THE SAVINGS-INFLATION PUZZLE

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CESIFO WORKING PAPER NO. 1645
CATEGORY 6: MONETARY POLICY AND INTERNATIONAL FINANCE
JANUARY 2006

CESifo *Working Paper No. 1645*

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Abstract

We find that inflation did not unanimously decrease savings in the US during the postwar period. This result is puzzling as it contradicts the implications of most monetary general equilibrium models.

JEL Code: E21, E65.

Keywords: inflation, savings, nominal interest taxation.

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1 Introduction

The theoretical evidence on the effects of inflation on savings is mixed. In his pioneering work, Sidrauski (1967) studies a general equilibrium framework and finds that money is superneutral in the steady state.[1] Accordingly, inflation does not affect the savings rate in the long-run.[2] Stockman (1981) shows that the same result also obtains in models with a cash-in-advance constraint on consumption. However, if the cash-in-advance constraint also applies to investment, a higher money growth rate reduces the savings rate. Den Haan (1990) considers a shopping-time model where inflation distorts the allocation of time on shopping, leisure, and labor. For higher inflation the opportunity costs of money increase, and agents reallocate more time to shopping activities. As a consequence, savings decrease. The effect of inflation is also quantitatively very pronounced in many general equilibrium models. For example, in the benchmark calibration of the model by den Haan (1990) a rise of the inflation rate from 0% to 5% decreases savings by almost 10% (own calculations). A similar negative quantitative effect of inflation on savings can be found in the model by Heer and Süssmuth (2006) who model the "Feldstein Channel". As argued by Feldstein (1982), loose monetary policy can increase the real capital income tax burden in a nominally based tax system. Therefore, higher inflation reduces the return on savings. In sum, the majority of computable general equilibrium studies either finds no or a significantly negative effect of inflation on long-run savings.

In the models of Stockman (1981), den Haan (1990), or Heer and Süssmuth (2006), growth is exogenous and inflation only affects the savings rate. Equivalently, in models of endogenous growth, higher inflation decreases the growth rate via the very same mechanisms. In these models, a lower labor supply is associated with less growth. In general, however, the quantitative growth rate effects in these models are found to be rather modest (see Jones and Manuelli, 1995). Most recent empirical studies are concerned rather with the effects of inflation on the growth rate than with those on the savings rate. In this vein, Kormendi and Meguire (1985), Fisher (1991), or Roubini and Sala-i-Martin (1995), among others, have identified the inflation rate as an important (and significantly negative) determinant

[1] In previous work on the effect of inflation on the portfolio allocation, Tobin (1965) assumed a constant savings rate.

[2] If labor supply is elastic, inflation may increase or decrease the savings rate depending on the functional form of utility.

of economic growth. However, the long-term correlation of savings and inflation has not received any attention hitherto.

2 The empirical relationship of savings and inflation

In order to study the effects of inflation on savings, we perform a regression analysis using the available annual US data from the period 1965-1998 that allows us to distinguish the monetary policy regimes of the Pre-Volcker Era prior (Pre-VE, 1965-78), the Volcker Era (VE, 1979-87), and the first eleven years of the Greenspan Era (GE, 1988-98). We also include the effective capital income tax rate as an additional regressor given the importance of the "Feldstein channel" emphasized in the literature.[3] As we are aiming to investigate the long-term relationship between the accumulation of capital and inflation, we extract trend components from the respective series.[4] We use an HP filter with a weight of 6.25 as recently suggested for series of annual frequency by Ravn and Uhlig (2002).[5] In particular, we estimate the following equation

$$s_t^{TC} = \beta_0 + \beta_1 \pi_t^{TC} + \beta_2 \tau_t^{TC},$$

where s_t^{TC}, π_t^{TC}, and τ_t^{TC} denote the trend components of the savings rate, the inflation rate, and the capital income tax rate, respectively. Estimating this equation over the total observation period from 1965 to 1998 renders no statistically significant relationship. However, the discrimination in Fed presidency regimes produces more reasonable results summarized in Table 1 below.

[3]We compute effective capital tax rates by following the strategy described in Mendoza, Razin, and Tesar (1994). Accordingly, we rely on data obtained from the OECD Statistical Compedium annual series (Revenue Statistics, National Accounts I, and Economic Outlook). See Mendoza et al. (1994), p. 300-306, for further details.

[4]Our findings are almost the same if we apply stochastic-trend rather than deterministic trend methods. The results are summarized in an appendix that is available from the authors upon request.

[5]The application of an HP filter with a standard weight of 100 for annual series (Hodrick and Prescott, 1997) produces fairly similar estimates. We also tried some bandpass filters. However, as it is more parsimonious, with regard to degrees of freedom, the HP filter seems better suited in the presence of the short series at stake.

Table 1. Relationship between saving rates and inflation by Fed presidency regime

	Pre-VE 1965-78	VE 1979-87	GE 1988-98
π_t^{TC}	-0.246^{***}	0.635^{***}	-0.552^{**}
τ_t^{TC}	-0.018	-0.391^{*}	-1.029^{***}
adjusted R-squ.	0.939	0.966	0.788

Note: All trend components are normalized, all estimates include a constant.
*, **, *** denotes significance at 10, 5, 1% level of significance
(Newey-West, 1987, std. errors).

Data: *IFS* Series (IMF), Mendoza *et al.* (1994), OECD, and own calculations

Higher capital income taxation seems to reduce savings, a result in accordance with the "Feldstein Channel". The effect of inflation on savings, however, is not robust: Depending on the sample period, the effect of inflation on savings is ambiguous. Increasing inflation is associated with decreasing savings during the Greenspan and Pre-Volcker Era, yet it is associated with increasing savings during the Volcker Era.

3 Conclusion

Computable general equilibrium models and empirical studies, in general, find an either insignificant or a significantly negative effect of inflation on the growth rate. Likewise, most computable general equilibrium models also imply a considerable negative effect of inflation on savings. We do not find unanimous support for the latter effect in the data. For the total sample period 1965-98 and for the Volcker period 1979-87, inflation either does not affect savings significantly or even increases savings.

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4 Appendix

One may wonder what happens if the trend underlying the series is stochastic rather than deterministic. Since UR tests are known to be of weak power, a sensitivity analysis of results for the stochastic trend case is straightforward. Assuming a stochastic trend, we estimate two standard error correction models (ECMs) of the form

$$\text{model I} \quad : \quad \Delta \ln s_t = \beta_0 + \beta_1 \Delta \ln \pi_t + \beta_2 (\ln s_t - \gamma_\pi \ln \pi_{t-1}) + \varepsilon_t$$

$$\text{model II} \quad : \quad \Delta \ln s_t = \beta_0 + \beta_1 \Delta \ln \pi_t + \beta_2 \Delta \ln \tau_t + \sum_{i=3}^{4} \beta_i (\ln s_t - \gamma_z \ln z_{t-1}) + \varepsilon_t,$$

where $z_t = \{\pi_t, \tau_t\}$ and γ-values are obtained from long term multipliers (Engle-Granger two-step estimator). The results are summarized in Table 2. The overall picture is very similar to the deterministic trend model. For the total 1965-1998 period, there is no statistically significant cointegrating equation for both specifications (model I and II). For the Pre-VE we find a statistically significant cointegrating relationship between s_t and π_t (for model II also for s_t and τ_t). For the Volcker Era the cointegrating equation is only estimated significantly as long as capital tax rates are included in the ECM. For the Greenspan Era the result is mixed, i.e. in specification I (II) the cointegrating relationship is (not) statistically significant.

Table 2. US saving rates and inflation by Fed regime: ECM

	Pre-VE 1965-78		VE 1979-87		GE 1988-98	
$\Delta \ln \pi_t$	$+0.013^{*}$	-0.003	$+0.018$	$+0.041^{*}$	$+0.013$	$+0.014$
$\ln s_t - \gamma_\pi \ln \pi_{t-1}$	-0.424^{*}	$+8.814^{***}$	-0.190	$+22.86^{*}$	-0.244^{**}	$+1.453$
$\Delta \ln \tau_t$		$+0.015$		$+0.036$		$+0.003$
$\ln s_t - \gamma_\tau \ln \tau_{t-1}$		$+8.140^{***}$		$+24.34^{*}$		-1.756
adjusted R-squ.	0.183	0.637	-0.032	0.426	0.103	-0.175
no. of obs.	14	14	9	9	11	11

Note: *, **, *** = significance at 10, 5, 1% level of significance (Newey-West, 1987, HAC std. errors).

Data: *IFS* Series (IMF), Mendoza *et al.* (1994), OECD, and own calculations.

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