# Some new evidence on the determinants of money demand in developing countries – A case study of Tunisia ☆

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## ARTICLE INFO

## ABSTRACT

The current article aims to estimate the money demand function in Tunisia. Unlike many previous money demand studies, the major components of real income are considered. Based on annual data ranging between 1979 and 2011 and the ARDL bounds testing approach, results reveal evidence of cointegration between the broad money demand and its determinants, namely the final consumption expenditure, the expenditure on investment goods, the export expenditure and the interest rate. The error correction model shows that the demand for money is only affected by the interest rate and the expenditure on investment goods in the short-run, while in the long-run the final consumption expenditure and the interest rate represent the major money demand determinants. These findings are robust to a variety of alternative money demand specifications and estimation methods. The Saikkonen–Lütkepohl cointegration test with structural shift and the Johansen–Mosconi–Nielsen structural break cointegration test are performed in order to control for structural change. In addition, the stability of the relationship is checked using the Chow stability test and the Hansen parameter instability test. In the light of the study, we advance that monetary policy in Tunisia should be based on a broad definition of money. Furthermore, the estimation of money demand functions must take into account the different expenditure components of real income.

## 1. Introduction

The conduct of monetary policy is a debated topic in the economic literature. The estimation of money demand functions has particularly attracted the attention of economists. Generally, the objectives consist in presenting the main determinants of the demand for money in closed and/or open economies and checking the stability of money demand functions. The demand for various monetary aggregates is often linked to a scale variable measuring the economic activity such as the income and a variable representing the opportunity cost of holding money such as the domestic interest rate. Econometrically, techniques that allow distinguishing the short-run effects from those of the long-run, such as the error-correction modeling, are usually employed. Empirical studies have approximately covered countries from all over the world, despite some regions

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received more attention than others. With regards to this point, a review of the empirical literature shows that few studies focused on the Tunisian economy. These include Simmons (1992), Treichel (1997) and Boughrara (2001). In line with the majority of empirical investigations on the subject, the above studies adopted the *traditional* approach, where the demand for a specified monetary aggregate depends on a scale variable and an opportunity cost measure. However, the different components of income may differently affect the demand for money (Ziramba, 2007). Checking the impact of aggregate income on money demand may be considered as a methodological limitation that may hide the impact of each expenditure component. To be more accurate when addressing policy recommendations, it is important to consider the different impacts of expenditure components in both the short- and long-run.

Throughout this article, we attempt to add some fresh empirical evidence to the debate. The present case study is different from previous ones on money demand since it estimates the short- and long-run impacts of different macroeconomic components of real income, as well as the interest rate, on the demand for M2 balances. To the best of our knowledge, no previous empirical research estimated the effects of disaggregated real income on money demand in Tunisia.[1] In addition, we employ the ARDL bounds testing approach for cointegration proposed by Pesaran, Shin, and Smith (2001) given its superiority to other cointegration techniques, especially in the case of small sample studies, such as the present. Furthermore, a special attention is given to the potential structural changes that might have occurred during the period and the stability of money demand. This is motivated by the occurrence of economic reforms and events that might distort the equilibrium relationship. The choice of Tunisia as a case study is motivated by many reasons. In fact, Tunisia has undertaken serious economic reforms such as the opening-up of the economy to foreign investors, the creation of new financial instruments, the partial openness of the capital account and the access to international financial markets. This study allows checking the determinants of money demand and the stability of the money demand function in an unstable macroeconomic environment. In addition, the current study might guide the policymakers when conducting the monetary policy. In the light of the study, one may determine factors on which the policymakers may act in order to reach the objectives of the monetary policy.

The rest of the article is structured as follows. In Section 2, we survey the related empirical literature focusing on Tunisia on the one hand, and splitting the real income into expenditure components on the other hand.[2] Section 3 briefly discusses the conduct of the monetary policy in Tunisia. The model specification, data, and econometric issues are discussed in Section 4. Sections 5 and 6 present empirical findings and a number of robustness and sensitivity checks, respectively. Finally, conclusions and some policy implications close the article.

## 2. Selected empirical literature

In spite of the boom in empirical works on the demand for money in developing countries during previous years, papers focusing on the Tunisian case received a little attention.[3] These few empirical studies are based on the conventional theory of money demand relating the volume of the demanded money to a scale variable that reflects the level of transactions in the economy (such as real income) and a variable that represents the opportunity cost of holding money (such as the interest rate or the inflation rate). Simmons (1992) investigates the demand for narrow money (M1) in five African countries (Congo, Côte d'Ivoire, Mauritius, Morocco and Tunisia) using an error-correction model. Based on annual data covering the period 1962–1989, results associated with the Tunisian case show that the demand for money, the real income, the discount rate and the price level converge to a long-run equilibrium relationship. The author concludes also that only real income plays a statistically significant role in explaining the demand for real narrow money in the long-run. Finally, real income and inflation rate are found to be significant money demand determinants in the short-run. The same issue has been discussed by Treichel (1997) using both annual and monthly data between 1962 and 1995 and the Johansen cointegration framework. The author concludes that real M2 is cointegrated with real income, but not with the money market rate or the rediscount rate. This result is also supported by the error-correction model, since the error-correction term is negative and statistically significant. The estimated income elasticity over the whole period is about 0.80. It has been also shown that the cointegrating relationship has been stable, especially over the period 1962–1990. The income elasticity over that period is twice higher than the one associated with the entire period (1962–1995). The author attributes these findings to the reduced demand for M2 over the period 1990–1995, due essentially to the introduction of Treasury bills in 1990. These results are confirmed econometrically using quarterly data over the period 1990–1995 since a long-run relationship between the demand for M2, income and the Treasury bill rate is found. However, the income elasticity dramatically falls and is lower than the one found over the whole period.

Arize and Shwiff (1998) estimate a money demand function in 25 developing countries using annual data covering the period 1960–1990 in the case of Tunisia. Money demand functions were augmented by two variables representing the exchange rate dynamics: the official exchange rate and the black market exchange rate. Empirical results suggest that real broad money demand is cointegrated with the real income, the interest rate, the inflation rate and the exchange rate. The

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[1]  Few authors disaggregated real income when estimating money demand functions. This has been especially done by Tang (2002, 2004, 2007) in several times for some Asian economies and Ziramba (2007) for South Africa.

[2]  Giving the abundance of the literature on the subject, we do not report the theoretical background on the determinants of money demand. In addition, we limit the literature survey to empirical studies focusing on Tunisia and on those splitting the real income.

[3]  Table A.2 in Appendix A summarizes some selected empirical works on the subject.