



Liquidity risk, economic development, and the effects of monetary policy

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ABSTRACT

Empirical evidence indicates that monetary policy is not super-neutral in many countries. In particular, in high inflation economies, inflation is negatively related to economic activity. By comparison, inflation may be positively correlated with output in low inflation countries. We present a neoclassical growth model with money in which the incidence of liquidity risk is inversely related to aggregate capital formation. Interestingly, there may be multiple monetary steady-states where the effects of monetary policy vary. In poor economies, the financial system is highly distorted and higher rates of money growth are associated with less capital formation. In contrast, in advanced economies, a Tobin effect is observed. Since inflation exacerbates distortions from a coordination failure in the low-capital steady-state, individuals become much more exposed to liquidity risk. Consequently, optimal monetary policy depends on the level of development.

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1. Introduction

There is a growing awareness that monetary policy is not super-neutral in many countries. In particular, in high inflation economies, a significant amount of evidence indicates that inflation is negatively related to economic activity. For example, in their study of Argentina and Brazil, [Bae and Ratti \(2000\)](#) find that higher rates of money growth are associated with lower levels of output.¹ By comparison, inflation may be positively correlated with output in low inflation economies. Notably, [Bullard and Keating \(1995\)](#) demonstrate that inflation is positively correlated with output in some low inflation countries while in others there is no relationship. [Ahmed and Rogers \(2000\)](#) focus on the U.S. economy. In their analysis, inflation and output are positively correlated. It has also been observed that inflation is generally higher in developing countries than industrialized economies.

Why do the effects of monetary policy vary across countries? In this paper, we propose an interesting explanation based on the degree of liquidity risk at different stages of economic development. In particular, in poor countries, individuals are more susceptible to events which cause them to liquidate their holdings of assets. This behavior is well documented in a

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¹ A number of studies also investigate the relationship between inflation and the growth rate of output across countries. [Fischer \(1993\)](#) concludes that inflation is negatively related to growth—regardless of the inflation rate. See also [Barro \(1995\)](#). In contrast, [Bruno and Easterly \(1998\)](#) find that high inflation crises are associated with lower rates of growth.

number of studies of developing countries.^{2,3} Since the exposure to liquidity risk varies across countries, individuals respond differently to rates of return in low income countries than in advanced economies. As a result, the effects of monetary policy will also vary between developing and advanced countries.

We proceed by outlining the details of our modeling framework. We study an overlapping generations economy with production similar to Diamond (1965). Following Townsend (1987) and Schreft and Smith (1997), there are two different geographically separated locations. There are also two types of assets: fiat money and physical capital. Within each location, agents have complete information regarding others' asset holdings. However, across locations, there is incomplete information such that individuals do not have the ability to establish and trade claims to assets. If an individual is forced to trade outside of his location of residence, he must acquire money balances. In this manner, private information leads to a transactions role for money.

Furthermore, individuals are subject to random relocation shocks. As money is the only asset that can cross locations, relocated agents must liquidate all their asset holdings into currency. Thus, random relocation is analogous to liquidity preference shocks in Diamond and Dybvig (1983). As a result, the model illustrates the risk pooling role of financial intermediaries.

In contrast to previous work, we assume that the probability of a liquidity shock is inversely related to the aggregate capital stock. We view that this relationship serves as a proxy for the linkages between economic development and liquidity risk observed in many studies. As in a standard random relocation model such as Schreft and Smith, an individual's return from bank deposits is stochastic. Expected income depends on the probability distribution of an individual's location status and the return in each state. However, in the standard random relocation model, the probability of a liquidity shock is independent of real variables. *By comparison, in our framework, the probability distribution depends on the amount of capital accumulation.* Since money is dominated in rate of return, income will be lower if an individual is forced to liquidate assets early. Moreover, relocation is less likely if capital accumulation is higher. From this perspective, *the probability distribution of income in advanced economies first-order stochastically dominates the probability distribution in developing countries.*⁴

As the distribution of income in an economy with a high-capital stock dominates the probability distribution in an economy with a low-capital stock, there are *positive spillovers* from capital accumulation in our model. Moreover, the economy-wide stock of capital influences the returns of a bank—if the probability of a relocation shock is low, individuals are more likely to derive earnings from physical capital. As a result, each financial institution will devote more resources to capital if the economy-wide stock of capital is high. In this manner, *strategic complementarities from investment in physical capital* are an important aspect of our modeling framework.⁵

Due to the presence of strategic complementarities, multiple monetary steady-states can occur. In the economy with a low amount of capital accumulation, an individual is highly likely to need to liquidate her asset holdings. Consequently, an individual's expected utility will be low. Moreover, her expected income from investment in capital will be low. In turn, banks acquire large amounts of money balances and devote little resources to productive activity.⁶ The reduced state of economic development exacerbates the problem of liquidity risk, increasing the need for banks to hold money. In this manner, a coordination failure occurs—the level of income is inefficiently low since no individual agent realizes any gains from deviating from equilibrium behavior.⁷ In addition, as in Schreft and Smith, the low amount of capital formation leads

² For example, Rosenzweig and Wolpin (1993) point out that households in poor countries are more likely to liquidate holdings of physical capital in response to adverse productivity shocks. In addition, Jacoby and Skoufias (1997) contend that poor, agrarian households withdraw children from school in the face of low realizations of income—thus, in developing countries, families are far more likely to liquidate investments in human capital. Moreover, the provision of social insurance (or lack of it) also plays a significant role. In particular, Chetty and Looney (2005) calculate that expenditures on social insurance programs in developed countries are nearly three times the amount of developing economies. As a result, individuals in developing countries are more likely to sell holdings if adverse shocks occur. Gertler and Gruber (2002) stress that health shocks would lead to less disruption of consumption smoothing if countries had more generous social insurance programs. The same arguments apply to labor market outcomes—publicly provided unemployment assistance would mitigate the economic costs of bad shocks.

³ McPeak (2006) emphasizes that it is easier for wealthy households in poor countries to enter into risk-sharing arrangements. As a result, wealthy households do not need to liquidate investments as often as poor households.

⁴ This definition follows Hadar and Russell (1969). Foster and Shorrocks (1988) propose that income distributions between countries can be compared using various degrees of stochastic dominance. Bishop et al. (1991) construct data on the income distributions of 26 different countries. Based on their evidence, international comparisons of income distributions can often be ranked according to first-order stochastic dominance. Moreover, their results indicate that the stochastic dominance of one income distribution over another generally depends on each country's level of economic development. That is, the income distributions of developed economies tend to first-degree dominate the income distributions of developing countries. This is consistent with the primary assumption of our modeling framework—the probability distribution of income in an economy with a high amount of capital accumulation dominates an economy with a low stock of capital.

⁵ As discussed in Drazen (1987) and Cooper and John (1988), strategic complementarities may be observed in situations where an individual's payoff depends on economy-wide aggregates.

⁶ Kochar (2004) concludes that the portfolio choice of assets in developing countries depends on the likelihood that a household will suffer from an adverse shock. In his work, households anticipating a higher likelihood of poor health outcomes will devote less income to illiquid assets. Since life expectancies in developed countries are longer than in poor countries, it is reasonable to infer that individuals in developing countries are more likely to experience adverse health shocks than in advanced economies. Therefore, portfolios of assets in developing countries will be relatively more liquid than in advanced economies.

⁷ Diamond (1982) develops a model with trading externalities where a coordination failure can arise as an equilibrium outcome. In addition, Laing et al. (1997) construct a search-theoretic model of the labor market with endogenous human capital accumulation. In their work, multiple balanced growth

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