The Role of Interest and Interest Spreads in Monetary Circuit Theory:

Empirical Analysis of the U.S, U.K, France, Germany, Australia and New Zealand

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1.Introduction

The Theory of Monetary Circuit has received more and more interest among post-Keynesians in recent years. Many writers try to explain macroeconomic problems such as employment, inflation, and distribution within the framework of the theory of the monetary circuit. Considerable development has been achieved. However, few pay attention to the macroeconomic performance of interests and interest spreads based on the theory of monetary circuit. In this paper, following the footstep of Secarreccia (2005), I investigate a simple model of the theory of monetary circuit that is based on the flux/reflux framework. In this three-sector model that includes households, firms and banks, by analyzing a fully coherent accounting framework, I reach the same conclusion as in Secarreccia (2005). That is, the difference between the loan rate and the deposit rate is negatively related to macroeconomic performance and does play a role in affecting macroeconomic variables. The empirical analyses are performed by using data from the United States, the United Kingdom, France, Germany, Australia, and New Zealand. The regression models are set up by using the GDP growth rate and the growth rate of business loans as dependent variables and the interest spread and real long-term interest rates as independent variables. Results from the regressions of these six OECD countries show a negative relationship between the GDP growth rate and interest spreads in each of the six countries tested, although at different significance levels. The results are also similar to those found in Secarreccia (2005) using Canadian data. The empirical tests strongly support the assumption about interest spreads that are discussed in this paper.

On the other hand, the results from testing the effects of interest spreads on the growth rate of business loans are inconsistent in different countries. Several possible reasons are given in the analyses.

The second section of this paper is a brief presentation of the theory of monetary circuit. In section 3, a simple model is introduced in the form of a fully coherent accounting framework. The effect of changes in interest spread is analyzed. Section 4 is the review of the empirical work of Secarreccia (2005) and some related work of other writers. In Section 5, I perform some empirical analysis using data from United States. Section 6 is the empirical analysis of United Kingdom, France, Germany, Australia and New Zealand. Section 7 is the concluding part.

2. A brief presentation of the theory of monetary circuit

In the theory of monetary circuit, money is an endogenous variable that appears in the form of credit money, usually represented by bank credit. Money, therefore, is created when an agent spends money that it borrows from the bank and is destroyed when the credit is repaid to the bank by the same agent. Based on this assumption, the community is divided into two different groups of agents. One group is producers; they have access to bank credit, and, therefore, their purchasing power is not constrained by their income or wealth. The other group is households, or wage earners; they can not borrow money from banks and can only spend what they already have. As Augusto Graziani (2003:26) says: Money being created by the banking sector and being

extinguished when it goes back to the same sector, its existence and operation can be described as a circuit.

The different phases of monetary circuit are usually described in a simple three-agent framework, which includes banks, firms and households (or wage earners). Furthermore, the economy is assumed to be closed, and there is no government.

In the first step, at the very beginning of the circuit, banks make a decision to grant credit to firms. With money in hand, firms are now able to start the production process. The amount of credit supplied by banks at this stage is denominated "initial finance" by (Graziani 2003:27). He also points out that in this stage, firms can be considered one integrated and consolidated sector. All the costs other than wages, such as purchases of raw materials and machines, are transactions inside the sector and among firms. The liquidity from the banks' credit is finally passed on to the employees. Therefore the demand for bank credit coming from producers depends only on how much wage they are going to pay. So there is obviously a relationship between the credit market and labor market. As Nell (1996: 289) pointed out: "...the level of deposit -money in circulation- adjusts in pace with the level of employment, which in turn is governed by the level of demand."

In the second step, production is being performed. Two kinds of products come out: consumer goods (for the purpose of selling on the goods market to wage earners) and investment goods (or capital goods, for the purpose of interchanging between firms). The producing level and employment level are all determined by firms, while the wage

earners can only decide the distribution of their wages among consumption expenditure, cash balance additions and securities purchase.

The two steps above are called the monetary "efflux" process. During this efflux process, firms therefore build up their stock of short-term debt with the banking system, and workers begin producing goods that are not yet available in the commodities market. (Seccareccia 2005)

In the third step, goods produced in the former step are being sold. Consumer goods are sold to wage earners, while investment goods are sold among firms. The money that wage earners spend for purchasing the consumption goods and the money they spend for purchasing the securities issued by firms flows back to the firms. Firms then can use it to repay the debt to the banks; as the result, an equal amount of money is destroyed. This process is referred to as the "reflux" of money. Once the initial bank debt is repaid and the money is destroyed, the monetary circuit is closed.

Based on the above consideration, the extent of the "reflux" of money is inversely proportional to wage earners' propensity to save, and more specifically, their liquidity preference. Wage earners' propensity to save is zero when they spend all their income to purchase the consumer goods or the securities issued by firms. Firms get back the entire amount of money they borrowed from banks at the beginning and are able to repay their debt to banks entirely. In this situation, the circuit is closed without losses. The overall economy, therefore, maintains an equilibrium state. If wage earners' propensity to save is larger than zero, that is to say, they want to use a portion of their income to increase

their cash balance (here, we suppose it appears in the form of bank deposits), a counterpart of equal amount of money remains as the firms' debts to banks and can not be destroyed. This is called "the Keynesian problem of insufficient reflux from the private sector" by Seccareccia (2005). He pointed out that the problem would easily disappear if some other sector is added in the model, for example the government; therefore, additional liquidity could be provided to offset the leakage because of households' preference for liquidity. Another viewpoint believes that this "leakage" will remain as the form of firms' debts toward banks at the end of a period of the circuit. I will discuss this further in the next section.

The theory of monetary circuit was first articulated by Knut Wicksell (1898). In his work, Wicksell paid extra attention to the role of interest rates in the flux-reflux framework. When analyzing "the use of money", Wicksell mentioned interest spreads between deposit rates and loan rates by writing that "The difference between these two rates remunerates the bank, first of all for the trouble and the risk involved and then for holding in its till a certain stock of metallic money which earns no interest and for holding liquid securities which carry only a moderate rate of interest." (Wicksell 1898: 139). But immediately afterwards, he stated "... on our assumptions, the necessary cash holdings of the banks are reduced to a minimum. We are also neglecting the banks' running costs. We can therefore assume that the rates of interest on loans and deposits are equal, or nearly equal-- in any case a pretty harmless assumption...." (Wicksell 1898: 139). Clearly, Wicksell treated the spread between deposit rates and loan rates just as

banks' method to meet their "running costs". He didn't realize the influence of interest spreads on macroeconomic performance. Wicksell's work influenced a large number of circuitist writers that make the same assumption when mentioning the two rates of interest. While Graziani, in his work *The Monetary Theory of Production*□pointed out the importance of the differences among the three kinds of interest rates, namely, (a) a rate on banks loans, (b) a rate on bank deposit and (c) a rate on securities issued by firms, when analyzing the relationship between demand and supply of firm-issued securities, he did not pay more attention to the effect of interest spreads of deposit rates and loan rates either. It was not until Seccareccia (2005), that the importance of the spread between the rates of deposit and loan has been investigated seriously. Now, following the footstep of Seccareccia, let's turn to exploring the macroeconomic implications of interest spreads within the theory of the monetary circuit framework.

3. Implications of interest spreads within the framework of the monetary circuit

So far, we have described a flux/reflux framework of the theory of monetary circuit by assuming that the interest of the loan is zero. Under this assumption, if households use their total income to purchase consumption goods or securities issued by firms, there is no leakage of liquidity and the monetary circuit is perfectly closed. However, if we consider the effect of the interest rate of a loan, as in the more practical situation, the circuit can not be closed even when the wage earners' propensity to save is zero. The reason is simple: at the end of the period, firms not only have to repay the principle of the

loan, but also have to pay the interest rate imposed on it. In this situation, firms, by selling their products and issuing securities to households, can get at most the equal amount of the households' total income, which is only the principal of the loan. As Edward J. Nell (1967) points out: "... at the end of production process the setting of the liabilities may not be possible. For the banks do not have any more money than M (that is advanced to entrepreneurs)... Only after the entrepreneurs have paid them interest will they have M+rM; but the capitalists must have M+rM before the entrepreneurs pay." This conclusion is agreed upon by most of the circuit writers. Abstracting from the possibility of accrued interest on deposits, Graziani gave a possible solution: "In order to get the money needed to satisfy their interest payments, the only thing they can do is to sell part of their products to the banks, which is tantamount to saying that interest can only be paid in kind." (Graziani 2003: 31) Another well-accepted way out is that banks distribute their revenues from loan interests to households in the forms of salaries and dividends, which become another source of households' income besides wages. In the simplified case we consider that there is only one form of financial saving—securities issued by firms. The income of households from banks will also be spent in the consumption market and the firm securities market.

The relationship inside the three-agent framework can be seen more clearly in the simple model depicted in Table 1.

In Table 1, the monetary payments from a sector are recorded in a column, while rows record receipts. Including a row for transactions on the capital account, accounting

consistency requires that the total for each row to be equal, ex-post, to the total for the corresponding column, yielding a system of accounting identities, one of which is linearly dependent on the others.

Table 1

	Firms	Households	Banks	Total
Firms		C		Y_f
Housholds	W_f		W_b+iM	Y_h
Banks	rM			Y_b
Capital Account	ΔE	ΔV		0
Total	Y_f	Y_h	Y_b	

Here, C is the total consumption of households by the end of the period. It is equal to the total income of households (Y_h) times the households' propensity to consume (1-s). The part that households decide not to consume becomes the increase in the capital account (ΔV).

Firms' total revenue (Y_f) is equal to the sum of wages paid to households by firms (W_f), the loan interests paid to banks by firms (rM), and the newly issued equities to households by firms (ΔE).

W_b, in this simple model, represents the wage of bank employees and dividends paid out regularly to bank shareholders whom in this model is also households.

iM is the interest for the deposits paid to households by banks.

To make this model simple, we hold several assumptions:

1. The entire surplus of banks from the difference between the rates of deposit and loan, $(r\text{-}i)$ M, is distributed to households in the form of W_b. As a result, banks make no profit.

2. The total deposit is equal to the total loan, which is also the credit money in this framework, namely, M.

3. Households' propensity to increase their banking deposits is zero. That is to say, all the money left from consumption is used to buy securities issued by firms. This assumption makes sure that firms are able to pay back the whole amount of a loan by the end of the period.

From the third row and column of Table 1, the equation for the budget constraint of banks is:

$$W_b + iM = rM$$

That is to say,

$$(r\text{-}i)M = W_b, \text{ or } (r\text{-}i) = W_b / M. \qquad (1)$$

This result is the same as that in Seccareccia (2005), which is reached by analyzing the framework of flux/reflux of credit money. This is also agreeing with Graziani 's viewpoint, "If $r=i$, receipts of firms are ... equal to their debt towards banks. The situation is different if, as it is most likely to be the case, $r>i$. In this case, even if wage earners spend the whole of their incomes, firms will never be able to repay their debt. A possible way out is given by the fact that banks themselves pay wages to their own

employees who spend their incomes on consumption goods or on the financial market, thus adding to the receipts of firms without adding to their outlays." (Graziani 1987)

Seccareccia (2005: 272) adds, "when Y_b, which includes wages and salaries of bank employees and management as well as dividends paid out regularly to bank shareholders, is fully spent and is equal to $(r - i)M$. In such an "equilibrium" situation (to use Graziani's (1987) expression), firms would be able to acquire the required reflux for the reimbursements of principal and interest. On the other hand, if in the "financial disequilibrium" situation Y_b is less than $(r - i)M$, that is to say, that the spread is too high relative to the net flow of spending from the financial sector, then banks would be foreclosing on some of the least creditworthy firms in the corporate sector, with accompanying losses on the part of such firms and/or banks equal to Graziani's 'financial disequilibrium' gap."

Graziani (2003: 118) draws the following conclusion regarding this problem: "... the firms have only two ways of paying interest to the banks, namely acknowledging the debt while letting it increase without limit over time, or paying it in kind."

Let's conduct a further investigation of equation (1). We can see that as long as the spread of the two interest rates and Y_b change in the same rhythm, the equilibrium will be well kept and firms are able to extinguish all of their debts at the end of the period. However, in a more sophisticated situation, this is not true if we consider the difference of propensity to consume between the two subsets of households. Under the assumption that households' propensity of deposit saving is zero, (that is to say, they spent all their

income in consumption market to buy goods produced by firms or in financial market to buy securities issued by firms,) there are two situations. First, if the propensity of consumption is the same for every household, no matter how high the interest rate (of loans or securities) is, firm's profit will not be affected, since the interest is not only a cost to firms but also a source of revenue since the interest income of households will finally flow back to firms through the consumption market and the security market. But if we turn to the more realistic assumption that there are two subsets of households—workers and rentiers—who hold different propensities to consume, the equilibrium will no longer hold. The reason is that an increase in interest rates on loans will lead to an increase in interest rates offered by banks, which in turn will benefit rentiers since they usually have a lower propensity of consumption and have a larger percentage of securities saving in their portfolios than wage earners. If this is true, as recognized by Seccareccia (1996: 411), one should expect that when the gap between r and i widens, firms will be facing progressively more difficulties in meeting their financial commitments. As a result, the growth of the overall effective demand will slow down.

Furthermore, in equation (1), the interest rate on deposit "i" is one of the major parts of the commercial banks' cost. Banks, which are in business to make profits, are usually treated as monopolies in the market for deposit because of the asymmetry of information. Therefore, banks can, to some extent, dominate i and make it relatively stable. While r, the interest rate of a loan, which is determined in a more competitive market, is more

prone to fluctuations according to macroeconomic indexes such as the overnight rate set by the central bank. W_b, in this case the wages and dividends paid by banks to households, are usually included in the fixed costs of the banking industry. Therefore, they also can be treated as relatively stable over the business cycle. Putting them together, we can see from equation (1) that, suppose there is an increase of r due to the change of the monetary policy, the interest spread tends to increase while W_b remains stable. As a result, the financial equilibrium will transform into a disequilibrium state. Noticing this relationship, Seccareccia (2005) pointed out that: "interest spreads (or bank markups) would be moving pro-cyclically, thereby impacting positively on business debt." The result is that an increase of interest spreads will finally lead to a slowdown of economic growth.

So far, our discussion has been based on the assumption that households hold only securities issued by firms as their financial saving. What is the situation if households also put some money in banks in the form of bank deposits?

When households decide to put part of their income into their deposit accounts in banks rather than purchase equities, the money reflux from households to firms is reduced. Firms lose the same amount of liquidity and cannot pay back the total amount of their debt to banks. They will remain indebted towards banks by the exact amount of households' desired holdings of bank deposits. As Lavoie (1992: 156) makes it clear, "in this model there is thus no difference between the outstanding amount of loans and the stock of money".

In our simplified model without the government sector, the presence of money holdings in the hands of households (or in the form of bank deposit) is also the debt of firms to banks, which plays the same role as the debt of government to central banks in the traditional viewpoint. Under this explanation, as long as banks tolerate some part of firms' debt existence, there is no negative effect on the overall economy. By noticing this, Graziani's view is: "So long as money holdings are considered a normal element of a monetary economy, an equilibrium position need not imply the full payment of all debts but allows instead the presence of a debt owed by firms to the banks." Graziani (2003: 121)

In this situation, banks' attitude toward the debts of firms and households' liquidity propensity are two important factors in the equilibrium.

If households have a certain desired level of liquidity propensity, once they reach that level, they will distribute their income totally between the consumption market and the security market. Either way, the money will flow back to firms. At the end of the period, firms will have no trouble in paying back the debts that they accumulated from banks at the beginning of the period. If banks also accept the level of firms' debt to some extent, the whole system will be in an equilibrium state.

If instead, households tend to increase continuously their liquidity preference, some part of the money will escape from the flux/reflux framework. In this case, firms will face the difficulty to repay debts at the end of every period. As a result, firms' debts toward banks will continuously increase. If banks refuse to allow firms' debts to grow,

firms will now face financial problems and will be forced to reduce their production activity level. The overall growth, therefore, will slow down.

To avoid this situation, firms could try to attract households' savings by offering higher interest rate on the securities market. Subsequently, there will be a competition between firms and banks for the available financial savings because on the other side of the financial market, banks will also increase the interest rate on deposits to attract more savings. The result of this competition will be an increase of rentiers' income. As their income increases, rentier's share in the whole economy increases, and the total effective demand decreases, because of their lower propensity of consume.

Let's now turn to the effect of real interest rates to the overall economy in the framework of the monetary circuit.

When there is inflation, banks that grant loans to firms will face the risk of a decrease of the real value of money (the purchasing power of money). This happens between the time when the loans are granted and the time when the loan is repaid. To avoid this risk, the indexation towards the possible inflation will be adopted by banks. One of the mostly used indexation is call the Financial Indexation (Graziani 2003), which is that while the principal of loan will be repaid by firms at its nominal value, the interest rate on the loan is increased according to the expected inflation along Fisherian lines. Suppose r is the original interest rate of loan, θ the expected inflation rate, M_0 the principle of the loan and M_t the total amount that firms have to pay back to banks at the end of period. By adopting the Financial Indexation:

$M_t = M_0 (1+\theta)(1+r)$

In this situation, since the firms' revenue will also increase by a percent of θ because of the inflation, firms' ability to repay the debt will not be impacted.[□] Seccareccia (2005) argues that, in an inflationary environment, a "financial equilibrium" would be consistent with real rates falling concomitantly with the rise in prices. But, in a more realistic situation in which there are two subsections of households, wage earners and rentiers, who have different propensities to save, Seccareccia pointed out that the overall flow of the aggregate demand from the household sector will have risen somewhat. The reason is that because of the fall in real interest rates, rentiers' income decreases and their share in the whole economy will be lower than before.

To investigate more, consider there is a foreseeable inflation. Firms have to increase their debt toward banks in order to pay wages to workers and begin production. In this situation, even if the interest rate is constant as if there were no inflation, firms' burden of debt is already increased by the ratio of the inflation. Now, if we consider that banks increase the interest rates on loans according to the inflation, by the end of the period, firms have to pay an amount equal to the principal plus twice of the inflation. This is because producers are forced to expand their bank debt and, in addition to that, the interest rate paid on each monetary unit borrowed from the banks is increased, according

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[□] In this situation, $M_t = M_0 (1+\theta)(1+r) = M_0 (1+r+\theta+r\theta)$. Here, since $r\theta$ is presumably very small, it can be neglected, thus the formula can be written as $M_t = M_0 (1+r+\theta)$. We can say that, if the expected inflation rate is θ, the monetary rate of interest will be $r+\theta$.

to Fisher's principle, by an amount equal to the rate of inflation. (Graziani 2003)[□] Therefore, if for example, the government, by foreseeing inflation, links the nominal interest rate to a price index in order to keep the real interest rate constant, it is actually adding the real financial burden towards firms. In this situation, the revenue of firms increases by the same proportion of the inflation, while firms' cost (the debts toward banks) is increasing by twice the revenue. As a result, a firm's profit decreases and the overall economy growth will be impeded. Seccareccia (2005: 275) concludes: "...any central bank rule that seeks to adjust nominal interest rates to the inflation rate would have a positive effect on business costs relative to revenues and could have a negative impact on growth."

4. Review of the empirical analysis from Seccareccia (2005) and some other writers

In Seccareccia (2005), the writer first uses the de-trended data for six countries in the G-7 (except United Kingdom) in a period of 24 years to show that the positive deviations from the trend in three sub-periods (the early 1980s, the early 1990s and 2000-2001) broadly coincide with periods in which most Western economies slowed down significantly. Then, by focusing the analysis to Canada, Seccareccia chose the chartered banks' prime lending rate and the checkable personal savings deposit rate during a period of 52 years (1950-2000) to do some further investigation. By comparing the two interest

[□] In this situation, $M_t = M_0 (1+\theta)(1+r)(1+\theta) = M_0 (1+r+2\theta+2r\theta+\theta^2+r\theta^2)$. Again, if we neglect the last three terms, we will get $M_t = M_0 (1+r+2\theta)$. Here the monetary rate of interest will become $r+2\theta$.

rates, Seccareccia points out that it's very clear from the chart that the lending rate is sensitive to changes in the central bank's interest policy while the deposit rate tends to be stickier. This result well supported one of his assumptions--,"the interest spread would be rising when central bank interest rate policy is tightening and narrowing when monetary policy is loosening, thereby displaying strong cyclical behavior." Seccareccia (2005: 278) Then, he added another time series, the percent growth in business credit, to display that there is a strong positive correlation between the interest spreads and firms' debts towards banks. This result supports the assumption that firms would be facing a more difficult time in extinguishing their debts during the period in which the interests spread widens. Seccareccia then turned to the relationship between interest spreads and the real GDP growth rate. The result from the graph obviously supports his assumption that the interest spreads negatively affect economic growth. When conducting the regression analysis of the relationship between interest spreads and real GDP growth, Seccareccia added a variable of real long-term rates to capture the role played by rentier income. The result is less than satisfactory because of a weak statistical significance. Seccareccia gave a possible explanation: "while higher real interest rates are a burden on business profits, they are also a source of greater sales proceeds. As long as rentier's propensity to consume is positive, then the overall effect might be quite mitigated because of these partially offsetting factors." Finally, in the Granger Causality test, the result shows that the interest spread could have caused changes in real GDP growth but not the reverse.

Seccareccia's empirical analyzing result not only strongly supports his assumptions but also arouses our attention to the role of interest spreads in explaining macroeconomic performance.

While the economic implication of interest rate spreads become more and more popular in recent years, most of the writers are actually referring to different concepts of interest spreads from what is investigated in this paper.

One of the most investigated interest spreads is the spread between the rate of long-term and short-term financial products. Estrella and Hardouvelis (1991), for example, by examining data in the U.S. over the period from 1955 to 1988, found that the spread between the yield on the 10-year Treasury bond and the 3-month Treasury bill is a useful predictor of economic growth. Another kind of an interest spread is the spread between public and private sector returns. The representative literature is Stock and Watson (1989) and Friedman and Kuttner (1992), who found that the spread between the commercial paper rate and the Treasury bill rate had been a particularly good predictor of the course of the economy. Kunt & Huizinga (1999), from a different angle, investigated the spread between the net return to savings and the gross return for investment ----the bank interest margins to see how bank interest spreads are affected by taxation, the structure of the financial system, and financial regulations such as deposit insurance.

Those who did investigate the spread between loan/deposit rates, such as Brock& Suarez (2000) and Moore& Craigwell (2002), always focused on the determination of the spread itself. Moore& Craigwell (2002), by investigating the determinants of the

high bank spreads observed in the Caribbean in the 1990s, found out that market power was one of the main influences of the spreads. They also mentioned that large interest rate spreads could push up the cost of capital, which in turn limits the financial resources available to potential borrowers, thereby reducing feasible investment opportunities and finally affecting macroeconomic performance.

Another kind of approach is called the markup theory. Stephen Rousseas (1985) sketched out this theory for the pricing of bank loans and investigated the reasons for bank lending rate changes in relation to its cost basis. He pointed out that as the interest rates became a more significant part of the total cost of firms in the early 1980s, prime costs in the non-financial sector increased, leading to a markup of goods prices and to a positive rate of inflation along with massive unemployment.

Seccareccia (2005)'s result shows the existence of the relationship between interest spreads and GDP growth in Canada. But what are the situations in other industrial countries? Do the results found in the case of Canada also hold up in other countries? In the next section, I will follow the footsteps of Seccareccia (2005) by conducting an empirical analysis of the United States and other OECD countries including the United Kingdom, France, Germany, Australia, and New Zealand.

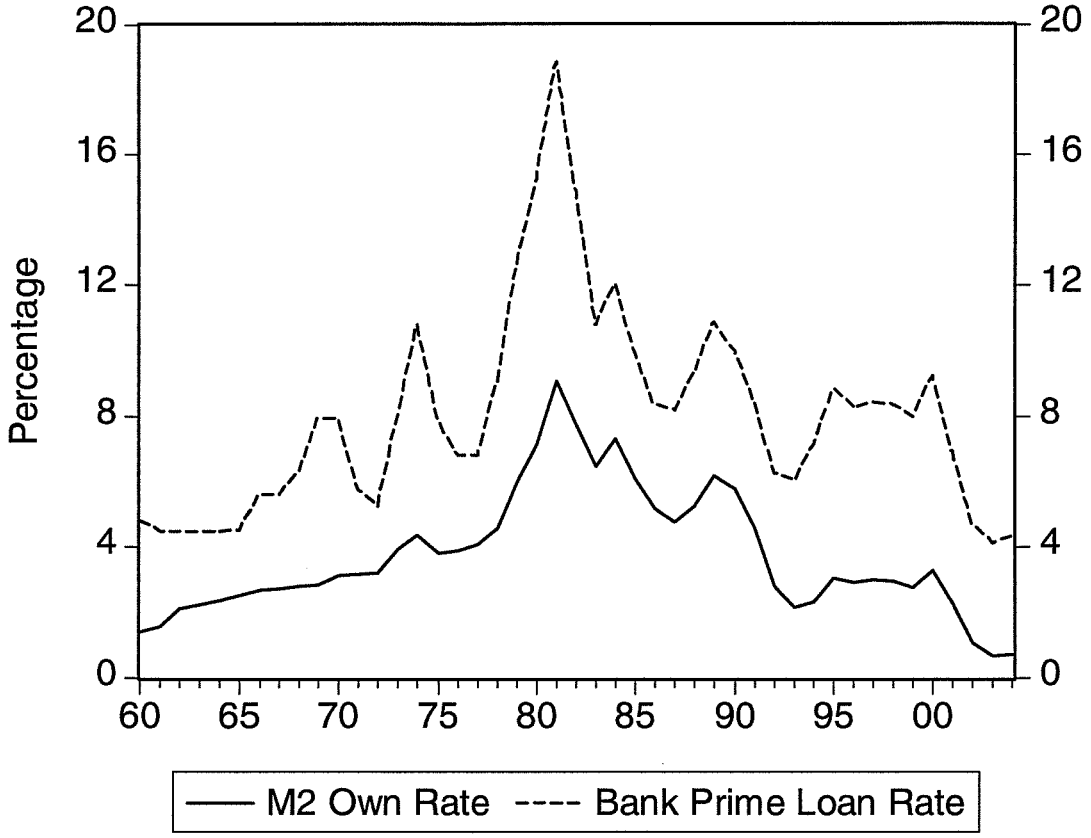
5. Empirical analyses of United States

Data and Graphs

The Federal Reserve Board of the United States has a list of time series data for

interest rates. To represent deposit rate i in Table1, I choose the M2Own rate, which is the weighted average of the rates received on the interest-bearing assets included in M2. For the loan rate, the prime rate is broadly accepted as a representative indicator; therefore, it is chosen for approximating r in Table1. The time series of these two representative rates are displayed in Chart 1. As we can see from Chart 1, the deposit rate moves in the same direction as the loan rate, especially since the late 1970s, albeit in a less fluctuant pattern. Therefore, when both interest rates rise due to a change in the monetary policy of the Federal Reserve, the interest spread also rises.

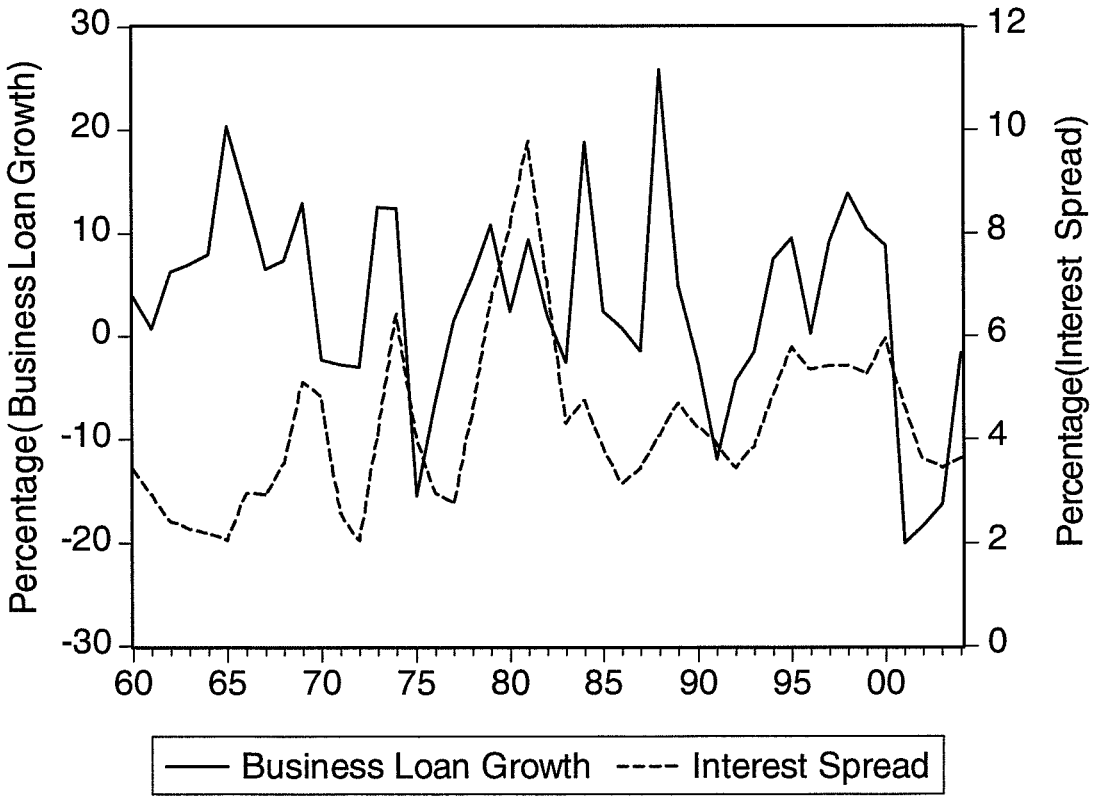
Chart 1. BANK PRIME LOAN RATE AND M2OWN RATE, USA, 1960-2004



For example, partly due to the Depository Institutions Deregulation and Monetary Control Act of 1980, which increased the amount of interest banks can pay on deposits and led to the competition among banks for high interest rate deposits, the interest rate of loans rose sharply to reach a peak value of 18.9% in 1981. As a result, the interest spread almost doubled in a two-year period from 1979 to 1981. The phenomenon here is similar to that in Seccareccia (2005: 278): "the interest spread would be rising when central bank interest rate policy is tightening and narrowing when monetary policy is loosening, thereby displaying strong cyclical behaviour."

As mentioned previously, based on the theory of the Monetary Circuit, if the interest spread (r-i) increases while the fixed costs in the banking industry (W_b) keep constant, firms can not get enough revenue to repay their debts toward banks. As a result, the total amount of business credit will rise because the spread increases. To test this assumption in the U.S. environment, I use the growth rate of commercial and industrial loans. The annually growth rate data is calculated from the "Commercial & Industrial Loans Outstanding in 1996 Dollars (BCI)" of CITIBASE. Chart 2 shows the relationship between interest spread and the growth rate of business loan base on the data above.

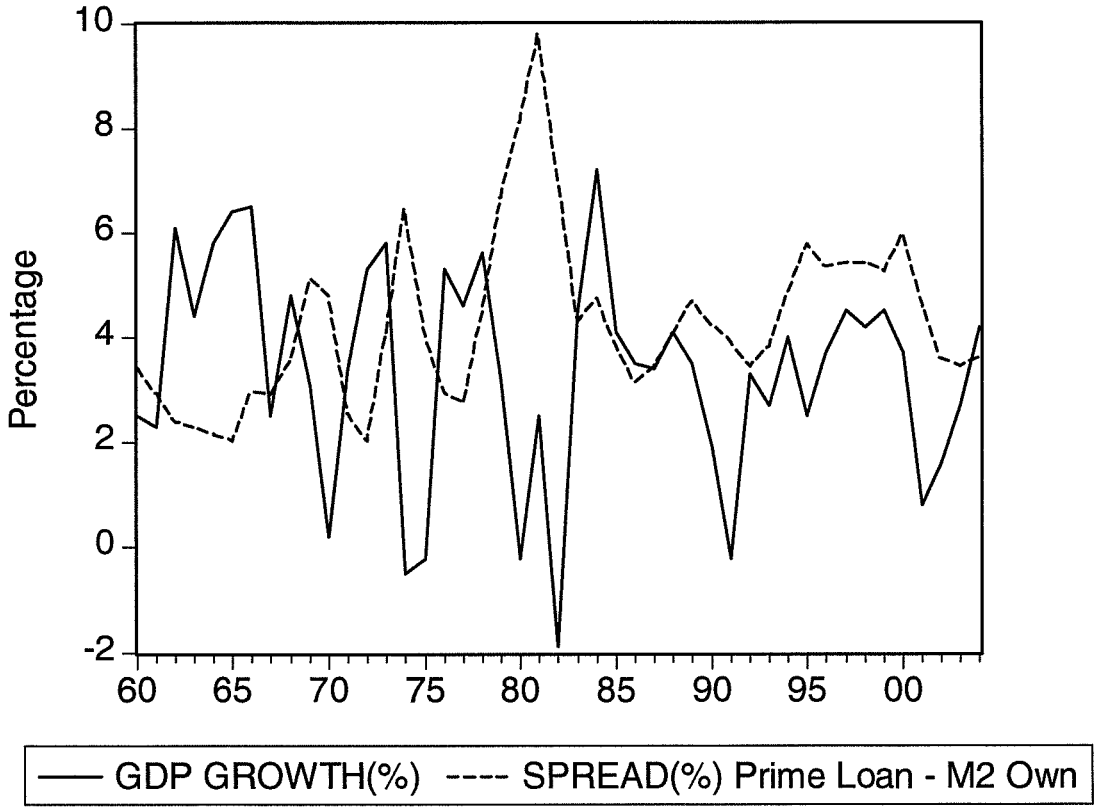
Chart 2. Interest Spread and Growth in Business Loan



The graph once again supports our assumption. There are strong relationships between these two series especially after the late 1960s.

Finally, our goal is to show whether the firms' growing debts due to an increase of interest spread harm firms' profitability and therefore have a negative effect on the overall growth. The evidence of this assumption is shown in Chart 3. Here, I select the seasonally adjusted time series of GDP percent changes based on chained 2000 dollars from the Bureau of Economic Analysis of the United States.

Chart3. Interest Spread and Real GDP Growth



From chart 3, we can see clearly the negative relationship between interest spread and GDP growth rate. The evidence is especially strong during the period of the late 1970s to early 1980s when the interest spread changed sharply. Furthermore, if we image a one-year lag of the interest spread in this chart, the evidence will be even more obvious.

This result coincides with our suggestion in the previous section that interest rates are determined by banks in the beginning of the monetary circuit, while their effects on the overall economy appear at the end of the circuit when firms begin to repay the debts toward banks. That is to say, any movement of the interest spread will lead to an opposite movement of real GDP growth in the next period.

Up to now, all the results are similar to the situation of Canada in Seccareccia (2005). How would the United States data perform in econometric testing? Are there significant relationships between interest spreads and real GDP growth in the United States like in Canada? In the next section, strict econometric regression tests are performed. In order to catch the effect of real interest rates on business loan and real GDP growth rate changes, I choose the Moody's AAA Corporate bonds rate minus the annual percentage change in CPI. The data on the bond rate is from the Federal Reserve of the United States, and the annual CPI data is from the OECD database. All the series selected are within a time span of 45 years (from 1960-2004) to fit the availability limitation of the deposit rate data.

Empirical Results:

In this part, some simple regressions are performed. The dependent variables are business loan growth and real GDP growth rate. The independent variables are the interest spreads and the real interest rate. The results are shown in Table 2 and Table 3 below. In order to account for the possible existence of autocorrelation, a AR(1) term is also added into the regression.

Table 2: Regression Results: Rate of Growth of Business Loan Correlated with Interest Spread and Real Interest Rates

Dependent Variable	Constant Term	Interest Spread	Real Rate	Adj. R^2	D.W.	AR(1)
Growth in Business Loan	-1.4655 *-0.3517*	1.0979 *1.2042*		0.0101	1.2061	
Growth in Business Loan	-6.7593 *-1.2108*	2.2951* *1.9798*		0.1632	1.9141	0.4540*** *3.2416*
Growth in Business Loan	5.1817** *2.1456*		-0.5402 *-1.0172*	0.0008	1.2337	
Growth in Business Loan	6.5182* *1.9404*		-0.9378 *-1.4116*	0.1315	1.9447	0.4055*** *2.8096*
Growth in Business Loan	0.5296 *0.1143*	1.0722 *1.1752*	-0.5225 *-0.9878*	0.0096	1.1820	
Growth in Business Loan	-2.9079 *-0.4471*	2.0747* *1.7715*	-0.8062 *-1.1858*	0.1717	1.9514	0.4626*** *3.2689*

Numbers in italic under the estimated coefficients are the t-ratios, respectively.

One, two and three asterisks indicate statistical significance at the 10%, 5% and 1% significance levels, respectively.

The result in Table 2 supports the evidence we have already seen in chart 2. All the coefficients of interest spreads have positive signs. That means the interest spread does have a positive relationship with the growth in business loan. Although the t-ratios (found in italic under the respect estimated coefficients) are not large enough for the 5 percent level of significance, all of them do exceed the ten percent significance level. Comparing to that found in Seccareccia (2005), the significance level here is weaker. This may be because firms in United States have more choices than their Canadian counterparts when facing the difficulties in repaying increasing debts toward banks due to the increase of the interest spread. For example, they may issue securities or commercial papers to make up for the shortage of the loan interest payments instead of

letting their loans grow. It could also because of the different selection of data. In Seccareccia (2005), the data used for business credit is short-term while here I'm using the data of total business loan. Usually, total business loan is stickier than short-term business loan during a fluctuation.

The performance of real interest rates here is also similar to that in Seccareccia (2005). The negative signs of the estimated coefficients show the firms' inclination to reduce their overall loans when facing real rate increases.

Table 3: Regression Results: Rate of Growth of Real Gross Domestic Product Correlated with Interest Spread and Real Long-Term Rates

Dependent Variable	Constant Term	Interest Spread	Real Long-Term Rates	Adj. R^2	D.W.	AR(1)
Real GDP Growth	5.8298*** *7.4315*	-0.5736*** *-3.3414*		0.1877	1.7771	
Real GDP Growth	5.9066*** *6.4972*	-0.5831*** *-2.9482*		0.1839	1.9751	0.1045 *0.6436*
Real GDP Growth	3.3624*** *6.6200*		0.0036 *0.0325*	-0.0232	1.5134	
Real GDP Growth	3.4287*** *5.2604*		-0.0058 *-0.0410*	0.0120	1.8916	0.2409 *1.4789*
Real GDP Growth	5.8522*** *6.6350*	-0.5738*** *-3.3027*	-0.0058 *-0.0581*	0.1684	1.7750	
Real GDP Growth	5.8922*** *5.9236*	-0.5847*** *-2.9201*	-0.0188 *-0.1695*	0.1641	1.9752	0.1082 *0.6557*
▲RealGDP Growth	**6.5092*** *9.5011***	**-0.9083*** *-5.5712***	**0.2171** *2.3001*	**0.4031**	**1.6292**	

Numbers in italic under the estimated coefficients are the t-ratios, respectively.

One, two and three asterisks indicate statistical significance at the 10%, 5% and 1% significance levels, respectively.

▲This regression is performed by using the interest spread of the previous period as one of the independent variable.

In table 3, the dependent variable is changed to the real GDP growth rate. Our assumptions based on the theory of monetary circuit are strongly supported. The signs of

interest spreads are all negative. This shows that an increase in interest rates hinders overall economic growth, as we have seen in chart 3. Furthermore, the t-ratios of the interest spreads are all significant at 1-percent level. Therefore, we can say that the negative relationship between interest spreads and real GDP growth indeed exists. The adjusted R-squares around 0.16 to 0.19 are also not bad results, considering that we have only one or two variables in this simple regression. The last two rows in table 3 show the result from the regression by using the interest spreads in the previous period as independent variables. This is in order to show the lag effect of spread on real GDP growth that we noticed in chart 3. The results here show stronger significance by the higher t-ratio. Furthermore, the R-square reaches 0.4031, which also shows the strong predictive ability of interest spreads to real GDP growth.

The result from the real interest rate side is not significant in any econometric sense; the sign of the estimated coefficients are also not consistent. This result shows the two-way effect of real rates on the real GDP growth, as Seccareccia (2005: 282) pointed out: "...while higher real interest rates are a burden on business profits, they are also a source of greater sales proceeds. As long as rentier propensity to consume is positive, then the overall effect might be quite mitigated because of these partially offsetting factors."

The result in table 3 shows the negative correlation between the interest spreads and real GDP growth. However, as we all know, correlation does not necessarily imply causation. A further causality test will give our more information about the real

relationship between these two variables. The Granger causality test will be a good tool to fulfill this goal. Before performing the test, it is worth to point out that Gujarati (1995) established that causality tests are sensitive to model selections and functional forms, and the use of simple two-variable relationships may therefore be misleading. Also, as pointed out by Seccareccia (2005), the federal funds rates, as a key interest rate, may affect a complete array of interest rates, including loan and deposit rates, and finally affect the overall growth of economy. To minimize these risks, I add a new variable, the federal fund rate, into the model. The Granger causality test therefore is performed among three variables--interest spreads, real GDP growth rate, and the federal fund rate. The Directions of Causalities is showed in table 4 below; the results from the test are attached in Appendix 1.

Table 4 Directions of Causalities (significance at the 5% level or better)

Interest Spread causes Real GDP Growth	Yes
Real GDP Growth causes Interest Spread	No
Federal fund rate causes Real GDP Growth	Yes
Real GDP Growth causes Federal fund rate	No
Federal fund rate causes interest spread	No
Interest spread cause Federal fund rate	No

As we can see from table 4, interest spreads can cause the real GDP growth while the real GDP growth cannot cause interest spreads. Not surprisingly, the same relationship exists between the federal fund rate and real GDP growth as well. However, there are not causalities between interest spreads and federal fund rates in either direction. This result

shows that at least in the Granger sense, our assumption that the change of interest spreads will cause the overall economic growth rate to move in the opposite direction is true.

The empirical results for the United States coincide with those of Canada in Seccareccia (2005) by using a similar dataset. This means that at least in North America, based on the theory of monetary circuit, the relationship between the interest spread and economic growth possibly exists.

At this point, we may be interested in how this assumption works in other industrial countries. To answer this question, I select several OECD countries to perform a similar regression test.

6. Empirical analyses of several other industrial countries

The selected countries are the United Kingdom, France, Germany, Australia, and New Zealand. Data is not readily available from the usually accessible resources; especially, it is difficult to find enough long period, annual time series for other countries as those found in the United States and Canada. To get sufficient observations for the regression, therefore, quarterly time series are used. The entire data sources are listed in the Appendix. Some important results from the tests are shown in the tables below:

United Kingdom

Table 5: Regression Results: Rate of Growth of Real Gross Domestic Product Correlated with Interest Spread and Real Long-Term Rates (United Kingdom)

Dependent Variable	Constant Term	Interest Spread	Real Long-Term Rates	Adj. R^2	D.W.	AR(4)
Real GDP Growth	0.8050***	-0.1604***		0.0522	1.9266	
	7.3947	*-2.6974*				
Real GDP Growth	0.8416***	-0.2018***		0.0526	1.9369	0.0337
	7.0821	*-2.7787*				*0.3574*
Real GDP Growth	0.9994***		-0.0656**	0.0643	1.1753	
	5.3815		*-2.3963*			
Real GDP Growth	1.0111***		-0.0715**	0.1362	1.2503	0.2433**
	4.4811		*-2.0945*			*2.0690*
Real GDP Growth	1.0162***	0.0959	-0.0821**	0.0585	1.2038	
	5.4168	*0.7596*	*-2.3461*			
Real GDP Growth	1.0299***	0.0597	-0.0833*	0.1246	1.2654	0.2189*
	4.5894	*0.4242*	*-1.9643*			*1.7235*

Numbers in italic under the estimated coefficients are the t-ratios, respectively.

One, two and three asterisks indicate statistical significance at the 10%, 5% and 1% significance levels, respectively.

In the case of the United Kingdom, an identical regression analysis to that of the U.S. is performed, which is, using the real GDP growth as the dependent variable and the interest spread and real long-term interest rates as the independent variables. The quarterly data is from the first quarter in 1977 to the third in 2005. The result from the regression is collected in Table 5. In order to account for the possible existence of seasonal autocorrelation brought by the quarterly data, a AR(4) term is also added in the regression. (Same methods are also used in the regressions for other countries that follows.) When using only the interest spread as the independent variable, the result agrees with our assumptions based on the theory of monetary circuit. The negative relationship between interest spreads and real GDP growth rates is significant at the 1%

level, which is very strong. However, when another variable (the real long-term interest rate) is added into the regression, the sign of the coefficient of interest spreads changed to positive, but not significant at any acceptable level. This is probably because of the multicollinearity between the data selected for the interest spread and the real long-term rates. When regressors are highly correlated, coefficients may have low significance levels and the "wrong" signs. (Gujarati 1992)

France

Table 6: Regression Results: Rate of Growth of Real Gross Domestic Product Correlated with Interest Spread and Real Long-Term Rates (France)

Dependent Variable	Constant Term	Interest Spread	Real Long-Term Rates	Adj. R^2	D.W.	AR(4)
Real GDP Growth	0.8589***	-0.0836***		0.1222	1.7477	
	5.3765	*-2.9182*				
Real GDP Growth	0.8816***	-0.0893***		0.1333	1.6831	-0.1687
	5.9389	*-3.1855*				*-1.0679*
Real GDP Growth	0.8164***		-0.0629	0.0214	1.5997	
	3.0531		*-1.4762*			
Real GDP Growth	0.9392***		-0.0837**	0.0212	1.5143	-0.1667
	3.5150		*-1.8969*			*-1.0853*
Real GDP Growth	0.0945	-0.2633***	0.2768***	0.2340	2.0505	
	0.3167	*-3.9643*	*2.9564*			
Real GDP Growth	0.1031	-0.2583***	0.2723**	0.2287	2.0171	-0.1322
	0.3130	*-3.7256*	*2.6366*			*-0.8277*

Numbers in italic under the estimated coefficients are the t-ratios, respectively.

One, two and three asterisks indicate statistical significance at the 10%, 5% and 1% significance levels, respectively.

In the case of France, the quarterly data is from the first quarter of 1990 to the third quarter of 2003. The results in Table 6 show that the relationship between interest spread and real GDP growth rate is negative and significant at the 1% level. Again, there seems to be the multicollinearity problem. As we can see from Table 6, when using real

long-term rates as the only independent variable, the signs are negative and R-squares are very small, while when the interest spread is added in, the signs change and the R-square increases more than 10 times. Another possible explanation for the sign changes in real long-term interest rates may be the diplex effect of real rates on the real GDP growth, which we have mentioned in the case of the United States.

Germany

Table 7: Regression Results: Rate of Growth of Real Gross Domestic Product Correlated with Interest Spread and Real Long-Term Rates

Dependent Variable	Constant Term	Interest Spread	Real Long-Term Rates	Adj. R^2	D.W.	AR(4)
Real GDP Growth	3.4013*** *3.0430*	-0.3811** *-2.3816*		0.0887	1.9518	
Real GDP Growth	1.0683 *0.8509*	-0.0616 *-0.3486*		-0.0429	2.0509	0.0302 *0.2411*
Real GDP Growth	-0.9845* *-1.7886*		0.3170*** *3.2073*	0.1621	2.0331	
Real GDP Growth	-0.6607 *-1.3699*		0.2418* *2.7264*	0.1132	2.1651	-0.0169 *-0.1351*
Real GDP Growth	1.6097 *1.3999*	-0.3680** *-2.5312*	0.3105* *3.3164*	0.2486	2.1048	
Real GDP Growth	0.5161 *0.4648*	-0.1850 *-1.1534*	0.2666* *2.9374*	0.1193	2.2018	-0.0468 *-0.3518*

Numbers in italic under the estimated coefficients are the t-ratios, respectively.

One, two and three asterisks indicate statistical significance at the 10%, 5% and 1% significance levels, respectively.

For Germany, the quarterly data is chose from 1991 (after the unification of West and East Germany) to 2005. The results are presented in Table 7. The signs for the coefficients of interest spreads are negative and significant at the 5% level, not as good results as the U.K. and France, but still good enough from the econometric viewpoint. Our assumption is once again supported here. The insignificant results are reached when

the AR(4) is added into the regression to avoid a serial correlation. However, the D.W values tell us that the AR(4) is inappropriate here, so the results in the second and the furth rows should be neglected. The real long-term interest variable has positive signs here. This shows that in Germany, when the real interest rate increases due to, for example, a tightening of monetary policy enacted by the central government, the positive effect from households' (especially from the rentiers') increasing interest income to the overall economy overcomes the negative effect of the increasing interest burden on firms. Therefore, real GDP growth will benefit from real long-term interest rate increases.

Australia

Table 8: Regression Results: Rate of Growth of Real Gross Domestic Product Correlated with Interest Spread and Real Long-Term Rates (Australia)

Dependent Variable	Constant Term	Interest Spread	Real Long-Term Rates	Adj. R^2	D.W.	AR(1)
Real GDP Growth	1.2345*** *3.2701*	-0.0733 *-1.0915*		0.0021	1.3049	
Real GDP Growth	1.4037*** *4.5997*	-0.0935* *-1.7232*		0.0648	1.5781	-0.2101** *-2.2404*
Real GDP Growth	1.4513*** *5.4666*		-0.0950** *-2.5503*	0.0840	1.7794	
Real GDP Growth	1.1528 *3.8773*		-0.0440 *-0.9921*	-0.0197	1.8173	-0.0614 *0.6440*
Real GDP Growth	3.8370*** *4.2033*	-0.3133*** *-2.7193*	-0.1761*** *-3.8056*	0.1736	2.0495	
Real GDP Growth	3.5894*** *3.3891*	-0.2881** *-2.3308*	-0.1592** *-2.6380*	0.0476	1.9879	-0.1632 *-1.1991*

Numbers in italic under the estimated coefficients are the t-ratios, respectively.

One, two and three asterisks indicate statistical significance at the 10%, 5% and 1% significance levels, respectively.

In the case of Australia, the quarterly data is from the first quarter of 1982 to the second quarter of 2005. The results are presented in Table 8. We can see that the relationship between interest spreads and real GDP growth rates is negative and significant (except in the first row). The coefficients of real long-term rates are consistently negative and significant, which shows the same pattern as in the case of the United Kingdom and also coincides with the Canadian case in Seccareccia (2005). This result shows the negative effect of real long-term rates as a burden on business profit.

New Zealand

Table 9: Regression Results: Rate of Growth of Real Gross Domestic Product Correlated with Interest Spread and Real Long-Term Rates (New Zealand)

Dependent Variable	Constant Term	Interest Spread	Real Long-Term Rates	Adj. R^2	D.W.	AR(1)
Real GDP Growth	0.6814 *0.7528*	0.0146 *0.1064*		-0.0173	1.7238	
Real GDP Growth	1.4064* *1.7391*	-0.0822 *-0.6754*		-0.0154	2.0722	-0.0920 *-0.7615*
Real GDP Growth	2.7056* *3.8058*		-0.2916*** *-2.7621*	0.1026	1.9045	
Real GDP Growth	1.5841* *1.8797*		-0.1121 *-0.8620*	-0.0104	2.0731	-0.1275 *-1.0135*
Real GDP Growth	5.3628*** *3.2899*	-0.2762* *-1.8034*	0.4204 *-3.3421***	0.1367	1.9825	
Real GDP Growth	4.4792** *2.3383*	-0.2568* *-1.6633*	-0.3011 *-1.7843*	0.0225	2.1402	-0.1431 *-1.1104*

Numbers in italic under the estimated coefficients are the t-ratios, respectively.

One, two and three asterisks indicate statistical significance at the 10%, 5% and 1% significance levels, respectively.

In the case of New Zealand, the quarterly data from the first quarter of 1991 to the third quarter of 2005 are used in the regression. The results are presented in Table 9. We

can see that the signs of the interest spreads are mostly negative (except for the first row), which agrees with our assumption, and when the variable of real long-term rates is added into the regression, the t-ratio shows that the variable of spread is significant at the 10% level. To the variable of real long-term rate, the regression results are negative and strongly significant.

Regressions using business credit growth rate as the dependent variables

To test the relationship between business credit and the interest spread, I perform the same regression analysis as in the case for the United States, which is, using the growth rate of business credit as the dependent variable and the interest spread and real long-term interest rate as the independent variables. The data are quarterly with different time spans between countries. The results are presented in the Table10 below.

Table 10: Regression Results: Rate of Growth of Business Credit Correlated with Interest Spread and Real Long-Term Rates							
Country	**Dependent Variable**	**Constant Term**	**Interest Spread**	**Real Long-Term Rates**	**Adj. R^2**	**D.W.**	**AR(4)**
United Kingdom	**Growth in Business Credit**	0.5148 *0.5174*	0.0151 *0.0225*	0.2479 *1.3361*	0.0137	0.7173	
	Growth in Business Credit	1.5684 *1.3020*	1.1777** *2.0425*	-0.1515 *-0.7242*	0.2273	1.2975	0.3915*** *3.7540*
France	**Growth in Business Credit**	2.9928* *1.6910*	-0.1978 *-0.5059*	-0.3153 *-0.6027*	0.0353	1.4024	
	Growth in Business Credit	1.7233 *0.8284*	0.2271 *0.4767*	-0.3438 *-0.6155*	0.0155	1.5606	0.2462 *1.3924*
Germany	**Growth in Business Credit**	2.9232 *0.5985*	-0.8094 *-1.3107*	0.5615 *1.4118*	0.0364	2.2904	
	Growth in Business Credit	4.6015 *0.6805*	-1.1755 *-1.2565*	0.7477 *1.5154*	0.0415	2.3138	0.2231 *1.4274*
Australia	**Growth in Business Credit**	-3.7150 *-1.0338*	0.8875* *1.9568*	-0.0414 *-0.2272*	0.0857	1.6486	
	Growth in Business Credit	-1.4780 *-0.3148*	0.6571 *1.1992*	-0.1857 *-0.6875*	0.0733	1.6700	-0.0220 *-0.1582*
New Zealand	**Growth in Business Credit**	10.1303* *1.8771*	-1.0798* *-1.9399*	-0.2863 *-0.7245*	0.0328	2.5469	
	Growth in Business Credit	9.8569 *1.5413*	-0.9917* *-1.7487*	-0.3327 *-0.6167*	0.0225	2.4535	-0.1863 *-1.2947*

Numbers in italic under the estimated coefficients are the t-ratios, respectively.

One, two and three asterisks indicate statistical significance at the 10%, 5% and 1% significance levels, respectively.

As we can see from the Table 10, the effects of interest spread changes on the growth rate of business loans are mixed. In the cases of the United Kingdom and Australia, the positive signs of the estimated coefficients of interest spreads show that business loans increase when the interest spreads become wider. The results agree with our assumption based on the theory of monetary circuit that the higher interest spread will get firms into trouble by increasing their burden to repay more interests. In the cases of Germany and New Zealand, the results are contrary--the negative sign of the coefficient of interest spread indicates that business loans in these two countries tend to decrease when facing increasing interest spreads. In the case of France, I get one positive sign and one negative sign, both of which have a weak significance. The reasons for the ambiguous results here may be because of the following reasons:

1. Different time span of data.

Although all the regressions here are using quarterly data, the difference in data availability among countries leads to different time spans (or the different available observations). In the case of the United Kingdom and Australia, in which the signs of interest spreads are positive, the time span of the available data are from 1977-2005 and 1982-2005 respectively, double of the time spans of the other three countries. Therefore, from the econometric point of view, the results from U.K and Australia in this case are more reliable than those from other countries.

2. Different statistical methods

In the regression between the real GDP growth rates and interest spreads, the GDP data is from the same source (OECD) and has few differences in the statistical methods among countries. Therefore, the results are, to some extent, consistent. While in the regression of business loans, the data is gathered from the central banks in different countries. The conceptual and statistical methods are not necessarily the same among countries and the coverage of the business loans data may differ widely. These differences may have caused the discrepancy of the regression results.

3. Different business credit structures

In the development of financial market, banks' role in providing credit has declined. Corporations have increasingly turned to securities markets to obtain credit. For most large, highly rated corporations, the primary source of short-term credit is no longer banks but commercial paper markets. (Saidenberg & Strahan 1999). As a result, when facing a financial problem caused by increasing interest spreads, firms may not necessarily increase their loans; instead, they may turn to securities markets to obtain credit. Also, business credit structures are different in different countries. Therefore, the effects of interest spreads on the growth rate of business loans tend to be ambiguous.

As for the real long-term interest rate variables, all the signs are negative (except in the case of Germany), which are the same as we have seen in the case of the United States. For Germany, the different regression result could also be due to less available observations and different statistical methods.

7. Conclusion

In this paper, based on the theory of monetary circuit, I set up a simple flux/reflux model that includes three major interactive sectors--banks, firms and households. In this model, money supply is assumed to be created only by bank credit. That is to say, money is endogenous. Analyzing this model yields several conclusions. First, I find that the interest spread between deposits and loans has a negative effect on overall economic growth. This relationship coincides with the finding in Seccareccia (2005). Second, it turns out that the effect of long-term interest rates to the overall economy is complicated. When the nominal interest rate remains constant during inflation, the equilibrium state will be unaltered. When the nominal interest rate is changing according to the inflation index, firms' financial burden will be aggravated, and as a result, the whole economy's growth will slow down.

The empirical analysis of the United States generates a very close result to that in the case of Canada, which is investigated in Seccareccia (2005). The widening interest spread leads to an increase in business loans and causes a slowdown of real GDP growth. The Granger causality test of this relationship shows that interest spread rate Granger cause the real GDP growth rate but not the reverse. Furthermore, by applying the same regression onto six other OECD countries--the United Kingdom, France, Germany, Australia and New Zealand--the results from all of them show the existence of a negative relationship between interest spreads and the real GDP growth rate. Despite the consistency of the relationship between interest spreads and real GDP growth, the effects

of spreads on the growth of business loans are different among the countries tested. For the United States, Germany and New Zealand, the interest spread affect the growth of business loans positively and significantly, while in the other four countries, the effects are negative and insignificant. The inconsistency of the results may have come from the measure of the time series data itself or the different structures of firms' liabilities in different countries.

Although the model analyzed in this paper is a simple one, the results still remind us that the interest spreads between loans and deposits play an important role in macroeconomic performance and deserve further investigations.

Appendix

Results from the Granger Causality Test (U.S.)

		H_0*			H_0**	
Number of Lags	observations	F-Values	Probability		F-Values	Probability
2	43	22.6101	3.4E-06		1.6739	0.2009
3	42	14.0793	3.5E-05		0.5424	0.6563
4	41	10.3981	1.6E-05		0.8611	0.4978

H_0* : "Interest Spread does not Granger Cause Real GDP Growth."

H_0** : "Real GDP Growth does not Granger Cause Interest Spread."

		H_0*			H_0**	
Number of Lags	observations	F-Values	Probability		F-Values	Probability
2	43	18.0636	3.1E-06		1.89685	0.16398
3	42	11.4367	2.2E-05		0.60425	0.61663
4	41	8.7432	6.9E-05		0.63608	0.64050

H_0* : "Federal fund rate does not Granger Cause Real GDP Growth."

H_0** : "Real GDP Growth does not Granger Cause Federal fund rate."

		H_0*			H_0**	
Number of Lags	observations	F-Values	Probability		F-Values	Probability
2	43	1.1120	0.3394		3.0137	0.0610
3	42	1.3721	0.2674		2.0919	0.1190
4	41	1.5976	0.1989		1.9403	0.1277

H_0* : "Federal fund rate does not Granger Cause interest spread."

H_0** : "interest spread does not Granger Cause Federal fund rate."

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Data Source

United States	Deposit rate	The Federal Reserves Board: M2 Own Rate
	Lending rate	The Federal Reserves Board: Bank Prime Loan Rate
	Business Credit	CITI BASE: Commercial & industrial Loans Outstanding In 1996 Dollars
	Long-term rate	The Federal Reserves Board: Moody's yield on seasoned corporate bonds- all industries, AAA
	GDP	OECD Economic Outlook No 77: Gross Domestic Product, Volume, 2000 Constant PPP, Annually data
	CPI	OECD Economic Outlook No 77: Annually data
United Kingdom	Deposit rate	Bank of England: Quarterly rate of return for UK resident banks'(inc. Central Bank) sterling time deposits (excl. TESSAs) from household sector (in percent) not seasonally adjusted
	Lending rate	Bank of England: Quarterly average of 4 UK Banks' base rates
	Business Credit	Bank of England: Quarterly 3 month growth rate of monetary financial institutions' sterling net lending to private non-financial corporations (in percent) seasonally adjusted
	Long-term rate	Quarterly average calculated 10 year par gross redemption yield on British Government Securities
	GDP	OECD Economic Outlook No 77: Gross Domestic Product, Volume, 2000 Constant PPP, Quarterly data
	CPI	OECD Economic Outlook No 77: Quarterly data
France	Deposit rate	Banque de France: Housing savings accounts deposit rate
	Lending rate	Banque de France: Loan interest rates (Business loans <= 1 year)
	Business Credit	Banque de France: Lending by bank to non-financial corporations
	Long-term rate	Banque de France: Yield on long-term government securities - monthly average
	GDP	OECD Economic Outlook No 77: Gross Domestic Product, Volume, 2000 Constant PPP Quarterly data
	CPI	OECD Economic Outlook No 77: Quarterly data

Germany	Deposit rate	Deutsche Bundesbank: Time series su0061: Deposit rates of banks
	Lending rate	Deutsche Bundesbank: Time series su0001: Lending rates of banks
	Business Credit	Deutsche Bundesbank: Lending to domestic enterprises / Short-term / All categories of banks
	Long-term rate	Deutsche Bundesbank: Term structure of interest rates on listed Federal securities/ residual maturity of 10.0 years
	GDP	OECD Economic Outlook No 77: Gross Domestic Product, Volume, 2000 Constant PPP, Quarterly data
	CPI	OECD Economic Outlook No 77: Quarterly data
Australia	Deposit rate	Reserve Bank of Australia: 1-month bank term deposit rate
	Lending rate	Reserve Bank of Australia: Indicator lending rates
	Business Credit	Reserve Bank of Australia: Private non-financial corporations' loans from banks
	Long-term rate	Reserve Bank of Australia: 10-year Government bonds yields
	GDP	OECD Economic Outlook No 77: Gross Domestic Product, Volume, 2000 Constant PPP, Quarterly data
	CPI	OECD Economic Outlook No 77: Quarterly data
New Zealand	Deposit rate	Reserve Bank of New Zealand: Call deposit rates
	Lending rate	Reserve Bank of New Zealand: Base lending rates
	Business Credit	Reserve Bank of New Zealand: Business credit aggregates
	Long-term rate	Reserve Bank of New Zealand: 10-year Government bonds rates
	GDP	OECD Economic Outlook No 77: Gross Domestic Product, Volume, 2000 Constant PPP, Quarterly data
	CPI	OECD Economic Outlook No 77: Quarterly data