On the role of policy interventions in structural change and economic development: The case of postwar Japan

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ARTICLE INFO

ABSTRACT

In this paper, we study the structural change occurring in Japan's post-World War II era of rapid economic growth. We use a two-sector neoclassical growth model with government policies to analyze the evolution of the Japanese economy in this period and to assess the role of such policies. Our model is able to replicate the empirical behavior of the main macroeconomic variables. Three findings emerge from our analysis. First, neither price and investment subsidies to the agricultural sector, nor industrial policy plays a crucial role in the rapid postwar growth. Second, had there existed a labor migration barrier, the negative long-run level effect on output would have been substantial. Finally, TFP in non-agricultural sector is mostly responsible for the rapid growth of Japan in the post-war period.

1. Introduction

Japan's successful postwar development has been a popular topic of investigation in a wide range of economic literature. To begin with, on the empirical side, economic historians such as Ohkawa and Rosovsky (1973) have made a significant contribution in constructing and analyzing long-term macroeconomic data from Japan. Second, in the tradition of development economics, researchers such as Minami (1968) and Yasuba (1975) employed the dualistic development models of Lewis (1954), Jorgenson (1961), and Ranis and Fei (1961) to identify the timing of Japan's turning point from a labor-abundant economy to the labor-shortage phase. Third, Inada and Uzawa (1972) and Inada et al. (1993) present a formal theory of economic development to explain the mechanism of an aggregate industrial development pattern in Japan, which takes into account the important role of food and labor supply as well as the performance of the subsistence sector. These studies are in the tradition of multi-sector economic growth models, beginning with Shinkai (1960), Uzawa (1961, 1963), and Inada (1963).

Despite the large literature in which the previous studies are included, there are remaining unresolved empirical issues in explaining Japan's rapid growth era. Especially, the effectiveness of targeted industrial policies has been debated repeatedly in the context of Japanese economic development and structural change (Johnson, 1982; Krugman, 1987; Komiya et al., 1988; Lee, 1993; Beason and Weinstein, 1996; Miwa and Ramseyer, 2004). However, without carefully designed

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counter-factual experiments, it is difficult to evaluate the effectiveness of industrial policies properly. Indeed, in a recent comprehensive survey on industrial policies Pack and Saggi state:

"*Consider the argument that Japan's industrial policy was crucial for its success. Because we do not know how Japan would have fared under laissez-faire policies, it is difficult to attribute its success to its industrial policy. It might have done still better in the absence of industrial policy—or much worse. Given this basic difficulty, only indirect evidence can be obtained regarding the efficacy of industrial policy. Direct evidence that can "hold constant" all the required variables (as would be done in a well-specified econometric exercise) does not exist and likely never will.*" (Pack and Saggi, 2006, p. 268).

The objective of this paper is to analyze the effectiveness of postwar Japan's unique policy interventions on its structural change. Given the importance of sectoral productivity growth in the structural transformation literature, we also study the role of total factor productivity (TFP) growth in agricultural and non-agricultural activities in such transformation. To achieve our goal, we first summarize the main facts about Japan's structural transformation, as well as the empirical evidence related to sectoral TFP and the main policy interventions, from the end of World War II to the start of the Lost Decade in the early 1990s. We then build, calibrate and simulate a model to try to reproduce the main characteristics of Japan's structural change. We finally use this model to perform counter-factual simulations to assess the role of the government policies and sectoral TFP growth in the structural transformation and the evolution of the economy in that period. With its analysis, this paper fills the gap in the existing literature on industrial policies in general, beyond a mere case study of Japan, since the general debate about industrial policy has been focused on Japan as the key example of a country that has a coherent one.[1]

The model employed in this paper is a two-sector neoclassical growth model, where the driving forces of the economy are innovations in technology, in the form of increases in TFP, in both agricultural and non-agricultural sectors. We assume Engel's law, which implies a lower need for workers in the agricultural sector as productivity grows and a shift towards manufacturing and other non-agricultural industries. We incorporate several government policies aimed at protecting agriculture while helping the development of both sectors. Such policies include price subsidies for agricultural goods and subsidies for the rental cost of capital for farmers and firms. The model is carefully calibrated to match the Japanese empirical evidence in the postwar period, and then solved using a perfect foresight shooting algorithm.

Since the relative price of agricultural goods is determined endogenously in the model and there are a variety of government policies in place, pure agricultural productivity growth may not be sufficient to explain the rapid structural transformation in Japan, as indicated by Hayami et al. (1975) and Minami (1994).[2] Our results show that it is the rapid growth of TFP, specially that of non-agricultural industries, that is responsible for the structural transformation and the Japanese economic miracle. We also show that the government policies studied in this paper do not play a crucial role, and that they do not affect the overall behavior of aggregate macroeconomic variables such as output per capita or the capital–output ratio.

Our paper is closely related to Hayashi and Prescott (2008), which employs a two-sector neoclassical growth model to investigate the reasons why the Japanese miracle did not take place until after World War II. However, their model is more stylized and does not include the different industrial policies we study here. Also very close to our study is Alvarez-Cuadrado and Pintea (2009), which studies the sources of growth in Europe after WWII and the relative importance of certain policies. In line with our results, they also find that some well-publicized policies, the Marshall Plan in their study, may have had a much smaller contribution to growth than it is traditionally thought. Our work is also connected to the analytical framework of two-sector growth models such as Matsuyama (1992, 2008), Banerjee and Newman (1998), Eswaran and Kotwal (1993), Robertson (1999) and Landon-Lane and Robertson (2007); it is also related to the numerical techniques of two-sector growth models of Caselli and Coleman II (2001), Laitner (2000), Hansen and Prescott (2002), and Lucas (2004); it likewise relates to the recently developed accounting literature, such as Vollrath (2009), Gollin et al. (2004, 2007), Restuccia et al. (2008), and Temple (2005). None of the previous papers however focus on the role of government policies in Japan in the post WWII period.

The remainder of this paper is organized as follows. In the next section, we briefly describe the postwar Japanese economy by looking at time series of several macroeconomic variables. Section 3 explains the two-sector growth model and its equilibrium conditions which will be matched with data. In Section 4, we briefly present the data and calibration procedure. Section 5 shows the simulation results and a set of counter-factual policy experiments. In the final section, we conclude and discuss the direction of future research.

2. Postwar Japanese economy

In order to understand the Japanese experience in the postwar era, and be able to build a model that can study the policies used by the government, we now summarize the main stylized facts of the Japanese economy in the period between the end of World War II and the start of the Lost Decade, i.e., 1990. We also summarize the main facts related to two of the

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[1] See Flath (2000, Chapter 9) for a detailed review of Japanese industrial policies.
[2] Solow (2005) criticizes the two-sector growth models, which are constructed for a consumer–good-producing sector and an investment–good-sector for farm and non-farm sectors in the development context, stating that too much in those models turned out to depend on differences in factor intensity between the sectors, and that we have very little in the way of facts or intuition about that issue. We overcome this criticism by carefully matching the postwar Japanese data with the model.