



# Equilibrium implications of fiscal policy with tax evasion: A long run perspective

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## ABSTRACT

This paper studies equilibrium effects of fiscal policy within a dynamic general equilibrium model where tax evasion and underground activities are explicitly incorporated. In particular, the paper analytically measures (both from a theoretical and empirical viewpoint) of how much the underground sector mitigates the distortionary impact of fiscal policies, while lessening the drop (rise) of aggregate production after contractionary (expansionary) tax shifts.

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## 1. Introduction

This paper studies the macroeconomic effects of fiscal policy within a dynamic general equilibrium model in which tax evasion and underground activities are explicitly incorporated.

Recent years have witnessed significant changes in the fiscal position of almost all developed (and developing) countries and that most of the discretionary measures undertaken, both on the spending and on the revenue side, were backed by little consensus among economists on their short to medium run effects. This lack of consensus stems from the difficulty that economists have in building theoretical and empirical models able to replicate the main empirical regularities concerning fiscal variables (i.e. Forni et al., 2010). Notice, moreover, that the debate on the empirical effects of fiscal policy shocks (in particular on the effects of government expenditure shocks on private consumption) is still unsettled.<sup>1</sup> In addition, the existence and increase of an underground economy pose several questions, the consequences on macroeconomic and social performance being among the major ones.

The macroeconomic literature on the "equilibrium approach to fiscal policy" studies the effects of fiscal policy within neoclassical growth models.<sup>2</sup> We are not aware of any contribution, however, that evaluates the macroeconomic effect of fiscal policy explicitly incorporating tax evasion and underground activities.<sup>3</sup> This might be an important part of the story since underground activities and tax evasion are a

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<sup>1</sup> The disagreement mainly concerns the effects of increases in expenditures related to military buildups in the US— Perotti (2007) argues that the response of private consumption is positive, while Ramey (2008) that it is negative. The literature on the effects of fiscal policy in "normal times"— that is abstracting from military buildups — mainly finds a moderately positive (or a non negative) response of private consumption to government expenditure shocks; also employment and real wages tend to grow, while the response of private investment is generally negative.

<sup>2</sup> Aschauer (1988) and Baxter and King (1993) are seminal contributions sharing an emphasis on the supply-side response of labor and capital to shifts in government demand and tax rates. Recent related contributions are: Braun (1994), McGrattan (1994), Uhlig and Mountford (2002), Burnside, Eichenbaum, and Fisher (2003), and Fiorito and Kollintzas (2004).

<sup>3</sup> McGrattan, Rogerson, and Wright (1997) study fiscal policy effects in a dynamic general equilibrium model for the US economy augmented with a household production sector. The model reveals the significant influence of household production in its affection on official variables. It generates different predictions for the effects of tax changes than similar models without household production. It is important to stress that an underground sector significantly differs from a household production sector, as Appendix C discusses in more details.

fact in many countries; for example, [Schneider and Enste \(2000\)](#) estimates suggest that the average size of the underground sector (as a percentage of total GDP) over 1996–1997 account for 39% in developing countries, for 23% in transition countries, and for about 17% in OECD countries. Avoiding tax payments is the very reason for the existence of tax evasion, and this may have an important impact on the effectiveness of fiscal policy to reach the desired objectives. More recently the estimates by [Schneider, Buehn, and Montenegro \(2010\)](#) and by [Tafenu, Herwartz, and Schneider \(2010\)](#) suggest that the size of the informal sector is significant and growing over time (more details are presented in [Section 2](#)).

We take this suggestion seriously, and address the issue from a macroeconomic and quantitative point of view. Our paper is a first attempt to fill this gap evaluating the possibility that the lack of fit of neoclassical models in predicting the correct response (if any) to fiscal policy shocks may be related to the lack of an explicitly incorporation of underground activities into the models. Technically, to investigate relationships between underground economy, taxation and public expenditure, we use a dynamic general equilibrium model in which there are three agents: firms, households, and government.<sup>4</sup> In addition there are two sectors: the regular and the underground sectors. Firms and households are subject to distortionary taxation, but they can use the underground sector to evade taxes, by reallocating labor services into it. Government faces tax evasion originating from the underground sector, and coordinates strategy to address abusive tax evasion schemes. Public expenditure is allocated to the purchase the final consumption goods. Our analysis focuses on the stationary equilibrium of the model.

Here is an overview of our results. Tax evasion and the underground economy mitigate the distortionary impact of fiscal policies, while lessening the drop (rise) of aggregate production after restrictive (expansionary) tax changes. Tax evasion and the informal economy offer a channel for self-insuring income and consumption patterns from distortions generated by fiscal policy.<sup>5</sup> In particular, the elasticities of aggregate GDP to an increase (cut) in income and/or corporate tax rates are negative, but very close to zero under tax evasion, while are negative (positive) without. The negative sign of the elasticities without tax evasion is consistent with the predictions of the neoclassical growth model; on the other hand, the almost zero elasticities under tax evasion are perfectly consistent with consumption and income smoothing done through the underground sector.

Eventually, we attempt a measurement exercise. It is important to stress that the purpose of this exercise it to have just a feeling for the relative magnitudes; it is not our intention to perform a fully fledged econometric exercise. Our results suggest that the model is substantially able to reproduce the qualitative features of the data

The paper proceeds as follows. [Section 2](#) presents selected stylized facts and sintetically discusses the related literature, and [Section 3](#) details the model. [Section 4](#) analyzes the equilibrium effects of fiscal policies under tax evasion, and [Section 5](#) concludes. Proofs and derivations are sketched in [Appendices](#).

## 2. Empirical evidence and related literature

### 2.1. Empirical evidence

We present here data for the Italian economy because it possesses a large underground sector. This analysis, however, is addressed to many European countries and to the United States as well.<sup>6</sup> [Fig. 1](#) presents estimates for size of the underground economy, and for tax evasion. All series are reported as a percentage of aggregate GDP.

The size of underground economy ranges between 13% and 18% of the GDP.<sup>7</sup> Given the difficulty to obtain official time series statistics for tax evasion, we attempt a conservative estimate to give an idea of the figures we are talking about. Conservatively assuming that the effective tax rate for the whole economy is the minimum of the effective income ( $\tau_Y$ ) and firm tax rates ( $\tau_F$ ), we compute two approximate measures for tax evasion as  $TaxEv_{\min} = (\min(\tau_F, \tau_Y)) \times u_t^{\min} \times GDP_t$  and  $TaxEv_{\max} = (\min(\tau_F, \tau_Y)) \times u_t^{\max} \times GDP_t$ , where  $u_t^{\min}$  and  $u_t^{\max}$  denote lowest and highest official estimates for underground economy share as a percentage of the GDP. The right panel of [Fig. 1](#) shows that tax evasion accounts for at least 5% of the GDP. This is a quite big figure, and an analogous exercise for other European countries and the United States generates qualitatively comparable figures. If governments were effectively able to recollect unpaid taxes, this would generate, on a yearly basis, a significant increase of government revenues.

[Table 1](#) offers more details on the size and the developments of the underground economy for the Italian economy, as estimated by different Authors and by the Italian Statistical Institute over time.

[Schneider et al. \(2010\)](#) present estimations of the shadow economies for 162 countries, including developing, Eastern European, Central Asian, and high income OECD countries over 1999–2006/2007. According to their estimations, the weighted average size of the shadow economy (as a percentage of 'official' GDP) in Sub-Saharan Africa is 37.6%, in Europe and Central Asia (mostly transition countries) 36.4% and in high income OECD countries 13.4%. They also find that an increased burden of taxation (direct and indirect ones), combined with (labor market) regulations and the quality of public goods and services as well as the state of the 'official' economy are the driving forces of the shadow economy. In an other recent contribution [Tafenu et al. \(2010\)](#) estimate the extent of the shadow economy in the regions of the European Union, using the multiple-indicators multiple-causes approach combined with elements of spatial econometrics is implemented. The analysis shows that the shadow economy is most extensive in Eastern and Southern Europe. In addition they show that within countries, the poorest regions tend to exhibit the highest shadow economy quotas and that the smallest extent of shadow activities is obtained for the Netherlands and the United Kingdom, while in Poland the shadow economy is most extensive. [Schneider \(2009\)](#) estimates the size and

<sup>4</sup> None of the previous contributions focus on optimal fiscal policy; neither does our model, to allow a consistent comparison with this literature. For quantitative implications of optimal fiscal policy within dynamic general equilibrium models, see, for instance, [Chari, Christiano, and Kehoe \(1995\)](#), or [Cooley \(1993\)](#).

<sup>5</sup> We could think, for example, that the government chooses in fact the statutory tax rates, while effective tax rates are endogenously chosen by households and firms relying on the additional dimension represented by tax evasion.

<sup>6</sup> The average size of underground activities ranges between 5% of the United States GNP (in the Seventies) and 9% of the United States GDP (in the Eighties, early Nineteens). See [Tanzi \(1980\)](#), [Schneider and Enste \(2000\)](#), [Paglin \(1994\)](#). Even though these figures are below the OECD countries average (17%), they still represent a significant amount of resources absconded from tax collection.

<sup>7</sup> See [Baldassarini and Pascarella \(2003\)](#).

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