The Importance of Positive Externalities and Intersectoral Linkages in Determining Growth Path of Developing Economies

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Abstract

This paper is intended to explore the significance of intersectoral linkage in determining the growth path of developing economies. It is commonly believed that intersectoral linkages among firms and industries is importance since it provides the positive externalities that enables firms or industries to gain the increasing return to scale. Increasing return to scale is the characteristic that drives the process of growth. The paper describes the source of increasing return to scale, the relation between externalities and sectoral linkages, and the link between sectoral linkages and growth path in developing economies. The analysis of the paper is based on the literatures review. All the models reviewed suggest the importance of sectoral linkages from various points of view, and come to the similar conclusion that the weak or absence of sectoral linkages could lead developing economies to be trapped in low equilibrium economy and low growth path. The conclusion is how the government able to release the developing economies from the historical trap of low equilibrium economy and low growth path by establishing a rational policy.

Keywords: *increasing return to scale, externalities, sectoral linkages, growth path*

The aim of this paper is to explain the importance of intersectoral linkage in determining the growth path of developing economies and to build the rationale of how it may release the developing economies from the historical trap of low equilibrium economy and low growth path. According to the new growth theory, economic growth results from increasing returns to scale where a proportional increase in labor and capital as input of production would rise more than proportional yield in output. These increasing returns drive the process of growth (Cortright, 2001). The increasing returns to scale could be driven by externalities aroused from interdependence among firms within industry and economy.

The structure of the paper is ordered as follows. The first section is introduction, followed by the second which is briefly explaining the source of increasing returns to scale. The third section briefly describes the types of externalities that generate the increasing returns, and illustrates a few relevant models that provide the link between intersectoral linkages and growth path. This section aims to put a theoretical framework. The forth section analyzes intersectoral linkage and growth path in developing economies based on the theoretical framework. In this section I will make a general theoretical observation based on the alleged characteristic of developing economies rather than go on details to analysis countries' cases, such as in Autant-Barnard, 2001; Combes, 2000; Henderson, *et al.*, 1995; Kim, 2008; and Venables, 1995). The fifth section briefly describes the policy that could be beneficial to overcome the historical growth path in developing economies. The last section is the conclusion.

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THE SOURCE OF INCREASING RETURNS TO SCALE

The source of increasing returns to scale could be external or internal to the firm. The internal increasing returns to scale of particular firm could be resulted from its huge fixed cost and volume of production. It is the characteristic of firm or industry that apply modern technology. The external source of increasing returns to scale could occur from interdependence where the progress in one firm creates beneficial externalities for others firms within industry simultaneously. Therefore firms producing individually with constant returns to scale could acquire increasing returns to scale at the sector or economy level if activities of firms collectively affect their production conditions. Although production of the firm exhibits constant return to scale, the externalities of industry growth would encourage the return to scale to increase (Ross, 2000).

THE EXTERNALITIES AND INTERSECTORAL LINKAGES

Externalities could be specified into technological and pecuniary externalities. Technological externalities are emerged from direct interdependence among producers, and related to the production function. While pecuniary externalities are in which the interdependence between producers occur through the market mechanism, providing lower cost, larger market size and higher demand for their goods (Ross, 2000).

Technological Externalities

The model of Rosenstein-Rodan (1943) states that externalities generate increasing return to scale is resulted from activities such as industrial training. Arrow (1962) added further that these effects are emerged from learning by doing process which increase the stock of experience accrued with the production activities. The expansion of economy that increases the resources of trained and skillful workers is beneficial for the firms. It improves the productivity, which could be applied to mass-production by capitalist sector. In the absence of externalities from economy expansion, the cost of providing trained and skillful worker would be much higher for any firm to acquire.

Rosenstein-Rodan model enables multiple equilibrium to exist since capital stock increase when market wage of trained and skillful worker provided by the economy is lower than the required wage to enable firm generating the steady capital accumulation. On the other hand, steady capital accumulation would decrease if market wage provided by economy greater than the required wage.[1]

If the market wage is lower than the required wage, firm would get more profit and the rate of capital accumulation would be higher over time. Capital intensity within economy would increase over time and reach the high level of equilibrium at stable steady state point with high real wage and high capital intensity. On the contrary, at the low level of capital stock where the market wage is higher than the real wage required to generate the steady state of accumulation, the rate of accumulation is less than depreciation and the size of capitalist sector would be narrower over time. The capital intensity within economy would declines and the equilibrium would reach the low equilibrium at subsistent level.

Pecuniary Externalities

Pecuniary externalities are externalities in which interdependence between producers occurs through the market mechanism, where the firms expand the market size and give benefit for other firms reciprocally. As a result, firms gain returns not only by its own expansion but also with the growth of industry and the whole economy.

[1] The required wage to enable firm generating the steady capital accumulation is a constant increasing function of capital stock. The market wage of trained and skillful worker could be lower or higher than the required wage. This is due to the elasticity of labor supply and additional effect of capital stock caused by increasing returns to scale due to expansion of economy.

Furthermore, Ross (2000) makes a distinction between horizontal and vertical pecuniary externalities. Horizontal means that the interdependence occurs horizontally through the interrelated market of final goods industries, where pecuniary externalities entails demand spillover across final goods industries. Vertical means that the industry acts as supplier and costumer, where firms provide the intermediate input to others firms. Horizontal interdependence could be described by *Big Push* model from Murphy, *et al* (1989), while vertical interdependence could be explained by model from Venables (1996).

Big Push Model

There is multisectoral economy producing different final goods. There are two techniques in the production of each sector: traditional technology with constant return to scale and modern technology with increasing return to scale. The modern technology relates with industrialization and would be more productive at higher level of output but less productive at lower level. Individual producer in the perfect competition market use traditional technology. On the contrary, a single firm in each sector has access to modern technology (Ross, 2000), although they are not necessarily able to utilize it. Utilization of modern technology requires the firm to set a premium wage, higher than the wage that is paid in traditional technology to draw the labor from traditional technology.

Utilization of modern technology by firm in particular sector would only be profitable if its level of employment required selling as much as the traditional do at its full employment is higher than total wage cost as function of labor input of applying modern technology. By replacing traditional producer, the firm would gain a larger market to be profitable and sales are higher than wage cost. The similar result would apply to utilization of modern technology by firm in others sectors. The utilization of modern technology would generate the higher wage paid and more profit, provides the large market size for the firm in first sector (Sachs & Warner, 1999). This would lead to industrialized equilibrium, when modern technology production in each sector produces at a full level of employment. This high level of equilibrium would display higher output, wage, and profit in economy (Ross, 2000).

However, if fixed labor input to initiate the modern technology production is so large that the total wage cost of applying modern technology is higher than sales accrued by modernized firm at level of full employment, the market is not profitable to apply modern technology. Therefore the industrialization would not emerge; economy would be set at low-income equilibrium with traditional technology.

Here we have multiple equilibriums. The economy equilibrium would be set at stable high equilibrium or stable low equilibrium. The temporary equilibrium beside those two would be temporary and moving to either stable high or stable low equilibrium.

Venables Model

Venables (1996) illustrates that there are two industries in economy, upstream industries and downstream industries. Upstream industries supply intermediate goods as input of production for downstream industry producing final goods. Domestic upstream industry operates in imperfect market while downstream industry with constant return to scale is price taker in both input market and output market. The industry uses intermediate goods and labor as input production. Both final goods and intermediate goods are tradable. The price of imported goods is the world market price plus tariff. With the expansion of economy, higher volume final goods would increase the demand for intermediate goods from upstream industry. It would encourage more entry into upstream industry, therefore the industry would be more competitive and lowering its average cost and its price.

Here Venables model demonstrates the pecuniary externalities between firms, which are operating trough demand link-

ages and cost linkages. The demand linkages occur when the increasing operation scales in downstream industries give advantage to upstream industry. The cost linkages emerge when the expansion of upstream industry lower the price and give benefit for downstream industry.

These externalities would establish multiple stable equilibriums; high level equilibrium and low level equilibrium. High level of equilibrium characterized by low intermediate goods price that enable the high volume of downstream output, sequentially attract many upstream firms to emerge in the market of intermediate goods that create more intense competition. The economy at this equilibrium is featured by high output and low cost.

On the contrary, low level equilibrium is characterized by narrow downstream industry. The price of intermediate goods set at the price of imported goods. The quantity of firm in upstream industry determined by the ability to cover cost at the price level of imported intermediate goods.[2] Therefore, the volume of upstream industry is narrow and the competition in upstream industry is not intense enough to provide lower intermediate goods price. The economy at this equilibrium is characterized by high cost and low output.

INTERSECTORAL LINKAGES AND GROWTH PATH OF DEVELOPING ECONOMIES

Developing economies is historically characterized by highly imperfect domestic industrial market, huge fixed cost, low worker productivity in industrial sector, and dependence of imported intermediate goods (Bardhan & Urdy, 1999). Given these characteristics, we can adopt theoretical framework of models mentioned earlier to observe the intersectoral linkage and the growth path in developing economies.

Rosenstein-Rodan model views economies growth as a process of learning-by-doing within a firm, industry and economy. As economy expands, there is spreading in learning across industry and the industry as whole with get benefit from it. The presence of technological externalities is very much linked with interdependence among firms in different sector. These externalities provide the trained and skillful worker in a lower cost beneficial for firm in each sector to apply capital intensive technology and mass production with increasing return to scale.

However, firm in developing economies faces the huge fixed cost to generate capital accumulation. Simultaneous with low productivity, this condition discourages the utilization of capital-intensive technology with increasing returns. The firms in different sectors also face the same thing. Therefore no firm are willing to initiate the expansion to drive the externalities (in term of technology spillover and learning-by-doing) spreading across economy. It would lead to the absence of capital intensive technology with increasing return to scale in economy. Therefore growth path would be steady set at a low-level equilibrium with low capital intensity, low wage and low per capita income.

According to the *Big Push* model framework, externalities aroused from intersectoral linkages are pecuniary externalities. Utilization of modern technology with increasing returns to scale in industrial sector would generate higher wage and profit; provide larger market for other firm from other. It leads to industrialization where firms in each sector apply modern technology with increasing return to scale and produce at full employment level. This would generate higher output, wage, and profit in economy as a whole.

However, fixed cost of applying modern technology in developing economies is too high for individual firm to produce in profitable level since output demand and market size is not large enough. Demand for output is too low and market size is too

[2] Since the intermediate goods are tradable, downstream industries could get intermediate goods from domestic downstream industries or imported from foreign countries. Provided narrow and high cost of domestic upstream industry, intermediate goods would be imported and domestic upstream industry should set the price at the same level as imported price.

narrow as other firm in others sector do not apply modern technology for the same reason. Therefore the growth path would be steady set in low-income equilibrium without industrialization.

Venables model emphasizes the importance of intersectoral linkage between upstream industries supplying intermediate goods, with downstream industries that produce final goods using labor input and intermediate goods. With the expansion of economy, intersectoral linkage would generate pecuniary externalities that are beneficial for both industries. Demand linkage is beneficial for upstream industry since the downstream industry demand more intermediate goods. Meanwhile cost linkage would give benefit for downstream industry, since the increasing demand for intermediate goods generates the competition in upstream industry resulted in lower intermediate goods price and lead to lower cost of downstream industry.

However, the upstream industry in developing is producing at high fixed cost level. Therefore most of intermediate input for downstream industry is imported and intermediate goods price is set at world-market price plus tariff. Consequently it would prevent the expansion of downstream industry since they would face a relatively high intermediate goods price. The growth path would be set at low-level equilibrium with low output and high cost of production.

All the model above explain the importance of sectoral linkages from a different views, and come to the similar conclusion that the weak or absence of sectoral linkages could lead developing economies to be trapped in low equilibrium economy and low growth path.

RELEASING THE DEVELOPING ECONOMIESS FROM LOW GROWTH TRAP

There are several initial ways to release the developing economies from low growth trap. According to Rosenstein-Rodan model, since the absence of learning-by-doing and technological spillover across industry is believed as the cause of low growth path, government should provide the knowledge and industrial training that beneficial for each firm in utilizing modern technology. Therefore government should emphasize the education sector and promote industrial training as well as research and development.

Big Push model suggests that government provide policy to generate a larger market to overcome huge fixed cost of modern technology utilization in industrial sector. This policy could be a large spending program that generates more income and lead to larger demand for industrial sector. Given initial large market due to government spending program, the progress of industrialization in one sector would generate a larger market demand for industrialization in other sectors, therefore the industrialization in economy would emerge.

According to Venables, the cause of low growth path is high cost of intermediate input that prevents the downstream industry to expand and reciprocally shrink the demand for domestic upstream industry. Therefore the policy of government should be directed to reduce the high cost of intermediate input and provide larger market for domestic final goods. Government could provide subsidy to lower the cost of upstream industry rather than protect the intermediate goods trade. On the contrary the protection on final goods is considerably beneficial.

Summarized from all explanation above, good and suitable government policy could move the developing economies from historically low growth path toward a higher level of growth path. In general, institutional is significant to overcome history. Institutions matter because it shape the environment for larger market and applying modern technology in production that lead to industrialization.

CONCLUSION

Intersectoral linkage is important in determining a growth path of developing economies. Economies growth result from increasing return to scale, and increasing return to scale could be driven by externalities aroused from interdependence among firm within industry and economy.

Developing economies is historically characterized by highly imperfect domestic market in industrial market, huge fixed cost, low worker productivity in industrial sector, and dependence of imported intermediate goods. The weak or absence of sectoral linkages in developing economies would prevent the externalities in term of technological spillover, demand spillover and cost spillover. The absence of externalities evades increasing return to scale and leads the developing economies to be trapped in low growth path.

Institutional matter is significant to overcome historical low growth path in developing economies. Its significance aroused from its capacity to shape the environment for larger market and application of modern technology in production with increasing return to scale that lead to industrialization. The government could establish policy on promoting education sector and research development activities, reducing cost and generating a larger market for industrial sector.

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