Structural change, Engel's consumption cycles and Kaldor's facts of economic growth [☆]

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ABSTRACT

Non-linear Engel-curves for consumer goods cause continuous structural change. Goods are sequentially introduced starting out as a luxury with high income elasticity and ending up as a necessity with low income elasticity. Although this leads to rising and falling sectoral employment shares, the model exhibits a steady growth path along which the Kaldor facts are satisfied. Extending the basic model to the case of endogenous product innovations shows that complementarities between aggregate and sectoral growth may give rise to multiple equilibria.

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1. Introduction

The process of economic development is characterized by fundamental changes in the structure of production and employment. In historical perspective, the emergence of new and the decline of old industries has led to a dramatic reallocation of resources between sectors of production.[2] Despite these huge structural changes, the long-term growth

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[2] Maddison (1987) documents the huge reallocation of labor in six major industrialized countries (France, Germany, Japan, Netherlands, U.K. and U.S.). His data show that the average employment share in agriculture was as high as 46.0% in 1870 and has decreased to 5.5% by 1984. During the same period the average employment share in the service sector has increased from 26.4% to 62.2%.

process has been remarkably stable in the aggregate. As mentioned by Kaldor (1961) in his famous stylized facts, a situation where the growth rate, interest rate, capital output ratio, and labor share are constant over time is a reasonable approximation of the long-run growth experience of a modern economy.

Changes in the structure of production and employment result either from sectoral differences in productivity growth or from sectoral differences in income elasticities of demand. This paper focuses on the *demand* side. In this case, the structural transformation is driven by changes in consumer demand as households get richer. In a poor society, the overwhelming part of income is spent on basic goods, predominantly food. Consequently, the larger part of the population is working in the agricultural sector. As the society gets richer, consumers devote their expenditures to cover less basic needs which is associated with the creation of employment opportunities in the manufacturing sector. In the mature society consumers direct their expenditures increasingly towards the satisfaction of more advanced wants covered predominantly (though not exclusively) by services.

The importance of the demand-based approach to structural change lies in the close relationship between the dynamics of sectoral employment and the composition of aggregate consumer demand. A strong case for such a relationship can be made for the agricultural sector. Historically, increasing per-capita incomes were not only associated with a strong decline in the employment share in agriculture but also with a strongly declining budget share for food, the latter relationship being known as "Engel's law". According to Houthakker (1987), "of all the empirical regularities observed in economic data, Engel's law is probably the best established."[3] In the U.S., for instance, the budget share for food has been strongly decreasing from 28% in 1950 to 14% in 2000 whereas service expenditures have been steadily increasing during the same period, from 21.8% in 1950 to 43.9% in 2000. Over the same period, the budget share for non-food manufactures (clothing, durables, other non-durables) decreased from 38.9 to 27.8. Moreover, the familiar sectoral trichotomy—agriculture, manufacturing, services—obscures a lot of heterogeneity within these sectors. For instance, further disaggregation shows that within the service sector, purchases of medical services rose disproportionately, similarly, purchases of clothing among non-food manufactures declined very strongly. This suggests that there is substantial structural change not only between but also within broad sectors which underlines the relevance to allow for heterogeneity in industries within these broad sectors.

Modern growth theory has been surprisingly silent on the issue of how to reconcile the huge structural changes with the Kaldor facts of economic growth. The first paper that has explicitly addressed the issue is Kongsamut et al. (2001). They study a three-sector model where consumers have Stone–Geary preferences over an agricultural good (a necessity), a manufactured good (with an income elasticity near unity), and services (a luxury). They find that a "generalized balanced growth path" along which the Kaldor facts are satisfied is only possible if preference and technology parameters jointly satisfy a knife-edge condition. Just like in Kongsamut et al. (2001), in our model structural change is driven by sectoral differences in income elasticities. Unlike Kongsamut et al. (2001), however, our model studies a situation where new goods are continuously introduced, leading to the expansion of new and the decline of old industries. This creates a non-linear relationship between manufacturing employment and the level of development that does not show up in the Kongsamut et al. (2001) model.

To the best of our knowledge, other papers rationalizing structural change and steady growth in a unified framework have focused exclusively on technological differences across sectors. In Ngai and Pissarides (2007) sectors experience different total factor productivity growth rates (but have identical capital intensities). They show that the aggregate growth process satisfies the Kaldor facts if the intertemporal utility function is logarithmic in the consumption composite; and the consumption composite is non-logarithmic (yet homothetic) across goods. Another recent paper by Acemoglu and Guerrieri (2008) does not only allow for different rates of technical progress but also for differences in capital intensities across sectors. In a two-sector growth model with constant elasticity of substitution preferences and Cobb–Douglas production technologies they show that, provided the elasticity of substitution is less than one, convergence to the limiting equilibrium may be slow and along the transition path (when the sectoral structure changes) the capital share and the interest rate vary only by relatively small amounts hence reconciling structural change with the Kaldor facts.[4]

In contrast to these technology-based approaches, our model is based on the assumption of hierarchic preferences. New goods are continuously introduced and each of these new goods starts out as a luxury with a high income elasticity and ends up as a necessity with a low income elasticity. These non-linearities in Engel-curves generate consumption cycles that

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[3] Engel (1857) concluded explicitly from his empirical analysis that needs have a hierarchic structure—an idea which goes back at least to Plato and has played an important role in the thinking of classical economists: "*Nunmehr (ist) gleichsam eine Scala der Bedürfnisse des Lebens zu Tage gefördert* (p. 27)." The idea that, in the age of mass consumption, the very concept of necessities and luxuries has changed, has been stressed by Katona (1964). See also the discussion on Engel-curves in Pasinetti (1981, Chapter IV).

[4] Starting with Baumol (1967) an important strand of the literature views structural change as a *supply* phenomenon. Sectors with low technical progress suffer from the "cost disease", i.e. rising relative costs and prices. When relative output levels of stagnant and dynamic sectors remain roughly constant (due to limited substitutability between products), the Kaldor facts are necessarily violated. Other models study the transition of agricultural to industrial societies without aiming at explaining the Kaldor facts as they focus on longer time periods. In these models the relative productivity between the agricultural and the manufacturing sectors determine patterns of the structural transformation, see Hansen and Prescott (2002), Parente and Prescott (2005). See also the endogenous growth models by Young (1993a, b) where changes in the structure of production arising from sector-specific learning-by-doing and/or complementarities among old and new technologies; by Chari and Hopenhayn (1991) where asymmetries arise from lags in the diffusion of new technologies; and by Thompson (2001) where quality uncertainty in connection with rising product variety leads to a non-degenerate firm size distribution. In these models, the demand-side plays a passive role as preferences between the various goods are assumed to be symmetric.