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A simple way to capture transaction balances

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Abstract

We try to capture transaction balances within a quantity theoretic framework. We apply it to different euro area countries and the euro area as a whole and find that, overall, only one third of currency holdings are held for transaction purposes.

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1. Introduction

The stock of currency used for domestic transactions is not directly known as some portion is held for hoarding purposes or outside the currency area (Rogoff, 1998, Snellman et al., 2000). In this paper, we present one simple indirect method to capture the stock of currency held for domestic transaction purposes, separating it from other motives of holding cash. This is of interest, especially to central banks, as domestic aggregate demand and price developments might be closely related to the development of currency used for domestic transactions. The method tries to find the share of currency within general money holdings that optimises a simple bivariate inflation equation for forecasting inflation. We exemplify the method with euro area data.

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2. A best-fit approach

According to quantity theoretical considerations, domestic price developments should be closely related to monetary developments at home. Accordingly, the amount and development of currency used for domestic transactions should be narrowly connected with domestic price developments, implying, in turn, that inflation developments might be informative for determining the share of currency used for domestic transactions. One natural candidate for overall domestic transaction balances is narrow M1 which usually consists of currency in circulation outside the banking system and overnight deposits. Unfortunately, the stock of cash used for transactions within the currency area is not known as some portion is probably held outside the country (e.g. Köhler et al., 2004; Porter and Judson, 1996) and some portion of domestically held currency is not held for (official) transaction purposes (e.g. Rogoff, 1998, Snellman et al., 2000).

Having all these in mind, we determine the average amount of currency held for domestic transaction balances by a grid search with quarterly euro area data from 1980 to 2000.¹ Consider the forecasts of inflation using the following linear bivariate model²

$$\pi_{t+i} = \alpha + \beta(L)\pi_t + \gamma(L) \cdot (od_t + \theta \cdot cu_t) + \chi time_t + \varepsilon_{t+i}, \quad (1)$$

where $\pi_t = \ln(p_t/p_{t-1})$ is the annualized quarterly inflation rate measured by the Harmonised Index of Consumer Prices (HICP) or the GDP deflator, respectively, cu are nominal cash balances, od are overnight deposits, $\beta(L)$ and $\gamma(L)$ are polynomials in the lag operator L , $time$ is a deterministic time trend, i is the forecast horizon and ε is the white-noise residual. To capture domestic transaction balances we use the parameter θ . Its unknown value measures the constant proportion of currency used for domestic transactions. It is added to overnight deposits to establish the total available transaction balances at home.³ All that is initially known about θ is that $0 \leq \theta \leq 1$. For $\theta=0$, cash is irrelevant for domestic transactions; for $\theta=1$, all cash is used for transactions within the euro area. An attempt is made to establish the value $\theta=\theta^*$ for which Eq. (1) yields the best fit. For this purpose, we let θ move in steps of 0.01 between 0 and 1 and determine the maximum of the log likelihood function (LL).⁴ The domestic portion θ^* is determined from the maximum of LL. $(1-\theta^*)$ is equivalent to the share of cash balances used for other motives.⁵

Chart 1 shows the log likelihood function for the euro area as a whole. It reaches its maximum at $\theta^*=0.35$. This means that 35% of the euro area currencies are held for transaction

¹ We exclude the years after 2001 due to the approaching cash changeover to the euro and the adjustments which took place since 2002.

² This methodology to assess the potential leading indicators for inflation was applied to the euro area by Nicoletti Altimari (2001). However, he does not consider currency in circulation.

³ As we are mainly interested in estimating transaction balances in cash we add the total of overnight deposits. These only include holdings of euro area residents at euro area banks, i.e. no holdings abroad. Moreover, there are no indications (at least in the sample considered) that overnight deposits are used for other purposes than official transactions (e.g. underground activities or hoarding).

⁴ LL is defined as $LL = \frac{N}{2} + \left(\frac{N}{2}\right) \log(2\pi) + \left(\frac{N}{2}\right) \log\left(\frac{SSR}{N}\right)$, where N is the number of observations and SSR the sum of squared residuals.

⁵ In estimating Eq. (1) we relate the levels of π and cu which are both $I(1)$ over the sample period considered. This is in line with trying to establish a long-run (cointegration) relationship.

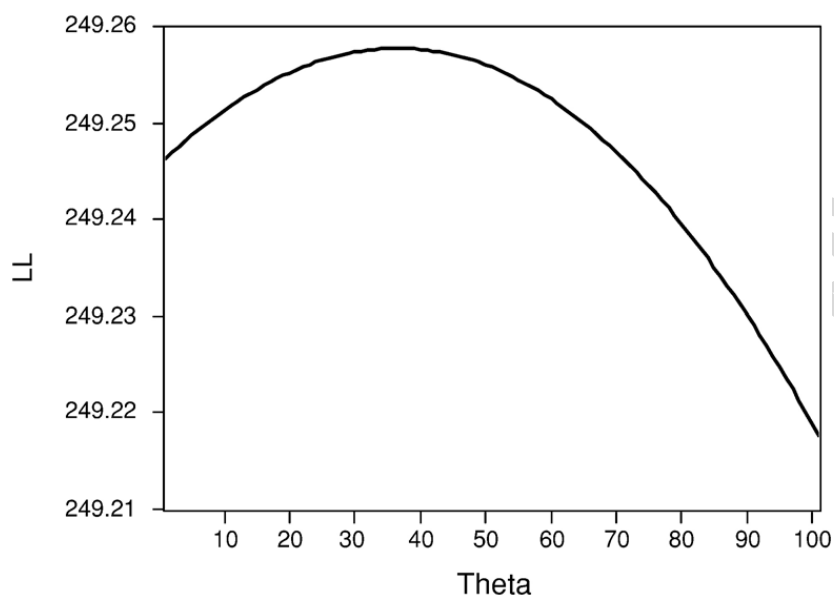


Chart 1. The log likelihood function for various values of θ .

purposes.⁶ Accordingly, 65% are used for other purposes (foreign demand, hoarding, underground economic activities not included in official transactions). The concrete equation reads as (Newey–West heteroskedasticity and autocorrelation corrected standard errors in brackets below the coefficients)

$$\pi_{t+1} = \underset{(0.24)}{-0.63} + \underset{(0.07)}{0.49} \pi_t + \underset{(0.06)}{0.45} \pi_{t-2} + \underset{(0.02)}{-0.05} (od_t + 0.35 \cdot cu_t) - \underset{(0.0003)}{0.001} T_t + \varepsilon_{t+1} \quad (2)$$

This figure corresponds approximately to the one derived in Köhler et al. (2004) with other indirect methods. Our result implies per capita transaction balances in cash of nearly € 400 in year 2000. Compared to the actual per capita currency holdings in 2000 of about € 1100 this figure seems to be more plausible and much more in line with anecdotal evidence and experience.

We also applied our method to three individual euro area countries. These are Germany (ge), reputed to have large overseas circulation of its currency (see Seitz, 1995) and an increasing size of the shadow economy in the sample considered (see Schneider, 2005), Spain (sp), where domestic hoarding increased substantially from the mid 1980s onwards (see Banco de España, 1996), and Greece (gr), a country with relatively low tax rates. Our model reveals transactions shares of $\theta^*(ge)=0.25$, $\theta^*(sp)=0.20$ and $\theta^*(gr)=0.60$, all in line with theoretical priors and anecdotal evidence.

3. Summary and conclusions

Our results show that in the euro area as a whole as well as in Germany and Spain, only a small part of overall currency holdings are used for transaction purposes at home. This seems to be true for other major

⁶ Nearly the same amounts would result ($\theta^*=0.30$) if we estimated the model with annual data and a forecast horizon of one year. Boeschoten, 1992, ch. 2, found that slightly more than 10% of the currency circulation in the Netherlands is needed to account for the transactions of households.

currencies, too (see, e.g., Porter and Judson, 1996). For Greece, a country with a high inflation history, low-value banknotes and relatively low tax rates, this is not the case. The estimates of the share of currency holdings used for transaction purposes therefore allow a more accurate picture of the demand for currency that is relevant for monetary policy purposes. This is of particular relevance in periods in which the demand for currency not held for domestic transaction purposes changes considerably and could, if unknown, lead to a misinterpretation of currency developments.

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