



Learning and shifts in long-run productivity growth[☆]

Rochelle M. Edge^a, Thomas Laubach^a, John C. Williams^{b,*}

^a*Federal Reserve Board, 20th and C Streets NW, Washington, DC 20551, USA*

^b*Federal Reserve Bank of San Francisco, 101 Market Street, San Francisco, CA 94105, USA*

Received 19 August 2006; received in revised form 10 January 2007; accepted 11 January 2007

Available online 21 February 2007

Abstract

An extensive literature has analyzed the macroeconomic effects of shocks to the *level* of aggregate productivity; however, there has been little corresponding research on sustained shifts in the *growth rate* of productivity. In this paper, we examine the effects of shocks to productivity growth in a dynamic general equilibrium model where agents do not directly observe whether shocks are transitory or persistent. We show that an estimated Kalman filter model using real-time data describes economists' long-run productivity growth forecasts in the United States extremely well and that filtering has profound implications for the macroeconomic effects of shifts in productivity growth.

Published by Elsevier B.V.

JEL classification: E13; E32; D83; O40

Keywords: DGE models; Kalman filter; Real-time data; Productivity shocks

[☆]We thank Dick Anderson, Susanto Basu, Dean Croushore, Michael Dotsey, John Fernald, Andreas Hornstein, Spencer Krane, Eric Leeper, Ed Nelson, Dave Reifschneider, Glenn Rudebusch, Tom Sargent, Argia Sbordone, Stephanie Schmitt-Grohe, Michael Woodford, Raf Wouters, anonymous referees, and participants at numerous seminars for comments on earlier drafts; Kirk Moore for excellent research assistance; and Judith Goff for editorial assistance. The views expressed herein are the authors and do not necessarily reflect those of the Board of Governors of the Federal Reserve System or its staff, or the management of the Federal Reserve Bank of San Francisco.

*Corresponding author. Tel.: +1 415 974 2240; fax: +1 415 974 2168.

E-mail address: john.c.williams@sf.frb.org (J.C. Williams).

1. Introduction

An extensive literature has studied the macroeconomic effects of shocks to the *level* of productivity in dynamic general equilibrium models; see, for example, Galí and Rabanal (2004) and references therein. However, there has been far less research on the effects of a sustained shift in the *growth rate* of productivity. This lack of attention is somewhat surprising given the notable shifts in productivity growth that have occurred in the United States, Japan, and other industrialized economies in recent decades, and the widespread view that these developments had profound effects on economic performance.¹

Simple filtering exercises of the annual growth rate of U.S. nonfarm business output per hour (such as that shown in Fig. 1), as well as formal statistical tests, support the occurrence of low frequency variation in the rate of labor productivity growth in the United States. Roberts (2001), Fernald (2005), and Benati (2006) are all able to reject the null hypothesis of constant trend labor productivity growth in post-war U.S. data and find evidence of economically significant low frequency variation in productivity growth. In addition, Kahn and Rich (2003) estimate a two-state Markov switching model for trend productivity growth and find evidence of shifts in the early 1970s and the late 1990s.

Theoretical research has highlighted what may seem a paradoxical result: a sustained *decrease* in the rate of productivity growth yields *positive* responses of the saving rate, hours, investment, and output. Viard (1993) and Carroll and Weil (1994) showed that a decline in the productivity growth rate should elicit an immediate rise in the saving rate. Campbell (1994) showed that in a real business cycle model a persistent decline in the productivity growth rate yielded the “perverse” response of a rise in employment and output. These predictions occur as a result of a negative permanent income effect implied by lower growth, which induces a decline in the consumption of goods and leisure. More recently, Pakko (2002) showed that qualitatively the same results hold true if the productivity growth shock is limited to the capital goods sector. These studies all point to *negative comovement* between long-run productivity growth and standard cyclical measures of economic activity, namely, hours, investment, and output, during the transition period.

The empirical evidence appears to be inconsistent with some aspects of these predictions. As predicted by theory, the U.S. investment rate—as measured by total fixed investment divided by GDP—was indeed higher during the low productivity growth period of the mid 1970s through the mid 1990s than the preceding high productivity growth period. But, contrary to the predictions of theory, the investment rate rose even higher during the high productivity period starting in the latter part of the 1990s. Measures of employment also appear to be at odds with the predictions of theory. The unemployment rate has been on average low during periods of rapid productivity growth and high during periods of low productivity growth, a pattern seemingly the opposite of what one would expect based on standard macroeconomic theory.

A key assumption in this theoretical research is that agents immediately recognize the shift in long-run growth. As seen in Fig. 1, however, transitory swings in productivity

¹See, for example, Gordon (2003) for a discussion of shifts in productivity growth in the United States and Hayashi and Prescott (2002) for Japan.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات