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Labor Surplus Revisited

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Abstract

Unskilled labor is the abundant resource in many developing countries, especially at an early stage of their development. Yet, even as at given technologies labor markets have not cleared, neo-classical economists have rejected the notion of an institutional or bargaining wage not based on competitive full employment marginal productivity fundamentals. This paper puts to rest some objections to labor surplus theory based on "red herrings" and then addresses the substantive challenges from the micro-econometric branch of neo-classical economics. We contend that the finding of inelastic supply curves of labor is based on a cross-section static analysis of labor supply within agriculture while the labor surplus model deals with tracing the dynamic reallocation of labor from a traditional to a neo-classical organized sector in a dualistic economy. We present data for a number of labor surplus developing countries showing that institutional wages lag behind agricultural productivity increases as countries move towards a "turning point" when inter-sectoral balanced growth has eliminated unskilled labor and the economy has lost its dual characteristic.

Key Words: development, labor surplus, neo-classical economics, turning point labor markets

JEL Codes: O10, O11, O17, O18, O41, O43, O57

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1. Introduction

Current literature on growth and development continues to be influenced by the one-sector Solow-type models or the two-sector Uzawa-type models, both of which have now been complemented by endogenous growth. While these endogenous growth models have recently begun to confront such issues as poverty traps at a theoretical level, they generally share the neoclassical feature of full employment and market clearing. In contrast, the surplus labor models advanced by Lewis (1954), and expanded upon by Ranis and Fei (1961, 1964, 1997), described a two-sector economy depicting an initially large traditional sector and a relatively small commercialized sector, with the key feature that the traditional sector does not adhere to the neoclassical full employment labor market clearing assumption. While various micro foundations can be constructed to detail why this might be so, at the macro level, which was the focus of these early dual economy models, it was sufficient to posit that labor was in excess supply relative to cooperating factors at the prevailing wage and technology, and thus that the commercialized sector faced an essentially infinitely elastic labor supply at any moment in time.

With unskilled rural labor the abundant resource in many developing countries, especially at an early stage of their development, what determines the price of labor has continued to be a controversial issue, although it is clear that, in recent years, the neoclassical model and market clearing approaches have enjoyed increasing popularity in not only the theoretical but also the applied literature. The notion of an institutional or bargaining wage not based on marginal productivity fundamentals has been especially repugnant to orthodox economists. The rejection of the labor surplus model has, in part, been due to some confusion as to which of its assumptions are necessary as opposed to which are sufficient.

This paper attempts three things. First we outline the theoretical framework of a dual economy model that highlights the necessary (not just sufficient) conditions for a labor surplus economy to exist. Second, we address the neoclassical critiques of such models. We contend that the microeconometric evidence seen as refuting the labor surplus model (e.g., Rosenzweig

(1980, 1988), Behrman (1999) does not, in fact, go to the heart of a model which is focused on the historical aspects of the transition of economies from a two-sector world to a fully commercialized one-sector economy. Third, we empirically examine the key implications of the labor surplus model in a number of countries.

The rest of the paper is therefore structured as follows. In Section 2, we briefly present the essence of the classical labor surplus model. In Section 3 we address some critiques of these models, starting by exposing some of them as "red herrings" but subsequently also addressing the principal neoclassical critique of the labor surplus approach. Section 4 presents our empirical findings and Section 5 concludes.

2. The Origins and Essential Ingredients of the Labor Surplus Model

In this section we describe the main implications of labor surplus models. These models evolved from the mainstream literature on developing economies (see Nurkse ,1959) , Rosenstein-Rodan (1943) and Lewis (1954,1972), aimed at describing the transition process of such economies and are still acknowledged as relevant (see Spence, 2010).

We should recall that the toolkit available to development economists in the early post-war period was fairly limited, restricted to the Harrold-Domar model, on the one hand, focusing basically on the steady state properties of a developed economy, and to the Keynesian model, on the other, focused on business cycle issues, again in a developed economy context. Against this backdrop, the concept of dualism attracted considerable attention, moving from sociological dualism associated with Boeke (1953) to technological dualism emphasized by Higgins 1955, and Eckaus 1955, and finally, and undoubtedly more critical, focusing on the coexistence of two basically asymmetrical sectors in the classical tradition as revisited by Arthur Lewis. The basic premise of such organizational dualism is that there exist some sectors or subsectors which, in the presence of a large initial endowment of unskilled labor and the relative scarcity of cooperating factors, such as land or capital, given technology, labor markets do not clear and wages result from a sharing or bargaining nexus.

It should be noted that the agriculture we are focused on is of the dominant small holder type which would exclude plantations which follow well-known neoclassical hire and fire principles. Moreover, there are likely to exist unlimited supplies of labor conditions in the so-called urban informal sector[1] where families, lacking sufficient cooperating capital, are forced to pursue small-scale service and distributive trade activities, yielding low marginal labor productivity and again characterized by a similar pooling of income in an extended family context.

By contrast, the full employment neoclassical solution under these circumstances would drive remuneration below socially acceptable, possibly even below subsistence, levels of income and consumption. A labor surplus exists when a substantial portion of the traditional sector labor force contributes less to output than it requires, i.e., the marginal product lies below the level of remuneration set by bargaining. The "labor surplus" designation thus arises from the fact that if such workers could be reallocated to competitive or neoclassically functioning sectors, such reallocation would eliminate the aforementioned inefficiency and thus materially enhance the total output of the system. This notion harks back to the "hidden rural savings" of Nurkse and the "disguised unemployment" of Rosenstein-Rodan, with the prime location in developing countries' agricultural sectors, characterized by family farms, other communal arrangements or configurations in which income or output shares are determined by an institutional or bargaining wage[2] related to the average rather than the marginal product of labor. Statically, the "disguisedly unemployed" include all those whose marginal product lies below their income share. The definition of "labor surplus" does not mean that a substantial portion of the agricultural labor force can be withdrawn without loss of output, i.e., that they have a marginal

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[1] See Hymer (1969) and Resnick (1970) and Ranis and Stewart (1993) for extensions of the basic model that include this informal non-agricultural sector.

[2] Also related in the migration model of Harris and Todaro (1970) and its extension into the 'new institutional economics' by Stiglitz (1974) where there is an exogenously/institutionally determined wage in the *urban* sector (rationalized by either institutional factors such as minimum wages or unions or by the choices of urban firms if shirking and worker quality are problems that

productivity of zero. Indeed, as Sen (1967) and Fei/Ranis (1964) pointed out, when some workers with low marginal productivity are withdrawn, those who remain are likely to work harder and other technology changes of the reorganization variety are likely to result.

As Fei and Ranis emphasized, in addition to this organizational dimension of dualism, there is also an important product dualism to be analyzed, focused on the exchange between the food produced by the non-commercialized agricultural sector and the goods produced by the commercialized non-agricultural sector. The key point here is that agricultural and non-agricultural products cannot really be substituted for each other; in the closed economy, food producing agriculture becomes a necessary condition for industry while the converse does not hold. Consequently, dynamically, something approaching balanced growth between productivity change in agriculture and non-agriculture, keeping the terms of trade from deteriorating too much for either sector, and a continuous labor reallocation process outstripping population growth, are necessary conditions for the eventual evolution of the system out of dualism and moving into a one-sector modern economic growth epoch in the Kuznets tradition.

There are thus really three ingredients to this "balanced growth" process in the labor surplus economy. The most obvious is that increases in agricultural labor productivity, freeing up labor and generating agricultural surpluses, are approximately matched by increases in non-agricultural productivity, generated by capital accumulation and technology change enhancing the demand for labor. Thus, the release of labor and its absorption by the commercialized sector must be roughly in balance if additional urban underemployment, i.e., the growth of an urban informal sector, is to be minimized. Closely related, intersectoral product markets must clear in the absence of a major shift in the intersectoral terms of trade, so that the system does not encounter food shortages or (less likely) food surpluses in a closed economy context. Thirdly, financial intermediation networks, personal early on, more impersonal and sophisticated later, must be capable of transforming non-commercialized sector surpluses, combined with

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can be attenuated by relying on unemployment as a screening device).

commercialized sector savings, into additional physical investment, presumably mainly in the commercialized sector.

3. Critiques of Labor Surplus Models

3.1 Red Herrings

Labor surplus models have been subjected to much criticism during recent decades, certainly in the North. Most such attacks have been focused quite specifically on what are considered heretical assumptions concerning labor market behavior, i.e., neoclassical critics reject out of hand any bargaining outcome that cannot be modeled precisely within the marginal productivity equals wage full employment equilibrium framework. Some of the critiques on record may be viewed as logically irrelevant "red herrings" which should be addressed first and gotten out of the way.

Undoubtedly, the leading "red herring" criticism resulted from the unfortunate choice as to the precise definition of "labor surplus" deployed by Nurkse, Lewis, Fei-Ranis, as well as others, implying a zero marginal product of labor in agriculture. It was this interpretation which led to the famous exchange between T. W. Schultz and Amartya Sen on whether or not a reallocation or, in that case, the demise of part of the agricultural labor force could be expected to leave agricultural output unaffected. In fact, all that is needed for the relevance of labor surplus theory is that the low marginal product of labor be initially below the bargaining wage, and that, over time, agricultural wages or income shares lag substantially behind increases in agricultural labor productivity. The emphasis on zero marginal product, a statistically highly unlikely event in any case, arose due to incautious comments in Lewis' seminal 1954 paper and also due to the mathematical convenience of horizontal labor supply curves presented by Fei and Ranis. The basic point is that the initial marginal productivity is low and may be sufficiently low to fall below the institutional or bargaining wage or income share. As Lewis put it in his 1972 retrospective piece, "whether the marginal productivity is zero or negligible is not at the core of our analysis. This has led to an irrelevant and intemperate controversy." Unfortunately, the

controversy has persisted. Otsuka, in reviewing Fei-Ranis' latest (1997) book, agrees that a zero marginal product assumption is both empirically unlikely and theoretically unnecessary. All that is indeed needed is that, at any point in time, there exists an excess supply of labor at the going wage. Nor does the reallocation of labor out of agriculture necessarily cause a food shortage if zero marginal productivity is, in fact, not the relevant issue. As Fei and Ranis have taken pains to point out, any withdrawal of labor from agriculture is likely to lead to a simultaneous reorganization of agricultural production, i.e., an upward shift in agricultural labor productivity, permitting the maintenance, most likely an increase, of the agricultural surplus available for transfer to non-agriculture. Thus, the intersectoral terms of trade need not deteriorate against industry due to a food shortage unless, of course, we don't adhere to more or less balanced growth and there is a relative neglect of agriculture, as has been the case in some countries. Related to this critique is the idea that a low marginal product of labor may not be enough to support the subsistence needs of an economy. For example, Ramaswamy (2008) finds that in India, unskilled wages were above subsistence needs during the 1960s and 1970s. This actually fits in well with the labor surplus model where institutional wages may well be above subsistence, even though the marginal product is not.

A similar critique, again in the "red herring" category, has to do with the level of this exogenously given agricultural wage over time. Otsuka, for example, in his aforementioned review, claims that he has "never encountered institutionally determined rigid wage rates in agrarian communities." But "institutionally determined" does not imply "rigid." It is the sharing rule, not the level of the wage over time, which is at stake. The labor surplus model assumption is that agricultural wages are related to the average rather than the marginal product of agricultural workers. We can expect the household head, or whoever else commands the agricultural surplus, to retain a portion for reallocation out of agriculture. As the average agricultural product rises due mainly to technology change, the bargaining wage is also likely to rise. Thus, over time, we can expect to see a gently rising supply curve of labor, while at any

point in time, it is likely to be horizontal. What we, therefore, encounter over time is a step function made up of annual unlimited supply of labor segments, econometrically difficult to distinguish from a gently rising conventional supply curve. But the fact that it is only gently rising before the "turning point", while agricultural labor productivity may be rising rapidly, remains the critical issue. If agricultural real wages lag markedly behind agricultural labor productivity over time this clearly does not support the neo-classical position of continuous market clearance.

The central critique of the dualistic model is the neoclassical school's absolute rejection of the bargaining wage concept since it cannot be deduced from first principles. We assume it is not difficult to see that in the kind of setting posited here, i.e., extended family or communal institutional arrangements, the unfavorable ratio of workers to cooperating factors as part of the initial conditions is not under the control of decision-makers, who cannot simply fire low productivity family labor or group members in order to reach a neoclassical equilibrium, or refuse to share some of the group's income with them. Fafchamps (1992) provides an overview of the principles underlying the solidarity network among peasants as depicted in the anthropological evidence of Geertz (1979) and Scott (1976). Ishikawa (1975, 1981), a long-time observer of Asian economic development, likewise endorses the concept of "a minimum subsistence level of existence" (MSL), as a version of the institutional real wage. Hayami and Kikuchi (1982), basically neoclassical in approach, find that, in Indonesia, "wages do not adjust on the basis of labor's marginal product but according to the subsistence requirements over time and social conventions." Yair Mundlak (1974), equally neo-classical, builds a model which emphasizes labor and savings flows from agriculture to non-agriculture and admits that "with respect to labor surplus economies…reaching the point of factor price equality may require several decades." Dietrich Vollrath (2009) points out that "the dual economy theory suggests that, prima facie, factor market inefficiencies exist within the economy." And Michael Spence, an orthodox economist, writing in 2011, acknowledges that "early stage labor markets don't

really form in the normal sense because the marginal product of labor is so low that income gets distributed through family and village structures." Ken Arrow, a high priest of neo-classical economics pointed out, at an International Economics Conference in Delhi that it may take decades to reach equilibrium (1988). All this is perfectly consistent with the notion of the transition from a two-sector toward a one-sector neoclassical world. The issue is how successful is the effort and how long does it take to get to the "turning point".

A question that may be raised is whether the dual economy model, even if relevant at one historical period, still serves a useful purpose, now that the agricultural sector and the agricultural population of many developing countries have become relatively small in size. It is our contention that, while some countries like Taiwan, Thailand, South Korea, and, most recently, China may already have reached their "turning point," an analysis of that historical process continues to be of interest. This is true as well for Japan, England and the Netherlands of an earlier era. Moreover, for India, Bangladesh, as well as much of Central America and even some portions of South America, still comprising a substantial proportion of the world's population, the initial condition of dualism remains relevant. Even sub-Saharan Africa, once described as "land surplus," has increasingly seen the combination of high fertility rates and the southward march of the Sahara leading to declining agricultural fallow periods and the increased use of fertilizer, such that this pivotal development region is now also moving in a labor surplus direction. As Gary Fields (2004) put it "Lewis's version of labor market dualism …remains a useful characterization of some economies today" and "Lewis's characterization of the informal sector entailed labor being paid the average product of labor …with substantial income sharing taking place. This too remains a meaningful feature of poor economies today." Mobilizing an agricultural surplus by reallocating an underemployed labor force into efficient pursuits elsewhere remains an important issue on the development agenda.

3.2 The Neoclassical School Critique

The most damaging critique to the labor surplus model has come in the form of

microeconometric studies on labor markets in countries such as India and Indonesia, where rich data on labor supply decisions at the household level first became available for rural areas. These contributions, as they tested various aspects of the static neoclassical labor supply model at the household level tended to cement the neoclassical view of rural labor markets – at least in the cross section – since the tests of the models tended to lend support to the predictions of the neoclassical framework. Foremost in this line of work is a series of related papers by Rosenzweig (1980 and 1988). While these papers consider distinct aspects of rural labor supply, the main implication they test is that the response of rural labor supply to a change in the wage should be smaller for the landless, as compared to the landed households. The reason for this is that the income effect of a wage change is smaller, all else equal, for landed households, since only their "off farm" hours of working contribute to the income effect, as compared to the landless households, for whom all of their work hours contribute to the income effect. This prediction of the static neoclassical model meant that Rosenzweig could test the applicability of the neoclassical model, *without* having to estimate income effects, as could be done in U.S. studies of the labor market, where greater data availability did not impede such an approach. In his data on rural Indian households, Rosenzweig tended to find empirical support for his neoclassical prediction.

While these tests tended to provide no evidence against the neoclassical model at the microeconomic level, we hasten to note that such tests also provide no evidence against the microeconomic tenets of the labor surplus model. The simple reasons for this lack of disagreement are that (i) such tests concerned the *cross-sectional* nature of rural labor markets, and furthermore (ii) these tests looked only at labor supply decisions *within* the rural sector. By contrast, the labor surplus model is inherently a model of the *historical* allocation of labor *across* sectors. Thus, the static studies, while novel and interesting in their own right, are not at all incompatible with the fundamental aspects of the labor surplus model. Rosenzweig presents a static timeless model focused on the microscopic labor supply curve within agriculture depicting

an individual family's response to variations in the real wage. We are concerned with the long run historical picture of the demand for labor by the commercialized sector intersecting with the unskilled wage at each point in time to determine the rate of inter-sectoral labor reallocation.[3] Simply put, these are two ships passing each other in the night, dealing with different issues. That said, the framing of these papers has been responsible for inappropriately cementing the view of rural labor markets as adhering to the neoclassical model.

4. Empirical Analysis

This section presents the empirical support of the labor surplus model by examining historical data in a number of countries which have moved from a dualistic economy in the direction of their "turning point". The labor surplus model described above is consistent with three empirical predictions. First, during the initial labor surplus phase, the agricultural wage or income share exceeds the low marginal product of agricultural labor on the limited land at the given technology. Second, over time, as agricultural labor productivity rises, the gap between the marginal product and an only gradually rising agricultural real wage, as the bargaining wage is adjusted, at first increases and then gradually narrows until a "turning point" is reached when the gap disappears and a neoclassical equilibrium is reached. Third, if there is successful balanced growth over time between agricultural and non-agricultural unskilled labor productivity change, a necessary condition for reaching the "turning point"," the inter-sectoral terms of trade do not change markedly.

We examined a number of candidate countries to see if the data are consistent with the above three predictions. A number of studies of suspect post-World War II developing countries (see Ranis, 1997), as well as of such historical cases as Japan (see Minami 1973) , the Netherlands (see Wintle 2000) and England (see Crafts and Mills, 1990, 1994), show a pattern supportive of the labor surplus model. To examine these macroeconomic predictions, we need

[3] Appendix to Chapter 3 in Fei and Ranis (1997) presents this contrast in greater detail.

data on agricultural wages and agricultural labor productivity.[4] Unskilled daily agricultural wages are easily observed. Since agricultural wages are observed on a daily basis, while agricultural labor productivity is measured on an annual basis, we need to obtain a value for the number of work days per year to obtain the relevant annual wage. Days worked per year vary across countries and so the gap between wages and agricultural productivity is not easy to calculate. Consequently, we opted to generalize the relevant number of work days a year at 200 and estimate their relationship on that basis.[5]

We intend to provide evidence for some relevant post-war developing countries as well as for England between 1780 and 1840, for the Netherlands between 1810 and 1910 and for Japan between 1870 and 1920. These are all cases which fit the labor surplus country in transition model, i.e. labor abundant agricultural sectors witnessing hefty increases in average agricultural labor productivity while the agricultural real wage or income share rises only gently in a step function manner, lagging substantially behind productivity increases, until a "turning point" is reached.

For the countries selected, we, therefore, present two sets of time series data. The first set shows the levels of the agricultural wage and agricultural labor productivity. This clearly illustrates the changes in wages and productivity over time as well as movement towards a "turning point" when the wage rises markedly to be in step with productivity. The countries we examined are Indonesia (Java), South Korea, Taiwan, Bangladesh, Thailand , China as well as the historical cases of Japan, the Netherlands and England. Where possible, we also present the inter-sectoral terms of trade.[6] Data sources are noted in the Appendix.

Figures 1a and 1b present the case of Java, Indonesia. Unfortunately, we do not have data for the 50s and 60s. By 1976, there was a little or no gap between the real wage and productivity

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[4] There exists a proportionality between the average and marginal product, i.e. the marginal product is the average product times the labor elasticity of output.

[5] Survey data provides a figure for the typical number of days worked per year.

[6] Defined as the ratio of the agricultural price index to the manufacturing price index or the ratio

in rupiahs. Between 1976 and 1990, Figure 1b shows that real wages remained relatively constant, while there were substantial increases in productivity. The widening gap indicates the continued absence of a neoclassical equilibrium and that the "turning point" had not yet been reached by 1990. Manning (1998) agrees, describing the Indonesia labor market as "still basically characterized by labor surplus conditions." We also note that the inter-sectoral terms of trade, at least for West Java, are nearly constant for this period.

Figures 2a and 2b demonstrate similar patterns for South Korea, with productivity in 1961 lower than the real wage (the gap between the two in 1961 was about 20% of the real wage). The real wage then continued relatively flat while productivity rose until the "turning point" was clearly reached in the late-1970s.[7] Once again, the terms of trade remained relatively constant over the period. Figures 3a and 3b present a similar picture for Taiwan, with the real wage initially above productivity, subsequently relatively stable, while productivity rose markedly between 1961 and 1968 when the "turning point" was apparently reached.[8] The inter-sectoral terms of trade were once again flat. Turning to Bangladesh, in Figures 4a and 4b, we note the initial wage exceeding productivity but then falling behind, with the "turning point" not yet in sight. Turning to Thailand, Figures 5a and 5b, the "turning point" seems to have been reached in the late 1990's.

Similarly, as all the literature confirms, China (Figure 6a and 6b) definitely reached its "turning point" around 2000. Our three historical cases, Japan, the Netherlands and England, provide similar support for the labor surplus model. Figures 7a and 7b present the Japanese case over the period 1875 to 1935. In the absence of early wage data we found no initial gap between wages and productivity. Until about 1920 when the "turning point" apparently occurred, we can

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of the index of prices received by farmers to the index of prices paid by farmers.

[7] Bai Moo-Ki (1982) uses a three sector model and also locates the "turning point" in the early 1970s.

[8] Confirmed also by Kuo.

observe productivity rising rapidly, with wages lagging behind.[9] The terms of trade are relatively constant over the 1874-1920 period, until Japan began importing rice for the first time.[10] R. Minami ("The Turning Point in Economic Development: Japan's Experience," 1973) locates Japan's "turning point" around 1956. The English case is represented by Figure 8 on the basis of more spotty data for the period after the enclosure movement which created an agricultural labor surplus between 1750 and 1826. We can observe a similar pattern of dramatic increases in productivity and only gently rising wages.[11] Williamson (1989) shows that the real wage was constant for nearly forty years and comments that "[Lewis was] right in viewing the rural sector as an 'industrial labor reserve."[12] For the case of the Netherlands (Figure 9), the evidence indicates that the "turning point" was reached by the late nineteenth century. For England and the Netherlands terms of trade data were not available.

In summary, the macroeconomic evidence, drawn from a sample of "suspect" labor surplus economies, bears out most of our predictions. In several cases we can discern wages in excess of productivity in the very early periods. Subsequently, we can always observe the existence of a labor surplus agricultural sector generating agricultural surpluses as productivity rises faster than lagging agricultural wages, en route to a "turning point" by virtue of decades of relatively balanced inter-sectoral growth.

5. Summary and Conclusions

We have endeavored to present the basic outlines of the labor surplus model of development and addressed the critiques of that model, some "red herrings," readily disposed of, and other, more serious challenges from the micro-econometric branch of neo-classical economics.

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[9] See also Fei and Ranis (1997)
[10] See Hayami and Ruttan (1970)
[11] See also Franklin Mendels (1981), Ogilvie and Cerman (1996) and Williamson (1989)
[12] J. Williamson, "Inequality & Poverty and the Industrial Revolution"

The central issue is whether wages are determined neo-classically or via a bargaining process at the early stages of development. We conclude that the neo-classical school which finds inelastic supply curves of labor is dealing with a cross-section static analysis of labor supply within the agricultural sector while the labor surplus model is dealing with the tracing of a dynamic reallocation of labor from a subsistence to a neo-classical organized sector in the dual economy. The neo-classical school's attack on the labor surplus model is thus not warranted. We are dealing with different issues, ships passing in the night.

The paper proceeds by marshalling data for a number of labor surplus developing countries showing that institutional wages lag behind productivity changes in the course of the unskilled labor reallocation process en route to a "turning point" when decades of inter-sectoral balanced growth have culminated in an unskilled labor shortage and the economy has lost its dual characteristic.

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Figures:

Figure 1A: Indonesia: Real Agricultural Productivity and Wages

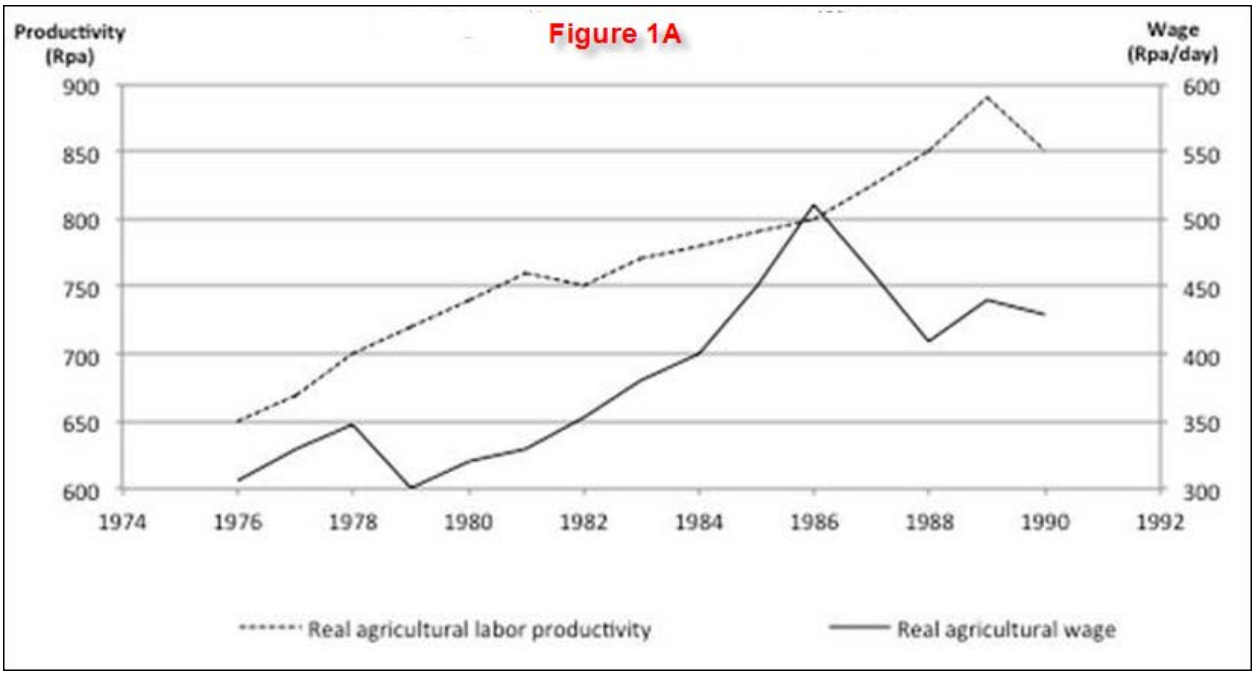
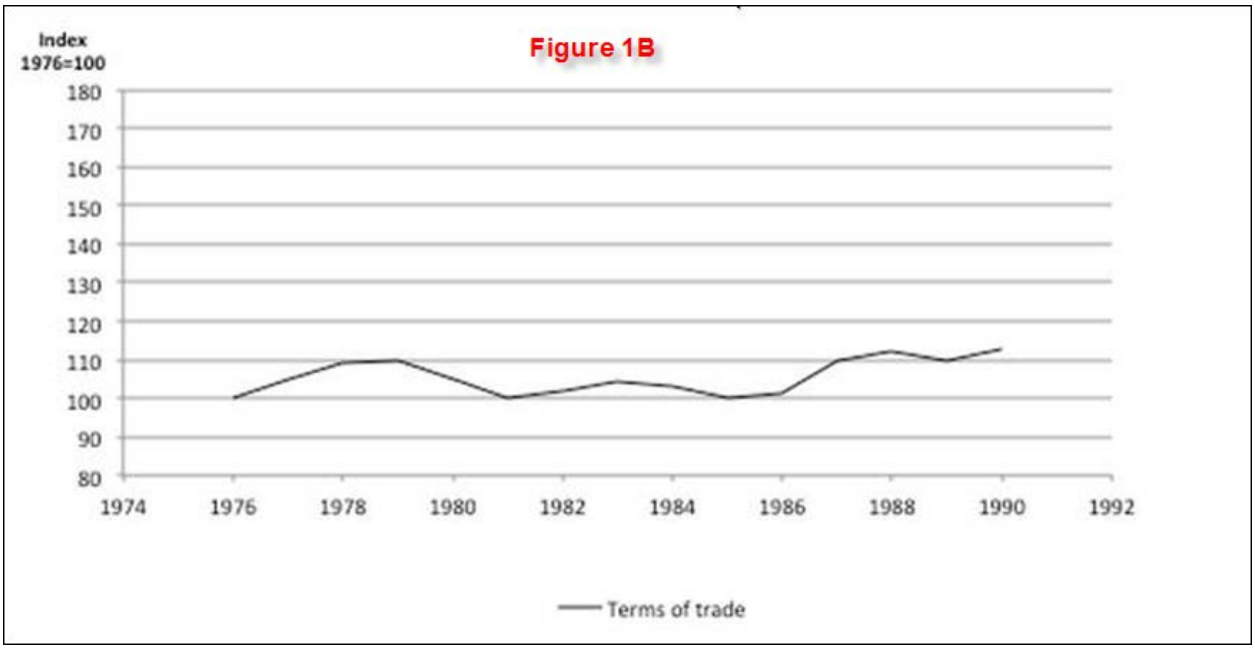


Figure 1B: Indonesia: Terms of Trade



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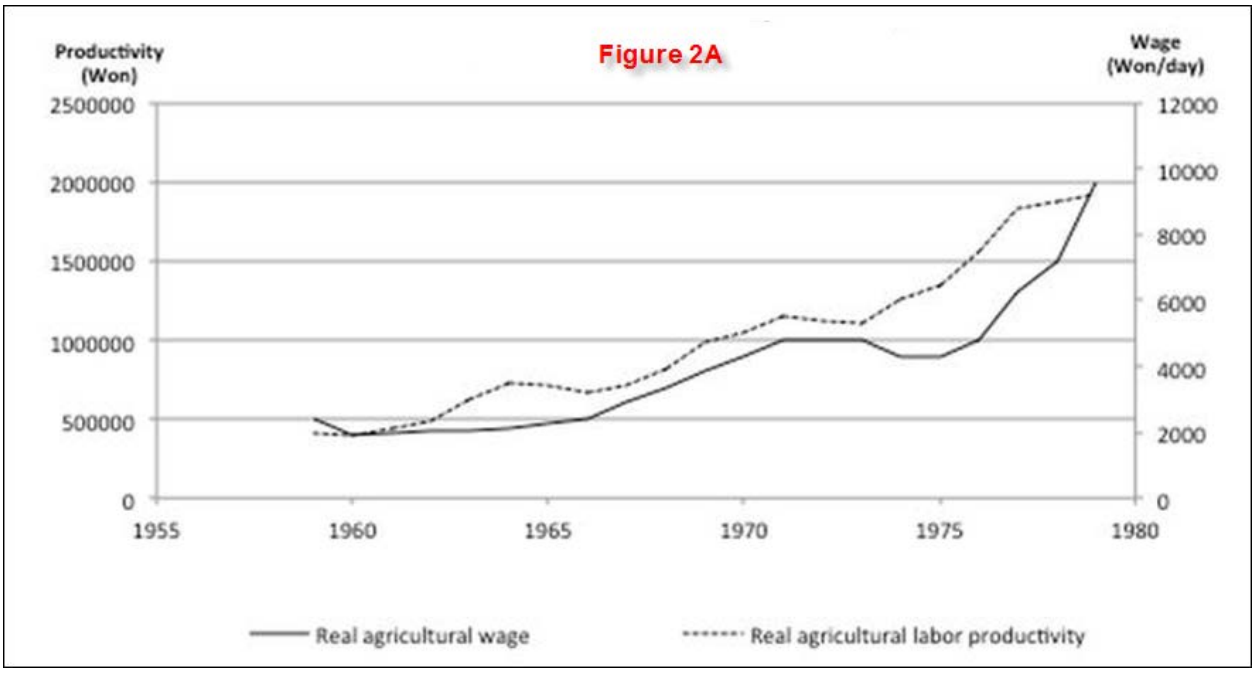

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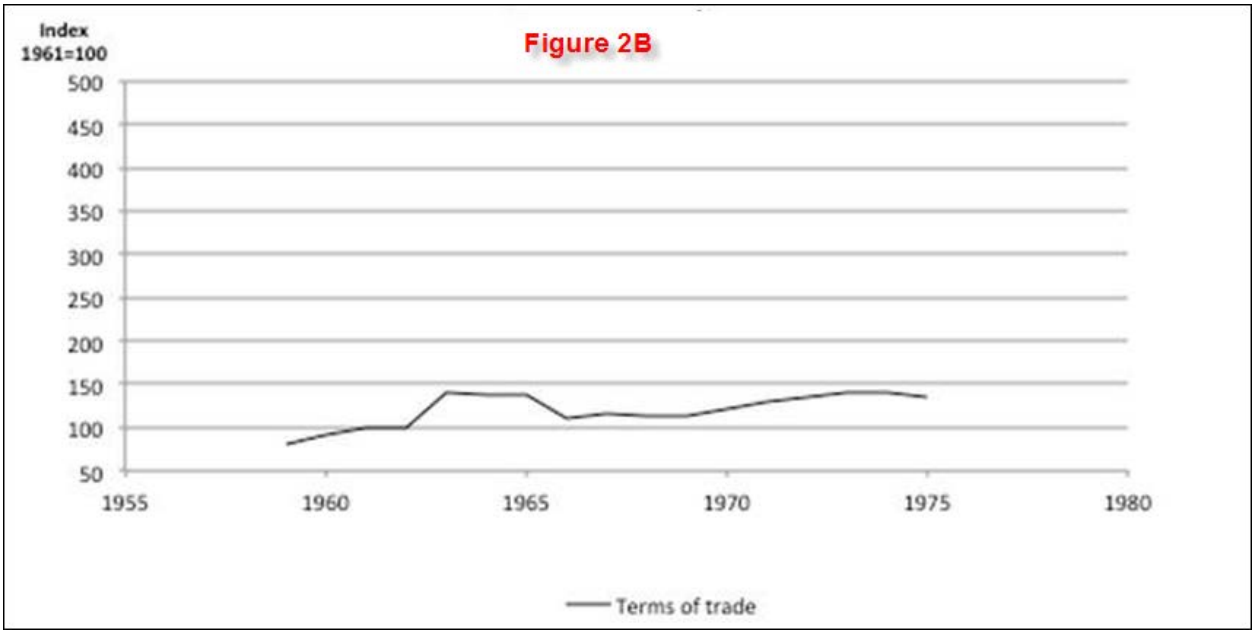
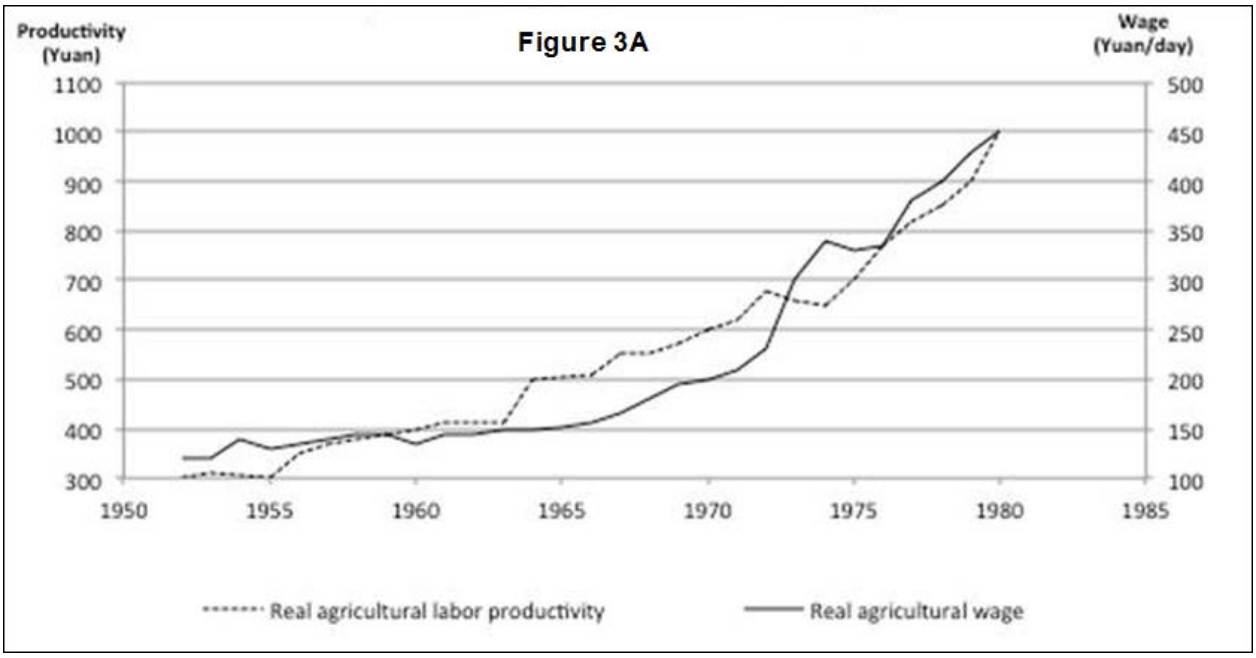


Figure 3A Taiwan: Real Agricultural Productivity and Wages



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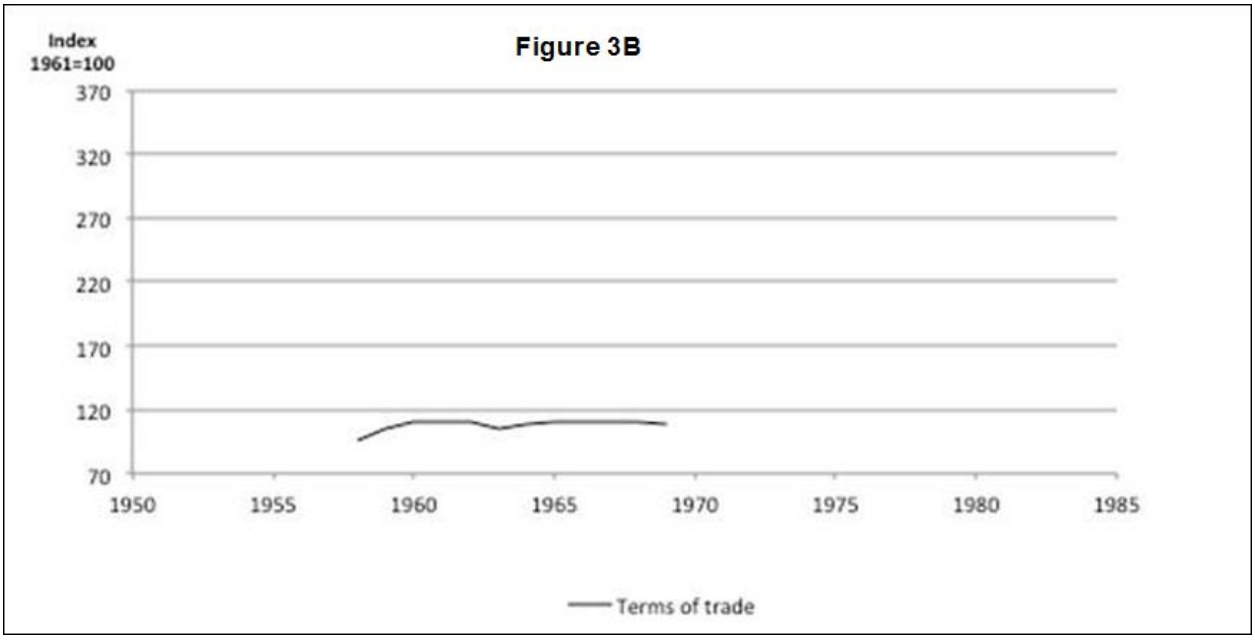
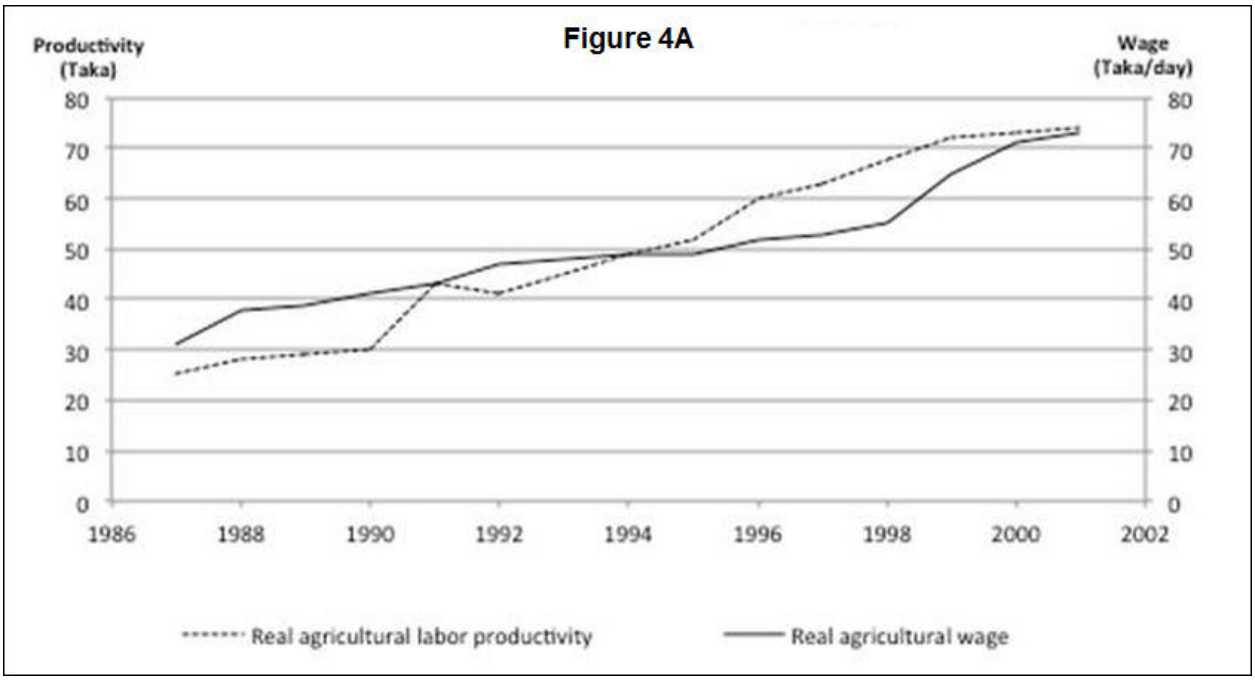


Figure 4A Bangladesh: Real Agricultural Productivity and Wages



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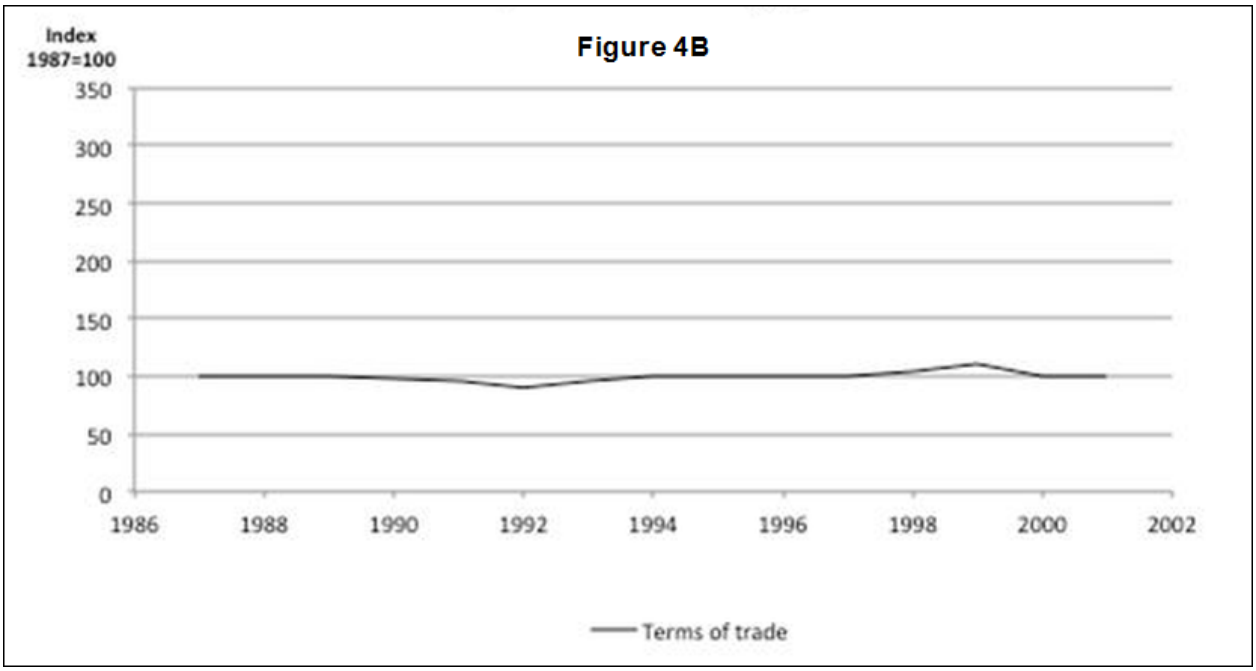
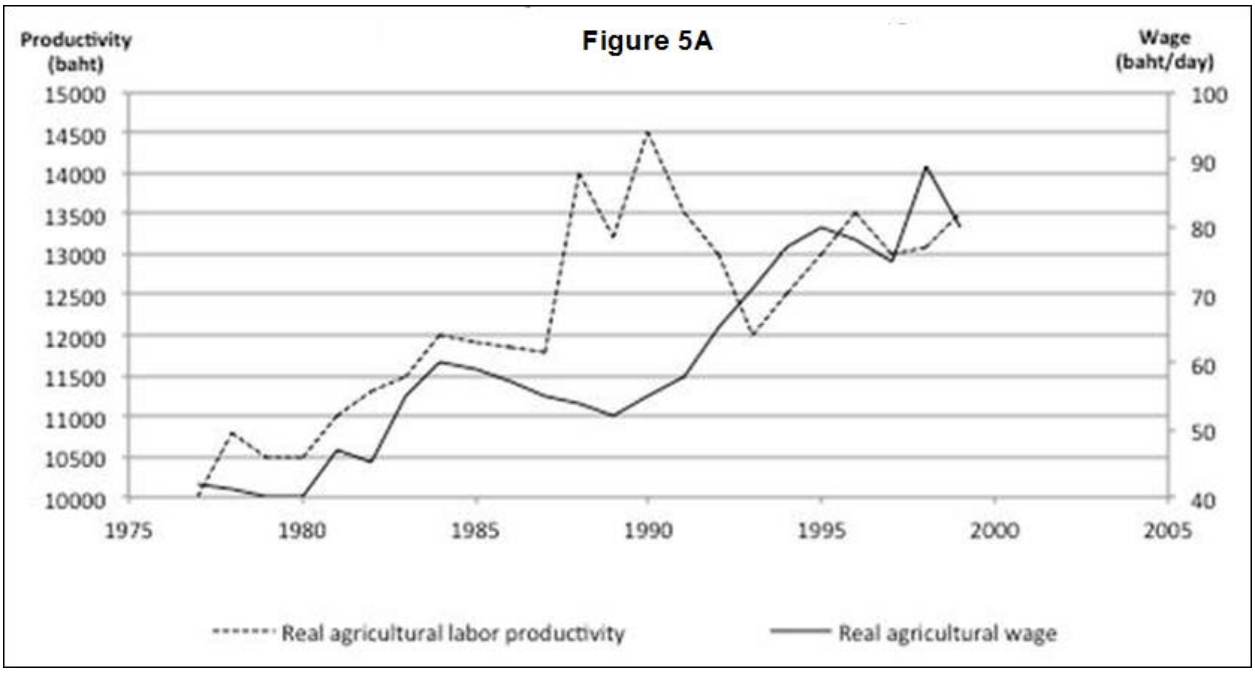


Figure 5A Thailand: Real Agricultural Productivity and Wages



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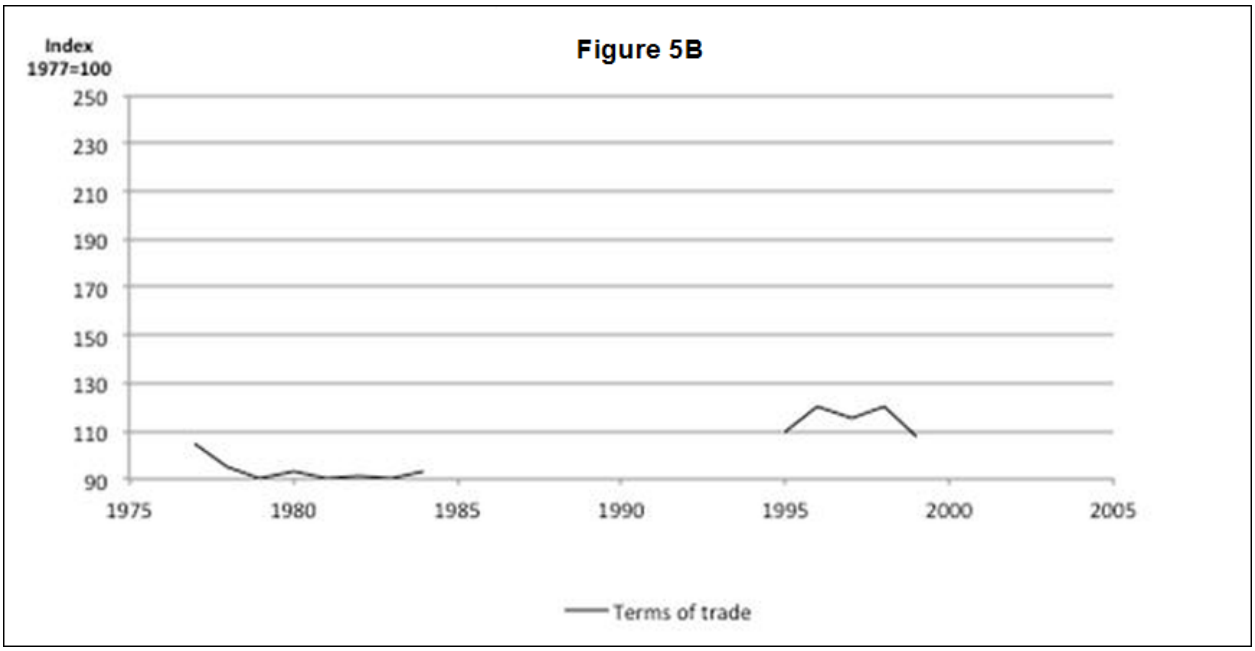
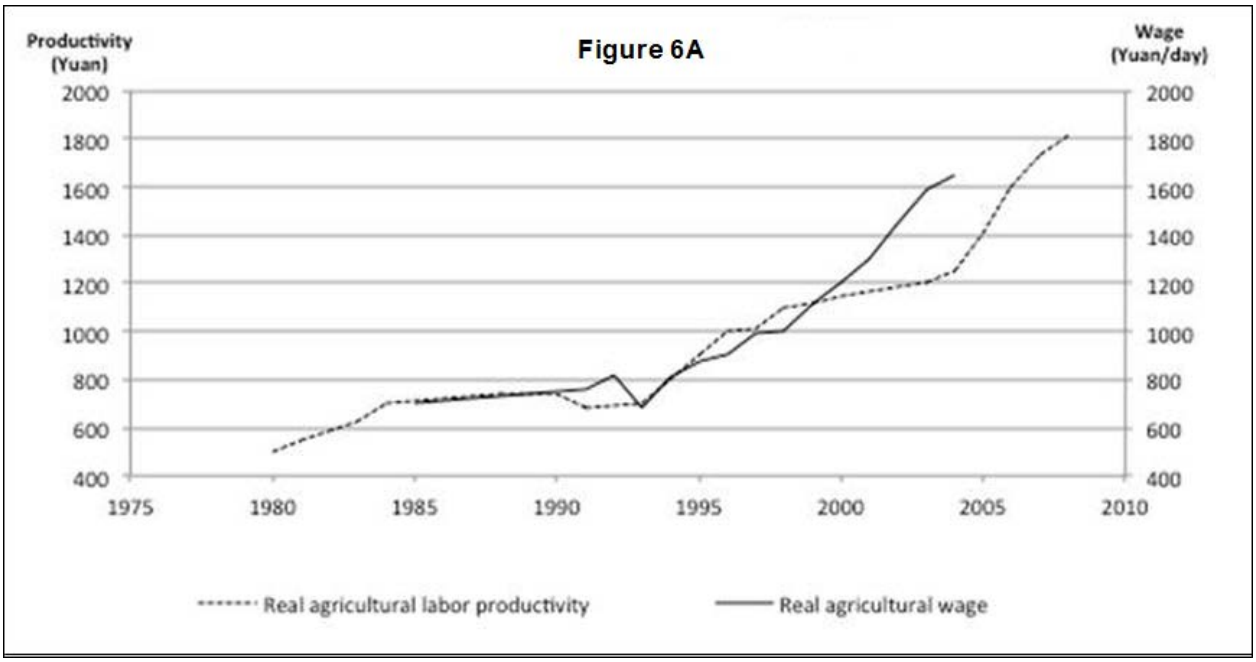


Figure 6A China: Real Agricultural Productivity and Wages



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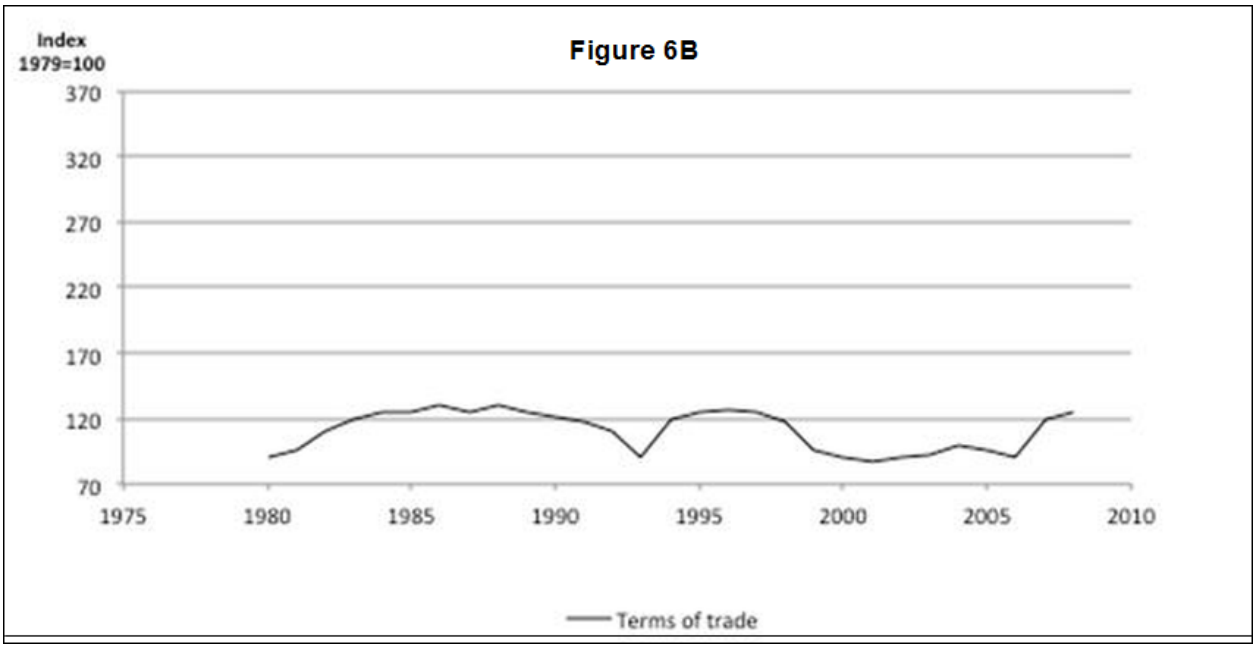

Figure 7A Japan: Real Agricultural Productivity and Wages

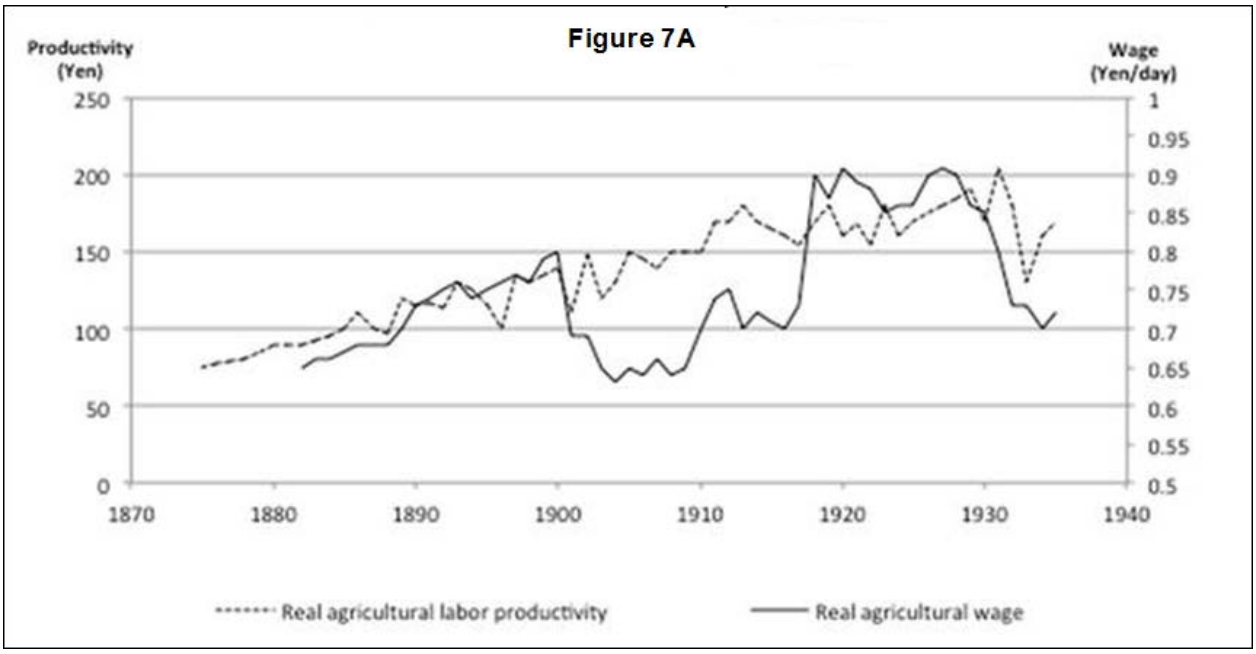

Figure 7B: Japan: Terms of Trade

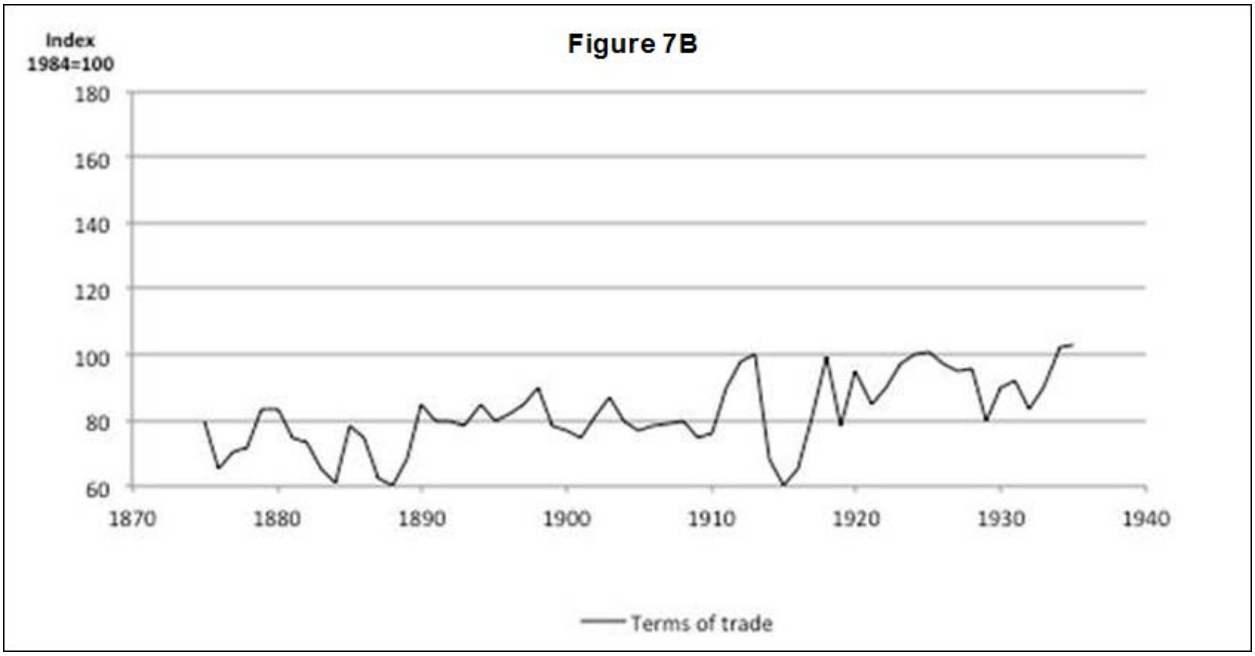

Figure 8 England: Real Agricultural Productivity and Wages

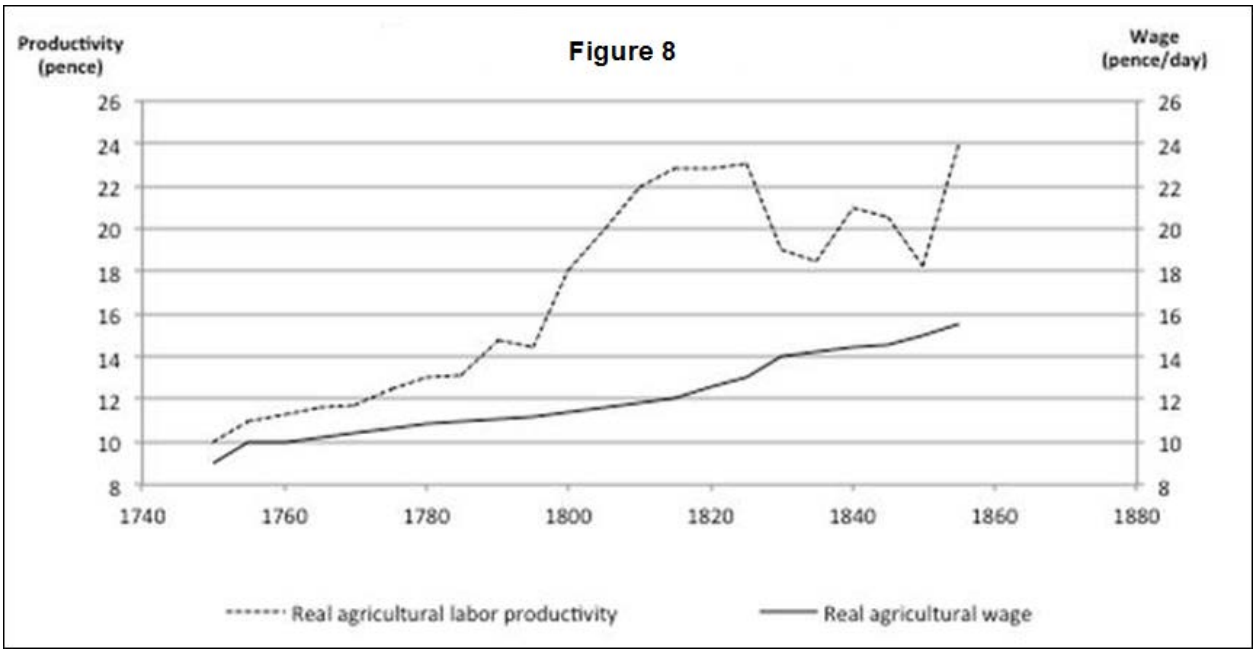
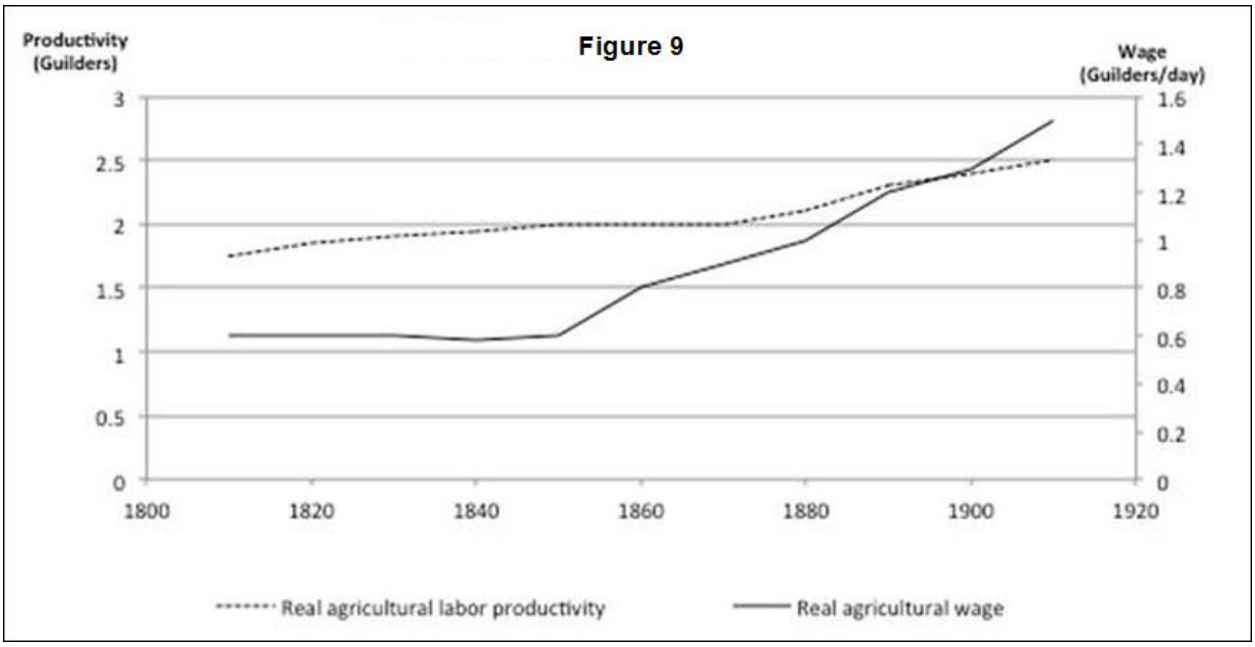
Figure 9 Netherland: Real Agricultural Productivity and Wages