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Narrow money and transaction technology: New disaggregated evidence

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ABSTRACT

This paper analyses the effect of transaction technology innovation on narrow money using Italian data disaggregated at provincial level. In particular, this study assesses the impact of the diffusion of ATMs (automated teller machines) and of POS (points of sale), on the demand for currency and on the demand for M1 using a unique data set. We find that transaction technology innovation has a negative effect on the demand for currency in circulation, while its effect on M1 is positive; additionally, heterogeneity in the use of cash within Italy is detected.

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1. Introduction

Money demand is intensively studied due to the relevance of a precise estimation of its parameters to better inform a number of crucial economic policy decisions. First, from a consumer finance perspective a quantification of the money demand parameters, in particular of the interest elasticity of the demand for money, is essential to estimate the welfare cost of inflation (Attanasio, Guiso, & Jappelli, 2002; Lucas, 2000). Second, a careful evaluation of money demand elasticity to the scale variable, product or consumption, is relevant to grasp the long run relation between money, inflation and output (Friedman, 1969). Third, in order to evaluate monetary policy stance it is relevant to detect possible shifts in money demand parameters due to financial innovation or to the introduction of new means of payments, such as debit cards, credit cards, electronic money. This third argument in support of the relevance of the study of money demand is well exemplified by the length and intensity of the

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debate on the stability of US money demand (Duca, 2000; Duca & Van Hoose, 2004; Teles & Zhou, 2005).

This paper studies the effect of the deployment of two types of terminal that innovated transaction technology, ATMs (automated teller machines) and POS (points of sale, the terminals where debit cards are used to settle transactions), on the demand for currency and on the demand for narrow monetary aggregate M1.¹ The analysis takes advantage of a unique data set that tracks heterogeneity in the distribution of cash across provinces. We attempt at attenuating the problems stemming from a possible instability of money demand parameters or from an endogeneity of the parameters to the monetary policy with the exploitation of the cross-section variability.² Estimates at the regional level of an area identified by a single currency and monetary policy are more precise than time-series estimates, since changes in the monetary policy reaction function can lead to changes in both money and nominal income over time, but not across regions.

The first goal of this paper is to ascertain the effect of the diffusion of ATMs and of POS on the demand for currency. It is worthwhile pursuing this objective, not only because of the need of understanding movements in money demand for the economic policy reasons above mentioned, but also because of the unsettled empirical evidence on the effect of lower transaction costs stemming from the adoption of new technologies on currency demand. The decrease in transaction costs that we exploit empirically is represented by the diffusion of ATMs and POS that leads to a reduction in the shoe-leather cost of withdrawing currency. Moreover, while the effects of the diffusion of ATMs was widely investigated, the effects of the diffusion of POS, that enhances the use of debit card as alternative to cash to settle transactions, to our best knowledge, was not analyzed thoroughly in theoretical models. Intuitively, however the increase in the spread of POS, analogously to that of ATMs, should lead to lower transaction costs, inducing a decrease in the average holding of cash.

The second objective is to evaluate the overall effect of ATM and POS diffusion on the demand for a more ample monetary aggregate, M1 (i.e. currency and demand deposits), to assess how the negative effect of transaction technology innovation on currency in circulation compares with the positive effect on demand deposits that arises from a decrease in the opportunity cost of holding a positive balance on the account.³ Partly due to a lack of disaggregated data for currency in circulation, the effect of the spread of new transaction technologies on M1 was not studied before.

To achieve the two objectives above enunciated, we take advantage of the natural experiment represented by the introduction of the euro that let us build a unique measure of the currency in circulation at the provincial level. The data set comprises data on the daily inflows and outflows of lira and euro banknotes in Italy through the branches of the Bank of Italy, that acted as cash offices. We cumulated all the euro banknotes put in circulation in all the working days since January 2 to March 29, 2002 (subtracting the notes that during the period were withdrawn from circulation), province by province, and we obtained stocks of euro increasing through the period observed. To derive the euro stocks we therefore exploited 5985 observations, each constituted of the net flow of euro banknotes for the province i (ranging between 1 and 95) and for the date t (ranging between 1 and 63). Our assumption is that in the first 3 months of 2002 the flows of euro banknotes between the different provinces were negligible so that the stocks built are reliable enough.

This data set enables us to assess the impact of the diffusion of ATMs and POS on currency with actual cross-section data allowing us to address heterogeneity in financial development that is relevant to Italy, especially regarding currency and payments (Fig. 1 displays the euro per capita stock in Italian provinces). To our knowledge, data on currency with such a degree of disaggregation were not used

¹ The two components of the Italian aggregate M1, currency in circulation and demand deposits, in the period examined, averaged 15% and 85% of M1 respectively.

² See Mulligan and Sala-i-Martin (1992).

³ The theoretical model of Paroush and Ruthenberg (1986) suggests that the introduction of ATMs increases the share of total money constituted by demand deposits at the expense of currency holdings, under the assumption that the cost of holding demand deposits is reduced with the introduction of ATMs. In a Baumol-Tobin framework, the lower cost arises from reducing the time, and hence the transaction cost, necessary of drawing on a demand deposit. Indeed, Paroush and Ruthenberg (1986) empirical findings are in line with the hypothesis that more ATMs lead to a higher level of demand deposit holdings and a lower level of currency holdings; see also Columba (2003).

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