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## **Was the Korean Slave Market Efficient?**

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### **Abstract**

Over the decades, the traditional condemnation of slavery has been based not only on philosophical argumentation and moral values, but also on the conjecture that slavery was inefficient. This position led to one of the most passionate debates in economic history on the efficiency of the US slave market. This question of efficiency has not been analyzed on the slave market in Korea.

The aim of this paper is to analyze the efficiency of the Korean slave market by examining the behavior of slave prices during the period 1689-1893. In order to do so, we collected long-run series of slave prices from nationwide surveys of more than 25 public and private historical records. We then tested whether the slave market was efficient using the arbitrage asset equation. We found slavery to have been efficient most of the time.

JEL classification: N15 ; N35

Keywords: arbitrage asset equation; efficient markets; Korea; slave

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## I. Introduction

The traditional condemnation of slavery has been based not only on philosophical argumentation and moral values, but also on the conjecture that slavery was inefficient. This position led to one of the most passionate debates in economic history, where on the one hand, Conrad and Meyer (1958) as well as Fogel and Engerman (1974) claimed that slavery was efficient, while many others, especially David and Temin (1979), claimed otherwise.

This debate on the US slave market led us to test whether the nineteenth-century slave market in other parts of the world was also (in)efficient. Moreover, since there is a renewal of interest in the economic history of Asian countries, particularly the newly industrialized countries, in this paper we will focus on this question in the context of the Korean economy. This paper is a first attempt to shed light on the Korean slave market, and more specifically, our aim is to analyze the efficiency of this market.

We are going to use a technique that differs somewhat from those proposed until now: We will use the arbitrage asset equation. Indeed, many theories -- from the principal-agent theory to the analysis of labor markets -- have been put to scrutiny on the efficiency of the US slave market. One theory has not been used: The asset price theory, and more specifically the arbitrage asset equation. This paper will show that *grosso modo*, the slave market was efficient in Korea.

Our paper will focus on the slave market in Korea during the period 1689-1893. The slave market, like other markets, started expanding at the time of the introduction of money to Korea in 1689. Therefore, we start analyzing the slave market at this time. It should be noted that from ancient times until the 20<sup>th</sup> century, Korea was an agricultural economy, and until 1689 was even not monetized (although already in 1678, for the first time ever, the coin money had been introduced and circulated in Korea).

From this period onwards, markets started developing; the introduction of money and a growing population leads to the development of markets along with a growing volume of transactions, and in consequence, the market for slaves begins to expand. It is interesting to note that in the Korean population of 15.8 million in the late 17<sup>th</sup> century, nearly a quarter was made up of slaves who worked in the agricultural sector (see Maddison 2001). In consequence, land, slaves, and labor services began to be sold in the markets systematically.

Economic research on slavery in Korea is scarce and has mainly focused either on Korea's social and legal system, or on demographics and the proportion of slaves in the population.<sup>1</sup> This paper focuses on the economics of this market, and will therefore present new series of data thereon.

The purpose of this paper is to analyze the Korean slave market and to test whether it was efficient from the time of the appearance of money in 1689 until the demise of slavery in 1894. This paper is a first attempt to present an empirical analysis on the price of slaves in Korea, and for doing so, new data has been compiled and at the same time, we use a differing technique than that used in analyzing the US slave market.

In the next section, we present a short history of the Korean slave market. In section III, we discuss the Korean slave economy and display the data that we have gathered on slave transactions during this period. In part IV, we apply the arbitrage assets equation to the Korean slave market. In order to analyze whether the Korean slave market was efficient during the period 1689-1893, it was necessary to also gather data on wages, productivity, and rice prices, which are presented in section III. Section V concludes.

## **II. A Concise History of the Slave Market in Korea**

Slave markets in East Asia were common, and Korea was no different than its neighbors. There is evidence of slavery in China as early as the *Jin* era (BCE 221-207), and in Korea, slavery dated as far back as the Three Kingdoms period (57 BCE-668 CE). Koreans were made slaves of other Koreans during the war between the Three Kingdoms, beginning with prisoners of wars between the states.<sup>2</sup> Over time, slaves became part of the Korean caste-status system, wherein slaves had a clear economic place.

Indeed, Korean society was very traditional and was divided into four hereditary groups. The *Yangban* were the elites; they were landowners who collected rents for themselves, and were tax-exempt. The second class was the *Chungin*; it was the middle class consisting of accountants, high-ranking soldiers, merchants, and magistrates. The third class was the commoners, or *Sangmin*, consisting of farmers and free laborers, who were subject to high taxes,

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<sup>1</sup> Palais (1996) and Patterson (1982) focus on the slavery system during the Joseon Korea, while Shikata (1938), Chong (1983), Han (1977), Choi (1974), Han (1982), and Lee (1998) focus on the demographics of slavery.

<sup>2</sup> In Appendix A, we present succinctly the various periods in Korean History.

rent for lands, and military conscription. The fourth class, the *Nobi*, were the slaves, who made up a large portion of the total population, between 25% to 40% depending on the period. The *Nobi* did not pay taxes, nor did they serve in the army. While the government owned many slaves (450,000 in 1467), slaves were also privately owned by the *Yangban*. Wealthy families commonly owned around 50 slaves per family, and some Confucian academies had over 700 slaves registered.

There was also an intermediate class between the *Sangmin* and the *Nobi*, the *Chonmin*. The *Chonmin*, like the *Sangmin*, were free and were not slaves, but they worked in jobs that the *Sangmin* would not, such as butchers, sailors, and plasterers, and resided in their own family groups outside the towns. When this class disappeared during the *Joseon* dynasty, the majority became *Sangmin*, yet some became slaves (*Nobi*). Our work focuses on the *Nobi*, who were bought and sold in the markets during the 18<sup>th</sup>-19<sup>th</sup> century, and on whom we collected data.

The Korean slave market did not develop until the late 17<sup>th</sup> century. In fact, markets in general in Korea were not very developed until the appearance of money in 1689. Until then, slaves were not frequently sold; free men might even become slaves to avoid penury.

The status of Korean slaves changed over time. During the first period, slaves were either former prisoners of wars between tribes or nations, or criminals, and they were publicly owned. Slaves began to be privately owned during the *Han* Chinese era (BCE 206-CE 8), when the government bestowed its public slaves upon the noble class. From this period on, slavery became a punishment for criminal behavior, or when parents were forced by circumstances to sell their children into slavery.<sup>3</sup> Moreover, commoners could fall into slavery due to private debts. However, during the *Sung* China (960-1279), the privilege of owning slaves was granted only to the noble class, and commoners could not own slaves.

As the market developed and coin money was introduced in 1689, slaves began to be bought and sold privately and systematically in *Joseon* Korea. The slave sector engendered massive regulation on the status of children as well as on the rights of owning them. There were conflicts among the ruling classes, and between the government and the ruling classes, over slavery policy, since the number of slaves could increase or decrease depending on their legal status. The

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<sup>3</sup> This differs slightly from the African slaves, wherein the manner of enslavement was usually kidnapping. Indeed, Nunn and Wantchekon (2008) refer to Koelle's inventory showing that regarding methods of enslavement, 24% were taken in war; 40% were kidnapped or seized; 16% were acquired via a judicial process, and 19% were sold or tricked by a relative or acquaintance.

literature stresses that slaves were also part of the dowry, or given as wedding gifts (see Patterson 1982).

Most regulation was on the status of children of slaves. The strictest rule was that slaves' children follow the status of their parents (the *Jongchon* law), i.e., children were slaves if one of their parents was a slave, regardless of the status of the other parent.

In 1397, the first government of the *Joseon* dynasty (established in 1392) needed more tax revenue in order to strengthen its power. In consequence, it changed the slavery policy in order to increase the number of commoners who could pay taxes. The *Jongyang* law stated that children were common if their mother was common, regardless of the status of the father. This change in slavery policy did not please the ruling class, the *Yangban*, because the number of slaves decreased on the basis of this law.<sup>4</sup> In 1430, the slavery policy reverted to the previous system in order to secure more slaves for the agriculture sector.<sup>5</sup> In consequence, after 1430, numbers of slaves increased until 1731. In 1731, the status law changed again due to social and economic structural changes. This policy change could explain the decrease in numbers of slaves after 1731. Slavery ended in 1894 by enactment of a law (*gapo*) abolishing it. It is interesting to note that the abolition of slavery was a common phenomenon throughout the world during the 19<sup>th</sup> century (see Table 1).

### III. The Slave Economy

#### 1. The Slave population

Several important studies have been conducted on the slave population in Korea, all in Korean except two in English, those of Palais and Patterson.<sup>6</sup> Palais' (1996) was the first article on Korean slavery and the slave population written in English. His data on the Korean slave population is based on H. Shikata (1938) and S. Chong (1983). Patterson (1982) provides a general overview of Korea's social and economic system, including slavery during the 18<sup>th</sup>-19<sup>th</sup> centuries.

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<sup>4</sup> See Choi (1978) and Ji (1995) for changes in slavery policy for this period.

<sup>5</sup> See Hong (1981) for changes in the slave population during the *Joseon* dynasty.

<sup>6</sup> See footnote (1). See also Pyung (1982), Y. Park (1986, 2007), and Jeon (1989) for slavery policy in the late *Joseon* Dynasty.

The main work on the slave population is that of Shikata (1938), who collected data of household tally registrations by class from the Daegu area in Kyungsang province. He showed that the proportion of slaves in the Korean population went from 43% in 1690 to 15% in 1789 and back to 31% in 1858 (see Table 2).<sup>7</sup>

In Table 3, we present the various series on the slave proportion of the Korean population in areas of Kyungsang province. It is clear that there is a wide variance among regions and periods in the percentages of the slave population, though in most areas, it decreases over time.<sup>8</sup>

## **2. Slave Transactions and slave prices**

The literature on slave transactions and prices is nearly non-existent, except for the works of Chong (1983) and Lee (1981). Chong's (1983) was the first attempt to build series of slave prices. He displays 143 observations for the 18th and 19th centuries from a single historical source named *GyujangGak*, which is an official nationwide record made by the central government. The second study, that of Lee (1981), presents only 17 slave transactions in Kyungsang province for the 17th and 18th centuries. Lee's data was from Kyungsang province only. Recently, Kim (2005) reported series of prices for self-selling slaves using the same data as Chong's (1983).

In this paper, we construct long-run series of slave prices from a nationwide survey of more than 25 public and private historical records, which enables examining the efficiency of the slave market. We first present the data on slave transactions, and then the prices of slaves.

### **A. Slave transactions and their characteristics**

Slave transactions took place in all regions of Korea. Based on historical records, we present in Appendix B a list of the 634 slave transactions that took place during the period 1689-1893.<sup>9</sup> This new data enables us to perform analytical and empirical analyses on slave prices, which was not possible when we had only 160 observations based on Chong (1983) and Lee (1981).

Table 4 describes the numbers of transactions for each period.<sup>10</sup> Note that slave trade

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<sup>7</sup> During the *Joseon* dynasty, Korea was divided into eight provinces: Kyungsang (southeast) and Cheonla (southwest) were the main agricultural sectors. Kyungki, Chungcheong, and Kangwon were located in central Korea; and three other provinces, Hwanghae, Pyungan, and Hamkyung, were in the northern part of Korea.

<sup>8</sup> Investigating the slave population in Kyungsang province before 1690, Han (1982) showed that the ratio of slaves was 39.5% in Danseong in 1606; and Choi (1974) pointed out that the ratio of slaves was 14.3% in SanEum in 1630.

<sup>9</sup> The second and third columns in Appendix B show the number and age of slaves by gender respectively. The fourth and fifth columns show the price per slave and the total sum of the slave transaction. The sixth column presents the code related to the specific sources listed at the end of Appendix B.

<sup>10</sup> We are aware that the number of transactions that took place during this period is higher than our sample.

increased after 1690, a period wherein money was used nationwide and commodity markets began to develop.<sup>11</sup>

The data presented in Table 4 shows that female slaves were more frequently traded than were men, a trend that got stronger during the 19<sup>th</sup> century. Moreover, the average age of slaves sold during the entire period is 18. There is not a great variance over the centuries (see Appendix B). In conclusion, it appears that over time, slave transactions were mostly of women and young people.<sup>12</sup>

It is interesting to note that while the proportion of the slave population decreased, as shown in Table 3, slave trade became more active during the 18<sup>th</sup> century and through the early 19<sup>th</sup> century. The diminishing slave population seems to be closely related to the change in slavery policy engendered by the *Jongyang* law enacted in 1731.<sup>13</sup> At the end of the 19<sup>th</sup> century, slave trade decreased, a phenomenon closely related to the disappearance of the slave markets in 1894.

Our data presented in Appendix B also provides information on the location of some of the transactions.<sup>14</sup> Slave transactions in Kyungsang (southeast) and Cheonla (southwest) provinces represented 93.9% of the total transactions, while in Seoul and Kyungki (the capital and its provincial area) transactions comprised 1.4% of the total. The reason why most transactions took place in the southern parts of Korea is that these regions were the main agricultural sectors, and slaves worked mainly on farms. Most of the ruling class (the *Yangban*) residing in the capital area owned farmland in these two provinces.

## **B. Nominal and Real Slave prices**

We gathered records on slave prices from *GyuJangGak* as well as from private records in Kyungsang, Cheonla, and all other provinces.<sup>15</sup> Chong (1983) and Y. Lee (1998) indicated that slave prices decreased rapidly in the 1690s as compared to previous periods. Slave prices were

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<sup>11</sup> We also gathered some 50 transactions from the period 1423-1689. Transactions before 1689 were rare, since coin currency was not yet in use.

<sup>12</sup> See H. Kim and J. Lee (2006) for the development of the slave market in Korea.

<sup>13</sup> Despite the continuous decrease in the slave population in the Kyungsang region, there was a huge increase in the slave population in the Daegu area around 1858, leading to a fierce debate among historians regarding the causes thereof.

<sup>14</sup> In fact, for 148 cases of a total of 285 cases reported (which represent 634 transactions), we have information on the location.

<sup>15</sup> See appendix B. The data from the *GyuJangGak* source is named "data source", in order to distinguish these data from the other sources.



officially set to about 100 *nyang* (unit of currency) by a Law of *Sok-Daejeon*.<sup>16</sup> This level of slave prices was maintained on average until money was introduced. From then until the 19<sup>th</sup> century, slave prices began to decrease and became volatile.

Our yearly data on slave prices are presented in Appendix C, column 1. In Table 5, we present average prices and average changes in slave prices. Slave prices increased by 0.20% annually for the entire period. Slave prices were relatively stable over the various periods, and their standard deviation did not vary much. The average price of a slave was about 16 *nyang* during the 18<sup>th</sup> and 19<sup>th</sup> centuries -- much lower than those of the 17<sup>th</sup> century (see Table 5).

Slave prices display six secular trends. As shown in Table 5, during three periods, we see a rise in the prices, and in other periods, there is a decrease. The average prices for males and females differ, and are presented in Table 5, columns 1 and 2. It is interesting to note that the prices for women were higher than for men, indicating that women were more valuable than were men, probably due to childbearing. Over time and gradually, free workers entered the farming sector, performing work that in the past had been done by male slaves.

Nominal prices of slaves are presented in figure 1a, based on the series presented in Appendix B.<sup>17</sup> The price of rice is our proxy for the price level. Rice was the main product as well as a representative consumption good in the *Joseon* Korea.<sup>18</sup> Rice has also been sometimes used as a medium of exchange along with bronze-cash. Quoted as money value (*nyang* per *suk* of rice), the price of rice was mainly obtained from the Kyungsang area, the southern Korea, in order to maintain regional consistency with productivity data.<sup>19</sup> The price of rice is presented in Appendix C, column 2 and in figure 1b.

Figure 1c depicts the real price of slaves. Over time, there was a decrease in the price of slaves. A reasonable explanation for this fall in slave prices is the increase in monitoring cost of slaves, as we will discuss in the next section.

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<sup>16</sup> Before the introduction of coin money as a means of transactions, slave prices were quoted in terms of silver and fabrics (commodity money). To convert slave prices into currency, we used these conversion terms: 1 unit of silver = 4 *nyang*; 1 unit of fabric (*seung*) = 2 *nyang*. For more details on conversion rates, see H. Kim and Lee (2006).

<sup>17</sup> We used the price of a normalized slave, whose price we developed using the technique of “hand equivalent” used by Fogel and Engerman.

<sup>18</sup> See J.Lee (1997) and H.Lee (1996) for a study on the price of rice.

<sup>19</sup> See J. Lee (1999) and D. Ko (1998) for the development of commodity markets in *Joseon* Korea. The *suk* is the unit of rice at this period and is around 178 liters (4.96 bushels) of rice.

### C. Wages and Productivity of Slaves

In the next section in which we analyze the arbitrage equation of the slaves, we use two series related to the slave market: wages of free workers, who are an alternative to slaves and the productivity of slaves.

The series of the average production of rice per slave is a proxy for slave productivity. We used data of two different areas of Kyungsang *province* to build the series of slave productivity. The first area is Kyungsang-ChilGok for the 17<sup>th</sup>-18<sup>th</sup> century, and the other is Kyungsang-Yeachon for the 19<sup>th</sup> century.<sup>20</sup> Slave productivity for the latter was not obtained directly from the historical records, since the latter contained data on land productivity only. We recalculated slave productivity by multiplying the productivity of a unit of land (*doolak*) and the size of plots cultivated by slaves for this period. We assumed that a worker could farm three doolaks as reported in the old records of Kyungsang-ChilGok for the 18<sup>th</sup> century.

Figures 2a and b display the wages and productivity series. Wages of free workers did not display much of volatility, while productivity of slaves did. This difference between these two series can be explained in many different ways, from rigidity in wages to changes in weather. We now turn to analyze the efficiency of the slave market, and will discuss further the data on wages and productivity.

## IV. Efficient Slave markets and the Arbitrage Asset Equation

Efficiency was one of the main subjects of debate over the slave market in the US. There were many facets to analyzing this problem: Some have studied efficiency in terms of profitability, i.e., these studies have focused on the question of whether farms using slave labor were estimated to have been more profitable than those using free workers.

Another way of analyzing the efficiency of the slave market was to check whether the purchase of a slave was a profitable investment that yielded returns comparable to those in investment in manufacturing. Related to that question, some have asked about the productivity of the slave and if the slave was more efficient and harder working than his or her free counterpart. Conrad and Meyer (1958) and Fogel and Engerman (1974) showed that slave productivity was

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<sup>20</sup> See W.Lee (2001) for the productivity in the *Kyungsang -Yeachon* area and G.Kim (1996) for the productivity in the *Kyungsang-ChilGok* area.

higher than that of free workers for this period, although David and Temin (1979) argued that slave productivity in the antebellum (US) South has been overestimated by measurement errors.

Another question related to efficiency regards the relative efficiency of slave agriculture as compared to free agriculture. Fogel and Engerman (1974, p. 5) claimed that: “Economies of large-scale operation, effective management...made southern slave agriculture 35% more efficient than the northern system of family farming”.

Our way of testing efficiency differs: We will use the asset price theory to test the efficiency of the slave market. Indeed, this theory has not been applied to slave markets, although based on how the slave markets behaved, this theory should be adopted for analyzing them, as it has been for other assets.

The arbitrage asset equation (see Blanchard and Fischer, 1989) states that each asset which can be bought and sold and which gives an annual dividend of  $\lambda$  can be priced in the following way:

$$rP_s = \lambda + dP_s, \quad (1)$$

where  $P_s$  is the asset price (which in our case is the price of slaves),  $\lambda$  the yearly dividends,  $r$  the interest rate, and  $dP_s$ , the change in price during the year.

The dividend an individual gets from buying and keeping a slave is equal to his net revenue from the work of the slave. That is:

$$\lambda = MP_L P_R - \text{costs} = VMP_L - C \quad (2)$$

where  $MP_L$  is the marginal product of slave work,  $P_R$  is the price of the output (which in our case is rice, since it was the main agricultural output), and  $VMP_L$  is the value of the marginal product.<sup>21</sup> The costs,  $C$ , comprise mainly two elements: the variable costs of having a slave, which is mainly food consumption,  $C_f$  and also the costs of monitoring the slaves,  $C_m$ .

The arbitrage equation can be rewritten in the following form:

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<sup>21</sup> Since under Korean law, offspring of slaves were also slaves, a slave was therefore an infinite lived asset.

$$rP_s = VMP_L + dP_s - (C_f + C_m). \quad (3)$$

In case the right hand side is lower than the left hand side, the benefit of holding slaves disappears. On the other hand if it is bigger, then more slaves should be bought.<sup>22</sup>

In consequence, if the arbitrage asset equation holds for the slave market, we should have that there is no trend in the difference between the two sides of equation (3).<sup>23</sup> In other words, we should find that B is not different than zero in the following equation:

$$G = A + Bt + \varepsilon \quad \text{where} \quad G = rP_s - (VMP_L + dP_s) + C_f \quad (4)$$

G is presented in Figure 3a.<sup>24</sup> It is interesting to note that after 1800, G becomes negative, which can be explained by the increase in the costs of monitoring slaves. Indeed  $\varepsilon$  consists of a random noise and the monitoring costs, which a priori should stay stable over the period studied. We check by regressing equation (4) if this is indeed the case.

The regressions of equation (4) are presented in Tables 6A and B. We present the regressions with different interest rates moving from 10% to 30%. The change in the interest rate does not influence the significance of the results. While B is not significantly different from 0 for the 18<sup>th</sup> century, it is so for the 19<sup>th</sup> century.

The reduction of G in the 19<sup>th</sup> century is due to the increase of monitoring costs during this period. Slaves began resisting the slavery system due to the development of markets and the expansion of the market for free laborers. The development of commodities markets, the introduction of small farming management, and some urbanization provided a social environment that offered an incentive for slaves to flee. From a slave owner's point of view, the main reason monitoring costs were so high at the juncture wherein slaves could find work as laborers is that catching runaway slaves was difficult. In contrast to the US, slave flight in Korea was easy, as in the former case, the appearance of blacks was visually distinct from that of

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<sup>22</sup> The  $VMP_L$  graph is presented in figure 2c. Due to increases in the price of rice, the  $VMP_L$  increases during the 19<sup>th</sup> century.

<sup>23</sup> See Blanchard and Fischer, 1989, p. 238.

<sup>24</sup> The average yearly per capita consumption of rice was around two *suk* (see Kim and Lee 1998). Therefore the costs of foods are: 2Pr. Moreover, interest rates fluctuated between 10% and 50%, and the graph in Figure 3 depicts G when the interest rate is 20% (see Kim and Lee 1998 for series on interest rates in Korea).

whites, making it difficult for American slaves to flee and hide. In Korea, the slaves' appearance was the same as that of the commoners, so after a slave fled from its owners' town, s/he could settle somewhere else without being noticed.<sup>25</sup>

According to historical records, fleeing Korean slaves caused a severe social problem in the 19<sup>th</sup> century.<sup>26</sup> So in the end of the 19<sup>th</sup> century, the slave market gradually disappeared: prices of slaves went down, and the free workers were a good substitute.

In conclusion, these tables show that the efficiency of the slave market holds for the 18<sup>th</sup> century, and also in the 19<sup>th</sup> century since monitoring costs have increased during the 19<sup>th</sup> century.

Another way to check if indeed arbitrage asset equation holds would be to check this equation with wages instead of the value of marginal product. In case the productivity of free workers and slaves are equal, and since in a competitive economy, wages of free workers equals the net value of marginal product, then:

$$w = \text{VMP}_L - (C_f + C_m). \quad (5)$$

Since the net value of marginal product equals the value minus the costs of having a slave. The arbitrage regression becomes then:

$$F = A + Bt + \varepsilon \quad \text{where} \quad F = rP_s - (w + dP_s) \quad (6)$$

F is presented in Figure 3b. In this case we see no trend in the residual. The regression results of equation (6) are presented in Table 7.<sup>27</sup> The difference between the wages and the value of the marginal product is that the former already includes the costs of monitoring, since free workers have no need of monitoring, while slave without monitoring will not work efficiently (see Fenoaltea, 1984).

In summary, we find that the residual of the efficient market equation was nearly constant over this period, although it increases during the last period. This residual is a proxy for the monitoring costs in the case that the asset equation holds. The increase in the last period of our

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<sup>25</sup> Shaping specific physical signs on slaves to make them distinct was forbidden by Confucianism.

<sup>26</sup> See Chung (1983) for more details on the fleeing of slaves.

<sup>27</sup> Wages displayed in Appendix C were multiplied by 12 for consistency between all variables.

sample in the residual can be explained by the fact that Korean slaveholders' monitoring costs increased due to flight, resistance, and sabotage on the part of slaves. It is interesting to note that when we introduce wages of free workers in lieu of the net value of marginal product, we obtain that efficiency holds during the entire period, even when slave prices significantly dropped.

Indeed, the regression results indicate that  $B$  is not statistically significant at the 5 % level in estimation of (6). It appears that there is no time trend for the arbitrage relationship. However, costs including the monitoring cost exist, and are trivial neither in magnitude nor in sign.

## V. Conclusion

The slave market in the US has been analyzed on many levels, from the treatment of slaves, and the deterrence of growth to the rate of returns to slavery. Despite the debate being based on facts, data, and theory, and undeniably the work of Fogel and Engerman is a seminal cliometric work; nevertheless the debate has slid quite rapidly to a philosophical debate on the negative and positive aspects of slavery.

One of the questions the least philosophical or based on moral issues has been the question of the efficiency of the slave market. This paper, which is a first attempt to analyze the slave market in Korea has therefore focused on this question -- the efficiency of the Korean slave market. In this paper, we constructed long run series of slave (*Nobi*) prices from nationwide survey of more than 25 different public and private historical records. The collecting period of 1689-1893 is nearly exactly from the time of the appearance of legal bronze cash until the total disappearance of slavery. Our data on slave trade includes information on gender, age, prices, and numbers of transactions.

Data on slave trade were rare before the 16<sup>th</sup> century. The number of slave transactions increased rapidly after 1690, when money began to be used nationwide and commodities markets began to develop. Slaves began to be recognized as a commodity, just like land and other commodities.

We can draw a few interesting results from comparing the slave markets between 19th-century Joseon Korea and the antebellum South of the US, the main of which is that net productivity and actual slave prices decreased in Joseon Korea for this period, while not so in the American south. This drop in Korean slave prices and productivity is mainly attributed to the

increase in monitoring costs of slaves due to changes in the Korean economy.

Large plantation farming management was common in the antebellum South of the US, which enabled the slaveholders to control their slaves to work efficiently. Moreover, the slaves could have their family at their own home belonging to the plantation. This arrangement might have deterred American slaves from fleeing from and from resisting their masters.

The rate of return of slaves in the antebellum South of the US was not lower than that of any other asset; indeed, demand for slaves even increased. In contrast to the experience of the southern US., the Korean small farming method and the fact that Korean slaves' appearances did not differ from those of free persons impeded means of controlling slaves to work efficiently in Joseon Korea. Therefore, slavery gradually disappeared even before the Gapo law, which brought an end to Korean slavery in 1894.

Indeed, when farmers compared the benefit of holding slaves to the cost of maintaining them, they sold and replaced slaves for free laborers when the productivity of slaves went down and the cost of holding them increased. However, during the period that slaves were sold, the slave market was efficient.

Regarding the question of the economic moribundity of slavery on the eve of its demise, it is clear that the Korean situation differed widely from that of the US. From the data we have presented, it appears that relative to wages in the free market, it became too costly to hold slaves in Korea; the height of the monitoring costs likely brought slavery to its end.

One could also ask about the effects of slavery on economic development. However, this question is irrelevant for Korea, since the development of Korea began only in the 20th century. Yet, slavery in particular and the entire caste system might indeed take its toll on development. In conclusion, since this paper presents new data on slave prices, our hope is that it will trigger new research on the slave markets in East Asia.

## References

- Blanchard, O. and S. Fischer. 1989. *Lectures on Macroeconomics*. Cambridge: MIT Press.
- Bloch, M., (1975), "Personal Liberty and Servitude in the Middle Ages", in *Slavery and Serfdom in the Middle Ages, Selected Essays*, edited by W. Beer, Berkeley, Univ. of California Press.
- Brown, P. and S. Hopkins, (1957), "Wage-rates and Prices: Evidence for Population Pressure in the Sixteenth Century", *Economica*, 289-306.
- Brown, P. and S. Hopkins, (1957), "Builder's Wage-rates, Prices and Population: Some Further Evidence", *Economica*, 18-38.
- Canarella, G., and J. Tomaske, (1975), "The Optimal Utilization of Slaves", *Journal of Economic History*, 35, 621-629.
- Choi, B., (1978), "A Study on Slaves in the Earlier Chosun Dynasty", *Jeonpook History* 2, 109-152, Korean
- Choi, J., (1974), "A Pattern of Family in the Early Chosun Korea", *Jindan Hakbo* 37, Korean
- Choi, S., (1997), "A Study on Interest Rates from Old Records in the Late Chosun Dynasty", *Korean Culture* 19, 89-128, Korean
- Chong, S., (1983), *A Study in Society Changes in the Late Chosun Dynasty*, Iljogak, Seoul, Korean
- Christopher, D., (1996), "Memories of Freedom: Attitudes towards Serfdom in England, 1200-1350", in *Serfdom and Slavery: Studies in Legal Bondage*, Edited by M.L. Bush, London., Longman.
- Conrad, A. H., and J. R. Meyer, (1958), "The Economics of Slavery in the Ante Bellum South", *Journal of Political Economy*, 56(2), 95-130.
- Curtin P., (1990), *The Rise and Fall of the Plantation Complex; Essays in Atlantic History*, N.Y.
- David, P. and P. Temin, (1979), "Explaining the Relative Efficiency of Slave Agriculture in the Antebellum South: Comment", *American Economic Review*, 69(1), 213-218
- Engerman, S., (1996), "Slaver, Serfdom and Other Forms of Coerced labour: Similarities and Differences", in *Serfdom and Slavery: Studies in Legal Bondage*, Edited by M.L. Bush, London., Longman.
- Fenoaltea, S., (1984), "Slavery and Supervision in Comparative Perspective: A Model", *Journal of Economic History*, 44(3), 635-668.
- Fogel, R. (2003), *The Slavery Debates, 1952-1990: A Retrospective*. Baton Rouge: Louisiana State University Press.
- Fogel, R. (1989), *Without Consent or Contract: The Rise and Fall of American Slavery*. Norton & Company, New York
- Fogel, R. and S. Engerman, (1974), *Time on the Cross: The Economics of American Negro*



- Slavery*, W.W. Norton & Company, New York
- Fogel, R. and S. Engerman, (1977), "Explaining the Relative Efficiency of Slave Agriculture in the Antebellum South", *American Economic Review*, 67(3), 275-296.
- Hilton, R., (1969), *The Decline of Serfdom in Medieval England*, London, Macmillan.
- Hilton, R., (1973), *Bond Men Made Free*, London, Methuen.
- Han, K., (1982), "A Composition of Classes in the 17<sup>th</sup> century Danseong Area", Thesis of MA, Chungnam Univ. Korean
- Han, Y., (1977), "A Pattern on Marriage of Slaves in Ulsan, 1609", *Journal of History*, Korean
- Hong, S., (1981), *A Study on Slavery in the Korea Dynasty*, Hankook Research Institute, Korean
- Jeon, H., (1989), *A Study on Status of Slaves in the Chosun Dynasty*, Iljokak Pub., Korean
- Jeon, H., (1996), "Resistance and Freedom of Slavs in the *Chosun Dynasty*", *Critiques in History*, 34, 325-336, Korean
- Jeon, H., (1998), "Pattern of Slavery in the Chosun Dynasty", edited by Korea History Association in *Nobi, Serfdom, Slavery-Comparison of History*, Seoul, Ilchokak, 277-303, Korean
- Ji, S., (1995), *Status of Slaves in the Chosun Dynasty*, Iljokak Pub., Korea
- Jordan, W., (1968), "Modern Tensions and the Origins of American Slavery", in *Understanding Negro History*, edited by D. Hoover, Chicago, 61-64.
- Jun, S.H. and JB Lewis, (2005), "Labour Costs, Land Prices and interest rates in the southern Region of Korea", mimeo.
- Kim, G., (1996), *Agricultural Management and Farmers in the 16<sup>th</sup>-18<sup>th</sup> Centuries in the Chosun Dynasty*, Ph.D. dissertation, SungKyunKwan Univ. Korean
- Kim, G., (2004), "A method of study on Private Slaves in the Late *Chosun Dynasty*", *Yeoksa hakbo* 181, 99-129, Korean
- Kim, H. and J. Lee, (1998), "A Cyclic Behavior of Price Level in the *Chosun Dynasty*", *Korean Journal of Money and Finance*, 3(2), 33-62., Korean
- Kim, H. and J. Lee, (2006), *Slavery and Land Ownership in the Chosun Dynasty*, Kyungpook National Univ. press, Korean
- Kim, Y., (1985), "Wealth of the Landholders in the Chosun Dynasty (I)", *Daegu History*, 27, 89-159, Korean
- Kim, Y., (1992), "People's Movements in the 17-18<sup>th</sup> Centuries of the *Chosun Dynasty*", *Kuksakwan Review*, 37, 135-172., Korean
- Kim, Y., (1997), *A Study on Private and Public Slaves in the Chosun Dynasty*, GibeoDang Pub., Korean
- Kim, Y.S., (1998), "Classes and Slavery in Chinese History", in *Slavery and Serfdom*, Seoul,

- Ilchokak., Korean
- Kim, Y.C., (1998), "Status and Slavery in Chinese History", Chapter 6, edited by Korea History Association, in *Nobi, Selfdom, Slavery-Comparison of History*, Iljogak, 221-276. Korean
- Ko, D.H., (1998), *Development of Commerce in Seoul in the Chosun Dynasty*, Jisik sanup Pub. Korean
- Lee, H., (1996), "Prices of Rice in 1678-1800 in the Chosun Dynasty", *Korean Economic History* 21, 117-158. Korean
- Lee, J., (1999), "Changes in Land Prices in the 18<sup>th</sup> – 19<sup>th</sup> century", *History and Boundary* 23, 605-626, Korean
- Lee, S., (1981), edited, *Old Records In Kyungpook Province*, Yeongnam Univ.. Korean
- Lee, Y. and E. Park, (2004), "National Market Convergence of Rice, 1713-1937", edited by Y.Lee in *The Late Chosun Dynasty by Econometric History*, Seoul National Univ. press, 225-250, Korean,
- Lee, Y., (1998), "Slavery in Korea", Chapter 7, edited by Korea History Association, in *Nobi, Selfdom, Slavery-Comparison of History*, Iljogak, 304-422, Korean
- Lee, W. (2001), "Trends of Wage for the Agricultural Sector: 1853-1910", chapter 5 in *Farmers of MatJil*, edited by An, B. and Y. Lee, Iljokag pub. 178-204, Korean
- Lucas, R.(1978), "Asset Prices in an Exchange Economy", *Econometrica*, 46:1426-1445.
- Maddison, A., (2001), *The World Economy: A Millennial Perspective*, Development Center Seminars, OECD.
- Mancall, P., J. Rosenbloom and T. Weiss, (2001), "Slaves Prices and the South Carolina Economy 1722-1809", *The Journal of Economic History*, 61:616-639
- Nunn, N. and L. Wantchekon. 2008. "The Trans-Atlantic Slave Trade and the Evolution of Mistrust in Africa: An Empirical Investigation, mimeo Harvard.
- Palais, J., (1996), *Confucian Statecraft and Korean Institutions: Yu Hyongwon and the Late Choson Dynasty*, University of Washington Press, 208-270
- Park, E., (2004), "Wages for the Skilled and Unskilled Labors for Korea in 1600-1909", edited by Y.Lee in *The Late Chosun Dynasty by Econometric History*, Seoul National Univ. press, 41-107, Korean
- Park, Y., (1986), *A Study on Ruling Class in the Chosun Dynasty*, Ph.D. Dissertation, Kyungpook National Univ. press, Korean
- Park, Y., (2007), *A Study on Social History of Rural Area in the late Chosun Dynasty*, Hyeon Pub., Korean
- Patterson, O., (1982), *Slavery and Social Death; A Comparative Study*, Harvard University Press, 141-144.

- Pyung, M., (1982), *A Study on Slavery in the Chosun Dynasty*, Jisiksanup Pub, Korean
- Shikata, H., (1938), "A Study on Population and Classes in the Chosun Korea ", A Review of Law, Kyungseong Imperial University, Japanese
- Smith, R., (1983), "Some Thoughts on 'Hereditary' and 'Proprietary' Rights in land under Customary Law in Thirteenth and Early Fourteenth Century England", *Law of History Review*, I, 95-128.
- Sutch, R. (1975), "The Treatment Received by American Slaves ", *Explorations in Economic History* 12:335-438.
- Temin, P., (2005), "The Labor Market of the Early Roman Empire", *unpublished work*
- Wright, G., (2006), *Slavery and American Economic Development*, Baton Rouge: Louisiana State University Press.
- Wright, G., (1975), "Slavery and the Cotton Boom", *Explorations in Economic History*, 12(4), 439-451.
- Yoon, Y., (1998), *Slavery and Wage Labor in the late Chosun Dynasty*, Seoul National Univ. Press, Korean

**Table 1. A Chronology of Emancipation in the World, 1772-1900**

1775	Slavery abolished in Madeira
1804	Slavery abolished in Haiti
1813	Gradual Emancipation in Argentina
1814	Gradual Emancipation in Colombia
1823	Slavery abolished in Chile
1824	Slavery abolished in Central America
1829	Slavery abolished in Mexico
1831	Slavery abolished in Bolivia
1838	Slavery abolished in all British Colonies
1842	Slavery abolished in Uruguay
1848	Slavery abolished in all French and Danish Colonies
1851	Slavery abolished in Ecuador
1854	Slavery abolished in Peru and Venezuela
1863	Slavery abolished in all Dutch Colonies
1865	Slavery abolished in the US
1873	Slavery abolished in Puerto Rico
1886	Slavery abolished in Cuba
1888	Slavery abolished in Brazil
1894	Slavery abolished in Korea

Source: Fogel and Engerman (1974), Table 1.

**Table 2. Population by classes in the Daegu area of the Kyungsang province**

year	Ruling class ( <i>Yangban</i> )	Commoners and others*	Slaves ( <i>Nobi</i> )	Total Population
1690	1,027 (7.4%)	6,894 (49.5%)	5,992 (43.1%)	13,913 (100%)
1732	2,260 (14.8%)	8,066 (52.8%)	4,940 (32.4%)	15,266 (100%)
1789	3,928 (31.9%)	6,415 (52.2%)	1,957 (15.9%)	12,300 (100%)
1858	6,410 (48.6%)	2,659 (20.1%)	4,126 (31.3%)	13,195 (100%)

Source: Shikata, 1938.

Note: We present the percent of the total population in parentheses.

\* In this column, we present the data for the *Chungin*, *Sangmin* and *Chomin* classes together.

**Table 3. Changes in the ratio of slaves among total population in regions of Kyungsang province (%)**

Region	1690	1711	1717	1729/ 1732	1765	1786/ 1789	1798	1804	1825	1858	1861	1867
Danseong			27.6			8.8			2.1			
Eonyang		8.2					1.4				0.3	
Ulsan				13.9	2.0			0.92				0.6
Daegu	43.1			32.4		15.9				31.3		

Sources: Data on Eonyang from Y. Park, 2007; Data on the Danseong area from K. Han (1982); on Ulsan from S. Chong (1983); on Daegu from H. Shikata (1938)

**Table 4. Number of slave transactions during the period 1689-1893, and average age of slaves sold.**

Periods	# Male transactions	# Female transactions	Total number of transactions
1423-1688	--	--	50
1689-1710	35 (21.0)	48 (21.8)	83
1710-1750	69 (15.1)	90 (21.3)	159
1750-1790	73 (16.3)	92 (20.8)	165
1790-1820	42 (16.0)	59 (18.9)	101
1820-1860	28 (13.0)	65 (17.0)	93
1860-1893	8 (27.3)	25 (13.7)	33
Whole period	255 (18.1)	379 (18.9)	634

Sources: The sources of the data for the 15-17<sup>th</sup> century are displayed in the sources for Appendix B. After 1689, data from Appendix B.

Note: In parentheses, we present the average age of slaves sold.

**Table 5. Slave prices: 1650-1893**

Year	Female (price in <i>nyang</i> )	Male (price in <i>nyang</i> )	Average slave price ( <i>nyang</i> )	Change rates in slave price (annual average, %)	Standard deviation
1650-1689	102.85	42.00	97.00		
1689-1710	23.90	20.14	20.36	0.14%	3.96
1710-1750	15.07	12.20	12.28	-1.48%	4.12
1750-1790	13.47	9.42	11.45	1.63%	4.95
1790-1820	11.06	7.34	12.43	-3.17%	3.97
1820-1860	34.16	10.11	19.08	3.78%	2.68
1860-1893	59.78	12.50	22.84	-0.64%	6.44
Whole period	27.07	11.95	16.40	0.20%	4.35

Sources: The data for the period 1650-1689 is from Chong (1983) and Lee (1981). For the other periods, the data is based on Appendix B.

**Table 6a. The efficiency Regression of G: 1689-1800**

The G REGRESSION BEFORE 1800				
<i>Variables</i>	r= 10%	r= 15%	r= 20%	r= 30%
Dependent variable: G				
<i>Constant</i>	-39.26645 (-1.08)	-31.89922 (-0.89)	-24.532 (-0.70)	-9.797556 (-0.29)
<i>Time</i>	.0178037 (0.85)	.0139682 (0.68)	.0101327 (0.50)	.0024617 (0.13)
$R^2$	0.0067	0.0043	0.0023	0.0001
<i>Obs</i>	111	111	111	111

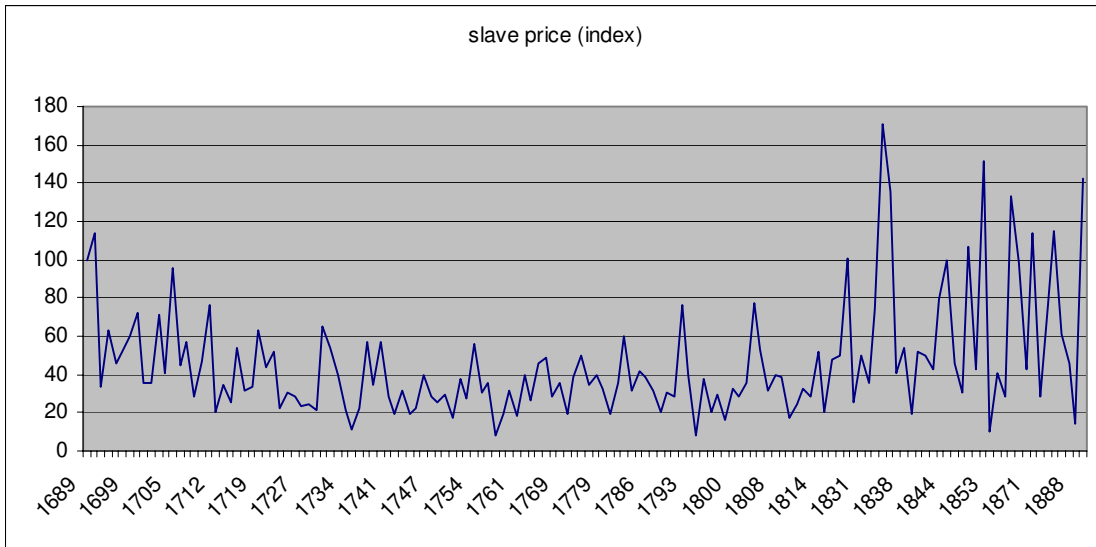
**Table 6b. The efficiency Regression of G: 1800-1893**

The G REGRESSION AFTER 1800				
<i>Variables</i>	r= 10%	r= 15%	r= 20%	r= 30%
Dependent variable: G				
<i>Constant</i>	722.5338 (7.33)	705.841 (7.25)	689.1481 (7.15)	655.7624 (6.92)
<i>Time</i>	-.4017272 (-7.53)	-.3920758 (-7.44)	-.3824243 (-7.33)	-.3631214 (-7.08)
$R^2$	0.3836	0.3780	0.3714	0.3551
<i>Obs</i>	93	93	93	93

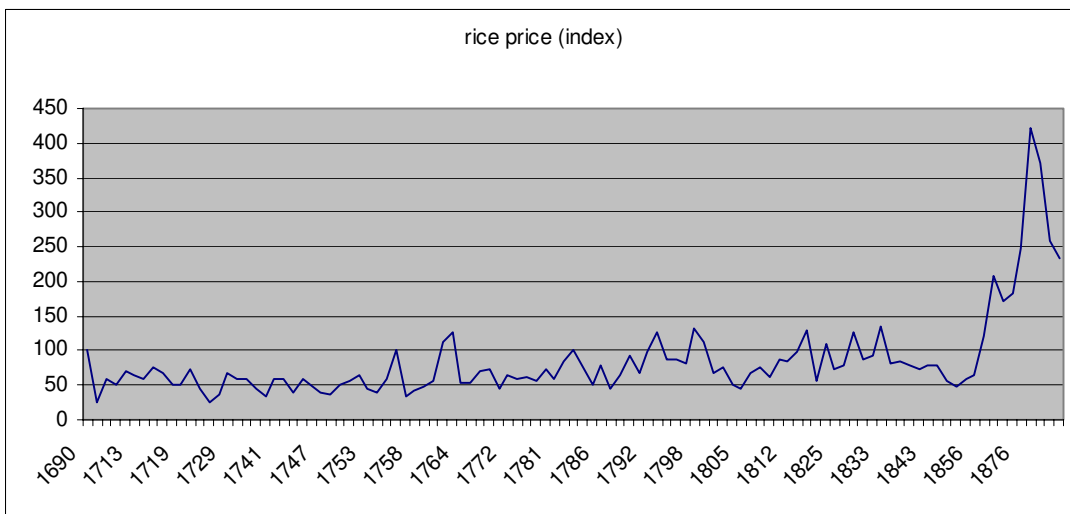
**Table 7. The efficiency Regression of F: 1689-1893**

The F REGRESSION				
<i>Variables</i>	r= 10%	r= 15%	r= 20%	r= 30%
Dependent variable: F				
<i>Constant</i>	-95.94254 (-3.94)	-101.5906 (-4.21)	-107.2387 (-4.47)	-118.535 (-4.99)
<i>Time</i>	.0082634 (0.61)	.0119094 (0.88)	.0155553 (1.16)	.0228472 (1.72)
$R^2$	0.0018	0.0039	0.0067	0.0145
<i>Obs</i>	204	204	204	204

**Figure 1a. Slave Prices**

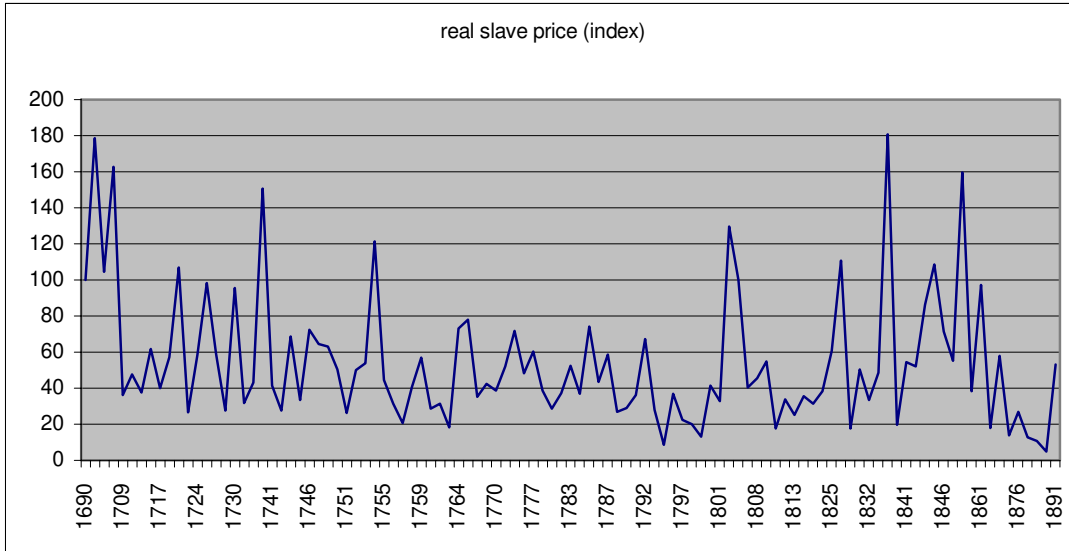


**Figure 1b. Rice Prices**

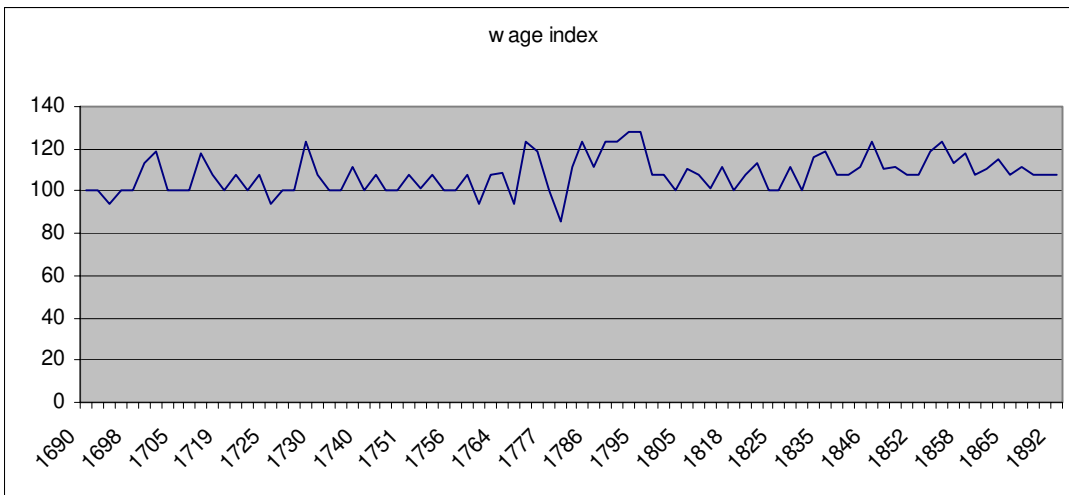




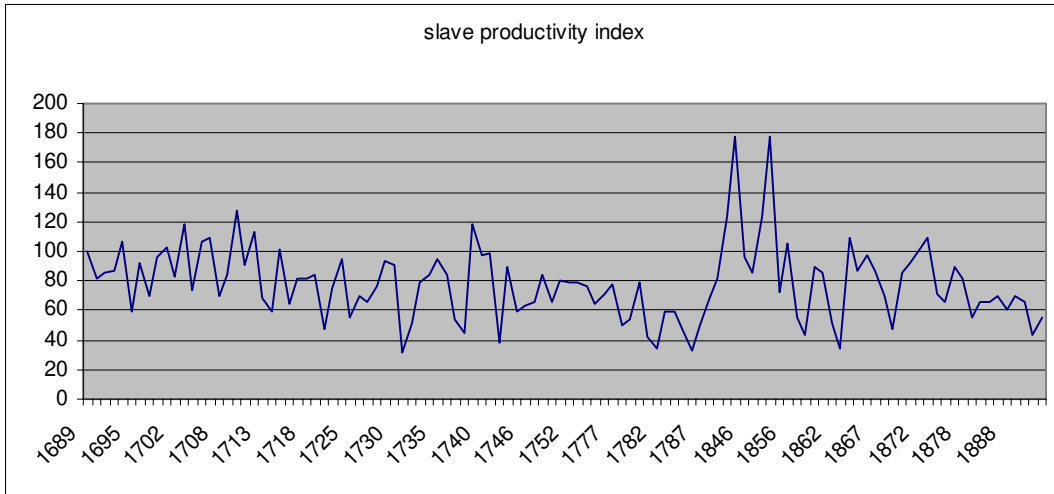
**Figure 1c. Real Price of Slaves**



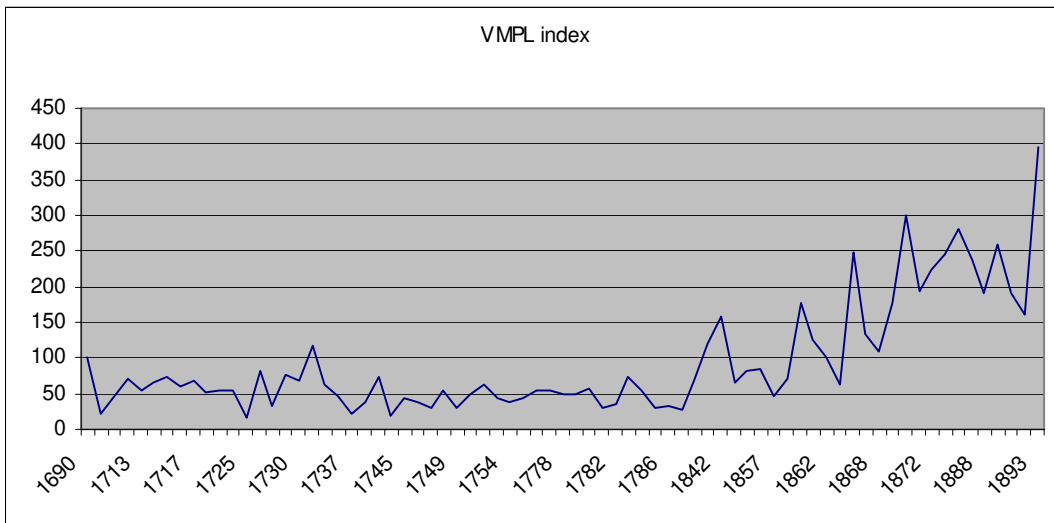
**Figure 2a. Wages of Free Workers**



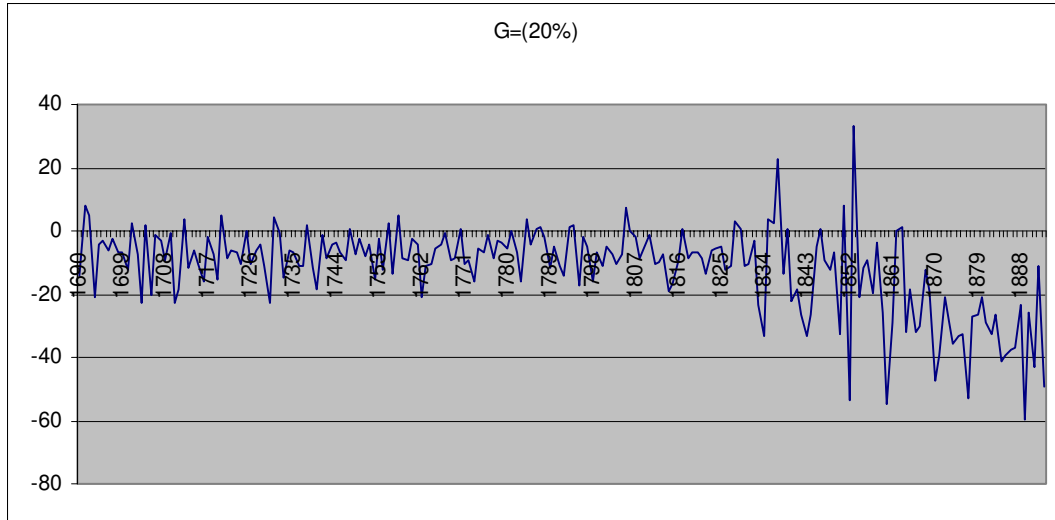
**Figure 2b. Productivity of Slaves**



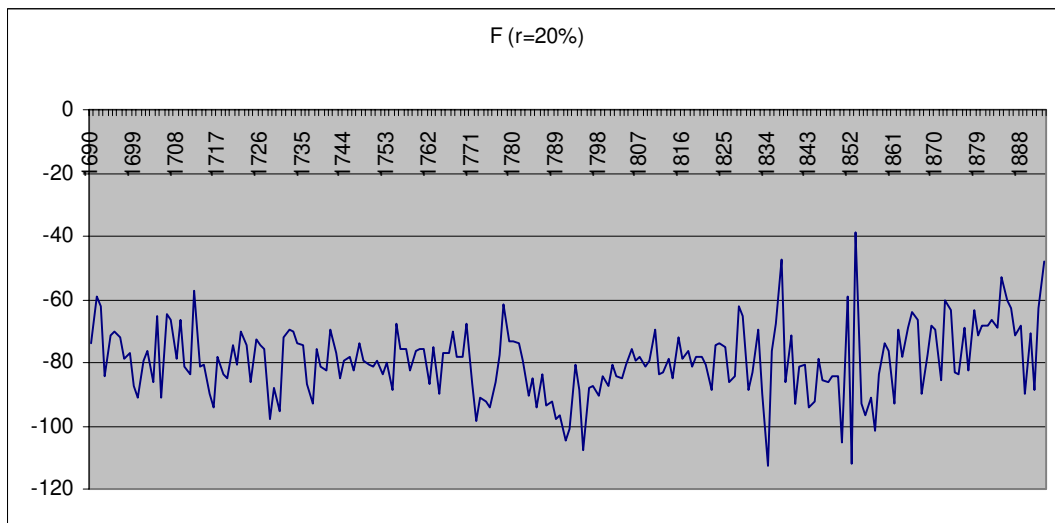
**Figure 2c. The Value of the Marginal Product of Slaves**



**Figure 3a. The Arbitrage Asset Equation- G.**



**Figure 3b. The Arbitrage Asset Equation- F.**



### Appendix A. A Brief history of Korea

2333 BC	Founding of the Korean Nation	
57BC- AD 668	Korea ruled by the Three Kingdoms – Goguryeo (north), Baekje (Southwest, and Silla (Southeast)	
AD 372	Buddhism and Confucianism introduced from China	
668-918	Silla Kingdom rules a unified Korea from its capital Gyeongju	
918-1392	Goryeo dynasty rules Korea – slaves known for celadon pottery	
1231	Mongols conquer Korea and dominate the country for over a century	
1392	Establishment of Joseon dynasty, with Seoul the capital (which lasted until 1910).	
1443	Invention of Hangeul, Korea's script by scholars working for King Sejong	
1592-98	Japanese invasions devastate Korea	
1801	Most male government slaves freed	
1876	Korea opens its ports to foreign trade	
1894	Slavery abolished	
1904	Japan defeats Russia. Korea becomes a Japanese protectorate	
1910	Japan annexes Korea and abolishes the monarchy.	
1945	Korea liberated	
1948	Republic of Korea established	

Sources: Lee Ki-baik (1984), and Robinson et al. (2004)

**Appendix B. Slave prices, and number of slaves transactions**

year-month	Number of slaves (ages)		Slave price (nyang)		Source
	Male	Female	Price per slave	Total Costs of slaves transaction	
1689-02	2(24,29)		35	Silver 28 nyang	B
1690-05	1(?)	6(?)	40	Silver 100nyang	C
1692	2(?)	3(73, ?)	11.8	50	A
1693	1(12)		26.7	20	A
1693-04		1(15)	17.3	Silver 13 nyang	D
1694-02		2(11,34)		Fabric 17, Cow 1	E
1696	1(27)		15	15	A
1696	2(9,21)	2(13,48)	5.7	20	A
1696-02	1(37)		10	10	B
1696-05		1(15)	30	30	F
1696-10		3(2,6,31)	18.8	47	G
1697-01		1(18)	20	20	C
1697-02	1(18)		20	20	B
1697-10	1(?)		15	15	U
1699-05	1(14)		24	18	B
1699-12		1(31)	18	18	H
1699-12		2(23,25)		Rice 30 suk	Z
1700	1(26)		20	20	A
1700	1(5)	1(40)	28.6	50	A
1700		1(15)	26.7	20	A
1701*		1(13)	53.2	40	A
1701	1(8)	3(13,24,46)	14.3	50	A
1701	1(45)		10	10	A
1701-02	1(13)		13.3	10	E
1702-01	2(13,15)	2(3,39)	12.5	40	U
1702-04	2(3,14)	4(3,28,31,54)		20, rice 20suk	G
1703	1(41)	1(39)	20	40	A
1703-10	2(43,47)		30	60	G
1704-02	1(24)	1(13)	14.3	25	E
1705	1(14)	1(21)	40	70	A
1705		1(21)	40	40	A
1705-03	1(13)		20	15	G
1707-01	2(4,30)	3(7,25,33)	15.6	70	G
1708-12		1(17)	20	20	I
1709	1(7)	2(16,44)	10.9	30	A
1709-05	1(9)		9.3	7	U
1710-7		1(7)	27.9	21	Q
1710	1(28)		20	20	A
1710-01	1(29)	1(3)	10.3	18	P
1710-01	1(29)	2(?)	6.6	18	B
1711		1(11)	26.7	20	A
1712	4(4,12,23,51)	1(9)	7.1	30	A
1713-04	2(7, 5)	1(34)	18.3	45	H
1713*	1(75)		26.7	20	A
1713		3(6,9,38)	14	35	A
1713	4(21,48,61,?)		7.5	30	A

**Appendix B. (continued)**

Year-month	Number of slaves (ages)		Slave price (nyang)		source
	Male	Female	Price per slave	Total costs of slave transactions	
1715	1(41)		9	9	F
1716	2(5,12)	3(9,16,43)	14.4	60	A
1716	1(13)		22.7	17	A
1716	2(18,30)	2(62,?)	20	80	A
1717	1(?)		11	11	A
1717*		1(26)	40	40	A
1718	2(5,15)	2(11,33)	7.7	25	A
1718	1(1)	1(22)	7.4	13	A
1718-01	1(13)		20	15	G
1719-10	1(19)	2(12,19)	22.2	60	F
1719		1(62)		Rice 1.7suk	A
1720		1(18)	25	25	A
1720-08	2(4,7)	2(10,37)	8.6	28	G
1720-10	1(4)	1(25)	12.8	22	U
1721-01	1(?)		18	18	G
1723	1(12)	1(31)	8.6	15	G
1723	1(3)	3(11,29,35)	5.7	20	A
1723	1(19)		5	5	A
1723-03	2(13,45)	2(4,10)	12.5	40	U
1724-02	1(25)		13	13	A
1724	1(?)		8	8	K
1724	1(1)	2(6,27)	6.4	16	A
1724	1(2)	1(25)	9.1	16	A
1724-07	1(1)	1(28)	17.7	31	A
1725	3(?)	4(?)	11.2	70	G
1725	1(3)	2(8,39)	8	20	B
1727		2(2,32)		Horse 3	U
1727-12	3(10,15,17)	2(7,39)	8.2	35	A
1728		3(2,4,28)	10	25	G
1728-09		2(2,29)	11.4	20	A
1728-10	3(?)	11(?)	4.1	50	G
1729-11	1(?)	2(?)	7.4	20	U
1730	1(3)	1(27)	22.9	40	G
1731		1(12)	18.7	14	A
1732		1(17)	20	20	A
1732-03		1(14)	8	6	V
1734-08	1(7)	2(?, 34)	6.7	18	A
1734	1(6)	1(30)	8.6	15	M
1735	3(2,10,20)	2(26,52)	3.8	17	A
1736		1(17)	14	14	A
1736-03	3(6,8,?)	3(18,22,52)	3.7	20	U
1736-12	1(?)		6	6	A
1737		1(17)	20	20	C
1739-01	1(20)		12	12	A
1740		1(18)	20	20	D
1741	1(1)	1(22)	8.6	15	A
1741-02	2(?)	3(?)	11.3	50	A
1742	3(5,29,41)	5(4,8,23,32, 61)	5.1	37	A

**Appendix B. (continued)**

Year-month	Number of slaves (ages)		Slave price (nyang)		source
	Male	Female	Price per slave	Total costs of slave transactions	
1742-08		1(26)	8	8	V
1743		1(20)	10	10	A
1743-02		1(26)	12	12	A
1744-03	2(5,21)	1(31)	6.6	18	U
1745-10	1(21)		8	8	D
1746-01		3(3,7,39)	6	15	J
1746		1(18)	18	18	D
1746		1(11)	17.3	13	A
1747		1(25)	10	10	A
1749		1(26)	10	10	A
1749	1(12)	2(2,37)	8	20	A
1750		3(12,16,39)	10.2	28	A
1751	2(3,36)	3(1,13,43)	4.9	21	A
1751	1(25)		7	7	A
1751	2(4,8)	2(15,37)	6.2	20	A
1752	1(30)	2(56, ?)	26.7	80	A
1752-03	4(9,11,14,17)	2(5,41)	6.1	30	U
1752-03	1(1)	3(7,9,31)	6.3	20	V
1753		2(11,40)	9.7	17	A
1754-07	6(?)		19.4	100	U
1755	1(20)	3(10,18, ?)	10.7	40	A
1756	1(19)	1(?)	15	30	A
1756	1(17)		10	10	A
1757-01		3(?)	2.9	8	D
1758	1(15)	1(11)	6.7	10	A
1759	1(25)		11	11	A
1761	5(2,7,15,43, 45)	4(4,22,24,27)	6.3	50	A
1761-03	3(17,?)	2(23,49)	6.3	30	E
1762		1(23)	14	14	A
1763		1(?)	13	13	A
1763-01	1(16)	3(2,8,36)	5.2	18	U
1764		1(18)	16	16	A
1766		4(1,6,19,32)	14.3	50	A
1766		1(?)	25	25	A
1766-03		1(18)	12	12	T
1767-05		1(?)	10	10	F*
1769	2(5,7)	2(3,27)	12.3	40	A
1770	3(25,45,47)	2(17,43)	10	50	A
1770-12		1(24)	6	6	W
1770-12	2(?)	2(?)	5.8	20	U
1770-12	1(?)	2(34,?)	5.6	15	U
1772-02	2(8,12)	1(15)	13.8	31	D
1772-03		1(12)	13.3	10	X
1773		1(22)	30	30	A
1775-12	1(3)	1(25)	17.3	30	V
1776	3(10,13,16)	3(5,7,45)	12	60	A
1777	1(?)		10	10	A

**Appendix B. (continued)**

year-month	Number of slaves (ages)		Slave price		source
	Male	Female	Price per slave	Total costs of slave transactions	
1777	6(11,11,14,15,17,20)	4(6,13,46,50)	17.7	150	A
1779-01	1(23)		11.5	11.5	C
1782		1(22)	25	25	A
1782-11	1(4)	1(6)	6.7	10	V
1782-12	2(2,15)	3(9,21,49)	6.1	27	W
1783		2(?)	21.1	37	A
1784-03	1(9)	3(2,6,31)	14.7	33	D
1784-01	1(?)		8	8	F
1784-03		1(13)	10.6	8	U
1785		1(?)	30	30	A
1785	2(6,15)	1(34)	6	15	A
1785		1(10)	8	6	A
1786	4(3,8,12,20)	2(16,47)	9.5	50	A
1786-08	2(12,26)	3(8,19,50)	17.8	80	E
1787-02	2(2,7)	1(25)	12	30	T
1787-10		4(3,7,15,38)	9.4	30	X
1787	1(6)	2(3,31)	11.2	28	A
1788-01	1(22)		7	7	V
1789-02		1(?)	10	10	F
1789-08	3(16,37,54)	2(8,42)	6.8	32	U
1789		1(22)	15	15	A
1790		1(26)	10	10	A
1792		1(12)	26.7	20	A
1793-01		1(16)	7	7	V
1793-01		1(23)	12	12	V
1793-02		1(?)	27	27	V
1793-05		1(17)	10	10	I
1794-01	1(?)		3	3	B
1795	1(17)	2(4,13)	16	40	A
1795-09	1(23)		10	10	J
1797	1(13)	2(9,42)	7.2	18	A
1798		3(7,10,36)	14	35	A
1798-04	1(?)		7	7	B
1799-01	1(?)		4	4	B
1799-04	4(2,5,23,27)		7.6	26	Y
1800	1(?)		20	20	A
1800-04	1(29)	3(4,7,35)	8.7	30	V
1800-04		2(?)	5.7	10	T
1801-02		2(7,10)	11.3	17	F
1801-02	1(18)	1(13)	13.7	24	D
1801-03		1(?)	5	5	O
1802-12		2(27, ?)	12.5	25	D
1804-04		1(?)	27	27	G
1805	2(2,18)	2(12,42)	17.1	60	A
1805-06		1(28)	21	21	V
1807	2(9,28)	4(1,4,11,32)	11	55	A



Appendix B. (continued)

Year-month	Number of slaves (ages)		Slave price (nyang)		source
	Male	Female	Price per slave	Total costs of slave transactions	
1808	1(9)	3(6,13,40)	13.9	45	A
1809		1(13)	26.7	20	A
1809-12	4(?)		10	35	D
1809-12	2(?)	3(?)	4.4	20	P
1810-02	2(12, ?)	2(23,45,)	8.1	30	N
1810-03	2(37,43)		2.5	5	V
1810-03	2(4,5)	4(7,21,?,?)	3.7	18	V
1810-03	2(15,17)	1(49)	3.8	10	V
1810		1(14)	14.7	11	A
1811-02	2(?)	1(?)	9.3	25	P
1811	1(19)		8	8	A
1812	1(19)		8	8	A
1812-03	2(?)		15.2	26	U
1812-11		2(12,25)	11.7	20	F
1812-11		4(4,8,15,46)	10.8	35	D
1813-02	1(?)		10	10	B
1814-11		1(15)	10	10	H
1814		1(15)	20	15	A
1814		2(19,29)	25	50	A
1817-01	1(30)		7	7	F
1822	1(16)		14	14	A
1822	1(23)	1(20)	25	50	A
1822	1(16)		16	16	A
1822-11	1(32)	1(20)	12.5	25	U
1824		1(21)	80	80	A
1825-01	2(5,15)	1(49)	7.6	19	D
1825-02	1(29)		10	10	F
1825-12		1(19)	35	35	V
1826		1(10)	46.7	35	A
1827-05	1(2)	3(8,10,31)	35.4	115	P
1829-01	1(14)		8	6	P
1829-05	1(?)		10	10	F
1831-06	2(1,4)	3(7,9,35)	17.3	69	B
1832	2(4,13)	3(7,11,35)	12.5	50	A
1833-05	1(20)		11	11	P
1833		4(2,6,9,36)	3.1	10	A
1833	1(12)	4(4,4,9,16)	11.3	45	A
1833		1(16)	40	40	A
1833		1(18)	45	45	A
1833-12		1(13)	46.6	35	U
1834*		1(21)	80	80	A
1834-01		1(14)	39.9	30	U
1836		1(19)	50	50	A
1836-01		1(16)	45	45	U
1837-12	1(24)		9	9	M
1837		1(25)	20	20	A
1837		2(2,23)	14.3	25	A
1838		1(?)	19	19	A

**Appendix B. (continued)**

Year-month	Number of slaves (ages)		Slave price (nyang)		source
	Male	Female	Price per slave	Total costs of slave transactions	
1839-12	2(5,10)	1(37)	17	25	P
1839		2(?)	57.1	100	A
1840		1(13)	24	18	A
1840		1(17)	20	20	A
1840		1(13)	20	15	A
1840-12	1(25)		8	8	B
1841		1(15)	17.3	13	A
1842-03		1(17)	15	15	C
1843-09	1(?)		6	6	F
1843		1(10)	49.3	37	A
1844-09		1(?)	25	25	P
1844-02		1(12)	53.2	40	U
1844		1(18)	40	40	A
1844		2(7,25)	21.1	37	A
1846		1(19)	16	16	A
1846		2(?)	37.1	65	A
1849-11	2(8,14)	2(4,45)	10.8	35	C
1850		1(11)	37.3	28	A
1851-12		1(22)	15	15	U
1852		1(10)	46.7	35	A
1852	1(?)	2(36, ?)	6.5	18	A
1853	2(14, ?)	3(37, ?, ?)	4	18	A
1853	1(31)		3	3	A
1855	1(4)	1(29)	14.3	25	A
1856		1(?)	10	10	A
1860*		1(17)	107	107	A
1860*		1(13)	107	80	A
1861		1(8)	46.7	35	A
1864-11		2(?)	34.5	59	Y
1866-05	1(12)		20	15	T
1867		2(?)	80	140	A
1869-06*		1(18)	100	100	U
1871-05		1(15)	39.9	30	U
1872-08*		1(?)	100	100	U
1873-10		2(2, ?)	10	20	D
1876-07		1(10)	26.7	20	T
1876-12*		1(20)	150	150	U
1877-02		1(12)	93.1	70	Y
1877-03		1(14)	18.7	14	P
1877-04	4(?)	4(?)	28.6	200	C
1877-12		1(13)	20	15	U
1878-07*		1(11)	133	100	U
1879-12*		1(11)	133	100	U
1884-04		1(14)	21.3	16	P
1885-05		1(11)	16	12	G
1888-12	1(?)		5	5	T
1891-10	1(37)	1(29)	50	100	H
1893*	1(33)	1(6)	657	1150	A

Data sources : The different sources are presented with their codes: Old Records of *GyujangGak* - (A); Old Records of KyungPook- (B); Old Records of Uisung Kim's Family - (C); Old Records of Youngnam- (D); Old Records of Buan Kim's Family- (E); Old Records of KyungJoo Choi's Family - (F); Old Records of Haenam Yoon's Family - (G); Old Records from the Tenri univ. - (H); Old Records of Kwangsan Kim's Family in Ocheon - (I); Old Records of Jaeyeong Lee's Family - (J); Old Records of Poongsan Ryu's Family - (K); Old Records of Damyang Ha's Family - (L); Old Records of Jinsung Lee's Family - (M); Old Records of Moonhwa Yoo's Family - (N); Old Records of Haenam Kim's Family - (O); Old Records of YoungHae Lee's Family - (P); Old Records from the Kyoto University of Japan(Q); A Law of Ruling Country (*KyungKook DaeJeon* in Korean) - (R); A Second Law of Ruling Country (*Sok DaeJeon* in Korean)- (S); Old Records from Youngnam univ - (T); Old Records from Cheonbuk Univ.- (U); Old Records from Onekwang univ.- (V); Old Records from Sooncheon Univ.- (W); Old Records from ChjeonJu History Museum - (X); Old Records from the Song Mano's Family - (Y); Old Records from Mokpo Univ.- (Z).

Note: Years with asterisk means that slave data were not used to obtain series of slave prices, since slaves were sold for a specific purpose such as second wife, or secretary.

### Appendix C. Slave price, rice price, productivity, and wages

Year	Slave price (nyang)	Rice price (nyang/suk)	Slave productivity (suk per person)	Monthly Wage (nyang )	Year	Slave price (nyang)	Rice price (nyang/suk)	slave productivity (suk per person)	Monthly Wage (nyang)
1689	35		10.95		1733		3.0	8.70	
1690	40	2.5	8.95	6.8	1734	7.6	1.5	9.15	
1691			9.33		1735	3.8		10.33	6.8
1692	11.8		9.47		1736	7.9	1.15	9.22	
1693	22		11.70		1737	20	0.83	5.85	
1694				6.8	1738		1.78	4.94	
1695			6.42	6.4	1739	12		13.01	7.6
1696	15.9		10.08	6.8	1740	20		10.71	6.8
1697	18.3	0.64	7.69		1741	9.9			
1698			10.49	6.8	1742	6.5	1.5	10.78	
1699	21			7.7	1743	11	1	4.23	
1700	25.1	1.5			1744	6.6		9.73	7.3
1701	12.5		11.23	8.1	1745	8	1.5	6.52	6.8
1702	12.5		9.03	6.8	1746	13.8	1.19	6.99	
1703	25		12.90		1747	10	0.97	7.19	6.8
1704	14.3				1748		1.34	9.27	
1705	33.3	1.28	8.06	6.8	1749	9	0.89	7.23	
1706			11.70		1750	10.2	1.27	8.76	
1707	15.6		11.95		1751	6	1.44		7.3
1708	20		7.67		1752	13.03	1.63	8.63	6.9
1709	10.1	1.75	9.19		1753	9.7	1.13	8.62	7.3
1710	16.2		14.04		1754	19.4	1	8.37	
1711	26.7		9.92		1755	10.7	1.5		6.8
1712	7.1		12.39		1756	12.5	2.5		6.8
1713	12.2	1.6	7.49	6.8	1757	2.9	0.87		7.3
1714		2.26	6.47		1758	6.7	1.03		
1715	9	1.5	11.07	8	1759	11	1.21		6.4
1716	19.03	1.93	7.10		1760		1.16		
1717	11	1.72	9.00		1761	6.3	1.38		
1718	11.7	1.28	8.89	7.3	1762	14	2.8		7.3
1719	22.2	1.3	9.29	6.8	1763	9.1	3.13		
1720	15.4		5.25	7.3	1764	16	1.37	7.03	7.4
1721	18		8.17		1765		1.55		
1722		1.85		6.8	1766	17.1	1.37		
1723	7.95	1.86			1767	10	1.78		
1724	10.8	1.16	10.40	7.3	1768		1.9		
1725	9.9	0.63	6.12	6.4	1769	12.3	1.81		
1726		2.35	7.71	6.8	1770	6.85	1.11		6.4
1727	8.2		7.15	6.8	1771		1.67		
1728	8.5	0.9	8.31	8.4	1772	13.55	1.63		8.4
1729	7.4	1.67	10.23		1773		3.26		
1730	22.9	1.50	9.97	7.3	1774		1.65		
1731	18.7		3.48		1775	17.3	1.51		
1732	14		5.68	6.8	1776	12	1.55	7.71	8.1

**Appendix C. (continued)**

Year	Slave price (nyang)	Rice price (nyang/suk)	Slave productivity (suk per person)	Monthly Wage (nyang )	Year	Slave price (nyang)	Rice price (nyang/suk)	Slave productivity (suk per person)	Monthly Wage (nyang)
1777	13.9	1.44	8.43	6.8	1821		2.44		7.3
1778		2.03	5.46	5.8	1822	16.8	2.74		7.7
1779	11.5	1.86	5.84		1823		2.1		6.8
1780		1.5	8.58		1824		2.06		
1781		1.46	4.59		1825	17.5	1.8		6.8
1782	12.6	2.11	3.73		1826		1.93		
1783	21.1	2.52	6.53	7.6	1827	35.4	2		
1784	11.1	1.88	6.46	8.4	1828		3.27		
1785	14.7	1.24	5.18		1829	9.0	3.17		
1786	13.7	1.97	3.67	7.6	1830		2.09		7.6
1787	10.86	1.16	5.45	8.4	1831	17.3	2.15		
1788	7	1.63			1832	12.5	2.33		6.8
1789	10.6	2.3		8.4	1833	26.1	3.35		
1790	10	1.72			1834	59.9	2.07	7.50	7.9
1791		1.43			1835				8.1
1792	26.7	2.48			1836	47.5			7.3
1793	14	3.15			1837	14.4			7.3
1794	3	2.15		8.7	1838	19			
1795	13	2.2		8.7	1839	6.6	2.1		
1796		1.51			1840	18		9.00	
1797	7.2	2.02			1841	17.3	1.99	13.50	
1798	10.5	3.28			1842	15	1.8	19.50	
1799	5.8	2.8			1843	27.6	2		7.6
1800	11.4	1.72		7.3	1844	34.8	2		
1801	10.0	1.9			1845		1.5		
1802	12.5			7.3	1846	16	1.4	10.50	8.4
1803					1847		1.97	9.30	
1804	27	1.3		6.8	1848		1.58		7.5
1805	18.4	1.15		7.5	1849	10.8	1.22		7.6
1806					1850	37.3	1.46		
1807	11	1.7		7.3	1851	15		13.50	7.3
1808	13.9	1.91			1852	53.2		19.50	7.3
1809	13.7	1.56			1853	3.5			
1810	6.17	2.2		6.9	1854		1.5		
1811	8.6				1855	14.3		7.92	8.1
1812	11.4	2.1			1856	10	1.64	11.55	8.4
1813	10	2.47			1857		1.7	6.00	7.7
1814	18.3	3.23			1858		3.37	4.71	8
1815		5.55		7.6	1859		4	9.84	7.3
1816		2.69			1860				
1817	7	1.4			1861	46.7	3	9.42	7.5
1818		1.4		6.8	1862		4.09	5.55	
1819		2.1			1863		3.79	3.75	7.8
1820		2.11			1864	34.5		12.00	

**Appendix C. (continued)**

Year	Slave price (nyang)	Rice price (nyang/suk)	Slave productivity (suk per person)	Monthly Wage (nyang)	Year	Slave price (nyang)	Rice price (nyang/suk)	Slave productivity (suk per person)	Monthly Wage (nyang)
1865			9.45	7.3	1881			7.20	
1866	15	5.19	10.65		1882		7.45		
1867		3.14	9.45		1883		6.26		
1868		3.13	7.71		1884	21.3	10.52		
1869		7.65	5.22		1885	16	9.25		
1870		7.1	9.42		1886		8.72	7.20	
1871	39.9	4.3	10.05		1887		6.93	7.62	
1872		4.49	11.13		1888	5	6.5	6.60	
1873	10	4.55	12.00		1889		7.48	7.71	
1874			7.74		1890		5.72		7.3
1875			7.26		1891	50	5.87	7.26	
1876	26.7	6.22			1892		7.5	4.80	7.3
1877	40.1		9.84		1893		14.75	7.00	
1878			9.00	7.6					
1879		5.94							
1880			6.00	7.3					

Sources: Slave prices are yearly average from Appendix B. Rice price and productivity are for the Kyungsang area. Rice price data are quoted from Y.Lee and E.Park (2004) and from Joseon Dynasty Record (*Sillok*), and wage data are from EuiGeo, quoted from E.Park (2004).