
Executive election	Binary indicator variable for whether an executive election was held in a given year.	Teorell et al. (2016)	All
Regime Durability	Regime durability (total years of existence of current regime).	Teorell et al. (2016)	All
Democracy	Average of Freedom House and Imputed Polity measures of democracy, transformed to a scale of 0 to 10.	Teorell et al. (2016)	All

Government balance	Difference of general government revenue and general government total expenditure as a share of GDP (%).	IMF (2016)	All
Trade openness	The sum of exports and imports of goods and services measured as a share of GDP.	World Bank (2018)	All
Investments	Officially are named as gross capital formation (% of GDP) and it consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories.	World Bank (2018)	All
Bureaucracy costs	An indicator which captures, in the normal business operations, the costs from bureaucracy – the regulatory environment. This includes regulatory compliance and bureaucratic inefficiency and/or opacity. On a scale from 0 to 10; higher scores indicate lower cost.	Gwartney et al. (2019)	From 1995-
Political Stability	Measures perceptions of the likelihood that the government will be destabilized/overthrown, on a scale of -2.5–2.5 (higher scores indicate greater stability).	Kaufmann et al. (2010)	From 1996-
Starting a business	An indicator which captures the amount of time and money it takes to start a new limited-liability business. Countries where it takes longer or is more costly to start a new business are given lower scores, on a scale from 0 to 10.	Gwartney et al. (2019)	From 1995-
Dependency ratio	Population aged under 15 as a share of working-age population (%).	World Bank (2018)	All
Mineral rents	Mineral rents (% of GDP).	World Bank (2018)	All
Top marginal tax rate	An indicator measuring the top marginal tax rate. The indicator is on a scale of 0 to 10 with higher values denoting more freedom from taxes.	Gwartney et al. (2019)	From 1995-
Rule of Law	A perception-based index measuring the strength and quality of the rule of law, on a scale of -2.5–2.5 (with higher values denoting stronger rule of law).	Kaufmann et al. (2010)	From 1996-
UNGA voting alignment	Voting similarity index with US on a scale ranging from 0 to 1, where 1 is perfect similarity and 0 is perfect difference.	Voeten et al. (2016)	All
UNSC temporary membership	Dummy variables: = 1 if country is a temporary member of UNSC, 0 otherwise.	Dreher et al. (2009b)	All

---

**Table 2** Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Shadow (Medina and Schneider, 2018)	2,557	30.8859	13.1336	6.16	71.34
Shadow (Elgin and Oztunali, 2012)	1,954	32.0160	13.1543	8.07	79.06
IMF participation	2,557	0.3418	0.4744	0	1
All conditions (binding)	2,557	8.5999	15.1163	0	124
Implementation corrected conditions	2,035	8.8197	15.1564	0	114
All conditions, non-binding included	2,557	13.0223	21.6960	0	148
Implementation discounted conditions	2,035	7.7429	14.0496	0	93
Structural conditions	2,557	1.6738	4.6315	0	80
Quantitative conditions	2,557	6.9261	12.0251	0	63
IMF liquidity ratio (ln)	2,557	5.6788	0.7562	4.5431	7.1092
Countries under program	2,557	55.0473	9.0439	35	66
Financial development	2,550	0.3109	0.2273	0	1
GDP growth	2,557	3.9151	4.6374	-50.2481	38.2007
GDP per capita (ln)	2,554	8.0241	1.6586	4.9175	11.1432
Executive election	2,557	0.6007	0.4898	0	1
Regime Durability	2,557	26.6625	32.0175	0	203
Democracy	2,557	6.4527	3.0386	0	10
Government balance	2,557	-1.8570	5.8923	-46.2340	43.3030
Trade openness	2,557	80.6451	45.5209	15.2390	439.6567
Investments	2,557	23.6148	7.4981	1.0968	67.9105
Bureaucracy costs	1,237	5.3639	1.9389	0	10
Political Stability	1,795	-0.1249	0.9311	-2.8447	1.7601
Starting a business	1,394	8.1905	1.6057	0	9.98
Dependency ratio	2,557	52.6616	24.3339	15.5184	106.4515
Mineral rents	2,557	1.0567	3.4252	0	44.6443
Top marginal tax rate	1,263	6.9287	2.4575	0	10
Rule of Law	1,795	-0.0637	0.9816	-2.1300	2.0137
UNGA voting alignment	2,509	0.3397	0.1494	0	0.9412
UNSC temporary membership	2,447	0.0760	0.2651	0	1

**Table 3** Effect of IMF intervention on the shadow economy

<i>Dependent variable:</i>	(1)	(2)	(3)	(4)	(5)	(6)
	<i>Controls</i>			<i>Shadow economy</i>		
	<i>only</i>					
L. IMF participation		1.2712*** (0.2576)	1.6397*** (0.3710)	0.7890*** (0.2988)	1.1724*** (0.3778)	0.9890*** (0.3766)
L. IMF conditions				0.0208** (0.0082)	0.0217*** (0.0080)	0.1233*** (0.0409)
L. Dependency ratio	0.0387 (0.0360)	0.0313 (0.0333)	0.0302 (0.0318)	0.0302 (0.0331)	0.0290 (0.0316)	0.0126 (0.0311)
L. GDP growth	-0.0831*** (0.0206)	-0.0814*** (0.0201)	-0.0810*** (0.0193)	-0.0833*** (0.0200)	-0.0829*** (0.0193)	-0.0895*** (0.0191)
L. Democracy	-0.0732 (0.1514)	-0.1148 (0.1425)	-0.1243 (0.1357)	-0.1169 (0.1434)	-0.1275 (0.1365)	-0.1928 (0.1378)
L. Government balance	-0.0499 (0.0320)	-0.0545* (0.0318)	-0.0554* (0.0308)	-0.0563* (0.0318)	-0.0573* (0.0308)	-0.0733** (0.0335)
L. Trade openness	-0.0287*** (0.0108)	-0.0293*** (0.0106)	-0.0293*** (0.0102)	-0.0299*** (0.0105)	-0.0300*** (0.0102)	-0.0343*** (0.0102)
L. Investments	-0.0617** (0.0283)	-0.0596** (0.0268)	-0.0594** (0.0256)	-0.0589** (0.0267)	-0.0587** (0.0256)	-0.0519** (0.0253)
L. Mineral rents	-0.0837 (0.0712)	-0.0840 (0.0693)	-0.0839 (0.0665)	-0.0785 (0.0696)	-0.0781 (0.0669)	-0.0532 (0.0723)
Constant	50.5484*** (4.1074)	51.3874*** (3.7801)	21.1051*** (2.1053)	21.0820*** (2.1880)	21.1735*** (2.0876)	22.1474*** (1.9725)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Dependent variable:			L. IMF participation		L. IMF participation	
L. Participation compound			0.3804*** (0.0309)		0.3790*** (0.0310)	0.4027*** (0.0347)
L2. IMF participation			1.5842*** (0.0857)		1.5882*** (0.0857)	1.1682*** (0.0632)
L. Countries under program			0.0495 (0.0428)		0.0493 (0.0427)	0.0736* (0.0376)
L. GDP per capita			-0.1885*** (0.0642)		-0.1886*** (0.0641)	-0.1004** (0.0469)
L. Executive election			0.1205 (0.0891)		0.1202 (0.0888)	0.1454 (0.0889)
L. Regime Durability			-0.0031* (0.0018)		-0.0031* (0.0018)	-0.0007 (0.0015)
L. Dependency ratio			0.0000 (0.0035)		-0.0001 (0.0035)	0.0021 (0.0038)
L. GDP growth			-0.0072 (0.0092)		-0.0072 (0.0092)	-0.0031 (0.0088)
L. Democracy			0.0497*** (0.0162)		0.0497*** (0.0162)	0.0277 (0.0174)
L. Government balance			0.0169* (0.0098)		0.0168* (0.0098)	0.0019 (0.0082)

L. Trade openness	0.0009	0.0009	0.0002
	(0.0010)	(0.0010)	(0.0009)
L. Investments	-0.0046	-0.0045	-0.0072
	(0.0057)	(0.0057)	(0.0057)
L. Mineral rents	-0.0055	-0.0055	-0.0037
	(0.0092)	(0.0092)	(0.0103)
Constant	-3.6495	-3.6354	-5.0685**
	(2.4361)	(2.4344)	(2.1561)
Region fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Dependent variable:			L.
			Conditionality
L. Conditionality compound			-0.3872***
			(0.0632)
L. Dependency ratio			0.1745*
			(0.0894)
L. GDP growth			0.0858
			(0.0739)
L. Democracy			0.8617**
			(0.3565)
L. Government balance			0.1589*
			(0.0913)
L. Trade openness			0.0284
			(0.0175)
L. Investments			-0.0338
			(0.0755)
L. Mineral rents			-0.0965
			(0.2214)
Constant			-11.5171**
			(5.4552)
Country fixed effects			Yes
Year fixed effects			Yes
F-statistic for participation instrument	151.82	149.76	134.69
F-statistic for conditionality instrument			37.54
Joint F-statistic			177.88
Number of observations	2,557	2,557	2,557
Number of countries	141	141	141

F-tests are Kleibergen-Paap statistics. Standard errors robust at the country-level in brackets. Significance level is denoted by \*\*\* (1%), \*\* (5%) and \* (10%).

**Table 4** Effect of IMF intervention on the shadow economy, composite indicators of conditionality

Conditionality variable:	(1) Implemented- corrected	(2) Implementation- discounted binding	(3) Binding and non-binding	(4) Structural vs. quantitative
<i>Dependent variable:</i>	<i>Shadow economy</i>			
L. IMF participation	0.7645** (0.3229)	0.6836** (0.2926)	1.0939*** (0.3971)	1.1027*** (0.3638)
L. IMF conditions	0.1153** (0.0457)	0.1377*** (0.0454)	0.0772** (0.0343)	
L. IMF structural conditions				0.3083*** (0.0755)
L. IMF quantitative conditions				-0.0046 (0.0558)
L. Dependency ratio	0.0176 (0.0338)	0.0129 (0.0337)	0.0173 (0.0315)	0.0239 (0.0322)
L. GDP growth	-0.1027*** (0.0208)	-0.1055*** (0.0211)	-0.0842*** (0.0189)	-0.0748*** (0.0191)
L. Democracy	-0.2098 (0.1434)	-0.1764 (0.1477)	-0.2108 (0.1389)	-0.1225 (0.1360)
L. Government balance	-0.0622* (0.0361)	-0.0654* (0.0348)	-0.0697** (0.0333)	-0.0569* (0.0331)
L. Trade openness	-0.0332** (0.0130)	-0.0326*** (0.0126)	-0.0330*** (0.0102)	-0.0333*** (0.0108)
L. Investments	-0.0702** (0.0287)	-0.0715** (0.0293)	-0.0501** (0.0254)	-0.0532** (0.0262)
L. Mineral rents	-0.0007 (0.0886)	-0.0231 (0.0840)	-0.0645 (0.0699)	-0.0373 (0.0682)
Constant	22.7814*** (2.3595)	54.3428*** (3.9206)	21.9727*** (1.9777)	20.9384*** (2.1196)
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
<i>Dependent variable:</i>	<i>L. IMF participation</i>			
L. Participation compound	0.4780*** (0.0440)	0.4747*** (0.0439)	0.4186*** (0.0323)	0.4083*** (0.0356)
L2. IMF participation	1.2198*** (0.0782)	1.2801*** (0.0807)	1.1434*** (0.0611)	1.1546*** (0.0639)
L. Countries under program	0.0618*** (0.0120)	0.0569*** (0.0116)	0.0562 (0.0417)	0.0669* (0.0372)
L. GDP per capita	-0.0781 (0.0667)	-0.0769 (0.0632)	-0.0587 (0.0521)	-0.1093** (0.0436)
L. Executive election	0.1192 (0.1012)	0.0701 (0.0996)	0.1393 (0.0867)	0.1501* (0.0883)
L. Regime Durability	-0.0053* (0.0028)	-0.0045* (0.0024)	-0.0009 (0.0015)	-0.0004 (0.0015)

L. Dependency ratio	0.0058 (0.0052)	0.0074 (0.0050)	0.0012 (0.0038)	0.0032 (0.0038)
L. GDP growth	0.0034 (0.0083)	0.0015 (0.0086)	-0.0076 (0.0086)	-0.0021 (0.0085)
L. Democracy	0.0111 (0.0217)	0.0201 (0.0205)	0.0276 (0.0178)	0.0344** (0.0167)
L. Government balance	0.0188** (0.0093)	0.0231** (0.0090)	0.0027 (0.0089)	0.0021 (0.0082)
L. Trade openness	-0.0011 (0.0011)	-0.0010 (0.0012)	-0.0008 (0.0009)	0.0001 (0.0009)
L. Investments	0.0058 (0.0069)	0.0068 (0.0065)	-0.0028 (0.0057)	-0.0064 (0.0058)
L. Mineral rents	-0.0124 (0.0096)	-0.0170* (0.0091)	-0.0031 (0.0094)	-0.0027 (0.0110)
Constant	-4.7921*** (0.7658)	-4.7876*** (0.7205)	-4.3864* (2.3787)	-4.7649** (2.1712)
Region fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
<i>Dependent variable (conditions):</i>	<i>L. Implemented- corrected</i>	<i>L. Implementation- discounted binding</i>	<i>L. Binding and non- binding</i>	<i>L. Structural conditions</i>
L. Conditionality compound	-0.3433*** (0.0600)	-0.3396*** (0.0637)	-0.3250*** (0.0584)	-0.7281*** (0.0920)
L. Dependency ratio	0.1432 (0.1075)	0.1617 (0.1043)	0.2385* (0.1323)	0.0319 (0.0197)
L. GDP growth	0.1016 (0.0709)	0.1040 (0.0776)	0.0568 (0.1106)	-0.0090 (0.0334)
L. Democracy	0.7890** (0.3692)	0.4770 (0.3977)	1.6145*** (0.5528)	0.1223 (0.1476)
L. Government balance	0.2110** (0.0956)	0.2054** (0.0876)	0.2094 (0.1304)	0.0126 (0.0284)
L. Trade openness	0.0269 (0.0182)	0.0198 (0.0183)	0.0308 (0.0244)	0.0048 (0.0050)
L. Investments	0.0146 (0.0881)	0.0262 (0.0713)	-0.0832 (0.1077)	-0.0061 (0.0195)
L. Mineral rents	-0.1296 (0.2769)	0.0545 (0.2293)	-0.0366 (0.2921)	-0.0769* (0.0421)
Constant	-11.0392** (5.4025)	-22.7298** (11.0900)	-17.8428** (7.6767)	-1.4239 (1.6890)
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
<i>Dependent variable (conditions):</i>				<i>L. Quantitative conditions</i>
L. Conditionality compound				-0.2918*** (0.0652)



L. Dependency ratio				0.1403* (0.0744)
L. GDP growth				0.1005** (0.0504)
L. Democracy				0.7359*** (0.2570)
L. Government balance				0.1401* (0.0727)
L. Trade openness				0.0241 (0.0148)
L. Investments				-0.0264 (0.0606)
L. Mineral rents				-0.0080 (0.1893)
Constant				-10.7196** (4.3214)
Country fixed effects				Yes
Year fixed effects				Yes
F-statistic for participation instrument	118.19	117.16	167.56	131.87
F-statistic for conditionality instrument	32.69	28.45	30.99	
F-statistic for structural conditionality instrument				62.59
F-statistic for quantitative conditionality instrument				20.05
Joint F-statistic	166.01	155.97	196.26	196.35
Number of observations	2,035	2,035	2,557	2,557
Number of countries	140	140	141	141

F-tests are Kleibergen-Paap statistics. Standard errors robust at the country-level in brackets. Significance level is denoted by \*\*\* (1%), \*\* (5%) and \* (10%).

**Table 5** Effect of IMF intervention on the shadow economy, additional control variables

	(1)	(2)	(3)	(4)	(5)
<i>Dependent variable:</i>	<i>Shadow economy</i>				
L. IMF participation	0.9920** (0.4067)	1.0824** (0.5183)	0.9859** (0.4014)	0.7107 (0.4884)	0.8605* (0.5117)
L. IMF conditions	0.1385*** (0.0363)	0.1220*** (0.0423)	0.1366*** (0.0385)	0.1295*** (0.0446)	0.1288*** (0.0397)
L. Dependency ratio	0.0225 (0.0380)	0.0454 (0.0618)	0.0275 (0.0396)	0.0101 (0.0475)	0.0096 (0.0582)
L. GDP growth	-0.0684*** (0.0228)	-0.0604** (0.0279)	-0.0762*** (0.0235)	-0.0871*** (0.0278)	-0.0801*** (0.0304)
L. Democracy	-0.0459 (0.1653)	-0.0198 (0.2735)	-0.0275 (0.1663)	-0.0691 (0.2310)	0.0752 (0.1672)
L. Government balance	-0.0572* (0.0301)	-0.0474 (0.0304)	-0.0636** (0.0309)	-0.0498 (0.0335)	-0.0980** (0.0418)
L. Trade openness	-0.0273*** (0.0104)	-0.0287*** (0.0088)	-0.0251** (0.0101)	-0.0168** (0.0081)	-0.0263*** (0.0091)
L. Investments	-0.0467** (0.0235)	-0.0249 (0.0174)	-0.0475** (0.0232)	-0.0366** (0.0168)	-0.0292 (0.0222)
L. Mineral rents	-0.0675 (0.0665)	-0.1971*** (0.0684)	-0.0744 (0.0630)	-0.1111 (0.0698)	-0.1077 (0.0976)
L. Political Stability	-0.9446** (0.4589)				
L. Bureaucracy costs		-0.0016 (0.0512)			
L. Rule of Law			-1.6758** (0.8353)		
L. Starting a business				-0.1271 (0.1716)	
L. Top marginal tax rate					0.0730 (0.1093)
Constant	17.5153*** (2.4572)	15.5050*** (3.3853)	17.6564*** (2.3993)	16.6935*** (2.9800)	14.2251*** (2.4128)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
<i>Dependent variable:</i>	<i>L. IMF participation</i>				
L. Participation compound	0.3501*** (0.0378)	0.2777*** (0.0536)	0.3434*** (0.0393)	0.3178*** (0.0428)	0.3326*** (0.0499)
L2. IMF participation	1.2741*** (0.0819)	1.3294*** (0.1237)	1.2736*** (0.0812)	1.2557*** (0.0890)	1.3940*** (0.1110)
L. Countries under program	-0.1568** (0.0766)	-0.1865** (0.0760)	-0.1532* (0.0783)	-0.1415* (0.0724)	-0.1515* (0.0777)
L. GDP per capita	-0.0367 (0.0474)	-0.2394*** (0.0869)	-0.0574 (0.0519)	-0.0751 (0.0683)	-0.2071** (0.0811)
L. Executive election	0.2234* (0.1161)	0.2225 (0.1471)	0.2141* (0.1151)	0.1898 (0.1272)	0.2988* (0.1531)
L. Regime Durability	0.0005 (0.0019)	0.0001 (0.0025)	0.0002 (0.0024)	0.0006 (0.0018)	0.0012 (0.0021)

L. Dependency ratio	0.0029 (0.0039)	0.0073 (0.0060)	0.0034 (0.0041)	0.0065 (0.0048)	-0.0019 (0.0058)
L. GDP growth	-0.0102 (0.0107)	-0.0270** (0.0126)	-0.0115 (0.0107)	-0.0152 (0.0129)	-0.0171 (0.0144)
L. Democracy	0.0377** (0.0184)	0.0483 (0.0299)	0.0284 (0.0231)	0.0257 (0.0251)	0.0227 (0.0266)
L. Government balance	-0.0080 (0.0091)	-0.0115 (0.0143)	-0.0091 (0.0089)	0.0050 (0.0144)	-0.0028 (0.0203)
L. Trade openness	0.0007 (0.0011)	0.0012 (0.0016)	0.0003 (0.0012)	-0.0006 (0.0015)	-0.0009 (0.0018)
L. Investments	-0.0129* (0.0070)	-0.0203** (0.0091)	-0.0144** (0.0069)	-0.0143* (0.0085)	-0.0174* (0.0094)
L. Mineral rents	-0.0021 (0.0114)	0.0096 (0.0124)	-0.0028 (0.0115)	0.0010 (0.0124)	0.0079 (0.0137)
L. Political Stability	-0.1683** (0.0728)				
L. Bureaucracy costs		0.0392 (0.0344)			
L. Rule of Law			-0.0705 (0.1143)		
L. Starting a business				0.0308 (0.0480)	
L. Top marginal tax rate					-0.0378 (0.0245)
Constant	6.7395 (4.3684)	9.7450** (4.3497)	6.8459 (4.5052)	6.1662 (4.2132)	8.3790* (4.6213)
Region fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
<i>Dependent variable:</i>		<i>L. Conditionality</i>			
L. Conditionality compound	-0.3707*** (0.0664)	-0.4120*** (0.1149)	-0.3684*** (0.0658)	-0.3716*** (0.0997)	-0.4383*** (0.0975)
L. Dependency ratio	0.0962 (0.1178)	0.2069 (0.2274)	0.1063 (0.1178)	0.0969 (0.1703)	0.1538 (0.1610)
L. GDP growth	0.0105 (0.1093)	-0.1402 (0.1048)	0.0072 (0.1118)	0.0230 (0.1139)	-0.0548 (0.1170)
L. Democracy	1.0566** (0.5149)	0.4458 (0.6949)	1.2063** (0.5437)	0.7097 (0.7667)	0.2612 (0.6010)
L. Government balance	0.0573 (0.1073)	-0.0415 (0.1231)	0.0487 (0.1090)	0.0630 (0.1128)	0.1367 (0.1449)
L. Trade openness	0.0215 (0.0214)	0.0110 (0.0357)	0.0228 (0.0221)	-0.0138 (0.0334)	0.0166 (0.0297)
L. Investments	-0.0447 (0.0901)	-0.0651 (0.1125)	-0.0515 (0.0911)	-0.0659 (0.1035)	-0.1331 (0.1060)
L. Mineral rents	0.0821 (0.2395)	0.1228 (0.3029)	0.0586 (0.2379)	-0.0169 (0.2992)	-0.1149 (0.3359)
L. Political Stability	-0.7430 (1.3288)				
L. Bureaucracy costs		0.3275			

(0.3043)

L. Rule of Law

-3.6904

(2.3965)

L. Starting a business

0.1341

(0.7338)

L. Top marginal tax rate

-0.8686\*

(0.5185)

Constant

-13.5814\*\*

-10.5952

-12.5191\*

-7.2977

3.8901

(6.8689)

(9.9401)

(7.1464)

(10.2033)

(8.8053)

Country fixed effects

Yes

Yes

Yes

Yes

Yes

Year fixed effects

Yes

Yes

Yes

Yes

Yes

F-statistic for participation instrument

85.81

26.83

76.42

55.02

44.40

F-statistic for conditionality instrument

31.21

12.86

31.32

13.90

20.21

Joint F-statistic

112.66

31.53

102.49

59.43

52.90

Number of observations

1,795

1,237

1,795

1,394

1,263

Number of countries

141

131

141

130

129

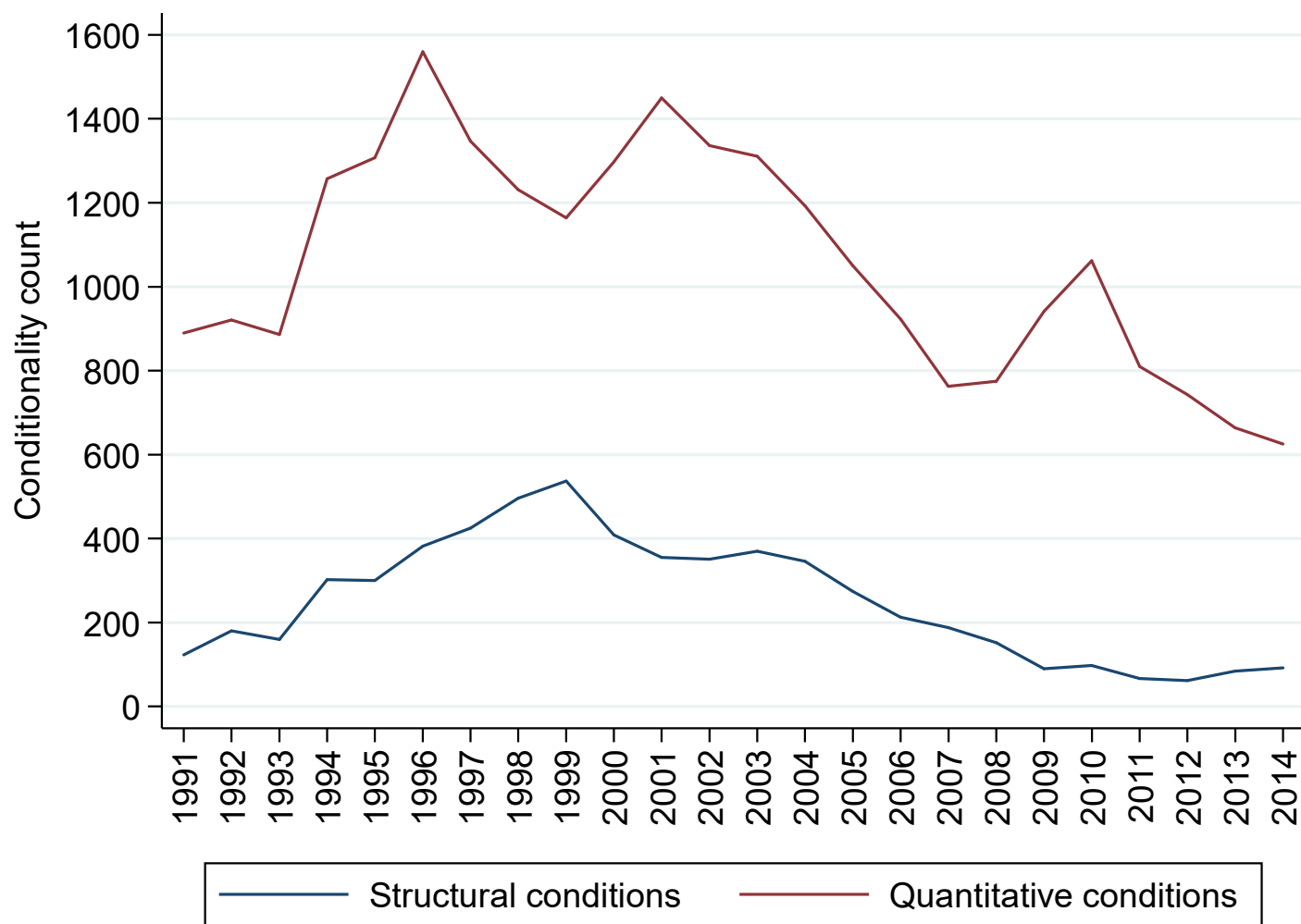
F-tests are Kleibergen-Paap statistics. Standard errors robust at the country-level in brackets. Significance level is denoted by \*\*\* (1%), \*\* (5%) and \* (10%).

**Table 6** Financial development, IMF intervention and the shadow economy

	(1)
<i>Dependent variable:</i>	<i>Shadow economy</i>
L. IMF participation	1.0582*** (0.3767)
L. IMF conditions	0.1411*** (0.0371)
L. Financial development	-4.1342* (2.4442)
L. Financial development * L. IMF conditions	-0.0260 (0.0587)
L. Dependency ratio	0.0187 (0.0333)
L. GDP growth	-0.0973*** (0.0190)
L. Democracy	-0.2426* (0.1408)
L. Government balance	-0.0737** (0.0344)
L. Trade openness	-0.0341*** (0.0101)
L. Investments	-0.0513** (0.0247)
L. Mineral rents	-0.0445 (0.0728)
Constant	23.8205*** (2.1112)
Country fixed effects	Yes
Year fixed effects	Yes
<i>Dependent variable:</i>	<i>L. IMF participation</i>
L. Participation compound	0.4008*** (0.0344)
L2. IMF participation	1.1778*** (0.0618)
L. Countries under program	0.0721* (0.0372)
L. GDP per capita	-0.1158** (0.0507)
L. Executive election	0.1552* (0.0860)
L. Regime Durability	-0.0012 (0.0016)
L. Dependency ratio	0.0023 (0.0038)
L. GDP growth	-0.0031 (0.0088)
L. Democracy	0.0250 (0.0176)
L. Government balance	0.0037 (0.0082)
L. Trade openness	0.0002 (0.0009)
L. Investments	-0.0073

	(0.0058)
L. Mineral rents	-0.0037
	(0.0104)
L. Financial development	0.2239
	(0.2719)
Constant	-4.9200**
	(2.1381)
Region fixed effects	Yes
Year fixed effects	Yes
<i>Dependent variable:</i>	<i>L. Conditionality</i>
L. Conditionality compound	-0.4197***
	(0.0601)
L. Dependency ratio	0.2046**
	(0.0902)
L. GDP growth	0.0770
	(0.0745)
L. Democracy	0.7866**
	(0.3612)
L. Government balance	0.1749**
	(0.0871)
L. Trade openness	0.0322*
	(0.0169)
L. Investments	-0.0182
	(0.0746)
L. Mineral rents	-0.0883
	(0.2208)
L. Financial development	-19.3818***
	(6.6678)
Constant	-5.6651
	(5.6679)
Country fixed effects	Yes
Year fixed effects	Yes
F-statistic for participation instrument	135.89
F-statistic for conditionality instrument	48.77
Joint F-statistic	194.71
Marginal effects of IMF conditions on the shadow economy	
at Financial development=0	0.1411***
	(0.0371)
at Financial development=0.25	0.1346***
	(0.0332)
at Financial development=0.50	0.1281***
	(0.0354)
at Financial development=0.75	0.1216***
	(0.0429)
at Financial development=1	0.1151**
	(0.0535)
Changing from 1 to 0	-0.0260
Number of observations	2,550
Number of countries	140

F-tests are Kleibergen-Paap statistics. Standard errors robust at the country-level in brackets. Significance level is denoted by \*\*\* (1%), \*\* (5%) and \* (10%).



**Figure 1** Total count of structural vs. quantitative conditions per year

## APPENDIX

<b>Table A1</b> List of countries				
Albania	Comoros	Honduras	Mexico	Slovak Republic
Algeria	Congo, Dem. Rep.	Hungary	Moldova	Slovenia
Angola	Congo, Rep.	India	Mongolia	Solomon Islands
Argentina	Costa Rica	Indonesia	Morocco	South Africa
Armenia	Cote d'Ivoire	Iran, Islamic Rep.	Mozambique	Spain
Australia	Croatia	Ireland	Namibia	Sri Lanka
Austria	Cyprus	Israel	Nepal	Sweden
Azerbaijan	Czech Republic	Italy	Netherlands	Switzerland
Bahrain	Denmark	Jamaica	New Zealand	Syrian Arab Republic
Bangladesh	Dominican Republic	Japan	Nicaragua	Tajikistan
Belarus	Ecuador	Jordan	Niger	Tanzania
Belgium	Egypt, Arab Rep.	Kazakhstan	Nigeria	Thailand
Benin	El Salvador	Kenya	Norway	Togo
Bhutan	Equatorial Guinea	Korea, Rep.	Oman	Tunisia
Bolivia	Eritrea	Kuwait	Pakistan	Turkey
Bosnia and Herzegovina	Estonia	Kyrgyz Republic	Papua New Guinea	Uganda
Botswana	Fiji	Lao PDR	Paraguay	Ukraine
Brazil	Finland	Latvia	Peru	United Arab Emirates
Bulgaria	France	Lebanon	Philippines	United Kingdom
Burkina Faso	Gabon	Lesotho	Poland	United States
Burundi	Gambia, The	Liberia	Portugal	Uruguay
Cambodia	Georgia	Libya	Qatar	Venezuela, RB
Cameroon	Ghana	Lithuania	Romania	Vietnam
Canada	Greece	Madagascar	Russian Federation	Zambia
Central African Republic	Guatemala	Malawi	Rwanda	Zimbabwe
Chad	Guinea	Malaysia	Saudi Arabia	
Chile	Guinea-Bissau	Mali	Senegal	
China	Guyana	Mauritania	Sierra Leone	
Colombia	Haiti	Mauritius	Singapore	



**Table A2** Alternative instrumentation strategy

	(1)	(2)	(3)
Instrumentation strategy for IMF participation:	UNGA	UNSC	Compound
<i>Dependent variable:</i>	<i>Shadow economy</i>		
L. IMF participation	1.0033*** (0.3684)	0.9893*** (0.3623)	0.9659** (0.3759)
L. IMF conditions	0.1156*** (0.0428)	0.1167*** (0.0428)	0.1187*** (0.0385)
L. Dependency ratio	0.0117 (0.0315)	0.0112 (0.0316)	0.0149 (0.0309)
L. GDP growth	-0.0885*** (0.0193)	-0.0878*** (0.0193)	-0.0896*** (0.0190)
L. Democracy	-0.1984 (0.1405)	-0.2086 (0.1414)	-0.1818 (0.1374)
L. Government balance	-0.0726** (0.0336)	-0.0722** (0.0336)	-0.0724** (0.0333)
L. Trade openness	-0.0342*** (0.0102)	-0.0339*** (0.0104)	-0.0343*** (0.0101)
L. Investments	-0.0545** (0.0251)	-0.0550** (0.0251)	-0.0519** (0.0253)
L. Mineral rents	-0.0673 (0.0718)	-0.0652 (0.0721)	-0.0518 (0.0722)
Constant	22.2656*** (2.0113)	22.3645*** (2.0299)	22.0100*** (1.9646)
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
<i>Dependent variable:</i>	<i>L. IMF participation</i>		
L. UNGA	1.4343** (0.5754)		
L. UNSC		0.1665* (0.0951)	
L. Participation compound			0.0433*** (0.0036)
L2. IMF participation	1.4056*** (0.0826)	1.3921*** (0.0857)	1.1313*** (0.0640)
L. Countries under program	0.0179 (0.0370)	0.0381 (0.0349)	0.0218 (0.0379)
L. GDP per capita	-0.2686*** (0.0883)	-0.2487*** (0.0857)	-0.0808* (0.0455)
L. Executive election	0.3060*** (0.1145)	0.2700** (0.1162)	0.1083 (0.0929)
L. Regime Durability	-0.0032 (0.0022)	-0.0028 (0.0023)	0.0000 (0.0014)
L. Dependency ratio	0.0037 (0.0046)	0.0057 (0.0048)	0.0023 (0.0037)

L. GDP growth	-0.0045 (0.0094)	-0.0057 (0.0089)	-0.0022 (0.0088)
L. Democracy	0.0604** (0.0263)	0.0731*** (0.0261)	0.0289 (0.0181)
L. Government balance	0.0044 (0.0085)	0.0006 (0.0087)	0.0034 (0.0085)
L. Trade openness	0.0004 (0.0013)	0.0004 (0.0012)	-0.0002 (0.0009)
L. Investments	-0.0033 (0.0062)	-0.0035 (0.0060)	-0.0056 (0.0060)
L. Mineral rents	0.0097 (0.0109)	0.0091 (0.0115)	-0.0022 (0.0109)
Constant	-1.0328 (2.1517)	-2.0451 (2.0405)	-2.3236 (2.1386)
Region fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
<i>Dependent variable:</i>	<i>L. Conditionality</i>		
L. Conditionality compound	-0.3958*** (0.0614)	-0.3926*** (0.0619)	-0.4109*** (0.0624)
L. Dependency ratio	0.1995** (0.0913)	0.2016** (0.0902)	0.1626* (0.0882)
L. GDP growth	0.0792 (0.0752)	0.0716 (0.0749)	0.0911 (0.0739)
L. Democracy	0.9976** (0.3877)	1.0828*** (0.3819)	0.8137** (0.3564)
L. Government balance	0.1536* (0.0910)	0.1503 (0.0916)	0.1560* (0.0914)
L. Trade openness	0.0286 (0.0189)	0.0257 (0.0177)	0.0292* (0.0177)
L. Investments	-0.0166 (0.0737)	-0.0122 (0.0730)	-0.0354 (0.0754)
L. Mineral rents	0.0289 (0.2346)	0.0120 (0.2371)	-0.1070 (0.2249)
Constant	-13.6536** (5.7091)	-14.4350*** (5.5250)	-10.9068** (5.4728)
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
F-statistic for participation instrument	6.21	3.07	141.52
F-statistic for conditionality instrument	41.50	40.24	43.34
Joint F-statistic	46.40	42.20	177.05
Number of observations	2,557	2,557	2,557
Number of countries	141	141	141

F-tests are Kleibergen-Paap statistics. Standard errors robust at the country-level in brackets. Significance level is denoted by \*\*\* (1%), \*\* (5%) and \* (10%).

**Table A3** Alternative proxy for the shadow economy (Elgin and Oztunali, 2012)

Conditionality variable:	(1)	(2)	(3)	(4)	(5)
	Binding	Implemented-corrected	Implementation-discounted binding	Binding and non-binding	Structural vs. quantitative
<i>Dependent variable:</i>	<i>Shadow economy (Elgin and Oztunali, 2012)</i>				
L. IMF participation	-0.0105 (0.2999)	-0.0265 (0.3047)	-0.1906 (0.2833)	-0.0446 (0.3105)	-0.0494 (0.2855)
L. IMF conditions	0.0758** (0.0374)	0.0892** (0.0365)	0.1135*** (0.0374)	0.0581** (0.0269)	
L. IMF structural conditions					0.2059* (0.1140)
L. IMF quantitative conditions					-0.0205 (0.0464)
L. Dependency ratio	-0.0071 (0.0367)	-0.0078 (0.0368)	-0.0119 (0.0375)	-0.0044 (0.0370)	0.0011 (0.0338)
L. GDP growth	0.0073 (0.0228)	0.0057 (0.0230)	0.0040 (0.0237)	0.0113 (0.0225)	0.0177 (0.0234)
L. Democracy	0.0155 (0.0879)	0.0103 (0.0882)	0.0397 (0.0900)	-0.0281 (0.0948)	0.0792 (0.0796)
L. Government balance	0.0230 (0.0183)	0.0212 (0.0186)	0.0158 (0.0182)	0.0239 (0.0182)	0.0402** (0.0200)
L. Trade openness	-0.0129 (0.0098)	-0.0131 (0.0099)	-0.0127 (0.0098)	-0.0122 (0.0097)	-0.0128 (0.0096)
L. Investments	-0.0734*** (0.0170)	-0.0725*** (0.0171)	-0.0738*** (0.0178)	-0.0719*** (0.0167)	-0.0730*** (0.0162)
L. Mineral rents	0.0664 (0.0545)	0.0684 (0.0559)	0.0467 (0.0578)	0.0707 (0.0557)	0.0842 (0.0529)
Constant	21.5486*** (1.6457)	21.6165*** (1.6403)	21.4373*** (1.6459)	21.7010*** (1.6439)	20.5814*** (1.5869)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
<i>Dependent variable:</i>	<i>L. IMF participation</i>				
L. Participation compound	0.5127*** (0.0484)	0.5129*** (0.0478)	0.4999*** (0.0478)	0.5228*** (0.0430)	0.0493*** (0.0041)
L2. IMF participation	1.2345*** (0.0787)	1.2202*** (0.0797)	1.2844*** (0.0855)	1.2057*** (0.0782)	1.1293*** (0.0718)
L. Countries under program	0.0284** (0.0110)	0.0321*** (0.0104)	0.0305*** (0.0116)	0.0208* (0.0108)	-0.0145 (0.0101)
L. GDP per capita	-0.0683 (0.0675)	-0.0636 (0.0670)	-0.0529 (0.0633)	-0.0132 (0.0743)	-0.1071** (0.0524)
L. Executive election	0.0758	0.0872	0.0504	0.0636	0.0878

	(0.1109)	(0.1105)	(0.1117)	(0.1049)	(0.1176)
L. Regime Durability	-0.0051*	-0.0051*	-0.0046**	-0.0039	-0.0041
	(0.0026)	(0.0027)	(0.0023)	(0.0027)	(0.0025)
L. Dependency ratio	0.0055	0.0055	0.0079	0.0049	0.0020
	(0.0051)	(0.0049)	(0.0048)	(0.0051)	(0.0046)
L. GDP growth	0.0025	0.0039	0.0026	-0.0026	0.0015
	(0.0087)	(0.0085)	(0.0088)	(0.0087)	(0.0089)
L. Democracy	0.0290	0.0244	0.0331	0.0287	0.0370
	(0.0244)	(0.0243)	(0.0228)	(0.0236)	(0.0252)
L. Government balance	0.0211**	0.0206**	0.0226**	0.0187	0.0197*
	(0.0106)	(0.0104)	(0.0100)	(0.0127)	(0.0107)
L. Trade openness	-0.0017	-0.0017	-0.0015	-0.0026**	-0.0030**
	(0.0012)	(0.0012)	(0.0013)	(0.0012)	(0.0012)
L. Investments	0.0051	0.0048	0.0061	0.0088	0.0027
	(0.0068)	(0.0068)	(0.0066)	(0.0065)	(0.0066)
L. Mineral rents	-0.0230**	-0.0220**	-0.0232**	-0.0212**	-0.0202*
	(0.0105)	(0.0106)	(0.0107)	(0.0100)	(0.0108)
Constant	-2.8008***	-3.0102***	-3.3781***	-2.8488***	0.0877
	(0.6624)	(0.6491)	(0.6966)	(0.6749)	(0.7341)
Region fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
<i>Dependent variable (conditions):</i>	<i>L. Binding</i>	<i>L. Implemented-corrected</i>	<i>L. Implementation-discounted binding</i>	<i>L. Binding and non-binding</i>	<i>L. Structural conditions</i>
L. Conditionality compound	-0.3451***	-0.3235***	-0.3234***	-0.2806***	0.0439***
	(0.0825)	(0.0722)	(0.0805)	(0.0753)	(0.0081)
L. Dependency ratio	0.1820	0.1574	0.1721*	0.2109	0.0424
	(0.1118)	(0.1031)	(0.1024)	(0.1524)	(0.0273)
L. GDP growth	0.0754	0.0882	0.0846	0.0166	-0.0063
	(0.0808)	(0.0731)	(0.0778)	(0.1159)	(0.0390)
L. Democracy	0.9226**	0.8444**	0.4965	2.0398***	0.1015
	(0.4151)	(0.3936)	(0.4310)	(0.6133)	(0.1845)
L. Government balance	0.2627**	0.2444**	0.2465***	0.3380**	0.0323
	(0.1041)	(0.0992)	(0.0915)	(0.1426)	(0.0373)
L. Trade openness	0.0257	0.0244	0.0159	0.0216	0.0067
	(0.0210)	(0.0205)	(0.0186)	(0.0292)	(0.0073)
L. Investments	0.0307	0.0239	0.0396	0.0101	0.0127
	(0.0905)	(0.0856)	(0.0705)	(0.1236)	(0.0270)
L. Mineral rents	-0.2424	-0.1949	0.0259	-0.3935	-0.1391**
	(0.2627)	(0.2541)	(0.2523)	(0.3427)	(0.0604)
Constant	-14.0073**	-12.0987**	-8.9277*	-22.8717***	-1.8568
	(5.8512)	(5.3943)	(5.3828)	(7.7549)	(2.2275)
Country fixed effects	Yes	Yes	Yes	Yes	Yes

Year fixed effects	Yes	Yes	Yes	Yes	Yes
<i>Dependent variable (conditions):</i>					<i>L. Quantitative conditions</i>
L. Conditionality compound					0.0226*** (0.0072)
L. Dependency ratio					0.1101 (0.0952)
L. GDP growth					0.0746 (0.0487)
L. Democracy					0.6519** (0.2849)
L. Government balance					0.2392*** (0.0804)
L. Trade openness					0.0194 (0.0172)
L. Investments					0.0229 (0.0702)
L. Mineral rents					-0.0284 (0.2472)
Constant					-13.1129*** (4.5078)
Country fixed effects					Yes
Year fixed effects					Yes
F-statistic for participation instrument	112.11	115.07	109.17	148.13	147.16
F-statistic for conditionality instrument	17.52	20.09	16.16	13.87	
F-statistic for structural conditionality instrument					29.26
F-statistic for quantitative conditionality instrument					9.94
Joint F-statistic	138.46	152.26	137.55	161.21	179.70
Number of observations	1,954	1,954	1,954	1,954	1,954
Number of countries	141	141	141	141	141

F-tests are Kleibergen-Paap statistics. Standard errors robust at the country-level in brackets. Significance level is denoted by \*\*\* (1%), \*\* (5%) and \* (10%).

## Funding

This research is co-financed by Greece and the European Union (European Social Fund-ESF) through the Operational Programme «Human Resources Development, Education and Lifelong Learning» in the context of the project “Strengthening Human Resources Research Potential via Doctorate Research” (MIS-5000432), implemented by the State Scholarships Foundation (IKY).



Acknowledgements: We thank Antonis Adam, Nikolaos Mylonidis and the participants at the 18th Conference on Research Economic Theory and Econometrics (CRETE) for helpful comments; and Valentin Lang for providing us with the IMF liquidity data. Andreas Sintos would like to acknowledge financial support from the IKY foundation. All remaining errors are our own.