



# Payment uncertainty, the division of labor, and productivity declines in great depressions

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## Abstract

This paper proposes a simple model that formalizes a variant of Ohanian's conjecture explaining the productivity declines observed in the Great Depression [Ohanian, L.E., 2001. Why did productivity fall so much during the Great Depression? *American Economic Review* 91 (2), 34–38]. If a large payment shock like an asset-price collapse renders many firms insolvent, other economic agents become exposed to a higher risk of not being paid (*payment uncertainty*). The payment uncertainty causes endogenous disruptions of the division of labor among firms, thereby lowering macroeconomic productivity.

The prediction of the model is that productivity correlates negatively with bankruptcies and positively with the cost share of intermediate inputs, which is consistent with the data from depression episodes. The model implies that the so-called failure of macroeconomic policy in the United States during the early 1930s, when a rash of bankruptcies occurred, could actually have been welfare enhancing, since the quick exit of insolvent agents can resolve payment uncertainty quickly.

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## 1. Introduction

The recently growing literature on great depressions,<sup>1</sup> in which the general equilibrium growth model is normally used as the paradigm of the analyses, shows that productivity declines were the primary contributor to the depressions in many cases.

It is shown that the declines in total factor productivity (TFP) explain almost all declines in output and investment during the 1929–1933 period in the United States (Cole and Ohanian, 1999; Chari et al., 2002). Hayashi and Prescott (2002) show that the protracted recession in Japan during the 1990s is consistent with a standard growth model, given the persistent slowdown of TFP growth. Bergoeing et al. (2002) find that the difference between the spectacular recovery of Chile and the long stagnation of Mexico subsequent to the external debt crises that hit both countries in the early 1980s is explained by the difference of recoveries of the productivity in both countries: The detrended TFP began to grow again quickly in Chile, while it continued to decline for a long period in Mexico. In Germany, Fisher and Hornstein (2002) find falling productivity was one of the most important contributors to the severe decline in the 1928–1932 period. Thus the literature has shown that general equilibrium growth theory can account for several depression episodes very well, taking productivity changes as given. The next question is what were the sources of the productivity declines in those depressions.

This paper presents a simple theoretical model that possibly explains the productivity changes in those depression episodes. The model may be regarded as a formalized variant of a conjecture made by Ohanian (2001). Some empirical evidence is provided using data from the Great Depression in the United States and the 1990s in Japan.

The model focuses on the payment process in the economy, in which a firm buys an intermediate input, transforms it into the next-stage intermediate good, and sells it to another firm. The intermediate goods are passed down from firm to firm in the market and are finally transformed into consumer goods. At a certain time, an economy operating under this production technology is hit by an exogenous macroeconomic shock that disturbs the payment process and renders many firms insolvent. The shock can be interpreted as the emergence and subsequent collapse of asset-price bubbles or an abrupt change in exchange rates.

On the one hand, I postulate an assumption that seems fairly orthodox in economics (Smith, 1776; Becker and Murphy, 1992) but does not generally receive much attention in recent business cycle literature. This is that productivity is enhanced by the division of labor. In other words, even when the total amount of inputs does not change, output increases if the number of specialized firms that are involved in production increases.<sup>2</sup> On the other, I assume that the increase of insolvent firms continuing to operate on the verge of bankruptcy makes a persistent “payment

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<sup>1</sup> The January 2002 issue of *The Review of Economic Dynamics*, edited by Timothy J. Kehoe and Edward C. Prescott, examines nine depression episodes from the perspective of growth theory. Kehoe and Prescott (2002) defines a great depression as a time period during which detrended output per working-age population falls at least 20% and the fall at least 15% must occur within the first decade of the depression. According to this definition, the current Japanese depression is not a great depression, but they argue that it will become a great one soon if the Japanese economy continues to stagnate.

<sup>2</sup> The assumption of the benefit of division of labor is applicable to the two modern economies, i.e., the United States and Japan, since in these economies products and services are produced from a huge number of parts by complex chains of productions, which involve many firms. For example, an automobile consists of approximately 20,000 parts, each of which is obviously more complex than a single pin. Smith (1776) emphasizes a startling enhancement of productivity in the production of pins by the division of labor. Therefore, in the production of automobiles the division of labor among workers in a single firm and also among firms tied up in a chain of productions naturally enhances the productivity.

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