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Journal of Macroeconomics 30 (2008) 817–843
Journal of MACROECONOMICS
www.elsevier.com/locate/jmacro

Labour markets and firm-specific capital in New Keynesian general equilibrium models

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Received 9 March 2006; accepted 18 February 2007
Available online 3 April 2007

Abstract

This paper examines the consequences of introducing firm-specific capital into a selection of commonly used sticky price business cycle models. We find that modelling firm-specific capital markets greatly reduces the response of inflation to changes in average real marginal cost. Calibrated to US data, we find that models with firm-specific capital generate a less volatile, as well as more persistent series for inflation than those which assume an economy wide market for capital. Overall, it is not clear if assuming firm-specific capital helps our models match the US business cycle data.
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JEL classification: E31; E32; E37; E58

Keywords: Intertemporal macro; Monetary policy; Real and nominal labour market distortions; Firm-specific capital

0. Introduction

In this paper we enquire how introducing firm-specific capital into general equilibrium models with price and wage rigidities affects the behaviour of such models, and how far it helps such frameworks match the business cycle stylised facts. The open economy dimension complicates issues along several dimensions and so the business cycle facts we track are those of the US, which is more like a closed economy than, say, the UK. This study is

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0164-0704/$ - see front matter © 2007 Elsevier Inc. All rights reserved.
doi:10.1016/j.jmacro.2007.02.002

motivated by the work of Woodford (2003, 2004) who argues that the common assumption of economy-wide factor markets is unappealing. Amongst other things, he argues that it may understate the degree of strategic complementarity across goods, making inflation appear more volatile and less persistent than it otherwise would be.

This is potentially an important point. The findings of Chari, Kehoe and McGrattan (2000) have been influential and contributed to a widespread view that New Keynesian models – based solely on realistic levels of nominal stickiness – have difficulty explaining inflation and output persistence, following monetary shocks. Related to this, the assumption of economy-wide factor markets may make monetary shocks appear to be less important than they really are, particularly with respect to their impact on aggregate output, as Sveen and Weinke (2004, 2005) argue. Finally, recent evidence from Bils and Klenow (2004) suggests that the degree of price rigidity (in the US) may be less than researchers have hitherto assumed. In the absence of some mechanism slowing the adjustment of the economy, standard New Keynesian models may be apt to imply that prices are more volatile, and output less volatile, than we see in the data; firm-specific capital may provide just such a mechanism.

We analyse the effects of introducing firm-specific capital in the context of two sticky price general equilibrium models. As a baseline model, we consider a canonical set-up in which labour markets are competitive and the goods markets are monopolistically competitive. Prices are sticky due to nominal rigidities. Next, we consider a model in which both goods and labour markets are imperfectly competitive and where both prices and wages are sticky.

We proceed to analyse the second moments generated by these two models under the assumption that the models are perturbed by estimated total factor productivity and interest rate shocks. We incorporate into our models an estimated interest rate feedback rule. The conclusions we draw from our assessment of the role firm-specific capital in helping our sticky price general equilibrium models match the data are mixed. In particular, even when the rate of price adjustment is higher than many economists have hitherto thought realistic, when there is more than one source of nominal rigidity in the model, we find that incorporating completely firm-specific capital may not be a decisive addition.

The remainder of this paper is structured as follows. Section 1 sets out the behavioural relations of our baseline model with economy-wide factor markets. Section 2 describes some of the variations in our baseline model. Specifically, we introduce firm-specific capital and sticky wages. Section 3 sets out the calibration of our driving processes and of the structural parameters of the model. Section 4 compares impulse response functions generated by the economy-wide capital market and firm-specific capital specifications of our models, and Section 5 compares a selection of second moments generated by our models to the unconditional second moments from the data. Before reaching some tentative conclusions from our work in Section 7, we offer some sensitivity analysis in Section 6.

1. The baseline New Keynesian model

We set out here, in the main body of the text, the core behavioural relations of our models, and then we develop the key extensions that we incorporate vis-à-vis the labour and capital markets. In an appendix we set out the log-linearised equations of our baseline model, and discuss in somewhat more detail the construction of our alternative models.

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