Anticipated tax reforms and temporary tax cuts: A general equilibrium analysis

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ABSTRACT

Macroeconomic studies of tax policy in dynamic general equilibrium usually assume that reforms hit the economy unexpectedly and last forever. Here, we explore how previous results change when we allow policy changes to be pre-announced and of finite duration and when these facts are anticipated by households and firms. Quantitatively we demonstrate a headstart advantage from pre-announcement that is never caught up by a surprising reform. The welfare gain stemming from a 5-year announcement phase of a corporate tax cut, for example, is estimated to be around 10 percent of the total gain from the reform. We show that impulse responses of important variables like firm value, dividends, and investment differ qualitatively depending on whether the reform comes expected or not. We are also able to demonstrate a genuine welfare gain from temporary tax cuts. Impulse responses generated by our numerical method can be retraced by phase diagram analysis, which facilitates explanation and interpretation of the produced results.

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1. Introduction

While economic research has not yet definitely settled whether and how taxes affect long-term economic growth it is indisputable that the design of the tax law has real effects on the levels of important macroeconomic aggregates such as consumption, investment, income per capita, and welfare. A recent empirical literature has argued that macroeconomic effects of tax policy may be larger than previously thought (e.g. Romer and Romer, 2008; Mountford and Uhlig, 2008) and tax alleviation is high on the policy agenda in many OECD countries. The present article continues the literature that tries to assess the quantitative impact of tax reform on macroeconomic aggregates by calibrating and simulating a dynamic general equilibrium.[1]

Usually this literature assumes that a change of taxes hits the economy unexpectedly and is then expected to last forever. While this might be true in some cases, in reality a tax reform is frequently pre-announced and thus expected quite a while before it actually comes into effect (see the discussion in Alvarez et al., 1998; Domeij and Klein, 2005).

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E-mail addresses: holger_strulik@brown.edu, strulik@vwl.uni-hannover.de (H. Strulik), trimborn@vwl.uni-hannover.de (T. Trimborn).
[1] An incomplete list includes Lucas (1990), King and Rebelo (1990), Greenwood and Huffman (1991), Cooley and Hansen (1992), Baxter and King (1993), McGrattan (1994), Stokey and Rebelo (1995), Laitner (1995), Mendoza et al. (1997), Kim (1998), Mendoza and Tesar (1998), Grüner and Heer (2000), Strulik (2003), McGrattan and Prescott (2005).

Likewise tax cuts are sometimes temporary. They are announced and thus expected to expire after a certain time. This is, for example, true for the tax relief acts during the Bush administration from 2001 and 2003 of which many measures were announced to end at a certain date between 2007 and 2010. These observations have motivated the present work, which tries to assess within the dynamic general equilibrium paradigm the macroeconomic consequences of anticipated tax reforms and temporary tax cuts.

Anticipated and/or temporary tax changes are analyzed in a small micro-economic literature on firm investment.[2] There, dynamics are driven by adjustment costs (and perhaps additionally by different tax treatment of old and new capital). While the micro-research has produced many interesting insights it cannot be used to assess how aggregate macroeconomic performance is affected by tax policy. The partial-equilibrium approach treats wages and interest rates as given and thus neglects important feedbacks through factor price adjustments. Also, since there are no households, the consequences of tax policy on welfare cannot be explored.

Our work shares probably most with two articles by Judd (1985, 1987) that investigate anticipated and temporary tax changes within the framework of the neoclassical growth model and which, like the present paper, explain adjustment dynamics by the desire of households to smooth consumption. In fact, our model can be conceptualized as an extension of Judd's work by a corporate sector and a decision problem of firm finance. Within a somewhat simpler institutional framework Judd computes in a quite sophisticated way the savings and welfare effects of tax reform analytically. That way he is able to obtain welfare effects of *marginal* tax changes.

Yet, tax reforms in reality are non-marginal and in fact sometimes quite drastic. Taking adjustment dynamics properly into account their (non-marginal) quantitative impact on welfare and other aggregates cannot be assessed analytically. Here, we thus propose a new numerical method for their assessment. The method is in detail described in Trimborn et al. (2008) and the general idea of it will be briefly reviewed later in the present paper. The numerical method has a one-to-one correspondence to phase diagram analysis and is thus very intuitive. It nowhere requires a linearization or other approximation of the economic model and allows to obtain impulse responses up to an arbitrarily small, user-specified error.

To our best knowledge our approach is new in the sense that Judd's framework has so far not been extended towards the quantitative exploration of pre-announced *non-marginal* tax reforms. The large standard literature on non-optimal taxation within the framework of the neoclassical growth model (e.g. the works cited in footnote 1) focusses on tax shocks, i.e. unexpected changes of fiscal policy.[3]

There exists, however, a small related literature investigating anticipation effects from a different angle and thus pursuing different questions than the present paper. Howitt and Sinn (1989) investigate *gradual* tax reforms, i.e. fiscal policies for which the tax rate changes continuously and converges towards a final value. Their problem could perhaps best be conceptualized as an un-anticipated tax reform that introduces a whole path of future tax changes, which are then, once the whole reform is known, anticipated.

Furthermore, Domeij and Klein (2005) and Trabandt (2007) explore how results on *optimal* capital taxation are modified when tax changes are anticipated. That literature generally finds that pre-announcement is detrimental to welfare: the longer the period of pre-announcement the longer is the time that capital holders can prepare by investing less for the optimally high tax that initiates the transition to low or absent tax rates in the long-run. In our framework of exogenous, non-optimal tax reform, preannouncement allows households and firms to prepare for a unique tax change at some future date (for example, by investing more already today in order to prepare for a future reduction of the corporate tax rate). Consequently, we generally find a *positive* welfare effect from pre-announcement.[4]

Because we can retrace impulse responses to tax changes with phase diagrams, our results are much richer than "only" an exploration of welfare gains. In particular, we explain how real variables (e.g. investment and growth) and financial variables (e.g. dividend policy and firm leverage) change during the announcement phase and after actual implementation of a policy. This allows us to explain why and how macroeconomic aggregates react differently depending on whether a tax reform is anticipated or unexpected. We employ the combination of numerical method and phase diagram analysis also to explore how permanent and temporary tax cuts affect macroeconomic behavior differently.

The concrete framework that we use for our investigation consists of a neoclassical growth model with explicit consideration of a corporate sector and a firm finance decision. For our purpose this setup combines several advantages. It allows for the introduction of a rich set of tax parameters and a discussion of real and financial impacts of tax reform and it is still simple enough to be reduced to a two-dimensional dynamic system such that we can exploit phase diagram analysis to provide economic intuition for the results.[5]

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[2] Summers (1981), Abel (1982), Auerbach (1989), Alvarez et al. (1998).

[3] Since we embarked on this project we became aware of two recent papers, Mertens and Ravn (2009) and Gourio and Miao (2008), which also investigate non-marginal temporary tax changes in a general equilibrium setting. In contrast to Judd's and our work both papers use a stochastic discrete-time setup. Aside from that we differ from Mertens and Ravn mainly by explicitly introducing a corporate sector (which allows us to discuss a richer set of capital tax reforms) and by modeling less frictions for the economy. We differ from Gourio and Miao mainly by our solution technique and our orientation on phase diagrams, features that guarantee that consumption and other important macroeconomic aggregates evolve smoothly at the time when a temporary tax cut expires.

[4] In order to avoid confusion, it may be helpful to emphasize that we compare the cases of having a tax change at a certain date pre-announced or not. Of course, implementing a generally beneficial reform earlier will always be better.

[5] Tax policy in this framework has been investigated by Turnovsky (1982, 1990), Sinn (1987), Osterberg (1989), and Strulik (2003). None of the earlier literature has been concerned with pre-announced and temporary tax policy.