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ABSTRACT

The basic idea explaining the relationship between economic growth and income distribution is the "U- shaped hypothesis" postulated by Simon Kuznets. This can be shown in a dual-economy model with technical progress. Initially, inequality is low, but as labour participation in the modern sector increases, higher wages in this sector tend to increase inequality. However, if enough labour is incorporated in the modern sector, wage inequality begins to diminish. Income inequality continues to worsen between the two sectors, if a new modern economy (e.g. IT-based technical change) is introduced and potential GDP shifts to a new trajectory before the turning point is reached. In a globalised word, the substantial unskilled-labour-saving technical progress puts pressure on wages of unskilled workers (in industrialized countries). Also, globalization may be blamed for leaving many nations and millions of people out from reaping the benefits of globalization. This problem can only be overcome by appropriate reforms of the international economic system.

Keywords: Economic Growth, Income Distribution, Globalization.

JEL Code: D31, O11.

RESUMEN

La idea básica que explica la relación entre crecimiento económico y distribución del ingreso es la "hipótesis en forma de U" postulada por Simon Kuznets. Esta puede surgir en una economía dual con progreso técnico. Inicialmente, la desigualdad es baja, pero mientras la participación del trabajo en el sector moderno sube, mayores salarios en este sector favorecen un incremento de la desigualdad. Sin embargo, si suficiente trabajo se incorpora al sector moderno, la desigualdad salarial comienza a disminuir. La desigualdad de ingresos continúa deteriorándose entre los dos sectores, si un nuevo sector moderno (p.e. el cambio técnico basado en la informática) es introducido y el PBI potencial se mueve hacia una nueva trayectoria antes que el momento decisivo es alcanzado. En un mundo globalizado, el substancial ahorro de trabajo no calificado debido al progreso técnico ejerce presión sobre los salarios de los trabajadores no calificados (en los países industrializados). También, la globalización puede ser culpada por dejar a muchas naciones y millones de personas fuera de los beneficios de la misma. Este problema solo puede ser resuelto por las reformas apropiadas del sistema económico mundial.

Palabras Clave: Crecimiento Económico, Distribución del Ingreso, Globalización

Clasificación JEL: D31, O11.

I. INTRODUCTION

It has long been recognized that the rate of economic growth and the degree of equality (or inequality) in the distribution of incomes and wealth are not independent. Indeed, it seems plausible that the two are mutually interdependent: growth rates affect distribution, and the distribution affects growth. One of the most popular hypotheses with respect to this interrelationship is Simon Kuznets' more than half a century old "u-shaped hypothesis" (1955). It postulates that income inequality first increases and then decreases during the development or growth process.

Although extensively tested and empirically confirmed, the hypothesis is missing a rigorous explanation. Kuznets' own argument was based in particular on the inter-sectoral transition from agriculture to industry. In his own words, it is caused by "a shift away from agriculture, a process usually referred to as industrialization and urbanization" (Kuznets 1955, p. 7). His particular case was the transition from egalitarian agriculture to a mixed industrial economy, followed by the decline of the

share of the rural population and the democratization of industry, combined with modern industrial relations and the rise of the welfare state.

In the following, the Kuznets' hypothesis is shown to follow from a simple two goods two sector model of economic growth based on the Harris-Todaro (1970) migration model. In the third section, technological change in the modern sector is incorporated, showing that the Kuznets' hypotheses may be disturbed. However, the "new growth theory" introduced in the fourth section allows to take into account also political solutions. A macroeconomic or global view closes the arguments.

II. A Simple Model to Capture Kuznets' Hypothesis

As a starting point, a simple Harrod - Domar growth model is used. The idea behind is that, as discussed in the earlier literature, labour and capital are rather complements within the same technology[1] than substitutes. Furthermore, in much of the history, growth has been more constrained by the lack of capital than by a shortage of labour.[2]

Denoting by Q_i the two outputs, by K_i capital stock in the two sectors, and by b_i the capital productivity or by its inverse $1/b_i$ the incremental capital – output ratio (ICOR), and by Li the labour employed in each sector ($i = A, M$), the two sector two goods model reads as follows:

• Traditional Sector

$$Q_A = b_A.K_A \ \ and \ \ K_A/L_A = C_A$$

• Modern Sector

$$Q_M = b_M.K_M \ \ and \ \ K_M/L_M = C_M,$$

where the capital/labour ratio will be fixed in every sector.

• Price of the traditional good

$$P_A = P_M \ (Q/L_A/Q/L_M),$$

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1. We can here argue also along very modern lines developed by Aghion and Howitt (1998, chapter 8), taking up the idea of a "general purpose technology" (GPT) that affects the entire economic system.

2. Cf. the influential papers by Arthur W. Lewis about economic development with unlimited supplies of labour; cf. e. g. Lewis (1954).

The price of the traditional good is a function of the ratio of the per capita income in the traditional sector to that of the modern sector times the price of the modern sector. In other words, the relative prices are a function of the relative demands.[3] This hypothesis also reflects the stylized fact that high per capita income countries produce modern goods which command higher prices on the world market, while poor countries produce mainly raw or traditional goods.

• The real wage in each sector

$$w_A \; = \; P_A.C_A/ICOR_A = P_A Q_A/L_A$$

and

$$w_M = P_M.C_M/ICOR_M = P_M Q_M/L_M \,,$$

which equal, as shown, the respective marginal revenue products.

Furthermore,

$$L_T = L_A + L_M$$

with LT as total labour force. Disguised unemployment can exist, but only in the traditional sector[4].

As long as the modern sector wage is higher than the traditional sector wage there will be migration from the traditional to the modern sector (cf. Harris and Todaro, 1970).

• The Gini coefficient

Defining by

$S_A = w_A.L_A/ (w_A L_A + w_M.L_M)$ the share of total income flowing to the traditional sector, the Gini coefficient is then given by

$$G = 1 – (2 \; area)$$

where area = $(S_A L_T + L_M)/ 2L_T$.

This is illustrated in Figure 1.

Since the wages are fixed in each sector, the area in Figure 1 is ½ if the entire labour force is in either of the two sectors of the economy

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3. An alternative formulation uses the income elasticities of demand for good *A* and *M.*

4. An interesting enlargement of the model could be in the direction of Bulow and Summers (1986), where an informal sector is introduced which is necessary to migrate through before one can apply for a job in the primary sector. This three sector model could then be used to explain the large informal sector of most developing countries.

(what makes it a one-sector economy). Hence, the Gini coefficient will be zero in both cases. During the migration process, the Gini coefficient will increase, reaching a maximum, and then decrease as more and more labour moves out of the traditional sector. This can be summarized in Hypothesis 1.

Hypothesis 1: Given the assumption about technology, the migration of labour from the traditional sector to the modern sector increases first the inequality, reaches a turning point and begins to improve as the traditional sector diminishes and marginal productivity in that sector raises wages on a par with the modern sector!

The inequality depends during the transition process on the distance of the relative wages in the two sectors.

Figure 1

Labour and income distribution during transition process
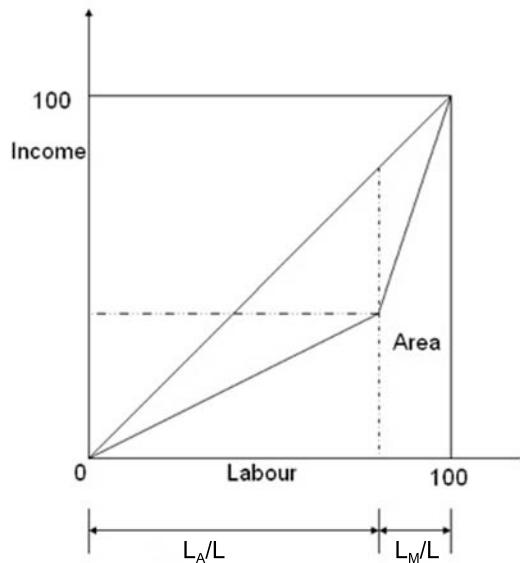
III. Technological Change in the modern Sector

With a more sophisticated dual economy model, it is possible to show that there may exist three different equilibria[5], e. g. by introducing increasing returns due to technological progress into the modern sector.

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5. Cf. e. g. Kylymnyuk, Maliar and Maliar (2007).

One equilibrium may be where the economy produces only the primitive good and converges to a low-income steady state. In other words, the movement from the traditional sector is (too) slow, and the Gini coefficient is (or becomes) fixed. As explained in the earlier literature, this can happen if not enough investment (or savings) can be generated to absorb the new entrants into the modern sector. The economy remains eventually technologically stagnant.[6]

A second possibility is that the country produces both the traditional and the modern, more sophisticated good, and converges to a medium-sized economy. Or it may specialize in the production of the modern good and then converges to a balanced growth path along Harrod - Kaldorian lines, where technological progress is incorporated.

A third possibility is that a new modern sector may be introduced at some point in time before the transition process is completed and the total labour force is integrated into the current modern sector.[7] Income inequality will continue to worsen between the two sectors. In a certain sense, there may be countries characterized by frequent innovations in GPT (as e. g. IT-based technical change) and a high demand for higher-level skills (like Japan, the United Kingdom and the United States) which tend to have higher inequality.[8] In other words, the process of equalization predicted by the Kuznets' hypothesis is interrupted. As Conceiçao and Galbraith (2001, p. 140) remark, "(t)he perhaps surprising fact is that technology, which had been credited for driving growth and prosperity, came equally to be blamed for this observed *increase* in inequality (italics added, R.E.) in developed countries".

Two sources could be mentioned which underline this general picture. Brandt, Burniaux and Duval (2005, p. 20) state that "gross earnings inequality has increased on average in OECD countries … This occurred in countries where labour market performance improved considerably …, as well as in countries where it deteriorated …". According to the widely-cited survey of Katz and Author (1999, p. 1465), "overall wage inequality and educational wage differentials have expanded greatly in the United States

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6. In this case, FDI or a stimulating internal investment via e.g. an incomes policy or redistribution policy can help to overcome this problem. Maybe this idea is also behind the "pro-poor growth" movement; cf. e. g. Menkhoff (2006).

7. This possibility is mentioned by Campano and Salvatore (1998).

8. This is discussed in Conceiçao and Galbraith (2001); cf. their Figure 7.3 on p. 157.

and the United Kingdom since the end of the 1970s … More modest increases in overall wage inequality and skill differentials in the 1980s and 1990s are apparent in most other OECD countries".

However, this general picture is in accordance with some of the modern literature fairly summarized by Aghion, Caroli and Garcia-Penalosa (1999). They ask two different questions: First, they ask whether inequality is always good for growth; secondly, they ask whether growth does increase earnings inequality. With respect to this second question, they remark, that "recent empirical studies have pointed to a substantial increase in earnings inequality in several OECD countries during the past twenty years" (ibid, p. 1632/3). These changes, they note, can be decomposed into three main elements: (1) an increase in educational wage differentials; (2) an increase in age-related wage differentials; and (3) an increase in within - group wage inequality.

In order, however, to explain earnings patterns and their change, it is necessary to understand the behaviour of supply and demand for different kinds of labour. As Jan Tinbergen (1975) pointed out, observed relative wages are the outcome of a "race" between the forces increasing the supply of skills (mainly education, but also experience) and those increasing the demand for skills required by firms (technological change). Tinbergen stated that "in the past seventy years that race was won by education" (1975, p. 103) thus resulting in falling relative wages. However, recent trends (and Tinbergen's own extrapolation for the 1990ies) indicate that there has been an acceleration of the relative demand for skills increasing the skill premium. This can be shown with the help of a simple supply and demand diagram (cf. Figure 2).

In the short-run supply is fixed, in the long-run the supply curve is horizontal where everybody has chosen to take education. Tinbergen's race can now be illustrated by shifts in demand and supply: if demand is more important (as shown in Figure 2) –i.e. technology is winning– then the relative wage of the skilled labour rises.[9]

And here, two factors can be made responsible for this acceleration (cf. Adrian Wood, 1998): The impact of trade with the rapidly growing economies in East Asia, and skill-biased technical progress.

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9. However, there exists also another explanation: The rising inequality may also be "due to an increase in the effective supply of low-skilled workers, through immigration or trade, driving down the wage", as Galbraith (2001, p. 6) has remarked.

Figure 2

Relative supply and demand for skilled/unskilled labour
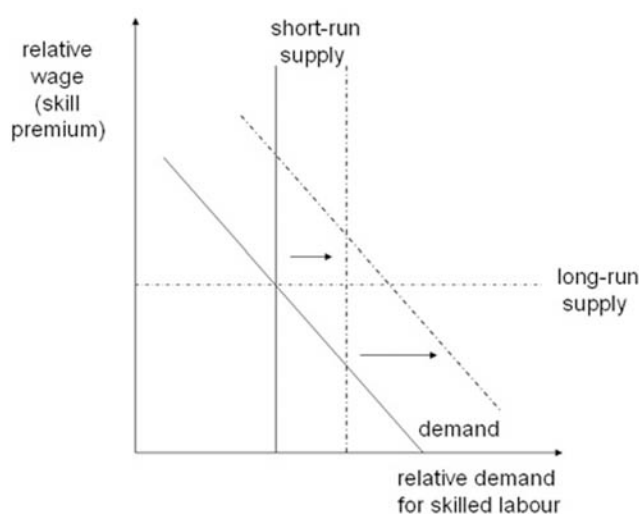
Source: Based on Johnson (1997, p. 44).

IV. THE IMPACT OF GLOBALIZATION: TRADE AND/OR TECHNICAL CHANGE

An interesting effect of globalization is the mentioned increasing gap between low-wage earners and high-wage earners (also in the same country or between countries). Without going here into the details, a growing (empirical) literature tries to sort out the impact of trade and/or skill - biased technological change on the observed rise of the skill premium. While opening trade between two countries, the different factor proportions (either between labour and capital or between low-skilled and high-skilled labour) change importance and with this the relative prices of the factors. This is the most important result of the Heckscher-Ohlin-Stolper-Samuelson (HOSS) model.

Even when some claim that trade is responsible only for a small part of this change in wage inequality, taking into account the role of imports as intermediate production factors then we can account for the steady rise in wage inequality across educational groups. The (larger) part

of this increase in the skill-premium, however, should be explained by technical progress on two different lines: Firstly, the acceleration in the diffusion of new technologies can lead to increasing wage inequality across skill groups (cf. Aghion and Howitt, 1998, chapter 8). Since about 60 percent of the increase in wage inequality over the past twenty years is within groups of individuals with the same educational level and the same experience, we need still another theory. Therefore, secondly, learning-by-doing and intersectoral mobility can be used to explain the increased wage inequality within educational groups (cf. e. g. Aghion, Howitt and Violante, 1998).

Given this view, skill-biased technical change and trade liberalization end up being complementary with the trade effect being carried over by technical change, as Aghion, Caroli and Garcia-Penalosa (1999, p. 1653) remark. This then can be summarized in Hypothesis 2.

Hypothesis 2: The effects of biased technical change on earnings inequality are "nonlinear": on the one hand, the acceleration in the diffusion of new technologies increases the skill premium until the new technology is applied in all sectors (and the supply of skilled labour keeps increasing because of education and experience). On the other hand, learning-by-doing and the transferability of knowledge through intersectoral mobility increase the within-cohort inequality until every worker has had some experience with the new technology. As summarized by Aghion, Caroli and Garcia-Penarosa (1999, p. 1655): "These two mechanisms thus tend to generate a kind of alternative Kuznets curve *(added, R.E.), with inequality first rising and then falling ... during the transition to a new technological paradigm".*

However, if technical progress is the crucial source of inequality whenever it is not neutral, that is, if it affects differently the productivity of the various types of labour, then the questions may be posed, when the skill-biased technical change emerged and which forces drive technical progress and in what direction. As remarked very early in the discussion by Joan Robinson (1962), technical progress does not fall from heaven like manna. Technical progress must be produced. This then leads us to the theory of induced technical progress (cf. for a traditional view Eisen, 1974, and for a modern version Acemoglu, 1998).

This idea of induced skill-biased technical progress is highly interesting, however, there seems to be a "chicken-egg" problem: goes

the direction from the Schumpeterian entrepreneur via induced technical progress to wages or from some macroeconomic causes down to technical progress and then wages or are wages determined on different grounds?[10] In other words: If it is the individual decision of entrepreneurs to spend money on (induced) technical progress to save costs (with respect to the more expensive production factor), then this would lead not to a global pattern which we can observe in the data. Individual entrepreneurs have different time horizons, different preferences, and differing costs. Therefore, one would expect actions at various times and the observed pattern should be stochastic or random.[11] Unless all countries, industries and entrepreneurs are hit almost at the same time by the same macro-economic shocks!

A superficial look at some date reveals the following picture (cf. e.g. Blanchard and Wolfers, 2000): while the labour share in GDP increases in the 1960s and until the mid-1970s, it declined dramatically since then (cf. ibid, Fig.4, p.C8). Labour demand shows little increment up to 1970, then increases up to 1980 and shows a strong decrease thereafter (ibid, p. C9). The change in the inflation rate is positive in the 1960s and until mid-1970s, however, is negative since then (ibid, Fig. 6, p. C11). Furthermore, while real interest rates were decreasing until the mid-1970s, since then they were increasing (ibid, Fig. 3, p. C7). And, most important, "(s)tarting in the early 1970s, Europe suffered a large decrease in the underlying rate of total factor productivity … growth" (ibid, p. C4 and Fig. 2, p. C5).

These data suggest, contrary to the theory of induced skill-biased technical progress, a pattern of macro-determination, where the different national experiences can be explained by the different positions of countries "in a nonlinear structure" (Conceiçao and Galbraith, 2001, p. 156). Or in other words, there seems to be a global pattern, starting in 1973 through 1980, the years of the first oil shock and the global increase of commercial debt inaugurating high economic growth and a decline of income inequality. Then from 1981 up to the end of the century, the second oil shock, Reagonomics and Thatcherism or the so called "neoliberal globalization", the years of debt crisis, the communist collapse, all together a profound change of the global economic system – and inequality of income within and between countries increased. However,

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10. There is a further problem, remarked by Thurow (1998), that, while the wage gap between high school and college graduates increased, real wages in both groups declined!.

11. This means that (the logarithm of) total factor productivity should follow a random walk.

the effects of these global forces (oil price increases, interest rate increases, FDI etc.) depend on the differing circumstances of the countries.

V. SUMMARY AND CONCLUSION

The idea of the "u-shaped hypothesis" postulated by Kuznets more than a half century ago, is a macroeconomic explanation, relating the process of inter-sectoral transition from agriculture (the traditional sector) to industry (the modern sector) with the evolution of economic inequality. Here it is shown that this hypothesis follows in a simple two goods two sector model of growth based on the Harris-Todaro (1970) model of migration. This is summarized in Hypothesis 1.

Introducing technical progress into the modern sector can lead to a different picture where the increase in inequality never stops. Examples of those countries introducing new technologies are Japan, the United Kingdom, and the United States. However, if one is interested in the development of "pay inequality" –which lies at the bottom of the Kuznets hypothesis as developed here– one observes "a substantial increase in earnings inequality in several OECD countries during the past twenty years" (as stated by Aghion, Caroli and Garcia-Penalosa, 1999, p. 1632/3). One strand of theory (e. g. Tinbergen's "race") explains this by relative shifts of demand and supply of different grades of labour, governed by trade and technical progress. This is summarized in Hypothesis 2. Following this line of argument further leads to the theory of induced skill-biased technical change.

Given this microeconomic view, one would expect that total factor productivity should follow a random walk. However, global data reveal a "global pattern". This may lead to another strand of theory, namely macroeconomics, thus stressing the macroeconomic background of Kuznets' explanation: Global changes happened in 1973 and in 1980/81 first decreasing and then increasing inequality within and between countries. This may best be summarized in Hypothesis 3.

Hypothesis 3: Globalization, trade liberalization and (induced) technical progress decrease inequality as long as they lead to high economic growth. However, globalization may be blamed for leaving many nations and millions of people out from reaping the benefits of globalization. This problem, however, can only be overcome by appropriate reforms of the international economic and financial system.[12]

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12. Cf. Stiglitz (2002).

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