



# Growth, sectoral composition, and the evolution of income levels

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## ABSTRACT

We assert that the endowments of production factors cause cross-country differences in GDP by generating disparities in the sectoral composition. We characterize the dynamic equilibrium of a two-sector endogenous growth model with several consumption goods that are subject to minimum consumption requirements. In this model, economies with the same fundamentals but different endowments of capitals will end up growing at a common rate, although the long run sectoral composition of GDP will be different. Because the total factor productivity (TFP) in multisector models depends on sectoral structure, these differences in capital endowments will also generate sustained differences in TFPs.

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## 1. Introduction

New growth theory has provided increasing evidence suggesting that the accumulation of production factors alone cannot explain the observed cross-country differences in GDP per capita (see, for instance, McGrattan and Schmitz, 1999; Parente and Prescott, 2004). Authors like Klenow and Rodriguez-Clare (1997) and Hall and Jones (1999) argue that differences in GDP per capita are mainly explained by differences in total factor productivity (TFP, henceforth). Simultaneously, another branch of development literature explains international differences in the growth rates of GDP as the result of differences in the sectoral composition of GDP (see Echevarria, 1997; Laitner, 2000). Recently, Caselli (2005), Chanda and Dalgaard (2008), and Cordoba and Ripoll (2009) unify these two lines of research by showing that changes in the sectoral composition contribute not only to output growth, but also to productivity growth without any true technological change. By using multisector growth models as the basis of growth accounting exercises, these works demonstrate that the aggregate level of TFP can be decomposed into a contribution from sectoral composition and a contribution from the level of technology. Furthermore, the empirical evidence shows that there are meaningful differences in the sectoral composition across countries. Therefore, the composition effect can explain a substantial amount of the observed differences in aggregate TFP levels across countries.

In order to account for the causes of the cross-country variation in output per capita, we then need theories that help us to explain the sustained differences in the sectoral composition of output across countries. Recent literature offers some explanations based on supply-side factors like differences in the aggregate productivity across sectors and the existence of

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barriers to allocate inputs to high productivity sectors.<sup>1</sup> In this paper, however, we offer a complementary explanation based on the same demand-side argument used by literature to explain the structural change: the income elasticities of demand differ across consumption goods.<sup>2</sup> We assert that the stationary sectoral composition also depends on the endowments of production factors if the differences in those income elasticities are permanent along both time and income. This result is in stark contrast with those derived from the neoclassical (either exogenous or endogenous) growth models, which predict convergence on sectoral composition across countries with the same fundamentals even when they start with different endowments. However, we show that these countries can converge to different sectoral compositions because the permanent differences in the income elasticities of demand across goods make sectoral structure depend on the income level, even in the long-run. As TFP depends on the sectoral composition, we will then conclude that the contribution of production factors in explaining GDP is greater when TFP is endogenous.

Demand systems with differences in income elasticities across goods have usually been considered formally by introducing minimum levels of subsistence that makes preferences non-homothetic. However, this kind of Stone–Geary preferences are incompatible with the existence of a balanced growth path (BGP, henceforth) because they generate permanent structural change and, hence, are not consistent with the Kaldor facts regarding the long-run regularities in economic growth.<sup>3</sup> Moreover, the differences in the income elasticities of demand across goods tend to vanish in the long run because the relative importance of the subsistence level asymptotically converges to zero as the economy grows. In order to avoid these problems we will consider a preference structure with minimum consumption requirements, which follow exogenous growth patterns. In particular, we assume that individuals in a country use the consumption level of the most advanced economies as a reference with respect their own consumption is compared to. We then gather the idea of the international demonstration effect used by some older literature to explain the process of uneven development on a world scale (see, e.g., Myrdal, 1956; Nurkse, 1953; Kottis, 1971; Dutt, 1988). It has long recognized that preferences of consumers across countries are interdependent because of international advertising and the existent large cosmopolitan elements in many populations (see, e.g., Bowles and Park, 2005). As James (2000) defends, after having reached some level of output, the emerging economies try to catch up the consumption patterns of the developed economies. The aforementioned literature on economic development uses this international extension of Duesenberry's (1949) notion of demonstration effect to explain the developing economies' low propensity to save during the first half of twentieth century.

We then consider a baseline model that displays structural change along the transition adjustment that is, moreover, consistent with the Kaldor facts. In particular, our choice of the model is based on the following fact: economies experiment meaningful changes in the structure of the production activity along the process of economic development. Empirical evidence has shown that there is a relationship between the level and the sectoral composition of GDP. Baumol and Wolff (1988) and Kuznets (1971), among others, show that the process of development is related to the process of structural change. In addition, the process of development is related to the growth of human capital, which explains the existence of a strong accumulation of human capital along the development process. Galor (2005) and Galor and Moav (2004) have shown the link between human capital accumulation and GDP growth. Therefore, according to the data, the process of development is linked to structural change and to the accumulation of human capital. In this paper we consider a growth model that takes into account this dynamic relationship between human capital accumulation and structural change along the transition dynamics. More specifically, we extend the two-sector model of endogenous growth with constant returns to scale and with physical and human capital accumulation, that was introduced by Uzawa (1965) and Lucas (1988). Apart from the absence of external effects, the main departure from Lucas (1988) is in the modeling of preferences. We consider that consumers derive utility from the consumption of two heterogeneous goods. Moreover, as was explained before, we assume that individuals form aspirations in consumption based on the standard of living reached by the most advanced economies. Finally, for the sake of simplicity, and without loss of generality, we assume that there are only two production sectors and that each of them produces a commodity that can be devoted either to consumption or to increasing one of the capital stocks.

These key assumptions on preferences yield important changes in the growth patterns predicted by the standard two-sector growth model.<sup>4</sup> As in the standard model (see, for instance, Caballé and Santos, 1993), there is a continuum of BGPs and, moreover, the initial conditions on the two capital stocks determine the BGP the economy converges to. However, in contrast with the standard two-sector growth model, the BGPs differ in their ratios of physical to human capital and in their sectoral compositions when the following conditions hold: (i) individuals derive utility from the consumption of the two heterogeneous goods; (ii) the income elasticities of demand differ across these consumption goods; and (iii) the technologies used by the two sectors exhibit different capital intensities. Thus, our model predicts that economies with the same fundamentals but different endowments of human and physical capital will converge to a common level of the relative price and to the same growth rate, although the long-run ratio of physical to human capital, the GDP to capital ratio and the sectoral structure will be different.

<sup>1</sup> Caselli (2005) documents the main points of these theories.

<sup>2</sup> See, for instance, Echevarria (1997), Laitner (2000), Kongsamunt et al. (2001) or Foellmi and Zweimuller (2008).

<sup>3</sup> Trade literature has also considered non-homothetic preferences by using generalized CES aggregators for the composite consumption good (see, Fielser, 2008; Fajgelbaum et al., 2009). However, these kinds of preferences are not compatible with the existence of BGP either.

<sup>4</sup> By *standard growth model* we mean a growth model with a unique consumption good and homothetic preferences.

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