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Modeling Long-run Money Demand for Nine Developed Economies

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Abstract: In this paper we investigate the presence of a long-run money demand in a selected group of nine developed OECD countries. We estimate two long-run money demand functions. In the estimation of an augmented money demand function the role of total wealth in its determination is highlighted. In this relation negative substitution effect seems to be predominant. Moreover, a parameter stability analysis suggests that, compared to a standard money demand function, the inclusion of total wealth reduces money demand stability.

Keywords: Money demand, wealth, panel DOLS, panel cointegration and unit root.
JEL classification: E41, E52, C23.

1 Introduction

Since the pioneering works by Keynes (1936) and Baumol (1952), money demand has been deeply and extensively studied by many economists. Yet to these days, many issues concerning the determinants and the dynamics of money demand remain obscure. Poole (1970) describes the optimal behavior of policy-makers under uncertainty. He shows that the central bank can have problems to determine if a certain stock of monetary base is adequate to the desired level of income, due to shocks in the demand for cash or in the money multiplier. In this condition, it is convenient to determine directly the equilibrium level of the interest rate. Poole's analysis on the most suitable choice of monetary authorities under uncertainty, at the time of its formulation, was very well integrated with the conclusions of the monetarists whether to control the money supply. Indeed, in the '60s financial markets were not very developed and the demand for money appeared very unstable. According to the dominant Keynesian orthodoxy it was believed that this instability was mainly related to money markets. Therefore, the main idea was that monetary authorities should control the interest rates. The '70s were characterized by the first oil crisis, so many economists began to give greater weight to real shocks and to the inability of monetary authorities to correctly predict the expected rate of inflation. In a world where prices growth was highly volatile, they suggested the opportunity to control the money supply. A key role for the evolution of financial markets was brought by the liberalization process and the subsequent reaction of financial intermediaries. In the late '70s and during the '80s most industrialized countries experienced a process of liberalization of financial markets and credit. As a consequence, wealth was considered to be a factor that can greatly influence money demand. As a matter of fact, when wealth is omitted, the elasticity of money demand with respect to income changes, and this is probably enough to justify its inclusion. Friedman (1988), asserts that the increase in wealth, caused by the expansion of asset prices, may be related to the increase in the demand for other liquid assets, such as money, driven by portfolio choices.

During the '90s the view of the economists about the instability of money demand has changed again. The development of financial markets and the growing importance of stock markets have again fed the idea that the primary source of instability is related to monetary aggregates. Moreover, the preference for liquidity in itself might be highly unstable because, for example, of wealth effects which influence non monotonically the demand for money. It follows that the degree of instability will strongly depend not only on the fluctuations of the individual components of money demand, but also on the degree of correlation of these components with one another. Therefore, these components can significantly determine the dynamics and the stability of money demand.

In this work, we draw attention to one aspect of the stability of money demand which has been largely ignored by the empirical literature. Despite the large number of studies on the issue, few economists have investigated the stability of money demand using wealth as a determinant. Hence, we contribute to the debate on stability of money demand by providing empirical evidence on the relation with its traditional determinants adding a wealth variable. To this end, we do not adopt single assets

indicators as a proxy for wealth, but a synthetic index calculated by the Bank of International Settlements (hereafter BIS). It is important to stress that in theory a wealth variable should include all forms of wealth like human wealth, financial wealth, housing wealth, and other assets. However, as explained below, our measure of wealth will include financial wealth, housing wealth and commercial wealth.
This paper intends to investigate the consistency and the stability of the relation between money demand and its determinants using a panel estimation.
To the best of our knowledge, this is the first empirical paper that estimates the long-run money demand adopting both panel data techniques and a synthetic and unique measure for wealth.
As a matter of fact, our analysis reveals some interesting results. First, there is a long-run relation between money demand and its determinants. Secondly, wealth is important in explaining the long-run demand for money. Nevertheless, wealth overlaps with the interest rate in modeling money demand due to a predominant negative substitution effect. Thirdly, the inclusion of wealth in the demand for money determines a more unstable long-run relation between money demand and its determinants.
The paper is organized as follows. Section 2 briefly reviews the empirical literature on money demand. Section 3 highlights the possible relations between money demand and wealth as intended by the main theoretical works in the field. Section 4 analyzes our dataset. Section 5 describes the methodology we employ to test for the long-run relations and their stability. Section 6 concludes the paper.

2 Literature Review

According to economic theory, a basic representation of the long-run money demand can be summarized by the following function:

$$\frac{M}{P} = f(Y, OC) \tag{1}$$

Equation (1) represents real money demand ($\frac{M}{P}$) as a function of income (Y) and of the opportunity cost (OC). Economic theory suggests that income should have a positive effect on money holdings. Instead, since by definition the opportunity cost measures the earnings from alternative assets, it should have a negative impact on money demand. Empirical analyses mainly rely on equation (1), but in many cases researchers employ an augmented money demand function:

$$\frac{M}{P} = f(Y, OC, Z) \tag{2}$$

where Z represents all other possible variables having an influence on real money demand such as inflation, exchange rates and different forms of wealth.
Although there is a vast literature on money demand adopting time series techniques, only a limited number of studies have applied panel data methodologies to this topic

so far. Nevertheless, time series studies suffer from some problems that can be overcome by adding a cross-sectional dimension to the data. According to Mulligan and Sala-i-Martin (1992), cross-section data may solve the problems concerning the sensitivity to the sample period and to the relevant interest rate, the non-stationarity and serial correlation of the error terms, the low statistical power of tests when the series are short, and the distortion of the income measure in the short-run. Hence, we can assume that in a panel data analysis these problems are mitigated without any loss of information on the time dimension.

Despite a common evidence of a positive estimated income elasticity, these values vary across different panel studies. Estimated income elasticity usually lies between 1 and 2, but there are some exceptions in the literature. Hamori and Hamori (2008) and Arnold and Roelands (2010) present income elasticity values above 2 for M1 and M3 in the EU adopting, respectively, cointegration and DOLS estimations. On the opposite, Harb (2004), Elbadawi and Schmidt-Hebbel (2007), Hamori (2008), and Kumar et al. (2010) estimate income elasticities below 1 for M1 in different groups of countries. DOLS estimations provide income elasticities between 1 and 2 in Mark and Sul (2003) for 19 OECD countries on M1, and in Setzer and Wolff (2009) for the Euro area members' M3. Similar results are obtained by Rao et al (2009) for eleven Asian countries adopting SGMM. Dreger et al. (2007) employ Pedroni, Breitung and DOLS techniques for a panel of ten new member countries in EMU on M2 and they find income elasticities between 1 and 2. Similar conclusions are drawn using ARDL in Nautz and Rondorf (2011) for M3.

Estimated interest rate semi-elasticity is negative in the great majority of the existing literature. Exceptions are in Arnold and Roelands (2010), Nautz and Rondorf (2011) and Harb (2004). Garcia-Hiernaux and Cerno (2006) estimate a money demand function for a panel of 27 developed and developing countries using GMM and they find -0.004 and -0.005 interest rate semi-elasticities, while Carrera (2008) estimates a -0.008 semi-elasticity with the Pedroni technique for a panel of 15 Latin American countries. On the opposite, higher semi-elasticities are shown in Dreger et al. (2007) and Setzer and Wolff (2009). Both studies have the same estimated value of -0.09.

Augmented money demand panel data studies including exchange rates do not show consistent results. The estimated elasticity coefficient in Rao et al (2009) is -1.73, in Narayan et al (2009) is 0.31, in Dreger et al (2007) ranges between -0.28 and -0.16, while in Fidrmuc (2009) goes from -0.07 to -0.03.

Although many time series studies also investigate the relation between money demand and wealth (see Setzer and Greiber, 2007; Boone and van den Noord, 2008; de Bondt, 2009; Dreger and Wolters, 2010; Capasso and Napolitano, 2012), panel data studies usually do not. Arnold and Roelands (2011) estimate a panel model for the U.S. money demand using annual state-level data. Arnold and Roelands (2010) present a money demand estimation for a panel of ten European countries adding four wealth variables, of which housing prices is the most significant one. The inclusion of housing prices in the panel regression reduces the income elasticity to values lying around one. They conclude that housing price developments within the euro area are relevant to the understanding of the demand for euros with a positive impact on money demand for the whole panel of ten euro area countries. They also conclude

that there is no significant impact of stock prices on money demand. Nautz and Rondorf (2011) employ quarterly panel data from all founding members of the European Monetary Union, and their ARDL estimation evidences that neither equity nor house prices affect the long-run money demand in a significant way. It is worth noting that none of these studies formally investigates the effects of the inclusion of wealth on the stability of money demand.

3 The Relation Between Wealth and Money Demand

Despite the limited number of empirical studies on the relation between money demand and wealth, this issue has been the focus of many theoretical studies in the last century. Briefly, in what follows, we summarize the main contributes.

The Cambridge school (with Marshall and Pigou) asserted that people demand money as a medium of exchange and as store of wealth. The latter links the level of people's wealth to money demand and, as a result, wealth can be considered as a proportion of nominal income. In this way, wealth is a component of money demand.

Patinkin (1956), following Pigou, argues that individuals hold part of their wealth in liquid form. The fundamental difference with respect to the Pigou's theory is that Patinkin believes that the amount of money holdings does not depend only on real variables, but also on what he called "real-balances effects".

With Keynes's Liquidity Preference Theory, the demand for money as a store of wealth is still considered (Keynes called it "speculative motive"), but an important role in this approach is played by the interest rate. The latter influences the decisions on money holdings.

Theories of money demand based on portfolio choices emphasize the role of money as a store of value. These theories point out that individuals hold money in their portfolios because it provides a low risk nominal return. Milton Friedman's theory considers money demand like the demand for any other asset (see Friedman, 1956). Therefore, it should be a function of wealth and the returns of other assets relative to money. According to the author, money demand depends on three major sets of factors: (1) Total wealth, (2) the price and return on wealth, and (3) preferences. Moreover, according to Friedman (1988) wealth may have different effects on money demand. A positive wealth effect can occur in three situations. First, an increase in the assets prices could imply a rise in the volume of their transactions, resulting in an increase in money demand to facilitate these transactions. Secondly, a rise in asset prices leads to additional wealth which may be stored in money. Thirdly, an increase in assets prices reflects an increase in the expected return from risky assets with respect to risk-free ones. The resulting increase in relative risk may induce risk averse agents to hold safer assets, such as money, in their portfolio. It seems worth noticing that the sign of this effect can also be negative under certain levels of risk aversion. Moreover, a negative substitution effect has to be taken in to account. It suggests that a rise in asset prices reduces the attractiveness of holding money as a component of the portfolio.

The above considerations show that, despite the numerous studies to these days, the

relation between money demand and wealth is still a debated issue.

4 Data Description

Our analysis employs quarterly data from a selected group of nine OECD developed countries including the United States (US), Japan (JP), Germany (DE), United Kingdom (UK), France (FR), Italy (IT), Canada (CA), Australia (AU) and Switzerland (CH). We adopt quarterly data spanning the period 1982:Q1-2008:Q4. Since we do not include any variable to capture the effect of uncertainty on money demand, our sample period excludes the recent crisis in the euro area. As pointed out by Hall et al. (2012), the effect of uncertainty on money demand can be extremely important during times of crises. Moreover, we choose to focus on these nine developed countries since they represent an interesting case, among the major industrialized countries, given that their monetary systems have undergone several major changes that strongly affected money demand and other monetary aggregates within the last three decades.

Our measure of money demand is the real M2, where nominal money stocks are deflated by the CPIs. M2 series have been provided by the national Central Banks, while the remaining data are from the IMF Financial Statistics database. Income is given by nominal GDP (Y), the interest rate is the three months treasury bill (R), and the exchange rate is measured by the nominal effective exchange rate (e). In our paper, wealth (w) is measured by the nominal Aggregate Wealth Indicator as calculated by the BIS[1]. The index combines three indices for three different assets classes: equities, residential properties and commercial properties. The index is constructed by weighting the components using the shares of the asset classes in the private sector wealth. Hence, quite differently from what standard literature does, we do not adopt single assets indicators as a proxy for wealth, but a synthetic index combining each of them. It has to be noted that the three classes of wealth included in the BIS indicator make up most of the wealth of the private sector, and in well organized markets these are traded with high frequency (see Jaeger and Schuknecht, 2004). According to Borio and Lowe (2002) this indicator has two advantages compared to single assets indicators. The aggregate assets price indicator provides a synthetic and useful proxy for variations of global wealth. Furthermore, it is able to disclose relations and common patterns possibly hidden by divergent behaviors of individual assets series.

Figure 1 plots the development of wealth, as represented by the BIS indicator, in the analyzed countries. It is clear that starting from 1982 our measure of wealth has increased dramatically for almost all countries in the dataset.

[1]As in most of the studies on money demand we take money, income, wealth and the exchange rate in logarithms.

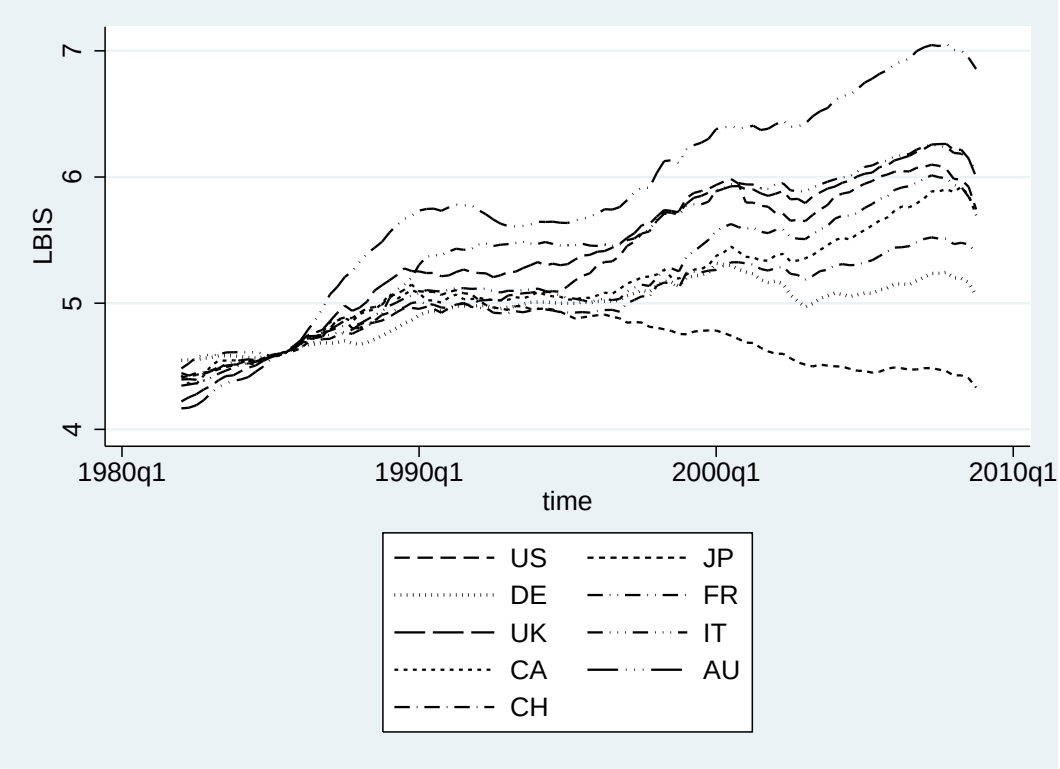

Figure 1: Single Countries Wealth Indicator Development

5 Empirical Analysis

The applied empirical methodology to estimate the long-run money demand is the Dynamic Ordinary Least Square (DOLS) estimator proposed by Mark and Sul (2003). In the DOLS framework, the long-run regression is augmented by lead and lagged differences of the explanatory variables to control for endogenous feedbacks (Saikkonen, 1991). Moreover, lead and lagged differences of the dependent variable can be included to account for serial correlation (see Stock and Watson, 1993). Hence, the DOLS estimator is able to correct standard OLS for bias induced by endogeneity and serial correlation.

A panel DOLS estimator is obtained using a two-step procedure. First, individual dynamic and deterministic components are regressed out separately for the panel members. Then, the residuals are stacked and a pooled regression is run. According to Hlouskova and Wagner (2010), the DOLS estimator outperforms all other studied single equation estimators and system estimators even for large samples. Moreover, Harris and Sollis (2003) suggest that non-parametric approaches such as FMOLS show problems in cases in which the residuals have large negative moving average components and are less robust if the data have significant outliers. It has to be noted that both situations are quite common in macro time series data.

The first step of the empirical analysis investigates the properties of our panel data. Hence, panel unit root tests are performed and reported in table 1. From these tests it can be concluded that there is a clear evidence for non-stationarity of $\ln(M)$

Table 1: **Panel Unit Root Tests**

Series	*Tests*					
	HAD		*LLC*		*Breitung*	
	Ind. eff.	Ind. eff. and time trend	Ind. eff.	Ind. eff. and time trend	Ind. eff.	Ind. eff. and time trend
$\ln(M^d)$	19.85^{***}	11.67^{***}	3.28	1.22	-1.99^{**}	3.1
$\ln(Y)$	21.42^{***}	15.76^{***}	-7.76^{***}	-3.09^{***}	4.49	-7.88^{***}
R	17.41^{***}	3.26^{***}	-0.33	0.56	-3.1^{***}	-2.96^{***}
$\ln(e)$	13.03^{***}	9.95^{***}	-2.76^{***}	-0.67	-1.95^{**}	-2.23^{**}
$\ln(w)$	20.49^{***}	9.94^{***}	-4.4^{***}	0.97	8.17	-10.26^{***}
	IPS		*ADF*		*PP*	
	Ind. eff.	Ind. eff. and time trend	Ind. eff.	Ind. eff. and time trend	Ind. eff.	Ind. eff. and time trend
$\ln(M^d)$	6.7	2.54	1.56	8.2	2.85	12.23
$\ln(Y)$	-3.14^{***}	1.03	41.43^{***}	20.35	178.8^{***}	48.8^{**}
R	0.1	-2.26^{**}	12.55	28.38^{***}	14.84	22.96
$\ln(e)$	-2.39^{***}	-1.69^{**}	28.93^{**}	26.84^{*}	25.33	17.43
$\ln(w)$	-0.65	1.42	16.84	11.55	19.63	10.85

Notes: The tests are: Hadri, 2000 (HAD); Levin, Lin and Chu, 2002 (LLC); Breitung, 2000; Im, Pesaran and Shin, 2003 (IPS); ADF Fisher χ^2 (ADF); PP Fisher χ^2 (PP) due to Maddala and Wu, 1999.
In Hadri the null is that the variable is stationary. ***, ** and * reject the null at 1%, 5% and 10% respectively.

and $\ln(w)$. Non-stationarity of R is confirmed by the great majority of the tests. For $\ln(Y)$ and $\ln(e)$ the evidence is more mixed. Nevertheless, the former is non-stationary according to Hadri, Breitung with individual effects, IPS and ADF with individual effects and time trends. Furthermore, Hadri, PP, and LLC with individual effects and time trend show non-stationarity for the latter. Therefore it is reasonable to conclude that our variables are non-stationary and $I(1)$ in their levels.
Before estimating our money demand, we perform panel cointegration tests in order to verify the presence of a long-run relation between the variables in our dataset. The cointegation tests results are reported in table 2 and we can conclude that a long-run money demand exists for the considered panel, as all its variables are cointegrated. After having highlighted the presence of cointegration we can proceed with the estimation of the long-run relations in our money demand function. This estimation is based on equation (2) and it is performed adopting the following baseline equation:

$$\ln M^d_{i,t} = \alpha_i + \beta_{1i} \ln Y_{i,t} + \beta_{2i} R_{i,t} + \beta_{3i} \ln e_{i,t} + \varepsilon_{i,t} \tag{3}$$

Table 2: **Panel Cointegration Tests**

	Pedroni		*Kao*
	No Determinisitic Trend	Deterministic intercept and Trend	
			-2.01^{**}
Panel v-Statistic	-1.15	-2.46^{**}	
Panel rho-Statistic	1.75^{*}	2.81^{***}	
Panel PP-Statistic	1.91^{*}	2.99^{***}	
Panel ADF-Statistic	2.35^{**}	3.39^{***}	
Group rho-Statistic	3.04^{***}	2.77^{***}	
Group PP-Statistic	3.86^{***}	3.39^{***}	
Group ADF-Statistic	4.13^{***}	3.07^{***}	

	Johansen – Fisher (Trace Test)		
	Linear Deterministic Trend	No Determinisitic Trend	Quadratic Deterministic Trend
$r = 0$	81.62^{***}	228.4^{***}	79.37^{***}
$r \leq 1$	43.94^{***}	84.04^{***}	34.58^{**}
$r \leq 2$	22.44	41.59^{***}	21.86
$r \leq 3$	18.12	34.18^{**}	19.08
$r \leq 4$	22.40	25.68	35.40^{***}

Notes: ***, ** and * reject the null at 1%, 5% and 10% respectively.

Moreover, the following augmented equation is estimated:

$$\ln M^d_{i,t} = \alpha_i + \beta_{1i} \ln Y_{i,t} + \beta_{2i} R_{i,t} + \beta_{3i} \ln e_{i,t} + \beta_{4i} \ln w_{i,t} + \varepsilon_{i,t} \tag{4}$$

Table 3 summarizes the results of the estimations of equations (3) and (4). Estimation of equation (3) evidences that our results are in line with the existing literature, as the estimated interest rate semi-elasticity is -0.05. Income has a positive impact on money demand and its coefficient is 1.227. All the estimated parameters are statistically significant at 1% except the interest rate semi-elasticity coefficient, which is significantly different than zero at 10%.

The estimation of equation (4) provides different results. In the augmented money demand estimation the coefficient of GDP is 1.71, while the impact of the exchange rate is 0.006 and both are significant at 1%. Wealth has a negative estimated impact of -0.41 and is highly significant. On the contrary the estimated semi-elasticity of interest rate is still negative, but it turns to be lower and statistically non-significant. The latter is not totally surprising, as similar results are highlighted in the litera-

Table 3: **Money Demand PDOLS Estimation**

Baseline Equation Estimation (3)

$Variables:$	α_i	$\ln Y_{i,t}$	$R_{i,t}$	$\ln e_{i,t}$
	0.837^{***}	1.227^{***}	-0.005^{*}	0.008^{***}
	(4.67)	(54.34)	(−1.68)	(17.57)

Augmented Equation Estimation (4)

$Variables:$	α_i	$\ln Y_{i,t}$	$R_{i,t}$	$\ln e_{i,t}$	$\ln w_{i,t}$
	-0.34^{*}	1.71^{***}	−0.0002	0.006^{***}	-0.41^{***}
	(−1.71)	(35.61)	(−0.07)	(13.78)	(−11.48)

Notes: Dependent variable is the logarithm of real money demand, $\ln M^{d}_{i,t}$. Standard errors in brackets.

ture when wealth measures are included in the money demand (among the others see Friedman, 1959 and Hall et al., 2012). Borio and Lowe (2002) decompose the BIS wealth indicator in its components and show how their weights have changed over time. For the countries in our panel there is clear evidence that starting from 1980 the weight of the financial wealth component has increased dramatically. In this sense the aggregate wealth in our panel is highly influenced by the financial component and this allows us to interpret our results as it follows. First, substitution effect is the cause of the negative sign of wealth elasticity since the increase in asset prices reduces the demand for money. Secondly, the strong influence of financial wealth in the aggregate indicator could determine the non statistical significance of the interest rate coefficient in the augmented regression. Since our measure of wealth is mainly composed by financial wealth, this variable captures the same substitution effect as the interest rate. In this sense interest rate and wealth are two alternative explicative variables for the money demand.

In order to evaluate the performance of these two explicative variables, the understanding of the stability of money demand coefficients is very important. Hence, we investigate if the coefficients of the money demand variables are changing over time. In order to achieve this task, we run a sequence of regressions for a moving window of three quarters with confidence interval of 0.5 for the baseline and the augmented money demand. Figure 2 plots the sequence of the estimated coefficients from equations (3) on the left-hand side and on the right-hand side the coefficients for equation (4). Figure 2 suggests that, for each variable, the estimated parameters of equation (4) are less stable than the coefficients estimated from equation (3). For a more precise and a better understanding of the estimated parameters stability, their standard deviations have been calculated. They confirm what has been suggested by figure 2.

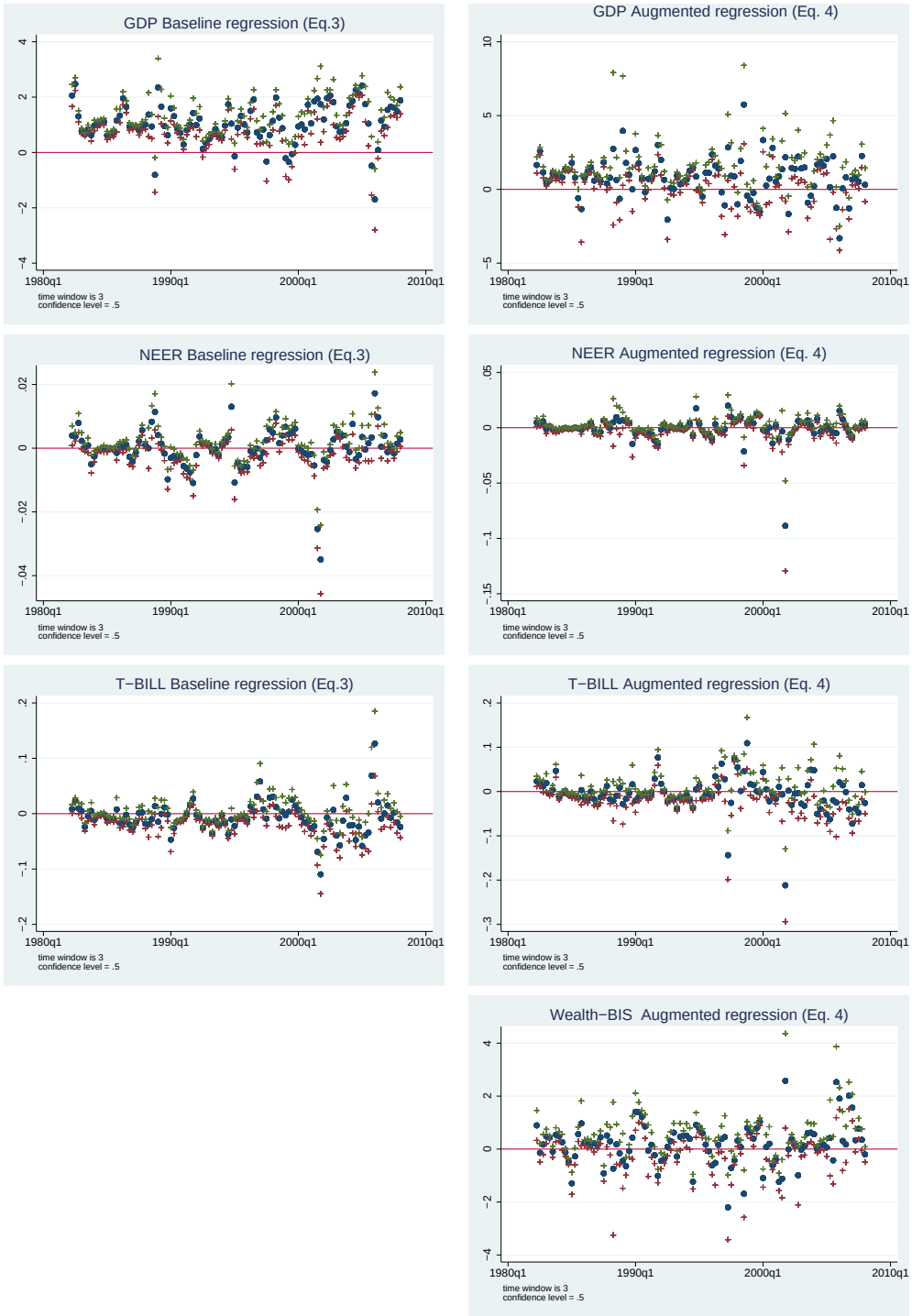

Figure 2: Parameters Stability

First, the relations obtained with the inclusion of wealth are less stable. The interest rate parameter shows similar stability in the two money demand specifications. Its parameters standard deviation is 0.027 in the baseline equation and 0.037 in the augmented one. The same applies to the the exchange rate elasticity, which shows a parameter standard deviation of 0.006 in the baseline estimation and 0.011 in the augmented regression. Substantial modification in the variability of income elasticity is observed. It is 0.697 in the baseline estimation and becomes 1.297 in the augmented specification. Moreover, as highlighted from the estimation of equations (3) and (4), interest rate and total wealth overlaps as explanatory variables in the demand for money, therefore it is worth comparing the stability of their parameters across the two equations. The standard deviation of the estimated interest rate elasticity from equation (3) is 0.027, while the standard deviation of the estimated total wealth elasticity from equation (4) is 0.767. This is another evidence supporting the intuition that the inclusion of wealth increases the money demand instability.
A rapid increase in wealth components (stock prices, houses prices, etc.) may generate an increase in the demand for liquidity due to an increase in net households' wealth. Consequently, there should be a positive relation between money demand and wealth, while the substitution effect can work in the opposite direction. Therefore, checking the effects of wealth on money demand is complicated both by wealth and substitution effects and by the measurement of the sensitivity of money demand to shocks.
Several factors can contribute to the instability of money demand. Some of these factors can be applied to this work. Looking at figure 1 we can see that for eight out of nine countries under investigation (Japan is the only exception) the wealth variable shows a positive trend. This implies that the share of wealth held in financial assets has increased during the years, exposing these countries to potentially destabilizing portfolio shifts. Another factor is related to the structural changes in the composition of wealth and the deepening of the process of financial integration that each country has faced in period that has been analyzed in this paper. Moreover, the existence of cross country differences in fiscal policies and banking structures, determine shifts of wealth that could significantly affect the money demand stability.

6 Conclusion

This paper has used a panel DOLS methodology to estimate the long-run demand for money for a panel of 9 OECD developed countries. We believe to have contributed to the debate on stability of money demand by providing empirical evidence on the relation between the demand for money and its traditional determinants, among which we have included wealth. To this end, we have not adopted single assets indicators as a proxy for wealth, but a synthetic index calculated by the BIS combining each of them. To the best of our knowledge, this has been the first empirical paper estimating a long-run money demand adopting both panel data techniques and a synthetic and unique measure for wealth.
Once we have evidenced the non-stationarity in the series in our dataset, we have

detected the existence of a long-run relation between these variables by means of a panel cointegration analysis. Our first panel DOLS estimation of a baseline money demand function has yielded results that are consistent with the existing literature. This shows that the semi-elasticity of money demand to the interest rate is negative, while the elasticities to income and to the exchange rate are positive. As a second step we have augmented our baseline money demand function in order to investigate the potential explanatory capabilities of total wealth. In this estimation, the reaction of money demand to income and to the exchange rate variations have remained positive. Moreover, interest rate semi-elasticity has remained negative but it has turned to be statistically non-significant, while a negative elasticity parameter has been estimated for total wealth. The negative sign for the estimated elasticity to wealth variations has shown the predominance of the substitution effect. We have also investigated the stability of some of the estimated relations. The results have shown that the inclusion of wealth increases the instability in the demand for money. Therefore, our results suggest that one of the possible causes for an unstable money demand is the impact of wealth.

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