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Measuring monetary policy with empirically grounded restrictions: An application to Thailand

Piyachart Phiromswad *

Sasin Graduate Institute of Business Administration of Chulalongkorn University, Sasa Patasala Building, Phyathai, Pathumwan, Bangkok 10330, Thailand

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ABSTRACT

This paper studies the effect of monetary policy in Thailand based on structural vector autoregression (SVAR) model. Unlike all existing studies, this paper (i) properly controls for external factors, (ii) uses the identifying restrictions which are specified and justified from empirical evidence and (iii) studies the immediate as well as the short term effect of monetary policy. I find that several important stylized facts on the transmission mechanism of monetary policy need to be revised.

1. Introduction

Understanding the transmission mechanism of monetary policy is crucial for building macroeconomic models which are used to formulate optimal monetary policy. The objective of this paper is to improve our understanding of the transmission mechanism of monetary policy in Thailand.

A common approach is to use the structural vector autoregression (SVAR) model. Several studies use the SVAR model to examine the transmission mechanism of monetary policy in Thailand (e.g. Patrawimolpon, Rattanalankar, Charumilind, & Ngamchant, 2001; Fung, 2002; Disyatat & Vongsinsirikul, 2003; Atchariyachanvanich, 2004; Hesse, 2007; Charoenseang & Manakit, 2007; Kubo, 2008). These studies have significantly advanced our understanding of the transmission mechanism of monetary policy in Thailand[1]. However, these studies have three serious limitations.

First, all SVAR studies in Thailand do not adequately control for external factors. This could bias the estimates of the impulse response functions and lead to incorrect inference of the transmission mechanism of monetary policy. External factors should affect various macroeconomic variables in a small and highly open economy such as Thailand.

* Tel.: +66 2 2184057; fax: +66 2 2181313.
E-mail address: piyachart.phiromswad@sasin.edu

[1] A backward-looking model such as the SVAR model has been criticized on the grounds that the estimated parameters are likely to be unstable when there is a structural change in the underlying structural parameters—the so called "Lucas critique" which is based on Lucas (1976). However, in a relatively stable environment, the SVAR model has been able to reliably summarize the dynamic co-movement of macroeconomic variables.

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Second, the restrictions to identify a monetary policy shock in existing SVAR studies of Thailand are based on *a priori* assumptions which remain debatable. A typical approach is to use short-run identifying restrictions which are essentially zero restrictions on the contemporaneous causal relationships of variables. "The exchange rate does not contemporaneously cause the interest rate" is one example. A serious problem for this type of restriction is that the opposite argument (e.g. from an absence of a relationship to a presence of one) is *equally plausible a priori*.

Third, we know very little about the immediate as well as the short-horizon impact (e.g. 3–4 quarters) of a monetary policy shock. The immediate impact of a monetary policy shock is not even studied. It is typically assumed. Our knowledge on the short-horizon impact will be relatively sensitive and depend greatly on the immediate impact of a monetary policy shock. The "price puzzle" which was introduced by Eichenbaum (1992) is a counter-intuitive and persistent increase in the price level after a contractionary monetary policy shock. The "price puzzle" is typically more evident for the immediate and short-horizon impact of a monetary policy shock. The "exchange rate puzzle" and "the delayed overshooting in exchange rate puzzle" are also especially concerned with the impact of a monetary policy shock over short-horizon[2].

In this paper, I have tried to overcome all three limitations. First, appropriate control variables were chosen to control for external factors. Second, this paper adopts the graph-theoretic approach in the spirit of Swanson and Granger (1997) which allows me to specify and justify restrictions to identify a monetary policy shock from *empirical evidence*. Arguably, this approach is more objective and should be less debatable. Third, the graph-theoretic approach allows me to *empirically examine* the immediate as well as the short-horizon impact (e.g. 3–4 quarters) of a monetary policy shock.

This paper is organized as follows. Section 2 discusses the importance of external factors. Section 3 presents the econometric framework to estimate the impulse response functions with empirically-grounded restrictions. Section 4 presents the findings. Section 5 presents the conclusion.

2. External factors

There are several reasons why external factors are important for Thailand. First, export and import of goods and services accounted for more than 60% of real GDP in Thailand during 1999Q1 to 2011Q4[3]. In July 1997, Thailand adopted the managed-float exchange rate system. As a result, changes in the demand and supply of currencies can have significant impact on the exchange rates. Second, Thailand has a relatively open capital market. On the positive side, a liberalized capital market enhances efficient allocation of resources (Galindo, Schiantarelli, & Weiss, 2007) and improves the domestic financial system (Levine, 2001) which could spur economic growth. However, on the negative side, a liberalized capital market has been associated with "sudden stops" of capital flows (particularly, short-term capital flows) which could lead to economic instability (Calvo, 1998; Stiglitz, 2000). During the past 15 years, the size of capital inflows and outflows for Thailand has increased considerably[4]. Therefore, the movement of capital flows could have a significant impact on the macroeconomic variables in Thailand.

Earlier studies on the transmission mechanism of monetary policy in Thailand controlled for external factors mainly by including a measure of exchange rates (e.g. either real or nominal effective exchange rate or exchange rate with the U.S. dollar) into their SVAR models. I conjecture that this approach is inappropriate for several reasons. First, changes in capital flows are found to affect domestic macroeconomic variables beyond their effect on the exchange rates (Corbo & Hernandez, 1994; Calvo, Leiderman, & Reinhart, 1993). Second, changes in the macroeconomic condition in a foreign country (e.g. a drop in the real GDP growth or a rise in inflation) could affect the domestic economy immediately through changes in the expectation of investors and consumers as information flows freely and immediately across countries. Therefore, the estimates of the impulse response functions (IRFs) to a monetary policy shock could be invalid if the external factors are not properly controlled. For example, if the foreign interest rate (e.g. the fed funds rate of the U.S.) affects both the domestic interest rate (e.g. the bank of Thailand monitors the fed funds rate of the U.S. and adjusts the policy interest rate accordingly) and the domestic output (e.g. the fed funds rate affects foreign demand which affects domestic output though export), then any estimation of the IRFs to a monetary policy shock will be invalid when foreign interest rates have not been controlled.

In order to control for the influences of external factors on the Thai economy, I construct trade-weighted measures of foreign real GDP growth, foreign inflation, and foreign interest rate of two countries and one group of economies (the U.S., Japan, and the Euro area) and incorporate these variables into the SVAR model[5]. For foreign output (Y^*), I constructed a trade-weighted average of year-on-year real GDP growth rates of the U.S., Japan, and the Euro area. From 1999Q1 to 2011Q4, the average share of trade (export plus import in U.S. dollars) from the U.S., Japan, and the Euro area are 12.0%, 17.1% and 11.4%, respectively[6]. In total, the U.S., Japan, and the Euro area accounted for 40.5% of trade with Thailand and should be a good proxy for external influences on the Thai economy. For foreign price (P^*), I also constructed a trade-weighted average of year-on-year inflation rates for the U.S., Japan, and the Euro area. Finally, the foreign interest (I^*) is the average of (very) short-term

[2] Exchange rate puzzle happens when the exchange rate depreciates instantaneously, while the delayed overshooting in the exchange rate happens when the exchange rate appreciates but does so only gradually in a hump-shape like response (Cushman & Zha, 1997).

[3] According to data reported by the NESDB (www.nesdb.go.th).

[4] According to data reported by the Bank of Thailand (www.bot.or.th).

[5] The GDP data for the U.S., Japan, and the Euro area are from the Bureau of Economic Analysis (BEA), the Economic and Social Research Institute (ESRI) and the Eurostat by order. The inflation data (constructed from the GDP deflator) for the U.S., Japan, and the Euro area are from the Bureau of Economic Analysis (BEA), the Statistics Bureau of the Ministry of Internal Affairs and Communications and the Eurostat by order. The interest rate data for the U.S., Japan, and the Euro area are from the Federal Reserve Economic Data (FRED), the Bank of Japan and the European Central Bank by order.

[6] The trade data is from the NESDB (www.nesdb.go.th).