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Kaldor's late contributions

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A Thesis

Presented to

The Faculty of Social Sciences

University of Denver

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In Partial Fulfillment

of the requirements for the Degree

Master of Arts

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by

Up Sira Nukulkit

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### **Abstract**

Nicholas Kaldor was a famous post-Keynesian theorist who fought on Keynesian revolution in Cambridge with Keynes himself. However, during the last twenty years of his life, Kaldor became engaged with increasing returns theory originated from Adam Smith and Allyn Young. Kaldor propagated the theory even though it was not mature. There were many controversies and critiques to Kaldor's increasing returns theory. Kaldor began to write extensively about this worldview scattered throughout many of his academic papers and essays. This thesis tracks Kaldor's process of theoretical formulation during the last twenty years of his life. It presents Kaldor's view from the first paper he wrote on increasing returns to his final essay. The thesis discusses both theoretical and historical aspects of each paper and essay in an attempt to understand Kaldor's theoretical development. Kaldor's late contributions is an evolution of a worldview. In the last chapter, the thesis provides a model of Kaldor's late contribution constructed from intuitions behind his writing.

## Table of Contents

Introduction.....	1
Chapter 1: Increasing returns: productivity and employment.....	5
Increasing returns, Verdroon's law, and demand .....	6
Constraint: labor and capital .....	10
Chapter 2: Reciprocal demand: the Two-Sector model and attacks on Say's law .....	22
The Two-Sector model .....	23
Attacks on Say's law .....	29
Chapter 3: The extent of the market: trade cumulative causation and reciprocal limits on growth .....	34
Trade cumulative causation .....	35
Reciprocal limits on growth .....	39
Chapter 4: Timeline and assessment of Kaldor's late contributions .....	45
Chapter 5: A model of Kaldor's late contributions .....	52
Bibliography .....	66

## List of Figures

Figure 1 Causality of Increasing Returns.....	17
Figure 2 Growth in the Two-Sector Model.....	27
Figure 3 Dynamic between $dI$ and $dI-1$ .....	57
Figure 4 Moving demand growth between $dI$ and $dA$ .....	58
Figure 5 Moving demand growth between $dI$ and $asS$ .....	59
Figure 6 Closed system of the model.....	60

## List of Tables

Table 1 Dynamic and the Balance of the Model.....	61
Table 2 Industrial Supply Shock and the Extent of the Market.....	63
Table 3 Industrial Supply Shock with no Market .....	64

## **Introduction**

Nicholas Kaldor had a unique worldview in contrast to those expressed in the mainstream economic literature. Although closely related to Kaldor's Cambridge post-Keynesian origins, the view was a breakthrough in terms of many revolutionary concepts. During the last two decades of his life, Kaldor formulated a theory that he claimed reflect more to reality. Kaldor's methodology of economics was based on empirical observations. His concern with the practicality of the theory led him through various political issues in economics. Kaldor wrote extensively about this worldview scattered throughout many of his academic papers and essays. His formulation should be considered as a high theory. Kaldor followed Adam Smith and Allyn Young in perceiving economics from a unique perspective. Writings in the last two decades of Kaldor's life were an attempt to formulate this theory.

Prior to these late contributions, Kaldor was one of the founders of post-Keynesian economics which concerned with economic growth and the nature of capital accumulation. Kaldor was very prominent by what are now called his Mark I and Mark II models, which were Keynesian models on saving and investment schedules, demand led growth and technical change. However, his late writings represented a substantial departure from post-Keynesian economics. Kaldor rarely mentioned his late formulation as along the post-Keynesian conceptual line. Although Kaldor sometime made use of

Keynesian concepts, the descriptions were used to explain the mechanism of his increasing returns, demand constraint and the extent of the market. The concept of increasing returns redefines the former paradigm of growth and capital accumulation. His models in the last two decades, which were called Mark III and Mark IV by prominent Kaldorians assumed implicit capital accumulation, which to some extent undermines the robustness of the traditional growth theory originated from Harrod-Domar model. Palumbo suggested that Kaldor's formulation of his late contributions is also a deviation out of the post-Keynesian framework.<sup>1</sup>

Kaldor's first breakthrough was on increasing returns and industrial production, presented in the two lectures: "Cause of the slow rate of economic growth of the United Kingdom" (1966) and the "Strategic factors in economic development" (1967). In the lectures, he attempted to establish industry as an engine of growth with the increasing returns to industry, and Verdoorn's law. During post-World War II, the poor economy in the United Kingdom was the subject of an ongoing debate. Engaging with the Labour government politics, Kaldor tried to explain the United Kingdom's poor performance in industrial production with his new theory. Kaldor's ideas stirred up both academic and public interest due to its relevance to the United Kingdom post-war situation. Kaldor gave empirical evidence of increasing returns by running many regressions from global economic data. Kaldor's new stance, as presented in the lecture, became quite controversial.

Even as early as these breakthrough lectures we can see that Kaldor's concerns with empirical data were based on a particular vision. While Kaldor emphasized the importance of reality, he also provided the readers with the theory that he had in mind. A series of papers were published in the process of his formulation of the theory, in an attempt to construct solid theoretical foundations from what he proposed in the lectures in 1966-67. After introducing increasing returns, Kaldor went on to describe demand constraints and the extent of the market. The ideas came out through many aspects depending on the political and academical context that Kaldor would like to address.

Kaldor's writings scattered in the 70s and 80s addressed many issues, but they were based on the same theoretical vision. He addressed why some countries are poor and some countries are rich, regional trade restrictions, the effect of devaluation, the infant industry argument, the capital/labor ratio in economic development, attacking the neoclassical equilibrium theory and Say's law, addressing the poor performance of the United Kingdom's economy and many more economic concerns with one single theoretical vision based on the frame work of Adam Smith and Allyn Young under the notion that the division of labor depends on the extent of the market. The formulation of the theory evolved through various phases. There was no single writing that summed up his real thought. Kaldor often changed his mind based on empirics and critiques, and he formulated the theory according to the current issues. The vision he had in the last two decades of his life evolved and scattered around many of his writings.

The first chapter of this thesis focuses on Kaldor's increasing returns and the controversial aspects of surplus labor and employment between sectors. The second chapter discusses the demand and supply reciprocal model and how Kaldor attacked the neoclassical equilibrium theory and Say's law. The third chapter focuses on trade and sustained economic growth. The first three chapters are designed to give reader both the theoretical aspects and the conceptualization of Kaldor's late contribution. Each of them is divided into two parts where the first part focuses on theory and the second part on its formulation. The fourth chapter provides a conclusion and an assessment of Kaldor's late contributions. The thesis is an attempt to unify Kaldor's formulations during the last two decades of his life. Kaldor was a prominent post-Keynesian throughout his career as an economist. However, Kaldor's late contributions contradicted the neoclassical equilibrium theory and yet were not in line with the traditional post-Keynesian theory.

At the end of Kaldor's biography, A. P. Thirlwall suggested that "Kaldor's work was not unified and sustained enough to be able to credit him with a major revolution of thought comparable to the 'Keynesian revolution' or the earlier 'marginalist revolution'." <sup>2</sup> The thesis suggests instead that the theory Kaldor was trying to formulate in the last two decades of this life was a breakthrough, and it could have been Kaldor's unfinished *magnum opus*.

#### Notes

<sup>1</sup> Palumbo (2009)

<sup>2</sup> Thirlwall (1987), p.331

## **Chapter 1**

### **Increasing returns: productivity and employment**

Increasing returns was Kaldor's first breakthrough concept. In the 1966-67 lectures, he focused on the dynamics and the details behind increasing returns. Instead of only the existence of increasing returns, the question became what contributed to the mechanism of increasing returns. Kaldor explained increasing returns by using the dynamic of employment and productivity as the foundation. Even though he used increasing returns as a starting point, Kaldor did not neglect the explanation and did not take increasing returns for granted. First, there were statistic regressions to prove the existence of increasing returns. Second, he provided Verdroon's law as an explanation of the increasing returns in addition to the common aspects of the division of labor and the economy of scale. Verdroon's law was a modern explanation of increasing returns due to the increase in productivity and employment. The exponential rise in production was a result of labor productivity and the shift of employment. However, there was also a causality problem between output and productivity. Kaldor was struggling to explain the mechanism of the process, the formulation of which became controversial. The theory became more crystallized in response to critics, as evidenced in his later writings. The formulation of the theory focused more on the mechanism rather than the notion of increasing returns itself.

The controversial lectures were published around the same time, and the latter one was an updated version of the first. As mentioned, Kaldor already had in mind the theory behind his empirical evidences. Kaldor acknowledge the influence of Adam Smith, followed by Alfred Marshall, and ,most importantly, Allyn Young: "Adam Smith, Alfred Marshall, and Allyn Young have all stressed the interplay of static and dynamic factors in causing returns to increase in response to an increase in the scale of industrial activities."<sup>1</sup> Kaldor took from Allyn Young that increasing returns was a macro phenomenon. With increasing returns, economic development tended to be commanded by the progress of industry. In the lectures, Kaldor proved increasing returns to industry by giving statistical estimations. He included numerous regressions on GDP growth, sectors output growth, employment growth, and productivity growth. Kaldor used modern statistical estimation to explain increasing returns in addition to the explanations of Smith, Marshall, and Young. He asserted that the phenomenon of increasing returns was a result of labor productivity growth and employment growth that are constrained by the output growth. The regressions were from data for twelve industrial countries from 1953/54 to 1963/64. A summary of the growth laws can be found in "A plain man's guide to Kaldor's growth law."<sup>2</sup>

### Increasing returns, Verdroon's law, and demand

Increasing returns is a macro phenomenon specific to the industrial sector. There are three laws extracted from the regressions: an explanation of increasing returns as an interrelated system of sectors, output, employment, and productivity. Kaldor's first law

from the regressions proves that industry is an engine of growth. There are dynamics of growth between sectors, and the industrial sector is the center of the dynamic. The second law or Verdroon's law is the mechanism of increasing returns in industry. Increasing returns is a result of growth in employment and labor productivity. The third law sets the limit for increasing returns in industry. The growth of productivity and employment from Verdroon's law follow only through the growth from demand of output. Kaldor saw the three aspects as an interrelated whole. The two lectures focused on the interplay of these three aspects of Kaldor's growth laws.

Industry is an engine of growth. In the regressions between 1953 to 1964 of twelve industrial countries Kaldor proved that manufacturing growth led to the overall growth of the economy without the help of other sectors. He ran many regressions to cross check for other possibilities, to determine if manufacturing was really the sole engine of growth. For example, Kaldor ran nonmanufacturing output growth with GDP growth and found no correlation between them. In another regression, he commented on the relation of service sectors growth and the GDP growth as having a one-to-one ratio. With these two results, Kaldor concluded that nonmanufacturing growth did not drive GDP growth, and service growth was a byproduct of the overall growth. The first law did not focus on the nature of increasing returns except to note that increasing returns in industry exist. Empirical evidences supported Kaldor's hypothesis that increasing returns to industrial sector leads to the growth of other sectors. Increasing returns is a process that revolves around industry.

Verdoorn's law was named after an economist who first ran empirical statistic on increasing returns. The second growth law is the most famous and the most controversial. It was given "to suggest the view that the growth of output must have played a major part in the determination of the productivity growth"<sup>3</sup>. The law shows the relationship of output growth to productivity growth and employment growth. Increasing returns in production is a result of increase in output per person and the shift of employment. This increase in labor productivity, which is induced by the growth of output, provides increasing returns to industry. However, Verdroon's law is also associated with employment. It is a complex relation of output, productivity and employment. An increase in labor productivity increases output, but an increase in employment can increase the output, too. There arises a question of causality between output to employment and productivity.

Growth of output is equal to productivity growth plus employment growth ( $g=p+e$ ). According to Kaldor's regression, "the equation suggested that each percentage addition to the growth of output with a .5 percent increase in employment in manhours and is associated with a .5 percent increase in productivity."<sup>4</sup> Hence, employment growth and productivity growth contributed equally to an increase in output. Even though Kaldor asserted that it was demand growth of output that governed Verdroon's law, it is possible that an insufficient transfer of employment to the manufacturing sector halts the increasing returns process. In a comment in a chapter on "Advance Countries and Mature Economies", Kaldor explicitly stated that the poor performance of the United Kingdom industrial sector was a result of labor supply constraint. The post-war United Kingdom

could not draw employment from the labor surplus sectors which prevented its growth. This notion of supply constraint was very controversial, which we will discuss in the following section. Kaldor later retracted this labor supply constraint to the demand of output constraint.

Kaldor's third law sets the limits to increasing returns. In response to the critics of his labor supply constraint, Kaldor ran two regressions to prove that GDP growth correlated to an increase in manufacturing employment and not to nonmanufacturing employment. Labor transfer to the manufacturing sector had an impact on GDP growth. The data supported Verdroon's law, that growth in employment is necessary for increasing returns in output. However, according to Kaldor, the transfer of labor is within a condition under the demand constraint.

"The higher the rate of growth of industrial output which these demand conditions permit, the faster will be the rate at which labour is transferred from the surplus-sectors to the high productivity sectors. It is my contention that it is the rate at which this transfer takes place which determines the growth rate of productivity of the economy as a whole."<sup>5</sup>

Hence, if the economy was not constrained by demand, manufacturing employment should increase according to output growth along with labor productivity. The post war United Kingdom suffered a condition Kaldor called a "mature economy." Wages in the manufacturing sector and service sector of the United Kingdom were at the same level preventing the transfer of labor to manufacturing. In his defense of the labor-constrained mature economy, three more regressions show that an increase in the overall productivity correlated with an increase in manufacturing employment but not with non-manufacturing employment. There should be a transfer of labor to manufacturing as long

as the wages in the manufacturing sector are higher than those in the rest of the economy. Labor supply constraint is a situation where the industrial sector cannot extract labor from the agricultural sector and the service sector because of the inelasticity of wage differences between sectors. The third law was the regressions of GDP and employment. Kaldor showed that labor transfer to manufacturing is needed for increasing returns under demand constraint.

The three growth laws have to be considered as an interrelated whole. In his later writings, Kaldor frequently relied on the lectures in 1966 and 1967 as the basis for his argument. The first law establishes that industry is an engine of growth. The second law explains the mechanism of increasing returns. It is important to emphasize that Kaldor saw increasing returns as coming from labor productivity and the shift of employment from the surplus sector. The third law set the limit to increasing returns under the condition of demand. Under the three growth laws, economic growth was a dynamic between sectors revolving around the industrial sector.

#### Constraints: labor and capital

At the start of the lectures' second chapter, Kaldor referred to Allyn Young's two conditions of self-sustained growth: returns must increase, and the demand for commodities must be elastic. He described the latter condition as

"in the special sense that a small increase in its supply will be attended by an increase in the amounts of other commodities which can be had in exchange for it. Under such conditions an increase in the supply of one commodity is an increase in the demand for other commodities, and it must be supposed that every increase in demand will evoke an increase in supply."<sup>6</sup>

Kaldor pointed out the two constraints that can limit the growth of an economy: supply and demand.

There are three main sources of demand: consumption, investment, and export. Consumption relates to income. At the low level of income, real income is given to food. Income elasticity for manufacturing goods is higher in the intermediate zone. Then, service goods dominates the consumption of high income. Keynesian investment also contributed to demand as a recurring process under the entrepreneur confident. Kaldor commented that "the manufacturing sector generates demand for its own products in the very process of supplying them"<sup>7</sup>. However, this aspect of Keynesian recurring investment as the source of growth in demand was abandoned in Kaldor's later writings. Kaldor focused more on the agricultural sector as the provider of demand where the capitalist sector "cannot grow on its own, lifting itself by its own bootstraps."<sup>8</sup> This thesis will return to this demand aspect in later chapters. The third source of demand was exports. To sustain development, Kaldor said that countries have to enter a certain stage where they become exporters of industrial goods. This aspect was emphasized many times in his writing after the 1966 and 1967 lectures. Kaldor saw export as the source of cumulative causation answering the question of why some countries are poor and some countries are rich. A country is poor, if it cannot take advantage of the export demand. The demand from trade is also the link to the notion of the extent of the market.

Supply constraints are the most interesting aspect of the two lectures. Kaldor briefly mentioned commodities input as one possible constraint when the industrial sector

starts to expand. A large industrial sector generates the demand for goods from the primary and tertiary sectors. It requires food from the primary sector and service from the tertiary sector. However, he saw this commodities input constraint as a trade constraint that can be imported in an open economy. The constraint is the balance of payments problem rather than the resource constraint problem. Industry cannot stand alone in a dynamic economy. It requires the resource input from the primary sector. However, this resource constraint is actually a trade demand constraint. The balance of payments constraint will be the subject that Kaldor later emphasized as a demand constraint.

The controversial aspect of the lectures was the labor supply constraint. Production consisted of both capital and labor. However, Kaldor did not regard capital as a constraint to growth. Capital was an essential input for production, but savings and investment are easily induced from profit. Kaldor commented that "savings that are necessary for a higher rate of growth of capital are self-generated by the production process."<sup>9</sup> Hence, Kaldor was left with manpower as the only supply constraint. He explicitly used the labor supply constraint to comment on the United Kingdom's poor industrial performance. The United Kingdom's manufacturing sector during the post war period was incapable of

"drawing labour from service since earning in the two sectors were nearly the same. Inelasticity in the supply of labour seems to me the main constraint limiting the growth potential of the United Kingdom in a way in which it is not true of any other advanced country."<sup>10</sup>

This assertion was based on Verdroon's law that explains increasing returns by the relationship of output to productivity and employment. Kaldor saw that "productivity

increase is not sufficient in itself to obviate the need for a faster growth of manpower. Increased productivity provides only one-half of the additional resource required; we still need increased employment for the other half."<sup>11</sup> The industrial sector needed a transfer of labor from the surplus sector for increasing returns to be realized, especially in the United Kingdom where earnings in service and industry were nearly the same, preventing the dynamic transfer of labor. Kaldor called this stage "economic maturity". It was uncharacteristic for a prominent Keynesian to advocate supply causality.

It was suggested by his biographer that Kaldor might use the labor supply constraint to justify the Selective Employment Tax which was introduced by the United Kingdom Labour government. The first attack on the labor supply constraint came from Wolfe. Wolfe argued that this labor movement "is a matter of population and immigration."<sup>12</sup> A labor shortage can be solved easily with immigration and population growth. In a reply<sup>13</sup> to Wolfe, Kaldor explained that his labor supply constraint refer to the failure the industrial sector to induce labor from the primary and tertiary sectors even when there was a surplus labor in those sectors. Kaldor provided empirical evidences of this with the third law regressions that demonstrated the relation of GDP to employment. The growth of the overall GDP requires the transfer of labor from the surplus sector under the condition of demand for output.

Years later, R. E. Rowthorn wrote an article<sup>14</sup> to critique Kaldor regarding the relationship between manufacturing output growth and employment growth. To Rowthorn, this law cannot hold as a simultaneous increase in both manufacturing output

and employment. Rowthorn attacked Kaldor's method of regression and the use of outstanding Japanese data as creating biases. Japan, at the time, was the most successful industrial country. Without Japan, the simultaneous increase in manufacturing output and employment did not hold true in Kaldor's regressions. Interestingly, Rowthorn's objections to Kaldor's claim of a relation between manufacturing output growth and employment were with reason. Rowthorn later carried this argument to his book "De-industrialization and foreign trade"<sup>15</sup> where an increase in manufacturing productivity goes in the opposite direction to manufacturing employment. The book is a standard text on deindustrialization literature. It discusses cases in which manufacturing employment dropped sharply in developed countries. Rowthorn's intention was not to contradict increasing returns in labor productivity. He commented that

"the purpose of my article was narrow, being to criticize his view of the importance during the nineteen fifties and early sixties of industrial economies of scale of the type associated with Verdoorn, and his theory that during this period Britain's slow growth of industrial productivity was due to a shortage of labour which prevented her from exploiting such economies of scale."<sup>16</sup>

Kaldor replied that he had since abandoned his hypothesis on economic maturity of wage differences between sectors. His concern was to find empirical support for Verdoorn's law. The employment regressions were intended to prove that increasing returns also came from labor productivity. Because output growth is equal to growth in productivity plus growth in employment;  $g=p+e$ , if employment is less than unity, the other source of increasing returns has to be labor productivity. Hence, labor productivity is the source of increasing returns in production. As an answer to Rowthorn's deindustrialization, Kaldor stated, "I nowhere suggested in my lecture that a statically

significant positive correlation between  $p(\text{productivity})$  and  $e(\text{employment})$  is a necessary test of the Verdroon Law"<sup>17</sup> which was not contradicted by Rowthorn deindustrialization hypothesis. Productivity and employment do not have to increase simultaneously for increasing returns to be realized.

The debate on Verdroon's law was very complicated. Both Kaldor and Rowthorn had their points, which require careful consideration. To the author, the only difference on their assumptions was the stage of demand for output in the post-war United Kingdom. Kaldor implied that there was still enough demand for output for industrial growth, which required a transfer of labor to the industrial sector, where as Rowthorn saw the shift of demand out of the industrial sector to the service sector during the post-war era. They arrived at different conclusions because of this assumption of the state of demand. Their models of the dynamic between sectors are different. To Kaldor, with a potential demand in industrial sector, labor supply constraint prevented the growth of the United Kingdom's industrial sector. To Rowthorn, there was no demand for industrial output. Hence, as labor productivity increased, industrial employment had to decline.

One last important point was the role of capital and investment to increasing returns. Verdroon's law established that increasing returns was a result of an increase in labor productivity and the transfer of surplus labor to industry. Capital investment did not increase labor productivity on increasing returns. Kaldor was very clear on this point in the appendix to the lectures and also in his later writings. He added that increasing returns was a macro phenomenon. It does not relate to investment.

Kaldor presented more regressions on the issue, adding an investment/output ratio to Verdroon's law. Investment affected the growth of productivity, but it was at a negligible level. "Thus, if we look for the effects of investment behavior on productivity growth... the effects of relatively high or low investment on productivity growth are far more readily discernible."<sup>18</sup> The regressions showed that there was no increasing returns relation between productivity and capital investment. Kaldor also emphasized this result in a reply to Wolfe. Verdroon's law was not an embodied of the technical change as in the modified Cobb-Douglas production function:  $Y=Ae^{ct}K^aL^b$ . The shift of technical progress function had a different characteristic than the increase of labor productivity which was a macro phenomenon. In other words, technical progress cannot be considered as having the same effect as increasing returns. In *Advanced Technology in a Strategy of Development*<sup>19</sup>, Kaldor stated that a higher capital/labor ratio does not imply a higher capital/output ratio. With increasing returns, Kaldor did not regard "the supply of capital as a serious limitation of economics growth."<sup>20</sup> The growth of supply of capital is implicit, along with increasing returns production.

The concept of increasing returns was not new. Kaldor traced the origin of the concept to Adam Smith and Allyn Young. Growth under increasing returns captivated Kaldor for the last twenty years of his life. The concept of increasing returns represented the start of Kaldor's formulation of his late contributions. Kaldor had a grand vision that was a breakthrough from neoclassical theory and even from his post-Keynesian root. The first chapter of this thesis discusses Kaldor's increasing returns with respect to the three growth laws. Kaldor explained increasing returns as dynamic between sectors in a

process of economic development. Increasing returns is a macro phenomenon related to the transfer of employment and the increase of labor productivity according to Verdroon's law. The growth process under increasing returns is limited only by the demand condition. The concept generated controversy. Kaldor wrote many more articles to build the theoretical foundations for the vision he had in mind.

### First law regressions

The first law shows the dynamic of increasing returns center around manufacturing industry. (1) Growth of manufacturing output leads to GDP growth. (2) Growth of manufacturing output leads to growth of nonmanufacturing output. (3) Confirms that manufacturing drove GDP growth without the help of the nonmanufacturing sector. (4) The coefficient is near unity which suggests that it should be GDP growth that leads to service growth.

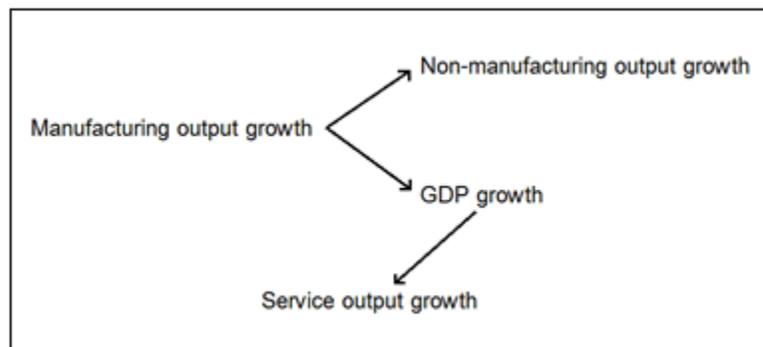


Figure 1 Causality of Increasing Returns

(1) Growth of GDP (Y) on Growth of Manufacturing Output (X)  
$$Y = 1.153 + 0.614X, \quad R^2 = 0.959$$
$$(0.040)$$

(2) Growth of Non-Manufacturing Output (Y) on Growth of Manufacturing Output (X)

$$Y = 1.142 + 0.550X, R^2 = 0.824 \\ (0.080)$$

(3) Growth of GDP (Y) on Growth of Excess Manufacturing over Non-Manufacturing Output (X)

$$Y = 3.351 + 0.954X, R^2 = 0.562 \\ (0.267)$$

(4) Growth of GDP (Y) on Growth of GDP in Service (X)

$$Y = -0.188 + 1.060X, R^2 = 0.930 \\ (0.092)$$

(5) Growth of Service Output (Y) on Growth of Industrial Production (X)

$$Y = 1.283 + 0.597X, R^2 = 0.846 \\ (0.0805)$$

### Second law regressions

E is the growth of employment, P is the growth of productivity, and X is the growth of output. Verdroon's law is true to manufacturing and industry (6), (8), (9). Kaldor made comments on the compatibility of each sector to Verdroon's law. Manufacturing, construction, and the industrial sector as a whole are on the criteria of Verdroon's law. (13) Commerce had a significant regression on productivity and output. However, the movement of labor to commerce had no relation to the productivity.

(6) Manufacturing

$$P = 1.035 + 0.484X, R^2 = 0.826 \\ (0.070)$$

$$E = -1.028 + 0.516X, R^2 = 0.844 \\ (0.070)$$

(7) Public Utilities

$$P = 2.707 + 0.419X, R^2 = 0.451 \\ (0.154)$$

$$E = -2.690 + 0.577X, R^2 = 0.609 \\ (0.154)$$

(8) Construction

$$P = -0.543 + 0.572X, R^2 = 0.810 \\ (0.092)$$

- $E = 0.552 + 0.428X, R^2 = 0.702$   
(0.092)
- (9) Industrial Sector as a Whole  
 $P = 0.888 + 0.446X, R^2 = 0.847$   
(0.060)  
 $E = -0.888 + 0.554X, R^2 = 0.893$   
(0.060)
- (10) Agriculture  
 $P = 2.700 + 1.041X, R^2 = 0.812$   
(0.155)  
 $E = -2.684 - 0.056X, R^2 = 0.844$   
(0.155)
- (11) Mining  
 $P = 4.0714 + 0.671X, R^2 = 0.705$   
(0.153)  
 $E = -4.0714 + 0.329X, R^2 = 0.365$   
(0.153)
- (12) Transport and Communication  
 $P = 2.314 + 0.224X, R^2 = 0.102$   
(0.252)  
 $E = -2.314 + 0.776X, R^2 = 0.576$   
(0.252)
- (13) Commerce  
 $P = -1.751 + 0.953X, R^2 = 0.923$   
(0.098)  
 $E = 1.744 + 0.056X, R^2 = 0.044$   
(0.098)

### Third law regressions

GDP growth as a whole relies on the movement of employment to manufacturing.

(14) is significant, while (15) is not. (16), (17), (18) are Kaldor explanation of economic maturity on wage in different sectors.

- (14) Growth of GDP (G) on Growth of Manufacturing Employment ( $E_M$ )  
 $G = 2.665 + 1.066 E_M, R^2 = 0.828$   
(0.15)
- (15) Growth of GDP (G) on Growth of Total Employment ( $E_g$ )  
 $G = 4.421 + 0.431E_g, R^2 = 0.018$

- (0.994)
- (16) Growth of GDP Per Person (P) on Growth of Manufacturing Employment ( $E_M$ )  
 $P = 1.868 + 0.991 E_M, R^2 = 0.677$   
(0.216)
- (17) Growth of GDP Per Person (P) on Growth of Non-Manufacturing Employment ( $E_{NM}$ )  
 $P = 4.924 - 1.800 E_{NM}, R^2 = 0.427$   
(0.660)
- (18) Growth of GDP Per Person (P) on Growth of Manufacturing Employment ( $E_M$ ) and Growth of Non-Manufacturing Employment ( $E_{NM}$ )  
 $P = 2.899 + 0.821 E_M - 1.183 E_{NM}, R^2 = 0.842$   
(0.169) (0.387)

Increasing returns and investment

E is the growth of employment, P is the growth of productivity, X is the growth of output, and I is the gross investment/output ratio. Kaldor used data from industry instead of manufacturing because of the lack of detailed data on investment in the manufacturing sector. We can see that the coefficients for investment are near zero.

- (19) Industrial sector (12 countries, 1953-54-1963-64)  
 $P = .527 + .356X + .0481I, R^2 = 0.880$   
(.079) (.029)
- (20) Industrial sector (11 countries without canada , 1953-54-1963-64)  
 $P = .709 + .356X + .0481I, R^2 = 0.960$   
(.047) (.017)
- (21) Industrial sector (12 countries , 1953-54-1963-64)  
 $X = 2.06 + .1.614E, R^2 = 0.893$   
(.176)
- (22) Industrial sector (12 countries , 1953-54-1963-64)  
 $X = .835 + 1.367E + .097I, R^2 = 0.940$   
(.168) (.037)
- (23) Industrial sector (11 countries without canada , 1953-54-1963-64)  
 $X = .937 + 1.320E + .105I, R^2 = 0.986$   
(.085) (.018)

## Notes

- <sup>1</sup> Kaldor (1967), p.13
- <sup>2</sup> Thirlwall, (1983)
- <sup>3</sup> Kaldor (1967), p. 17
- <sup>4</sup> Ibid., p. 17
- <sup>5</sup> Kaldor (1968), p. 386
- <sup>6</sup> Kaldor (1967), p.27
- <sup>7</sup> Ibid., p. 30
- <sup>8</sup> Kaldor (1975a)., p.198
- <sup>9</sup> Kaldor (1967)., p. 34
- <sup>10</sup> Ibid., p. 41
- <sup>11</sup> Ibid., p. 35
- <sup>12</sup> Wolfe (1968), p. 121
- <sup>13</sup> Kaldor (1968)
- <sup>14</sup> Rowthorn (1975)
- <sup>15</sup> Rowthorn and Wells (1987)
- <sup>16</sup> Rowthorn (1975), p. 897
- <sup>17</sup> Kaldor (1975)., p. 892
- <sup>18</sup> Kaldor (1967)., p. 20
- <sup>19</sup> Kaldor (1972)
- <sup>20</sup> Kaldor(1968)., p. 309

## **Chapter 2**

### **Reciprocal demand and supply: the Two-Sector model and attacks on Say's law**

The growth of an economy under increasing returns is constrained by demand. Follow from the controversial aspect of supply and demand causality in the first chapter, Kaldor moved his attention from increasing returns to other aspects that constrain economic growth. From the first chapter, industry inhibits increasing returns, but it needs other sectors to provide it with resources and also the purchasing power for industrial goods. The growth of other sectors sets the limits on the growth of the increasing returns sector. Economic growth is a dynamic between sectors. Kaldor followed Allyn Young's reciprocal demand and supply as a process for sustained growth. In his first attack on the equilibrium theory, Kaldor actually criticized the idea as being similar to the neoclassical Say's law. However, in his two later papers, which he also wrote to attack the neoclassical theory, Kaldor used this concept to construct the Two-Sector model, explaining it as a demand constrained model in contradiction to Say's law. The concept became a growth model for the agricultural and the industrial sectors. Kaldor followed the increasing returns tradition of Adam Smith and Allyn Young and showed that their vision is a contradiction to Say's law of the neoclassical equilibrium theory.

The Two-Sector model was also Kaldor's answer to his controversial labor supply constraint discussed in the first chapter. The model provides a foundation for what constrains economic growth. Increasing returns in industry relies on other sectors to sustain the growth. Increasing returns in industry needs supplies of food and also purchasing demand from outside its own sector. Kaldor commented briefly in the lectures in 1966 and 1967 that

"the rate at which non-agricultural employment can increase depends on the rate of growth of *marketed* food supplies... The growth of the agricultural surplus is an essential condition for providing the growth of *purchasing power* necessary for sustaining industrial expansion."<sup>1</sup>

This preliminary statement of the lectures in 1966 and 1967 shows that Kaldor had an early intent to connect the Two-Sector model to increasing returns. The increasing returns lectures established increasing returns to industry with empirical evidences. The Two-Sector model provides a condition for sustaining growth under the reciprocal demand and supply between agriculture and industry. Economics growth is a dynamic between sectors that evolved around industry.

### The Two-Sector model

Kaldor quoted Young's condition for sustained growth under increasing returns production as when

"a small increase in its supply will be attended by an increase in the amounts of other commodities which can be had in exchange for it... under such conditions an increase in the supply of one commodity is an increase in the demand for other commodities, and it must be supposed that every increase in demand will evoke an increase in supply... there are no limits to the process of expansion except the limits beyond which demand is not elastic and returns do not increase."<sup>2</sup>

Kaldor called the notion "reciprocal demand and supply." He commented that Young's notion was similar to the neoclassical Say's law. The quote obscured in the meaning of elasticity of demand as a chain reaction for sustaining growth under increasing returns. It was

"lacking a theory of income generation such as was supplied by Keynes in the General Theory eight years later, he thought that the necessary additional condition to ensure a continued chain reaction is to be found in the nature of reciprocal demand and supply function."<sup>3</sup>

In Kaldor's first attack to the neoclassical equilibrium theory, "The Irrelevance of Equilibrium Economics" in 1972, he added the Keynesian perspective of induced investment to Young's reciprocal demand and supply. Kaldor saw the Keynesian induced investment as filling "the essential element missing from Young's presentation, and which can only be supplied on the basis of Keynesian economics."<sup>4</sup> Induced investment is based on a method different from that of the equilibrium theory of supply and demand. In contrast to the equilibrium market clearing price of Say's law, price and sale or demand are factors that induce investment.

"The process of endogenous self-sustained growth requires both a certain inelasticity of expectations concerning prices (in regard to primary products) and also a certain elasticity of expectations concerning the volume of the sales (in regard to manufactures)."<sup>5</sup>

Induced investment centers on the notions of price and demand. Price controls agricultural production, whereas sale or demand controls industrial production. Young's reciprocal demand and supply needs this Keynesian aspect to distinct it out from Say's law and the market-clearing price. Kaldor later carried this into a mathematical model attacking the neoclassical equilibrium theory.

Kaldor explicitly stated a model for Young reciprocal demand and supply in two articles. "What is Wrong with Economic Theory," written in 1975, focused on the mechanisms that contradicted the Say's law. "Equilibrium Theory and Growth Theory" in 1979 focused more on explaining the post-Keynesian capital accumulation of the Two-Sector model. The model begins with Keynesian investment and a pricing scheme to arrive at Young's reciprocal demand. A closed economy has two production sectors: primary agricultural production and secondary industrial production. Economic development is the growth of both sectors. Agriculture produces foods, and industry produces capital goods. The food will be either reinvested in the agricultural sector or consumed by workers of both sectors. Capital goods will also be reinvested in industry to produce more capital and traded for food from agriculture. There is a price terms of trade between both sectors in the exchange of food and capital. In this way, agriculture can grow only with the help of industry, and industry needs demand from agriculture in order to expand capital production. It is a reciprocal two sectors model for sustained growth. Kaldor illustrated his model with two equations; price in terms of industrial goods to agricultural goods, and industrial output in terms of agricultural demand. The two equations were in line with Kaldor's induced investment that he outline in the first attack to equilibrium theory. The first equation was a price equation for a primary product. The second equation was an induced investment from sale or demand of the manufacturing sector.

$$(1) p = (1 + \pi)wl$$

where

$p$  = prices of industrial goods per unit, in terms of agricultural goods prices

(i.e. terms of trade)

$\pi$  = profits as a share of output

$w$  = wage per person, which cannot fall below a certain minimum cost of subsistence

$l$  = labor per unit of output

The first equation was Kaldor's foundation for Young's reciprocal demand and supply in contrast to Say's law. Kaldor added in the Keynesian wage and profit-capital accumulation scheme. Because the model includes trade between the two sectors, the terms of trade ( $p$ ) will determine the income distribution of the subsistence wage ( $w$ ) and profit ( $\pi$ ). Furthermore, wage per person cannot fall below the subsistence level. Price is a function of profit and wages not of the resource allocation or marginal rate of substitution between agriculture and industry. The equation contradicts Say's law on that price is determined first hand which result in the rate of growth of the two sectors, whereas Say's law uses price as the market-clearing mechanism for resource allocation between agriculture and industry. Price or the terms of trade in the Two-Sector model has an aspect of a fixed price which is determined by the subsistence wage and profit of the industrial sector.

Reciprocal demand and supply of the agricultural and industrial sectors reacts through the terms of trade in the effect of induced investment. In contrast, the price of the equilibrium theory operates in a different way to equate supply with demand by the market-clearing price. If there is an excess in supply, the price mechanism will adjust for a right price that reallocates goods from the productions. On the other hand, elasticity of the reciprocal demand and supply in the Two-Sector model works through the effect of complementary induced investment. Price is in fact determined prior than the process.

The function of price is not to reallocate resources but to control the growth process between the agricultural sector and the industrial sector. Kaldor clarified the obscurity on Young's elasticity of demand on the price aspect by noting that it was actually a contradiction to Say's law.

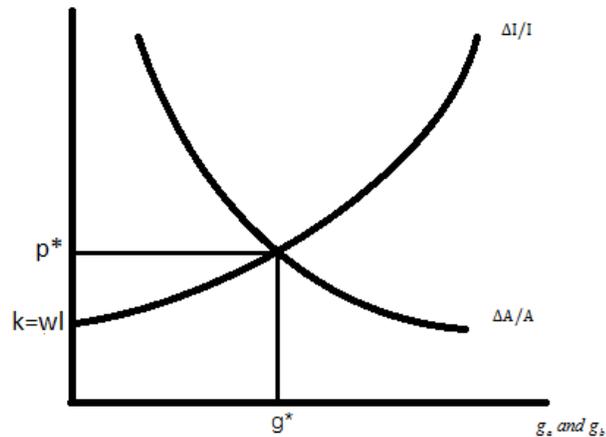


Figure 2 Growth in the Two-Sector Model

Figure 2 is Kaldor's illustration from "Equilibrium Theory and Growth Theory" which focuses more on the mechanism of growth between agriculture and industry. Kaldor used the graph to explain his sustained system of the Two-Sector model. The vertical axis is the unit price of industrial goods in terms of agricultural goods. The horizontal axis determines growth of both agriculture and industry. Agriculture and industry will trade with each other for capital goods in the former and for foods in the latter. The terms of trade in equation (1) determines the rate of capital accumulation. Growth in both sectors depends on how much capital each sector gains during the period. The agricultural sector gains capital goods by trading food with the industrial sector. All

surplus food from the production will be sold to industry in exchange for capital goods.

The surplus food will be used to feed industrial workers.

"The exploitation of new technology requires capital investment; capital investment is a matter partly of the size of the surplus over consumption needs of the primary sector, and partly of the term on which industrial goods can be obtained in exchange for primary products—in other words, on the terms of trade  $p$ . Hence, the rate of growth of primary output will be all the greater the more favorable are the terms of trade to agriculture. This is projected by the downward sloping nature of the  $\Delta A/A$  curve."<sup>6</sup>

The upward sloping industrial growth curve  $\Delta I/I$  is the profit residual from the term of trade. 'k' is the level of subsistence wage.

"Industrial production can grow only if some part of the output is 'ploughed back' in the form of industrial investment. To the extent that this happens,  $p > k$ , the excess  $(p - k)/k$  being equal to the share of output which is 'retained' by the sector for the purpose of investment by the sector."<sup>7</sup>

The intersection of both lines determines the reciprocal growth( $g^*$ ) of both sectors.

At equilibrium, industrial surplus is equal to demand from agricultural surplus divided by the terms of trade.

$$(2) I_s = \frac{1}{p} A_s \text{ or } O_I = \frac{1}{m} D_A$$

where

$O_I$  = industrial output

$D_A$  = demand for industrial products coming from agriculture

$m$  = share of expenditure on agricultural products in total industrial income

With a fixed price from equation (1), growth is determined by a component of demand outside the industrial sector. "This is the doctrine of the foreign trade

multiplier,"<sup>8</sup> Kaldor said in reference to the Harrod's trade multiplier.<sup>9</sup> The second equation states that industrial output is a function of agricultural demand for industrial goods. Industrial output is equal to demand from agriculture divided by the share of agricultural products in industrial income.

"Industrial growth is dependent on the exogenous components of demand for industry... industry will determine what the term of trade will be, since  $p$  will depend on factors endogenous to the sector; but the growth of purchasing power of the primary sector (which is the same as its growth of output  $\Delta A/A$ ) will determine the growth rates of both."<sup>10</sup>

The second equation also made a distinction for industrial growth on induced investment. Elasticity of demand to the industrial sector operates on the volume of the sale or the demand for industrial goods. The agricultural sector provides this demand to the industrial sector. The second equation provides a theoretical aspect: the growth of the system is constrained by exogenous demand to the industrial sector.

### Attacks on Say's law

Kaldor's conceptualize of his late contribution led him to attack the causality of the mainstream economics. Kaldor critiqued equilibrium theory based on various grounds, including the methodology. According to Kaldor, the neoclassical theory was an axiom with no connection to the real world. Concepts such as producer, consumer, maximization, or perfect competition were created only to satisfy the political ends of Pareto optimality. Indeed, if we look at Kaldor's methodology on increasing returns, he proved the theory with empirical evidences. The neoclassical theory was unrealistic and became more abstract, thereby contradicting the reality. Kaldor added that using the

econometric method without an understanding of the actual reality may lead nowhere. He commented that "these sudden bursts of fashion are a sure sign of the 'pre-scientific' stage, where any crazy idea can get a hearing simply because nothing is known with sufficient confidence to rule it out."<sup>11</sup> The general equilibrium theory was caught in a stage of mathematical crystal without any connection to the reality.

Nevertheless, Kaldor's attack on the neoclassical theory was focused primarily on Say's law. The Two-Sector model was a direct attack on Say's law. Supply and demand in the equilibrium theory operates according to a different paradigm than the Two-Sector model. Supply and demand equilibrium theory sorts out the market-clearing price. Price is moving to eliminate the excess of demand or supply. If there is an excess of supply in industrial production, the terms of trade between agriculture and industry should favor more to agriculture eliminating the excess industrial good. There will be prices that clear the market out. Say's law will break only when the price is below zero and the market still has excess product. However, under the Two-Sector model, price cannot fall below the subsistence wage. If there is an excess of supply from industry, the terms of trade between industry and agriculture cannot get below the subsistence wages paid to industrial workers. This breaks Say's law. Hence, under the subsistence wage condition, Kaldor illustrated that Say's law was invalidated.

Furthermore, the price mechanism is not only about allocation of resources. Price works through the complementary effect. Economic sectors complement each other. The primary, secondary, and tertiary sectors produce products that complement the other

sector productions. Price has an effect of complementarity for new products instead of allocation. The elasticity of demand works on goods from industry as inducing purchasing power through price. In the Two-Sector model between agriculture and industry,

"the supply of goods produced by the capitalist industrial sector is highly elastic at a particular price in terms of agricultural goods (meaning that at the given terms of trade between industry and agriculture, the quantity supplied is highly responsive to the quantity demand)."<sup>12</sup>

Say's law operates under the notion of allocation of resources, but in a real economy each sector produces goods that support other sectors in a chain reaction. This is the stock-adjustment principle where production adjusts to quantity signals. Prices affect the allocation of demand among different kinds of goods such as food, clothing, or housing.

"But within each of these groups are subgroups, and subgroups within subgroups, and the narrower the group the more prices are likely to influence the composition of quantity signals. It is through direct or indirect price-advantages that new commodities manage to displace existing ones."<sup>13</sup>

This adjustment principle through the effect of price complementarity implies that economic growth is demand constrained.

The major difference between neoclassical growth theory and Kaldor's Two-Sector model is the price and demand constraint that violated Say's law. Growth is demand constrained and not resource constrained. However, it is very easy to confuse them as Kaldor noted with respect to the similarity of Young's reciprocal demand and supply and Say's law. There was a criticism of the two-sector model, although not of Kaldor himself, but to Thirlwall's interpretation of the model.<sup>14</sup> In the article, like Kaldor,

Thirlwall claimed that the Two-Sector model was a superior model to that of the neoclassical model. Amitava Dutt commented critically on Thirlwall's interpretation of Kaldor's Two-Sector model on various points. Most importantly, Dutt claimed that the Two-Sector model was actually the same as the neoclassical model regarding demand and supply causality. There was

"no demand problem in any sector: if they sell their product to the other sector they simply exchange it for an equal value of the product of that sector... Agriculture does not serve as a solution to industry's market simply because there is no market problem for industry in this model."<sup>15</sup>

It is true that there is no market problem for industry; the two-sector model implied that all industrial surpluses would be reinvested in itself. Thirlwall, in a rejoinder to Dutt, pointed out that even though industry reinvests in itself, it

"does not mean that the level of output is independent of demand. There is a difference between the question of whether any level of output is self-financing (à la Say's Law), and the question of what determines output in the first place."<sup>16</sup>

Dutt did not recognize the effect of price in the Two-Sector model that is contradicting Say's law. The similarity between Young's reciprocal demand and supply and Say's law had already been pointed out by Kaldor.

The Two-Sector model violates Say's law on two fronts. First, price in the terms of trade is determined prior to demand and supply. Price is a function of wage and profit between the two sectors with no relation to the market-clearing price. Second, the growth of the system is determined by demand constraints not supply constraints. Demand—not resource allocation—limits the growth of the economy. Kaldor had moved from the concept of increasing returns to reciprocal demand and supply which determines

economic growth. Kaldor inherited this idea from Allyn Young. Young's notion of reciprocal demand and supply sounds very close to Say's law. However, reciprocal demand and supply contradicts Say's law on sustaining increasing returns growth under demand constraints.

### Notes

<sup>1</sup> Kaldor (1967), p.56

<sup>2</sup> Kaldor (1972a), p.1246

<sup>3</sup> Ibid., p. 1246

<sup>4</sup> Ibid., p. 1249

<sup>5</sup> Ibid., p. 1250

<sup>6</sup> Kaldor (1979), p. 288

<sup>7</sup> Ibid., p.289

<sup>8</sup> Kaldor (1975b), p.354

<sup>9</sup> Harrod (1933)

<sup>10</sup> Kaldor (1979), p. 289

<sup>11</sup> Kaldor(1972a), p. 1240

<sup>12</sup> Kaldor (1975a), p. 198

<sup>13</sup> Kaldor (1985), p. 33

<sup>14</sup> Thirlwall (1986)

<sup>15</sup> Dutt (1992), p.163

<sup>16</sup> Thirlwall (1992), p.170

### Chapter 3

#### The extent of the market: trade cumulative causation and growth reciprocal limits

The extent of the market is a notion outlined in the third chapter of the Wealth of Nation. Kaldor commented that

"the third chapter, perhaps the most significant of them all, is devoted to the proposition 'that the division of labour is limited by the extent of the market'-a theorem which Allyn Young, writing 150 years later, regarded as 'one of the most illuminating and fruitful generalizations which can be found anywhere in the whole literature of economics.'"<sup>1</sup>

In the previous chapter, the Two-Sector model was discussed as operating according to the assumption of a closed economy. The reciprocal demand from agriculture limits industrial production. The extent of the market of a closed economy is limited by the primary production in reciprocal exchange with industry. The market requires the improvement of land and labor saving in primary production to expand in order for industry to grow. In the world economy, demand comes from trade. The extent of the market is thus limited through reciprocal trade between economies.

Kaldor applied the extent of the market to answer why some countries are rich and some countries are poor. The extent of the market represents exogenous demand to the increasing returns sector. Kaldor believed that trade is the real source of demand rather than the domestic demand from agriculture. If left unchecked, trade can cause a

divergence of the growth rate among economies. Rich countries gain an advantage over poor countries through trade. Growth becomes polarized between developed countries and underdeveloped countries. It is a process of cumulative causation. Kaldor argued for planned trade where growth is sustained at the level that each economy grows in complement reciprocally to each other. Exogenous demand to the increasing returns sector limits the growth of the economy. Kaldor asserted that maintaining economic growth is to sustain the exogenous demand from trade and primary production for the increasing returns sector.

#### Trade cumulative causation

Uneven development is the cumulative result of increasing returns in certain regions. The increasing returns sector gains advantage of production by a sustained exogenous demand fed to the production of the sector. Exogenous demand comes from two sources: domestic primary production, and outside trade demand. Domestic demand from the primary sector is crucial in the early phase of economic development, whereas outside trade demand sustains the growth of the increasing returns sector of an advanced country. Kaldor separated these two sources of demand on the two phases of economic development: between underdeveloped countries and developed countries.

"In an advanced economy, with highly developed manufacturing sector, the most important exogenous factor in the growth of demand is the increase of world demand for exports. But for a country in the earlier stages of industrialization which is unable to break into the export markets, the exogenous component of demand is the surplus of its own agricultural sector."<sup>2</sup>

However, trade demand tends to polarize in certain regions. The exogenous demand from trade further pushes increasing returns regions for more competitive advantage in their production. Kaldor saw that the polarization process of the demand for increasing returns production in certain developed regions produced a chronic imbalance of payments to the world economy in the long run. Sustained economic growth requires the complementarity of the reciprocal demand acquired from regions that grow together. Chronic imbalance of payments prevents reciprocal growth among economies. Trade becomes a barrier to sustained growth.

The foreign trade multiplier was introduced verbally even before the Two-Sector model in "The Case for Regional Policy,"<sup>3</sup> which was Kaldor's first paper on increasing returns after the two lectures in 1966-67. The foreign trade multiplier treats demand for export as an exogenous component. Trade demand gives rise to a multiplier accelerator effect where import follows export endogenously. The multiplier is the coefficient for reciprocal demand between import and export. A long run sustained growth is created in the balance of payments of import and export. In other words, in line with the Two-Sector model, the reciprocal coefficient is the terms of trade between agriculture and industry imposed on trade as between import and export. The mathematical formula for the foreign trade multiplier is the same as the second equation of the Two-Sector model. However, the foreign trade multiplier differs from the Two-Sector model in its implication for change of exogenous demand for export. The long run sustained growth depends on the component of demand from trade instead of the autonomous demand

from agriculture. Kaldor also saw that the trade multiplier doctrine "asserts the very opposite of Say's law."<sup>4</sup> He gave credit to Roy Harrod<sup>5</sup> for the foreign trade multiplier as

$$Y = \frac{1}{1 - k} E \text{ or } \frac{1}{m} E$$

where

$Y$  = output

$E$  = export

$k$  = coefficient for induced demand (investment and consumption) by export

$m$  = coefficient for induced demand (investment and consumption) for import on total income

With the same theoretical foundation as the Two-Sector model, the effect of price on the trade multiplier contradicts Say's law. During the period when Kaldor wrote about the foreign trade multiplier, there was a political belief that devaluation in trade in the manufacturing sector of the United Kingdom would improve its industrial production. The belief was based on the neoclassical equilibrium theory that price is an adjustment mechanism between demand and supply. Kaldor's trade multiplier works in contrast of the neoclassical theory. He used this theoretical foundation to comment on "The Effect of Devaluation on Trade in Maunufacture."<sup>6</sup> Kaldor showed in the paper that there was no statistic correlation between devaluation and manufacturing export on the data he compiled among certain developed countries. Export performance is not determined by the price or the terms of trade in manufacturing. Theoretically, the foreign trade multiplier treats export performance as an exogenous component instead of being determined by price as in the equilibrium theory. Price devaluation will change the coefficient 'm' in the trade multiplier, but it does not mean that export performance will increase. Kaldor commented that "the main result of these currency changes was thus not

so much in export performance but in the differing movement of the term of trade of the manufacturing."<sup>7</sup> Hence, devaluation is not a solution to increasing industrial export performance. The Harrodian worlds "believe that forces making for balance operate mainly through relative income variation, not through price variation."<sup>8</sup> Kaldor commented that Keynes in the midst of the Great Depression neglected the foreign trade multiplier in favor of the saving/investment multiplier. Keynes attacked Say's law in its short period of liquidity preference and the rate of interest. It was unfortunate that Keynes did not realize that in the long run the world economy would also govern by demand of the trade multiplier which also violates Say's law. Furthermore, the effect of currency realignment might enhance the polarization process, giving a greater reward to regions that already have the advantage from increasing returns production. Kaldor referred to this as the theory of cumulative causation.

Kaldor never modeled his cumulative causation in mathematical terms. It was modeled mathematically by Dixon and Thirlwall<sup>9</sup> (also Thirlwall<sup>10</sup>). Kaldor's cumulative causation was the result of increasing returns in industry and the lag of money wage to catch up with productivity. The money wage in the industrial sector tended to fall behind the rising productivity of the increasing returns.

"Efficiency wage will, tend to fall in regions (and in the particular industries of regions) where productivity rises faster than the average. It is for this reason that relatively fast growing areas tend to acquire a cumulative competitive advantage over a relative slow growing area."<sup>11</sup>

As a result, the efficiency wage in industry will not move as fast as the increase in productivity. Industrial regions or countries will gain competitiveness cumulatively on

real wage that is lower than the real productivity. "It is for this reason that relative fast growing areas tend to acquire a cumulative competitive advantage over a relative slow growing area", and "the comparative costs of the production in fast growing areas tend to fall in time relatively to those in slow growing areas; and thereby enhance the competitive advantage of the former at the expense of the latter."<sup>12</sup> Cumulative causation causes uneven growth through demand from trade of the increasing returns sector.

Cumulative causation works in favor of the industrial regions and countries at the expense of underdeveloped regions and countries. Kaldor urged that competitiveness in industry can also diffuse (spread) as well as concentrate (polarize).

"Falling costs generally lead to oligopoly rather than monopoly so the principle of cumulative causation leads to the concentration of industrial development in a number of successful regions and not of a single region. These 'successful' regions in turn may hold each other in balance through increasing specialization between them-some area becomes more prominent in some industries and another area in some other industries"<sup>13</sup>.

Cumulative causation explains why industrialization concentrated in certain developed regions while it did not spread to underdeveloped regions.

### Reciprocal limits on growth

Kaldor's formulation of his late contributions came to the last period where he considered what set the limits to economic growth. Kaldor rarely mentioned increasing returns and assumed that it is implicit to the system. The limits to growth is on the demand side. Under cumulative causation growth is polarized between underdeveloped and developed economies. Trade can cause uneven growth among economies. This is not

to say that underdeveloped countries should ignore trade and focus on their policy of import substitution, relying on their domestic demand. Kaldor saw that trade will eventually be crucial to development. Underdeveloped countries in the process of development to a certain phase will have to rely on trade demand to expand their increasing returns sector. Trade policies have to be carefully moderated. Protectionist policies implemented for the industrialization of the developing countries can hurt the economy itself. Tariffs and trade barriers are implemented to provide the domestic demand for the increasing returns sector. However, the barrier is imposed at the expense of the primary production sector. Overprotection can instead cause the domestic market to shrink because industrial production is growing at the expense of agricultural production.

"For as soon as import substitution is accomplished, the further growth of domestic industry becomes dependent of either on the development of industrial exports or on the growth of production in the complimentary sector of the economy, that is, agriculture."<sup>14</sup>

In addition to trade, Kaldor also emphasized building the reciprocal demand of the domestic market.

Growth after industrialization depends on trade. Kaldor saw that the industrial revolution in the United Kingdom was not a result of demand from agriculture or the industrial sector own demand for capital. The demand had to be from trade with other countries. Trade hence produces the real source of demand and the limits to growth. However, cumulative causation and the polarization effect on trade hinder the growth the long run of each reciprocal economy. Trade cumulative causation causes a chronic

imbalance of payments even among the developed countries. Kaldor suggested a planned trade where each economy agrees on the pattern of surpluses and deficits payments and to some extent on some kind of auction for licenses<sup>15</sup> to trade. Kaldor advocated restricted trade where "a conflict is only avoided if world industrial production continually accelerates so that the emergence of each new centre of industry is a net addition to the existing rates of growth of the other industrial countries."<sup>16</sup> The growth of one economy should complement the growth of other economies reciprocally.

There is a possibility for reinvestment within the industrial sector, but in the long run it is less likely. Kaldor commented that "the capitalist sector, beyond a certain stage, cannot grow by its own, lifting itself by its own bootstrap."<sup>17</sup> Increasing returns production cannot reinvest in its own production. Limits on growth of the increasing returns productions hence have to rely on exogenous demand from outside, which does not, nevertheless, mean that growth is limited to a resource constraints or some supply of production. Increasing returns to industry creates the opportunity for growth in other sectors. This growth in itself will reciprocate to industry as in the Two-Sector model.

"The purchasing power generated by the additional production of the capitalist sector will not in itself be sufficient to match the increase in supply: for only a proportion of the incomes earned in the capitalist sector (whether in the form of wages, profits or rents) will be spent on goods produced within that sector: the rest will generate demand for products of others, mainly agriculture."<sup>18</sup>

Sustained growth under increasing returns requires a reciprocal growth in the other sectors. "The real issue is whether the growth of labour productivity in industry and service and the growth of land productivity in agriculture and mining are in appropriate relationship to one another."<sup>19</sup> In an open economy, growth of the economy under

increasing returns provides an opportunity for other economies to grow under a well-regulated trade. Kaldor envisioned growth for each economy that complements other economies.

Considering the world as a whole, the limits on growth are the extent of the market. Kaldor commented that Ally Young

"did mention that the very size of America as measured not by area nor by the number of inhabitants but the size of its aggregate product, makes it easier to develop the division of labor as compared with say, England, whose possibilities were more constrained."<sup>20</sup>

Growth comes from the increasing returns production. In the meantime, growth depends on demand from the primary production and trade demand constraining the process. The size of the American market was larger than that in England enable them to benefit from the higher degree of increasing returns productions.

In contrast to the neoclassical theory,

"it is the growth in the output of primary product (of food, fuel and raw materials) which governs the rate of economic growth generally, and not the rate of capital accumulation or some exogenous growth rate of labour force. This view is of course in sharp contrast to the neo-classical view which regards the 'natural rate of growth' of any closed economy (i.e., of any wholly self-contained region) as being determined by the growth of the labour force, plus the growth of labour productivity due to technical progress."<sup>21</sup>

The extent of the market, according to Kaldor, is the demand outside the increasing returns sector. Economic growth is governed by the exogenous demand in contrary to the natural rate of growth propose by the neoclassical theory. According to the Two-Sector model, exogenous demand comes from the growth of primary production demand. As to the foreign trade multiplier, growth in the extent of the market is from trade demand. It

was in Kaldor's contention that sustained growth can be maintained through these reciprocal factors.

#### Notes

<sup>1</sup> Kaldor (1972a, p.1241)

<sup>2</sup> Kaldor (1972, p.142)

<sup>3</sup> Kaldor (1970).

<sup>4</sup> Kaldor (1975a, p.199)

<sup>5</sup> Harrod (1933)

<sup>6</sup> Kaldor (1977).

<sup>7</sup> Kaldor (1977, p. 112)

<sup>8</sup> Kaldor (1980, p. 25)

<sup>9</sup> Dixon and Thirlwall (1975)

<sup>10</sup> Thirlwall (1987)

<sup>11</sup> Kaldor (1970, p.343)

<sup>12</sup> Ibid., P.343

<sup>13</sup> Ibid., P. 344

<sup>14</sup> Kaldor (1972, P. 145)

<sup>15</sup> Kaldor (1977, p. 115)

<sup>16</sup> Kaldor (1981, P.609)

<sup>17</sup> Kaldor (1975a, P. 198)

<sup>18</sup> Kaldor (1975a, P. 197)

<sup>19</sup> Kaldor (1986, P. 191)

<sup>20</sup> Kaldor (1985, P. 75)

<sup>21</sup> Kaldor (1981, P.611)

## **Chapter 4**

### **Timeline and assessment of Kaldor's late contributions**

1966. Cause of the slow rate of economic growth of the United Kingdom (*Increasing Returns and Supply Employment*)

1967. Strategic factors in economic development (*Increasing Returns and Supply Employment*)

1968. Productivity and growth in manufacturing industry: A reply (*Supply Employment 1<sup>st</sup> Clarification*)

1970. The case for regional policies (*Trade Demand and Cumulative Causation*)

1972. Advanced technology in a strategy of development (*The Demand Two-Sector Model*)

1972a. The irrelevance of equilibrium economics (*Increasing Returns, Demand Constraints, and Cumulative Causation*)

1975. Economic growth and the Verdoorn's law--A comment on Mr. Rowthorn's article (*Supply Employment 2<sup>nd</sup> Clarification*)

- 1975a. Capitalism and industrial development: Some lessons from Britain's experience  
*(Economic History with Increasing Returns and Demand Two-Sector Model)*
- 1975b. What is wrong with economic theory? *(Critique of Equilibrium Theory and the Demand Two-Sector Model with Mathematical interp*
1977. The effect of devaluations on trade in manufactures *(Balance of Payments and Industrial Development)*
1979. Equilibrium theory and growth theory *(Increasing Returns, Demand Constraint, and Cumulative Causation)*
1980. What is De-industrialization? *(Foreign Trade Multiplier)*
1981. The role of increasing returns, technical progress and cumulative causation in the theory of international trade and economic growth *(Increasing Returns, Demand Constraint, and Cumulative Causation)*
1985. Economics without equilibrium *(Increasing Returns, Demand Constraint, and Cumulative Causation)*
1986. Limits on growth *(Increasing Returns, Demand Constraint, and Cumulative Causation)*

Kaldor's contributions during the last two decades of his life was a vision of a system. The vision was first discovered by Adam Smith and restated by Allyn Young. All

the issues that Kaldor addressed during the last twenty years of his life were analyzed according to this worldview. A. P. Thirlwall suggested that "Kaldor's work was not unified and sustained enough to be able to credit him with a major revolution of thought comparable to the 'Keynesian revolution' or the earlier 'marginalist revolution.'" <sup>1</sup> Indeed, Kaldor never started a revolution. However, Kaldor was the only prominent modern economist after Allyn Young who extensively followed Adam Smith's notion that the division of labour depends on the extent of the market. The thesis suggests that Kaldor's works during the last two decades of his life were his unfinished *magnum opus* based on the famous notion.

Kaldor started with his two controversial lectures on increasing returns in 1966-67. His methodology was based on the observation of reality. Increasing returns is a real phenomenon in economics. Kaldor proved this by his statistical regressions that became Kaldor's growth laws. Kaldor was very critical of theoretical construction, expressed particularly for neoclassical theorists' disregards of observed phenomenon and building their theory to the point of mathematic crystal. The two lectures in 1966-67 used observed data to establish increasing returns to industry. The lectures also raised the question of what really constrains economic growth. Kaldor allegedly said it was the labor supply constraint for the United Kingdom post-war economy. He later admitted the mistake and pointed that

"it is a hen-and-egg question whether historically it was the growth of commerce which continually enlarged 'the size of the market' and thereby enabled increasing returns to be realized, or whether it was the improvement in communication which led to the growth of commerce."<sup>2</sup>

The controversy became a causality problem.

The Two-Sector model answers the hen-and-egg question. Economic growth is a reciprocal system of demand and supply. Growth of one sector provides another sector with demand. Sustained growth is a complementary process among sectors. The theory revolves around income elasticity of demand. Change in production depends on the income elasticity of demand of the other sectors, which is a direct contradiction to Say's law of the neoclassical theory. Reallocation of resources does not determine price. It is income elasticity of demand instead of price that governs economic productions. Kaldor developed this self-sustained growth system from Allyn Young's idea of what Kaldor called reciprocal demand and supply. Demand and supply react through the income elasticity providing sustained reciprocal growth to the economy. Reciprocal demand is an endogenous aspect of Kaldor's late contributions.

The extent of the market is the exogenous demand that governs the increasing returns productions. Kaldor answered the question of uneven development by trade. Demand from trade is distributed unevenly among various economies. Countries with the advantage of increasing returns production tend to receive more demand for their products. Polarization of demand and an advantage on increasing returns production lead to the process of cumulative causation, which widens the gap between underdeveloped countries and developed countries. Kaldor summed this up with the foreign trade multiplier where growth is ultimately determined by exogenous demand from trade.

The foreign trade multiplier is a model of multiplier and accelerator

"where production is determined by demand, or rather by the exogenous component of demand, which in turn determine, through the usual multiplier and accelerator effects, the endogenous components of demand."<sup>3</sup>

The Two-Sector model is also a multiplier and accelerator model where capital accumulation is assumed implicit. Kaldor's contributions during the last two decades of his life break from the post-Keynesian tradition on this particular aspect. Kaldor abandoned saving and investment capital accumulation in favor of the exogenous demand constraints as the ultimate limits to growth.

Palumbo<sup>4</sup> commented that Kaldor's models formulation of his late contributions lacks the post-Keynesian aspects of saving and investment. A model without an explicit description of saving and investment behavior cannot describe the change in demand and the change in capacity utilization by which a real economy works. Kaldor's late contributions do not have the Keynesian perspective where capacity might be ahead of demand. In other word, Kaldor's late contributions disregard economic repression where saving exceed investment. The accelerator model assumes full adjustment between output and capacity. It thus cannot capture Kaldor's rich analysis that growth is not a pre-ordained trajectory. However, Palumbo's evaluation of Kaldor's models might not justify Kaldor's real thought to economic growth.

Kaldor's late contributions were based on a single vision of economic growth. The appreciation of the theory should not be on the pretext of post-Keynesian theory. Demand constrained growth is in itself governed saving and investment. Kaldor's late contributions were an attempt to formulate a theory concerning economic growth in the long run and to examine the limits of the system. The theory concerns sustaining growth

and development. Formulation of the theory into a multiplier accelerator model presents the core ideas of the system mechanism. The theory is a departure from the post-Keynesian tradition. Kaldor himself saw the foreign trade multiplier as governed by economic growth over the longer period. He commented that

"I believe it to have been unfortunate that the very success of Keynes's ideas in connection with the saving/investment multiplier diverted attention from the 'foreign trade multiplier', which, over longer periods, is a far more important and basic factor in explaining the growth and rhythm of industrial development."<sup>5</sup>

Furthermore, capital accumulation to Kaldor is an endogenous process.

"Of course the success of the Model T Ford meant a tremendous accumulation of capital, which would not have taken otherwise, Of course this accumulation required a lot of saving...But the saving, the accumulation, the adoption of highly capital intensive techniques were all consequence of a successful search for markets which enabled Ford to exploit the economies of large-scale production."<sup>6</sup>

In defending this formulation of the theory, Kaldor also defended Adam Smith and Allyn Young's vision that the division of labor is limited by the extent of the market.

Kaldor's late contributions interweave many complicated issues on economic growth and revolve around the concepts of increasing returns, supply constraint, reciprocal demand and supply, cumulative causation, the extent of the market, etc. In Kaldor's words,

"economic growth is thus always *demand-induced* and not resource constrained. This remains true even when regions are political entities, i.e., 'countries'. 'Resource' such as capital and labour do not determine growth, partly because they are mobile between regions, and partly because they are never optimally allocated (there are always economic sectors where labour is in surplus in the sense that its marginal productivity is zero or negative, as e.g., in agriculture); and partly because capital (in the sense of industrial capacity) is automatically generated as part of, and in consequence of, the growth of demand."<sup>7</sup>

Note

<sup>1</sup> Thirlwall (1987), p.331

<sup>2</sup> Kaldor (1972), p. 1249

<sup>3</sup> Kaldor (1975b), p. 353

<sup>4</sup> Palumbo (2009)

<sup>5</sup> Kaldor (1975a), p. 199

<sup>6</sup> Kaldor (1985), p. 71

<sup>7</sup> Kaldor (1981), p. 603

## **Chapter 5**

### **A model of Kaldor's late contribution**

This section will attempt to construct a model based on Kaldor's insights. The model is an interpretation of Kaldor's late contributions. In contrast to his post-Keynesian origins, economic growth in the long run does not depend on accumulation and utilization. The limits to growth are on the reciprocal demand from domestic production and trade. The model attempts to represent the economic theory that Kaldor formulated in the later part of his life as well as providing the revolutionary concepts from the Kaldorian heterodoxy.

#### **The Model**

The economy consists of three sectors; agricultural primary sector (A), industrial secondary sector (I), and service tertiary sector (S). Unique to this model, it is demand that determines demand. This model uses demand growth as the determinate variables. Growth stems from the interaction between these three sectors. The model neglects the question of where growth comes from by assuming growth is implicit. The model has causality that runs from demand to supply, i.e. demand creates supply. If there is demand, supply growth is a simultaneous autonomous process. The model follows the intuitions

from Kaldor's Two-Sector model: the growth of demand from one sector will lead to the growth of demand in other sectors. Demand growth of one sector creates supply growth. In turn, the growth of supply will create reciprocal growth of demand to the other sector.

### 1. Agricultural sector

Agricultural production has an autonomous rate of demand growth  $C$  to absorb industrial production.

$$d_A = C \quad (1)$$

When talking about development Kaldor always mentioned agriculture as the primitive source of demand<sup>2</sup>. In this model demand growth from the agricultural sector is an autonomous demand exogenous to the model. The autonomous demand from the agricultural sector can also represent the notion of "the extent of the market." Kaldor, referring to Allyn Young and Adam Smith, relied upon this notion to strengthen the historical aspect of his idea. The extent of the market functions as the fundamental determinant of the long run rate of growth. If autonomous demand is an increasing function overtime, then we can have a moving equilibrium.

### 2. Industrial sector

Demand for Industrial output can be determined only by the demand of its product from other sectors. Demand growth of the industrial sector is equal to the sum of growth of industrial demand from the agriculture sector and reciprocal demand to supply growth of the service sector.

$$d_I = d_A + as_S \quad (2)$$

Equation 2 shows that the demand growth of industry is constrained by growth of industrial demand from agriculture plus growth of industrial demand from service. Demand growth from agriculture is an autonomous factor exogenous to the model. Growth of industrial demand from service is a reciprocal multiplier of industrial demand elasticity and growth of supply from service, which gives us two factors: autonomous demand, and an endogenous demand multiplier.

Growth of industrial demand from the service sector is a reciprocal demand reaction from industrial growth. Reciprocal demand and supply is central to Kaldor's theory. In his own words, "in order that there should be self-sustained growth, two conditions must be present: returns must increase, and the demand for commodities must be elastic."<sup>3</sup> Reciprocal demand "a", a scaling factor of the supply growth from the service sector, provides the same behavior as the Keynesian multiplier. Kaldor attributed the origin of this idea to Allyn Young.<sup>4</sup> The multiplier is the determinant of steady state growth in the long run.

For the second equation demand growth of industry consists of autonomous demand from agricultural growth and demand multiplier from service supply growth. It is in these two factors that we can show Kaldor's vision of an economy constrained by demand.

$$s_I = d_I \quad (3)$$

Our third equation equates supply and demand in the industrial sector. Growth of industrial supply equals the growth of industrial demand. The third equation emphasized the causality that demand created supply contradicting Say's law.

### 3. Service sector

Growth of service demand is a reciprocal growth of industrial supply. It is a completely elastic one-period, lag-reciprocal demand of the growth of industrial supply.

$$d_s = s_{I-1} \quad (4)$$

The service sector grows with the expansion of industry. Kaldor showed in his 1966, and 1967<sup>5</sup> regressions that growth of the industrial sector induces growth in other sectors. The lag period can be interpreted as industry-led growth as in Kaldor's growth law. Growth of demand in the service sector is a reciprocal supply of industrial growth multiplied by the elasticity of demand for service. The model assumes that industrial reciprocal demand to service is completely elastic so that it is equal to one. In this way, the growth of industry will contribute exclusively to the growth of the service sector and not to the agricultural sector.

$$s_s = d_s \quad (5)$$

Equation (5) shows that growth of service demand simultaneously creates growth of service supply. The growth of service supply, in turn, will be

distributed as a reciprocal demand between industry and agriculture. The reciprocal demand multiplier, "a", from the service supply growth is the scaling factor that determines the distribution of demand growth between the industrial sector and the agricultural sector. Thus, the model becomes a closed system with the balance of payments constraint inside the economy; a fraction of service supply growth contributes to the demand growth in domestic industry, and the rest pays to the autonomous agricultural demand growth.

### Equilibrium and Dynamic of the Model

Five equations above reduce into a simple linear first order difference equation.

$$d_t = C + ad_{t-1} \quad (6)$$

The model behaves in the same way as the Keynesian multiplier with one period lag. In the Keynesian cross model it is aggregate demand that determines aggregate supply. However, unique to this model, it is demand that determines demand. The model implies that supply growth is implicit in itself. With increasing returns, supply will grow, following from the growth of demand.

The linear first order difference equation yields the following solutions:

$$d_t = a^t(d_{t,0} - \underline{d}_t) + \underline{d}_t \quad (7)$$

$$\underline{d}_I = C/(1-a) \quad (8)$$

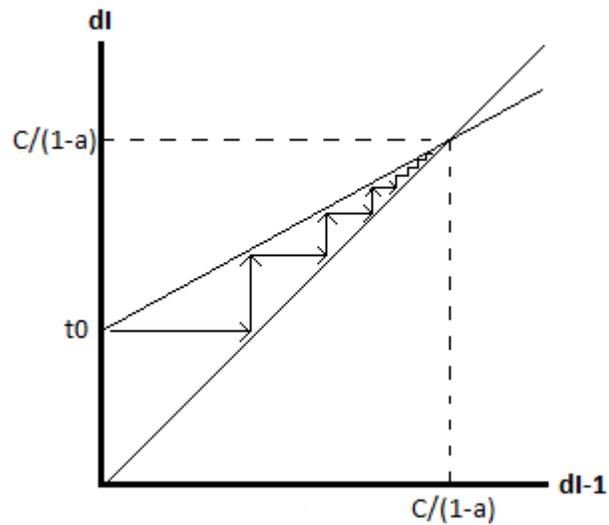


Figure 3 Dynamic between  $d_I$  and  $d_{I-1}$

The dynamic between  $d_I$  and  $d_{I-1}$  of the model is illustrated in Figure 3. The model converges to steady state  $\underline{d}_I$  in solution (8). Steady state growth of demand is a function of exogenous autonomous demand and reciprocal elasticity of demand from the service sector. The growth of demand is determined exogenously from the model. However, unlike mainstream growth theories, the growth rate is determined only by variables of demand. Hence, we have a demand determined model.

Once development starts, autonomous demand triggers the development of industry within the economy. There is no explanation about where autonomous demand from agriculture comes from. Following from Kaldor, the model takes it for granted that the autonomous demand is given exogenously. Aside from the demand from the agricultural sector, the autonomous demand can be interpreted as trade demand and also demand generated by the extent of the market.

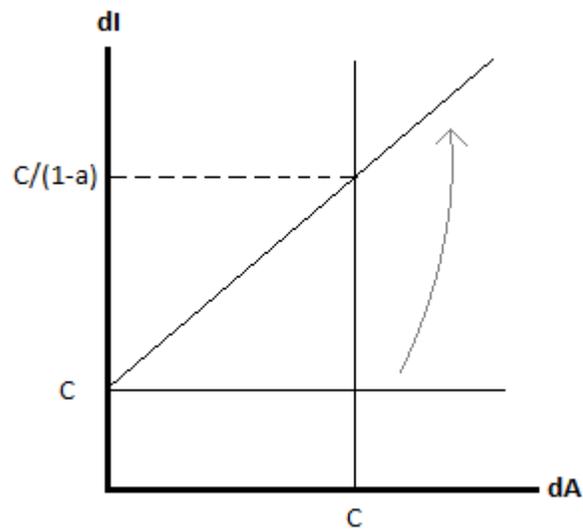


Figure 4 Moving demand growth between  $dI$  and  $dA$

If there is only an exchange between agriculture and industry, industrial demand growth will be limited to the trade between agriculture and industry. However, the industrial sector trades with the service sector. The service tertiary sector moves the equilibrium demand growth up as shown in figure 4 and figure 5.

$$d_I = C + as_S \quad (2)$$

The horizontal line derived from equation (2) moves up the slope as the system shifts to the steady state in both Figure 4 and Figure 5. Vertical autonomous demand growth from agriculture remains constant, and the vertical line that represents service demand growth moves to the right, which reflects the growth of the domestic market within the economy. The reciprocal demand and supply between industry and service is

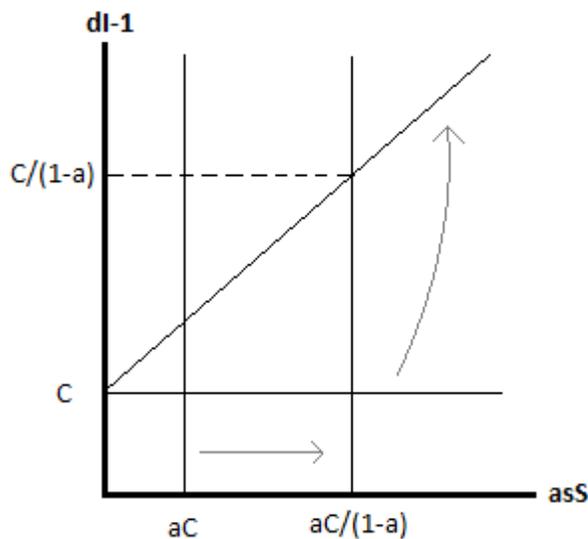


Figure 5 Moving demand growth between dI and asS

central to our model. The growth by the reaction of reciprocal demand and supply gives us surprising implications regarding the accounting identity.

The system moves as a cycle from agriculture to industry and to service in a closed economy. First, demand from agriculture creates demand in the industrial sector. Second, growth in the industrial sector leads to growth in the service sector. Third, the service sector in turn purchases both industrial goods and agricultural goods. The agriculture sector purchases only from the industrial sector. Then the industrial sector purchases only from the service sector. It should be emphasized that it is only the reciprocal service demand that provides demand to both industry and agriculture. This mechanism is stated in Kaldor's Two-Sector model. In other words, industrial demand comes from both agriculture and service. Service demand comes only from industry, whereas agricultural autonomous demand achieves equilibrium by the purchase of a portion less the multiplier of the service sector. The system continues on in a cycle to the

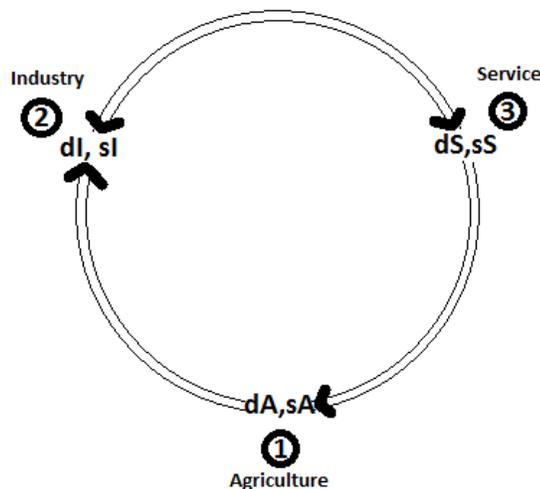


Figure 6 Closed system of the model

steady state. The model does not have a balance of payments problem. Autonomous demand growth from agriculture is paid by the growth of service demand.

The model is complete in itself as a closed model. Table 1 shows the completed cycle of the model. The system starts from agriculture to industry and then to service. Once the cycle is completed,  $(1-a)s_s$  is the residual from the service sector reciprocal demand growth to industry. The residual is paid to agriculture. The three last rows demonstrate that the residual is equal to autonomous demand (1) at the steady state

	(1)	(2)	(3)	(4)	(5)	Reciprocal	Residual
T	$d_A$	$d_I = d_A + a s_s$	$s_I = d_I$	$d_S = s_{I-1}$	$s_S = d_S$	$a s_s$	$(1-a)s_s$
1	C	C	C	0	0	0	0
2	C	$(1+a)C$	$(1+a)C$	C	C	$aC$	$(1-a)C$
3	C	$(1+a+a^2)C$	$(1+a+a^2)C$	$(1+a)C$	$(1+a)C$	$a(1+a)C$	$(1-a)(1+a)s_s$
4	C	$(1+a+a^2+a^3)C$	$(1+a+a^2+a^3)C$	$(1+a+a^2)C$	$(1+a+a^2)C$	$a(1+a+a^2)C$	$(1-a)(1+a+a^2)C$
...	...	...	...	$(1+a+a^2+a^3)C$	$(1+a+a^2+a^3)C$	$a(1+a+a^2+a^3)C$	$(1-a)(1+a+a^2+a^3)C$
...	C	$C/(1-a)$	$C/(1-a)$	...	...	...	...
...	C	$C/(1-a)$	$C/(1-a)$	$C/(1-a)$	$C/(1-a)$	$aC/(1-a)$	$(1-a)C/(1-a) = C$
...	C	$C/(1-a)$	$C/(1-a)$	$C/(1-a)$	$C/(1-a)$	$aC/(1-a)$	C
...	...	...	...	...	$C/(1-a)$	$aC/(1-a)$	C

Table 1 Dynamic and the Balance of the Model

The model relies on two mechanisms: autonomous demand, and reciprocal demand. The model is an accounting identity that ignores accumulation. It is not a growth model concerned with capital accumulation and investment e.g. the Harrod-Domar model or Neoclassical Solow-Swan model. The model aligns more closely with the Harrod's foreign trade multiplier and the Balance of Payments Constraints theory. Concerning Harrod's trade multiplier, Thirlwall stated that "he (*Harrod*) wanted to demonstrate and argue that in conditions where no accumulation is taking place."<sup>6</sup> Both Harrod's trade

multiplier and the Balance of Payments Constraint are demand determined theories. The models neglect accumulation process and function more as a accounting identity.

To reiterate, the model fits in the category of Harrod's trade multiplier and the Balance of Payments Constraint, although it differs with respect to sector-specific growth, and the relation of international trade and domestic trade. The model relies on growth of both domestic reciprocal and external autonomous demand; it provides a different result than models in the trade multiplier literature. Most importantly, we arrive at the model from the analysis of "increasing returns and the extent of the market," not from the trade multiplier. Thus, the model has the same modeling structure with different foundations.

#### Stability, Steady State, and the Extent of the Market

A one-period lag, linear first-order difference equation always converges to a steady state at any given initial value. A shock to our model should result in convergence to the steady state growth determined exogenously to the model. However, this might not be the case if we consider the extent of the market as autonomous demand, i.e. if we can consider autonomous demand as a moving variable. Autonomous demand moves by the residual of growth from reciprocal demand from service to industry. Thus, we can change the autonomous demand to equal the sum of agricultural demand growth and a function of the extent of the market.

$$d_A + d_T = C + \text{Extent}(\text{residual}) \quad (1)'$$

We will illustrate two cases: one with the extent of market and one with not extent of the market. Consider a shock to industrial supply in equation (3). If we have the extent of the market, a shock to industrial supply growth will lead to new steady state growth. The new equilibrium depends on the function of the extent of the market. Table 2 illustrates the effect of the extent of the market and the industrial supply shock. The shock can be either positive or negative. The new equilibrium can move to either side, which reflects the notion of cyclicity and cumulative causation. It is industry that determines the performance of the entire economy. If the industrial sector performs well, the whole economy will benefit from it and vice versa.

	1 + extent market	2	3	4	5	Reciprocal	Residual
t	$d_A + d_T$	$d_t = d_A + a s_s$	$s_t = d_t$	$d_s = s_{t-1}$	$s_s = d_s$	$a s_s$	$(1-a) s_s$
...	C	$C/(1-a)$	$C/(1-a)$	$C/(1-a)$	$C/(1-a)$	$aC/(1-a)$	C
...	...	...	...	...	$C/(1-a)$	$aC/(1-a)$	C
shock1	C	$C/(1-a)$	$C/(1-a)+\Delta$		...	...	...
shock2	C	$C/(1-a)+a\Delta$	$C/(1-a)+a\Delta$	$C/(1-a)+\Delta$	$C/(1-a)+\Delta$	$aC/(1-a)+a\Delta$	$C+(1-a)\Delta$
shock3	$C+f(1-a)\Delta$	$C/(1-a)+a^2\Delta+f(1-a)\Delta$	$C/(1-a)+a^2\Delta+f(1-a)\Delta$	$C/(1-a)+a\Delta$	$C/(1-a)+a\Delta$	$aC/(1-a)+a^2\Delta$	$C+(1-a)a\Delta$
...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...
...	$C+g(\Delta)$	$C/(1-a)+g(\Delta)$	$C/(1-a)+g(\Delta)$	$C/(1-a)+g(\Delta)$	$C/(1-a)+g(\Delta)$	$aC/(1-a)+ag(\Delta)$	$C+g(\Delta)$

Table 2 Industrial Supply Shock and the Extent of the Market

On the contrary, if there is an excess of supply growth without the extent of the market, the model will converge to the same steady as shown in Table 3. A supply shock is a temporary deviation away from the steady state if there is no the extent of the market to absorb the supply shock. The economy will remain closed, and the shock is just a disequilibrium in the balance of payments.

T	1	2	3	4	5	Reciprocal	Residual
	$d_A$	$d_r = d_A + a s_s$	$s_r = d_r$	$d_s = s_{r-1}$	$s_s = d_s$	$a s_s$	$(1-a)s_s$
...	C	$C/(1-a)$	$C/(1-a)$	$C/(1-a)$	$C/(1-a)$	$aC/(1-a)$	C
...	...	...	...	...	$C/(1-a)$	$aC/(1-a)$	C
shock1	C	$C/(1-a)$	$C/(1-a)+\Delta$		...	...	...
shock2	C	$C/(1-a)+a\Delta$	$C/(1-a)+a\Delta$	$C/(1-a)+\Delta$	$C/(1-a)+\Delta$	$aC/(1-a)+a\Delta$	$C+(1-a)\Delta$
...	...	...	...	...	...	...	...
...	C	$C/(1-a)$	$C/(1-a)$	$C/(1-a)$	$C/(1-a)$	$aC/(1-a)$	C

Table 3 Industrial Supply Shock with no Market

With the extent of the market our linear first order difference equation exhibits a moving equilibrium. In the balance of payments constraint theory, growth of a country in the long run equals the growth of the world economy. Balance of payments forces the growth of a country to equal the world growth. The model treats this differently because the growth of the domestic market between the reciprocal supply and demand of industry and service will relax the external autonomous demand growth. This is possible because the model assumes that growth of the industrial sector will lead to the growth of the service sector. The model assumes a strong causality of industrial-led growth in the domestic market as shown in equation 4.

$$d_s = s_{t-1} \quad (4)$$

If growth of service demand is a decreasing function of the industrial supply growth, the effect of relaxing the balance of payments constraint diminishes. Domestic growth relaxes the balance of payments constraint resulting in a moving steady state. Contrary to the Balance of Payments Constraint theory, the growth of the domestic

market makes it possible to reach the markets within the extent. The supply increase of the domestic market is constrained by demand. The long run growth of an economy becomes a moving steady state dependent only on "the extent of the market."

#### Notes

<sup>1</sup> Thirlwall (1986), on interpreting Young (1928) and Kaldor (1979)

<sup>2</sup> Kaldor (1972, 1975a)

<sup>3</sup> Kaldor (1967), p. 27

<sup>4</sup> Young (1928)

<sup>5</sup> Kaldor (1966, 1967)

<sup>6</sup> Thirlwall (2001), p. 82

<sup>7</sup> Ibid., p. 83

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