



A panel data approach to the demand for money and the effects of financial reforms in the Asian countries

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ABSTRACT

Alternative panel data estimation methods are used to estimate the cointegrating equations for the demand for money (M1) for a panel of 14 Asian countries from 1970 to 2005. The effects of financial reforms are analyzed with estimates for two sets of sub-samples and two break dates. Our results show that money demand function has been stable and financial reforms are yet to have any significant effects. Since there is no evidence for instability in the demand for money, the central banks of these countries should use money supply, instead of the rate of interest, as the monetary policy instrument.

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1. Introduction

Demand for money and its stability have received vast attention in the country specific time series studies. Developments in the unit roots and cointegration techniques and financial reforms have stimulated further empirical work on this already well researched relationship. It is now an almost stylized fact that the demand for narrow and broad money has become temporally unstable in the developed countries after the continuing changes to the financial sector due to financial reforms. Reforms have increased competition, created additional money substitutes, increased use of credit cards and electronic money transfers, increased liquidity of the time deposits and lead to higher international capital mobility. Consequently many central banks of the developed countries have abandoned money supply as a policy instrument because it is difficult to predict demand for money with a temporally unstable function. Furthermore, the Taylor rule has made attractive the use of the bank rate as the policy instrument by arguing that it will enhance the built-in stability of the economy. Therefore, since the late 1970s many central banks in the developed countries have abandoned using money supply as the policy instrument and switched to adjusting the rate of

interest to stabilize the economy. This is also consistent with [Poole \(1970\)](#) who showed that the rate of interest should be targeted if demand for money is unstable.²

Following these developments, central banks in many developing countries have also started using the rate of interest as their monetary policy instrument although there is no convincing evidence that their money demand functions have become unstable after financial reforms. [Bahmani-Oskooee and Rehman \(2005\)](#) found that demand for money functions in several developing Asian countries, by and large, are stable.³ According to [Poole \(1970\)](#) if demand for money is

² Poole's arguments are well explained in [Mishkin \(2003\)](#) pp.459–463. However, [Rao \(2007\)](#) has argued that central banks should not be given the power to change the interest rates because such changes have significant distributional effects. The recent worldwide severe downturns seem to be due to artificially lowering the interest rate by the FED in the USA. If interest rates were left to be determined by the market forces, perhaps we could have avoided credit bubbles, accumulation of huge toxic loans and severe downturns.

³ The countries selected in this study are India, Indonesia, Malaysia, Pakistan, the Philippines, Singapore and Thailand. They found that while in India, Indonesia and Singapore, demand for M1 is stable, in Malaysia, Pakistan, the Philippines and Thailand demand for broad money (M2) is stable. In the latter 4 countries the cointegrating equations with M1 are not well determined. However, in a recent paper [Sumner \(2009\)](#) with data from 1950 to 1998 showed that the components of the demand for money (M1 and M2) in Thailand have been stable and well determined. In our paper we shall use M1 for analysis because M1 is by and large the dominant component of money supply in the developing countries. We do not rule out using M2 or M3 as alternatives and our framework can be easily used for M2 or M3. In particular it is hard to control NBF1 in the organized and unorganized sectors in the developing countries and hence our preference for the narrow definition of money.

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Table 1
Panel unit root tests 1970–2005.

Series	LLC	Breitung	IPS	ADF	PP	Hadri
$\ln(M)$	−1.977 (0.02)*	2.461 (0.99)	−2.061 (0.02)*	52.132 (0.003)*	54.082 (0.00)*	7.700 (0.00)*
$\ln(Y)$	1.883 (0.97)	−3.628 (0.00)*	1.256 (0.90)	24.621 (0.65)	25.440 (0.60)	5.509 (0.00)*
R	−1.901 (0.03)*	−2.462 (0.01)*	−0.082 (0.47)	29.271 (0.40)	12.758 (0.99)	7.711 (0.00)*
$\Delta \ln(M)$	−19.954 (0.00)*	−15.588 (0.00)*	−20.591 (0.00)*	334.51 (0.00)*	359.55 (0.00)*	1.769 (0.04)*
$\Delta \ln(Y)$	−8.724 (0.00)*	−6.121 (0.00)*	−11.206 (0.00)*	176.380 (0.00)*	228.998 (0.00)*	1.112 (0.13)
ΔR	−15.630 (0.00)*	−12.781 (0.00)*	−13.682 (0.00)*	218.139 (0.00)*	242.821 (0.00)*	0.930 (0.18)

Notes: The tests are: Levin, Lin and Chu (2002, LLC), Breitung (2000), Im, Pesaran and Shin (2003, IPS), ADF Fisher χ^2 (ADF), PP Fisher χ^2 (PP) which is due to Maddala and Wu (1999) and Hadri (2000). In Hadri the null is that the variable is stationary.

Probability values are reported in the parentheses.

* and **Denotes the rejection of the null at 5% and 10% levels, respectively. For a discussion of these tests see Baltagi (2005) and Pesaran and Breitung (2005).

stable, central banks should use money supply as the monetary policy instrument. Using the rate of interest as the policy instrument will only accentuate instability.⁴ Therefore, it is important to know if the money demand functions in the developing countries have become unstable. Stable money demand implies that using the rate of interest as the monetary policy instrument is inappropriate.

The objectives of this paper are twofold. First, we examine, with the Pedroni (2000, 2004) Fully Modified Ordinary Least Squares (FMOLS) panel data methods, if there is a meaningful long run relationship between the demand for money and its determinants for a panel of 14 Asian countries. For comparisons we have also used two other alternative panel estimation methods of Mark and Sul (2003) and Breitung (2006).⁵ Second, we will examine if there has been a structural change in this relationship leading to instability after financial reforms because this has implications for the choice of monetary policy instruments.

The second objective is difficult to test. However, we shall proceed as follows. In comparison to testing for unit roots in a variable with structural breaks, there are only a few works on structural breaks in the panel data cointegrating equations. Banerjee and Carrion-i-Silvestre (2006), BC hereafter, is one such recent and influential work. BC's method has some limitations, from an applied perspective, because they assume a single structural break at the beginning or in the middle or towards the end of the sample period. Consequently, it is not possible to determine the break date endogenously and estimate the parameters of cointegrating equations for the pre and post break samples. BC's main objective seems to be to show that their technique has more power than Pedroni's (2004) in which there are no structural breaks. Therefore, BC's method is especially useful if the Pedroni methods fail to yield plausible cointegrating equations. In another recent study Westerlund (2006) has developed a method to test for breaks in the deterministic components i.e., intercepts and trends. However, this has a limited use for our purpose because we are interested in the changes of the slope parameters. Furthermore, this method needs a large time series dimension and especially useful for quarterly and monthly data; see also Bagnani (2009) who notes similar limitations.

If financial reforms have been effective, it is to be expected that there would be a structural break in the cointegrating equation after the mid 1980s because these reforms have been implemented in the Asian countries after such reforms were implemented in the developed countries. From the demand for money perspective there should be some improved economies of scale meaning that income elasticity

should show a decline and an improvement in the responsiveness of money demand to changes in the rate of interest because of more market based interest rate policies and improved capital mobility. There are no tests for the temporal instability of the panel data cointegrating equations which are similar to the popular CUSUM and CUSUMSQ tests in the country specific time series models. Furthermore, strictly speaking, the CUSUM tests are not tests for the temporal stability of the cointegrating equation because the long run money demand is a derived relationship and unobservable.⁶ Therefore, one may hypothesize that if the long run demand for money has become unstable due to financial reforms, estimates of the cointegrating parameters, after the structural break, will be less robust or may yield implausible estimates or there is no cointegration between the variables. Consequently, we can only make plausible conjectures about the effects of financial reforms on the structure of the demand for money and its stability in the panel data methods. For this purpose it is necessary to estimate the demand for money for the sub-samples with observations before and after the reforms. However, it is difficult to select a date for the structural break because financial reforms were not introduced by all the Asian countries at the same time and with the same intensity.

While many East Asian countries have liberalized their financial markets from the early 1980s, the South Asian countries were late starters and delayed reforms until the early 1990s. Furthermore, reforms seem to have been introduced without considering the adequacy of the existing banking laws. Consequently the East Asian countries had a major financial crisis during 1997–1998. On the other hand in countries like India several non bank financial intermediaries, known as chit-funds, were established. They have mobilized large amounts of deposits but many have become insolvent and bankrupt due to the inadequacies in the Indian banking laws. Therefore, a single break date might be somewhat restrictive.

With this perspective, the outline of this paper is as follows. Section 2 briefly discusses the data and presents results for unit root and cointegration tests and estimates of the cointegrating equations for the entire sample period of 1970–2005 with the Pedroni (2004) FMOLS. For comparisons we also report estimates with the dynamic

⁴ Poole's results are based on the instability in the IS and LM relations. However, instability in the demand for money is the major cause of instability in LM.

⁵ These are known as the first generation panel data methods and assume homogeneity across the cross section units. The second generation panel methods allow for heterogeneity and are beyond the scope of this paper.

⁶ What is tested with the stability tests like the CUSUMS is the stability of the parameters of the short run dynamic coefficients in the ARDL terms and the adjustment coefficient of the lagged error correction term (ECM). To test for the stability of the long run demand for money it is necessary first to estimate the cointegrating equation, for example, with the Gregory and Hansen (1992) method which allows for breaks. The lagged ECM from this can be used to estimate the short run dynamic adjustment equation. In the second stage, CUSUM and CUSUMSQ tests may be applied to test its stability. However, it is necessary for further developments for determining in panel data methods and BC note these limitations. Therefore, our aforesaid procedure should be interpreted with caution. Mark and Sul (2003) summarize the observed changes in the parameter estimates and in particular the decline in the income elasticity of the US demand for money. This indicates that the structure of the long run demand for money is somewhat susceptible to structural changes.

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