Interbank market under the currency board: Case of Lithuania

Marius Jurgilas
Department of Economics
University of Connecticut, Storrs 06269 CT, USA

October 23, 2005

Abstract

This paper studies the liquidity effect in the environment of a currency board. Under such an environment, the endogeneity issue common to other monetary regimes does not arise, thereby allowing for a straightforward analysis. Using daily data from the interbank market in Lithuania, we estimate the liquidity effect and show that, contrary to the existing literature, overnight interest rates tend to fall at the end of the reserve holding period while being higher at the beginning. Thus, the martingale hypothesis of the interest rates is rejected indicating inefficiency in the interbank market. It is also shown that banks do not utilize aggregate liquidity information provided by the Bank of Lithuania due to the structural impediments of the market. Contrary to the findings in the literature we do not find significant impact of the treasury account holdings to the interbank market interest rates.

JEL CLASSIFICATION: E52, E58
KEY WORDS: interbank market, liquidity effect, currency board, Lithuania

1 Introduction

Since 1 April 1994, Lithuania has adopted a currency board regime. Throughout the eleven years of the currency board existence there has been extensive discussion as to the appropriateness of such a decision. In this paper we will not try to judge this decision, but focus our analysis on the interbank market operation under a currency board. The purpose of this study is to provide empirical evidence for the overnight interest rate fluctuations within the reserve holding period.

The standard method of empirical analysis was introduced in Hamilton (1997). It was shown, that while measuring the impact of a change in the outstanding banking system reserves on the interest rate (the liquidity effect), one has to bear in mind, that there is also a reverse causality. Developments in interest rates induce central banks to respond, bringing the effective rate into the target zone. This introduces a simultaneity problem, and requires the use of instrumental variable estimation. A recent solution to this identification problem is provided by Hayashi (2001) in the case of Japan.

According to the market efficiency hypothesis the interest rate should be a martingale[1] within the period of reserve holding. None of the known information should help predict developments in the interest rates. This is not, however, what has been observed empirically. For example, a majority of empirical studies predict higher and more volatile interest rates on the last days of the reserve holding period. Several explanations for this departure from market efficiency have been proposed.

Banks hold required reserves (and excess reserves) not for the sole reason of satisfying the required reserves imposed by the central bank. Thus, an analysis based only on the reserve holding patterns will fail to encompass all the factors that banks take into consideration while managing their liquidity.

It can also be argued that the martingale property is not observed because of market frictions or institutional constraints like transaction costs, credit or exposure limits. Interestingly Prati et al. (2003) reports that although the violations of martingale hypothesis are observed across international data, patterns of violation are heterogeneous. It argues that settlement day tightness is not a robust finding across countries, suggesting that central banks' inclination to adjust liquidity fluctuations is a plausible explanation.

Contrary to the above, some literature reports a market efficiency result. Moschitz (2004) finds that the mean of the overnight interest rate in the euro area does not vary

[1] A random process is a martingale if the best predictor of the future realizations is the current value: $E^P[X_{t+s}|I_t] = X_t$, for all $s > 0$. Which can be verbalized that given the information of period t (I_t), none of $t-1$ information is useful in predicting $t+s$ values.

systematically throughout the reserve maintenance period, although it reports calendar day effects (end of the month, end of the quarter). Thus, the current literature has not reached a consensus on a definite explanation of the interest rate fluctuations within the reserve holding period.

Recently Ewerhart et al. (2004) provided a theoretical model that shows a possibility of liquidity effect reversal. It is shown that in the market with strategically acting banks one might observe situations in which outstanding reserves of the banking system and interest rates are rising or falling at the same time. In such an environment the central bank should be reluctant to provide aggregate liquidity information to banks, since such information is shown to increase volatility of overnight interest rates.

This paper aims to answer the question of whether the variation in the overnight interest rates observed in the Lithuanian interbank market has any systematic patterns. After careful consideration and empirical study this paper concludes that the fluctuations are systematic and can be attributed to the institutional arrangements of the market, currency board specifics, and market inefficiency.

The rest of the paper is structured as follows. Section 2 provides a summary of institutional peculiarities of Lithuanian interbank market. Section 3 describes the data set and provides empirical model for interest rate determination. Empirical results are reported in Section 4, and Section 5 summarizes and concludes. Auxiliary regression tables are provided in the appendix.

2 Institutional framework

In May 1994 Lithuania adopted a currency board with the base currency of the United States Dollar (USD). Since then commercial banks can exchange the base currency at the central bank for the preannounced fee of 0.025-0.125%. This fee has been gradually decreased and finally completely abolished as of March 24, 2004[2]. This forex window acts like a standing facility for the commercial banks and has as of recent been highly utilized. If we look at figure 1 in the Appendix, it is evident, that the volume of the forex transactions increased dramatically after the cut in the transaction fee by the Bank of Lithuania. Furthermore, the variability of the interest rates (measured as the difference between LONIA and EONIA [3]) dropped around the same date too.

In this paper we argue that the observed decrease in the variability of the interest

[2]A fixed fee of 50Lt per transaction is still charged.

[3]LONIA - Litas OverNight Index Average, EONIA - Euro OverNight Index Average

rates is actually deceiving, and may be detrimental to financial stability. In particular, noting the relationship between the forex transaction fee and the interest rate variability, the current level of the fee may be suboptimal. While interest fluctuations impose a cost on the economy, eliminating them by imposing zero transaction cost on the forex transactions in the base currency, creates some other possibly nonnegligible costs. In particular, all liquidity management costs usually incurred by commercial banks can be easily transferred to the central bank. In case of a liquidity shortage or unexpected inflow of funds commercial banks will utilize a forex window available at the central bank. This creates incentives for the banks to engage in riskier activity without regard for liquidity problems thus infringing on the financial stability of the banking system. Allegedly, the effects of the forex window are exacerbated by the fact that, since December 2004, commercial banks do not face exposure limits in euro.

The major monetary policy tool of the Bank of Lithuania is the required reserves policy. Banks are required to maintain required reserves on average over the maintenance period (from 24th to the 23rd of the month). The required reserve base is calculated based on the last day of the previous month. Since February of 2002 Lithuania adopted the euro (EUR) as the base currency and joined the European Union in May 2004. Up until 2002, the required reserve maintenance period used to be from the 13th to the 12th of every month, with the required reserve base calculated based on last month's liabilities on the 7th, 14th, 21st and last day of the month. It has to be noted that required reserves in foreign currencies are not held based on average but as a fixed amount throughout the period. If banks do not meet the required reserves they have to pay a fine. Yet the central bank did not fine banks which did not meet the required reserves during the banking crisis of 1996, thus effectively introducing a 0% required reserve ratio. This sheds some light on the credibility of such policy in times of financial instability. Apart from the foreign exchange window commercial banks can take short period liquidity loans, although this facility is not often utilized by banks for fear of higher scrutiny from the Bank of Lithuania. Thus, such a loan was taken only several times over a 10 years period.

Another big change in the Lithuanian interbank market happened on November 1, 2001. On that day the Ministry of Finance transferred the Treasury account to the central bank, making the central bank a banker for the government. Fluctuations in the Treasury account, major pay-days, and collection days are expected to have a significant impact on the liquidity of the banking system. This effect though should be somewhat alleviated, since the central bank imposed a policy of 0% interest on domestic currency deposits, forcing the Treasury to hold a majority of deposits denominated in foreign currency. Vetlov (2004) shows

that since 1998, about 90% of fluctuations in the official foreign reserves can be explained by the activity in the Treasury account. Despite that, Garbaravicius (2004) reports that net Treasury flows constitute up to 40% of the required reserves, thus greatly affecting the interbank market.

In an effort to increase market efficiency starting in November 2000, the Bank of Lithuania reports daily aggregate liquidity information for the banking system. Thus banks, especially small ones, supposedly can make more informed decisions for managing their liquidity needs based on the situation in the market. As will be shown in section 4, banks do not fully utilize this information. Starting in January 2005, the Bank of Lithuania began releasing even more detailed information on the autonomous factors influencing the interbank market. Such practice is also implemented at the ECB and at the Bank of Japan.

While this paper focuses on the interbank market for overnight funds it has to be admitted that commercial banks conduct overnight transactions with their corporate clients too. Unfortunately, we could not obtain an official estimate of such transactions, but it is believed that monthly turnover of such contracts exceeds the interbank market by at least twice.

3 Data and the econometric model

Data used in this paper is mainly provided by the Bank of Lithuania through their "Web-Service" databank. It is a repository of daily data on the aggregate liquidity situation in the banking system. European overnight interbank rate average (EONIA) is obtained from the Central Bank of Finland.

Due to the developing nature of the Lithuanian interbank market and the institutional changes that took place recently, we choose to analyze the period after the adoption of the euro peg[4]. Overall, the full data set spans the period from 2002/02/01 to 2004/09/30 with 673 data points.

Following the current literature (Hamilton (1997), Prati et al. (2003), Gaspar et al. (2004)) the empirical model estimated is of EGARCH (p, q) form:

$$r_t = \mu_t + h_t \, \epsilon_t \tag{1}$$

$$\text{where } \mu_t = r_{t-1} + b' \, X_t \tag{2}$$

[4]Extending the sample period into the period of a peg to US dollar makes analysis susceptible to the model instability criticism.

$$\text{and } \ln h_t = \lambda' V_t + \sum_{j=1}^{q} d_{j1} (\ln h_{t-1} - \lambda' V_{t-1}) + \sum_{i=1}^{p} d_{i2} \frac{\epsilon_{t-1}}{\sqrt{h_{t-1}}} + d_{i3} (\frac{|\epsilon_{t-1}|}{\sqrt{h_{t-1}}} - \sqrt{\frac{2}{\pi}}) \quad (3)$$

Also following the literature, the error term is assumed to have a mixture of two normal distributions:

$$\epsilon_t \sim p\, N[0,1] + (1-p)\, N[0,\sigma^2] \quad (4)$$

After examination EGARCH $(1,1)$ is chosen. While the EGARCH model has been introduced by Nelson (1991), still no consensus has been reached in terms of developing EGARCH model specification tests. Malmsten (2004) also suggests various tests, while noting that even the existent tests have not been widely used.

The EGARCH specification allows model variance to respond asymmetrically to positive and negative error terms[5]. The mixture of distributions is introduced to capture periods of frequent small changes in interest rates and occasional large fluctuations. Hamilton (1996) argues that this formulation makes the estimated parameters robust with respect to large outliers and has become the standard formulation in high frequency financial models.

Apart from the usual list of explanatory variables found in the empirical interbank market literature, we include interest rate developments of the base currency into the mean equation. It is expected that the interbank market of a currency board has to follow, to some extent, the base currency interest rate movements. Day of the week dummies are included, both in the mean and variance equation, to test for the weekday effects. As an extension, a specification of the model including lagged reserve deficiency measures is estimated to test the efficient use of the announced aggregate liquidity information. Aggregate liquidity information is introduced in the form of average and current deficiency.[6]

As mentioned above, the left hand side variable is an effective interbank rate as provided by the Bank of Lithuania. On some days no actual contracts took place. In that case two options were explored - dropping the days with no actual contracts taking place and substituting in the average of VILIBID and VILIBOR. No significantly different results were obtained, thus only the first case is reported. The model is estimated by numerically maximizing the sample conditional log likelihood function, as described by Hamilton (1997).

[5]In our formulation we would expect variance to increase when interest rates are rising and variance to decrease than interest rates fall.

[6]Average deficiency - defined as the difference in required reserves and accumulated average, weighted by the reserve requirement of the period. Current deficiency - defined as the difference in accumulated average and the current account holdings of the commercial banks.

4 Estimation results

Estimation results are provided in Table 1 through Table 4. According to the martingale hypothesis it should not be possible to predict interbank interest rates using past or already observed information. This is not the case in the Lithuanian interbank market. This result is not that surprising. Even in well developed financial markets like the US or UK, tests for the martingale hypothesis have failed. Since the Lithuanian banking market is quite young, a rejection of the martingale hypothesis is expected. What is of interest here is the observed patterns of martingale hypothesis violation. The major concern in the literature interpreting the martingale hypothesis violation is the endogeneity issue - the reaction of the central bank to the developments in the interbank market. Thus, in the case of an independent central bank, it is not clear if the observed fluctuations in the interest rates are market driven or stem from the actions of the central bank. Such a problem does not arise in our case and all of the observed fluctuations are market driven.

End and beginning of the reserve maintenance period effect

In the case of Lithuania, interest rates are estimated to be significantly lower at the reserve maintenance period end. This is quite surprising, since so far empirical studies have witnessed various degrees of interbank market tightness towards the end of the reserve holding period.

At the same time, it has to be acknowledged, that tightness at the end of the reserve maintenance period is not a fact well established in the literature. It has been observed that interbank market tightness around the settlement day depends on the way in which the central banks manage liquidity in the market. Some central banks induce market participants to manage their funds prudently, thus allowing for settlement day tightness, others are supportive and accommodate market demand for reserves. As can be seen in Table 1, in the case of Lithuania, the effect of the reserve period end is reversed.

Looking at aggregate banking system liquidity indicators, it appears that over the last two years commercial banks became reluctant in ending the reserve maintenance period with minimal excess reserves. It seems that banks try to meet the reserve requirement early in the period and end up with excess reserves later. This is inferred from the data on the aggregate liquidity of the banking system. One might think, that large banks accumulate excess funds with intension to loan them out later to deficient small banks. This strategy would pay off if interest rates were higher at the end of the reserve maintenance, and they are not.

Estimation results also indicate that the Lithuanian interbank market experiences increased volatility at the end of the reserve period (Table 1). This matches results observed

in the literature. Increased interest rate volatility is expected to be observed in countries with small or no carry over provisions. Lithuania does not have any carry over provisions for reserve maintenance.

It is observed that interest rates are significantly higher at the first day of the reserve maintenance period. It can be explained by a surge in funds demand, e.g. banks trying to build up reserve positions early in the period. Another hypothetical explanation could be a liquidity effect reversal as in Ewerhart et al. (2004): With the abundance of funds in the market some banks act strategically forcing interest rates up.

The first day of the reserve maintenance period seems to have significantly higher variability of interest rates too. The conventional interpretation of high volatility periods in the literature is based on the increased uncertainty in the market and asymmetric information. Thus, empirical results indicate that in the case of Lithuanian interbank market, commercial banks face high uncertainty at the beginning of the reserve holding period and minimal uncertainty towards the end. This is supported by the fact that in aggregate, banks build up high reserve balances quickly and end up with excess reserves.

Reserve deficiency

In a recent study Siaudinis (2003) raises a hypothesis that the fluctuation in the domestic interest rates (VILIBOR) as compared to LIBOR can be explained by the deficiency or surplus of funds in the interbank market. It is argued that whenever the outstanding reserves plunge to less than 25% of the required, an increase in the interest rates is observed. Empirical estimation carried out in this paper quantifies this proposition. Results reported in Table 1 show that overnight interest rates tend to rise with increase in accumulated reserve deficiency and increase in current reserve deficiency. Looking at the interaction terms of the deficiency measures with the reserve maintenance period dummy it can be seen that a falling accumulated reserve average is associated with lower interest rates on the last days of the reserve holding period. This looks peculiar, but can be explained by the developing nature of the Lithuanian interbank market. Faring that the interbank market will be incapable to satisfy their liquidity needs, banks try to meet the reserve requirements early in the period, and approach the reserve holding period end with significant excess reserves. When the risk of not meeting the reserve requirement is minimal, we observe contemporaneous decrease in the reserve holdings and overnight interest rates. This contradicts the intuitive expectation of market tightness towards the reserve holding period end.

It is also estimated, that the variability of the interest rates increases with the deficiency in accumulated reserves. We included an interaction term in the variance equation expecting

that the deficiency will have a stronger impact towards the maintenance period end. This does prove to be the case - the effects of the deficiency in the reserve market are exacerbated on the last days of the reserve maintenance period (Table 2).

Starting in November 2000, the Bank of Lithuania started releasing daily aggregate interbank market liquidity information. Since the end of January 2005 more detailed information providing the impact of the autonomous factors and forecasts of future liquidity needs has been made available. Nonetheless, it appears that the participants of the interbank market fail or are not able to utilize fully the information made available since 2000. As can be seen from Table 3 it is estimated that if current reserves in the banking system are running lower than the accumulated average and this information is made available to the market, interest rates are expected to increase. Once again the efficiency hypothesis can be rejected.

Treasury activity

Since we were not able to identify how much of the variation in the Treasury account holdings in domestic currency translates into forex variation the model is estimated as if all changes in Treasury account holdings in domestic currency have a direct effect on the interbank market. Note that if the Treasury performs a foreign exchange operation, it shows up in domestic currency account but has no impact on the outstanding liquidity in the market. Ideally, one would include treasury account changes net of the forex transactions. As in Garbaravicius (2004) we find that increases in the treasury account holdings in national currency are negatively correlated with the overnight interest rates.[7] Although, simultaneously controlling for the other effects within a single model, we find no significant impact of the Treasury account fluctuation to the overnight interest rates.

Other effects

It is estimated that the overnight interest rates tend to be higher on Fridays, possibly accounting for the uncertainty over the weekend and the benefit of reducing required reserves over the weekend. To account for the decreased variability of the interest rates since the cut in the forex transaction fee, a dummy for the period following the cut is introduced. As expected, variability of the interest rates is found to be diminished (Table 2 and Table 4).

[7]Following Garbaravicius (2004) a correlation between treasury deposit changes and changes in overnight interest rate was estimated. Pearson correlation estimate of $Corr = -0.14$ with the estimated significance of $\alpha < 0.01$ was obtained, showing statistically significant negative linear relationship.

5 Summary

This paper estimates liquidity effect of the interbank market in the case of Lithuania. It is found that overnight interest rates tend to be higher at the beginning and lower at the end of the reserve holding period. This contrasts the market tightness around the reserve holding period end as documented in other empirical literature. Banks tend to accumulate required reserves early in the period being reluctant to minimize excess reserves at the end of reserve holding period. It is believed that this result can mainly be attributed to a currency board arrangement and only to a leaser extent to the developing nature of the Lithuanian interbank market.

Statistically significant estimates of aggregate liquidity information provided by the Bank of Lithuania suggest that banks do not utilize such information fully, thus the hypothesis of interest rate being a martingale can be rejected.

The forex window under a currency board proves to be the de facto standing facility that is being increasingly utilized. Recently, the variability of the overnight interest rates has decreased substantially due to the policy change of the Bank of Lithuania towards the forex transaction fee that resulted in increased use of the forex window by the commercial banks. This may pose a moral hazard problem. Since banks have fewer incentives to manage their liquidity, they may resort to riskier behavior. Thus, it is argued that falling variability of the overnight interest rates is not a good signal for increased financial stability.

While this paper focuses on the interbank market, an interesting avenue of research in explaining the liquidity effect is an extension of the current empirical literature to include the ever growing overnight market of the corporate sector.

References

Ewerhart, C., Cassola, N., Ejerskov, S., & Valla, N. (2004). Liquidity, information, and the overnight rate. *European Central Bank Working Paper*.

Garbaravicius, T. (2004). Impact of treasury transfers on the Lithuanian money market. *Pinigu Studijos*, pp. 5–33.

Gaspar, V., Quiroz, P., & Mendizabal, H. (2004). Interest rate determination in the interbank market. *European Central Bank Working Paper*.

Hamilton, J. D. (1996). Measuring the liquidity effect. University of California at San Diego, Economics Working Paper Series, Department of Economics, UC San Diego.

Hamilton, J. D. (1997). Measuring the liquidity effect. *American Economic Review*, *87*(1), 80–97.

Hayashi, F. (2001). Identifying a liquidity effect in the Japanese interbank market. *International Economic Review*, *42*(2).

Malmsten, H. (2004). Evaluating exponential GARCH models. *SSE/EFI Working paper Series in Economics and Finance*.

Moschitz, J. (2004). The determinants of the overnight interest rate in the euro area. *European Central Bank Working Paper*.

Nelson, D. (1991). Conditional heteroskedasticity in asset returns: A new approach. *Econometrica*, *59*, 347–370.

Prati, A., Bartolini, L., & Bertola, G. (2003). The overnight interbank market: Evidence from the G-7 and the euro zone. *Journal of Banking and Finance*, *27*, 2045–2083.

Siaudinis, S. (2003). Effectiveness of modern currency board operational frameworks: discussion continued. *Pinigu Studijos*, pp. 5–22.

Vetlov, I. (2004). Monetary transmission mechanism in Lithuania. In Mayes, D. G. (Ed.), *The Monetary Transmission Mechanism in Baltic States*, pp. 61–107. Esti Pank.

A Appendix

Table 1: Estimation results: mean parameter estimates

Parameter	Estimate	
p	0.2759	***
	(0.0468)	
$\sigma_1{}^2$	0.3238	***
	(0.0256)	
Mean constant	0.0143	
	(0.0148)	
End of reserve maintenance	-0.1067	***
	(0.0292)	
First day of the reserve maintenance	0.3231	***
	(0.0827)	
Change in EONIA	0.0903	
	(0.0561)	
Treasury	0.0002	
	(0.0002)	
Average deficiency	0.1333	***
	(0.0399)	
Current deficiency	0.2841	***
	(0.0420)	
Average deficiency x RMPE	-0.3184	***
	(0.0937)	
Current deficiency x RMPE	-0.1042	
	(0.0927)	
Tuesday	0.0121	
	(0.0183)	
Wednesday	-0.0182	
	(0.0197)	
Thursday	-0.0039	
	(0.0194)	
Friday	0.0363	**
	(0.0182)	

Source: *Author*
* - 10% significance.
** - 5% significance.
*** - 1% significance.

Table 2: Estimation results: variance parameter estimates

Parameter	Estimate	
Variance constant	1.8936	***
	(0.5988)	
End of reserve maintenance	0.7388	*
	(0.3901)	
First day of reserve maintenance	1.4934	***
	(0.3312)	
Average deficiency	4.4591	***
	(0.8120)	
Current deficiency	0.3341	
	(0.4604)	
Average deficiency x RMPE	2.7549	**
	(1.3426)	
Current deficiency x RMPE	0.8266	
	(1.4441)	
Tuesday	0.1448	
	(0.1975)	
Wednesday	0.3046	
	(0.2203)	
Thursday	0.2633	
	(0.2068)	
Friday	0.0747	
	(0.2091)	
Zero fee	-2.6893	***
	(0.4140)	
d_{11}	0.7545	***
	(0.0534)	
d_{12}	0.1116	
	(0.1114)	
d_{13}	1.3132	***
	(0.2136)	
N	673	
R^2 adj.	0.7322	

Source: *Author*
* - 10% significance.
** - 5% significance.
*** - 1% significance.

Table 3: Estimation results: mean parameter estimates ($t-1$ information)

Parameter	Estimate	
p	0.2838	***
	(0.0484)	
${\sigma_1}^2$	0.3221	***
	(0.0261)	
Mean constant	0.0040	
	(0.0157)	
End of reserve maintenance	-0.0413	*
	(0.0236)	
First day of the reserve maintenance	0.2858	***
	(0.1095)	
Change in EONIA	0.0885	*
	(0.0506)	
Treasury	-0.0002	
	(0.0001)	
Average deficiency ($t-1$)	0.0582	
	(0.0371)	
Current deficiency ($t-1$)	0.2086	***
	(0.0400)	
Average deficiency x RMPE ($t-1$)	-0.0120	
	(0.0865)	
Current deficiency x RMPE ($t-1$)	0.2304	
	(0.1454)	
Tuesday	0.0040	
	(0.0193)	
Wednesday	-0.0233	
	(0.0204)	
Thursday	0.0090	
	(0.0199)	
Friday	0.0300	*
	(0.0177)	

Source: *Author*
* - 10% significance.
** - 5% significance.
*** - 1% significance.

Table 4: Estimation results: variance parameter estimates ($t-1$ information)

Parameter	Estimate	
Variance constant	1.9021	***
	(0.6169)	
End of reserve maintenance	0.4973	
	(0.4436)	
First day of reserve maintenance	1.5616	***
	(0.3630)	
Average deficiency	4.3698	***
	(0.8182)	
Current deficiency	0.4899	
	(0.4328)	
Average deficiency x RMPE	1.2385	
	(1.6037)	
Current deficiency x RMPE	-0.8079	
	(1.4245)	
Tuesday	0.2162	
	(0.1995)	
Wednesday	0.3397	
	(0.2313)	
Thursday	0.3181	
	(0.1981)	
Friday	0.0782	
	(0.2059)	
Zero fee	-2.6963	***
	(0.4074)	
d_{11}	0.7659	***
	(0.0529)	
d_{12}	0.0942	
	(0.1096)	
d_{13}	1.2851	***
	(0.2052)	
N	673	
R^2 adj.	0.7264	

Source: *Author*
* - 10% significance.
** - 5% significance.
*** - 1% significance.

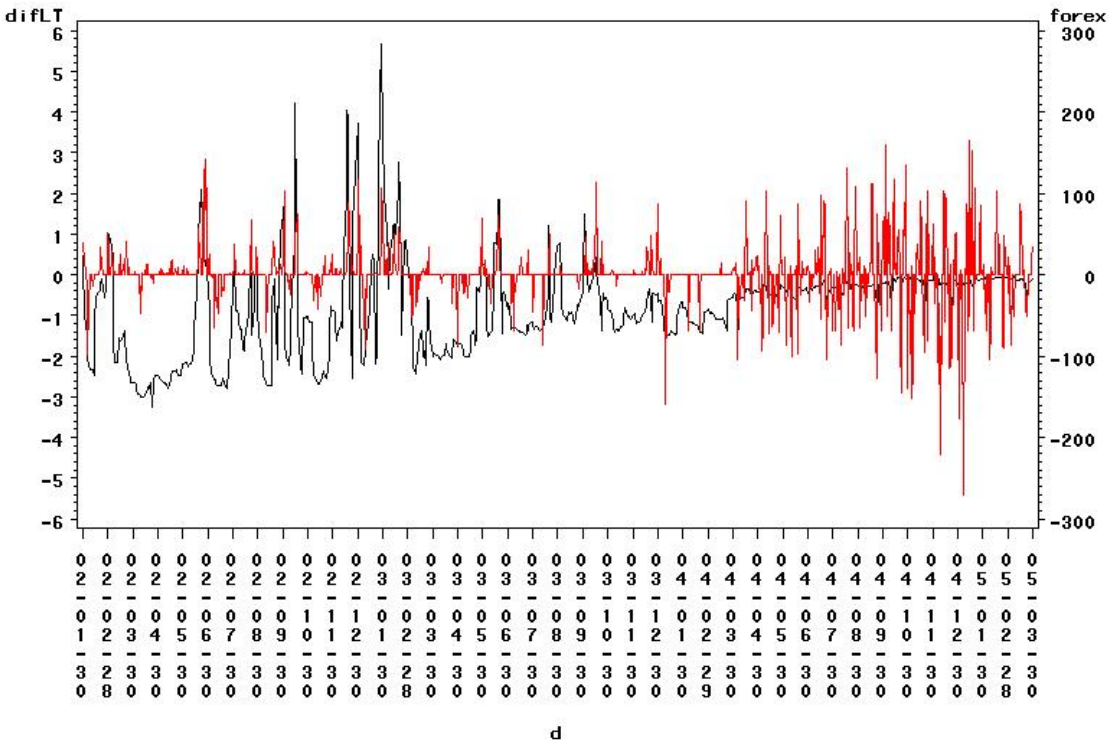

Figure 1: Interest rate differential (LONIA-EONIA) and the volume of forex transactions at the central bank