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# Poverty traps, the money growth rule, and the stage of financial development ☆

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ABSTRACT

This paper investigates how monetary policy influences the emergence of local indeterminacy, local bifurcations, and multiple steady states, depending upon the degree of the commitment parameter that defines financial market imperfection, using Diamond's overlapping generations model with credit market frictions. The analytical results will show that poverty traps happen as an inevitable outcome under a wider range of money growth rates, because financial markets are less developed. Put differently, we derive analytically the positive link between financial development and per capita income.



## 1. Introduction

It is well known that there are sharply differing opinions regarding the importance of the development of financial markets to economic performance. For example, Schumpeter (1912) argued that financial markets are essential for economic development. Similarly, Hicks (1969) declared that it was a critical and inextricable part of industrialization in England. In contrast, Robinson (1952) contended that financial development responds passively to economic growth. Lucas (1988) also asserted that the role of financial factors in economic development should not be overstressed. However, a growing body of empirical work demonstrates a strong positive link between the functioning of financial markets and long-run economic growth. Empirical evidence makes it difficult to conclude that the financial system is inconsequential to the process of economic growth (see King and Levine, 1993; Levine, 1993).

This paper explores how monetary policy affects the emergence of indeterminacy, local bifurcations, poverty traps and multiple steady states, depending on the degree of the commitment parameter that defines credit market frictions. If business entrepreneurs can borrow up to the present value of project revenue at the commencement of a project, there

☆ Please refer to my online working paper for the exact theoretical arguments. Please access the working paper from "http://www.ritsumei.ac.jp/~y-gokan/index.html".

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exists no credit market friction and the credit market is competitive. However, the present paper explicitly takes up credit market frictions in the sense that an entrepreneur is allowed to borrow only up to a fraction of the present value of project revenue. The lower the financial market imperfection, the larger is the proportion of the present value of project revenue up to which agents can borrow. The magnitude of credit market frictions corresponds negatively to the degree to which financial markets develop in the economy. We will show that poverty traps occur as an inevitable consequence, under a wider range of money growth rates, because financial markets are less developed. Poverty and slow development are more likely in an economy with a less developed financial system. We can say that poverty traps occur as an inevitable outcome, when either of the following two situations emerges.

(1) A low-capital-stock steady state exists, but middle- and high-capital-stock steady states do not exist.
(2) Low- and middle-capital-stock steady states exist, but there is no equilibrium path converging to a middle-capital-stock steady state.

To derive the positive analytical link between the functioning of financial markets and economic development, we introduce money as a substitutable asset in Diamond's overlapping generations model with credit market frictions, as studied in Matsuyama (2004). This type of growth model has been extensively utilized in existing literature. For example, Matsuyama (2004) considered a nonmonetary version of Diamond's growth model with credit market imperfections and analyzed the effects of financial market globalization on the inequality of nations. However, he did not explore the existence of endogenous fluctuations driven by agents' self-fulfilling expectations and endogenous cycles through a Neimark–Sacker bifurcation, as discussed here. Using a monetary version of Diamond's overlapping generations model, Boyd and Smith (1998) and Huybens and Smith (1998, 1999) illustrated the possibility that poverty traps are created as the inevitable outcome of a moderately high rate of inflation.

However, the present paper differs significantly from Boyd and Smith (1998) and Huybens and Smith (1998, 1999) in several respects. First, the structure of their model is analytically complex because the credit market imperfection is endogenously derived through the solution of a costly state verification problem. Due to this analytical complexity, they must rely on numerical simulations to examine the local stability of steady states and cannot emphasize the importance of financial development in investigating how likely it is that the economy is trapped at a low level of real activity. In contrast, because the structure of credit market imperfections in this paper is much simpler, we can characterize more fully the equilibrium dynamics that demonstrate the occurrence of poverty traps as an inevitable outcome of the low stages of financial development.

There is a significant literature deriving the positive link between the functioning of financial markets and economic development (see Greenwood and Jovanovic, 1990; Bencivenga and Smith, 1991; Atje and Jovanovic, 1993; Greenwood and Smith, 1997), in which financial intermediation enhances growth by allowing a larger proportion of investment to be directed to activities with high returns. In the above papers, however, the importance of financial markets for macroeconomic instability is not emphasized. In contrast, the present paper examines the relations between the development stage of financial markets and the occurrence of macroeconomic instability as in poverty traps, local indeterminacy, Neimark–Sacker bifurcations, and multiple steady states.[1]

The rest of the paper proceeds as follows. Section 2 describes the structure of the model, while the existence and local stability of steady states with and without credit market frictions are analyzed in Section 3. In Section 4, we explore how the money growth rate influences the existence of steady states and the occurrence of local indeterminacy and endogenous cycles. Using the results from Section 4, Section 5 explores how financial development interacts with the appearance of poverty traps as an inevitable pattern. Section 6 considers the global dynamics to enhance the representation of local dynamics analyzed in the previous sections. Section 7 concludes the paper.

## 2. The model

### 2.1. Environment

We consider an economy populated by an infinite sequence of two-period-lived overlapping generations. It can be regarded that the representative young and old agents coexist at every period, since each generation is identical and is normalized to one. Time is indexed by $t=0,1,\ldots$. At each date, a single final good is produced, using $K$ units of capital and $N$ units of labor. For analytical tractability, we focus on the case of unit-elastic capital–labor substitution given by $F(K,N)\equiv Nf(k)$, where $k\equiv K/N$, $f(k)=Ak^s$ and $s\in(0,1)$. Capital and labor are traded in competitive markets at each date. Letting $w_t$ and $\rho_t$ denote the factor rewards for labor and capital, respectively, we can obtain the standard factor pricing relationships:

$$w_t=f(k_t)-k_tf'(k_t)\equiv w(k_t) \text{ and } \rho_t=f'(k_t). \tag{1.1}$$

[1] In Gokan (2006, 2008), the importance of government fiscal policy was emphasized in analyzing whether local indeterminacy and endogenous cycles through Neimark–Sacker and/or flip-bifurcations can emerge.