



Organizational dynamics and aggregate fluctuations: The role of financial relationships



Keisuke Otsu^{a,*}, Masashi Saito^b

^a School of Economics, University of Kent, Canterbury, Kent CT2 7NP, United Kingdom

^b Bank of Japan, Monetary Affairs Department, 2-1-1 Nihonbashi-Hongokucho, Chuo-ku, Tokyo 103-0021, Japan

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ABSTRACT

This paper constructs an estimated dynamic stochastic general equilibrium model to study the role of labor reallocation between production and organizational tasks within a firm in movements in measured TFP in Japan. Allocating more labor to organizational tasks strengthens the financial relationship with financial intermediaries and helps firms to mitigate a widening in credit spread during financial difficulties. However, doing so reduces the labor allocated to production tasks and hence the measured TFP. Our quantitative analysis indicates that labor reallocation contributes to the observed procyclicality in measured TFP. We also find that this mechanism amplifies and propagates the effects of exogenous shocks on aggregate activity.

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1. Introduction

Securing finance during hard times is an important task for firms. This activity is costly for firms in the sense that the resources allocated to such activity cannot be utilized for producing goods and services. When a larger fraction of available labor is used for securing finance instead of production, the measured total factor productivity (TFP) falls. Despite such negative impact on TFP, firms may still have incentive to pursue such labor reallocation, because such reallocation is expected to enable them to alleviate the worsening in borrowing conditions, for instance by allowing them to mitigate a widening in the credit spread.

This paper explores the relationship between labor reallocations within a firm and aggregate TFP in Japan using an estimated dynamic stochastic general equilibrium (DSGE) model. In the model, part of the fluctuation in TFP arises endogenously due to the reallocation of labor between production and organizational tasks, where the latter is related to firms' labor inputs dedicated to securing finance as described above. Organizational tasks include hours allocated to the preparation for application of new loans or renewals, presenting business plans to potential lenders, negotiating the lending conditions, and periodically updating on business results to lenders. We assume that the time spent on the organizational tasks positively affects the stock of organizational capital, which can be interpreted as the strength of the financial relationship between firms and financial intermediaries. The more organizational capital a firm has relative to its amount of borrowing, the better the terms of financing in the form of a smaller credit spread. The model also allows for the organizational capital to be reduced by exogenous financial shocks; this is intended to capture a situation where an existing borrower and lender relationship breaks down due to balance sheet shocks to the financial intermediary.

* Corresponding author. Tel.: +44 1227 827305.

E-mail addresses: K.Otsu@kent.ac.uk (K. Otsu), masashi.saitou@boj.or.jp (M. Saito).

We believe that the financial relationship between firms and financial intermediaries is an important determinant of the firms' borrowing condition especially in Japan where loans from financial institutions are the main source of firm finance.¹ The view that the long-term relationship between firms and financial institutions (so-called relationship banking) is an important determinant of external financing conditions in Japan is supported by several studies. [Berger and Udell \(1995\)](#) show empirically that borrowers with a stronger bank–borrower relationship are required to pay lower interest rates. In their paper, the strength of the relationship is measured by the duration of a relationship. [Japan Small and Medium Enterprise Agency \(2002\)](#) reports a negative correlation between firms' borrowing history with its main bank and the interest rate, similar to [Berger and Udell \(1995\)](#).² The model in this paper is based on a similar idea, although we model the bank–firm relationship as a depreciable organizational capital which requires labor input for maintenance, instead of the number of years a firm borrowed from a bank.

As we explain in the next section, the perceived difficulty of firms' external financing in Japan is countercyclical during economic downturns—firms express uneasiness in external financing in recessions—while the observed credit spread in financial markets is not necessarily related to business cycles—the credit spread faced by firms does not necessarily rise during recessions. This is an interesting feature of the Japanese economy given the recent literature focusing on the countercyclicality of the credit spread in the US such as [Gilchrist and Zakrajsek \(2009\)](#) and [Gomes and Schmid \(2010\)](#).³ Our model provides one explanation to this fact. In times of financial difficulty, firms reallocate labor from production tasks to organizational tasks (rebuilding financial relationship with financial intermediaries) and this reallocation helps to offset an upward pressure on the credit spread.

Unfortunately, data on the labor allocated to organizational tasks do not exist so we cannot directly assess the labor reallocation channel. We thus structurally estimate the DSGE model with Japanese data and use the model to infer the role of the labor reallocation between production and organizational tasks in movements in the measured TFP in Japan. We find that the labor reallocation channel plays a quantitatively important role in the evolution of Japanese TFP, and it is more important than the role played by exogenous productivity shocks in the procyclicality of TFP. Our results also indicate that the endogenous movements in TFP induced by the labor reallocation channel operate as an additional amplification and propagation mechanism through which exogenous shocks affect aggregate activity.⁴

Understanding why total factor productivity (TFP) fluctuates over time is an important topic in macroeconomics. This is especially so in Japan: as [Hayashi and Prescott \(2002\)](#) argue, the major factor behind the long-lasting slowdown in Japanese economy is due to a deceleration in the measured TFP growth. This paper intends to offer an insight on the mechanism behind the evolution of TFP. The idea in our paper is closely related to [Ohanian \(2001\)](#), which argues that about two-thirds of the TFP decline in the U.S. during the Great Depression is related to a decrease in organizational capital, and suggests that it is due to the breakdowns in the relationships between firms and their suppliers. In response to the relationship breakdown, firms shift time away from regular production to establish new relationships, and this leads to endogenous decline in the measured TFP.⁵ The specifics of our model are different in that we emphasize the importance of the relationships between firms and their lenders, however. [van Rens \(2004\)](#) and [Koenders and Rogerson \(2005\)](#) are also related to this paper in that these papers use a model with reallocations of labor within a firm between regular production and building organizational capital. They attempt to explain the jobless recovery of the U.S. in the early 2000s. Their explanation is that firms simply shifted labor from organizational tasks to production during this period without increasing hiring, and the overall employment was left unchanged.⁶

While we focus on labor reallocations within a firm, several papers claim that reallocations of production resources across plants and firms influence aggregate TFP. For example, [Restuccia and Rogerson \(2008\)](#) present a model in which aggregate TFP is low when production resources are not allocated efficiently across establishments. [Hsieh and Klenow \(2009\)](#) argue that the efficiency of resource allocation across plants contributes to the TFP differences between the U.S. and developing countries such as China and India. [Eisfeldt and Rampini \(2006, 2008\)](#) argue that during recessions capital reallocations across firms become costly, and aggregate TFP falls due to the resulting misallocation of capital. As for the Japanese economy, [Caballero et al. \(2008\)](#) claim that Japanese banks continued to allocate funds to inefficient Zombie firms in order to avoid the recognition of losses, increasing inefficiency in resource allocations in Japan after the burst of bubbles.⁷ However, [Fukao and Kwon \(2006\)](#) provide an empirical evidence that supports our focus on resource allocation within

¹ In specific, in 2009 the total amount of outstanding loans on firms was 4.8 times the amount of firm equity and 8.7 times the amount of outstanding corporate bonds.

² [Petersen and Rajan \(1994\)](#) also provide empirical evidence that bank–borrower relationship benefits borrowers. The paper finds that the benefit arises in terms of the amount of borrowing, and not in terms of the interest rate they pay, however.

³ Note that these studies on the US credit spread use the corporate bond rate while we use the private bank lending rate.

⁴ Specifically, the exogenous shocks in the model are productivity shocks, investment-specific technology shocks, shocks to financial relationships between firms and financial intermediaries (shocks to organizational capital), and shocks to household preference weights on consumption and leisure.

⁵ [Bernanke and Parkinson \(1991\)](#) take up other explanations for procyclicality in labor productivity in the U.S., such as labor hoarding and increasing returns.

⁶ [Hall \(2000\)](#) also proposes a model of organizational capital based on the idea that when adverse shocks cause job destructions, the economy substitutes between regular production and the formation of new organizational capital. Earlier papers on organizational capital include [Prescott and Visscher \(1980\)](#) and [Atkeson and Kehoe \(2005\)](#).

⁷ [Hosono \(2009\)](#) argues that a rise in the financial intermediation cost due to the increase in non-performing loans reduces aggregate TFP by depressing firm turnover.

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