

Agricultural Sector Development and Structural Transformation: Sub-Saharan Africa versus East Asia

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This study examines the nature of economic stagnation in the majority of the countries in Sub-Saharan Africa (SSA) and discusses different approaches to structural transformation of their traditional agriculture-based economies. The argument is that the economies and people of SSA countries suffer from a Malthusian stagnation and poverty. This study attributes the Malthusian stagnation to underutilization of the richly endowed land and other agricultural resources, which in turn is due to the prevalence of “communal ownership of land” in rural areas. It argues that the traditional institution has kept agricultural productivity at extremely low levels and prevented a demographic dividend from being created. This study reviews the experiences of East Asian and other countries in their early stage of economic development along with those of SSA to understand the process of an economic takeoff. From this emerges the importance of broad-based agricultural development in enabling a traditional agriculture-based economy to get prepared for the takeoff. In particular, it turns out that internalizing the external effects of agricultural development on human development and its effects on savings is the key. It also finds supportive evidences from panel-data analyses of the dynamic driving forces in different stages of economic development.

Key words: Sub-Saharan Africa, Agricultural development,
Demographic dividend, Communal ownership of land,
Industrial development

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I. Introduction

The economic challenges that face Sub-Saharan African economies¹ are twofold: broadening the base of economic growth and sustaining the growth momentum. The narrowness of the growth bases reflects multifaceted impediments to contemporaneous interactions of agents and sectors with each other. The long-term trend of economic stagnation in Sub-Saharan Africa (SSA) implies the existence of underlying forces that hamper inter-temporal resource allocation.

A narrow growth base makes an economic growth momentum unsustainable. The rapid growth of SSA's economy in the last decade has been concentrated on the commodity sector. In particular, the growth relied heavily on exports of mining resources, with 90 percent of African trade taking place between this continent and the rest of the world.² Moreover, only a small portion of this growth has been translated into social development.³ To the extent this is the case, the current momentum may not present an exception.⁴

In social underdevelopment, poor quality of one factor (*e.g.*, labor) prevents another factor (*e.g.*, capital) from increasing. A non-exhaustive list of the factors that reinforce one another in weighing down upon the SSA economy includes pre-modern institutions and infrastructures, low agricultural productivity, malfunctioning of market institutions, underinvestment in human and physical capital, prevalence of HIV/AIDS, gender inequity, conservation of traditional technologies by smallholders, political instability, and shortages in employable labor supply. These factors underlie the weak linkages between exports and domestic sectors and the widespread poverty in SSA. According to *World Development Indicators*, the share of individuals living on less than PPP-adjusted 2 dollars a day still remains approximately 70 percent of the total population.⁵ The high

¹ It is also noted that SSA includes several good performers, such as Botswana, Cape Verde, Equatorial Guinea, and Mauritius. The GDP per capita of these countries have more than tripled from 1980 to 2013. The other countries share approximately the same features of stagnant GDP per capita.

² Mthuli Ncube, cited in David Smith, *Africa's Growing Ambition* pp. 48-51, *Portfolio*, Issue 77, May 2012.

³ For example, studies on this region in the past decade have shown that non-monetary poverty does not necessarily improve in parallel with monetary poverty (McKay 2013).

⁴ GDP growth rates from 2000 to 2013 averaged at 4.9%, increasing from the previous 14-year average growth rate of 2.0% (World Development Indicators, The World Bank).

incidence of poverty among the population has negative effects on the development of other productive factors. With subsistence levels of income, the majority of population can hardly improve their health to the adequate level required for industrial work. The poor in SSA often opt to give birth to as many children as possible,⁶ which, combined with extreme poverty, results in high rates of child mortality, malnutrition, and stunted growth of children. Poor health, short life expectancy, and an extremely high age dependency, *i.e.*, the ratio of dependent age population to working age population, continue to exert negative influences on economic development. Poverty perpetuates itself over generations because it hinders health improvement and reduces the life expectancy of the succeeding generation. Thus, the interaction between social and economic factors makes the design of economic development policies a significantly elusive matter.

This study examines the nature of economic stagnation in most SSA countries and discusses different approaches to finding the way out. It posits that the economies and people in SSA suffer from a Malthusian stagnation and poverty. It attributes the stagnation to underutilization of the richly endowed land and other agricultural resources in rural areas. The low agricultural productivity resulting from the underutilization of the land prevents a “demographic dividend,” *i.e.*, a long period of a decreasing age dependency ratio from being generated. Furthermore, it ascribes the underutilization of land in rural areas to the “communal ownership of land” prevalent in the region.

This study contends that reforming traditional institutions for agriculture may provide a solution to the poverty trap. Data from the World Development Indicators for GDP per capita in 1960 (Figure 1a) demonstrate a stark contrast between stagnation in the SSA region and economic takeoff in the East Asia and Pacific region. The latter began its economic takeoff in the 1960s and caught up with SSA in around 1990. Literature reviews on economic takeoffs in East Asian countries as well as in England indicate that the establishment of institutional and physical infrastructures for agriculture is the key.

⁵ In several countries, including Seychelles, Gabon, Cameroon, Mauritania, Mauritius, South Africa, the proportion is less than 50%.

⁶ Some individuals opt to have as many children as possible in the hope that their surviving children would take care of them when they get old. Others give birth to many unwanted children mainly because of the unmet need for family planning and the lack of contraceptives (*e.g.* WHO Global Health Observatory Data Repository, MDG 5, 2014).

This study also maintains that the takeoff of a traditional agriculture-based economy involves structural transformations in both the society and economy. Moreover, the interaction between social and economic development requires much time. The episodes of economic takeoffs in the UK and other countries, including those in East Asia, usually ensued from a series of structural transformations in different sectors at different time periods, for example, starting from agriculture in a generation and then moving to industry in the next generation. According to Azariades and Drazen (1990), Temple, *et al.* (1998), and other scholars, an economy can respond to economic opportunities in a specific sector only when its social capabilities reach a threshold.

However, the literature is fraught with counter-arguments based on short-term perspectives. In particular, some support subsidizing industrialization while taxing agriculture. This approach, however, may be justified only if the economy has not inherited widespread poverty, which exerts downward pressure on human and physical capital development.

The application of a long-term perspective to empirical research is restricted by the paucity of long-term data covering all of the different economic development phases.⁷ Given the degree of backwardness of economic development in Africa, Korea's experience in the first 50 years from the early 1910s when it began to reform its agriculture-related institutions is more relevant than that in the second 50 years from 1960 when the country began its industrialization. Ignoring this fact, most contemporary researchers including the Commission on Growth and Development (2008) used data starting from 1960. Or, it may be that they were distracted by the "miraculous growth" recorded by the Korean economy since 1960.

Researchers and policy makers are torn between supporting the strategy of "leapfrogging to industrial development" and that of "agriculture first." For example, two prominent speakers expressed opposing views in the African Economic Conference held in Tunis in October, 2010. Malam Sanusi, the then governor of the Central Bank of Nigeria, argued for industrialization in Africa along the value chains of agriculture. By contrast, Shenggen Fan, the then director general of the International Food Policy Research Institute, urged African leaders to focus on in-

⁷ An exception is the long-term data on GDP per capita compiled by Maddison (2003). According to this dataset, Africa's GDP per capita in 2001 (USD 1,489) remained more similar to that of pre-industrial UK in 1700 (USD 1,250) than to that of China in 2001 (USD 3,583).

vesting in agriculture first to achieve food security before adopting the strategy of industrialization. Development institutions have yet to agree on this issue as well. The World Development Report 2008 (World Bank 2007) presented an argument that “the case for using the powers of agriculture for poverty reduction and as an engine of growth for the agriculture-based countries is still very much alive today” (p. 64). However, the United Nations Conference on Trade and Development (2010) urged the least developed countries in Africa to implement industrial policies to benefit from trade and finance liberalization.

To fill these gaps in literature and in practice, the current study adopts a holistic approach and proposes a conceptual framework, namely, *a two-transition approach to an economic takeoff*. The testable hypotheses derived from the approach are as follows. First, agricultural development generates positive external effects on industrial development and not *vice versa*. Second, the stages of economic development undergo two transitions, namely, agricultural sector development and industrial development, in the sequence. Third, the demographic dividend and savings to be accumulated in the agricultural sector development phase are essential for an economy’s transition to industrial development.

The remainder of this paper is organized as follows. Section II provides a critical review of related literature. Section III provides a discussion on the nature of the initial conditions for economic development of SSA and then presents the two-transition approach to economic takeoff. It also discusses the policy choices available for agricultural sector development in SSA. Section IV presents empirical analyses of the hypotheses derived from the discussions on the dynamics of growth and structural transformation. Section V provides the conclusions.

II. Literature Survey

A. “Agriculture-first” versus “pro-industry” argument

A prominent feature emerging from the debates on the “agriculture-first” versus “pro-industry” argument is the prevalent skepticism about the role of agriculture in creating momentum for self-sustained economic growth. Agriculture pessimism is deeply rooted in the belief that industry is innately more productive than agriculture. In the words of Hirschman (1958), the linkages of industry to other sectors are stronger than those of agriculture.

This strand of the literature often neglected to check the preconditions

for industrialization. The dual economy model proposed by Lewis (1954) can explain the structural transformation of East Asian countries. However, its policy implication of taxing agriculture to subsidize industry⁸ is not necessarily applicable to SSA countries. The validity of the strategy depends critically on the existence of “unlimited supplies of labor” in the traditional agricultural sector. In SSA in the 1960s and 1970s, when many of its countries implemented an import-substitution industrialization policy, SSA countries did not have the “unlimited supplies of *employable* labor in industry.” It was because the majority of the people, although populous, were mostly unqualified for employment.⁹

A theoretical explanation of how the “*unlimited supplies of labor*” came into existence in East Asia by 1960 may be found in the model of Jorgenson (1961). He derived theoretically the need for agricultural productivity to reach a threshold so that the traditional economy can have a critical mass of labor supply for industry. The bottom line is that, for the economy to be able to launch and sustain industrialization, additional supply of food is needed to feed ex-farmer industrial workers. Another reason for the need for prior development of agriculture is its role in expanding the domestic demand for industrial products by increasing income of farm households.

This agriculture-first argument was countered by Myint (1975), who pointed out the possibility for developing economies to import cheap foods for industrial workers. Such possibility negates the necessity to develop domestic agriculture before undergoing industrialization. However, importing food is likely to perpetuate the economic stagnation; it deprives local people of the opportunities to make most of the richly endowed resource, land, and foster the future generation of workers.

The disagreement between pro-industry and agriculture-first advocates is most pronounced in their different interpretations of the law of declining relative importance of agriculture as an economy develops. Pro-industry advocates attribute the law to the superior productivity of industry and use it to justify the policies of subsidizing industry at the

⁸ This policy is referred to as “inward-looking” industrialization as opposed to “outward-looking” industrialization.

⁹ In SSA subsistence economies, the population is not well prepared for rigid and disciplined industrial work, with the portion of the population aged 0 to 14 being equivalent to 43%. Many of them suffer from malnutrition. They have a short life expectancy of approximately 50 years. During their lifetime, they give birth to approximately six children. Rearing children takes most of their time and energy and does not leave much room for their own training and education.

expense of agriculture. By contrast, the advocates of agriculture-first ascribe it to the success of agricultural development and argue that the relative decline of agriculture cannot begin unless a threshold of agricultural productivity is reached.

Contrary to development theorists, economic historians mostly agree that agricultural productivity is indispensable to industrial development. Rostow (1960) introduced an interim stage called “preconditions to take off” between a traditional economy and the takeoff stage. He considered the role of the commercial development of agriculture in the preconditions stage while assuming the existence of foreign markets for agricultural produce. Kuznets (1967) demonstrated that the onset of industrialization in advanced countries had almost always been linked with agricultural development. Kang, *et al.* (1999) showed that Korea was able to industrialize owing to prior investment and corresponding productivity gains in the agricultural sector during the colonial period from 1910 to 1945.

Timmer (1988) synthesized the debate into four phases of agricultural transformation, in which the role of agriculture is redefined as the economy evolves.¹⁰ In the first Mosher phase, agriculture requires inputs, institutional changes, and the adoption of new technologies for agricultural development to ensue.

In the second Johnston Mellor phase, agriculture contributes to growth, whereas the share of agriculture in employment begins to decrease. Simultaneous efforts are exerted to promote agricultural and industrial development in consideration of the close relationship between agricultural transformation and industrial-technological progress. The roles of agriculture in this phase in increasing the supply of food, releasing labor for industrial employment, expanding the market for industrial output, and increasing the supply of domestic savings, involve positive external effects on the economy. The reason is because market prices of agricultural products are not likely to fully reward these contributions.

The shortcomings common to all of the aforementioned theories are as follows. First, they ignored the role of the micro-foundations, particularly institutions, for economic transition. For example, Rostow ignored the importance of property rights in motivating individuals to take risks. Second, the theories disregarded the inter-generational transfer of agricultural surplus to generate a pool of employable labor forces. Al-

¹⁰ Discussions on the third Schultz-Ruttan phase and fourth Johnson phase of agricultural transformation are omitted given that they are irrelevant to the SSA context.

though a report by the Food and Agriculture Organization (Sakuyama 2007) recognized the role of the agricultural sector in providing surplus labor, it did not consider the possibility that this role is realized through inter-generational transfers rather than through markets. Even World Development Report 2008 did not elaborate on this issue; although it highlighted agriculture as an engine for economic development in a certain type of country *i.e.*, an agriculture-based developing economy, it did not demonstrate agricultural development as the *only pathway* through which an agriculture-based developing economy can make the transition to an economic takeoff.

B. Demographic dividend, agriculture, and institution

Some neoclassical economists regarded agriculture as competing with industry for limited resources, particularly labor. Matsuyama (1992) argued that an initially low agricultural productivity in Japan has contributed to the transfer of labor from agriculture to industry whereas an initially high agricultural productivity in Argentina has hampered the release of labor from agriculture to industry. He attributed the success and failure of Japan and Argentina, respectively, in industrialization to this. The main rationale is that industry has strong learning-by-doing effects whereas agriculture does not.

However, this argument neglected the possibility of a demographic channel of agriculture's contribution to the initiation of economic development. Without the demographic dividend generated by agricultural development, efforts to develop industry would not be feasible in the first place. Examples include the "inward-looking industrialization" policies implemented by some SSA governments in the 1960s and 1970s, which had mostly failed over time.¹¹

The literature on the demographic channel of agriculture's contribution to economic development is less extensive, although a few studies have been conducted on the interaction between population and technological progress and on the role of agriculture in generating demographic changes. In general, a rapidly growing population exerts pressure on available resources, including land. A high and increasing population density pressures people to adopt intensive agriculture (Boserup 1965).¹² Goodfriend and McDermott (1995) modelled the economic transition from a non-

¹¹ Sabala (1997) compares the case of Kenya vis-à-vis that of South Korea.

¹² Intensive agriculture refers to the method of cultivating with a large amount of capital and labor per land area.

market to a market economy as being driven by population growth, which leads to the expansion of markets and opportunities for specialization. To model the long-term economic transition from a Malthusian to a post-Malthusian economy, Galor and Weil (2000) assumed that an increase in population size induces technological progress. This assumption reflects the observation that the high population growth in Western Europe until 1820 preceded the high growth in output per capita thereafter.

By contrast, Heinsohn (2003) and others found that a high population growth could lead to social deterioration rather than technological progress; the youth bulge in the population age structure that accompanies a spurt-like population growth tends to lead to social unrest, war, or terrorism. Conflict and war may in turn lead to a decline in the rural population and an increase in the urban population (African Development Bank 2011).

Empirical studies in World Development Report 2007 (the World Bank 2006) show that “as the proportion of workers in the population rises or falls, so do opportunities for economic growth.” In particular, a period of the declining age dependency ratio¹³ or the so-called “demographic dividend” provides a traditional economy with opportunities to begin economic growth. The decline in age dependency ratio leads to the following results in a sequence. First, the mortality rate begins to decline while the fertility rate remains constant. Second, the fertility rate also begins to decline with a lag. The demographic dividend usually lasts for approximately 40 years from the time of the emergence of the baby boom generation. The demographic dividend contributes to increases in labor supply, savings, and human capital. In particular, a long life expectancy fundamentally changes the way people live, their attitudes to education, family, and retirement, and the role of women in work (Bloom, *et al.* 2003, p. 41).

Studies by Bloom and Sachs (1998) ascribed between one-fourth and two-fifths of East Asia’s economic growth to the demographic dividend. By contrast, Bloom, *et al.* (2003) found that despite several instances of decline in the mortality rate in SSA, the age dependency ratio in this region has not fallen. Based on this observation, they argued that “as long as fertility remains high and families have large numbers of children,

¹³The age dependency ratio is measured by the ratio of the number of dependents (people aged 0 to 15 and above 65) to that of working people (aged 15 to 64).

SSA countries are unlikely to see rising incomes or healthier and better-educated workers” (p. 65).

In a similar vein, Fogel (1993) singled out reduction in malnutrition as the main factor behind the first secular decline in mortality in Britain between 1725 and 1830. The reason is that malnutrition during childhood, having long-term effects, predicts morbidity in adulthood. He also showed that increased caloric intake during childhood leads to increased body size, which in turn leads to less mortality and morbidity. According to Fogel, the resulting increases in human efficiency and dietary energy available for work contribute substantially to economic growth. He also showed that the lag between the time when investment in public health is made and when the benefits occur may be as long as a century.¹⁴

As for the source of the demographic dividend in the UK, Timmer (2002) maintained that “until 1875, nearly all of the food that permitted the increases in nutrient intake in Britain was produced domestically, a result of the *agricultural revolution* in the late 18th century and early 19th century” (p. 1502). The first wave of secular decline in mortality in the UK from 1725 to 1775 followed a decrease in wheat price in England by 23 percent between 1660 to 1669 and 1717 to 1724 (John 1965, p. 19). These observations imply that agricultural development in the decades before 1725 contributed to the genesis of the demographic dividend in the UK.

Timmer (2002) further argued the agricultural revolution as heavily stimulated by “the protection offered by the Corn Laws that existed from 1815 to 1846” (p. 1503).¹⁵ Such protection led to large investments in new agricultural technology and rural infrastructure, which in turn led to agricultural productivity increases. He compared this experience to that of France at that time. France had a provisioning policy designed to keep food prices low. Thus, France was unable to increase agricultural productivity. Moreover, “imports were not sufficient to provide increases in caloric intake per capita especially in rural areas where three-quarters of the labor force lived and worked” (p. 1503).

The validity of this argument does not necessarily imply that a protective policy is sufficient for the commercial development of agriculture.

¹⁴ Fogel maintained that investments made a century earlier contributed to the extension of life expectancy by four years in the period between 1929 and 1939 despite a continued high unemployment rate of above 16 percent.

¹⁵ The Corn Laws aimed to protect cereal crop producers against competition from abroad.

As Acemoglu and Robinson (2011) have documented, without reforming strongly inertial pre-modern institutions¹⁶ and infrastructure, a traditional agriculture-based economy is likely to be stuck in an economic stagnation. In the UK, the private property rights to land established long before the *Corn Laws* were enacted played an important role in agricultural development. The institution was strengthened by the enclosures of common lands, the expansion of which accelerated in the 15th and 16th centuries. Establishment of private properties through the enclosures contributed to increased investments in large-scale agriculture combined with international trade. It also contributed to the appearance of a landless working class. Private property was further protected at the constitution level by the 1688 *Glorious Revolution*. Private property rights provided a legal infrastructure supporting commercial agriculture and investment in physical infrastructure. The policies of mercantilism helped commercial development of agriculture by providing ample markets for British agriculture in the 17th century.

Comparison of the experiences of the UK and China in agricultural development leads to the inference that the order or timing between institutional reform and infrastructure development is not of importance.¹⁷ As explained in the above, institutional reforms preceded the development of agricultural infrastructure in the UK. By contrast, infrastructure development in China preceded the establishment of private ownership of agricultural products or land. The communist movement emphasized the provision of *physical infrastructure*, such as roads and electricity, which could be used for both agriculture and industry. These improvements in infrastructure supported the initial agricultural development, which led to a decline of mortality rates. It was not until 1978 that a new regulation of land use and agriculture allowed a form of private ownership. Despite their ostensibly vast differences, the experiences of the UK and China commonly illustrate the likely effectiveness of protective measures for agriculture in promoting agricultural sector devel-

¹⁶ "Institutions are the humanly devised constraints that structure human interactions. They are made up of formal constraints (rules, laws, constitutions), informal constraints (norms of behavior, conventions, and self-imposed codes of conduct), and their enforcement characteristics" (North 1990). Institutions establish the payoff matrices for the counterparties and their choices of transactions. Under a specific institution, some actions get rewarded, whereas others are penalized. A few institutions promote cooperation among individuals, whereas others do not.

¹⁷ *Infrastructure* "facilitates market transactions or makes other economic inputs more productive (Jimenez 1995)" as do proper institutions.

opment provided that institutional and physical infrastructure for agriculture have been established.

III. Agricultural Sector Development and Structural Transformation of SSA

A. Initial conditions of economic stagnation

At the risk of oversimplification, a typical SSA economy is characterized as being partly modern and partly traditional, with the majority of the population being engaged in subsistence agriculture in rural areas. The core institution governing the traditional economy is the communal ownership of land (AU, African Development Bank, and UNECA 2010).¹⁸ Under informal customary rule sets, village lands are controlled by associations or committees of farmers. The representatives, *e.g.*, paramount chiefs in Sierra Leone, presidents of registered villages in Tanzania, *etc.*, undertake the roles of land custodians. Although smallholder farmers have access to land, only a few have the title to their land. In some cases, they are unsure whether they can keep tenure in the following year or whether they can recoup the returns from their own investments in the land. They may have to yield the land to other members in the next year even if they have improved land by making investments in irrigations and other agricultural facilities. Thus, they would rather extract as much from the land as possible despite its consequent degradation and depletion. In West Africa, for example, smallholders may move deeper into forests to clear land for “slash-and-burn” farming upon depletion of the land, accelerating deforestation.

Due to these customary land institutions, land is not available as a means of accumulating wealth by smallholder farmers. Even where land tenure is secured, land is not an asset that is readily bought or sold. Without a cadastral survey and with registration costs being high, land registration is seldom done. Smallholders cannot utilize land as collateral for obtaining credits. Partly due to this, and partly due to financial illiteracy, high fees, and documentation requirements, finance remains

¹⁸ According to the EU (2004), land ownership in Eastern and Southern Africa is featured by large-scale alienation of land by those associated with the former colonial powers, by commercial farmers, and by national parks. Land ownership in West Africa is characterized by limited white settlement and the continued strength of customary powers, overlaid by sequences of legal, political, and institutional changes.

underdeveloped (Salami, *et al.* 2010). Credit is not available to those who have no legal land titles to use as collateral for borrowing, except for those small amounts of credit extended to families with a sufficient number of young and healthy male workers.

With finance and land being unavailable for wealth accumulation, smallholder farm households use their children as the means of saving (Azariades and Drazen 1993). Smallholders choose to have as many children as possible in the hope that their surviving children will support them in their old age. The private rate of returns from having another child is higher than that of social returns, meaning that an additional child has negative external effects. With high human fertility, the population grows rapidly, amplifying the negative external effects and weighing heavily on public safety nets. The average family size is large. The young-age dependency ratio is kept high. According to World Development Indicators, the share of the population under age 15 exceeds 40 percent of the total. Moreover, the ratio of the dependent to the working-age population has never been lower than 80 percent until recently. Bearing and rearing children require time and energy. Thus, the high age dependency ratio demobilizes workers, making the current generation less productive work forces, and leads to a lower average labor quality of the next generation. The private benefit of a large family is eroded as the family size increases above a certain limit. The private benefits as well as the social benefits having of an additional child become negative if it leads to a youth bulge in the population.

Another factor preventing farmers from adopting intensive agriculture is lack of infrastructure. Infrastructure connecting rural communities located in sparsely populated areas to the outside world is poorly developed although coastal cities are closely integrated with the global economy. The economy is generally highly fractionalized not only because of ethnic, linguistic, and religious factors but also because of infrastructure underdevelopment. Formal and informal sectors, as well as urban and rural areas, are not well integrated because the poor supply of roads, electricity, and communication keeps transaction costs high. The lack of incentives to invest in land and the insufficient water supply and roads restrain individuals from practicing intensive agriculture. Under extensive farming, specialization cannot be expanded beyond the farm households.

The pre-modern land institution, underdeveloped infrastructure, and high age dependency reinforce one another and lock the economy in extensive agriculture. According to the World Agroforestry Center (2009),

“cereal yields in Africa average about 1 tonne per hectare, compared to average cereal yields of 2.5 tonnes in South Asia and 4.5 tonnes in East Asia” (p. 1). Due to the low productivity of extensive agriculture, farm households’ income remains at a subsistence level. Without adequate income to support development of their children, parents are likely to witness their babies perish early. Even when their offspring survive, malnutrition would hamper their growth into healthy and strong workers. Hence, the supply of employable labor would not expand in the next generation despite rapid population growth.

Under these circumstances, the new generation has no choice but to repeat the traditional ways of doing business. With many children to feed and due to the lack of other means to save, new smallholders voluntarily stick to the old regime of “communal ownership of land” because it provides them with free access to land, which usually assures them of subsistence level income. Therefore, movements to change the status quo are stalled.

B. Two-transition approach to economic takeoff

The literatures reviewed above do not by themselves enable us to answer the question of how to move away from the vicious circle between communal land ownership, extensive agriculture, large family size, low income, and rapid growth of dependent population in SSA. Studies on the role of agriculture in preparing an economy for industrialization (e.g., Jorgenson 1961) do not consider the effects of agriculture on savings. In fact, the savings channel of agriculture’s contribution to the initiation of economic development has seldom been rigorously addressed in economic development literature. The scope of phase theory by Timmer (1988) is limited to sector development via agricultural transformation and thus misses the broader dimensions of an economy’s evolution. Moreover, studies on the endogenous evolution of economic stages (Goodfriend and McDermott 1995; Galor and Weil 2000) have failed to incorporate the SSA context in their models because the researchers presumed the existence of market institutions from the beginning, which is not necessarily the case in SSA.

To fill these gaps, we propose to synthesize the building blocks into a big picture. It may be called a *two-generation two-transition approach to the takeoff of a traditional economy* or a two-transition approach for short. In moving the economy out of the abovementioned vicious circle, it proposes SSA countries to focus on what they have in plenty land

rather than on what they do not have enough of—money, infrastructure, and modern technology and how to motivate and empower the people.

The two-transition approach posits that it takes two steps for a primitive economy to make a structural transformation. The first transition is broad-based agricultural sector development. The second transition is industrial sector development. The order is important because industrial sector development requires the existence of a demographic dividend, which is lacking and broad-based agricultural development can generate a ‘demographic dividend.’

Agricultural development is considered “broad-based” when the following two conditions are met. First, the benefits are broadly shared by contemporaries according to equitable land ownership and by the current and succeeding generations in a household through human capital accumulation in terms of health improvement and more education. Second, the domestic markets are integrated based on private property.

Broad-based agricultural sector development in a traditional agriculture-based economy requires reform of the “communal ownership of land” into private ownership or Chinese-style agricultural incentive schemes so that tillers may have strong incentives to invest in the land.¹⁹ It requires the land reform to be as equitable as possible so that each smallholder farmer has a piece of land. In addition, it requires investment in infrastructure to reduce the transaction costs related to commercial agriculture.²⁰ Lastly, it requires a shift from extensive to intensive agriculture and thereby an increase in agricultural productivity large enough to allow for financial savings.

Setting aside the issue of how to carry out, the reforms, once implemented, will strengthen the incentives for individual farmers to invest in the land. The more evenly the land is redistributed among smallholders, the stronger the incentive effects at the aggregate level will be. Ownership of land will let ownertiller be better positioned to make investments in land as it will help them access to finance. With these improved conditions, farmers will be able and willing to switch from

¹⁹ Acemoglu and Robinson (2011) maintained that extractive institutions characterized by a lack of law and order and unsecure property rights need to be transformed into inclusive institutions characterized by secure property rights, law and order, markets, and state support for markets.

²⁰ Common-pool resources, such as irrigation systems and pastures, may be governed as public goods at the national or local level or as common property resources by communal groups. Refer to Ostrom (1990) for details on governing common property resources.

extensive to intensive agriculture. Public provision of infrastructure will accelerate agricultural intensification. Agricultural productivity will increase to generate economic surpluses. This “broad-based agricultural development” approach satisfies the criterion suggested by Johnston and Mellor (1961, pp. 590-591), which indicates that agricultural development has to “both minimize its demand on resources ... and maximize its net contribution required for general growth.”

The allocation of agricultural surpluses by individual households among competing activities, such as self-consumption, rearing children, and financial savings, determines the extent to which the momentum generated by agricultural development spills over to the rest of the economy over time. First, agricultural surplus can be utilized to nourish and educate children. Increased caloric intake by children lowers the childhood mortality rate. With the fertility rate remaining constant, a declining mortality rate implies the genesis of a demographic dividend or baby boomers. Second, as smallholder farmers switch to intensive agriculture, they may be able to change their means of savings from children to financial savings. These savings may be channeled to investments in land, agricultural infrastructure, and other projects.

The effectiveness of channeling savings to investment depends critically on the extent of financial deepening. The two-transition approach presumes agricultural development to be a precondition for financial liberalization; without agricultural development, financial liberalization would be unable to deepen financial markets.²¹ In a traditional agriculture-based economy, savings are not sensitive to changes in real interest rates unless agricultural productivity is high enough to allow people to deposit surpluses in banks.

Anecdotal evidence that confirms this presumption can be obtained by comparing the experience of Korea in interest rate deregulation with that of Kenya. In Korea, the reform was implemented after its agricultural sector increased its productivity whereas it was implemented without broad-based agricultural sector development in Kenya. When the Korean government lifted up the ceilings on interest rates in 1965, the real interest rate on long-term bank deposits rose from negative 17% in 1964 to positive 11.2% in 1965 (Aghion, *et al.* 2009). Subsequently,

²¹ This presumption is contradictory to the McKinnon (1973) and Shaw (1973) hypothesis that interest rate liberalization is a sufficient condition to deepen financial markets and thereby facilitates industrial development. This view neglects the importance of agricultural development in strengthening the nexus between finance and economic growth in traditional developing economies.

savings increased from a level of 12.0% of the GDP over the five years before the reform to a level of 17.0% of the GDP thereafter. Despite the hikes in interest rate, investment climbed from 12.8% of the GDP to 21.6% of the GDP over the same period (National Accounts of Korea). In contrast, Kenya's similar interest rate deregulation was not followed by an increase in domestic savings (Kariuki 1994).²² The prior development of the agricultural sector in Korea must have helped the financial reform in Korea to succeed in mobilizing savings and deepening financial markets; the rice yield per hectare in Korea increased from a little above 1 ton in the 1910s to more than 3 tons in the 1960s (Kim 2010). This increase indicated the generation of substantial economic surpluses. Economic surpluses resulted in unlimited labor supply because the majority of farmers could feed and educate their children from increased incomes. Once agricultural development has made the demographic dividend and domestic savings available for the economy, labor-intensive industries that employ numerous healthy second-generation workers could be established. This condition stands in stark contrast to the case of Kenya's financial reform; the lack of comparable agricultural development in Kenya in the period before the reform accounts for the failure.

C. Policy choices for agricultural development

The above discussion clearly indicates that the key to structural transformation in a typical SSA economy is the intensification of agriculture. Two policy choices can be adopted to achieve this goal.

On the one hand, the government may pursue a policy of developing large-scale commercial agriculture, which refers to agricultural intensification based on large-scale organization of land and infrastructure for commerce. By opening the economy to international trade and investment, the government can help the economy obtain international competitiveness in commercial agriculture. This policy facilitates agricultural benefits from economies of scale through the increased size of farm operations and increased adoption of advanced agricultural technologies.

However, this policy is unlikely to generate positive spillovers on human capital stock large enough to create a demographic dividend. Large-

²²The savings channel of agricultural development to the economy provides us another reason to put agricultural development before industrial development. However, a rigorous empirical analysis of this channel is beyond the scope of this study.

scale intensive farming allows only a small number of landlords to enjoy high profits while providing relatively few jobs and low incomes for farm workers. With minimal agricultural surpluses, the rest of the population may be left out and forced to carry on with subsistence farming for a prolonged period. This situation implies that this policy blocks the economy from the demographic channel of agriculture's contribution to economic development.

On the other hand, the government may adopt an alternative policy: broad-based agricultural sector development. This policy aims to intensify agriculture, integrate domestic markets, and ensure participation of as many farmers as possible in the process. It takes more than just the elimination of price control to establish institutional infrastructure for markets in the traditional agriculture-based economy. In fact, the dismantling of agricultural marketing boards during the 1980s and 1990s did not lead to emergence of market institutions in SSA. The success story of agricultural sector development in Korea could not have begun without Koreans' undergoing the politically painful process of establishing both *de facto* and *de jure* private property in land. First, the process involved cadastral surveys in the early 1910s. Second, investments in agricultural infrastructure such as water reservoirs and roads had been made in the 1920s and 1930s. Third, land reform was enacted to establish land ownership by tillers in 1949.²³ Similarly, the success story of China started with the government's simultaneous implementation of agrarian reforms and building roads and other agricultural infrastructure in the 1920s, 1930s, and 1940s. The country benefited from these efforts in terms of increased agricultural productivity.

Establishment of private property rights in land motivates and facilitates individuals to specialize, take risks, save, and innovate. For example, the "land-to-the-tiller" reforms under free enterprise systems in East Asia, particularly that of South Korea in around 1950, brought about immediate increases in agricultural surpluses and farm households' income. According to Mason, *et al.* (1980), South Korean land reform resulted in an increase in the share of owner-tillers from 16.5% of total farmers in 1947 to 73.6% in 1960 (p. 427). The agricultural incomes of

²³ The Agricultural Land Reform Act of 1949 was revised in 1950. The government purchased the landownership in excess of 3 jungbo (around 30,000 m²) from landlords with land compensation bonds and sold the land to tillers. The price was set at 1.5 times one year's output of the land. But, the land compensation bonds became almost worthless due to hyperinflation caused by the Korean war.

farm households also increased by 80% in real terms from 1930 to 1975. A half of this increase was attributed to productivity growth, and the other half to new ownership following the land reform. Productivity growth resulted partly because the equitable distribution of land facilitated rapid diffusion of new agricultural technologies among farmers. Besides, the farmers, whose land holdings were largely of uniform size, very quickly emulated their neighbors who adopted new technologies.

The "land-to-tiller" reforms is likely to lead to enhanced agricultural productivity and more equitable distribution of agricultural income among households. Consequently, the children will be well nourished. The infant mortality rate will start to fall, signaling generation of a demographic dividend.

However, a counter argument for land reforms exists. It states that land ownership is not a binding constraint on farmers in SSA where land is not valued as an asset. Matchaya (2010) has analyzed survey data for rural Malawi to find that land ownership has no significant effects on investments and output efficiency in this area. This insignificance of land ownership as a determinant of investment may reflect the lack of complementary factors to make landownership matter. The missing factors such as poor legal institutions can keep transaction costs extremely high for the land markets to function. Insofar as land title does not bring additional value to the owner compared with that to the leaseholder, an owner would not make any more investment in the land than a leaseholder would. However, this condition does not necessarily preclude the possibility that land ownership matters under other circumstances when the transaction costs are sufficiently low.

To enable small land owner-tillers to achieve scale economies, the government may encourage farmers to organize agricultural cooperatives. Through the organization, the farmers can help themselves by cooperating in procurement, financing, marketing, and production. The Korean experience indicates that agricultural cooperatives can play important roles in marketing products, providing farm inputs and consumer goods, credit and banking, insurance, warehousing, transportation, and other social and cultural activities.

To promote a shift from extensive to intensive farming, the government may also consider land zoning. Land zones which are connected with roads and other infrastructures will enable farmers to engage themselves in intensive agriculture. Land ownership in these zones will increase the value of land reflects both its agricultural productivity and its value as an asset. The land will be valued as a collateral for bank credit once

productivity has increased above a certain level. Under the communal ownership of land, however, the land is under-valued because of its low productivity. Land zoning can best be performed while the costs of land zoning, apart from its political costs, are low and the land remains under-valued.

IV. Empirical Analyses

A. Testable hypotheses

We perform pilot tests on several aspects of the two-transition approach to an economic takeoff. The first three hypotheses pertain to individual building blocks, and the last hypothesis pertains to a synthesis.

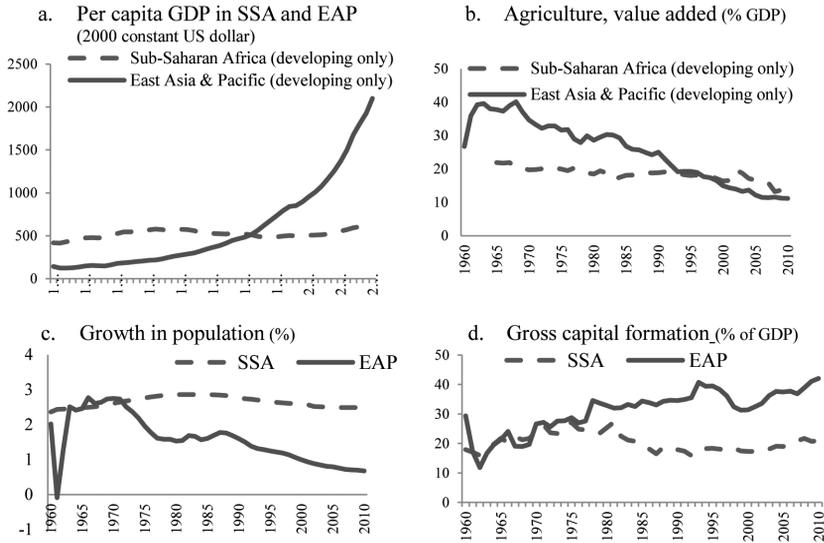
Hypothesis 1: (Role of agriculture in demographic change). Agricultural development creates conditions for the genesis of a demographic dividend.

Hypothesis 2: (Causal role of agriculture). Agricultural development generates positive external effects on industrial development and not vice versa. Accordingly, a success in agricultural development rather than industrial development triggers a decline in its relative importance in the economy.

Hypothesis 3: (Getting agriculture moving). To get agriculture moving, investments in the institutional and physical infrastructure for agriculture are required.

Hypothesis 4: (Stages of economic development and their drivers). Economic development has several stages. In a primitive economy, (extensive) agriculture's inability to create a demographic dividend perpetuates economic stagnation. Widespread agricultural productivity growth enables a primitive economy to generate a demographic dividend, and the demographic dividend and savings drive the economy's transition to industrial development.²⁴

²⁴ The increase in economic productivity due to movement of resources from a sector with low productivity to another with high productivity is called the Syrquin (1986) effect.



Data: *World Development Indicators*, The World Bank.

FIGURE 1
ECONOMIC INDICATORS

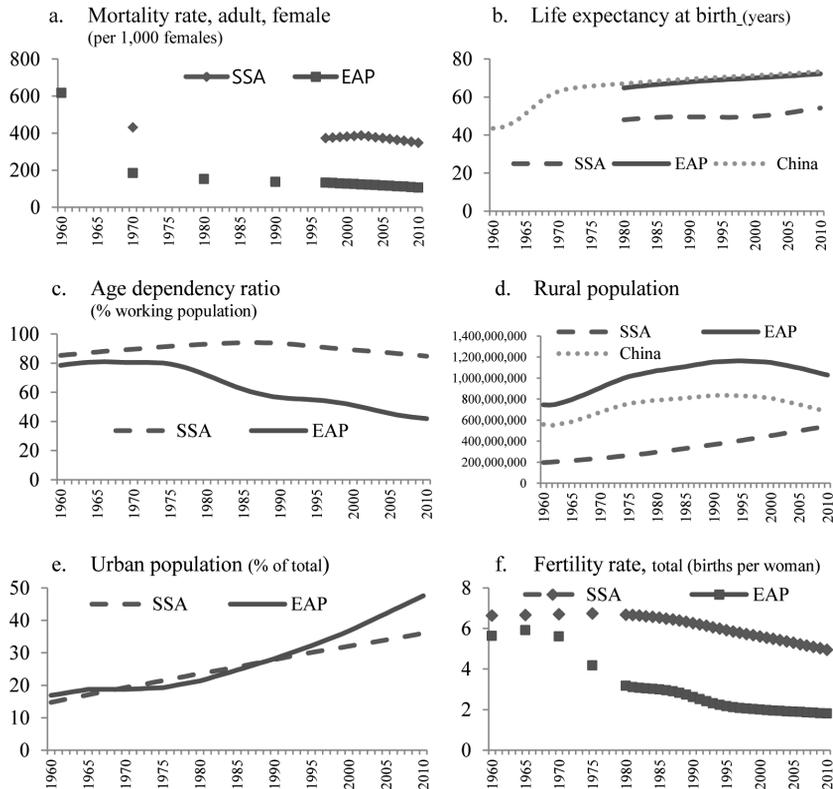
B. Evidence from time-series data of EAP and SSA regions

A set of data from the *World Development Indicators* of the World Bank provides clues to trace the whole process of an economy’s takeoff. By comparing the time series data of developing economies in the East Asia and Pacific (EAP) region against those of the SSA region from 1960 to 2010, we found the following pattern. The GDP per capita in the EAP region increased from levels lower than that of SSA in the 1960s, 1970s, and 1980s. The former surpassed the latter by the early 1990s and continued to rise since then. The latter, in contrast, stayed below the level it reached in the mid-1970s (Figure 1a).²⁵

This contrasting pattern of growth implies the existence of at least two different stages of economic development, namely, a stagnant economy and an economy in takeoff.²⁶ This is consistent with *Hypothesis 4*.

²⁵ All the data are from the *World Development Indicators 2011* of the World Bank.

²⁶ The latest upward movement of GDP per capita in SSA calls for some reservation for a final judgment about whether SSA is going to remain in an economic stagnation.



Data: *World Development Indicators*, the World Bank.

FIGURE 2
DEMOGRAPHIC INDICATORS

With regard to *Hypothesis 1* on the role of agriculture in demographic change and *Hypothesis 2* on precedence of agricultural development to industrial development, the sequence of structural changes provides us several stylized facts. First, a rising share of value added in agriculture in the early 1960s was followed by a decline thereafter as shown in Figure 1b and an increase in the rate of population growth in the late 1960s as shown in Figure 1c. The 1960s was characterized by a steeply declining mortality rate Figure 2a, a sharp rise in life expectancy, which picked up from around 45 years in 1960 to around 65 years in 1970 Figure 2b,²⁷ a persistently high age dependency ratio until the mid-1970s Figure 2c, an increasing rural population Figure 2d,²⁸ and a

stable share of urban population Figure 2e. These structural changes in demography during the 1960s occurred despite the low ratios of gross capital formation to GDP during the period.

Second, the persistently high age dependency ratio in the 1960s was followed by a declining age dependency ratio in the 1970s as shown in Figure 2c. The mortality rate, which had fallen substantially in the previous decade, continued to decrease as shown in Figure 2a. The high and stable human fertility rates in the 1960s decreased sharply in the 1970s as shown in Figure 2f. The decline of mortality in the 1960s preceded the decrease in the fertility rate in the 1970s and contributed to the genesis of the demographic dividend in the 1970s. The increased share of the working age population in the EAP region in the 1970s was not due to the population policy. In the case of China, the government's one-child policy was implemented in 1979 after the appearance of the demographic dividend in the mid-1970s.

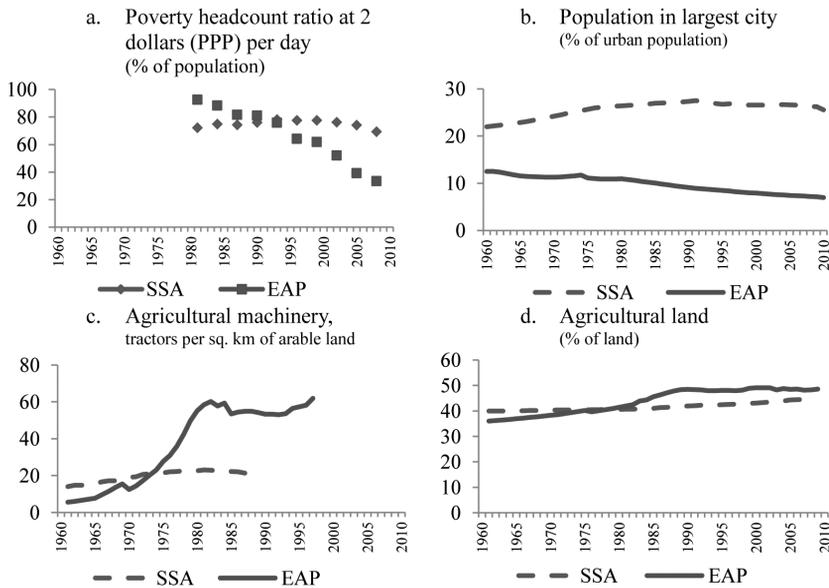
Third, the rapid increase in the working age population since the mid-1970s shown in Figure 2c, the sharp increase in investment rates since 1970 shown in Figure 1d, and the stable urbanization rate during most of the 1970s as well as the 1960s shown in Figure 2e imply altogether that demographic changes in the 1960s and 1970s occurred predominantly in rural areas. The rural-agricultural development in the 1960s and the first half of the 1970s, which had such broad-based effects on demography, provided a shelter for youths awaiting employment. Such broad-based agricultural development was essential in abating the risk that the youth bulge in the population structure could impinge on socio-political stability. It was also instrumental in generating a large pool of cheap labor employable in industry.

Fourth, from the 1980s onward, the decline of the age dependency ratio in the EAP region continued and was accompanied by an acceleration in the growth of GDP per capita. The trend of an ever-decreasing poverty rate in the region since 1980 Figure 3a implied that broad-based agricultural development in the previous decades made industrial development and urbanization from the late 1970s possible.

Last, the structural features of the SSA region showed symptoms of a traditional economy in stagnation. The relative importance of agriculture

²⁷ The life expectancy in the EAP region tracks that in China as shown in Figure 2b.

²⁸ The size and trend of the rural population in the EAP region appear to be dominated by China as shown in Figure 2d.



Data: *World Development Indicators*, the World Bank.

FIGURE 3
SOCIAL DEVELOPMENT AND AGRICULTURAL INPUT INDICATORS

in output and the demographic structure, particularly the age dependency ratio, exhibited little change, with only a few exceptions since 1960. The rate of population growth reached 3% by 1967 and then remained at that level until 2004 when it declined to 2%, which was still much higher than that in the EAP region. Even the gradual decline in the fertility rate shown in Figure 2f indicates not broad-based agricultural development but urbanization without agricultural development. Meanwhile, the proportion of the population living in the largest cities in the SSA region had increased until 1990 as indicated in Figure 3b. This attests to the view that urbanization in this region resulted from rural people's flight to the cities during civil wars. Such urbanization without prior development of rural-agricultural areas indicates that people in the region are likely to be in a vicious circle that involves extensive agriculture, large family size, low income, rapid growth of dependent population, youth bulge, and socio-political instability.

The sequences of structural changes in the EAP region and the structural features of the SSA region partly support *Hypotheses 1* and *2* at

the least. That is, agricultural development generates a demographic dividend and thus creates conditions conducive to industrial development; without it, industrial development is not feasible.

Evidences in support of *Hypothesis 3* include the rapid and slow increases in agricultural mechanization in the 1960s (Figure 3c) and the increases and non-increases in the shares of agricultural land in the EAP and SSA regions Figure 3d, respectively.

Until the mid-1970s, the EAP region had achieved less agricultural mechanization and developed less agricultural land than the SSA region. Afterwards, the EAP region started to catch up with the SSA region in terms of agricultural input and completed the catching up by the 1970s. The catching up by the EAP region in agricultural input in the 1970s preceded that in economic output in terms of GDP per capita in the early 1990s (Figure 1a). This pattern confirms *Hypothesis 2* on the causal role of agricultural development in economic development and *Hypothesis 4* on the stages of economic development and their drivers.

C. Evidence from international panel data

Despite being implicative, the time-series data do not provide sufficient information to establish an inference about *Hypotheses 4*. Instead, such inference can be established by using international panel data, with developing countries grouped according to the stage of economic development. To identify the different stages of economic development, we grouped the 102 developing countries into six samples: three sub-groups of low-income countries (LICs) in SSA, non-SSA, and East Asia (EA) and three sub-groups of middle-income countries (MICs) in SSA, non-SSA, and EA. Annual data from the *World Development Indicators* were transformed into six non-overlapping three-year averages from 1990-1992 to 2005-2007 to balance the panel data.

The empirical model for examining growth dynamics is an augmented neoclassical growth model proposed by Mankiw, *et al.* (1992). In Model (1), the dependent variable is GDP per capita of a country i , $gdpp_{it}$. The explanatory variables include the ratio of domestic savings to GDP, sy_{it} , and the rate of population growth, $gpop_{it}$, in the basis setup. The empirical specification includes two lagged dependent variables to de-trend the dependent variable.²⁹ The unique feature of the model is the vector of additional variables Z_{it} , which includes agricultural value added per

²⁹Including only one lagged dependent variable does not bring about any substantial changes in the estimation results.

TABLE 1
DATA SUMMARY IN ARITHMETIC AVERAGES

	Low-Income Countries						Middle-Income Countries					
	SSA		Non-SSA		East Asia		SSA		Non-SSA		East Asia	
	1990-07	2005-07	1990-07	2005-07	1990-07	2005-07	1990-07	2005-07	1990-07	2005-07	1990-07	2005-07
$gdpp_{it}$	2.35	2.38	2.50	2.59	2.51	2.68	3.01	3.06	3.23	3.34	3.06	3.19
sy_{it}	0.74	0.80	0.99	0.93	1.10	1.31	1.21	1.33	1.22	1.31	1.44	1.48
$gpop_{it}$	2.65	2.37	1.89	1.85	1.82	1.70	2.18	1.56	1.22	1.27	1.50	1.43
$aggdp_{it}$	2.28	2.31	2.50	2.53	2.51	2.56	2.78	2.83	3.22	3.30	2.76	2.83
$empag_{it}$	1.94	1.91	1.85	1.82	1.88	1.87	1.65	1.59	1.41	1.64	1.63	1.57
$depyoung_{it}$	1.94	1.93	1.84	1.80	1.81	1.75	1.87	1.82	1.70	1.62	1.69	1.61

Notes: $gdpp_{it}$, sy_{it} , $gpop_{it}$, $aggdp_{it}$, $empag_{it}$, and $depyoung_{it}$ denote logarithmic values of the GDP per capita, the ratio of domestic savings to GDP, the rate of population growth, agricultural value added per worker, the share of labor employed in agriculture, and the young age dependency ratio, respectively. All variables except population growth are in logarithmic values of ratios in percentages; population growth is in percentage. Data were obtained from *World Development Indicators*, the World Bank.

worker, $aggdp_{it}$, and the share of labor employed in agriculture, $empag_{it}$, and the young age dependency ratio, $depyoung_{it}$, rather than the index of education level in Makiw, *et al.*

$$gdpp_{it} = b_1^s + b_2^s gdpp_{it-1} + b_3^s gdpp_{it-2} + b_4^s sy_{it} + b_5^s gpop_{it} + b_6^s Z + \eta_i + \varphi_t + v_{it} \quad (1)$$

$$i = 1, \dots, N; t = 0, \dots, T, s = LIC_{SSA}, LIC_{Non-SSA}, LIC_{EA}, MIC_{SSA}, MIC_{Non-SSA}, MIC_{EA}$$

where GDP per capita is expressed at constant 2000 US dollars, subscript i denotes a country, subscript t denotes a three-year time period, and superscript s indicates a stage of economic development.

To take the potential correlation between the lagged dependent variable and the unobserved panel-level effects into account, Arellano Bover's (1995) linear system dynamic paneldata estimation was employed. The method uses moment conditions based on time-differenced and level errors to correct the problem due to this potential correlation.

Table 1 presents the averages of logarithmic ratios of the variables in model (1) for the six country groups. The low-income countries in SSA

exhibit not only low economic and agricultural productivities but also low savings, high shares of labor employed in agriculture, high rates of population growth, and high young age dependency. The middle-income countries in SSA resemble those in non-SSA in terms of their economies (*e.g.*, GDP per capita and savings ratios) and low-income SSA countries in terms of demography (*e.g.*, high rates of population growth and young age dependency ratios). However, their relatively high GDP per capita resulting from exports of natural resources has not been translated into broad-based human development.

Table 2 presents the results of panel data regressions. The coefficients estimate of the agricultural value added per worker, $aggdp_{it}$, are insignificant for both low- and middle-income countries in SSA. That of the share of labor employed in agriculture, $empag_{it}$, is significantly positive for low-income countries in SSA whereas it is insignificant for middle-income countries in SSA. The former implies that people in low-income SSA countries are engaged in extensive agriculture using manual labor intensively. The insignificance of the young age dependency ratio, $depyoung_{it}$, together with the persistently high ratio of age dependency in SSA partly reflects people's strong preference for having as many children as possible. This tendency underlies the social inertia hindering economic transformation in SSA.³⁰ Similarly, the extremely low rate of domestic savings in low-income SSA countries despite the significantly positive contribution of savings to GDP per capita growth also reflects people's choice of children as a means of preparation for old age. This condition impedes the accumulation of capital in excess of a threshold. Therefore, it may be inferred that the lack of broad-based agricultural development in low-income SSA countries prevents the people there from escaping the poverty trap and middle-income SSA countries from broadening their economic growth base.

For low-income countries in the non-SSA region, the coefficient estimate of agricultural value added per worker, $aggdp_{it}$, is large and positive, with the elasticity of GDP per capita with respect to it amounting to 0.25. This result possibly reflects large positive spillovers from agricultural intensification to other sectors in the economy. In the same group of countries, the coefficient estimate for the young age dependency ratio, $depyoung_{it}$, in an alternative specification of the model is positive. Thus, it indicates that increased income allows farm households to

³⁰ Detailed examination of the data shows that a few exceptional middle-income countries, such as South Africa and Mauritius, exist.

TABLE 2
RESULTS OF ESTIMATION FOR MODEL (1)

Dep. variable: $gdpp_{it}$	Low-Income Countries			Middle-Income Countries		
	SSA	Non-SSA	East Asia	SSA	Non-SSA	East Asia
$gdpp_{it-1}$	1.38*** (0.08)	1.40*** (0.07)	1.37*** (0.46)	1.07*** (0.08)	1.42*** (0.05)	1.21*** (0.15)
$gdpp_{it-2}$	-0.44*** (0.08)	-0.41*** (0.07)	-0.25 (0.47)	-0.09 (0.08)	-0.41*** (0.04)	-0.26** (0.15)
su_{it}	0.03** (0.01)	0.03** (0.01)	0.01 (0.06)	0.06*** (0.02)	0.07*** (0.01)	0.10** (0.04)
$gpop_{it}$	-0.01 (0.01)	-0.00 (0.01)	0.06** (0.03)	0.02** (0.01)	-0.00 (0.00)	-0.01 (0.02)
$aggdp_{it}$	-0.00 (0.04)	0.25*** (0.05)	-0.17 (0.11)	-0.01 (0.02)	-0.01 (0.03)	0.03 (0.03)
$empag_{it}$	0.09* (0.05)	-0.06 (0.04)	0.04 (0.14)	0.00 (0.02)	-0.04** (0.02)	-0.02 (0.04)
$depyoung_{it}$	0.00 (0.05)	0.10** (0.05)	0.10** (0.05)	0.00 (0.03)	-0.14*** (0.03)	-0.00 (0.03)
no. obs.	86	25	10	47	191	24
no. countries	23	8	3	13	50	6
Sargan test (p-value)	0.18	0.20	0.99	0.10	0.00	0.69

Notes: 1) The dependent variable is $gdpp_{it}$ for all models, 2) $gdpp_{it-1}$, $gdpp_{it-2}$, su_{it} , $gpop_{it}$, $aggdp_{it}$, $empag_{it}$, and $depyoung_{it}$ denote GDP per capita in time periods t , $t-1$, and $t-2$, the ratio of domestic savings to GDP in time period t , the rate of population growth, agricultural value added per worker, the share of labor employed in agriculture, and the young age dependency ratio, respectively. 3) Standard errors are in parentheses. 4) *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively.

have more children. Therefore, low-income non-SSA countries appear to have started the phase of early development.

For the small group of low-income countries in East Asia, the coefficient of population growth is significantly positive similar to the middle-income countries in SSA.³¹ The coefficient estimate of the young age dependency ratio is significantly negative. These facts imply that improvements in youth health and body development have begun to drive the economy in low-income EA countries. The coefficient of the savings ratio is insignificant and implies that some distortions due to, for example, an inappropriate political regime, are at work to deter the economies from proceeding to industrial development.

For the middle-income non-SSA countries, the coefficient estimates of the savings rate and the speed of outmigration are positive and negative, respectively. Alternatively, those of the savings rate and the young age dependency ratio are positive and negative, respectively. This pattern implies that middle-income non-SSA countries are probably in an economic takeoff.

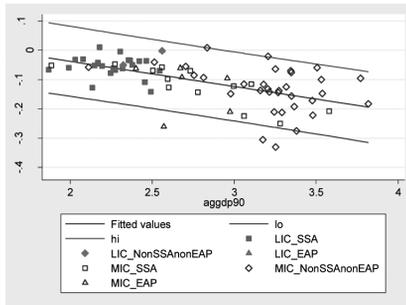
The coefficient estimate of the savings rate, 0.10, in the middle-income EA countries is much larger than that in the middle-income non-SSA countries (0.05 or 0.07) on the average. The coefficient estimate of outmigration in middle-income EA countries is insignificant, whereas that of the middle-income non-SSA countries is significantly negative.

The above results for various groups of countries support *Hypothesis 4* of the two-transition approach to an economic takeoff.

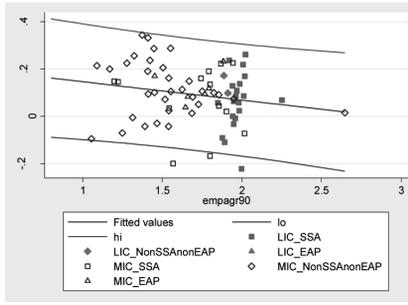
To indirectly test the positive spillovers of agricultural development on the structural transformation of a traditional economy as stated in *Hypothesis 2*, we have checked whether the levels of agricultural value added per worker in the initial year 1990 help predict the decreases in the share of labor employed in agriculture from 1990 to 2005.

As shown in Figure 4, the agricultural value added per worker in 1990, $aggdp_{i,1990}$, can explain the changes in the share of labor employed in agriculture or the decline of the relative importance of agriculture from 1990 to 2005, $dempagr_{i,2005-1990}$. By contrast, the inverse relationship does not hold. That is, the initial share of labor employed in agriculture in 1990, $empagr_{i,1990}$, explains few of the changes in agricultural productivity from 1990 to 2005, $daggdp_{i,2005-1990}$ (Figure 5). The two

³¹ Some reservations are in need for making statistical inferences about East Asia because of the small size of observations.

**FIGURE 4**

EFFECTS OF THE INITIAL LEVEL OF AGRICULTURAL PRODUCTIVITY ON FUTURE OUTMIGRATION

**FIGURE 5**

EFFECTS OF THE INITIAL LEVEL OF OUTMIGRATION ON FUTURE AGRICULTURAL PRODUCTIVITY IMPROVEMENT

Note: $dempagr = empagr_{2005} - empagr_{1990}$ and $daggdp = aggd_{2005} - aggd_{1990}$, where $empagr_{it}$ and $aggdp_{it}$ denote the share of labor employed in agriculture and the agricultural value added per worker, respectively. 2) “hi” and “lo” denote the upper and lower bounds of the 95% confidence interval. 3) LIC and MIC in the names of country groups are acronyms for low income and middle income countries, respectively. EAP, SSA, and NonSSAnonEAP in the names of country groups are acronyms for East Asia and the Pacific, Sub-Saharan Africa, and non-Sub-Saharan Africa and non-East Asia and the Pacific.

figures support the argument that the decline of the relative importance of agriculture in terms of employment resulted from agricultural productivity increases and not the other way around.

An equivalent means of summarizing the information in Figure 4 is to estimate simple cross-section regressions as in the models (2a) and (2b) in Table 3. In the former, the speed of outmigration from agriculture is regressed on the initial level of agricultural sector development. In the latter, the speed of agricultural labor productivity growth is regressed on the initial level of the relative importance of agriculture in employment. The results of the estimation with the entire sample reported in Table 3 confirm the interpretations in the plotting exercise above. The estimation result of model (2a) in Table 3 shows that the decreases in the share of labor employed in agriculture from 1990 to 2005 can be explained with the initial level of agricultural productivity in the initial year (1990), with R^2 being 0.35. Meanwhile, the estimation result of model (2b) shows that the increases in agricultural productivity during

TABLE 3
RESULTS OF CROSS-SECTION REGRESSIONS

Model (2a)			Model (2b)		
$dempagr_{2005-1990}$ $= 0.13^{***} - 0.09^{***} aggdp_{1990}$ (0.04) (0.01) $R^2 = 0.35$			$dagdpp_{2005-1990}$ $= 0.22 - 0.08 empag_{1990}$ (0.08) (0.05) $R^2 = 0.03$		
Note: $dempagr = empagr_{2005} - empagr_{1990}$, where $empagr_{it}$ denotes the share of labor employed in agriculture.			Note: $daggdp = aggdpp_{2005} - aggdpp_{1990}$, where $aggdp_{it}$ denotes agricultural value added per worker.		

the same period had little to do with the share of labor employed in agriculture in 1990 or the initial degree of relative unimportance of industry in the economy, with R^2 being merely 0.03.

The existence of positive spillovers of agricultural development in these developing economies implies that a high level of agricultural development facilitates demographic changes, savings, and outmigration of labor from agriculture over the years to come. It also implies that labor migrates out of agriculture not only because of the high productivity of industry but also because of the increased household income due to agricultural development.^{32,33}

In addition, the causal role of agriculture disclosed in the above discussion helps distinguish the degrees of validity among arguments in literature. First, the significantly negative sign of the regression coefficient in model (2a) is in agreement with the finding of Temple, *et al.* (1998) that the initial level of social development positively affects the growth rates of GDP per capita over the years to come. Second, the insignificance of the correlation in model (2b) allows us to reject Matsuyama's (1992) hypothesis that the initially high productivity of agriculture shifts resources away from industry to deter industrial development. Last, the unilateral influence of the initial level of agricultural productivity on the decline of relative importance of agriculture conforms to Jorgenson's (1961) argument that only when agricultural productivity reaches a

³² Another important driver of the outmigration of labor is the provision of infrastructure, which lowers transaction costs.

³³ The negative correlation between the initial levels of agricultural value added per worker and changes in the proportion of workers in agriculture is also consistent with the finding of Lee (2013) that a decrease in agricultural productivity takes labor away from manufacturing to agriculture to meet the subsistence requirement in developing economies.

threshold does the relative importance of agriculture begin to decline.

V. Conclusions

This study contends that the main culprit for economic stagnation in SSA is the communal ownership of land prevalent in rural areas. It argues that the lack of private ownership of land leaves smallholder farmers, which constitute the majority of the population, without the capacity and motivation to invest in land, the most richly endowed resource. The result is a vicious circle that involves the lack of investment in land, low productivity of agriculture, lack of household income to nourish children, poor quality of labor, and scarcity of domestic savings to support industrial development.

This study has examined the potential roles of broad-based agricultural development in transforming the traditional agriculture-based economies in SSA. It posits that broad-based agricultural development will prepare the economies to take off based on the experiences of East Asia. The proposed framework for initiating sustained economic development in SSA considers not only the factors of production but also the institutions that create incentives to accumulate the factors. It is envisioned that an economic takeoff is achieved through two transitions: one from primitive to commercial agriculture and the other from thence to an industrial economy. The key is to transform the negative external effects of agricultural underdevelopment on human and financial development and savings into positive ones. This task requires much time, a generation at the least. The negative externalities can be turned into positive externalities through reforms that establish market institutions, such as private land ownership based on land-to-tiller principles.

This study presents supportive evidence from the experiences of East Asia's catching up with SSA. Getting agriculture moving requires investments in institutional and physical infrastructures. Agriculture contributes to industrial development by generating a demographic dividend. Thus, internalizing the positive externalities of agriculture in the market economy in one generation is instrumental to prepare the next generation for an economic takeoff in terms of labor supply and savings. The results of the analysis of panel data on the changing driving forces in different stages of economic development also support the approach.

The results have some policy implications on economic development strategies. In a nutshell, the traditional agriculture-based SSA economies had

better shun away from the strategy of “leapfrogging to industrial development” within the current generation. Instead, they should strive for broad-based agricultural sector development in the current generation, with the aim of achieving industrial development in the next generation. They need to focus on creating a demographic dividend and savings by improving agricultural productivity. By contrast, countries that have created a demographic dividend through broad-based agricultural development are advised to promote industrial development to make the most of the opportunities the demographic dividend brings about.

To establish this approach on a firmer ground, more studies need to be conducted. One of the promising topics for further research is an empirical study on the public-good nature of broad-based agricultural development, such as the role of agriculture in enhancing governance and strengthening the nexus between finance and economic growth in early development.

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Appendix

APPENDIX TABLE 1
 LIST OF COUNTRIES IN THE SSA AND EAP REGIONS
 (WITH EAST ASIAN COUNTRIES UNDERLINED)

SSA region	EAP region
Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Dem. Rep., Congo, Rep., Cote d'Ivoire, Eritrea, Ethiopia, Gabon, Gambia, The, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mayotte, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe	American Samoa, <u>Cambodia</u> , <u>China</u> , Fiji, <u>Indonesia</u> , Kiribati, <u>Lao PDR</u> , <u>Malaysia</u> , Marshall Islands, Micronesia, Fed. Sts., <u>Mongolia</u> , <u>Myanmar</u> , Palau, Papua New Guinea, <u>Philippines</u> , Samoa, Solomon Islands, <u>Thailand</u> , Timor-Leste, Tonga, Tuvalu, Vanuatu, <u>Vietnam</u>

APPENDIX TABLE 2
LIST OF COUNTRIES IN THE PANELDATA ANALYSIS

Low-Income Countries			Middle-Income Countries		
SSA	Non-SSA		SSA	Non-SSA	
(26)	(9)	East Asia (3)	(15)	(52)	East Asia (6)
Benin, Burkina Faso, Burundi, Central African Republic, Chad, Congo, Dem. Rep., Eritrea, Ethiopia, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Senegal, Sierra Leone, Tanzania, Uganda, Zambia, Zimbabwe	Bangladesh, Cambodia, Lao PDR, Mauritania, Nepal, Somalia, Tajikistan		Angola, Botswana, Cameroon, Congo, Rep., Cote d'Ivoire, Djibouti, Gabon, Lesotho, Mauritius, Namibia, Nigeria, South Africa, Sudan, Swaziland, Togo	Algeria, Argentina, Armenia, Belarus, Belize, Bhutan, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Egypt, El Salvador, Guatemala, Guyana, Honduras, India, Iran, Jamaica, Jordan, Kazakhstan, Latvia, Lebanon, Lithuania, Mexico, Morocco, Nicaragua, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Poland, Romania, Russian Federation, Serbia, Sri Lanka, Suriname, Trinidad and Tobago, Tunisia, Ukraine, Uruguay, Uzbekistan	China, Indonesia, Malaysia, Mongolia, Philippines, Thailand

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