



Great ratios and international openness



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ABSTRACT

The great ratios have been regularly used to calibrate the long-run properties of theoretical macroeconomic models; yet their stationarity is not supported by empirical studies unequivocally. This paper empirically tests whether the international openness governs the stationarity of the great ratios. By considering 21 OECD countries, our results show that the countries with relatively high openness are less likely to exhibit a balanced-growth-path equilibrium. By controlling for a potential endogeneity problem, the great ratios are less likely to be stationary if the economy runs a surplus trade balance.

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1. Introduction

The real business cycle (RBC) theory (e.g., Kydland & Prescott, 1982; Hansen, 1985; King, Plosser, & Rebelo, 1988a,b), based on the neoclassical growth model, predicts that an economy exhibits a balanced-growth-path equilibrium, in which capital, consumption, and output all grow at the same rate. The balanced-growth equilibrium is consistent with the well-known Kaldor (1961) stylized facts in the sense that both the consumption–output and the investment–output ratios are *stationary* in the characterization of the long-run behavior of the U.S. Nowadays, the balanced-growth prediction, i.e., the stationarity of these “great ratios,” has a remarkable influence on the development of modern macroeconomics. On the one hand, sample averages of these great ratios have been regularly used to calibrate the long-run properties of a wide range of theoretical macroeconomic models. On the other hand, the common trend prediction has also played an important role in modern empirical characterizations of macroeconomic trends and cycles.

Due to this importance, there has been a long list of empirical studies examining how robust these great ratios are to various countries and to different periods of time. King, Plosser, Stock, and Watson (1991) and Rotemberg and Woodford (1996) confirm the so-called Kaldor (1961) stylized facts and show that the postwar U.S. data are consistent with the balanced-growth hypothesis. Similarly, Neusser (1991) finds that, with the exceptions of Austria and the U.K., the evidence not only for the U.S., but also for Canada, Japan, and Germany, is favorable to the prediction of a neoclassical growth model. However, the empirical results have not been unanimous. Kunst and Neusser (1990) point out that Australian data strongly reject the propositions that the log ratios of consumption to output

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and investment to output are stationary, and Serletis (1994) shows that these log ratios in Canada are not stationary, either. By considering more countries, Serletis and Krichel (1995) use data with ten OECD countries to refer to the nonstationarity of the great ratios; the consumption–output ratio is stationary only for Canada, Japan and The Netherlands and the investment–output ratio is stationary only for Canada. The phenomenon of non-stationary great ratios is also supported in most G7 countries in a recent study by Harvey, Leybourne, and Newbold (2003). By turning the focus to developing countries, Hossain and Chung (1999) show that the data from South Korea and Taiwan provide little evidence to support the balanced growth proposition. Perron (1989) points out that it is important to account for structural changes in the trend function when we examine the trend stationarity of macroeconomic time series. To react to this point of view, Clemente, Montañés, and Ponz (1999) and Attfield and Temple (2010) take into account the presence of breaks in their tests of the integration order of the consumption–output and investment–output ratios. By so doing, a further finding is that more countries are found to have stationary ratios. Nonetheless, these great ratios are still not so great for a number of countries.

As is evident, by delicately testing for the unit roots of the ratios or their co-integrated relationships, these empirical studies still cannot arrive at a conclusive result. A potential problem in the existing literature is that we only see a lot of studies, based on the data from different countries and various time periods, testing the stationarity of the great ratios, but no explanation is provided for the mixed results. No one has ever attempted to systematically investigate and explain why the stationarity of great ratios holds in some countries, while it does not in others. In particular, these aforementioned empirical studies examine these great ratios in a variety of economies; some countries are quite open to international trade (such as Canada and Norway), while others exhibit a low degree of trade openness (such as Japan and the U.S.). Unfortunately, the existing empirical literature has by and large ignored the distinct characteristic of international trade openness, although we can expect that it may play a crucial role in terms of governing the long-run behavior of an economy.

In the theoretical literature, the application of rigorous macroeconomic dynamic models to small open economies has been a thriving area of research for over two decades. The theoretical studies indicate that a standard growth model of a small open economy can result in an unbalanced-growth-path equilibrium. Given that the domestic resource can come from abroad by accessing the international markets and the country is small, relative to the whole world market, the equilibrium of an open economy may be characterized with independent growth rates for domestic consumption, on the one hand, and capital and output, on the other (see, for example, Turnovsky, 2002, for a one-sector model and Chang, Tsai, & Chang, 2012, for a two-sector model). The long-run equilibrium can sustain differential growth rates of consumption, capital (investment), and GDP, as a consequence of the economy being small and open. This contrasts with a closed economy in which, constrained by the growth of its own resources, all real variables, including consumption, capital (investment) and output, would ultimately have to grow at the same rate under the balanced-growth path equilibrium.

Are the great ratios, then, less likely to be stationary in a more open economy? This theoretical prediction motivates us to empirically explore the underlying reasons behind the validity of the great ratios by shedding light on the importance of international openness. To systematically study this question, we consider two distinct measures of international openness: one is “international trade openness,” measured by trade account-related indicators, and the other is “international capital openness,” measured by capital account-related indicators. For international trade openness, two simple, but direct trade-related indicators – the total trade–output ratio (defined by the amount of exported and imported goods as a percentage of GDP) and the net trade–output ratio (defined by the difference between exported goods and imported goods as a percentage of GDP) – are used to examine the relationship between international openness and the great ratios. The total trade–GDP ratio measures the degrees of openness of an economy, while the net trade–GDP ratio measures the situation of the trade balance of an economy (i.e., running either a surplus trade balance or a deficit trade balance). Simultaneously considering these two indicators allows us to clarify that the resource mobility via international trade influences the validity of a country's great ratios in a symmetrical or an asymmetrical manner. If international trade symmetrically affects the great ratios, the total trade–output ratio is more powerful than the net trade–output ratio in terms of explaining the various consequences of the great ratios for different countries. By contrast, if the effect of international trade is *not* symmetric, the net trade–output ratio (the trade balance) is a better indicator to explain why some countries exhibit balanced-growth equilibria, while others do not. If the evidence supports the former hypothesis, it implies that, empirically, the great ratios are not stationary for the highly-open countries and hence, theoretically, the balanced-growth prediction is not appropriate to apply to an open economy. If the latter holds true, another interesting issue emerges which is whether the great ratios are more likely to be stationary for the countries with either a surplus or a deficit trade balance.

International capital openness is another way of measuring an economy's openness. Similar to international trade openness, we consider both the capital account mobility–GDP ratio and the net capital account–GDP ratio (capital account-related indicators) to examine the influence of international capital flows on the validity of the great ratios. To differentiate the international openness of trade goods from capital flows is important, for it enables us to provide not only a more complete picture of the relationship between the great ratios and international openness, but also gain a better understanding as to whether the international flow of goods or capital is a key determinant in governing the (non-)stationarity of the great ratios. In the theoretical literature on macroeconomics, a non-balanced-growth-path equilibrium may result from either a given world interest rate (which is related to the international capital flows) in a one-sector growth model or from the fixed terms of trade (or real exchange rates, which are related to the international trade) in a two-sector growth model. Our paper is then an empirical attempt to test whether the non-stationarity of the great ratios is caused by either international trade or capital flows.

This study considers 21 OECD countries by the following empirical procedure. First, we examine the stationarity of the consumption–output and the investment–output ratios for these 21 countries based on an Augmented Dickey–Fuller (ADF) test with/without structural breaks. We next turn to sort the countries according to the trade-related and capital account-related indicators. Notice that these indicators can be highly affected by the openness policies, which can also be correlated with the great ratios. Thus, it is common

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