H.Ü. İktisadi ve İdari Bilimler Fakültesi Dergisi, Cilt 14, Sayı 2, 1996, 107-119

DEVELOPMENT AS STRUCTURAL CHANGE: PATTERNS OF DEVELOPMENT APPROACH

Hakan Mıhçı *

Abstract

This paper attempts to analyse some conceptual, methodological and statistical aspects of Chenery-Syrquin's patterns of development approach. To investigate the background of the approach, the works of Clark and Kuznets have been reviewed in section two, and subsequently, the main features of the patterns approach has been examined. In section four, some statistical problems related with this approach has been pointed out.

The paper reaches the conclusion that the patterns approach developed by Chenery and Syrquin should be considered in any study dealing with the structural aspects of the development process.

Özet

Yapısal Değişiklik Olarak Kalkınma: Kalkınma Kalıpları Yaklaşımı

Bu çalışmada Chenery-Syrquin'in kalkınma kalıpları yaklaşımı kavramsal, yöntemsel ve istatistiksel yönleriyle incelenmeye çalışılmıştır. Yaklaşımın kökenini ortaya çıkarmak için, Clark ve Kuznets'in çalışmaları ikinci bölümde gözden geçirilmiş ve daha sonra bu yaklaşımın temel özellikleri incelenmiştir. Dördüncü bölümde ise, kalkınma kalıplarıyla ilgili bazı istatistiksel sorunlara değinilmiştir.

Çalışmadan elde edilen temel sonuç, kalkınma sürecini yapısal yönleriyle inceleyen her türden araştırmanın, Chenery ve Syrquin tarafından geliştirilen kalkınma kalıpları yaklaşımını dikkate alması gerektiğidir.

---

* Research Assistant at Hacettepe University, Department of Economics.
Key Words: Development, Structural Change, Patterns of Development.
Anahtar Sözcükler: Kalkınma, Yapısal Değişim, Kalkınma Kalıpları.

I. Introduction

Development economics has been broadly defined as the study of the economic structure and behaviour of less developed and developing countries.

Structural analyses are generally performed in two different "levels". The first, and more recent, generally deals with the functioning of markets, institutions and mechanisms for resource allocation. This is primarily a micro approach which heavily depends upon economic theory, giving little emphasis to the historical record and long-run processes of structural change. In the second, and more traditional, development is seen as an interrelated set of long-run process of structural transformation. This is essentially a comparative approach deriving its information from the historical experience of the advanced economies and from inter-country associations of structural changes and growth. Pattern of development can be included in this later approach.

The main objective of this paper is to analyse and clarify some conceptual, methodological and statistical features of the patterns of development approach which have been developed by Chenery and Syrquin.

For this purpose, the main components of the works of Clark and Kuznets will be examined in the following section, due to the fact that these pioneering studies constitute a background for the development of "patterns" approach. Section 3 is devoted to the analysis of the Chenery- Syrquin's patterns of development approach. In section 4, statistical problems related with the patterns approach will be pointed out.

II. The Background

The first writer who sees the development as structural change is Colin Clark. Clark's work on structural change focused on the proposition that in the course of economic growth, the structure of production and employment changes (Clark 1940). In this process, the share of agriculture, which constitutes the greater part of the primary sector, declines relative to manufacturing -the secondary sector- and to services -the tertiary sector. In other words, Clark's approach is closely related with the "sectoral transformation" which occurs during the process of economic development, and this transformation is seen as a source of growth. Since productivity tends to be higher in manufacturing and services than in agriculture, as Clark argued, transferring labour from less to more productive spheres can be an important source of economic growth.

It should be mentioned that Clark's approach to structural change heavily depended on the historical experience of today's developed countries and was firmly rooted in empirical investigation.

His approach was so influential in traditional development thinking that the rate of sectoral transformation was used to determine the development level of the countries from the 1940s onwards. More specifically, the increasing share of manufacturing and services sectors in total output and employment at the expense of agricultural shares was seen as a development criterion. Hence, development strategies have usually focused on rapid industrialization (Todaro, 1994:14). It should also be noted that the thesis put forward by Clark in the 1940s still has its modern-day adherents.

Clark's pioneering study on structural change constituted a base for a more systematic derivation of development patterns which have been defined as a variation in economic structure associated with a rising level of income (Ingham, 1995:77). The empirical study of Kuznets falls within this category.

Kuznets employed long-run measures of national income for individual countries through time (1700-1960). Together with national income statistics, Kuznets was able to measure the associated economy-wide changes in consumption, production, trade and the distribution of income through time (Kuznets 1971).

Some of Kuznets's findings support Clark's proposition: the structure of production and employment changes in favour of industrial sector and at the expense of agricultural sector as the level of income rises (Kuznets 1971).

Between various findings of Kuznets, two deserve special interest[1]: Kuznets was the first economist to demonstrate statistically that during the period of rapid economic growth, there was a substantial rise in the share of savings and investment in national income.

The other finding is related to income distribution. Kuznets showed that in the early stages of economic growth, the distribution of income worsens. In the later stages, however, national income becomes more evenly distributed ('U'-shaped curve for income distribution). Therefore, declining inequality is a feature of the later stages of economic transformation.

In short, Kuznets concentrated on the long-run trends of national income and the associated changes in the structure of the economy. By doing so, he extensively utilised statistical material. But he did not use econometric techniques

1. For a summary of Kuznets's findings, see Kuznets (1973). Here, only the best-known findings of Kuznets will be mentioned, not all of them.

to analyse his data. Furthermore, he only dealt with the long-run trends in today's developed economies. At the time when he carried out his work,[2] this was unavoidable due to the data limitations for most of the developing countries.

As will be seen in the next section, however, Chenery and Syrquin (1975) were able to use statistical information on developing countries which increasingly became available during the 1950s. The work of Chenery and Syrquin on the patterns of development also differed from Clark and Kuznets in employing econometric techniques to analyse the data. Furthermore, Chenery and Syrquin benefited from the introduction of computer techniques which enabled them to handle large data sets. As a consequence, they were able to develop more systematic empirical analysis and a comprehensive description of the patterns of development.

III. Patterns Of Development: Chenery- Syrquin (C-S) Model

In an attempt to identify patterns of development, C-S (1975) have tried to investigate the stages of structural transformation generally experienced by developing countries rather than a detailed examination of individual phenomena.

The interrelated processes of structural change that lead to economic development are jointly referred to as the "structural transformation" in the model (Syrquin, 1991:206). The term structural transformation, in its most simplest form, can be defined as a transformation from a primarily agricultural to industrial economy. Meanwhile, it should be mentioned that the accumulation of physical and human capital and shifts in the composition of demand, trade, production and employment are generally described as the economic core of the structural transformation; while the related socio-economic processes (such as demographic transition, income distribution etc.) are identified as peripheral in the model (C-S, 1975:6-8; Chenery, 1988:31-37).

C-S selected twenty seven dependent variables[3] which are related with per capita income level (measured with 1964 US dollars), and which describe the basic processes of accumulation, resource allocation and demographic and income distribution that appear to be essential features of development, while

2 It took more than 30 years starting from the 1940s and the initial results were published in the journal of *Economic Development And Cultural Change* between 1956-1967.

3 . Dependent variables are as follows: gross domestic savings as % of GDP, gross domestic investment as % of GDP, capital inflow as % of GDP, government revenue as % of GDP, tax revenue as % of GDP, education expenditure by government as % of GDP, primary and secondary school enrollment ratio, private consumption as % of GDP, government consumption as % of GDP, food consumption as % of GDP, primary output as % of GDP, industry output as % of GDP, utilities output as % of GDP, services output as % of GDP, exports as % of GDP, primary exports as % of GDP, manufactured exports as % of GDP, services exports as % of GDP, imports as % of GDP, share of primary labor, share of industry labor, share of services labor, urban % of total population, birth rate, death rate, share of highest 20% in income distribution and share of lowest 40% in income distribution.

some processes are thought to be essential on the basis of experience of more advanced countries.[4]

It should be stressed that by describing the processes of development, C-S tried to replace the notion of dichotomy between developing and developed countries with the concept of transition from one stage to another. This transition was defined by a set of structural changes that have always accompanied the growth of per capita income level (C-S, 1975:135).

C-S analysis is based on 20.000 observations covering 101 countries over twenty years (1950-1970). To avoid difficulties in combining various results into a consistent analysis, C-S (1975:18) have adopted a uniform set of regression equations for all processes. Basic regression equations are as follows:

$$X=\alpha + \beta_1 \ln Y + \beta_2 (\ln Y)^2 + \gamma_1 \ln N + \gamma_2 (\ln N)^2 + \Sigma\delta_i T_i \qquad (1.1)$$

$$X=\alpha + \beta_1 \ln Y + \beta_2 (\ln Y)^2 + \gamma_1 \ln N + \gamma_2 (\ln N)^2 + \Sigma\delta_i T_i + \varepsilon F \qquad (1.2)$$

where X= dependent variable,

Y= GNP per capita in 1964 US dollars,

N= population in millions,

F= net resource inflows as a share of total GDP,

T_i= time periods (i = 1, 2, 3, 4).

Equation (1.2) was used to allow for a separate effect of external resource inflow on the development processes while equation (1.1) included its average effect in the coefficients for Y and N (C-S, 1975:16).

As noted by C-S (1975:18), the treatment of net resource inflow as an exogenous variable creates statistical difficulties because of the fact that as equilibrium is restored, adjustment takes place in the resource inflow as well as in exports, imports, savings and investment. The estimated coefficients of F, therefore, are only measures of "partial correlations".

As far as time trends are concerned, equation (1.1) assumes that in all countries there are shifts in the structural relationships over time that are independent of income changes within each country. Therefore, C-S (1975:18)

4 . Investment, government revenue and education are included in accumulation processes whereas structure of domestic demand, structure of production and structure of trade in resource allocation processes. Demographic and distributional processes cover labor allocation, urbanization, demographic transition and income distribution

used five-year periods to measure T which corresponds to T_1=1950-54; T_2=1955-59; T_3=1960-64 and T_4=1965-69.

The fundamental hypothesis underlying the set of estimates is that development processes occur with sufficient uniformity to produce consistent patterns of change in resource allocation, factor use and other structural aspects as the level of income rises (C-S, 1975:11). It should, however, be noted that the overall pattern of transformation can show significant differences in the "timing" and "sequencing" of particular aspects of change. The various paths may reflect differences in initial conditions such as size and resources, in the historical environment (wars, external shocks) and in economic policies during the relevant period (C-S, 1989:4).

Overall, the results of C-S can be summarized as follows: the development processes measure the normal changes in the economic structure that accompany an increase in per capita income GNP from $100 to $1000. Average values are also given for the countries below $100 and above $1000 per capita GNP; and they show that 75 to 80 percent of the total change occurs within this range (C-S, 1975:19).

Some of the processes have taken place in the early stages and are half completed at an income level of $200, while others are delayed until income levels of $500 or more are reached (C-S, 1975:22). It can, therefore, be said that there are timing differences between development processes. For all the basic processes, the average midpoint is about $300[5], and the transition is 90 percent complete at a level of $900 to $1000. Therefore, individual processes can be classified as early, normal or late in relation to these averages. Similarly, individual countries can be qualified as "leading" or "lagging" in different aspects of the transition to the average patterns of change (C-S, 1975:22).

Major structural changes that appear with the increase in per capita income during the transitional period can be crudely summarized in the following way:

(i) The shares of industrial and services production in total production increase at the expense of the primary sector. Similar changes occur in the process of labour allocation. Labour is transferred from agricultural to the industrial and services sectors.

(ii) As development takes place, a shift is realized from the production of consumption goods to the production of capital goods, and, therefore,

5. The range for the midpoint is between $200 and $450 for accumulation processes; $150 and $1000 for allocation processes and $150 and $450 for demographic and distributional processes.

capital accumulation in the economy considerably increases. On the other hand, investments are increasingly financed by domestic savings and the necessity of consuming foreign resources substantially diminishes.

(iii) Changes in the structure of production lead to further changes in the comparative advantages of the economies and in their structure of trade. Consequently, the share of industrial sector in foreign trade rises at the expense of the primary sector. Furthermore, both exports and imports rise as a proportion of national income and the economy becomes more dependent on foreign trade.

(iv) Income growth changes the structure of domestic demand in favour of the goods which have high income elasticity (Engel law).

(v) The gap between birth and death rates narrows during the transition period and further increases in per capita income become possible.

(vi) The biggest change, in quantitative terms, occurs in the primary and secondary school enrollment ratio. The number of educated people tremendously increases parallel to the rise in education expenditure.

(vii) Migration from rural to urban locations takes place. Consequently, the proportion of urban population to the total population increases.

(viii) Similar to Kuznets's finding, the distribution of income initially becomes more unequal. The share of the poorest 40 percent of the population falls until about the half-way of the transitional period, and then rises. Correspondingly, the share of the richest 20 percent of the population rises at the beginning of the transition, and then rapidly declines. Toward the end of the transitional period, income is more evenly distributed.

In short, in an attempt to identify patterns of development, C-S found cross-country "norms"[6] for the basic processes of development which depend on per capita income levels. They established a "uniform" and "comprehensive" description of structural transformation. In other words, they determined the average or normal patterns of development for all countries, especially the developing ones.

6 . Norms in patterns of development approach refer to the "average" or "normal" relations showing the expected transformation during the transition from a low income, agrarian economy to an industrial urban economy with substantially higher per capita income.

But are the associations represented by patterns of development, like the transition from an agricultural to industrial economy, necessary conditions for economic development, or do they only represent statistical correlations for a given sample and period?

At a broad level, as Solow (1977:493) points out, "...the standard pattern of economic development is something like a historical likelihood or near-necessity. The modern world could have evolved somewhat differently, but since it did not, it would be extraordinarily difficult to change the standard pattern now." At a lower level, however, variations in the behaviour of individual components from the broad level of aggregation have to be emphasized. This notion, according to C-S (1989:6), resembles Gerschenkron (1966)'s concept of "substitutability", if it is modified to recognize that its nature depends not only on relative backwardness but also on other national factors.

For example, in resource-rich countries, the shift of resources away from agricultural production lags behind that in other countries at low levels. At higher income levels, however, the gap is much reduced. The availability of resources also affects the composition of industrial production. Resource-rich countries emphasize more the capital-intensive techniques due to the relatively high price of labour in comparison to their degree of industrialization . On the other hand, resource-poor countries have to find substitutes for primary products exports to increase their source of foreign exchange. Early development of manufactured exports and a reliance on foreign capital in those countries can be seen as a response to the absence of natural resources (C-S, 1989:33-50; 1975:64-117).

Similar discussion can be found in the field of economic history. During the 1950s and much of the 1960s, the British model has often been viewed as the only optimal path for growth. But from the 1970s onwards, this view has been challenged by several historians.[7] In their comparative study of long-run economic growth in France and Britain, O'Brien and Keyder (1978:196) argue that "economic theory lends no support to assumptions, (...), that there is one definable path to higher per capita incomes and still less to the implicit notion that this path can be identified with British industrialization as it proceeded from 1780 to 1914." And in the conclusion of their study, they say that "... there is more than one way of transition from agricultural to industrial economy and from rural to urban society (O'Brien and Keyder, 1978:196)."

O'Brien and Keyder do not seem to reject the notion of transition from an agricultural to urban economy, but the view that the path of transition is unique is challenged.

7 . See for instance Crafts (1991; 1984); Floud and McCloskey (1981); O'Brien and Keyder (1978). For an earlier attempt, see also Hobsbawm (1968).

Therefore, it can be argued, that universal factors that identify economic development is the main justification for expecting uniformities across countries in the long-run analysis of transformation. But this does not imply that there is a single unique path through which all economies have to pass. It is obvious that the above warnings should to be kept in mind while evaluating and using the patterns of development approach.

In fact, since the publication of C-S's original study[8], various writers have adopted a comparative approach of the "patterns" type to investigate in the pace of and structure of economic change (Adelman and Morris 1984; Crafts 1984; Smith 1992; Wood 1986). The main focus of these studies has been on the basic processes of accumulation and resource allocation. The work of Adelman and Morris, and that of Crafts, were attempts to establish the extent to which nineteenth century Europe shared the dimensions of structural transformation identified by C-S for contemporary countries. In her D.Phil thesis, Smith examined structural change in Sub-Saharan Africa giving an emphasis on the social indicators of development by using a pattern approach. What all the patterns studies demonstrate is that cross-country comparisons are a useful way to identify important processes in the course of economic and social development.

It should also be pointed out that the patterns of development approach is crucially important in the sense that it creates an opportunity to identify easily the development levels of specific countries. Furthermore, this approach provides a quantitative basis to examine how the development process of a particular country conforms or diverges from the norms predicted for a country of its size (as measured by population) and income level.[9]

IV. Statistical Problems Of The Model

In this part of the paper, some statistical problems of the C-S model, namely the omitted variables, goodness of fit and exchange rate conversions, will be briefly discussed.

1. Omitted Variables

Alongside income and size, other factors also influence the development processes. The impact of variables that are correlated with income over time is partly reflected in the estimated income effects. Certain long-run processes of

8 . C-S updated their original study at the end of 1980s (C-S 1989). In this later version, the analysis period was extended to 1983 and the emphasis was only given to the processes of accumulation and resource allocation. The processes of demographic change and income distribution were not analysed.

9 . For this aim, patterns of development approach has been applied to Turkish case, for example, by several writers. See Hatiboğlu (1978); Türkkan (1981) and Celasun (1983).

change, however, proceed over time independently of variations in income, such as changes in the level of technology, international environment or the development strategies. Such changes may lead to shifts in the dependent variables. But, as mentioned by C-S (1989:50), if these long-run changes are assumed to be universal and to affect all the countries in the same manner, their effect would be captured by the time dummy variables ($\Sigma\ \delta_i T_i$) in the basic regression equations.

2. Goodness of Fit of the Estimated Equations

In C-S model, for some of the regression equations, R^2 s are too low to explain the relationship between dependent and explanatory variables. R^2 s are particularly low for certain resource allocation and capital accumulation processes. Similarly, in some of the equations, t-ratios for the explanatory variables are too high to accept a meaningful relation between dependent and explanatory variables.

In the case where the countries are grouped according to their size (large or small) or trade orientation (inward looking or outward oriented), however, the R^2s rise and standard errors and t-ratios fall for many development processes.

For the large country group, standard errors decline almost for all the processes, most notably on the export and primary production (C-S, 1975:106). When small countries are subdivided according to their trade orientation, the improvement in the goodness of fit of the estimated equations is obvious. Therefore, it can be argued that the statistical accuracy of the estimates improves when more homogeneous country samples are analysed. So, at least empirically, it seems better to concentrate on the homogeneous country groups in future researchs on "patterns" type.

3. Exchange Rate Conversions

In patterns of development approach, the principal variable is the level of development and it is usually measured by income per capita in US dollars at official exchange rates.

It is well known that exchange rates do not measure the purchasing power of the various national currencies. Price structures vary across countries and exchange rates at best reflect only the prices of internationally traded goods, and they are not usually determined at the equilibrium levels. The alternative of using exchange rates as conversion factors for international comparisons is to reprise income in every country at a uniform set of prices. This is similar to using purchasing power parities (PPPs) as conversion factors. Such exercise was made by C-S (1988:78-84) for 27 countries. They found that real growth amounts to

68 percent of growth in income converted at exchange rates at all income levels. The remaining 32 percent represents the price effect (C-S, 1988:82).

Therefore, the impact of switching to income converted at PPPs instead of official exchange rates on the income levels would be to reduce all of them uniformly by 32 percent; but all the acceleration and deceleration effects on growth would still remain. It should, however, be mentioned that the patterns of development approach could be statistically improved by using PPPs as conversion factor instead of official exchange rates.

V. Conclusion

Although many changes have occurred in the way of looking at the development phenomenon through time, it has been traditionally viewed in the framework of structural change from the 1940s onwards. The pioneering work of Clark and subsequent studies of Kuznets and C-S could be evaluated within this context.

Clark's work on structural change heavily relied on the sectoral transformation that occurred in the course of economic growth. Together with Clark, Kuznets's herculean efforts to systematize and synthesize historical development patterns constituted a base for C-S to investigate structural transformation generally experienced by developing countries.

In doing so, C-S adopted more advanced empirical analysis than their antecedents (although further refinements have to be needed), and attempted to identify patterns of development systematically. In brief, they tried to describe the transition process of an economy from a developing to a developed one. They viewed this process as a set of socio-economic structural changes that have always accompanied the rise of per capita income level.

All in all, C-S model opened up the possibility of identifying the countries that have been following similar development strategies, and also comparing the countries with similar development patterns to drive more valid performance standards. Additionally, this attempt gave an opportunity to determine the development level of a particular country on the one hand, and comprehend how its development process deviates from the "norms" that have been identified, on the other.

In conclusion, any study dealing with the structural aspects of the development process should take into consideration the patterns approach developed by Chenery and Syrquin.

References

ADELMAN, I and MORRIS, C.T. (1984); "Patterns of Economic Growth, 1850-1914, or Chenery-Syrquin in Historical Perspective", in M. SYRQUIN, L. TAYLOR, and L.E. WESTPHAL (Eds.) ***Economic Structure and Performance: Essays in Honour of Hollis B. Chenery***, New York: Academic Press.

CELASUN, M. (1983); ***Sources of Industrial Growth and Structural Change: The Case of Turkey***, World Bank Working Papers, No:614, Washington DC.

CHENERY, H.B. (1988); "Typical Patterns of Transformation", in H.B. CHENERY, S. ROBINSON and M. SYRQUIN (Eds.), ***Industrialization and Growth***, Washington DC: Oxford University Press.

CHENERY, H.B. and SYRQUIN, M. (1975); ***Patterns of Development 1950-1970***, London: Oxford University Press.

CHENERY, H.B. and SYRQUIN, M. (1988); "Typical Patterns of Development", in H.B. CHENERY, S. ROBINSON and M. SYRQUIN (Eds.), ***Industrialization and Growth***, Washington DC: Oxford University Press.

CHENERY, H.B. and SYRQUIN, M. (1989); ***Patterns of Development 1950-1983***, World Bank Discussion Papers, No: 41, Washington DC.

CLARK C. G. (1940); ***The Conditions of Economic Progress***, London: Macmillan.

CRAFTS, N.F.R. (1984); "Patterns of Development in Nineteenth Century Europe", ***Oxford Economic Papers***, 36, 438-458.

CRAFTS, N.F.R. (1991); ***British Economic Growth During The Industrial Revolution***, Oxford: Clarendon Press.

FLOUD, R.C. and McCLOSKEY, D.N. (1981); ***The Economic History of Britain Since 1700***, Volume:1, Cambridge: Cambridge University Press.

HATİBOĞLU, Z. (1978); ***An Unconventional Analysis of Turkish Economy: An Essay on Economic Development***, İstanbul: Aktif Büro.

HOBSBAWM, E.J. (1968); ***Industry And Empire***, London: Weidenfeld and Nicolson.

INGHAM, B. (1995); ***Economics And Development***, Cambridge: McGraw-Hill, Inc.

KUZNETS, S.S. (1971); ***Economic Growth of Nations: Total Output And Production Structure***, Cambridge, Mass.: Belkamp.

KUZNETS, S.S. (1973); "Modern Economic Growth: Findings and Reflections", ***American Economic Review***, 63, 3, 247-258.

O'BRIEN, P.K. and KEYDER, Ç. (1978); ***Economic Growth in Britain And France 1780-1914***, London: George Allen and Unwin.

SMITH, M.A. (1992); ***Food And Hunger in Sub-Saharan Africa***, University of Sussex, unpublished D.Phil Thesis.

SOLOW, R.M. (1977); "Comment on Chenery" in B. OHLIN, P.O. HESSELBORN and P.M. WIJKMAN (Eds.), ***The International Allocation of Economic Activity***, London: Macmillan.

SYRQUIN, M. (1991); "Patterns of Structural Change", in H.B. CHENERY and T.N. SRINIVASAN (Eds.) ***Handbook of Development Economics***, Volume: I, Netherlands: Elsevier Science Publishers B.V.

TODARO, M.P. (1994); ***Economic Development***, New York: Longman.

TÜRKKAN, E. (1981); "İktisadi Gelişme Teorisinde "Mukayeseli Geçiş Ekonomisi" Yaklaşımı ve Türkiye Örneği ("The Comparative Transition Economy" Approach in The Theory of Economic Development And The Turkish Case), ***Hacettepe Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi***, 1, 4, 1-16.

WOOD, A. (1986); ***Growth and Structural Change in Large Low-income Countries***, World Bank Staff Working Paper, No: 763, Washington DC.