Labour costs, land prices, land rent, and interest rates in the southern region of Korea (1700 to 1900)

Korea from 1700 to 1900 developed two different trends within its agricultural base. The first trend was one of economic growth and prosperity based on a stable commodity market. The stability was achieved in large part through effective government grain storage and complemented by productivity gains in agriculture from 1750 to around 1830. The second trend appeared when the stability ended and prices began to rise from the 1830s. It was marked also by a deterioration in land productivity and the collapse of real wages. This paper offers descriptive statistics on output prices, input costs, paddy land price, paddy rental costs per acre, and interest rates for the period 1700-1900. The conclusion is that stable agricultural prices, high real wages, rising land prices, rising return rates on land, and falling interest rates reflected increasing agricultural productivity from at least 1750 to the 1830s. Thereafter, prices rose, real wages fell, the return rate on land fell, interest rates rose, and general productivity fell. At several times over the nineteenth century (1809-1810, 1814-15, and 1833-34) climatic shocks spiked prices and political explosions occurred. From 1850 diminishing returns were clear. Korea was marked by prosperity in the eighteenth century and stagnation by the mid to late nineteenth century. All these trends were apparent before the appearance of imperialism and the absorption of Korea into the global market from 1876.

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Introduction

To construct price and income data that is comparable within the East Asian region and comparable across continents, we first need to construct descriptive data (and beware of estimated data). We then need to explain the data, and only then can we move on to analysis and model-building. In this paper we provide detailed data on commodity prices and labour costs to reach an estimation of real labour costs or real daily wages. In addition, we also supply information on land prices, land rent, and the financial market. By combining real wages with land prices, return rates, and interest rates we can begin to approach estimates of agricultural productivity.[1] The basic question for comparison is: was Korean rice more or less expensive than Chinese or Japanese rice or European wheat? To gauge this, we are asking if real wages were higher or lower than Chinese, Japanese, or European wages? In addition, we ask, did land prices, rent rates, and interest rates show a general patter of return or loss over time? We introduce the question of comparability and offer a few comparisons with other places, but this is not our purpose.

Our purpose is to clarify the unknown and that is the Korean case. Nevertheless, to make comparability easier, we have converted local units to silver grams per metric units.[2]

Before reviewing the details of our findings, we should reflect on the nature of rice. Rice was the most important commodity in the pre-modern, domestic Korean market. Rice on the stalk represented food, fuel, and even a building material, because the stalk and husk could be burned or used as thatch for roofs and raingear, even stuffing for pillows, but rice did not appear in the market on the stalk. Unhusked rice was presented to the government and to landowners as tax or tenant payments, but rice for the market was threshed to remove the stalk and husk. 'Rice prices' recorded in rural markets were usually prices for unhusked rice (for seeding), polished rice (for meals), and glutinous rice (*ch'apssal*, for cakes and candies). These various forms represent differing degrees of polishing or closer and closer steps to an end product. With varying degrees of chaff or bran left on the rice grain, rice had largely three functions. One was as a staple food. Polished rice can be made ready for the rice bowl with only water, cooking fuel, and a few minutes of cooking time.[3] The point is that rice can be directly consumed, and we need make no estimations between an intermediate product (flour) and end product (bread): threshed and unhusked rice was an end product.[4] Another function of rice was as an intermediate good to produce: wine, syrup, rice drinks, cakes, paste, and starch. Wine, syrup, rice drinks, and cakes were expensive and figure prominently in ancestor rituals. Rice paste was used to hang paper on sliding doors, windows, and the walls and ceiling of a room. Starch was used in clothing, but these products require good harvests and an affluent society. The final function of rice was as money. Below, we have taken the definition of real wages to be a comparison of wages in rice terms with the price of rice.

By a careful comparison of various measures with records of food payments, we have determined that an individual labourer might have expected to consume about 210 grams for three meals a day or 70 grams per meal.[5] Cooked rice expands about 2.2 times its original dry volume.[6] It is not yet clear in all cases if the 70 grams was 100 percent white rice or 50 percent white rice, diluted with barley or millet. Given the health dangers, cultural predilection against, and expense of eating only white rice, we assume that rice was diluted. This does not affect our wage data, because that data is reported as

the cost in copper cash and is not based on calculations related to absolute consumption.[7] There is no estimation or conversion. Wages in kind are eliminated, leaving only copper payments.

Through documents from the southern village of Yŏng'am, we can get a rough idea of the secular trend in the structure of rice consumption by monitoring the polished rice account from the eighteenth century through the nineteenth century. In the eighteenth century, when the standard of living was fairly high, rice consumption was spread among staple foods and intermediate industrial goods, such as wine, syrup, drinks, cakes, and paste. However, from the late nineteenth and into the early twentieth century, these items disappeared from the accounts, and especially from 1920 onwards, rice was only consumed as a staple food by the rich. The shift probably indicated a degree of rural de-industrialisation, but we will return to this question below.

Data sources, the limitations of comparisons, and structural differences

Most of our data comes from counties in the two southern provinces of Korea, Chŏlla and Kyŏngsang Provinces.[8] These two southern provinces produced nearly half of the national rice production.[9] Our price data from these provinces show a high correlation across the southern rice-producing area, indicating that they dominated the rice market.[10] Recently, local data has become plentiful, and we no longer need to rely on spotty, heterogeneous central government data. The local data is not local government data, but is produced by cooperative societies, private academies, or clan associations, and can be taken as more accurately reflecting immediate economic conditions. Our methodology compares macro (government sources) with micro data (account books) to arrive at a relative understanding of the value of each. Many of the local records are account books, and the accounting is in a form that closely approximates the standards of double-entry accounting.[11] Because the records balance so closely, we can be assured of a high uniformity of measurements, and because the accounts range over centuries, we can construct time-series.

Agricultural prices are revealed through four markets: commodities, labour, land, and finances. We have extracted and organised our data under these categories. In this paper, we deal with only rice as the proxy for our commodity market. There were

generally two commodity markets: proto-industrial goods and agricultural goods. Proto-industrial goods included paper, brush and ink, yeast cakes made from barley for wine production, lamp oil, and sesame oil for cooking and sesame seeds for fertilizer. Agricultural commodities included: poultry (800 grams of meat per chicken), red beans (hypothesised at 1 litre at 750 grams),[12] and rice (determined to be 1 litre at 849.5 grams).[13] Our rice price data comes from five counties around Chŏlla and Kyŏngsang Provinces: Yŏng'am, Changhŭng, and Haenam in Chŏlla Province and Kosŏng, Kyŏngju, and Taegu[14] in Kyŏngsang Province. The labour market information comes only from Yŏng'am. Information on the price of land comes from five counties in the south: Kuye, Yŏnggwan, and Yŏng'am in Chŏlla Province and Kyŏngju and Sangju in Kyŏngsang Province. Information on land rent is taken from Yŏng'am and Changhŭng counties in Chŏlla province. Finance data is taken from Yŏng'am County.

The data may have an inherent bias, because most of it is drawn from only Yŏng'am County. We believe the biases can be controlled for the following reasons. Yŏng'am data correlates highly with macro-economic data produced by the capital government. Yŏng'am data appears in highly systemized accounts, virtually double-entry accounts, that not only balance internally, but are also reported homogenously over long time periods.[15] In short, given the high quality of the source, we believe that the Yŏng'am data can be used as something of a standard with the addition of data from other areas. This geographic weighting of the data from one southern county does not appear significant when discussing the southern rice-growing areas,[16] but is problematic if we attempt to include the northern half of the peninsula. Climate, rainfall, and land use varied as one moves from south to north, particularly along a southwest to northeast axis, but less so along a southeast to northwest axis where population was concentrated in optimum circumstances of balanced land use between dry and wet fields.[17] The variations are significant, and we do not yet have adequate data on the circumstances in the north.

Comparability beyond Korea is a key concern. Because the Yangzi River Valley was also a rice economy, as was Japan, Korean data can be directly compared to Chinese data. The Chinese land area called *mu* is roughly similar to the Korean *turak* (0.16 acre). Chinese and Korean societies share countless similarities deriving from the structures of

rice production, not to mention ideological and cultural similarities. While there are enormous similarities across the board, the differences may be hard to spot, but they are significant. We have yet to perform a systematic survey, but we have noticed a difference in labour inputs for rice production. Table 1 ('Differences between Korea and China in labor input between direct seeding and transplanting') illustrates this point. As we can see in Table 1, direct seeding in Korea required more labor input (primarily because of weeding) than transplanting in China. We will leave questions of comparability aside for now.

While Korean data can be directly compared to Chinese data (and perhaps Japanese data), the general institutional and structural conditions of Korea make comparisons with Europe more difficult. The general institutional peculiarities of Korea should be kept in mind when considering the role of labour, wages, and the standard of living. Korean taxation included corvée labour, so population assessments cannot be seen apart from government objectives. English parish registers were a roll-call of souls, but Korean government registers were a roll-call of arable population. Population has to be thought of like land, because it was taxable. The implications are that official statements about labour costs cannot be taken as reflecting the market.[18] Privately produced information, such as is used here, is much closer to a real picture.

Another institutional difference between Korea and the European case is in the relative position of government in the overall economy. The Korean case was marked by highly centralised, highly bureaucratised government intervention in all aspects of the economy, particularly the grain market. The objectives of government were to create a general moral economy based in part on grain storage that was used to suppress price swings. In Europe, free markets were expected to achieve an acceptable level of price stability, while in Korea government-controlled storage was expected to create stability. When data is compared from these two very different situations, there may be problems that cannot be overcome.

The greatest structural difference is difference between rice and wheat. We have just begun to consider the extent of these differences, but we cannot begin to explore them here. Suffice it to say that the economic 'common sense' that emerges from a wheat-based system may not apply at all to a rice-based system and vice-versa. It is

increasingly apparent that most agricultural economic theory has been developed for wheat and we now need to create new models to explain rice.[19] There were other structural differences that also may create difficulties for comparison. For example, Korean data is rural, and European data is urban. The Korean economy was not as highly monetized as the European economy.

Within these structures, trends developed that relate directly to the question of real wages in agriculture. Namely, in the 1830s and 1840s, one epoch of high real wages ended to be followed by a period of low real wages. Although we do not have the data to hand, we suspect that this epoch may have continued until the early 1970s. Correlating with the collapse of high real wages is the end of stable rice prices and the beginning of unstable, rising prices. Other correlations seem to reveal this change: the decline of government storage, shifting land use from dry fields to paddy for speculative purposes, climatic shocks, and other related factors. All these trends pointed towards a dismantling of benevolent government intervention in the markets, the collapse of the moral economy. After these trends had emerged from the 1830s and 1840s, they were negatively amplified from the 1880s—after the opening of the ports in 1876—by the appearance of imperialism (primarily Japanese) and the forced, violent absorption of the Korean rice market into a global commodity market.[20]

Labour Costs or Real Wages

Ordinarily, real wages are nominal wages divided by a consumer price index, but we have gathered data on just one county in the south, and so the construction of a weighted average is currently impossible. Wages in Korea were predominantly denominated in terms of rice, although there was some monetization in the northwest that derived from the China trade. Here, we use the average price of rice as a general proxy for a consumer price index. This may be the best that can be done in a rice eating country.[21]

In Table 2 ('Nominal and Converted Wages in Yŏng'am County, South Chŏlla Province'), we have compiled records of nominal wages. The records directly report a great deal of labour information, but there are two large problems. One problem is that key details needed to calculate wages may be missing. For example, some records are

missing the number of days worked or the number of labourers employed. Depending on the type of work, we can estimate the time: one day for work connected with rituals and one day for attaching or repairing locks by a blacksmith. We have found that we cannot estimate the time taken for large jobs, such as building work. For each day of work, we assume that labourers were fed five times, but the total consumption was about 210 grams of rice daily. The ideal data contains: time, type of labourer, the various wage payments (copper cash, copper cash for wine, copper cash for tobacco, and copper cash for food other than rice) for the job (not a daily wage), the cost of raw materials, the number of days worked, and the number of people on the job.

Another large problem is that some wages are paid in kind (unrefined rice wine and food other than rice) in addition to cash, so their conversion to monetized units is difficult. All nominal wages have not been included because we chose not to estimate, not to convert in kind payments to their copper value. We have used only wages reported in copper values. Below we report gross and net wages. The net wages are purely the cash element given to the labourer or what the labourer carried away. The gross wages are the cash element plus the consumables that were supplied while on the job (wine, tobacco, straw sandals, and food other than rice). These consumables were bought in cash and then given to the labourer while he worked. Although payment was by the job, because we know the number of days worked and the number of people employed, we can calculate the daily net nominal wages in copper cash (cash ÷ days worked * number of labourers) and daily gross nominal wages in copper cash (cash + cash for wine + cash for tobacco + cash for side dishes ÷ days worked * number of labourers). Because we know the conversion rates from copper to silver and real rice wages (see: Appendix 1: Silver Values in Korea), we can calculate the daily rate in silver grams and in kilograms of rice (See Figure 1: "Rice Prices in Copper Coins and Silver Grams"). Finally, because the price of rice is our proxy consumer price index and that value has been incorporated into the conversion of silver wages to rice in kilograms, the final two columns in Table 2 (P & Q) show real net wages and real gross wages.

From the real net wages and real gross wages in Table 2, we have classified labourers as skilled and unskilled. In Table 3 and Figures 2a and 2b, we can see that skilled labour (e.g. bamboo mat makers, blacksmiths, carpenters, builders, plasterers,

masons, horsemen, hypocaust builders, and utensil makers) were rewarded significantly better than unskilled labourers (porters, day labourers, errand boys, and servants). This is not surprising. What is surprising is the change over time. Here, we can clearly see that the 1840s, both in nominal and real wages was the end of one epoch and the beginning of another. Unlike the European case where unskilled wages rose to meet skilled wages, Korean skilled wages collapsed to meet unskilled wages. When wages are compared with rice prices, we can see that the upward shift of prices began in the 1840s. With prices starting to climb, real wages fell. In other words, the long, prosperous eighteenth century ended in the 1830s and 1840s, and from that time onwards, internal disintegration took hold, exacerbated later by the shocks of the domestic market becoming enthralled first with the Japanese market and later with the world market.[22]

If we return to the question of comparability across regions, we can extract certain key information from Table 3 and augment it with comparative data from China and Europe.[23] (see: Table 4: Real Wages for Skilled and Unskilled Labours in Korea and Elsewhere)

Table 4: Real Wages for Skilled and Unskilled Labours in Korea and Elsewhere

	Korea (net) 1780-1849	**avg**	Korea (gross) 1780-1849	**avg**	Korea (net) 1850-1900	**avg**	Korea (gross) 1850-1900	**avg**	China (late 1600s)	England (London) 1750-59	Italy (Milan) 1750-59
Unskilled (silver grams)	0.82-1.55	**1.2**	0.82-1.73	**1.3**	0.59-1.50	**1.1**	0.59-1.50	**1.0**	**1.55**	**5.57**	**2.10**
Skilled (silver grams)	2.13-5.63	**3.9**	2.13-5.71	**3.9**	1.80-2.94	**2.4**	2.25-3.45	**2.9**		**11.14**	**5.73**
Unskilled (rice/ bread in kg)	0.96-2.82	**1.9**	1.04-3.41	**2.2**	0.54-2.47	**1.5**	0.54-2.78	**1.7**	**2.80**	**5.42**	**2.33**
Skilled (grain) (rice/ bread in kg)	3.23-11.72	**7.5**	3.23-11.89	**7.6**	1.66-3.62	**2.6**	2.11-5.28	**3.7**		**8.13**	**6.30**

Source: Korean data from Table 3, see text. Other data from Robert C. Allen, "The Great Divergence in European Wages and Prices from the Middle Ages to the First World War", *Explorations in Economic History* 38 (2001): 411-447.
NB: the price of rice is used as the deflator. Unskilled and Skilled labour wages in silver represent nominal wages, but Unskilled and Skilled in rice/bread represent real wages.

In the eighteenth century, the highest gross silver wage in Korea for skilled labour competed with Milan (5.71 vs 5.73), while unskilled wages were a bit lower (1.73 vs 2.10). The highest real wages (rice) for skilled labour in Korea surpassed China, London, and Milan (11.89 vs 8.13 for London), but high Korean real wages did not last. Prices rose while wages fell from the mid-nineteenth century onwards. There appeared a clear divergence between the Korean and the European cases from the mid-nineteenth century. Until the mid-nineteenth century, high real wages were based on price stability, and when price stability collapsed and prices rose, real wages collapsed as well. When prices remain the same and wages rise, value rises (Korea in the eighteenth century). When prices rise and wages remain the same, value falls (Korea in the nineteenth century). Since the origins of the numbers for China and Europe are not completely clear, we have taken the average of the Korean range for comparison. Even then, the differences between Korea and London or Milan are slight. The implication is that the standard of living in Korea from the eighteenth century into the mid-nineteenth century was roughly on a par with London and Milan, but diverged thereafter.

The Korean collapse of real wages in the nineteenth century can be starkly conveyed by considering actual consumption. For example, in the eighteenth century (1780-89), the lowest real daily net unskilled wage we could find was 0.96 kg. or 960 grams. If an average person required about 210 grams per day, then 960 grams could have supported about four people with a little left over for housing, clothing, or other necessities. By contrast, in the nineteenth century (1870-79), the lowest real daily net rice wage for unskilled labour fell to 0.54 kg. or 540 grams of white rice or half of what it had been less than a century earlier.

While agricultural productivity was high in the eighteenth century, urban areas did not expand their employment opportunities, and any surplus labour that appeared—already small in the case of rice agriculture—was absorbed by the service sector. As productivity decreased in the nineteenth century and surplus labour expanded, it failed to find a labour market in urban areas. The result was that an agricultural stagnation crisis loomed large that was marked by peasant disturbances and massive migrations to Manchuria.[24]

Land Prices

From the seventeenth to the nineteenth centuries, the size of land sales was small, averaging 0.85 acre (5.3 *turak*) in Yŏng'am County,[25] and land holdings were not usually contiguous. Most trading was done in the spring, before planting.[26]

Figure 3 shows the average nominal price of paddy land in copper coins and silver grams.[27] The paddy land is denominated by *turak* or 0.16 of an acre. Comparing Figures 2 and 3, we can see that the land price parallels the price of rice, but what we need to know is the real price of paddy land. Figure 4 ("Real Price of Paddy Land") shows the trend of paddy-land prices in real rice terms. The data displays the average land price for one *turak* (0.16 acre) in a *sŏk* (a Korean 'bushel': 50 kg. weight and 120 litres volume).[28] These prices are in unhusked rice, not white, polished rice. From this we can see that the trend line is rising or flat in the eighteenth century and declining in the nineteenth century. In other words, the real price of paddy land declined in the nineteenth century. The meaning of this is multiple, but we interpret this fall in the value of land as a fall in the productivity of land.

In the eighteenth century, paddy land was more expensive because its productivity was higher, but this productivity depended on investments in infrastructure. The construction of irrigation works for the three southern provinces of Kyŏngsang, Chŏlla, and Ch'ungch'ŏng peaked in the late eighteenth century (see Figure 5 "Irrigation Facilities in southern Korea"). Irrigation works were expensive, were often government projects in part or whole, and represented an enormous capital investment in land. Floods from devastating rains easily destroyed these investments, and so their construction did not ensure their permanence. They required maintenance. For example, devastating rains in 1821-22 destroyed much investment, and government reconstruction afterwards failed to restore the *status quo ante*. Figure 5 provides spotty data, but we can see that infrastructure investment peaked from the late eighteenth century into the early nineteenth century and declined thereafter. Figure 5 is macro data, collected by the central government and records its activities. We can see what may be corroboration in the micro data presented in Figure 7 ('Return Rate to Paddy Land'). Note the gap in Figure 7 that develops between the two trendlines. The dotted trendline indicates the gross return rate on land or what was paid at the time of harvest. The solid trendline

indicates the net return rate on land or the annual payment after deducting for seeding, tillage, and investment in irrigation infrastructure by the owner of the land. The widening gap probably indicates the need for greater and greater local investments in irrigation repair, because seeding and tillage costs were fairly constant. Although other costs such as fertilizer and labour did not change, after heavy floods in the nineteenth century, the costs of irrigation repair became too high for recovery. As government investment in infrastructure declined over the nineteenth century, private investment tried to pick up the costs, but land productivity dropped, and the price of land dropped.

Land Rent

Generally, tenants paid 50 percent of their crop to the owner. In Figure 6 ('Land Rent'), the rents are divided between gross rent and net rent. Gross rent was what the tenant paid to the owner at harvest time in the autumn. Net rent was what was left after costs. Although our data is from the south, we have to mention regional cultural differences between south and north. In the northern provinces, in the spring, the owner was responsible for supplying seed, paying tillage costs, paying tax, and repairing irrigation works. These costs fell to the owner, because the harvest was divided in the field and the owner received straw and bran from the harvest. Straw became fuel and carried a higher value than straw in the south, because northern winters are much colder. Straw was also used for thatch, matting, rope, bags, and fodder. Bran became livestock feed and fertilizer in both south and north. In the southern provinces (Chŏlla and Kyŏngsang), the owner was responsible for nothing. The tenant at least had to pay the seeding costs and tax, and might have had to pay the tillage costs and irrigation repair. Judging from the widening gap in the trendlines in Figure 7, however, the owner probably paid for irrigation repairs, but we will return to this point below. An early nineteenth-century political economist, Chŏng Yag'yong, explains that, in the south, the harvest was taken back to the tenants' houses, where the grain was threshed in their courtyards, and the tenants kept the straw and bran, but in the north, threshing took place in the field.[29] The result was that the northern tenant's work took place under the watchful eyes of the owner, but the southern tenants had complete control over the production from the fields and presented the owner with the agreed rent at the end of the

process. Considering that the tenant may have mis-reported the harvest, the tenant was responsible for costs.

In our data, we see the owners and tenants in Changhŭng acting in typical southern fashion, probably because the owner-tenant relations were commercial. The result is that we cannot know the costs of production in Changhŭng (seeding, tillage, and irrigation), because all we have are the owner's accounts and not the tenant's accounts. In the case of neighbouring Yŏng'am, we see more cooperative, 'northern-style' relations. In other words, we see that the owner (a village or clan association) generously supplied seed, paid tillage costs and tax, and repaired irrigation works. The tenants still threshed in their own courtyards and kept the straw and bran. We are fortunate that the custom in Yŏng'am was different, because their records reveal itemized costs, and so we are able to calculate the gross and net rents. In the Yŏng'am ledgers, the autumn rent revenue account includes an expected rent just before harvest as well as a field investigation with the tenant's name. The field investigation records the rent presented from a piece of arable land (A), any outstanding rents with the tenant's name (B), any settlements of outstanding rents with the tenant's name (C), and all deferred rents (D). We can calculate the gross rent per *turak* (0.16 acre) by adding up everything, but the real rent was A + C - (B + D). Expenditure accounts in spring time of the same year were composed of rice traded for copper cash, brown rice milled into white polished rice, seed, tax, tillage cost, and irrigation repairs. By subtracting costs from income, we can calculate the net rent per 0.16 acre. But gross and net rents (Figure 6) are inadequate to understand the situation. What we need is the real return rate on paddy land.

Return Rate

The finding that real land prices fell (Figure 4) is corroborated by the declining return rate on paddy land (see Figure 7: 'Return Rate to Paddy Land'). From Figure 6, we have taken the gross and net rents and divided them by the real land price to determine the return rate on land displayed in Figure 7. Government determined the natural depreciation rate on rice to be 10 percent (spoilage, vermin consumption) over a year, and this was the official rate granted at government granaries. Anything above this as a return rate on land could be called a profit, and anything below this natural spoilage

rate could be called a loss. As we can see in Figure 7, the return rate grew over the eighteenth century to reach a high of just under 15 percent around 1800. There seems to have been a lag in the land market, because the real price of paddy land reached its height around 1810. Thereafter, the return rate fell together with the real price of land, corroborating a decline in productivity. From work on land use, we also know that from the first half of the nineteenth century, dry fields were increasingly converted to paddy fields. Below, we will discuss this shift in land use caused by a speculative bubble favouring paddy land. Speculation was kept in check in the eighteenth century by government stability measures enacted through the state granary system, but government measures fell victim to corruption and climatic shock in the nineteenth century, and the fragile system began to collapse.[30] The falling return rate would also be consistent with a rise in the amount of quickly converted dry fields into paddy land, or land lacking in good irrigation infrastructure investments.

Financial Market

Our final problem is to outline the financial market. We believe that a speculative bubble in land appeared from the mid-nineteenth century, but to demonstrate this, we have to know whether land was being bought and sold at prices that represented rising apparent values. Before examining the conclusions drawn from data on interest rates, we should consider the incentives attached to land ownership and the momentum of the structures that come out of the eighteenth century.

There were three main sets of incentives working to increase agricultural productivity in the eighteenth century. One set was that paddy land in southern areas was bought and sold at a higher price than dry fields. Originally, paddy land carried a much higher risk towards drought than dry fields, but with an increase in irrigation facilities supplied by government, paddy land became a safer investment. The second set of incentives derived from the recovery following the Imjin Waeran (Japanese invasion of 1592-1598). The invasion devastated the population and created a labour scarcity. For the post-invasion recovery, the government was in desperate need of funds and even resorted to selling offices. One thing it had in abundance was land, and it consciously modified institutions to provide incentives for cultivation. Chief among these

modifications was to weaken the power of privilege in obtaining and keeping land and strengthen the market.[31] Much of the discussion above presumes this very market. Because secure land ownership was thought to undergird enhanced production, ownership rights were strengthened. Furthermore, steps were taken or institutions strengthened to protect the small, vulnerable tiller. To conform with the dictates of Confucian ideology that preached a moral economy and to preserve the small owner-tiller tax base, an elaborate grain storage system operated as an agricultural bank for loans as well as to maintain price stability. Government appropriation through tax was made highly elastic. Tax assessors paid close attention to harvest quality and adjusted taxes through relief measures to track the ups and downs of production.[32] Therefore, paddy land cultivation was actively promoted through infrastructure investment and institutional arrangements that supported and regulated the market and protected the small land owner. Wet rice agriculture is highly vulnerable to climatic shocks, frequent on a peninsula exposed to bouts of severe cold and at the northern end of the Pacific typhoon corridor, and government took steps to ameliorate risk.

The third set of incentives was social and technological. Local elite groups organized various associations, introduced rational bookkeeping methods, managed seed, paid tillage costs, offered wages, and paid irrigation costs. In addition, they published agricultural manuals and actively introduced the transplantation technologies developed in the Yangzi River Valley. Transplantation technology in a wet-rice environment continued to expand from its first introduction in the thirteenth and fourteenth centuries, and by the late fifteenth to early sixteenth centuries reached a stable plateau of roughly 30 percent of arable land. Paddy land is more productive than dry fields, and it is more labour intensive on smaller plots of land. The intensification or increased labour input wedded to technological advancement did not push agriculture into decline or stagnation in China[33] or Korea. Rather, technological advancement that required more labour even significantly reduced the need for certain types of labour. As we can see in Table 1, transplantation in the seventeenth to nineteenth centuries reduced the weeding workday for a *turak* (0.16 acre) from 8.5 to 3 days. Obviously, there were efficiency gains from technological advances, but short bursts of intensive labour were required.

In fact, the Chosŏn social milieu that saw local elites engaged in the development and dissemination of rational methods to improve the agricultural economy was mirrored at the national level. We also see the central government actively engaged in promoting technologies to improve agricultural efficiency for both ideological and fiscal reasons. The pattern was set early in the dynasty by the fourth king. King Sejong (1418-1450) was personally involved in the development of an alphabet to promote literacy, while his government delimited the national boundaries in the north, surveyed land use, counted people, and standardized measures. In the eighteenth century under Kings Yŏngjo and Chŏngjo (1724-1800), Chosŏn saw a revival with the expansion of the post-Imjin reforms mentioned above (promotion of the market and protection of the small cultivator), a strengthened storage system, and the publication of agricultural manuals. The manuals discuss intensification and ways to improve output, and some discuss land reclamation and clearing to expand the agricultural base. Side by side with these incentives to develop land, to introduce the higher technologies of paddy cultivation, and to support and regulate the land market and rice production, we also see the expansion of proto-industrial crops such as cotton in the eighteenth century.

But the question remains: what financial incentives prevailed? Can we determine any trends over time? Figure 8 ('Interest rates') shows the pattern of the data we have collected thus far on interest rates and the return rates of land in comparison with the cost of land. At the risk of repeating ourselves, let us first consider the cost of buying land. Land was generally traded in a unit roughly equivalent to the Chinese *mu*. The Korean *turak* was also about 0.16 acre,[34] but the term refers directly to seeding. One *turak* required about 6 litres (≈ 2.5 kg.) of unhusked rice to seed. In eighteenth century Yŏng'am, the real value of paddy land was about 250 kg. of unhusked rice with an output of 100 kg. If the rent was 50 kg. per year, the return rate to the paddy field was 20 percent, which meant that if the owner somehow banked five year's worth of rent, he could buy an identically valued piece of land. This is displayed in Figure 8 as 'Years required to purchase land' (YP). As is evident, the curve of this data over the period 1741 to 1900 parallels the curve for the return on land (Figure 7). In short, as the eighteenth century progressed, it took more and more years of savings to buy land, but when we enter the nineteenth century, the curve heads back downwards indicating that

fewer and fewer years were required. Needless to say, this indicates a decline in the value of land, as we have already seen in the declining return rate.

The maximum legal annual rate of interest was 10 percent (*sokdaejŏn*), but the return rate on land fluctuated between 5 and 20 percent. The interest rate (*ija*) in the financial market within a year might fluctuate between 20 and 100 percent. Averages were between 10 and 50 percent (see: Figure 8). The return on mortgages (*hwant'oe*) varied annually between 15 and 20 percent.[35] Although we still have sparse data for interest rates, in Figure 8, we can see that the interest rate declined over the eighteenth century and then began a climb in the nineteenth century. Figure 8 (years required to purchase) corroborates Figure 7 (return rate to land) and it shows the inverse relationship between interest rates and land return rates. The downward drift of interest rates in the eighteenth century indicates greater and greater land values, because of infrastructure investment and institutional measures to stabilise the price of rice. We know that the mix of land use was balanced at that time between dry and paddy fields and that dry fields supplied proto-industrial goods and more variety for the diet. But going into the nineteenth century, that balance slipped, general circumstances became less and less stable, land returns fell, and interest rates drifted upwards. Land ownership began to concentrate in fewer hands, land use patterns shifted from dry fields to paddy land, returns from lending rose, and a land bubble emerged.

Conclusion

The epoch coming out of the late seventeenth century and lasting until the early nineteenth century was one of prosperity, stability, and rising productivity. Real wages were high, returns on land were high, and interest rates were falling. From the data on real wages, we can see that an epoch of high real wages ended in the 1830s and 1840s and an epoch of low real wages began. The collapse of high real wages correlates with the end of stable rice prices and the beginning of unstable, rising prices. At the same time, the real price of paddy land declined, and we can see a decline in the return rate on paddy land. As land values fell, interest rates began to rise and a land bubble was born.

From the mid nineteenth-century, a number of factors, both internal and external came together to initiate the decline. Government corruption neutered the storage system;

climatic shocks from ENSO events devastated irrigation facilities, and the fragile nature of the rice economy was unable to cope. From the latter quarter of the nineteenth century, internal decline was exacerbated by the shock of imperialism. Imperialism's chief result was to seize the internal agricultural market and make it a part, first of the Japanese market and later of the world market. Because the moral economy had already begun a decline, it was unable to defend itself against intrusive market relations, and Korean society and economy entered a long period of low productivity, low real wages, and general social decrepitude. This epoch probably ended in the early 1970s in agriculture with the Saemaul Movement in the south, a return of sorts to a moral economy, and with the self-immolation of Chŏn Tae-il, who became a martyr for the labour movement in southern industry and triggered the modern labour movement.

Endnotes

[1] Gregory Clark, "Land Rental Values and the Agrarian Economy: England and Wales, 1500-1912," Working Paper, February, 2001. Clark's findings throw into doubt the notion of an "agricultural revolution" in England that preceded and aided the industrial revolution. England posted no unusual rates of productivity growth and those that did occur were the result of a growth in yields, not in labour productivity.

[2] Peter Lindert defined the basic terms of comparison. See Peter Lindert, "Preliminary Global Prices Comparison, 1500-1870," unpublished paper presented at the XIII Congress of the International Economic History Association, Buenos Aires, 22-26 July 2002.

[3] The process of converting unhusked rice into rice which may be cooked and eaten is a very simple process compared with milling wheat into flour from which a baked product must then be made. V.D Wickizer and M.K.Bennett, *The rice economy of Monsoon Asia*, (Stanford: Stanford University, 1941): 63.

[4] Robert. C. Allen, "The Great Divergence" (2001), p.419.

[5] Kungnip minsok pangmulgwan, ed., *Han'guk ŭi toryanghyŏng* (Seoul: Kungnip minsok pangmulgwan), 1997.

[6] Kim, Hŭi-t'ae, *Chosŏn mijak yŏn'gu*, (Seoul: Chŏngŭmsa, 1948): 257.

[7] It is still difficult to estimate rice consumption, even in general terms. For example, in the capital city of Hansŏng (modern-day Seoul) in 1792, the population inside the capital administrative district was about 200,000 persons. The annual rice supply for this population was recorded as one million *sŏk*, the term for a Korean bushel. We cannot be sure of the type of rice supplied: unhusked rice or husked, polished white rice. The government recognized a ratio between the two of 2 to 5. That is, 2 *yang* of copper cash bought a *sŏk* of unhusked rice, and 5 *yang* bought a *sŏk* of husked, white rice. The volume of the measure—*sŏk*—was the same or 120 litres, but the reduction rate from unhusked to husked rice reflected the official price differential. In other words, husked rice lost 60 percent of its volume to become white rice. The weight of a *sŏk* of unhusked rice was 50 kilograms, but the weight of a *sŏk* of husked rice was 40 kilograms. In short, to have the same volume (120 litres) of husked rice required 2.5 *sŏk* of unhusked rice. If the one million *sŏk* were unhusked rice, then the annual, supply was about 50,000 metric tons. After husking it would have produced 40,000 metric tons of unhusked, polished, white rice. With 200,000 people to feed, that works out to 200 kilograms per person per year or 548 grams per day per person. After deducting direct consumption from the per capita allotment (548 – 210), we are left with 338 grams. We believe that the one million *sŏk* referred to white, polished rice, which would have produced 100,000 metric tons. With 200,000 people to feed, that works out to 500 kilograms per person per year or 1,370 grams per day. After

deducting average consumption from the per capita allotment (1,370 – 210), we are left with 1,160 grams. Rice wine consumed about half of what was left, and the remainder went for cakes and cookies. (See: Kim, Yong-sŏp, *Chŭngbo-p'an Chosŏn hugi nongŏpsa yŏn'gu, II, Nongŏp kwa nongŏp ŭi pyŏndong*, (Seoul: Ilchogak, 1994): 306, and the *Ilsŏngnok*, 5/9/1792: 都下釀戶, --登市之米居其半云. The capital city was urban and probably represented the upper end of additional consumption of rice in cakes and cookies.

[8] Our work is possible only because, for the last twenty-five years, the Academy of Korean Studies (Chŏngsin Munhwa Yŏn'guwŏn) has been collecting, microfilming, and printing pre-1900 documents scattered in private collections across the southern half of the Korean peninsula. Among these, the account books of the clan and village associations of Yŏng'am Village in South Chŏlla are central to the data presented in this paper. The following gives an outline of the general holdings available for these accounts.

Title of account book	Period	Size (cm.)	Number of sheets
Head clan association account book	1741-present	25 x 22	726 (to 1928)
Collateral clan association account book	1819-1884	25 x 22	689
Village association account book	1761-1945	23.6 x 20.5 (20.8 x 18.6)	1,620

[9] 'Rice' refers to the variety commonly known as *japonica*.

[10] SH Jun and JB Lewis, "A History of Rice Prices in Korea (1713-1933) and a consideration of their relation to population and other factors" (working paper).

[11] SH Jun and JB Lewis, "On Double-entry Bookkeeping in eighteenth-century Korea: A consideration of the account books from two clan associations and a private academy" (now under review with the *Accounting Historians Journal*, organ of the Academy of Accounting Historians)

[12] We use the standards reported in the economic statistics *Yearbook* by The Bank of Korea.

[13] Park Hŭngsu, *Toryanghyŏng kwa kuk'ak nonch'ong*, (Seoul: Pak Hŭngsu paksa hwagap ki'nyŏm nonmunjip kanhaenghoe, 1980): 159.

[14] Taegu is the only urban data source.

[15] The account books used for much of the data usually breakdown accounts into three groups: unhusked rice, polished rice, and copper coins. The entries are not recorded in chronological order, because these are not daybooks, and they serve the purpose of comprehensively reporting the financial statements at the end of an accounting period. Rent revenue is the main income, but many items were included, depending on the harvest situation.

[16] SH Jun and JB Lewis, "A History of Rice Prices in Korea (1713-1933) and a consideration of their relation to population and other factors" (working paper).

[17] JB Lewis and SH Jun, "Economic Perspectives on Korean History: macroscopic structures, 1400 to 1800" (working paper).

[18] In 1799, the daily wage recorded by the government was polished rice 3 *sŭng* (1.09 kg = silver grams 0.41-0.77 per kg) + copper 5 *pun* (silver 0.5 grams). Thus, the average daily wage was about 1.09 grams of silver. *Pibyŏnsa tŭngnok*, 28/03/1799. Occasionally such information appears in central government documents, but the provenance is never clear and may well refer to a policy decision set by government, not by the market.

[19] Francesca Bray has offered a good beginning comparison of social structures, but much more work needs to be done on rice. Francesca Bray, *The Rice Economies: Technology and Development in Asian Societies*, (Berkeley: University of California Press), 1986.

[20] Another trend that we have identified was a change in the rate of commercialization. The rate of commercialization seems to have declined from the eighteenth into the nineteenth century, while the reverse was happening in Europe. We can see this by a shift in the number of transactions over time from a concentration in the spring (18th century) to a concentration in the autumn (19th century). This indicates that the high time of exchange shifted from the planting season to the harvest season or from proto-industry to agricultural production. Other trends will appear in our data below.

[21] Osamu Saito, "The Labor Market in Tokugawa Japan: Wage Differentials and the Real Wage Level, 1727-1830", *Explorations in Economic History* 15 (1978); 84-100.

[22] The new epoch that began in the 1830s and 1840s also initiated a period of unlimited labour supply with low real wages. This period did not end until the mid to late 1970s and the inauguration of an activist

labour movement. Union organization did not become free until the late 1980s. This situation is reminiscent of Arthur Lewis' thesis of the unlimited labour supply that defines a Third World economy. Of course, by contrast, Europe experienced labour shortages with high skilled and unskilled wages that provided incentives to develop labour-saving machinery.

[23] For the Chinese and European data, see: Robert C. Allen, "Involution, Revolution, or What? Agricultural productivity, Income, and Chinese Economic Development", Working Paper, 2002. "Real wages in Europe and Asia: A First Look at the Long-Term Patterns", Working Paper, 2001.

[24] We hesitate to use the term 'involution'. It is clear that the eighteenth century saw a period of stability, even growth, but for the reasons explained in the text, the needed infrastructure and institutions that maintained price stability and high real wages suffered blows in the nineteenth century that unbalanced the system. The system was not destined to result in imbalance for structural reasons having to do with rising population, limited land, and rice agriculture. In fact, the population fell drastically between 1807 and 1822, and this very drop may have contributed to the stagnation that set in from mid-century.

[25] This is the result of the analysis of paddy-land sales in Yŏng'am County.

[26] Data from Yŏnggwang County, Yŏn'am Village Kim clan documents; Kuye County, Munhwa Village Yu clan documents; Kyŏngju County, Yongsan Academy documents, and Sangju County.

[27] Prices came from notary documents. Notary documents were legally required to contain the following information on land prices: 1) date of transaction (year, month, day); 2) buyer's occupation, family name, and given name; 3) method of obtaining land (by trade, from wife's family, from father, or land grant from government); 4) reason for sale (urgent financial need, continuous bad harvest, to pay for a daughter's wedding, funeral costs, or moving); 5) information on the site and registration (taxable amounts, seeding size, land classification into paddy, dry field, forest, possessing a house roofed with thatch or tile, number and type of trees); 6) price (currencies varied by period: copper, unhusked rice, silver in the 16th century, cotton in the 17th, rice and copper in the 18th, copper in the 19th, and rice, copper, and even yen in the 20th century); 7) any related documents attached, 8) owner's name and signature, guarantor's name and signature, and the names and signatures of the scribe and the notary.

[28] Transaction costs can also be determined. A land sale required a notary's fee, which was recorded in the 40,000 or more documents that the Academy of Korean Studies has collected on land and house sales. From an analysis of 15,000 documents thus far, in the eighteenth century, the land transaction cost per transaction was 0.2 to 0.27 copper *yang* (1.875 to 2.531 grams of silver). In the nineteenth century, the cost increased from 1.4 to 1.5 copper *yang* (13.125 to 14 grams of silver) per transaction, a growth of over 450 percent.

[29] Quoted in Hŏ Chong-ho, *Chosŏn ponggŏn malgi ŭi sojakche yŏn'gu*, (Seoul: Hanmadang, 1989): 13-14.

[30] SH Jun and JB Lewis, "A History of Rice Prices in Korea (1713-1933) and a consideration of their relation to population and other factors" (working paper).

[31] 1688 King Sukjong 乙亥定式=給價買得制, 起耕者爲主.

[32] SH Jun and JB Lewis, "A History of Rice Prices in Korea (1713-1933) and a comparison of price movements with Japan", unpublished paper presented at the XIII Congress of the International Economic History Association, Buenos Aires, 22-26 July 2002.

[33] Bozhong Li makes this argument for the Jiangnan area in *Agricultural Development in Jiangnan, 1620-1850*, p. 8.

[34] The seeding area from 46 observations averaged 0.16 acre, with a standard deviation of 0.04 acre. Han'guk Chŏngsin Munhwa Yŏn'guwŏn, ed., *Komunsŏ chipsŏng*, vol. 21 and 22, (Sŏngnam: Hanguk chŏngsin munhwa yŏn'guwŏn), 1995.

[35] S.H Jun, "Chosŏn hugi miga-sa yŏng'u (1725-1875)", unpublished Ph.D. dissertation, Sunggyun'gwan University (1998): 189-191.