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# The impact of terms of trade and macroeconomic regimes on private saving

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## HIGHLIGHTS

- We study the impact of terms of trade and macroeconomic regimes on private saving.
- Higher terms of trade raise saving, and this effect is larger for temporary shocks.
- Accelerations and volatility of terms of trade also raise private saving.
- When credit is less constrained, the effect of higher terms of trade is diminished.
- Inflation targeting reduces private saving, by lowering precautionary saving.

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## ABSTRACT

In this paper we present novel findings on private saving behavior. Relying on the largest available world database, we find that higher terms of trade (TOT) raise saving, and this effect is much larger for temporary TOT shocks. When credit constraints are less binding, the marginal effect of higher TOT on private saving is lessened. Accelerations in TOT growth and larger TOT volatility raise private saving. While adopting fiscal rules and floating exchange rate regimes yields no effect on private saving, introducing an inflation targeting regime reduces private saving, possibly by lessening the need for precautionary saving.



## 1. Introduction

The relationship between private saving and its determinants has been studied at depth in the literature (see Grigoli et al., 2014 for a recent review). However, the recent abrupt drop in oil and other commodity prices has revived the interest in exploring further the effect of terms of trade (TOT) changes on private saving. At the same time, new macroeconomic regimes, sometimes introduced as a result of large TOT volatility and in other cases as part of institutional development, have been adopted by many countries over the last three decades. Despite the availability of data, there is virtually no evidence on the extent to which these reforms affect private saving.

In this paper we present novel results in the literature on private saving by extending existing research to previously neglected effects. By relying on the largest available dataset on private saving in the world, we first examine the relationship of the latter with several measures of the TOT, in linear form and in interactions with other saving determinants. Second, we explore if selective macroeconomic regimes (fiscal rules, inflation targeting, and floating exchange rates) have an impact on private saving.

## 2. Analytical context

Large fluctuations in external prices have characterized recent decades. In this respect, consumption theory provides a set of testable hypothesis. A higher level of TOT induces a positive income effect on saving, which should be amplified in open economies,

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while the pure price effect (i.e., the effect after the increase in income) is ambiguous. Permanent-income theory suggests that the positive income effect on saving should be much larger for the temporary than the permanent component of a TOT rise.[1] A higher rate of growth of TOT may induce a larger saving and investment effort (Izquierdo et al., 2008), like in the case of higher income growth. Larger TOT volatility is likely to increase precautionary saving and hence raise private saving. Positive TOT shocks are likely to lead to higher private saving in economies that face more stringent credit constraints, owing to the reduced access to financing.

The last decades have seen the introduction of new macroeconomic regimes in many economies. Their effect on private saving, however, has not been tested in the empirical literature. While the objective of fiscal rules, inflation targeting, and floating exchange rate regimes is generally different from increasing private saving, there are reasons to believe that their adoption could lead to lower private saving, mainly by reducing the need for precautionary saving.

In the case of fiscal rules, the commitment of governments to meet pre-defined fiscal targets and the transparency associated to their adoption (Kopits, 2004; Debrun and Kumar, 2007) could lessen the need for precautionary saving by the private sector. Successful monetary stabilization is generally reflected in low inflation, reducing precautionary saving. However, an additional reduction in precautionary saving could come from the adoption of inflation targeting, a monetary regime that is associated to higher levels of policy transparency and accountability, and better anchored inflation expectations (Svensson, 2010; Schmidt-Hebbel and Carrasco, 2016). Finally, a more flexible exchange rate reduces the probability of exchange rate crises and persistent overvaluations, allows exchange rate adjustment as a buffer against shocks, and enhances monetary policy independence. Thus, precautionary saving could decline as a result of floating. However, higher nominal and real exchange rate volatility, as well as higher interest-rate volatility, associated with a floating exchange rate, may rise precautionary saving. Hence, the aggregate effect of a floating exchange rate on private saving is ambiguous.

## 3. Data

We employ the dataset developed in Grigoli et al. (2014) to investigate the impact of TOT and macroeconomic reforms on private saving. The dataset is, to our knowledge, the most comprehensive and recent aggregate data on private saving (as well as its determinants), containing 4137 observations and spanning 32 years for 165 countries.[2] Private saving rates are defined as the ratio of gross private saving to gross private disposable income (GPDI) and the public saving rate as the ratio of gross public saving to GPDI.

With respect to macroeconomic regimes, we collect fiscal rules data from the IMF Fiscal Rules Dataset and inflation targeting framework data from IMF Finance & Development,[3] while discrete categorical exchange rate data is compiled from the IMF Annual Report on Exchange Arrangements and Exchange Restrictions. Thus, we generate dummy variables taking value one if the country has, alternatively, a fiscal rule, an inflation targeting framework, and a *de jure* flexible exchange rate regime, and zero otherwise.

## 4. Estimation method

We employ here the empirical methodology used in Grigoli et al. (2014). In particular, we estimate the following dynamic model:

$$y_{i,t} = \gamma y_{i,t-1} + \beta x_{i,t} + \delta z_{i,t} + c_i + \tau_t + u_{it} \quad (1)$$

where $y_{i,t}$ denotes the private saving rate, $\gamma$ is the coefficient on the lagged dependent variable, $x_{i,t}$ includes the endogenous (and predetermined) covariates for country $i$ at time $t$, $z_{i,t}$ includes (strictly) exogenous variables and an intercept, $\beta$ and $\delta$ are the relative coefficients, $c_i$ and $\tau_t$ are the time-fixed and country-fixed effects, respectively, and $\varepsilon_{it}$ is a mean zero error term that captures unobserved heterogeneity.

The baseline specification includes the explanatory variables used in Grigoli et al. (2014). Specifically, $x_{i,t}$ and $z_{i,t}$ include the log of real per capita GPDI in PPP terms, real growth rate of per capita GPDI in PPP terms, public saving in percent of GPDI, inflation, the real deposit rate, and the flow of private sector credit in percent of GPDI as endogenous variables, and the old-age dependency ratio, the share of urban population, and the (log of) the TOT as endogenous variables, respectively. Focusing now on our variables of interest, we add to the baseline variables in $z_{i,t}$ alternative measures of the TOT and dummy variables for the adoption of fiscal rules, inflation targeting, and floating exchange rate regime.[4]

We are also interested in exploring the interaction effects between the TOT and trade openness and private credit flows. Therefore, we employ interaction terms as in the following specification:

$$y_{i,t} = \gamma y_{i,t-1} + \beta x_{i,t} + \delta z_{i,t} + \eta x^n_{it} + \pi k_{i,t} + \psi x^n_{it} k_{i,t} + c_i + \tau_t + u_{it} \quad (2)$$

where $x^n_{it}$ is the $n$th variable of matrix $x_{i,t}$ (TOT), $k_{i,t}$ is the other component of the interaction term (e.g., trade openness or private credit flows), $x^n_{it} k_{i,t}$ is the interaction term, and $\eta$, $\pi$, and $\psi$ are the relative coefficients.

We employ the two-step system GMM (S-GMM) estimator (Arellano and Bond, 1991; Blundell and Bond, 1998). This allows to increase efficiency by estimating a system of two simultaneous equations, one in levels (with lagged first differences as instruments) and the other in first differences (with lagged levels as instruments). This estimator assumes that the idiosyncratic error $u_{it}$ is a white noise process and that past values of the endogenous variables $y_{i,t-s}$ are not correlated with the current error $u_{it}$. However, it also requires that the instruments are exogenous to the fixed effects. We test these assumptions by applying a second-order serial correlation test for the residuals and the Hansen $J$-test for overidentifying restrictions.[5]

## 5. Results

Table 1 reports the results for the estimation of the impact of TOT shocks on private saving, controlling for our set of standard determinants. In Column 1, we report the baseline specification as in Grigoli et al. (2014). Results on the baseline determinants are robust across all specifications. Private saving rates are generally persistent and positively associated with the income level and growth. Inflation contributes to raise private saving, possibly reflecting precautionary motives. Increased credit availability provides consumption opportunities, dampening private saving. A higher old-age dependency ratio reduces saving as the elderly

[1] The literature generally constructs proxies for the permanent and temporary components of the TOT by applying the Hodrick–Prescott (HP) filter to the log of the index. In this paper, we follow the same approach.

[2] Slight revisions to data from national authorities result in the loss of 12 observations when compared with Grigoli et al. (2014). See Grigoli et al. (2014) for details on concept construction, variable generation, data replacement, augmentation, and data cleaning.

[3] See Roger (2010).

[4] Endogenous variables are assumed to be correlated with present, past or future error terms.

[5] The Windmeijer (2005) correction is applied to the standard errors.