

# Afghanistan: Balancing Social and Security Spending in the Context of a Shrinking Resource Envelope

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For Afghanistan, the dual prospect of declining donor support and high ongoing security spending over the medium term keeps its government budget tight. This paper uses a general equilibrium model to capture the security–development trade-off facing the government in its effort to rehabilitate growth and fiscal sustainability. In particular, it considers strategic policy options for counteracting and minimizing the negative macroeconomic impact of possible aid and revenue shortfalls. We find that the mobilization of domestic revenues through changes in tax policy is the preferred policy response for the Afghan central government. Such a response helps to place its finances on a sustainable path in the near term and preserve most of the growth potential. Cutting expenditures balances public finances but causes the economy to permanently shrink. Debt financing helps to preserve much of the economy size but can quickly put the sustainability of public finances at risk.

*Keywords:* Afghanistan, public investment, development spending, security spending, security and growth, public investment, and fiscal sustainability

*JEL codes:* E22, E32, E62

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## I. Introduction

Afghanistan shares the common challenge of many low income and developing economies: large development needs and limited resources. While the choices are not new or unique, Afghanistan faces additional complications from the development and maintenance of a large security infrastructure that diverts scarce funds from other important capital spending. Furthermore, the prospect of declining

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donor support and the need for high ongoing security spending over the medium term means that the security–development trade-off is unlikely to ameliorate over the next decade. This paper aims to model this trade-off and illustrates the implications of policy choices. There are no easy answers. The model presented here abstracts from a myriad political and institutional elements that are unique to Afghanistan and complicate the outlook beyond the trade-off we explore.

The macromodeling framework used in this paper is an adaptation of the workhorse model used by the IMF to analyze policy challenges in low-income countries (Buffie et al. 2012). The adapted framework is used here to trace the impact of exogenous shocks (such as a decline in foreign aid) or policy failures (such as a lower domestic revenue yield) on fiscal stance and economic output.

The key methodological contribution is the explicit focus on the public policy choices between investment and security spending, both of which are growth enhancing. The government supplies security services with the aim of ensuring a stable socio-political climate conducive to growth by enforcing the rule of law. The government also provides public infrastructure which equates to capital spending for development needs. Both public services affect the economy with a positive externality, and the government's objective is to maximize social welfare through provision of these services.

The central finding points to the mobilization of domestic revenue resources as the government's best response to an exogenous shock that shrinks the resource envelope. The negative impact of exogenously reducing the government's pool of funds on growth is best minimized by raising additional tax revenues. The additional revenue helps to offset partially the shortfall in foreign aid and maintain supply of public services near original levels. Policy options like debt financing or cutting public expenditures would sacrifice either fiscal sustainability or supply of public services and output.

The next section outlines the economic situation in Afghanistan. Section III describes the macromodeling apparatus, including the decision-making process in the government sector. Section IV analyzes the behavior of the public sector, where the focus is on the optimal allocation of public resources between infrastructure and security investment. A reader less interested in the technical aspects of the macromodeling framework may go directly to section V that looks at fiscal experiments and evaluates possible policy responses to (i) a possible shortfall in foreign aid, and (ii) a possible increase in tax avoidance. Section VI concludes with a discussion of policy implications.

## II. The Economic Landscape

Since 2001, Afghanistan has received substantial donor support to assist the country's recovery from 30 years of conflict, and the country remains heavily reliant

on foreign donor grants. Out of an estimated total public spending of 52% of gross domestic product (GDP),<sup>1</sup> the IMF estimates that donors financed 31% of GDP via extra-budgetary operations (“off-budget”) in addition to providing 10% of GDP in grants directly to the Afghan budget (“on-budget”).<sup>2</sup> The remaining 11% came from domestic revenue collection. In other words, only one-fifth of Afghan public spending was funded from domestic means.

Such levels of donor support—while needed in a post-conflict situation—are unlikely to be sustained indefinitely. As such, the Afghan government needs to find ways to balance the takeover of externally-financed expenditures while increasing pro-poor and development outlays as international engagement gradually declines. In particular, economic development over the medium term will depend on the impact of the envisaged drawdown of a large foreign military architecture (“transition”) and foreign civilian engagement (“transformation”), the former having begun in 2012 and expected to be largely finalized by 2014. In the case of Afghanistan, donor support has already started to decline, and may decline further as the military presence shrinks further. Notwithstanding, donors pledged \$16 billion until 2016 at the 2012 Tokyo Conference—a significant level of support.

Its difficult past and geopolitical importance has meant that Afghanistan’s security needs have grown relatively large for an economy of its size. At present, an estimated 4% of GDP was spent on security by the government using its own resources, while an additional 20% of GDP was funded by donors. Compared to other fragile economies, Afghanistan’s total military expenditures stand out. As a result, the lion’s share of donor support was for security. In 2011, donors funded 60% of the on-budget costs of the Afghan security forces—military and police. In addition, donors directly paid for the costs of foreign troops in Afghanistan to the tune of \$12 billion (60% of GDP in 2011).

From a medium-term policy perspective, the speed of the military transition is the key determinant of how much security spending would need to be funded from the country’s own budgetary resources. The exact trajectory of support from the international community, including grants from such bodies as the NATO Training Mission and the Law and Order Trust Fund Afghanistan, will determine how much fiscal space the government has for other spending priorities.<sup>3</sup> Many policymakers expect that domestically produced security services will eventually be cheaper than foreign security services; therefore, there will be more fiscal space for non-defense expenditures.

<sup>1</sup>IMF country report (IMF 2011).

<sup>2</sup>Hogg et al. (2012) estimate that donors spent close to 100% of GDP in the same year under the label of Afghanistan, though not all of this money was actually spent inside the country. In this case, the Afghan contribution is that much smaller at 10%.

<sup>3</sup>Even though donors expect the country to shoulder a larger share of the costs, the 2012 Chicago NATO summit nevertheless generated significant support over the coming decade, with Afghanistan agreeing to contribute up to 23% of its security costs.

In addition to taking over security spending, the Afghan government will also have to shoulder projects and investment spending currently run by donors. This includes the capital stock put in place by donors (for example, roads, bridges, schools, and hospitals). As donor-financed development projects are surrendered to the Afghan government, the tight resource envelope will force the government to evaluate the viability of this capital stock. The IMF and World Bank conservatively estimate the cost of maintaining this capital stock at 15% of GDP.

Domestic revenue effort is the main means by which the government can loosen its own budget constraint. Successive administrations have achieved impressive improvements in revenue collection in the space of five years (a quadrupling in absolute terms between 2005/2006 and 2010/2011). Realizing further gains depends heavily on the speed and determination with which the fiscal reform agenda is implemented as well as exogenous political and economic developments. Mining revenues and a broadening of the domestic tax base (e.g., the introduction of a value-added tax (VAT) and excise duties, which are relatively more easily collected than other alternatives) would generate vital fiscal space. It would also help to wean the country off reliance on import duties and other border taxes, the proceeds of which can be victim to misappropriation. At present, the IMF estimates that, assuming a stable security outlook, domestic revenues will be around 17% of GDP by 2025, while donor support may still account for a respectable 23% of GDP.

In most countries, shortfalls in resources could be debt financed. However, the Afghan government is still in the process of building a government bond market based on *sukuk* securities.<sup>4</sup> The success of any future *sukuk* issuance depends on a number of factors, ranging from the ability to tap a relatively young domestic banking sector for liquidity to foreign investor appetite for holding claims on an economy with a unique security profile and outlook. The latter depends on the ability of the government to fund security in the first instance, and therefore the government's fiscal constraint indirectly becomes a function of its security provision.

In the years ahead therefore, the government of Afghanistan has to balance the need to maintain and improve security while advancing the country's growth and development. This must be achieved using a very limited domestic revenue base and in view of the reality that donor support will decline from its elevated levels in the immediate post-conflict period.

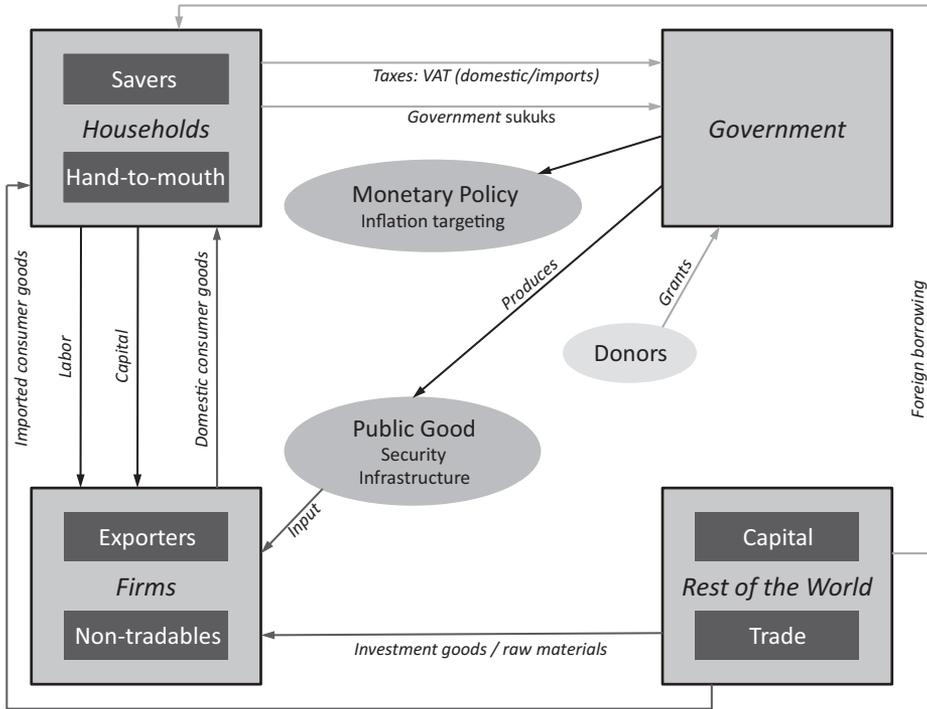
### III. Macroeconomic Model

This section summarizes the modeling framework used, which is inspired by Buffie et al. (2012). Here the formal part of the Afghan economy is characterized by seven basic sectors: households, producers, importers, exporters, financial

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<sup>4</sup>*Sukuk* is a financial instrument structured to comply with the Islamic law.

Figure 1. Model Schematics



Source: Authors' depictions.

intermediaries, government, and the rest of the world.<sup>5</sup> The model structure is schematically depicted in Figure 1. The rest of the section details the behavioral characteristics of individual economic agents and sectors.

**A. Household Sector**

The economy is populated by two types of households: households that are rich enough to save or borrow against their expected income and households that live on a day-to-day basis. The former group of households will be loosely called *savers* (because this group can not only save but also borrow). The latter group will be called *hand-to-mouth* households.

The two groups face the following decision problems.

<sup>5</sup>The model is designed to gauge economic output that is captured by GDP estimates excluding an informal sector. According to some measures, the informal sector is about two-thirds of the actual economy so a large part of the economy remains outside the purview of the framework developed. The existence of the informal sector may support more favorable economic and fiscal policy outcomes than the model predicts, by helping to buffer adverse economic shocks and smooth national income.

**1. Savers**

The objective of savers is to maximize their lifetime welfare from consumption,  $C_t^s$ , and leisure,  $1 - N_t^s$ , at time  $t$ , or

$$\max_{\{C_t^s, N_t^s, K_t^s, D_t, B_t\}} E_0 \sum_{t=0}^{\infty} \beta^t \left[ (1 - \xi) \log (C_t^s - \bar{C}_t^s) - \frac{1}{1 + \eta} (N_t^s)^{1+\eta} \right]$$

by making optimal consumption purchases and allocating working time,  $N_t^s$ , where total time is normalized to one. The savers can further smooth the stream of consumption by investing in the form of physical capital,  $K_t^s$ , buying domestic one-period government *sukuks*,  $D_t$ , and buying or selling foreign one-period *sukuks*,  $B_t$ , valued at the nominal exchange rate,  $FX_t$ . The savers discount the future at the factor of  $0 < \beta < 1$ , where the discount factor  $\beta$  depends on the domestic long-term risk-free interest rate. The savers' consumption habit persistence and labor supply elasticity are characterized by  $0 \leq \xi < 1$  and  $\eta > 0$ , respectively.

The optimal decisions are subject to the nominal income constraint

$$W_t N_t^s + R_{k,t-1} K_{t-1}^s + R_{l,t-1} B_{t-1} F X_t + R_{t-1} D_{t-1} + T_t^s + \Pi_t = \dots \\ \dots (1 + \tau_t) P_t C_t^s + P_{k,t} I_t^s \left[ 1 + \xi_I \left( \frac{I_t^s}{I_{t-1}^s} - 1 \right) \right] + B_t F X_t + D_t \tag{1}$$

While utility from consumption is influenced by how much savers consumed in the past (external habit formation,  $\bar{C}_t^s$ ), savings allow them to smooth consumption through good and bad times by intertemporally reallocating their assets. Consumption is taxed at the rate  $1 > \tau_t > 0$  set by the government.<sup>6</sup>  $P_t$  is the domestic price level,  $P_{k,t}$  is the price of physical capital,  $W_t$  the nominal wage rate,  $R_{k,t}$  the gross nominal rental rate on capital,  $R_{l,t}$  the gross nominal interest rate paid on the foreign *sukuks*, and  $R_t$  the gross nominal risk-free interest rate paid on domestic government bonds. Savers also receive income from the government in the form of transfers,  $T_t^s$ , and dividends from firms,  $\Pi_t$ , that they own. Investment in physical capital,  $I_t^s$ , at time  $t$  is subject to convex adjustment costs,  $\frac{I_t^s}{I_{t-1}^s} - 1$ . The cost's intensity depends on the investment adjustment cost parameter  $\xi_I \geq 0$ .

Savers are endowed with an initial physical capital stock,  $K_0^s > 0$ . The capital stock depreciates at the rate  $0 < \delta < 1$ , following the law of motion of

$$K_t^s = (1 - \delta) K_{t-1}^s + I_t^s \tag{2}$$

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<sup>6</sup>In numerical simulations in later sections,  $\tau_t$  is either set to balance government budget or it is set at an exogenous rate  $\bar{\tau}$ .

The first-order conditions that solve the savers' maximization problem imply the following equilibrium law of motions

$$\frac{1 - \xi}{C_t^s - \bar{C}_t^s} = (1 + \tau_t) \lambda_t P_t \tag{3}$$

$$(N_t^s)^\eta = \lambda_t W_t \tag{4}$$

$$\lambda_t P_{k,t} = \beta[(1 - \delta)E_t P_{k,t+1} + R_{k,t}]E_t \lambda_{t+1} \tag{5}$$

$$\lambda_t = \beta R_{l,t} E_t \lambda_{t+1} \tag{6}$$

$$\lambda_t F X_t = \beta R_{l,t} E_t \lambda_{t+1} F X_{t+1} \tag{7}$$

$$P_{k,t} = P_t \left\{ 1 + \xi_l \left[ \left( \frac{I_t^s}{I_{t-1}^s} - 1 \right) - \beta \left( \frac{E_t I_{t+1}^s}{I_t^s} - 1 \right) \right] \right\} \tag{8}$$

where  $\lambda_t$  is the shadow price of consumption. In the presence of capital adjustment costs, the equilibrium price of capital,  $P_{k,t}$ , will be subject to a time-varying markup that will depend on the shadow price of consumption and the rental costs of physical capital. Without capital adjustment costs, when  $\xi_l = 0$ , capital will be priced at the general price level  $P_t$ .  $\bar{C}_t^s$  is the external consumption habit, which simply depends on the past consumption level,  $\bar{C}_t^s = \xi C_{t-1} + \varepsilon_{c,t}$  with  $0 < \xi < 1$ , and a consumption habit shock,  $\varepsilon_{c,t}$ , which is stochastic with zero mean and finite variance.

In equilibrium, the decision to buy or sell foreign *sukuks* is given by households' preferences for domestic versus imported foreign goods and the subsequent need to finance their purchase. The balance of international payments must be in line with the households' net foreign asset position (see the market clearing condition in subsection III.H below).

Savers' (as well as hand-to-mouth consumers') consumption basket,  $C_t^s$ , consists of domestically produced,  $C_{d,t}^s$ , and imported foreign consumption goods,  $C_{f,t}^s$ . Both goods are assumed to be consumed as complements at fixed proportions

$$C_{d,t}^s = \omega C_t^s \tag{9}$$

$$C_{f,t}^s = (1 - \omega) C_t^s \tag{10}$$

where  $0 < \omega < 1$  is the share of domestically produced goods in the basket. The complementarity assumption implies that the consumption goods will be demanded at fixed portions regardless of their relative prices. This assumption captures the belief that over the medium term, the variety of domestically produced goods will remain limited and households will largely maintain their demand for foreign goods regardless of their price.

The Leontief structure of the consumption basket implies that the aggregate price level is a weighted average of the prices of the two consumption goods

$$P_t = \omega P_{d,t} + (1 - \omega) P_{m,t} \quad (11)$$

where  $P_{d,t}$  is the price of domestic goods and  $P_{m,t}$  is the price of imported goods.

## 2. Hand-to-mouth Consumers

Hand-to-mouth households are less fortunate than savers. They maximize a similar lifetime utility function

$$\max_{\{C_t^h, N_t^h\}} E_0 \sum_{t=0}^{\infty} \beta^t \left[ \log(C_t^h) - \frac{1}{1+\eta} (N_t^h)^{1+\eta} \right]$$

but lack the opportunity to smooth their consumption by saving/borrowing or investing. Also, they exhibit no consumption habits, implying they must be flexible in aligning their consumption to income.

Because hand-to-mouth households do not own any physical or financial assets, their income constraint simply equates labor income and government transfers to (after-tax) expenditures on consumption goods.

$$(1 + \tau_t) C_t^h P_t = W_t N_t^h + T_t^h \quad (12)$$

Hand-to-mouth consumers spend all of their income. The first-order conditions imply that hand-to-mouth consumers maximize their welfare when the labor supply is aligned with the real wage,  $\frac{W_t}{P_t}$ ,

$$\frac{W_t}{P_t} = (1 + \tau_t) C_t^h (N_t^h)^\eta \quad (13)$$

Similar to savers, hand-to-mouth households consume domestic,  $C_{d,t}^h$ , and foreign,  $C_{f,t}^h$ , consumption goods at a fixed share  $\omega$ , where

$$C_{d,t}^h = \omega C_t^h \quad (14)$$

$$C_{f,t}^h = (1 - \omega) C_t^h \quad (15)$$

## 3. Aggregation

In the model economy, there is a fraction  $f$  of hand-to-mouth consumers and a fraction  $(1 - f)$  of savers. Aggregate consumption demand, labor supply, investment,

and capital demand of an average household is then given as a weighted sum of the respective demand and supply functions of savers and hand-to-mouth consumers:

$$C_t = (1 - f)C_t^s + fC_t^h \tag{16}$$

$$C_{d,t} = (1 - f)C_{d,t}^s + fC_{d,t}^h \tag{17}$$

$$C_{f,t} = (1 - f)C_{f,t}^s + fC_{f,t}^h \tag{18}$$

$$N_t = (1 - f)N_t^s + fN_t^h \tag{19}$$

$$I_t = (1 - f)I_t^s \tag{20}$$

$$K_t = (1 - f)K_t^s \tag{21}$$

**B. Domestic Producers**

Following Buffie et al. (2012), a representative producer operates in a perfectly competitive environment.<sup>7</sup> She maximizes her profits by optimally using the production factors of labor,  $N_t$ , physical capital,  $K_{t-1}$ , and imported intermediate goods,  $M_t^y$ . For using these resources, the producer pays the nominal wage,  $W_t$ , to compensate labor supply, the rental rate,  $R_{k,t}$ , to compensate renting capital, and the price  $P_{m,t}$  for imports.

The nominal profit function

$$\max_{\{N_t, K_{t-1}, M_t^y\}} \Pi_t = P_{d,t}Y_t - W_tN_t - (R_{k,t} - 1)K_{t-1} - P_{m,t}M_t^y$$

is maximized subject to a CES Cobb-Douglas production function

$$Y_t = A (N_t)^{\alpha_n} (K_{t-1})^{\alpha_k} (M_t^y)^{1-\alpha_n-\alpha_k} G_t^\psi \tag{22}$$

where  $A > 0$  is total factor productivity (TFP);  $\alpha_n$  and  $\alpha_k$  capture the share of labor and capital inputs in production;  $0 < \alpha_n, \alpha_k < 1$ , and  $\alpha_n + \alpha_k < 1.1 - \alpha_n - \alpha_k$  captures the share of imports in production.

Except for the production factors listed above, real output  $Y_t$  also depends on the level of public services,  $G_t > 0$ , that enter in the form of a positive externality (similar to Barro 1990), their use essential for production. Public services are supplied to the producers at no cost, positively affecting the producers' total factor productivity. The weight on public services  $\psi$  is nonzero, but it will hold that  $\psi > \alpha_n$  (i.e., exogenous growth is guaranteed).<sup>8</sup>

<sup>7</sup>The assumption of perfect competition appears appropriate because the model time period is annual and there free entry to the industry is likely.

<sup>8</sup>If  $\psi > \alpha_n$ , then the production function would exhibit increasing returns to scale in capital and government services and the model would exhibit endogenous growth. The issue of endogenous growth is left for future research.

The first-order optimality conditions give the firm labor, capital, and import demand functions, respectively,

$$N_t W_t = \alpha_n Y_t P_{d,t} \quad (23)$$

$$K_{t-1} R_{k,t} = \alpha_k Y_t P_{d,t} \quad (24)$$

$$M_t^y P_{m,t} = (1 - \alpha_n - \alpha_k) Y_t P_{d,t} \quad (25)$$

### C. Importers

Demand for imports in this economy comes from both households that demand foreign consumption goods and producers that use foreign intermediate goods in the production of domestic consumer goods. The total demand for imports is then

$$M_t = C_{f,t} + M_t^y \quad (26)$$

The imported final and intermediate goods are both purchased at the same import price,  $P_{m,t}$ .

### D. Exporters

There is a representative exporter that buys domestic consumption goods and sells them abroad at the export price,  $P_{x,t}$ . The demand for exports,  $X_t$ , depends on the level of foreign demand,  $Y_{w,t}$ , and on the relative price competitiveness of domestic goods on the foreign market

$$X_t = \bar{X} \left( \frac{P_{x,t}}{P_{w,t} F X_t} \right)^{-\epsilon_x} Y_{w,t} \quad (27)$$

where  $P_{w,t}$  is the world price of equivalent foreign goods (in foreign currency),  $F X_t$  is the exchange rate, and  $\epsilon_x > 1$  is the export price elasticity.

The export price  $P_{x,t}$  directly derives from the terms of trade,  $T_t$ ,

$$T_t = \frac{P_{x,t}}{P_{m,t}} \quad (28)$$

which is given exogenously.

### E. Financial Intermediaries

The role of financial intermediaries is to costlessly intermediate funds between domestic and foreign lenders and borrowers. They operate in perfectly competitive

markets where the world risk-free interest rate,  $R_{w,t}$ , is the price benchmark. The financial intermediaries exist because lenders and borrowers lack the capacity to tap international capital markets by themselves.

The intermediaries access loanable funds abroad and intermediate them to domestic private borrowers if needed. The rate at which the funds are loaned out,  $R_{l,t}$ , depends on the world risk-free interest rate,  $R_{w,t}$ , augmented for the country credit risk,  $cr_t$ ,

$$R_{l,t} = R_{w,t} + cr_t. \quad (29)$$

The country risk premium is assumed to depend on the economy's relative indebtedness

$$cr_t = prem \left[ \log \left( \frac{R_{l,t} B_t FX_t}{P_{k,t} K_t} \right) - \log(LVR) \right] \quad (30)$$

where  $R_{l,t} B_t FX_t$  represents the interest of foreign debt value in domestic currency,  $P_{k,t} K_t$  is the nominal asset value (capital) that can be used as collateral, and LVR is an exogenous loan-to-value ratio that foreign creditors accept without a risk penalty. LVR is nonzero and is calibrated to match the country's net foreign asset position relative to GDP (see section IV.A).

It is assumed that markets charge a risk premium on foreign borrowing, and therefore capital is not perfectly mobile. The existence of a risk premium serves two purposes. First, it better reflects the reality of relatively less mobile capital in low-income countries. Second, with perfect capital mobility, countries' foreign indebtedness could grow in an unbounded fashion.<sup>9</sup> A risk premium that increases with external debt anchors debt to stationary levels.

The risk premium can be positive or negative, depending on whether the country is a net saver or borrower. In equilibrium, the net foreign asset position lines up with the trade balance (see condition in subsection III.H). It is useful to note, however, that even though the expression for the risk premium may look ad hoc, it can be viewed as a reduced form of credit premia implied by optimal pricing models such as the financial accelerator model by Bernanke et al. (1999).

## F. Monetary Policy

The key role of monetary policy is to anchor inflation expectations at a desired level. Because of the fiscal focus of the paper, the role of the central bank is modeled in a minimalistic way. The bank follows an inflation targeting rule in which the

<sup>9</sup>See Schmitt-Grohe and Uribe (2003) for the review of other possible approaches addressing this problem.

domestic risk-free rate is set as

$$R_t = \rho_r R_{t-1} + (1 - \rho_r)[\bar{R} + \phi_\pi(\pi_t - \pi^*)]. \quad (31)$$

The central bank desires to smooth its interest rate decisions by a factor  $0 < \rho_r < 1$  weighting the existing interest rate level,  $R_{t-1}$ , and the need for new action given by the deviation of current inflation,  $\pi_t$ , from the policy target,  $\pi^* \geq 0$ .

### 1. Government Agency: Public-services Producer

The agency's charter from the government is to maximize the supply of public services,  $G_t$ . Public services are supplied to the whole economy and serve as a free input to private production. The basket public services are composed of security services,  $H_t$ , and infrastructure services,  $z_t$ .

Security and infrastructure are substitutes blended in constant returns to scale (CRS) manner. The assumption is motivated by Berman et al. (2011). In their seminal empirical analysis for Iraq, they find that development spending helps to improve civilians' attitude towards local as well as central government and reduce insurgent activities. In Afghanistan, development programs seem to have similar implications for security, although the evidence is less clear-cut (Beath et al. 2012, Chou 2012).<sup>10</sup>

The agency's decisions to maximize the level of public services are constrained by the funding allowances from the central government. At the beginning of each period; the agency is endowed with a lump-sum money transfer,  $I_{g,t}$ , and optimally decides how much of these funds to allocate to infrastructure investment,  $I_{z,t}$ , or invest in security-related human capital,  $I_{H,t}$ . The production of public services exhibits constant returns to scale with respect to security capital and the level of infrastructure. Their individual shares are given by  $0 < \phi < 1$ .

Formally, the agency's problem is characterized as

$$\max_{\{H_t, z_t\}} E_0 \sum_{t=0}^{\infty} \Lambda_t (A_g H_t)^\phi z_t^{1-\phi}$$

subject to the budget constraint

$$I_{g,t} \geq I_{z,t} + I_{H,t} \quad (32)$$

<sup>10</sup>Beath et al. (2012) has lately argued that a certain minimum level of security must be provided for public development programs to have improving effects on public attitudes towards the government and reducing violence.

and subject to the accumulation law for security-related capital,  $H_t$ , and infrastructure,  $z_t$ ,

$$H_t = (1 - \delta_H)H_{t-1} + s(I_{H,t} - \bar{I}_H) + \bar{I}_H \tag{33}$$

$$z_t = (1 - \delta_z)z_{t-1} + s(I_{z,t} - \bar{I}_z) + \bar{I}_z. \tag{34}$$

$A_g > 0$  is the factor associated with security capital productivity. The levels of security and infrastructure capital accumulate in a similar fashion to private physical capital. Security capital and infrastructure depreciate at the rates  $0 < \delta_H < 1$  and  $0 < \delta_z < 1$ , respectively. As is also typical in low-income economies, and Afghanistan is not an exception, investment in public capital is subject to losses and inefficiencies. The parameter  $0 < s < 1$  captures these inefficiencies by “penalizing” investment levels that differ from the long-term equilibrium,  $\bar{I}_z > 0$  and  $\bar{I}_H > 0$ , respectively. It captures the notion that if government desires to increase the level of public capital by the value of AF1, it needs to invest more than AF1. In the context of the experiments in section V, this feature will tend to amplify the pressures on the government expenditure policy due to shrinking financial resources.

When prioritizing investment decisions, the agency takes into account current as well as expected future benefits that such investment will bring to the public. The stochastic discount factor,  $\Lambda_t$ , captures that agency’s role in a formal way. The discount factor is stochastic because it depends on households’ marginal utility from consumption that is subject to stochastic disturbances,

$$\Lambda_t = \beta E_t \left\{ \frac{U_c(C_{t+1}^s, N_{t+1}^s)}{U_c(C_t^s, N_t^s)} \right\}. \tag{35}$$

The discount factor is derived from the savers’ decision problem to capture public welfare (e.g., see Gali et al. 2007).

The stochastic discount factor introduces a time dimension to the agency’s problem. Without the stochastic discount factor, the decision problem would be static. First, the factor makes the agency’s decision problem dynamic by making intertemporal substitutions optimal. That means that the agency can bring some investment projects forward or delay them if it finds it desirable from the public welfare viewpoint. Second and more importantly, the nature of the stochastic discount factor makes the supply of public services countercyclical.

The discount factor depends on the expected economic performance. If the economy is expected to expand in the future, the value of the discount factor declines. From the public welfare perspective, that decline makes the supply of public services more valuable today when the economy is weaker relative to the future when the economy is doing better. An inverse logic also holds. When the economy is expected to do worse in the future, supply of public services will be more valuable in the

future than today. The agency will tend to postpone its investment decisions into the future.

The agency cannot make any savings decisions other than accumulating capital at different rates. By investing in security and infrastructure at a different pace, this allows the agency to smooth public expenditures over time.

The first-order optimality conditions to the agency's decision problem yield the agency's rules for allocating spending between domestic security and infrastructure, respectively,

$$\phi \frac{G_t}{H_t} = \lambda_{g,t} - (1 - \delta_H) E_t \Lambda_{t+1} \lambda_{g,t+1} \quad (36)$$

$$(1 - \phi) \frac{G_t}{Z_t} = \lambda_{g,t} - (1 - \delta_z) E_t \Lambda_{t+1} \lambda_{g,t+1} \quad (37)$$

where  $\lambda_{g,t}$  is the shadow price of public capital.

The equilibrium structure of public services depends on the relative costliness to maintain individual forms of public capital  $\{\delta_H, \delta_z\}$  and their importance for the production of final public services,  $\phi$ .

In a special case when both security and infrastructure depreciate at the same rate,  $\delta_H = \delta_z$ , and when  $\Lambda_t \lambda_{g,t} = 1$ , then it is optimal for the agency to invest in both public services in a fixed share that is given by their relative importance,  $0 < \phi < 1$ :

$$H_t = \frac{\phi}{1 - \phi} z_t.$$

The total amount of public funds allocated towards security investment positively depends on the relative importance of security in the supply of public services:

$$I_{H,t} = \phi I_{g,t}.$$

## 2. Treasury

The role of the treasury is to manage government revenues and expenditures to meet the government income constraint:

$$\tau_t P_t (C_t^s + C_t^h) + F X_t T_{d,t} + \frac{D_{t+1}}{R_t} = P_{d,t} [\Omega_t (I_{g,t} - \bar{I}_g) + \bar{I}_g] + D_t + T_t^S + T_t^h. \quad (38)$$

The sources of revenues, the left-hand side of the income equation, include consumption tax,  $\tau_t C_t$ , and foreign aid,  $T_{d,t}$ , converted to domestic currency at the nominal exchange rate,  $F X_t$ . The government can also obtain additional revenue,  $\frac{D_{t+1}}{R_t}$ , from issuing one-period *sukuks* discounted at the risk-free rate,  $R_t$ . Government

expenditures, the right-hand side of the budget equation, consist of the annual endowment to the public goods producer,  $P_{d,t}I_{g,t}$ , repayment of maturing *sukuks*,  $D_t$ , and transfers to savers and hand-to-mouth households,  $T_t^s$  and  $T_t^h$ , respectively.

The inflow of foreign aid  $T_{d,t}$  is exogenous. In the steady state, it is calibrated to a positive fixed value (see Table 2).

It is assumed that the government faces cost overruns in public investment,  $\Omega_t$ . Additional costs typically come from planning and coordination problems. This is a particularly important feature of low-income countries (Buffie et al. 2012). Therefore, in order to achieve a certain effective level of investment, more resources have to be provisioned for. Following Buffie et al. (2012), the cost overruns depend on the size of infrastructure investment relative to its existing level and its deviation from its steady-state level, where

$$\Omega_t = \left( 1 + \frac{I_{z,t}}{z_{e,t-1}} - \frac{\bar{I}_z}{\bar{z}_e} \right)^\kappa. \tag{39}$$

The parameter  $\kappa > 0$  captures the severity of the absorptive capacity in public capital.

In the experiments that follow the effective tax rate is pinned down either by the requirement of a balanced budget or set to a fixed value calibrated to match a desired nominal ratio (see section IV.A). Similarly, the balanced budget condition is used to pin down the debt level in debt financing scenarios in section V.

**G. The Rest of the World**

The experiments considered later focus primarily on the financial policy option of the domestic economy. Except for foreign aid, the behavior of the foreign economy plays a secondary role. Therefore, the foreign block is modeled in a rudimentary manner. The foreign interest rate,  $R_{w,t}$ , price level,  $P_{w,t}$ , and foreign output,  $Y_{w,t}$ , are set at long-run equilibrium levels,  $\bar{R}_w > 0$ ,  $\bar{P}_w > 0$ , and  $\bar{Y}_w > 0$ , respectively, that are calibrated to match Afghanistan trade and financial position.

**H. Market Clearing and Dynamic Equilibrium**

All markets clear in the economy. The domestic goods market clears when supply equals the sum of domestic consumption demand,  $C_{d,t}$ , private and public investment,  $I_t$  and  $I_{g,t}$ , and foreign demand,  $X_t$ ,

$$Y_t = C_{d,t} + I_t + I_t \xi_I \left[ \left( \frac{I_t^s}{I_{t-1}^s} - 1 \right) - \beta \left( \frac{E_t I_{t+1}^s}{I_t^s} - 1 \right) \right] + I_{g,t} + X_t. \tag{40}$$

The adjustment costs to private investment demand enter as social costs here.

Finally, the national aggregate resource constraint is given by the balance of payments that equates national spending with national income:

$$B_t FX_t = R_{l,t-1} B_{t-1} FX_t - (P_{x,t} X_t + T_{d,t} FX_t - P_{m,t} M_t). \quad (41)$$

The external balance of the economy is closed by the balance of payments.

In summary, the model dynamic equilibrium is characterized by equations (1) through (41). In what follows, the model is solved as log-linear model. An existence of a deterministic steady state is assumed for the Afghan economy and the model equilibrium dynamics is log-linearly approximated around the steady state.<sup>11</sup>

#### IV. Security and Infrastructure Investment in the Long and Short Run

This section summarizes the behavioral characteristics of the model introduced above. A reader interested in using the model for fiscal experiments may skip directly to section V. Given the main contribution of this paper, the attention in this section is focused on the behavioral properties of the public sector. The private sector behaves in a stylized fashion.

##### A. Baseline Calibration

The model baseline calibration is summarized in Table 1. Parameters are set to match selected nominal ratios characterizing the Afghan economy. A point worth highlighting is that under the baseline calibration, government will prefer investment in security to infrastructure services. Firstly, it is because it is assumed that security is overwhelmingly important to the economy ( $\phi = 0.9$ ). Secondly, once accumulated, infrastructure capital is less durable than security-related capital ( $\delta_z = 0.3$ , while  $\delta_d = 0.2$ ), which increases the incentive to invest relatively more in security than to infrastructure. The relative importance of security over infrastructure in Afghanistan is motivated by Beath et al. (2012) who suggest that a minimum level of security has to be in place for development spending to be beneficial to economic growth. For all the experiments presented later, it is implicitly assumed that security will remain central for economic stability and development over the whole baseline time horizon.

Selected GDP ratios characterizing the baseline model are summarized in Table 2. Under the baseline, the overall fiscal deficit (including grants) is zero. A

<sup>11</sup>Considerations about alternative solution approaches such as high-order approximations, approximations around stochastic steady states, exogenous or endogenous growth, or corridor stability are left for future research.

Table 1. **Baseline Calibration**

Parameter	Value	Definition
$\alpha_n$	0.80	Labor's share in domestic production
$\alpha_k$	0.10	Physical capital's share in domestic production
$\beta$	1/1.1 <sup>0.25</sup>	Time preference factor
$\eta$	0.20	Labor supply elasticity
$\delta$	0.03	Physical capital depreciation rate
$\delta_z$	0.30	Infrastructure depreciation rate
$\delta_d$	0.20	Security capital depreciation
$\chi$	0.80	Consumption habit persistence
$\kappa$	0.25	Absorptive capacity
$\varphi$	0.90	Security's share in public services production
$\tau$	0.14	Average tax rate
$\psi$	0.27	Weight of public services in private production
$\rho_d$	0.90	Autocorrelation in foreign aid
$f$	0.60	Share of hand-to-mouth consumers
$\omega$	0.20	Weight of domestic goods in consumption basket
$\varepsilon_x$	2.00	Price elasticity of export demand
$R_w$	1.06 <sup>0.25</sup>	Foreign gross interest rate
$LVR$	0.02	Risk free loan-to-value ratio
$prem$	0.10	Private debt risk premium
$\varphi_\pi$	1.50	Monetary policy weight on inflation stabilization at the target
$\pi^*$	0.00	Long-run inflation target
$\xi_I$	20.00	Adjustment costs for private investment
$s$	0.60	Public investment efficiency

Source: Authors' representations.

Table 2. **Baseline GDP Ratios (%)**

<b>Public Finance</b>	
Overall fiscal deficit	0
Tax revenues	11
Donors' aid	34
<b>Aggregate Economy</b>	
Private consumption expenditures	75
Domestic goods	30
Foreign goods	45
Private fixed investment	14
Government expenditures	45
Infrastructure	5
Security	40
Trade deficit	34

Source: Baseline model calculations.

substantial part of government expenditures is covered from the inflow of foreign aid that makes 34% of domestic GDP. A major part of economic output goes to private consumption (85% of GDP), with two-thirds of consumption goods being imported. This is reflected in the size of the trade deficit (34% of GDP).

## B. Structure of Public Services

Given the geopolitical situation in Afghanistan, current spending preferences favor security over infrastructure. In the model context, this is captured by the government agency subjectively assigning higher preference to security relative to infrastructure in the production of public services ( $\phi = 0.9$ ). In addition, the stock of infrastructure depreciates faster than the stock of capital related to security,  $\delta_z > \delta_d$ . The former assumption stems from the understanding that productive development cannot occur without a stable security environment, and therefore, in the medium-term, security services are preferred for the time being. Infrastructure is assumed to deteriorate at a faster rate given its overall scarcity and the intensity with which it is used, for example, the heavy use of only a handful of major roads by all forms of traffic (civilian and military).

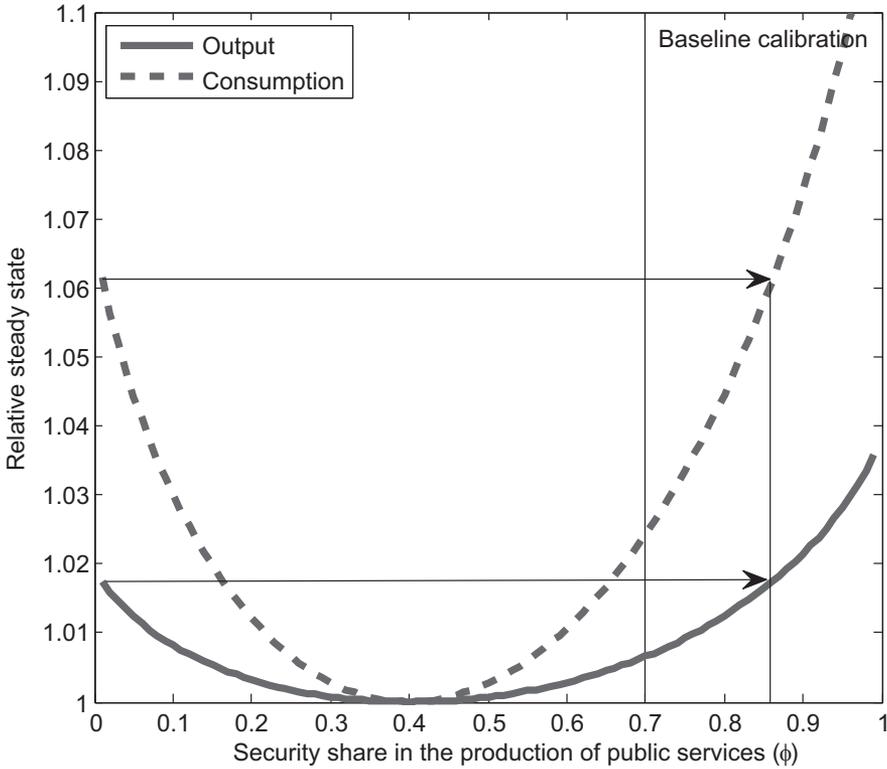
Because security and infrastructure capital are substitutes in the CRS production process of public services, if the government should set its spending preferences optimally, the choice will be driven by the relative durability of the two types of public capital. If the infrastructure capital is more durable than security capital, the government agency would maximize the level of economic output or private consumption by supplying only the infrastructure services. Figure 2 shows that if security capital is more durable than infrastructure capital (baseline calibration here), the agency would maximize the economic output by supplying only security services.

The effects of the changing importance of security services are summarized in Figure 3.

Both stocks of infrastructure and domestic security capital (as shares of GDP) are declining with the depreciation rate of infrastructure, although security is notably less elastic with respect to the depreciation rate of infrastructure because of the relatively low importance of infrastructure relative to security. The bottom right panel shows that the share of the security sector in the economy increases with the increasing public importance of security. Correspondingly, the share of infrastructure sector declines (bottom left panel). Changes in the shares are disproportionate, with the infrastructure sector reacting with much greater sensitivity.

Figure 4 complements the above results by focusing solely on the role of capital depreciation. It shows that the level of infrastructure, security, and public services as a whole is declining with declining durability of infrastructure. Leaving all other things constant, the size of public sector (measured as the share of public services supply to total GDP) increases as security capital depreciates faster (top right panel). Because security becomes more costly to maintain, resources are allocated in favor of infrastructure (bottom right panel). The level of public services falls because the newly accumulated level of infrastructure is insufficient to fully offset the negative effect of the declining level of security. But faster depreciating security capital positively affects output (top left panel).

Figure 2. Importance of Security, Output, and Consumption



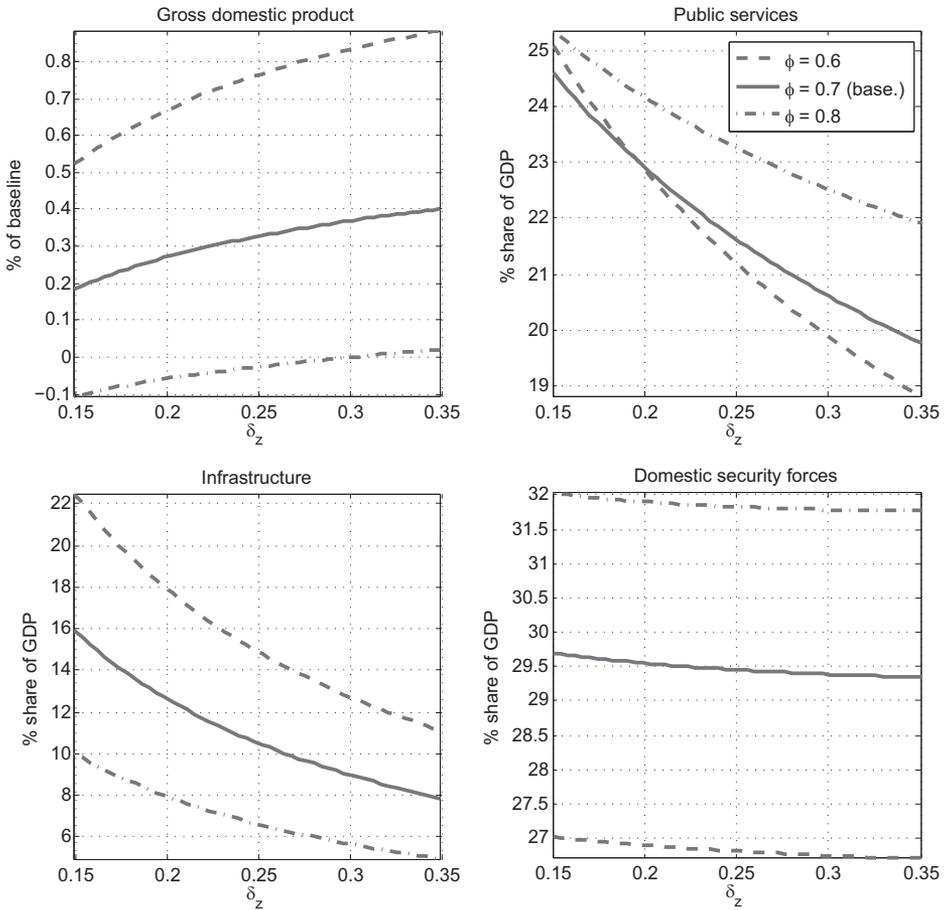
Source: Authors' calculations.

**C. Public Investment Multipliers**

What is the long-run effect of an additional increase in public investment on GDP and its key components? Table 3 summarizes the multipliers of a permanent increase in donor aid by one US dollar (i) invested in both infrastructure and security, (ii) invested only in infrastructure, or (iii) invested only in security. The last multiplier summarizes the long-term impact of a permanent increase in government expenditures financed by raising additional 1 afghani in consumption tax revenues. The reported baseline multipliers are based on the assumption that the government runs a balanced budget and any inflow of foreign aid in foreign currency is fully sterilized.

An additional \$1 of donor aid to the domestic government yields about \$1.4 of additional real GDP. Foreign aid has the largest impact on consumption and public investment. The multipliers are somewhat smaller when additional foreign aid flows only to security or only to infrastructure investment, illustrating complementarity of the two.

Figure 3. Effects of the Changing Structure of Public Services



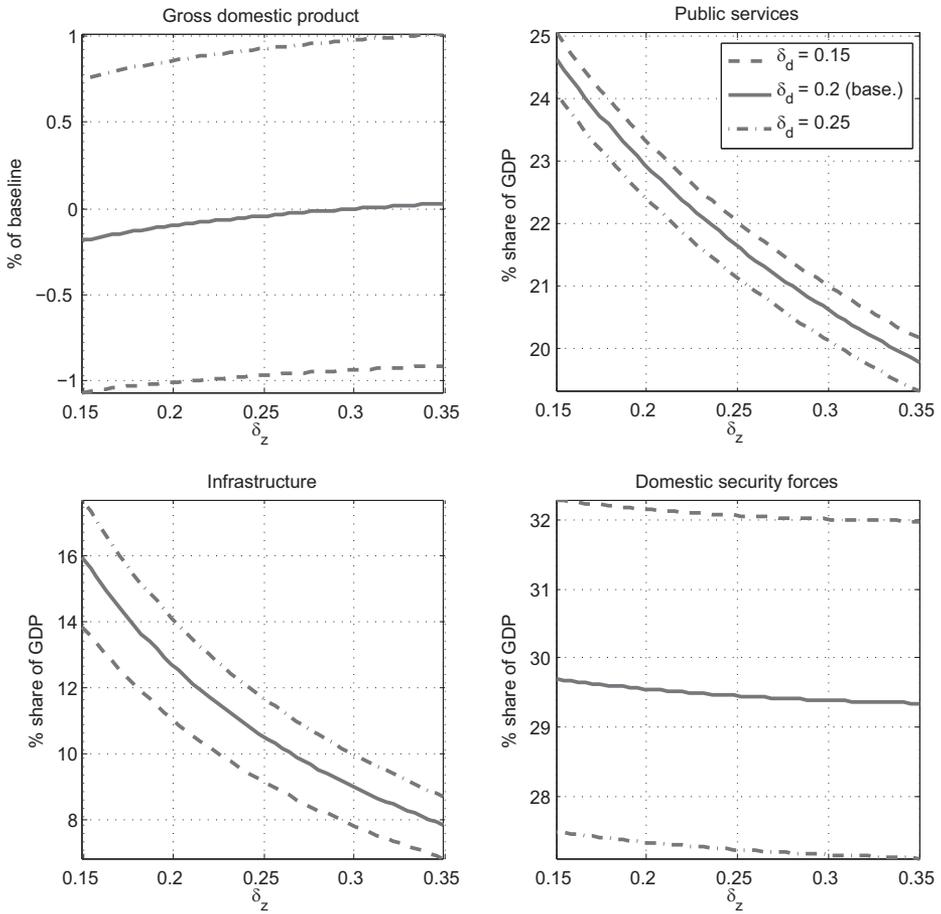
Source: Authors' calculations.

Fiscal expansion financed by increasing tax revenues has no positive impact on the macroeconomy. An increase in tax revenues by AF1 generates no real increase in economic activity—GDP or private investment remains unchanged. Any positive effect of the fiscal expansion is muted by the distortionary effect of the tax increase on private consumption. Private consumption falls by AF0.7 as a result of the additional tax of AF1 that consumers must pay. The increase in public investment by AF0.1 is insufficient to offset the negative effect of the tax increase.

**D. Impact of Government Spending Shock**

Although there are no long-run effects on the economy, the model developed in this paper predicts fiscal expansion financed by tax increases may have short-run

Figure 4. Effects of Depreciation on the Supply of Public Services



Source: Authors' calculations.

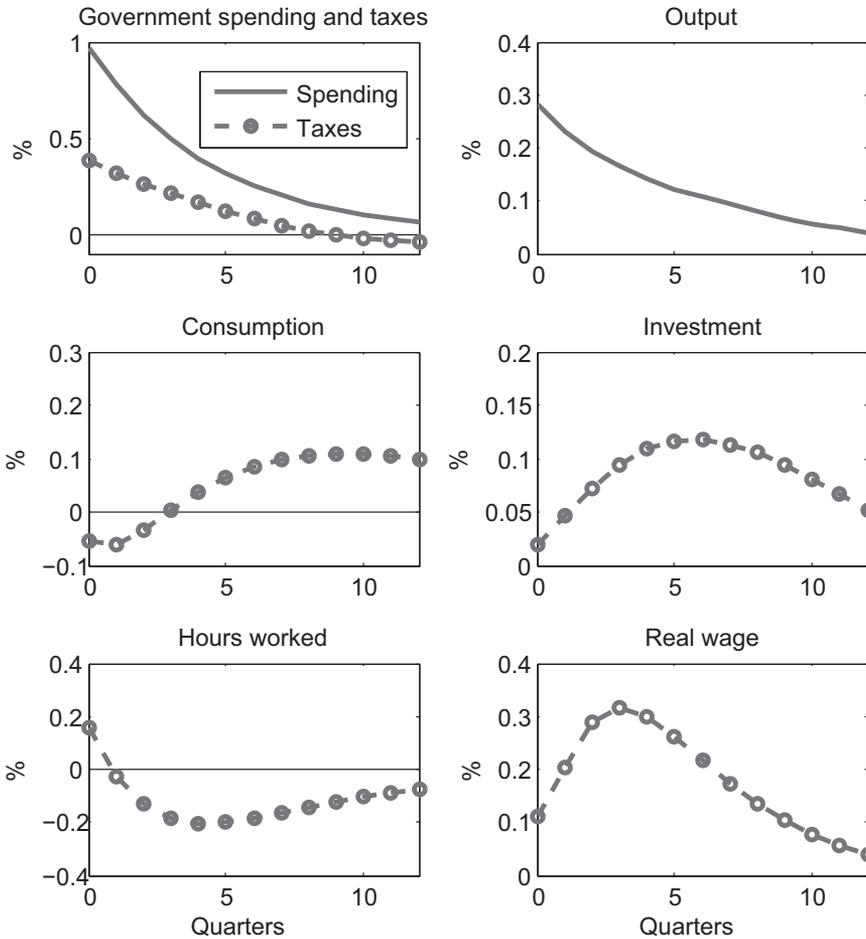
Table 3. Selected Fiscally Relevant Long-run Multipliers

	Donors' Aid	\$1 of		AF1 of
		Security Investment	Infrastructure Investment	Consumption Tax Revenues
Gross domestic product	1.4	0.1	0.8	0
Private consumption expenditures	0.4	0.1	0.9	-0.7
Private fixed investment	0.1	0	-0.2	0
Public investment	1.1	0	0.4	0.1

Note: All simulations assume that the government runs a balanced budget and that the budget is balanced by adjusting the effective tax rate. It is also assumed that the inflow of foreign aid in foreign currency is fully sterilized and therefore has no effect on domestic real prices and allocation of resources in the steady state.

Source: Baseline model calculations.

Figure 5. Impact of Government Spending Shock

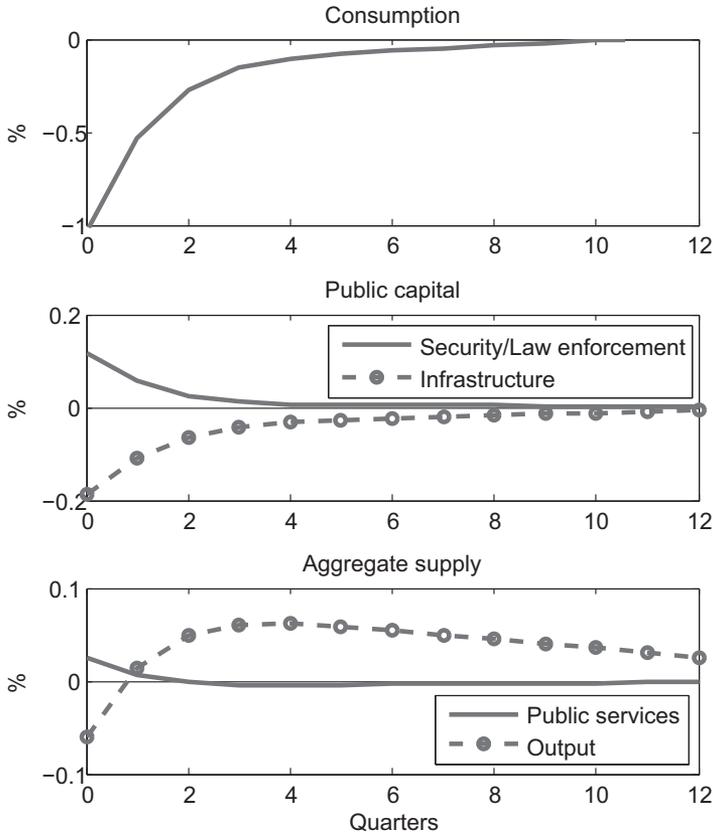


Source: Authors' calculations.

expansionary effects. A 1% increase in government expenditures increases output on impact by 0.3% (Figure 5, top panels). Under the balanced budget constraint, additional public expenditures are financed by tax hikes. The increasing tax burden initially leads to lower consumption (by 0.1%)—partially compensated by more labor supply, but the positive wealth effect of expenditure expansion eventually offsets the higher taxes and consumption increases before returning back to the long-run equilibrium. The positive wealth effect comes as a result of higher private sector productivity due to more public services, real wage increases, and labor supply declines (bottom panels). Gali et al. (2007) arrive at similar results.

In response to negative aggregate demand shocks, the model predicts government spending to behave in a countercyclical way. Figure 6 shows the reaction

Figure 6. Fiscal Response to Consumption Shock



Source: Authors' calculations.

of public sector when consumption falls by 1%. The bottom panel illustrates the countercyclical behavior of government expenditures by showing that the supply of public services increases when the economy contracts. As the economy recovers, supply of public services gradually declines. Because security capital is a more durable and more valuable asset in the production of public services, the government maximizes supply of the services by allocating relatively more resources towards the security sector in an economic downturn.

**V. Fiscal Experiments**

The anticipated withdrawal of foreign troops scheduled for 2014 and the gradually declining inflow of foreign aid pose a serious challenge for the sustainability of public finance in Afghanistan. Many policymakers argue that going forward it is

essential for the Afghan government to focus on the mobilization of domestic revenue resources to ensure the financing of security-related services and vital public infrastructure. Both types of public goods are essential for securing the country's future development. The results summarized in this section support this argument that without greater self-reliance of the Afghan public finances, the economic growth seeded via foreign aid will remain fragile at best and diminish rapidly at worst.

Using the analytical framework from section II, this section explores two fiscal experiments. The first experiment looks at the impact of a permanent decline in foreign donors' aid. The second experiment looks at the impact of a shortfall in tax revenues due to increased tax evasion. Both experiments consider three alternative fiscal responses:

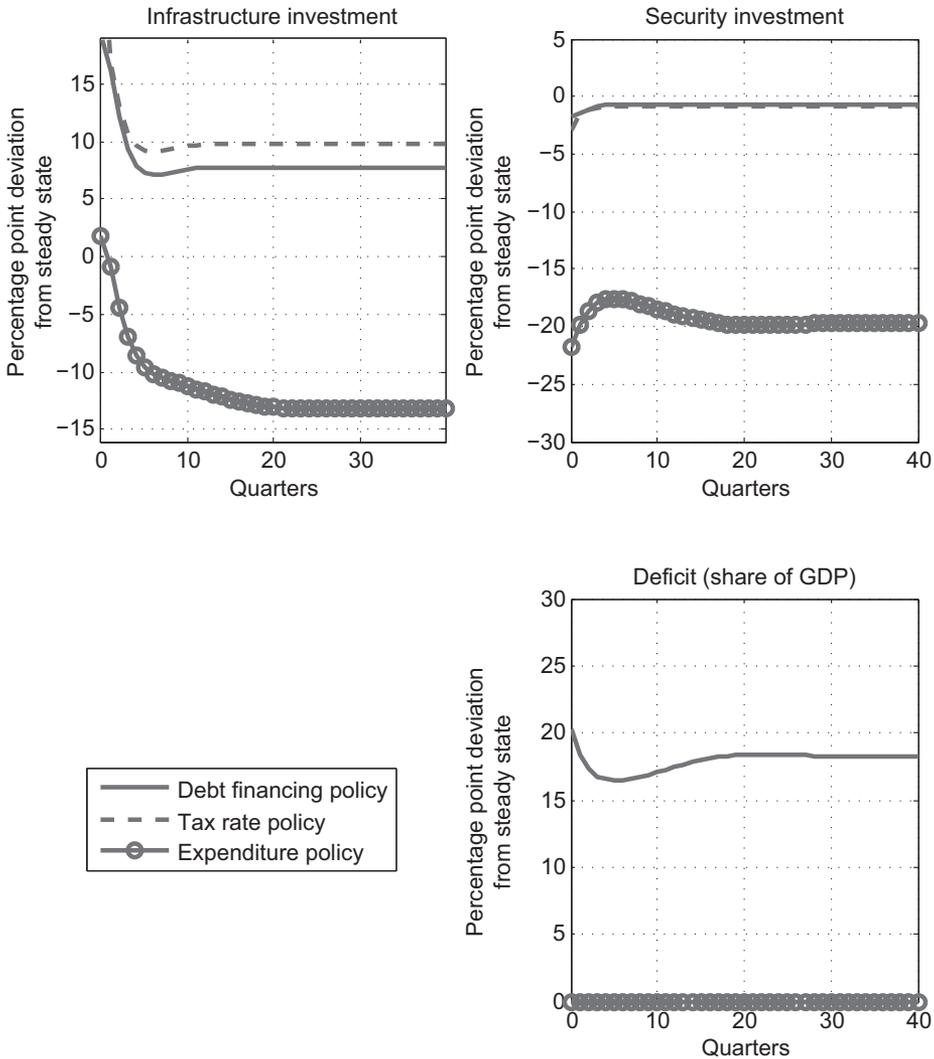
- (i) Debt financing policy—the government budget is permitted to be unbalanced and the shortfall in revenue is supplemented by the issuance of domestic debt; government keeps all budget chapters unchanged; real public investment expenditures, in particular, are kept constant at their steady-state level; the effective tax rate remains unchanged;
- (ii) Tax policy—the government commits to running a balanced budget; the shortfall in revenues is consolidated by effective tax rate increases up to the point where the government's budget is balanced; government expenditures are assumed mandatory, and they are kept constant at their initial steady-state levels;
- (iii) Expenditure policy—the government commits to running a balanced budget; the shortfall in revenues is consolidated by scaling back public investment expenditures while debt and the effective tax rate remain unchanged at their initial steady-state levels.

To rank the considered policy options, a quantitative criteria is used. The usefulness of individual policies is judged by (i) the size of fiscal and trade deficits and (ii) implications for economic output, all with equal weights on their relative importance.

#### **A. Shortfall in Foreign Donors' Aid**

In this experiment, the inflow of donors' aid is permanently scaled back by half. The effects on public finance and selected macroeconomic variables are summarized in Figures 7 and 8, respectively. Overall, the sudden shortfall in foreign aid permanently shrinks the size of the economy. None of the three considered policy responses can fully offset the negative fiscal and economic impact. While increased public borrowing would minimize the contraction, the necessary build up in debt would reach levels that are, for a low-income country like Afghanistan, unsustainable. Given the unfavorable interest–growth differential the country would

Figure 7. **Public Finance Response to a Permanent 50% Cut in Foreign Aid**

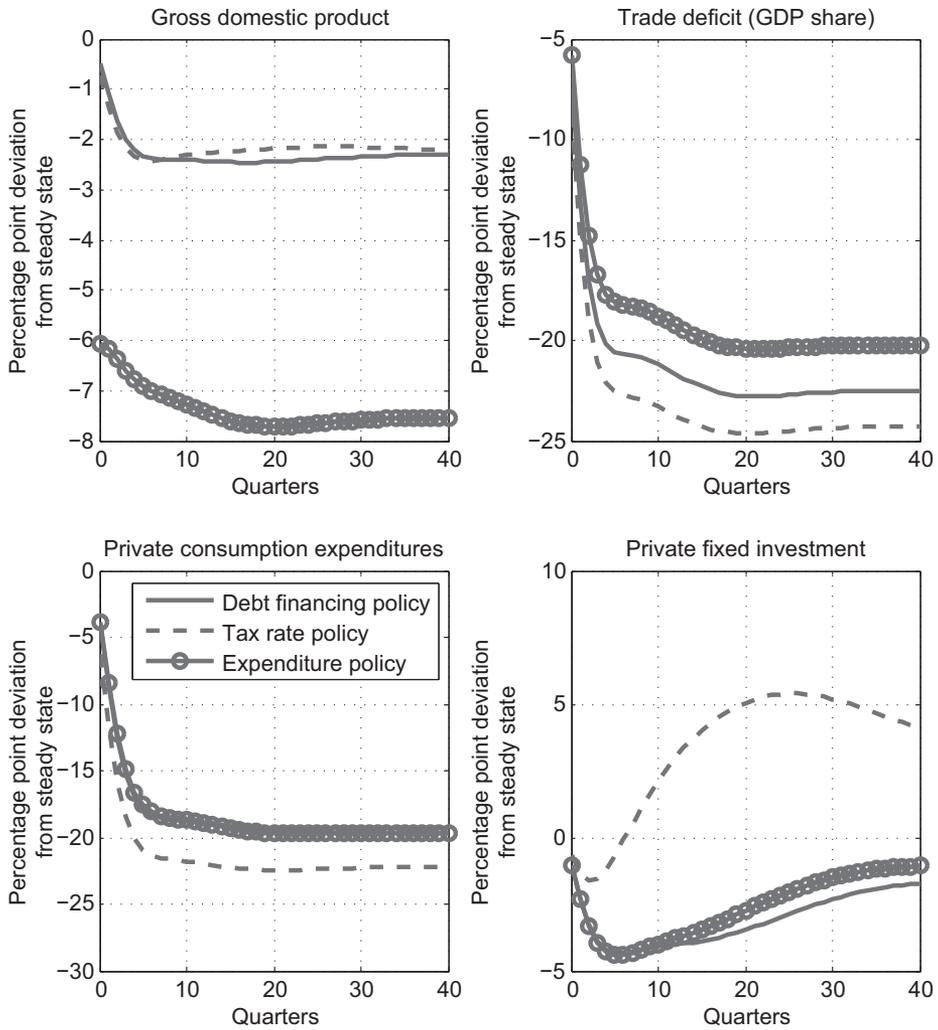


Source: Authors' calculations.

face under this scenario, the risk of losing access to capital markets and default increases.

It is the mobilization of domestic revenues by raising consumption tax that has the potential of minimizing the negative impact on the economy by preserving the public capital accumulated due to past foreign aid while maintaining fiscal sustainability (Figure 5, top left panel). In contrast, cutting public expenditures keeps the budget in balance but at the expense of disinvesting and lowering the level of public capital. Public disinvestment worsens the outlook for household real income,

Figure 8. Real Economy Response to a Permanent 50% Cut in Foreign Aid



Source: Authors' calculations.

private consumption, and investment, as the supply of public services falls sharply. Finally, pure debt financing policy helps to preserve public capital and support the economy, but it is not a fiscally prudent option. Debt increases are insufficiently compensated for by increasing tax revenues from the expanding economy, and the debt rapidly accumulates to an unsustainable level.

Mobilization of domestic revenues via tax increases is the most favorable policy response in terms of economic outcomes (Figure 5, top left panel, dashed line). Under this scenario, domestic consumption tax increases almost twofold (from

14% to the level of about 23%). The GDP level remains largely unchanged and over the 10-year period it is projected to decline by 3 percentage points from its initial level. As the government sustains its baseline level of public investment in both security and infrastructure (Figure 5, top right panel), the contractionary effect of a higher tax rate comes through its distortive impact on private consumption. As household disposable income declines, so does consumption (Figure 5, middle left panel, dashed line), which leads to lower aggregate demand and hence, lower demand for capital by firms (private investment falls; middle right panel, dashed line).

Initially, private consumption declines by more in this policy option as compared to expenditure-led fiscal measures since the distortive effect of a higher tax on consumption dominates the negative wealth effect associated with expenditure cuts. Three years into the shock, however, these two policy options converge into a permanent decline in private consumption of 19 percentage points as compared to baseline. Households smooth their disposable income by private borrowing. That impacts the country's balance of payments and the trade balance. Private (mostly foreign) borrowing comes at a cost to the economy in the form of raising the country's credit risk, which leads to a domestic currency depreciation to the order of 20% compared to the baseline. As domestic demand falls, imports fall, and the trade balance improves (Figure 5, bottom left panel, dashed line).

Debt financing is a less favorable policy option. To the degree that the government is tapping domestic markets for borrowing, this negatively affects private consumption and investment in the short run as households find it optimal to save more (the risk-free interest rate increases by more than the foreign lending rate making it more attractive for households to lend domestically).<sup>12</sup> Hence, the contractionary effect on the real economy comes through the private sector. Such debt financing, however, would put public finances in an unsustainable path as public debt would reach 80% of GDP in 10 years and the debt servicing cost would result in an ever increasing overall and operating budget balance (Figure 4, bottom right panel).

Cutting public investment expenditures is economically the least favorable policy option out of the three. In this policy option, the government has to shrink in order to keep the budget balanced. As a result of the shrinking public sector, real GDP per capita permanently drops by about 5% relative to the baseline over a decade. Investment in security declines by 5%, and investment in infrastructure declines by 10% compared to the baseline (Figure 4, top two panels).

The reason for such a strong impact is that the decline in the supply of the public good has dual effects: the first is the direct effect on the aggregate demand, and the second is the negative externality. In the latter case, the contraction in the

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<sup>12</sup>Afghanistan would not be able to tap international markets at interest rates that would keep public debt on a sustainable trajectory. Concessional financing is likely to be available, but in limited amount. Hence, as a simplification, we constrain the government to domestic borrowing.

provision of the public good acts as a TFP shock—any additional unit of public services increases the productivity of each factor of production. Hence, as the government cuts public investment in both infrastructure and security in its effort to compensate for the shortfall in aid, it is causing an economy-wide contraction of 10% via a direct effect of lower demand in the economy as well as a decline in the rate of return of all factors of production. Production is negatively affected via the reduction in TFP as the supply of public services (both of security and infrastructure) falls. Lower returns on factors of production such as labor and capital also lead to lower private consumption and investment. This has knock-on effects for the trade balance which shows improvement as total imports decline due to the weakening of domestic demand while exports remain unchanged. Finally, the contractionary effect on the economy leads to slightly lower domestic revenues. However, this is offset by the larger expenditure cuts which lead to an improvement in the operating deficit as a share of GDP.

## B. Shortfall in Tax Revenues

This section looks at the implications of shortfalls in tax revenues. A foreign troop withdrawal is likely to result in heightened uncertainty, and the public financial management architecture remains fragile in Afghanistan, as do both the customs and tax administrations. Evasion and corruption are daily challenges for tax and customs officers, and therefore, any number of events could lead to the impairment of revenue administration generating greater risks for revenue shortfalls.

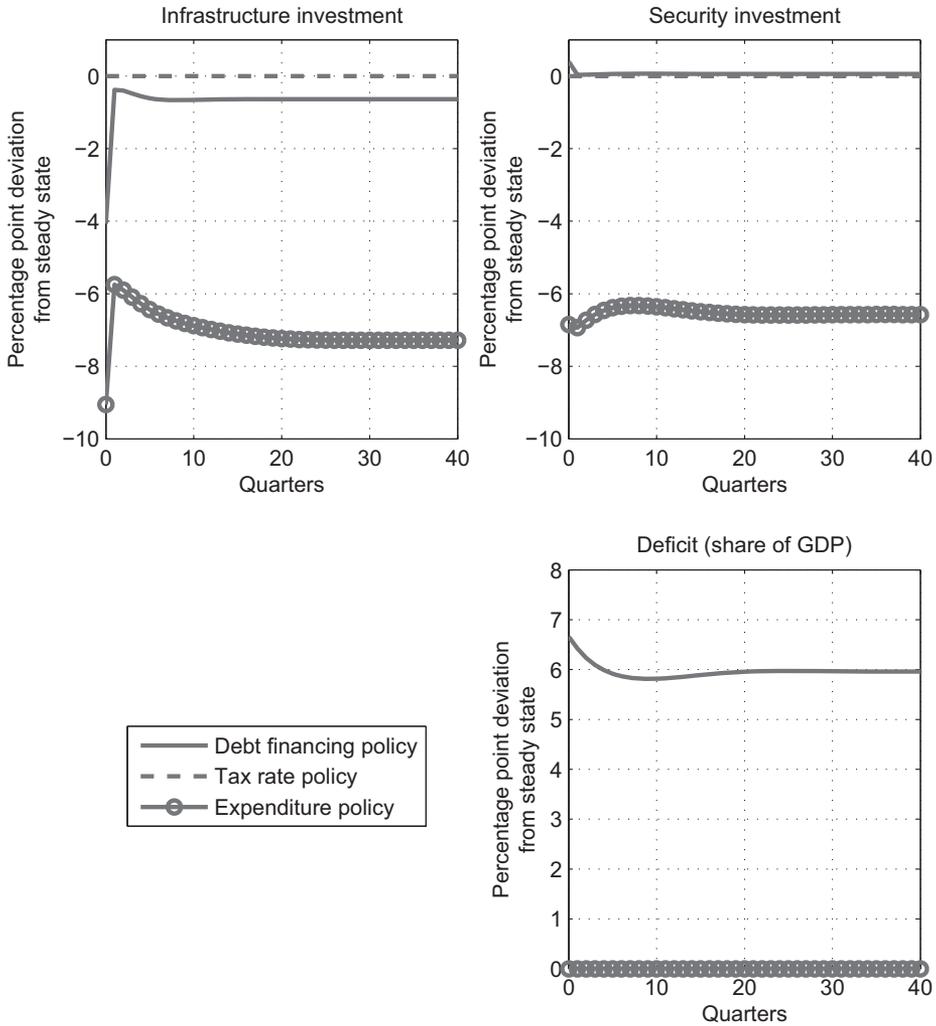
In this experiment, consumption tax revenue, as a share of GDP, permanently declines due to tax evasion. Specifically, tax revenue relative to GDP permanently declines by 1 percentage point from the baseline, 11% down to 10%. Technically, the shortfall is modeled by reducing the effectiveness of tax collection that translates into a lower effective tax rate. The lower effective tax rate is expansionary for economic activity as it boosts private consumer demand because households enjoy higher disposable income. This is the case for the debt financing policy option. Under the public investment policy setup, the positive growth effect is more than offset by the negative externality of lower public spending and the subsequent supply loss of public services. Domestic revenue mobilization in this setup aims at reversing the increase in evasion by increasing the tax rate, thus, completely offsetting the initial expansionary effect of a lower effective tax rate.<sup>13</sup> The effects on public finance and the aggregate economy are summarized in Figure 9 and 10, respectively.

In the effort to reverse the lower revenue, the government could borrow in the domestic market, which would partially offset the expansionary effect of the lower effective tax rate as households would find it optimal to permanently increase

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<sup>13</sup>We do not model the impact of an increasing tax rate as leading to further tax evasion. Existing taxpayers remain compliant. Should this not be the case, the offset would only be partial.

Figure 9. **Public Finance Response to a Permanent Decline in Tax Revenues**

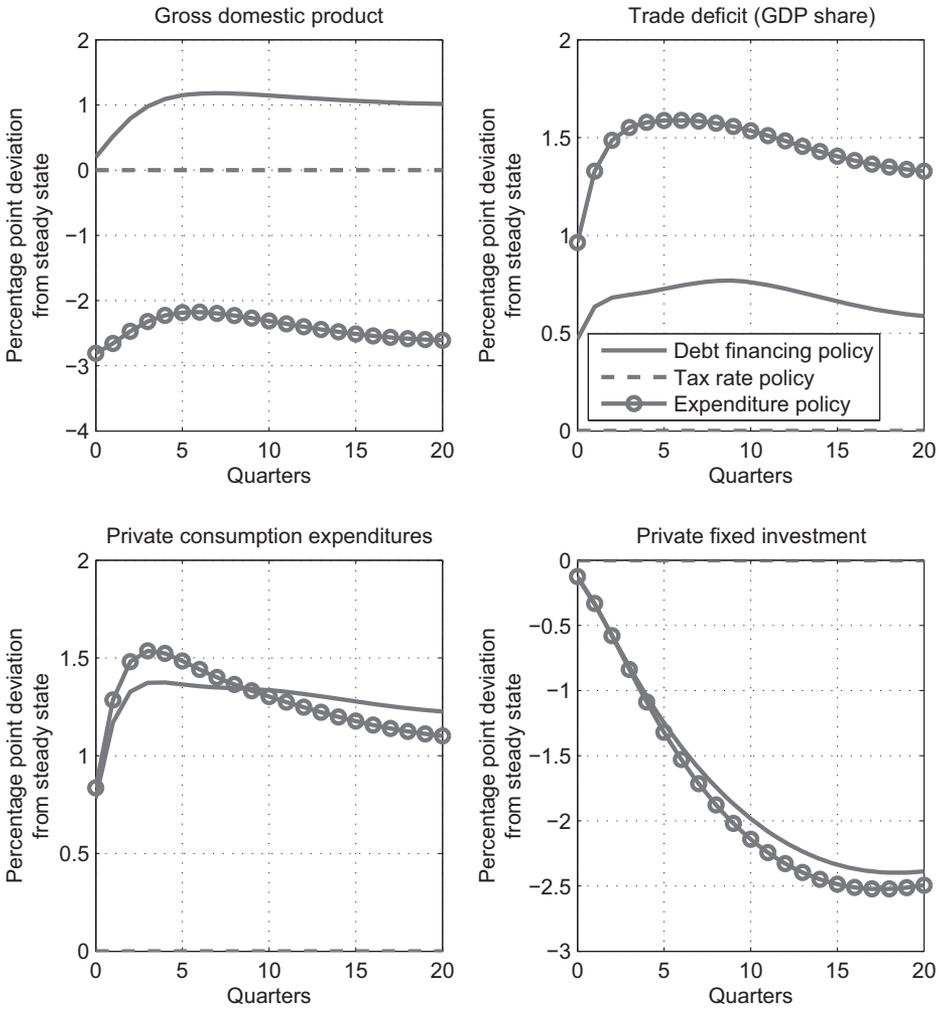


Source: Authors' calculations.

their saving rate. Private investment also declines as a result. The model suggests that the net effect is mildly expansionary on the real economy, while resulting in a permanently higher overall deficit and rising debt-to-GDP ratio of 6 percentage points by the end of the 10th year, putting the cumulative debt-to-GDP ratio to 62% and rising.

Hence, in this policy scenario, a permanent decline in the effective tax rate while having a negative effect on fiscal sustainability due to lower revenue stimulates growth via higher private consumption. The accumulated debt over 10 years is fiscally unsustainable due to an unfavorable interest–growth differential, and

Figure 10. Real Economy Response to a Permanent Decline in Tax Revenues



Source: Authors' calculations.

stabilization measures will be required. A stabilization action results in lower real GDP (by 0.3 percentage points) compared to the baseline. Once again, as described in section IV.A, the strong impact of cuts in public investment comes from the dual effect of lower aggregate demand and the negative externality effect that acts as a negative TFP shock.

The third policy option for the government to restore the loss of revenue is via additional tax measures, assuming that such tax measures will not intensify tax evasion. An additional effective tax rate increase will tend to offset the effect of evasion. Given the expansionary effect of the latter, the increase in the rate does not

need to be of the same magnitude in order to fully reverse the increase in the rate of evasion.

In summary, in this experiment, debt financing and revenue measures are superior to cuts in public investment. The optimality of increased public borrowing depends on the magnitude of the shock, as that would determine the fiscal sustainability of such an option.

### C. Results and Discussion

In the simulations, the preferred policy response depends on the magnitude and duration of the shocks generated. The key implications arising from the two experiments carried out in this paper are that expenditure cuts in the form of lower public investment are the least preferred option as they have an amplified negative effect on the economy given the strong positive externalities associated with government-provided public goods. Domestic revenue mobilization, either in the form of raising revenues through broadening the tax base (e.g., efforts to introduce a VAT or excise duties) and mining or reducing tax evasion by improving tax administration, is the most preferred option.

One must note, however, that depending on the magnitude of the shock, the required increase in the tax rate (or collection efforts) must be realistically feasible. In the experiment of donor aid falling by 50%, the effective tax rate would need to increase by 13 percentage points to 23% within a decade. While this is more than doubling the current rate, Afghanistan ranks as one of the countries with the lowest revenue-to-GDP ratio and poorest revenue administrations. Whether such a rate increase could truly mobilize revenue will be dependent on a number of factors, most notably structural improvements in revenue administration.

It is also important to note that both the experiments above refrained from considering cutting recurrent spending as a consolidation measure. In Afghanistan, this would be predominantly wages, and while it would have a potentially lower negative effect on the economy as compared to cuts in public investment (via lower consumption), it would require unrealistic levels of wage cuts and/or retrenchment in the security sector. Furthermore, the framework naturally abstracts from a number of other important characteristics of the Afghan economy. For example, the preferred responses could be altered once we allow for the fact that evasion is likely to be a function of the tax rate in such a poor-administered country. Furthermore, for a country that is starting from a level of zero debt, it is unclear how much debt local or global markets would be willing to bear before funding costs become prohibitively expensive. Using a novel general equilibrium framework to study the key trade-off facing the government, the analysis should be interpreted as providing only a partial equilibrium analysis. Clearly, political stability of the country is a key prerequisite for any economic policy to be efficient.

Overall, the analysis also shows that public borrowing from world capital markets is likely a nonviable option to finance permanent shortfalls in revenues. While there is, in principle, a case for intergenerational burden sharing of the reconstruction and development costs, Afghanistan is de facto financially constrained. Some concessional donor borrowing is likely to materialize, but borrowing from international capital markets would most likely come at prohibitive costs. Therefore, Afghanistan's capacity to carry public debt is indeed very limited. There is some scope for domestic issuance, mainly to promote market development. But unless there is a growth dividend much higher than predicted in this paper, the model predicts that Afghanistan is unlikely to be able to finance its spending needs through borrowing. Quite soon, debt servicing costs would crowd out other spending, and debt would be propelled onto an explosive path.

A worse-than-expected security situation in Afghanistan is the main downside risk. A worsening security situation can be expected to drain scarce budget resources from development spending to security spending, reducing the much-needed improvement in living standards. Similarly, shortfalls in donor support, or volatility in donor support, will trigger expenditure cuts that will sacrifice future development. Lastly, failure to achieve the targeted revenue gains will equally entail expenditure cuts and lower growth. For now, the pecking order for spending is clear, with security expenditure necessarily taking primacy.

## VI. Conclusion

Using a general equilibrium framework with rational expectations, we attempted to capture the unique policy trade-off that exists in Afghanistan given the competing priorities of security and development against a backdrop of declining foreign aid. By exploring the evolution of the Afghan economy over the coming decade using two risk scenarios, it is possible to trace how public investment in both security and development, together with sustained domestic revenue efforts, reinforce one another in support of growth. In particular, with public spending on security and development acting as complements in raising the living standards of Afghans, the government needs to carefully balance the two spending categories.

Even though the paper focused on isolated policy responses in its experiments, a combination of various alternatives might also be warranted. Indeed, this is likely to be the most suitable way forward. To the degree that public investment might be reduced in response to permanent shortfall in revenues, the allocation of these cuts will depend on the return on each investment to the production of public services. In the current calibration, it is investment in security that takes the predominance over infrastructure. This might change as the economy develops and the risks associated with the lack of security decrease reversing the return on that type of public investment. The government can also explore in incremental steps, what limited role debt financing, ideally concessional, can play.

This paper is a first step towards a comprehensive framework that can be used for quantitative analysis of fiscal policy in Afghanistan. Several directions of future research appear fruitful. First, it would be useful to understand better the interaction between the formal and informal economy, the role of informal sector in Afghanistan in helping to finance the current account, as well as linking domestic tax revenue effort more clearly to the size of the informal sector. Second, an important direction is to investigate the role of security at the microeconomic level. What is the price of civil war? What is the sufficient level of security to support stability and sustainable development in Afghanistan? Finally, it would be useful to extend the framework for endogenous technology growth to analyze the effect of public investment in security and infrastructure on long-term growth potentials.

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