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Credit, income, and causality: A contemporary co-integration analysis

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ABSTRACT

In this study, we investigate the macroeconomic fundamental issue of causal relationship between credit and money income, for the US postwar economy, along the lines of the “Credit-View” theorists. In the long-run, we provide significant evidence that credit causes income. Further, we support the view that there is a rather weak causality effect from income to credit, in the long-run. Indeed, we identified that there is a dynamic causality effect in the short-run, from income changes to credit ones. A contemporary co-integration analysis is applied, using the maximum likelihood method. Additionally, considering the formulated VAR, a stability analysis of the equivalent first order dynamic system has been performed. Finally, dynamic forecasts from the corresponding ECVAR (Error Correction VAR) are obtained, in order to verify the validity of the co-integration vector used. It may be useful to mention, that we have not met in the relevant literature, the type of forecasting presented here.

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1. Introduction

This study has two main purposes. One is to explicitly examine the substantive macroeconomic question: Is there significant statistical evidence that credit (as commercial bank lending) is “exogenous” in the credit–income relationship? The other is to explicitly display in the two macro variables’ case, a contemporary time-series methodology concerning the widely used co-integration analysis.

The main empirical finding regarding the hypothesis that contemporary proven causality is, in the long run, strongly directional from credit to income, agrees with the “Credit-View” that is verified by the postwar US data. Whereas, the hypothesis that there is a rather weak causality effect from income GNP to credit in the long-run, is also accepted. Identified causality effect in the short-run is evidenced from income changes to credit changes.

More substantially, we conclude that contemporaneous decreases of credit have a more significant influence on income, than the corresponding increases.

This study proceeds as follows. Section 2 reviews in short the literature on credit and income growth. Section 3 deals briefly with methodological issues concerning the contemporary co-integration analysis and the data used. Section 4 presents, in great detail, the econometric analysis and the empirical results; while, Section 5 concludes the credit–income causality issue.

2. The credit issue revisited

It has long been established that money stock and GNP measure of economic activity are positively correlated. There is “old” evidence that money tends to “lead” income in a historical sense,¹ where mainstream monetarists through the “Quantity Theory” explain the empirical observations as causal relations running from money to income. But money might equally well react, passively, to fluctuations in income (Sims, 1972). Since the seminal works of Chris A. Sims, empirical validation of money and income fluctuations have been established (Sims, 1972, 1980a).

On the basis of historical facts, Friedman and Schwartz have argued that major depressions of the US economy have been caused by autonomous movements in money stock.² Sims (1980a) concludes that money stock emerges as causally prior, following Granger’s sense,

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accounting also for a substantial fraction of income variance during the interwar and postwar business cycles' periods. On the other hand, old skepticism remains on causality direction between money and income, especially now that bank credit gets in the middle.

It is well known that traditional monetarists are consistent with the old-classic view that only “money-matters”, so that even when bank credit tightening does occur during recessions, they see these as part of the endogenous financial system, rather than exogenous events that induce recessions. As Brunner and Meltzer (1988) argues, banking crises are endogenous financial forces, which directly affect business cycles conditional on the monetary propagation mechanism. Note that monetarists seem to stress mainly, the complementarity of credit and money channels of transmission, the short-run stability of the money multiplier, and the long-run neutrality of money.

In contrast, the “new-credit” viewers stress further the importance of credit restrictions, while accepting the fundamental inefficiencies of the monetary policy. The “new-credit” view combines the “old-credit” view of the money to spend perspective, with the money to hold perspective of the money view. The “old-credit” view focused on decisions to create and spend money, on the expansion effects of bank lending, and emphasized the issue of the non-neutrality of credit money in the long-run (see also, Trautwein, 2000). Bernanke and Blinder (1988), in their seminal article, conclude that credit demand is becoming relatively more stable than money demand since 1979 and throughout the 1980's; where, money demand shocks became much more important relative to credit demand shocks in the 1980's, due to their estimation of greater variance of money vs. credit residuals analysis.

Evidently, one of the most challenging issues of the applied monetary theory is the existence and importance of the credit channel in the monetary transmission mechanism. Bernanke (1988) emphasizes that according to the proponents of the credit view, bank credit (loans) deserve special treatment due to the qualitative difference between a borrower going to the bank for a loan and a borrower raising funds by going to the financial markets and issuing stock or floating bonds. He accepts that due to the high transaction costs involved in lending activities, the source of banks' special role is the fact that banks can hold the costs of lending to a minimum. With an eye on history, Bernanke stresses the case of the Carter Administration in the early 1980's, where direct controls on consumer lending by banks, oil companies and other business, designed to slow the growth of consumer credit as part of an anti-inflation strategy, resulted in a recession, while open-market interest rates declined, all facts perfectly consistent with the “credit-view”. Stiglitz (1992) stresses the fact that the distinctive nature of the mechanisms by which credit is allocated plays a central role in the allocation process. He, quite clearly, identified several crucial reasons that banks are likely to reduce lending activity (p. 293), as the economy goes into recession, where banks' unwillingness and inability to make loans obviates the effect of monetary policy. Bernanke and Blinder (1992), and Bernanke (1993) find that the transmission of monetary policy works through bank loans, as well as through bank deposits. Tight monetary policy reduces deposits and over time banks respond to tightened money by terminating old loans and refusing to make new ones. Reduction of bank loans for credit can depress the economy.

Kashyap and Stein (1994) leave no doubt while supporting Bernanke's (1983), and Bernanke's and Jame's (1991) examination of the Great Depression in the US, that the conventional explanation for the depth and persistence of the Depression is one of the strongest pieces of evidence supporting the view that shifts in loan supply can be quite important. The supporting evidence stands strong, considering also that the intensity declines seen in recessions are partially due to a cutoff in bank lending (Kashyap et al., 1994).

Both Bernanke and Blinder (1992) and Gertler and Gilchrist (1993) using innovations in the federal funds rate as an indicator of monetary policy disturbances, find that M1 or M2 declines immediately, while bank loans are slower to fall, moving contemporaneously with output.

King and Levine (1993) stress that financial indicators, such as the importance of the banks relative to the central bank, the percentage of credit allocate to private firms and the ratio of credit issued to private firms to GDP, are strongly related with growth. Further evidence reveals that the exogenous components of financial intermediary development are positively associated with economic growth.³

More recently, Kashyap and Stein (2000) prove that the impact of monetary policy on lending behavior is stronger for banks with less liquid balance sheets, where liquidity is measured by the ratio of securities to assets. Their principal conclusions can be narrowed down to the very substantial two, namely: (a) the existence of the credit-lending channel of monetary transmission, at least for the US and their sample period, seems undeniable; and, (b) the precise quantification and accurate measurement of the aggregate loan-supply consequences of monetary policy, although very substantial, remain very difficult in econometric terms, at least due to large estimation biases.⁴

All previous works provide clear evidence that is consistent with the existence of a *credit-lending channel* of monetary transmission. The very heart of the *credit-lending view* is the proposition that the Central Banks, in general, and the Federal Reserve in US, in particular, can shift banks' loan-supply schedules, by conducting open-market operations. Hence, a contraction in Federal Reserves leads banks to reduce loan supply, thereby raising the cost of capital to bank-dependent borrowers. Additionally, the credit-lending channel also requires imperfect price adjustment and that some borrowers cannot find perfect substitutes for bank loans.

Consequently, given the aforementioned empirical research on the credit-lending channel and the established relationship between financial intermediation and economic growth in general, our main focus here is to analyze in detail the causal relationship between finance and growth by focusing on bank credit and income GNP, in the postwar US economy. Note that ever since the appearance of the seminal works of Goldsmith (1969), Mckinnon (1973), and Shaw (1973), the debate has been ongoing strong about the role of financial intermediaries and bank credit in promoting long-run growth.

3. Methodological issues and data

In the empirical analysis, for the case of the US postwar period 1957–2007, we test for the existence of causality between the total loans and leases at commercial banks, denoted by (*Real Credit*), representing the development of the banking sector, and the money income, GNP, denoted by (*Real Income*) representing national economic performance. Both variables are quarterly seasonally adjusted from 1957:3 to 2007:3, i.e. 201 observations, and are expressed in real terms, indexed by 1982–84 as base 100, in billions of US \$. Considering the natural logs, we defined two new variables (W_i, Y_i) such that $Y_i = \ln(\text{Real Income}_i)$ and $W_i = \ln(\text{Real Credit}_i)$, for $i = 1, 2, \dots, 201$. Our data are obtained on line from the Federal Reserve Bank of Saint Louis, Missouri, through their open source data base.⁵

³ For the relevant role of the monetary process and the financial sector, see, in particular, Stock and Watson (1988, 1989), Bernanke and Blinder (1992), Murdock and Stiglitz (1993), Ramey (1993), Feldstein and Stock (1994), Swanson (1998) and Angeloni et al. (2003).

⁴ See also the significant works of Mishkin (1995), Bernanke and Gertler (1995), and Meltzer (1995), for the bank lending channel.

⁵ And, we are deeply thankful for that.

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