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Using an error-correction model to test whether endogenous long-run growth exists

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Abstract

A major empirical interest in growth studies is whether permanent changes in economic fundamentals affect the long-run growth rate or not. However, a direct time series analysis of this hypothesis may not always be feasible because the permanence of many such changes is rather questionable. This paper explains why examining the long-run effects of temporary changes in investment share on per capita output provides indirectly the answer regarding the effects of (possibly hypothetical) permanent changes in investment share, when log per capita output and log per capita investment are cointegrated. Applying the proposed method to the post-war data of major industrial countries, it is found that a disturbance to investment share does not produce a positive long-run effect in each of the three countries – France, Japan and the United Kingdom – in which log per capita output and log per capita investment are cointegrated. The evidence is unfavorable to the class of endogenous growth models.

JEL classification: O40; E22

Keywords: Error-correction model; Endogenous long-run growth

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1. Introduction

Whether a permanent change in economic fundamentals affects the long-run growth rate of an economy is an empirical question that many researchers and policy makers are interested in. Moreover, it is a distinguishing characteristic between endogenous and exogenous growth models because the change leads to a growth effect in the former class of models but only a level effect in the latter; see, for example, Romer (1986) and Lucas (1988). Based on this implication, Jones (1995) performs empirical analysis and concludes that the evidence on major industrial countries is unfavorable to the class of endogenous growth models. Similarly, Stokey and Rebelo (1995) conclude that income taxes do not have a growth effect according to the evidence provided by the tax reform 'experiment' in the United States of America (USA): income tax revenues increased dramatically from 2% to 15% of output in the early 1940s, but there was no change in per capita output growth.

While the endogenous and exogenous growth models imply different long-run effects of permanent changes in economic fundamentals, a direct examination of this hypothesis may not always be feasible because *the permanence of many such changes is rather questionable*. As an example, one of the frequently cited evidence against endogenous growth models is that the growth rates of per capita output (in USA and other industrial countries after World War II) are essentially trendless, but many investment share (i.e., investment-output ratio) series, based on total investment or producer durables investment, contain either strong positive trends or unit roots (Jones, 1995, Table IV). While the evidence regarding stationary output growth is expected, the conclusion of non-stationary investment shares in many industrial countries is quite different from those in several well-known empirical studies such as King et al. (1991). Moreover, the stationarity of some 'great ratios' such as the consumption-output ratio and investment-output ratio is regarded by many researchers as a stylized fact; see King et al. (1991) and especially Cochrane (1994). One may expect that many economists and econometricians, trained to be critical, would demand more evidence before deciding whether the endogenous growth models are empirically relevant or not.

By assuming explicitly that a permanent change in investment share is absent (or at least cannot be established affirmatively) in the data, this paper takes a complementary approach to deal with the question regarding the presence or absence of a growth effect of a (possibly hypothetical) permanent change. It examines the long-run effect of a temporary change in investment share on per capita output, and explains why the proposed method provides indirectly the answer to the above question, when *log per capita output and log per capita investment are cointegrated*.

The connection between these two apparently distinct questions (long-run effects of permanent and temporary changes in investment share, respectively) is implied by the theoretical results on the time series properties of stochastic endogenous and exogenous growth models. Lau (1997) shows that permanent changes in economic fundamentals lead to growth effects, and temporary changes cause permanent level effects for endogenous growth models. On the other hand, permanent changes in