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**Long-term Changes in Prices, Wages and the Size of
the Monetary Economy in Pre-industrial China
1000-1770**

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Abstract

This paper aims to compare later imperial China's market economy in two transitional periods: the Tang-Song transition (starting from the eighth century to the twelfth century, and the Ming-Qing transition (starting from the sixteenth century to the eighteenth century). The size of the Song market economy in the twelfth century was probably larger than that of the Ming economy prior to 1600 and was only exceeded by the Qing economy in the 1770s; while in terms of real income per capita the Song lead remained even thereafter. This comparison also indicates that the early Ming period (1368-1450) was a turning point that caused this Song-Ming divergence: prices dropped to a level as low as that of the seventh-century China; meanwhile real wages declined dramatically even when the aggregate population decreased by one-third in the late fourteenth century.

This paper highlights the significant role of silver imported from Japan and the newly discovered America in the late sixteenth and early seventeenth centuries played in the Chinese economy. Comparing the share of imported precious metals in the money supply between early modern Europe and late Ming China, the author argues the European colonial expansion, in fact, rescued the late Ming economy which was then severely constrained by the money famine mostly due to the failure of the Ming state's fiscal and monetary policies.

World historians have viewed China in the post-Song time as a transition from a major leading civilization towards a stagnant agrarian empire, even though it still could sustain a population as large as 0.3 billion in 1775. In a seminal comparative study of economic growth in world history, the economic historian Eric Jones makes the startling argument that Song China exhibited intensive growth (economic growth per capita), preceding both Tokugawa Japan and seventeenth-century Britain by more than five centuries.¹ While Jones does point to the rise in real income per capita during the Song period, it seems to me that one of the implicit questions generated by his study is the following: why did the intensive growth fail to continue in the ensuing dynasties? Were social upheavals such as the Mongol invasion one crucial factor in this downward turn?

In the following sections I will examine changes from the demand side of the economy. The study on the demand side has an advantage in quantitative analysis. The central government in pre-industrial China, especially in Song, was involved in taxing non-agricultural sectors, financing the state apparatus to pay for a large number of administrative staff and soldiers, and making governmental purchases for strategic purposes. Thus, a large quantity of documents on wages, prices and currency were made with respect to these affairs. My own empirical research has convinced me of the value of using such methods in the analysis of the pre-industrial economy in the Chinese historical context.

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¹ Jones, 1988, 77-8.

The methodology I am using here, to be more specific, is to examine the interrelations among prices, money supply and real income per capita through quantitative monetary theory, especially through the Fisher equation $MV=PT$.² As the equation shows, changes in monetary items on the left side can be related to changes in real economy on the right side. First, this interconnection in a monetary economy allows one to view long-term changes in China's pre-industrial economy at the aggregate level, namely, prices, money stock, and the nominal national income. It indicates the macroeconomic demand for an increase in money stock when the market economy is expanding, esp. transactions. Secondly, one can use it to estimate long-term changes in real income per capita. For this purpose, T shall be substituted by Y (output or national income). In Sections 1, 2 and 3, I explore changes in prices, in population, in money supply, and in the nominal national income. I also choose four specific years as the benchmarks for comparison: 1120, 1550, 1600, and 1750. The size of the monetary economy in 1750 is the largest, totaling 376-400 million strings of bronze coins, and the Song monetary economy in 1120s is the second largest. Given the fact that the population in 1120 was only one-third of that in 1750, the money supply *per capita* in Song China would be the highest. This result will help to explain why the market economy in Song was unusually vigorous.

In Section 4, I examine changes in real wages during Song and post-Song times. Wages is the puzzle preoccupying many historians of the performance of the Chinese economy, because little empirical work has been done in this field, and also because only a small amount of information is reliable. To diminish these technical difficulties, I chose

² Here M stands for money supply, P for average price level, V for velocity of money in circulation, and T for total volume of transactions.

to study the real wages of commoners as an alternative. For China prior to the eighteenth century, one can hardly find any long-term wage data for either non-skilled laborers or artisans that is similar to the Brown & Hopkins index of building wages in Britain. In my research I adopt soldiers' wages as the standard indicator for changes in payments to the commoners. It is worth noting that, as early as in the writings of political arithmetic, soldiers were already identified as a social group with lower-income. In Gregory King's social table, soldiers' family income in late seventeenth-century Britain was only second to the poorest income category of cottagers and paupers, and slightly lower than that of laborers and out-servants.³ In late imperial Chinese history, soldiers received their payment in different forms, and these payments in real terms varied greatly between Song and early Ming. Likewise, soldiers and their families in China were always conceived of as poor, just as their counterparts in early modern Europe.

Changes in real wages as shown in the index of soldiers' wages during Song and Ming times (see Appendix A) have in another way confirmed my estimates about real income per capita. A comparison of soldiers' real wages shows that Song soldiers were paid 50 per cent more than their counterparts in the 1770s; based upon deduction from monetary quantitative analysis, the gap in real income per capita would be 30 per cent.

Many of the estimates should be taken as approximations: they are often highly speculative and at best no more than reasonable guesses that need to be improved by future empirical studies. However, this quantitative analysis shows a surprising consistency with data from different dimensions of the economy. It therefore helps to

³ Gregory King, *Natural and political observations and conclusions upon the state and condition of England*, in *Two Tracts*, 31.

integrate the rich but often isolated, and even sometimes conflicting, pieces of Chinese economic history into a coherent account of economic change over eight centuries.

In addition to quantitative analysis, I also provide in this paper contextual narratives and institutional analysis that are both independent of and compatible to the quantitative approach. The Ming government in the fourteenth and fifteenth centuries, for instance, made attempts to administer society through direct command of people and resources. I will demonstrate in this paper the anti-market nature of the Ming state apparatus in enforcing services and taxes. The radical decline of state capacity to intervene in the market economy stands in sharp contrast to the Song government, which was capable of supplying sufficient currencies to meet the needs of the expanding economy and of stimulating the economy through many fiscal means. Besides the damage to the Ming economy inflicted by wars and disasters in the fourteenth century, the coercive policies of the Ming government to a large extent impeded economic progress in later times, as shown by the prices, wages and money supply data. This paper highlights the significant role of silver imported from Japan and the newly discovered America in the late sixteenth and early seventeenth centuries played in the Chinese economy. Comparing the share of imported precious metals in the money supply between early modern Europe and late Ming China, the author argues the European colonial expansion, in fact, rescued the late Ming economy which was then severely constrained by the money famine mostly due to the failure of the Ming state's fiscal and monetary policies.

1. Population and Prices: the great divergence between Song and Ming

1.1. Estimates of demographic change, 1120-1775

Demographic change is of chief importance in any understanding of long-term trends in an economy. For the project under discussion, we will come across six centuries. However, the inexact nature of demographic data preserved in Chinese historical records makes it hazardous for scholars to speculate either about the size of the aggregate population or on the growth rate. In the last two decades scholars have made many attempts to resolve data problems and sketch out an outline of demographic changes over centuries.⁴ They have come to view Chinese demographic changes during the late imperial period, especially from 1368 onward, as increasing at a slow but forward pace up to the eighteenth century. However, a few years can serve as benchmark for changes in population over the four centuries. The 1393 figure is the only reliable record for population until the next reliable aggregate figure was secured in 1775, when the population had already reached 310 million. To step further from Ho's analysis, Dwight Perkins estimates the aggregate population in China around 1600 was about 120-200 million. Despite many disagreements among scholars as to the size and growth rate over the four centuries, the general trend in Ming-Qing population as described by Ho and Perkins has been widely accepted.

Scholars are much more confident of the quality of Song population figures in

⁴ Ho Ping-ti's work *Studies in Chinese Population History* laid a foundation for later research. Through Ho's efforts, historians came to understand that the population census in pre-industrial China was serving as an administrative apparatus to control taxation and labor services. Under such circumstances, women and children were often ignored in the official registration. Therefore, those figures recorded in official documents have to be adjusted before they can be viewed as a survey of the aggregate population.

contrast to Ming population figures.⁵ For the aggregate population in the Song dynasty from 980 to 1109 and from 1149 to 1223 respectively, we have at least one reliable record for every two or three years. In the first phase, Song China achieved an annual rate of the population growth at 9.2 %.⁶ It is beyond a doubt that Song population in the 1120s had already reached 110 million. Therefore, the 60 million recorded in the 1390s was a consequence of demographic decline owing to wars and disasters in the preceding centuries. However, the demographic changes described above are far from sufficient as a basis for making a general survey over Song-Ming times. In spite of the fourteenth-century gap in terms of both aggregate population and urban residents, there are no reliable estimates on the late Ming. The uncertainty of Chinese population in the sixteenth and seventeenth centuries will happen again when we examine the size of sixteenth-century monetary economy.

1.2. The demographic context of the Song-Ming transition

Researchers in the last ten years have paid attention to the political and social contexts that had a direct impact upon immigration and family structure in Song-Ming times. Many discussions point to the unusual scale of government-organized immigration in the late fourteenth century and strict control of the Ming government over the population. Long-lasting rebellions and disasters in the mid-fourteenth century brought an end to the rule of Mongols in China. The succeeding ruler decided to consolidate the new empire by strict control over economy and society. The Ming government in its first century succeeded in forcing people to move from rich, densely settled areas to

⁵ In the twentieth century, scholars had many doubts about the Song demographic statistics. However, in the recent decades the study of the Song population administration shed some light on this subject, such as the definition of *ding* (Wu Songdi, 2000, 2-4, 24-33).

⁶ Wu Songdi, 2000, 349.

devastated areas in northern and southwestern China. The total number of immigrants, according to Cao Shuji, may have reached eleven million, over one-sixth of the early Ming population.⁷ In addition to forced mass immigration, the Ming government enforced strict control over the Ming populace in professions and residential places through household registration. All the households under jurisdiction were identified by a profession (peasants, artisans, soldiers, and so on.). Those who were registered in registration could not freely change their professions or move to a new place other than the registered one.⁸ The categories covered all kinds of military and administrative service ranging from soldiers, mining laborers, and artisans, to sedan carriers, trumpeters as well as graveyard keepers. The majority of households in the registration were farmers, who were called upon once for three months every three years to labor at places where certain state needs, such as building city-walls or conveying grain taxes to the capital, had to be fulfilled. The ideology of the early Ming government was that people, under the Ming emperor, would organize themselves both to serve the state and to maintain the harmony of local society. Neither the market nor the bureaucracy was favored as the means in state building, because they both would bring out corruption in government and local communities.⁹ Thus, the early Ming state had to rely solely upon its direct control of individuals and resources. The military organization in the early Ming comprised 2.76 million soldiers, and if one takes into account their immediate families, their extended families in their hometowns, and the reserves, the population under the professional title of military services would be 6.2 million, about 8.5 per cent of the national population. Yet the early Ming state spent very little to sustain such a large number of soldiers and

⁷ Cao Shuji, 1997, 472-3.

⁸ Wang Yuquan, 1991.

⁹ For a discussion on the early Ming state, see Chapter IV in my Ph.D thesis.

staff. The military troops, for instance, whether stationed in hinterland or frontier, had to use more than half of their staff to cultivate and farm in order to maintain themselves in a self-sufficient way. In 1403 the grain output from military farms was reported to be 23 million *shi*, which was not far below the annual agricultural tax the Ming government could collect from rural peasant households.¹⁰

These policies reduced the bureaucracy and cash payments to a minimum size. Even officials and generals were paid in grain instead of money. Government procurement almost disappeared in the early Ming. As for its impact on society, people were requested to provide services according to status, which the state assigned to them, and their duties would be transferred to the succeeding generation when the seniors passed away. Soldiers in the military, for instance, were enrolled from the households identified in the registration as “military households”. Once a family was chosen to be a military household, they were obliged to remain as such over generations. People needed to request permission from the government when migrating, changing professions, or traveling. The entire empire had been, in fact, organized as a workshop in which the intra-regional flow of personnel and goods was shifted away from the market to central government demand. Such a command system had severe impacts upon the economy, including a decrease in monetary transactions and a very low price-level in Ming China, both of which we will discuss in the following part of this paper.

The early Ming policies lasted one and a half centuries. Beginning in the late fifteenth century, one sees the recovery of the market economy and the prosperity of local society in many parts of Ming China, especially in the Lower Yangtze Delta. Many scholars describe the Ming economy then as so vibrant that it was entering an economic and

¹⁰ Wang Yuquan, 1965, 209.

cultural boom lasting into the eighteenth century. However, the collapse of the early Ming system also terminated any effective state intervention into the private economy, so that the sixteenth-century economic boom brought no significant expansion in the Ming state revenues.¹¹ One is left with little information in official documents on the wealth and population. Therefore, the estimates of Chinese economy and population in the sixteenth and seventeenth centuries should be made with great caution.

An institutional analysis of the Song dynasty will demonstrate contrasting characteristics between Song and Ming in population administration and immigration policies. The growth of the population in Song times accompanied the rise of a market economy and urbanization. The literature on Song institutional and legal history points to the fact that labor migrated from countryside to cities, or from one profession to another by choice, and usually depending on the opportunities provided by the market economy. To maintain its capacity to negotiate with society in a market economy, the Song government was consistently sensitive to information on labor and wealth. The official registration of local population and households was carried out once every three years with particular concern for revaluating property and recording male adults.¹² Thus, the very distinctive feature presented in the Song official records of population and households is the basic division between taxable and non-taxable people, the so-called *zhuhu* and *kehu*. For the individual falling into the former category, all of his and his family's mobile and immobile properties (cash, estate, farm, incomes, etc) were strictly

¹¹ The state in post-15th century China was inactive with diminished revenue. This situation remained unchanged even up to the twentieth century. According to Rawski, at this period the taxes and public spending remained below 10 percent of GD. With such a low share of state revenue, only two countries in the post-war world, Afghanistan and Ethiopia, could stay alive (Rawski, 1989, 25-6). For a discussion of the very limited role of the state in Ming-Qing China, see Eastman, 1988, 103-7, 130-4.

¹² For the institutional aspect of Song household registration, see So, 1982; Wu Songdi, 2000, Chapter 2.

evaluated and in many cases required to be converted into cash.¹³ This concept of wealth enabled Song officials to tax people based upon the amount of family property and personal income, regardless of where they lived (urban or rural), or what they were doing (farmers, merchants, owners of transport vehicles, or landlords). However, there was no national standard for property gradations; local officials graded on the basis of local situations all taxable farmer families into five levels, and urban residents into ten levels. By comparison, *Kehu* were defined as employed laborers without any other major income, such as tenants on a farm.

In light of these contextual analyses, one can perceive demographic changes in relation to changes in social and institutional environments. I believe that the fourteenth-century demographic data shall be reinterpreted as more than a quantitative reduction in aggregate size. Much has to be considered about social differences between Song and Ming.

1.3. Price: the great divergence

Price is the most evident indicator of the great divergence between the Song and Ming economies. Owing to the studies by Peng Xinwei and Quan Hansheng, it is already well known that the Ming food prices remained comparatively low.¹⁴ Yet the peculiarity of the low prices in Ming China has been discussed little in relation to the working of a real economy. Owing to their strategic significance, the prices of grain, especially that of rice, were frequently reported to the government in imperial China. Although there are several series of grain prices, the only comprehensive one to cover all periods of later

¹³ For the property classification in household registration, see Liang Taiji, 1998, 19-36, 37-68, 1998; Wang Zengyu, 1996, 8-27. For the household registration in rural areas, see Yanagida Setsuko, 1986, 102-131.

¹⁴ Both Peng and Quan pointed out that the purchase power of the silver in the Ming was higher than in the Song (Peng, 1965, 706-722; Quan, 1967a).

imperial China's prices is made by Peng. I choose Peng's series and compute them into a single series based on silver value.

As the Peng's grain index shows (see Table AA-1 in Appendix A), if we set the price of 961-970 at 100, Song grain price gradually climbed up to 200 in nearly a hundred years. By the beginning of the 13th century, it had risen to 3.5-4 times the early Song grain price. After 1126, grain price in Southern China increased 50 per cent during the twelfth century. Thus, during the three centuries, grain price continuously rose to 4-5 times that in pre-Song times. If grain price represents the general change of the prices, this rising trend actually can be traced to an even earlier time. Scholars working on the economic history of Tang China (618-907) have pointed out that the price level in Tang began to rise in the late eighth century. By the beginning of the Song dynasty, silk prices, for instance, were double that of the early eighth century.¹⁵

However, the long upward trend in prices came to an end in the late fourteenth century. During the Ming, prices moved in the opposite direction. The Peng's price index indicates that, by the early Ming, it had almost returned to the original low level of the mid-tenth century. Yet it was not the lowest point—grain prices bottomed out in the first half of the fifteenth century. Not until the mid-sixteenth century did the grain price reach 250. And it was only in the second quarter of the eighteenth century that the grain price attained the highest level in the Song grain prices. The two peaks were five hundred years apart.

Song bronze coins continued to serve as one of the major currencies in Ming, and

¹⁵ Ikeda On compares the price level between Han (206 B.C.-220 A.D.) and Tang (618-907) China and concludes that the prices remained at a relatively low level in ancient China until the eighth century. Acknowledging the fact that the rise of prices began in the late eighth century and heightened twice in the Song China, he attributes it to the transition in social-economic structure in Tang-Song China. See Ikeda On, 1968.

were necessary for small-sum transactions at local markets.¹⁶ Because of the sharp change in the silver-coin ratio, the current price index in silver value has disguised the Ming deflation; using bronze coins as the value unit, the gap between Song and Ming price levels might be magnified at least three times! The rice price in the early thirteenth-century Lower Yangtze Delta, for instance, was, in fact, about ten times that in 1430s.

Two questions arise from the above comparison: why did the price level remain so low in the early Ming and take so long time to regain the high level of the thirteenth century? To what extent was such long-term deflation interrelated with the real economy?

Theoretically, price deflation means either a shrinking of total demand, and hence the sluggishness of transactions among people who hold the money, or an adoption of a new monetary system which has a low nominal value, but whose real value (exchange in goods such as grain, textile, etc.) remains more or less the same.¹⁷ Scholars tend to attribute the low price level to the Ming money supply, especially to the trivial coinage from Ming imperial mints, which could be ignored in comparison to the large amount of money supply in Song.¹⁸ Both the lack of bronze coins and consumers' preference for silver, according to this monetarist argument, led to the higher purchasing power of silver. However, this argument often fails to tell us whether the deflationary trend had an impact upon the real working of the Ming economy, or vice versa.¹⁹ An interpretation from a purely nominal monetary perspective will face challenges from changes in relative prices over Song-Ming times. As shown in Table 1, changes in relative prices show a wide range

¹⁶ Peng, 646; von Glahn, 1996, 98-102.

¹⁷ For the latter case, the Fisher equation $MV=PT$ indicates the price (P) may descend or rise in direct connection with the change of the money supply (M), only when the velocity of circulation (V) and quantity of transaction (T) remain constant. Thus, the change of the money supply may only influence the price level, without interfering with the working of the real economy.

¹⁸ The Ming money stock (including all the monetary means) prior to 1550, as I will discuss later, was only 1/6-1/3 of the total output of bronze coins from Song imperial mints until 1220s, not to mention other kinds of money in circulation during Song.

¹⁹ Peng, 1965, 706-12; Quan, 1967a.

of variance. What is striking is the relative price between silver and coinage, which declined sharply from an exchange rate of 50 grams equal to 2,000-3,000 *wen* (the minimum monetary unit for Chinese bronze coins) to 750 *wen*. This change goes against the ratio of other items.

Table 1. Relative prices of silver in Song and Ming

Silver (50 gram)	Gold (gram)	Silk (<i>bolt</i>)	Rice (liter)	Coin (<i>wen</i>)
Song	1	0.67	340	2000-3000
Ming	7.5 (1:7.5)*	1.67 (1:2.5)	1060 (1:3.1)	750 (1:0.32)

Sources: Quan, 1967a; Wang Wencheng, 2000, 175, 198.

* Figures in parentheses indicate the ratio between the Song and Ming prices of the same item purchased with silver.

In addition to changes in relative prices between Song and Ming, the price movement in Ming itself contradicts the nominal monetary interpretation as well. At first sight the great gap between Song and Ming money supplies should account for the price divergence. However, the price in Ming showed a deeper decline in the first half of the fifteenth century, and remained at a low level for most of the century. It was by the end of the fifteenth century that the price level moved towards a higher level, which had never occurred before in the history of Ming prices. Such a trend implies no linear relationship between the price level and the Ming money supply, since the latter had not changed profoundly since the end of the fourteenth century. Most of the imperial mints were closed in 1390s, and the silver output from state-controlled domestic mining reached a relatively high output in the first decade of the fifteenth century.²⁰ When grain prices began to decline again from 1400 on, the money supply during the period (1400-1435) was larger than before or after. There is no reason from the money supply side to explain

²⁰ Quan, 1967b.

why the price level declined during most of the fifteenth century and began to rise at the end of that century.

2. The fourteenth and fifteenth centuries: a real crisis

The divergence between Song-Ming price regimes recalls the price revolution in sixteenth and seventeenth century Europe, but in an opposite direction—the price levels increased about seven times in England and ten times in Netherlands. Jack Goldstone has argued persuasively that the primary reason for such inflation was the change in the velocity of the money (V), impelled by commercialization, especially urbanization, which would certainly intensify the chances of transactions.²¹

I am convinced that the divergence between Song and Ming price regimes was not a simple combination of the shrinking in money supply and the sharp decline in aggregate population.²² The insufficient money supply contributed to the Ming price deflation; however, this cause could not explain the relative decline and rise within the Ming price regime. Goldstone's interpretation of the British price revolution highlights the fact that urbanization and rising population were agents promoting a rise in V , which will grow as the square of population growth when commercialization is spreading.²³ The price level

²¹ Goldstone, 1984; Lindert, 1985

²² If we turn to the quantitative monetary theory, we might calculate from either side of the equation to see if the results are compatible. The money stock in late eleventh-century China was in fact about 3-6 times as large as that of the Ming before 1550 (see Table 6 in this paper). If we assume the early Ming phase stops around 1450, we can roughly estimate the money supply then as only two-thirds of the Ming money stock around 1550. The imperial mints closed after the early Ming, and we believe many of Song coins still remained in circulation, thus giving more weight to the money supply in the early Ming—then we can estimate that the money supply in the early Ming was only 11-22 per cent of that in the 1120s, and even one half or two-thirds of that proportion for the late Hongwu Reign. We know the Chinese population was 101 million in the 1120s and 60 million in 1394. If one assumes V constant (this assumption is only to downplay the V in the early twelfth century which witnessed innovations of instruments of credit to facilitate the circulation of money; the early Ming state's demonetized policies would make the transactions more difficult), then it can be estimated that the early Ming real income per capita could be very likely 1/2-2/3 of the early twelfth century.

²³ Goldstone, 1984.

in the first decade of the Ming dynasty was already only 75 per cent of that in the 1120s, but it went down again in the first half of the fifteenth century to just 20 per cent of that in the 1370s. Since there is no evidence suggesting a radical change in money supply before 1370 and 1420, it is difficult to imagine this ever deepening deflation would not result in changes in V and T as well in response to changes in M. Contrary to the view of a deflation only in nominal terms, I suggest that the divergence between Song and Ming price regimes reveals a long-term trend of deflation in the Ming monetary economy and, more significantly, a crisis in real economy.

Several pieces of evidence from the early Ming point out precisely the diminution of hard currency in transactions. In a mountain village situated in Huizhou, a region at the far western part of the Lower Yangtze delta, The Wang brothers, Wang Qiugan and Wang Qiuguan, left 38 contracts of land purchases.²⁴ These land purchases mostly occurred in the early Ming, with the first case recorded in 1393, just seven years after the establishment of the Ming dynasty, and the last case in 1430.

²⁴ Wang's contracts were respectively collected by Anhui Provincial Museum and History Institute, China Academy of Social Sciences. These contracts, along with many other land documents have been published in *Ming-Qing Huizhou Shehui Jingji Ziliao Congbian*, vol.1-2, 1988, 1990. For Wang's contracts, see *ibid.*, vol.1, 1-15, 24-26, 388; vol.2, 19-23, 28.

Table 2. Land purchase in Huizhou, 1393-1430*

Period	(a) Baochao	(b) Coin	(c) Kind	(d) Silver	(e) Record	(f) c/e (percentage)	(g) a/e (percentage)
1393-98	6	-	4	-	10	40	6
1399- 1402	3	-	8	5	18	44.4	16.7
1403- 1413	0	0	6	0	6	100	0
1414- 1424	-	-	-	-	0	0	0
1425- 1430	0	0	5	0	5	100	0
Total	9	0	22	5	39	56.4	23

*Source: *Ming-Qing Huizhou Shehui Jingji Ziliao Congbian*, vol.1, 1-15, 24-26; vol.2, 19-23, 28.

On the one hand, these contracts, as displayed in Table 2, show the withdrawal of currency, especially paper currency, in the first decade of the fifteenth century. On the other hand ever since the late fourteenth century until the mid-fifteenth century, people had to use cloth, grain and silver as payment to complete a transaction.

The contracts of land purchases occupy a large part of the preserved Huizhou historical documents. Li Ruoyu reports about 1,062 Huizhou contracts collected in the Anhui History Museum, dating from 1368 to 1644.²⁵ He finds 226 cases for the first century (1368-1457) in Ming history, among which payments in kind (cloth & grain)

²⁵ Li Ruoyu, 1988, 40-41.

were 72, about 32 per cent of the total contracts. Especially for the early and middle fifteenth century, cloth and grain became the means for land purchases.²⁶ Silver was not permitted to be used as currency in the early Ming; however, payment in silver represented another one-thirds of land purchases. Units and quality of these silver payments varied tremendously, and were described with particular attention in the contracts. Some cases even indicated that they were from personal ornaments. In later times, these variances disappeared from the contracts as silver was widely accepted in circulation. Both the case of the Wang brothers and the report by Li Ruoyu from a broader perspective demonstrate the use of cloth and grain in purchases in the early Ming, especially in the fifteenth century. This explicitly points to the rising of a barter economy in local communities in the Lower Yangtze Delta, the leading region in the Ming economy. These non-standard payments were unlikely to encourage people to make more transactions beyond the necessities. As a result, V , the velocity of money in circulation, must slow down.

In addition to the cases of land purchases and sales in Huizhou, we know from many but loose accounts that coins were rare and that silver was not yet popularly used. Then we have to conclude that if the role of Ming paper currency in money circulation is not considered important (as I will argue in the next section), then the early Ming economy would have done little with monetary exchange, and is instead run on a basis of a barter economy and unilateral payments.²⁷

We have no direct evidence to verify an almost disappearance of the monetary

²⁶ Li Ruoyu, 1988, 43. Also see von Glahn, 1996, 78.

²⁷ The term “unilateral payments” is borrowed from the study of medieval European economy, which indicates the revenues due to landlords and settled in kind or in labor (Cipolla, 1956, 7-8). I use it in the Chinese case to indicate the early Ming state extracted revenues from local societies almost exclusively in kind or in labor. Not until the mid-sixteenth century did local governments gradually convert those “unilateral payments” into cash income. And this came into a national accomplishment as late as in the mid-eighteenth century.

economy, despite the fact that we do have enough information to speculate. The early Ming left almost no concise information about market prices. Except for the official exchange rates between money, grain and cloth in unilateral payments recorded by the government, which were kept unchanged over years, scholars find little information available about early Ming prices and markets. The Huizhou case is exceptional in this regard, which proves the existence of local markets in some regions in the early Ming, but purchasers at these markets had to appeal to specific goods for exchange. Merchants and craftsmen were, according to official records, sent for administrative and military services to the capital and frontier garrisons mostly from the Lower Yangtze delta. They were paid very low wages, if any, and had to make a living from other resources. In the Wang brothers' contracts, I find six cases of land sales owing to the transportation of grain taxes: in the summer of 1401, six farmers from the same place sold their lands in small lots to Wang in order to accumulate money for traveling expenses incurred in delivering grain taxes to state depots.²⁸ Delivery and transportation of grain taxes was one of the heaviest burdens for peasants in the Lower Yangtze Delta, who had to carry all grain taxes by themselves on a rotating basis to the state depots mostly situated at the capital. Doushan Gong, a patriarch of a famous lineage at Huizhou, was from a military household. His lineage established collective property in 1399 in order to support lineage members' military service at a remote garrison in Manchuria, thousands of miles away from Huizhou. Both his father and his senior brother died at that garrison. They had to keep providing a male adult to serve in the troop as well as providing all his living expenses there.²⁹ In addition to grain transportation and military services, the early Ming

²⁸ *Ming-Qing Huizhou Shehui Jingji Ziliao Congbian*, vol.1, 10-11; vol.2, 20-21.

²⁹ *Doushan Gong Jiayi Jiaozhu*.

state used in construction projects more than a hundred thousand craftsmen and laborers, who were classified as artisans in the Yellow Register (*Huangce* 黃冊). In 1393, more than 230,000 artisans across the country were recorded in the Yellow Register for the building of the city wall of Nanjing, the capital then.³⁰ They were called on once every three years from their rural residences and worked at the assigned place for three months. However, there is no evidence indicating that they were able to do business there, or, that a commercial network spread out along the migration area. As noted before, the early Ming policies tended to reduce the size of bureaucracy as well as money in circulation to a minimum size. Many projects, including grain transportation and military defense, were enforced on the basis of unilateral payments. The three capitals in the early Ming (Fengyang, Nanjing and Beijing), for instance, were built by the corvee enlisted from rural communities, soldiers and prisoners. Laborers exceeded 1 million people for each project.³¹ Except for reimbursements made on rare occasions, most of the seasonal labors such as peasants were supposed to feed themselves, and soldiers and artisans working yearly were paid in grain, which was too little by which to support a family.

As a preliminary remark, I would conclude that as the formation of social organizations and social relations in the early Ming centered on the state, the dominance of unilateral payments greatly constrained developments in long-distance trade and intra-regional networks.³² Scholars usually take the Grand Canal as the example of long-

³⁰ *Ming Taizu Shilu*, vol.230; *Ming Huidian*, vol.189, Ministry of Works.

³¹ Yang Guoqing gives estimates of the corvee in the construction of Nanjing's city wall; he points out that the potential human sources for building works included 200 thousand soldiers, probably fewer than 200 thousand artisans, 1 million peasants, and several hundred thousand prisoners. The total work required 7 million individual workdays. See Yang Guoqing, 2002, 37-44.

³² Although the development of markets and business network showed continuity in China from the sixteenth century through the twentieth century, in Xu Tan's view, it was in the Qing time that long-distance trade was expanding to coastal areas and to the Yangtze river system in addition to the Grand Canal already achieved in the mid-Ming. (Xu Tan, 2000).

distance trade under the Ming government. The transportation of grain tributary through the Grand Canal to feed the officials and soldiers at Beijing was becoming more urgent when Zhu Di decided to move the capital to Beijing. Corvée laborers and soldiers were used extensively in grain transportation. Even ships used in transportation were built entirely by the artisans at government docks and cost no money.³³ It was as late as the 1430s that Zhou Chen, a high official in the Lower Yangtze Delta reported that native people would avoid taxes and labor services by going out and seeking refuge at cities and ferries along the Grand Canal, where they were able to do small-scale business.³⁴ For our purpose—money circulation and domestic trade in the early Ming—the Grand Canal can hardly make out a strong case for such an argument.

If monetary demand did not come from long-distance trade in the early Ming, did local markets draw much money? Many relevant records in the early Ming suggest that this was not the case either. In the Ming gazetteers scholars find only a few towns and periodic markets dating back to the early Ming, while the majority of local markets and towns came into sight in the sixteenth century.³⁵ Before that one can hardly expect that the ongoing transactions on a trivial scale at rural markets would absorb a good deal of currency. The contracts of land sales from the Huizhou archives also demonstrate the dominance in the early Ming of land transactions in small pieces with pretty low prices.³⁶

³³ Fu Chonglan gives a good survey of cities and industries along the Grand Canal in late Ming and Qing and traces their origins to the early Ming with regard to their administrative and military functions (Fu Chonglan, 1985).

³⁴ Zhou Chen, “Yu xingzai hubu zhugong sh”, in Hong, 1988, 30-33.

³⁵ For north China, see Yamane, 1995; for the Pearl River delta, see Ye Xian'en & Tan Lihua, 1984; for Fujian, see Chen Keng, 1986; For Shandong, see Xu Tan, 1995. For the Lower Yangtze delta, see Fan Shuzhi, Liu Shiji. Xu Tan recently attempts to theorize these regional investigations on the base of Skinner's framework. She gives a comprehensive analysis of the development of local markets and town both chronologically and geographically (Xu Tan, 1997, 1999, 2000). The early Ming just saw the primary stage of markets development in rural counties ever since the long-lasting civil wars which had destroyed local economy and society.

³⁶ In the early Ming contracts, such as those of the Wang brothers, most transactions dealt with lands less than 1acre. The price, if paid in grain, often doubled an annual rent of the land. Although in terms of *Baochao*, the land value inflated much in the Yongle reign, the land prices in Huizhou in the early Ming remained as low as less than 1 tael of silver per *mu* (1 *mu* = 0.16441 acre) until 1440s. It then jumped up to about 10 taels in the Hongzhi reign (1488-1505),

The loss of about one-third or half of the population together with a severe deflation would weaken the fourteenth-century economy significantly. The weak demand from domestic markets should have been a direct cause of the low-level prices in the early Ming. The anti-market policies of the early Ming government certainly shattered society and delayed the recovery of a market economy because, for the first hundred years, one can find little information on the resurgence of markets and consumption in local society.³⁷

3. Money supply

3.1. Periodization of Chinese monetary history: A silver economy vs. a coin economy

The periodization of Chinese monetary history also follows the division between Song and Ming China. In the former period, both the number of bronze coins in circulation and the amount supplied by imperial mints reached their height in Chinese history; in the latter, however, silver became the major currency, whose supply and circulation were entirely out of state control, and which largely depended on foreign import. The influx of silver imports from America and Japan came to a peak at the end of the sixteenth century.³⁸ The silver influx in sixteenth-century China undoubtedly

and even lowered somewhat in late-sixteenth and mid-seventeenth centuries. In the late seventeenth and the first decade of the eighteenth century, it rose slowly, but became apparently faster in the second decade, and came to a peak in the Qianlong reign (1736-95), with the average price about over 20 taels per *mu*. The high price in land markets in the Qianlong Reign can find a parallel in Suzhou (see the contracts of land sales collected by Hong Huanchun, 1988, 87-177). It is worth be a promising prospect if scholars in the future can undertake a comprehensive research on changes in land prices over the six hundred years ever since the fourteenth century in China, as there are more than hundred thousand land contracts scattered over the country, especially concentrating on the lower Yangtze delta, Guangdong, and Fujian.

³⁷ See discussion on the early Ming state and economy in Chapter IV of my Ph.D thesis.

³⁸ Scholars emphasize the monetary transition from using bronze coins to silver, and view it as a milestone in the Chinese monetary economy. In this way, the silver transition theory does relate the Chinese economy to the emergence of the sixteenth-century world economy. The monetarist historian Miyazawa has made a significant argument that the monetary transition from bronze coins to silver was an important aspect of the social and economic transformation of China from Song through Ming-Qing times. The different uses of these two kinds of metal currencies, according to him, can be identified as a sequence of temporal stages in which each of them, either coins or silver, was predominant in response to the needs of the Chinese economy and society at different stages (Miyazawa, 1993, 213-6). For the current

stimulated a market economy, but it was far from sufficient to determine the trend of price change, not to mention the nature of the economy.³⁹ Ever since the Song dynasty, China had been dominated by a multiple monetary system. In addition to bronze coins, the Song government used a variety of monetary tools such as currency reserve (gold & silver) as well as securities backed by precious metals and strategic goods (tea, salt, alcohol, and so on.).⁴⁰ Thereafter, merchants could easily save on the costs of transferring bronze coins in long-distance trade by using bills of exchange issued or guaranteed by the imperial ministry of the treasury. By the mid-twelfth century, paper notes (*Huizi* 會子) had become the major currency, maintaining successfully their nominal value for over sixty years. However, during the transition from Song to Ming, the state lost sovereignty in issuing money. It was the rejection of paper currency by society and the inability of the government to provide large amounts of coinage that gave rise to the prevalence of silver as the standard value. The monetarist argument of the *silver economy* pays no attention to money circulation, and often fails to acknowledge the question: how did changes in monetary items, whether bronze coin or silver, interact with the working of a real economy?

From a macro-economic perspective, one needs to relate the money supply, either in bronze coin or in silver, to the needs of a developing market economy. It is not necessarily true that bronze coins are inferior to silver as long as the former is maintained in sufficient amount and supported by other monetary means. The circulation of bronze coins in Song was supported by other monetary and fiscal tools such as commercial loans

discussion on the formation of the silver economy in the Ming China, see Atwell, 1990,1998; Von Glahn, 1996; Miyazawa, 1998.

³⁹ The Swiss is another example of a country using low-value metal coins. Tokugawa Japan even adopted rice as the standard for its payment in place of bronze coin. Yet this “regression” was particularly related to economic growth occurring then in Japan. See Akira, 1988.

⁴⁰ For the silver serving as the medium of exchange in the Song, see Wang Wencheng, 2001.

and bills of exchange. Hence, there were few technical difficulties in dealing with long-distance trade. Below, I am going to argue that the Song money supply measured in bronze coins (not including silver, gold or any M2 currency) far exceeded that of Ming, even if one includes both silver and bronze coins in the latter case.

Before making any estimate of the money supply in the two periods, I will address a background issue in relation to the money supply in Ming: shall we take *Baochao*, the Ming paper currency, as a part of the money supply? I suggest *Baochao* was used as a means of payment rather than a medium of exchange. Following Song and the Mongols, the Ming government issued *Baochao*.⁴¹ But they issued paper currency only for fiscal purposes and subsequently it was irrelevant to other hard currencies in circulation. Ray Huang reports that, in 1390, the emperor handed out no fewer than 75 million *strings* of new paper currency, a figure Huang takes to be about 2.5 times of the annual land tax revenue, which was the major income source of the Ming state.⁴² The inflation got worse during the Yongle reign—whereas 1 *guan* of *Baochao* could, according to the regulation of the Hongwu reign, buy 1 *shi* of rice, and was equal to 1,000 *wen* of bronze coins, in 1407, 1 *guan* of *Baochao* could buy only 1/30 *shi* rice. In 1448, a decade later, it was only worth 2 *wen* even at the official rate, an inflation rate 500 times in comparison to its original value. However, this super-inflation did not make the real economy inflationary—the prices in both bronze coin and silver remained quite low almost through the fifteenth century. This point will shed light on the nature of the Ming monetary economy. The Ming government proceeded with issuing and distributing *Baochao* mostly

⁴¹ Unlike Song and the Mongols, the Ming government prepared no reserve to back up *Baochao*, but commanded that *Baochao* was the only currency in the market. Neither coins nor silver could be used. This policy was disregarded by common people, who preferred coins and silver.

⁴² Ray Huang, 1974, 69-70.

as payments to officials and to soldiers, while at the same time people no longer took them as money. In this case, one can hardly expect circulation of baochao to be able to meet monetary needs of the economy.

3.2. Estimates of the money supply in Song and Ming prior to 1550

At this point, we can turn to metallic money, both bronze coins and silver. It is a well-known fact that the Song state minted the largest number of bronze coins ever in Chinese monetary history, most of which were made prior to 1125.⁴³ Even today, what archeologists frequently discover in hoard sites are mostly Song coins. Furthermore, Song coinage can be proven to support a monetary economy much larger than that of the silver economy in seventeenth-century China. Before we quantify the size of the monetary economy in Song and Ming, however, we have to figure out the size of the money supply in Song and Ming China. To make them compatible, I constrain the investigation to metallic money (coins and silver). For the minting of bronze coins in Song China, we have reliable records for most periods.⁴⁴ The total adds up to 193.4 million *strings* of bronze coins prior to the Jurchen in 1125. Recently, Gao Congming has reexamined Hino Kaisaburo and Peng's estimates on the output of Song imperial mints, and suggested that the total amount of the Song coinage (excluding steel coins) prior to 1125 was around 262 million strings of coins.⁴⁵ Both his estimate and mine give weight to the New Policy period, whereas he gives a more optimistic opinion on the late decades (1100-25) of the New Policy. Either of the two figures can be hardly taken as real output,

⁴³ When the court moved to Hangzhou in southern China, the scarcity of mineral sources, especially copper, forced it to issue Huizi instead.

⁴⁴ For the sources of information on imperial minting production, see Appendix A.

⁴⁵ Gao, 2000, 103. Miyazawa suggests the money stock was about 300 million strings over the Song prior to 1127 (Miyazawa, 1993, 204).

but they indicate a spectrum in which real output could fall. Archaeologists and numismatists have noticed that most of the Song coins regularly weighed and presented a standard of material-combination. This, in fact, rules out the possibility of counterfeiting currency in a large amount, which allows me to count only products from imperial mints as the Song money supply.

The Ming imperial minting produced a smallest number of coins in the late imperial history. The government was neither willing nor able to produce coins that were required by the economy. From 1368 through 1572 the Ming imperial minting produced 4-6 million strings of coins, a figure roughly matching the annual output of the Song state in the 1080s.⁴⁶ However, coins, including those from previous dynasties and even counterfeit currency, were admitted by the imperial authority to be used in small transactions most of the time. I assume the rate of 8:1 as the normal ratio between Song and Ming coins in circulation during the Ming dynasty.⁴⁷ This will increase the total money stock to 36-54 million strings of coins, an amount roughly 15-27 per cent of that in the Song money supply prior to 1125, but already far exceeding the usual expectation of bronze coins in circulation in Ming.

The monetary economy in Ming China was often characterized by the use of silver. I will estimate how much the Ming money supply was secured by silver. For silver domestic production, Quan notes that the Ming state lagged behind the Song in silver mining. In contrast to the average annual mining revenue of 223,850 taels of silver in the eleventh century, the Ming mining output was only 100,000 taels of silver per year (about 220,000 taels in the early fifteenth century, declining to 50, 000 taels in succeeding

⁴⁶ For the estimate of the coins in circulation, see Appendix A.

⁴⁷ For how can I reach such a ratio, see Appendix A.

periods).⁴⁸ The total amount from 1390 through 1520, according to Quan, was about 11,395, 775 taels.⁴⁹ Since no more official records were reported after 1520, Wang Yuxun gives his estimate of the Ming silver revenue in the later period (1520-1664). He thinks the total amount in the late sixteenth and early seventeenth centuries should be 13,820,100 taels, which could be even larger than that in the preceding periods.⁵⁰ The aggregate silver output from domestic mining, then, according to this optimistic view, would reach 25 million taels. A second look, however, suggests 15-25 million taels silver.

We need to take it in mind that, before significant imports of silver into China began in the late sixteenth century—quite late for Ming history—the money supply from the domestic side was very limited: 15-25 million taels of silver plus 36-54 million strings of coins would add up to 46.5-71.5 million strings of coins in total value.⁵¹ This figure is only half of the money supply of the Song state prior to 1043. In the succeeding decades of the New Policies the outputs of coinage outstripped all that had ever been produced previously in the Song imperial mints.

The import of silver in late Ming times has legitimated the allegation that the Ming monetary economy developed into an unprecedented size pumped up by its strong connection to an emerging world economy. However, much of this assertion is not tested in quantitative research. Because of the lack of reliable quantitative records available on the Chinese side, we have to rely on the records documented by officials and merchants in Japan, Manila, Macao and Europe, countries that did not necessarily distinguish their

⁴⁸ Quan, 1967b. Quan also notes that the silver collected in the Song was the tax part of mining output, while in the Ming, owing to the strict monopoly policy, mining households submitted 40-50 per cent silver outputs to the court, which was much larger than in the Song. This would imply a greater variance in silver outputs between the Song and the Ming. See Quan, 1967b, 613-5. For a comprehensive view on mining policies in Song China, see Qi, 1987, 576-97.

⁴⁹ Quan, 1967b, Table 1 & 2, 602-8. For the period from 1487 through 1520 the mining revenues added gold and silver together, thus the silver revenue would be a little lower than in records. Also see *Cambridge History of China*, vol.8, 386.

⁵⁰ Wang Yuxun, 2001, 19.

⁵¹ I estimate 1 tael of silver as being equal to 0.7 string of coins according to the contemporary price of coins in silver.

exports to China from those to other countries in East Asia and Southeast Asia. Researchers come down quite differently on the aggregate value of imported silver, in exchange for Chinese goods such as silk and tea, into late Ming China. The estimates, for instance, vary from 100 million to over 300 million for the inflow of silver by the end of the Ming empire (see Table 3).

Table 3. Estimates of Chinese Imports of Foreign Silver in Ming China, 1550-1645
(in millions of taels^a)

	von Glahn	Wu Chengming	Yamamura & Kamiki	Quan
1550-1600	57.7-62.5	41.27-51.77	47.4-63.5	-
1601-1645	134.2	44.4-59.4	184.9-225.1	-
Total, 1550-1645	191.9-196.7	85.7-111.2	232.4-288.9	45.8

Sources: von Glahn, 2000, 140; Wu Chengming, 2002, 170-173; Yamamura Kozo & Kamiki Tetsuo, 1983; Quan, for Japan, 1984, 644; for Spain, 1957 (also see Lin Man-houng, 1990, 303-4).

a. I have converted the weight unit into tael: 1 ton silver = 0.027 million taels silver.

Although the estimates in Table 3 show obvious variances in the total value of silver imports, they reveal a similar trend that silver imports grew rapidly in the first half of the seventeenth century.

3.3 Money supply and domestic markets: the late Ming puzzle

The significance of silver imports, rendered by these estimates, should not be underestimated. One may calculate, following von Glahn's opinion, that "during the second half of the sixteenth century silver imports were adding at least eight times more bullion to China's stock of money than domestic mines; in the first half of the

seventeenth century, imports exceeded domestic production by perhaps twenty-fold”!⁵² One can also conclude, merely by recalling that the Ming money supply (coins plus silver) before 1550 was estimated to be 40-63 million strings of coins, that this would cause the money stock to swell 100 per cent around 1600, and more than 250 per cent around 1650.⁵³ This extraordinary increase in silver imports makes even less significant the bullion flow from America into Europe. Imports between 1500 and 1650 increased by only 26.7 per cent Europe’s stock of silver bullion. For gold, the increase was even lower—3.6 per cent.⁵⁴

In sum, the size of the Ming monetary economy could probably be as large as 174-200.7 million strings of coins, an amount that already approximates that of the Song money supply in the early eleventh century. Contrary to the Song case, however, the increase in the Ming money supply was secured through marine trade, by which the volume of about 200 million taels would indicate a similar size of exports from China such as silk and tea. If these speculations can be proven, they reveal an export-leading economy in late Ming. This pattern, though emphasizing the significance of foreign trade, contradicts the current paradigm of the Ming domestic-based market economy. Economic historians usually argue that the development of the market economy was based upon domestic needs. And, in fact, until 1550, we see no sign of a strong connection between domestic output and foreign markets.

How large, then, was China’s domestic trade and what was the share of foreign trade in China’s trade? Wu Chengming suggests an annual volume of long-distance trade in

⁵² von Glahn, 2000, 140-1. Wu Chengming also suggests the silver import before the eighteenth century would tripled the Ming silver stock (Wu Chengming, 2002, 173, 249).

⁵³ I suppose the contemporary rate between silver and bronze coins is: 1 tael of silver = 0.7 string of coins.

⁵⁴ Braudel, 1974, 28.

domestic markets of 12.1 million taels of silver.⁵⁵ Multiplying this figure by 5, we will get an annual value of 121 million taels of silver for domestic trade in China.⁵⁶

Table 4 Annual volumes of Domestic trade & overseas trade in Ming China,
1550-1645
(in million taels silver)

Period	Domestic trade	Overseas trade ^a	Trade, Total	O/T ^b (percentage)
1550-60	121	1.2	122.2	0.98
1601-45	121	2.98	124	2.4
1550-1645	121	2	123	1.6

a. To get the annual volume of overseas trade, I divide the total silver imports (von Glahn's figures in Table 2.3) by the years from respective periods: the annual average amount of silver imports 1.2 million for 1550-1600, 2.98 million for 1601-45, and about 2 million for the whole period of late Ming.

b. The ratio between overseas trade and trade in total.

The estimates of domestic trade and overseas trade are shown in Table 4. The figures are best viewed as an order of magnitude rather than a precise measure of quantity. Nonetheless, they demonstrate the very minor percentage of overseas trade in the total trade, which, in fact, supports Wu's argument. However, these two narratives of the Ming economy, one of a gradual process driven by domestic markets, the other a spurt of foreign trade and silver exports in the late sixteenth and early seventeenth centuries, cannot be true at the same time. Either might be possible, but neither supports the other.

Estimates on coins in circulation and silver imports suggest an obvious delay in the

⁵⁵ Wu Chengming approaches this figure through estimating several major goods in late Ming long-distance trade: grain (8.5 million taels), cloth (3.3 million taels), silk (0.3 million taels). See Wu, 1983b. Wu Chengming approaches this figure through estimating several major goods in late Ming long-distance trade: grain (8.5 million taels), cloth (3.3 million taels), silk (0.3 million taels). See Wu, 1983b. The size of long-distance trade, according to Wu's estimates, was no more than 20 per cent of the aggregate value of domestic trade in the eighteenth century. Perkins' study indicates that the ratio between the size of long-distance trade and that of rural markets prior to 1900 was about 1:3-4 (Perkins, 1969, 114-5). When applying this ratios to estimating the late Ming's trade, I assume the gross value of goods at the rural markets was about 10 times long-distance trade, because the underdevelopment of long-distance trade in late Ming, thus late Ming domestic trade not exceed 121 million taels.

⁵⁶ Wu's estimate is closely related to his Marxist view of the market economy in a pre-industrial society. He focuses his demonstrations on the supply side instead of the demand. This made the estimate particularly indecisive because of the impossibility of measuring the total products of peasant households at aggregate level.

Ming money supply in proportion to monetary demands from a market economy. In the first narrative, the development of domestic markets in the sixteenth and seventeenth centuries was achieved on the basis of specialization in agriculture and handicraft industries, a specialization that led to increasing exchanges between agricultural products and non-agricultural goods across regions, and growth in productivity on both sides. This pattern has been recognized as a successful way to a high-level market economy, and named as the *Jiangnan* (the Lower Yangtze delta) *Path*.⁵⁷ Such a theory reserves little space for the argument of foreign trade and silver imports as an engine for development in the Ming economy, because regional specialization in agriculture and industry was a gradual process starting from the late fifteenth century, thus, independent of foreign trade, which was still negligible until the late sixteenth century. Silver imports only began to influence the trend of the economy almost a century later. As such, one must ask how could the Ming market economy maintain expansion with such a small money stock before 1600?

In the second narrative, one cannot find the corresponding relationship between silver imports and the prices. Silver imports began to surpass the domestic part of the money supply, which I estimate to be 36-54 million strings of coins, until 1600. However, the prices still remained stable around 1600.⁵⁸ Furthermore, as I discuss later, both nominal and real wages changed little. How to explain the expansion of the market economy in late Ming at an aggregate level still remains a big puzzle. In sum, there is no

⁵⁷ For the recent theories of the market economy in the Lower Yangtze delta, see Li Bozhong, 1998.

⁵⁸ According to Braudel & Spooner, the total amount of metal money in circulation in Europe and the Mediterranean before the discovery of America was an approximate total of 5,000 tons of gold and 60,000 tons of silver. The arrivals of bullion from America during the century and a half between 1500 and 1650 amount to 1,600 tons of silver and 180 of gold (Braudel, 1974, 28). The amount of silver importing into Europe in the sixteenth century now looks less significant than it used to. In contrast, the case in late Ming would be extremely unusual by the dominant size of imports over domestic stock of money and, yet, the stability of prices presented in the economy of late Ming China.

direct evidence either to support or to deny the existence of a market economy of such size. The very backward nature of the Ming state made its tax revenues irrelevant of growth in the market economy, and thus the Ming official documents can hardly recount any changes in trade or industry at the aggregate level. Neither do we have a clear idea of population growth around 1600.⁵⁹ Any estimate of the size of the monetary economy in late Ming China, therefore, shall be no more than a very speculative attempt; and to make such speculation relevant, one needs to choose a benchmark year with rich and high-quality data, for further analysis of the late Ming case.⁶⁰ I will thus give an estimate of the monetary economy in 1750, a year when the eighteenth-century economy was starting to reach prosperity.

I attempt to compare the size of the monetary economy over the long run,⁶¹ and the results are given in Table 5.

Table 5. Money stock in China, 750-1750

	Tang, 750	Song, 1120	Ming, 1549	Ming, 1600	Qing, 1750
Bronze coin (000,000 string)	21.3-42.6 ^a	193.4-262	36-54 ^c	36-54	122.8-146.8
Coins per capita ^d (in strings)	0.31-0.61	1.53	0.18-0.45	0.18-0.45	0.4-0.48
Silver (in millions of taels)	-	-	15-25	125.8-130.6	317
Money supply (in millions of	21.3-42.6	193.4-262 ^b	46.5-71.5	124-145 ^e	376-400 ^f

⁵⁹ The year of 1600 is currently recognized as the peak year of the Ming population. However, there was no reliable record for the aggregate population in the last two hundred years of the Ming dynasty. The estimates of the aggregate population then vary between 120 and 200 million. A few examples are: Ho, 150 million (Ho, 1959, 264); Perkins, 120-200 million (Perkins, 1969, 216); Wu Chengming, 120 million (Wu Chengming, 2000, 25); Cao, 200 million in 1590 (Cao Shuji, 2000a, 201).

⁶⁰ Despite the fact that most of China's socioeconomic historians often acknowledge the late Ming and early Qing as an integral part of economic development, especially those engaged in the regional study of the Lower Yangtze delta and other coastal provinces, the study of economic performance in pre-industrial China encounters two different cases in regard to aggregate data.

⁶¹ Peng is the first in Chinese monetary history to propose comparing the money supply over the course of Chinese history. His comparison sets up an example for later researchers, without whom the present research might be impossible. However, in Peng's estimates the money supply of the Ming in both total value and per capita are overestimated. Peng underestimates the aggregate population of the Ming as only 60 million, and fails to identify the specific year on which he is focusing (Peng, 1994, 781).

strings)					
MS* per capita (in strings)	0.31-0.61	1.53	0.23-0.6	0.62-1.21	1.25-1.33

Sources: for Tang China in 750, see Peng, 1994, 781. For an estimate of coins and silver in the Qing, see Lin Man-hung, 1991.

* Abbreviation of Money supply.

- a. Peng assumes private coins were probably not different from the total for official coins, thus doubles the latter to get this figure. I decide to use official coins for a lower bound estimate.
- b. I include only the coinage as the Song money supply. In fact, it would be larger if we took into account precious metals (gold and silver) and commercial bills.
- c. The Ming coinage accounts for only 1/9 of coins in stock. The majority are Song coins.
- d. The aggregate population for each period is assumed to be: Song (1120)—126 million, Ming (1550, 1600)—120~200 million, Qing (1750)—300 million.
- e. 1 tael of silver is equal to 0.7 string of coins.
- f. 1 tael of silver is equal to 0.8 string of coins.

The money supply expanded remarkably to a total value of 400 million strings of coins around 1750, a height in Chinese monetary history. Song China, however, maintained the record of money stock per capita, and followed immediately the Qing in total value. The Ming cases show a great gap between the money supply in the two periods, the pre-1450 period and the years between 1450-1600, which calls for further explanation if such radical change ever occurred. But for most of the Ming, the money supply per capita seems to have been very low. In addition to changes in the general trends in the money supply, one should consider the role of coins as well. As late as the eighteenth century coins were still a significant part of the money stock, and probably accounted for 30-40 per cent of the total. Such a high percentage, in fact, goes against Miyazawa's monetary transition thesis.

4. Wages

Changes in prices and money supply in Song-Ming times inform us of a divergence in economic performances between the two eras. The market economy was never wiped out of daily life in the early Ming, and became vigorous again in the sixteenth-century

Lower Yangtze delta and some other coastal regions; however, the Song market economy was unparalleled in terms of the annual growth rate in population, the rising price level and the volume of money in circulation. Furthermore, my speculation suggests a more optimistic view of the Qing monetary economy and, in turn, a rather pessimistic one of the Ming economy, even though the late Ming image remains uncertain. In other words, if changes in prices and the money supply can denote the long-term trend in the real economy, then one can tentatively conclude that the monetary economy expanded astoundingly in the late eleventh and twelfth centuries with increases in population growth, aggregate demands and monetary payments, and that this expansion did not occur again until the eighteenth century. Between the two periods, the Chinese economy encountered a long-term stagnation if not a total decline. In response to all these factors, one would expect changes in living standards (esp. real wages) to appear during Song-Ming times as well. The following analysis will investigate whether changes in real wages occurred and how, if they did, they could be related to other changes over Song-Ming times. In contrast to choosing unskilled laborers' real wages, I will use soldiers' real wages for a comparison of living standards.⁶²

I have converted wage data into an index of real wages for comparison. The index clearly indicates a continuous decline in real wages over seven and a half centuries (see Appendix A). In other words, the Song soldiers were paid much better than their counterparts in Ming: the Song soldiers prior to 1125 received payments 1-2.5 times higher than the early Ming soldiers. In the Southern Song (1127-1279), because of the severe inflation, their payments were just fifty to eighty percent higher than those made

⁶² For the discussion on the way of adopting the wage of unskilled laborers as the alternative standard for real income per capita and why the soldiers' wage can be used in particular, see Appendix A.

to early Ming soldiers --and probably no higher than that of the Ming soldiers when the latter were better paid in the mid-sixteenth century. During the first hundred years of the Song dynasty (960-1060), the soldiers' wages came to a peak in real terms, and then went down to a monthly pay of fewer than 300 liters per head. In the century beginning from the 1150s, wages were even lower, ranging between 200 and 100 liters per head.

Besides the index of real wages based on the data from soldiers' wages, I also find support for my argument in the research on both Song and Ming military systems and policies by other scholars. Policies in the recruitment and payment of soldiers are far less responsive to temporal and situational variance as compared to the wage data. Nonetheless, they can reveal the base of military expenses, especially soldiers' wages, and by what means those expenses and payments could be accomplished.

The Song soldiers were paid in accordance to rank and skill. As noted before, their wages usually comprised three parts: cash, rice, and a clothing allowance in spring and winter. The first two were paid monthly, and the last was often converted into cash and paid biannually. A middle-level soldier serving in the central armies was, each month, paid 2.5 Song *shi* (125.6 kg) in rice and 500-700 *wen* in cash together with an annual compensation of 6 bolts of silk, 0.5 kg of cotton in addition to 3,000 *wen* of bronze coins.⁶³ Leaving aside the clothing allowance in order to make the comparison with the Ming soldiers convenient (about 6000 *wen* of bronze coins altogether, which was larger than that of Ming soldiers⁶⁴), these wages can be converted into 176-186 kg or 235-248 liters of threshed rice.⁶⁵ The above estimate is for a soldier stationed at Kaifeng, the Song

⁶³ Wang Zengyu, 1983, 216-9.

⁶⁴ For the Ming soldiers' clothe pension, see Appendix A.

⁶⁵ I adopt the prices at the Capital Kaifeng in the Xining Reign (1068-77), usually 1 bolt silk equals 1,000 *wen* bronze coins, 1 Song *shi* 1,000 *wen*. 1 Song *shi* rice in other regions 1 Song *shi* would be lower than in the apital, ranging from

capital. The Song central armies (*jinjun*) at the beginning of the eleventh century had 660,000 soldiers, about 3.5 per cent of whom were stationed at the capital. A soldier serving in other regions enjoyed as much as 6-15 per cent of extra grain owing to the lower price of rice in relation to the monetary part of his payment. For soldiers in local troops (*xiangjun*), they received monthly payments of 2 Song *shi* of rice, 100 *wen* in cash, and an annual clothing allowance of 4 bolts of silks plus 2,000 *wen* in cash.⁶⁶ If it is a soldier living in North China, this would be converted to be 143 kg or 191 liters of rice.

Since the Song central government moved to the south in the mid-twelfth century, soldiers' salaries were adjusted. The cash part increased proportionately: a soldier in the central armies would be paid monthly with 3,000-9,000 *wen* in cash, 0.9-1.5 Song *shi* of rice, with or without a clothing allowance.⁶⁷ Leaving aside the clothing allowance, in the mid-twelfth century a soldier in the central armies stationed in the Lower Yangtze Delta would be paid in real wages about 105.5-256.3 kg, or 141-342 liters of rice. In general, the armies in the Southern Song still maintained real wages at an average level of 120-150 liters of rice. This was lower than the salary of the soldiers in the Northern Song, which was about 200-240 liters of rice.⁶⁸

This estimate essentially matches the wage data presented before. But the latter gives both some higher and lower records departing from this standard as well.

The salary of the Ming soldiers is less studied than that of the Song. In an edict of 1379, Zhu Yuanzhang, the first emperor of the Ming ordered that a soldier with a family should be paid 1 *shi* of rice per month, a single soldier 0.60 *shi*. This rule continued

500-700 *wen*. also equals to 0.67 *shi*. 1 *shi* is the basic unit of traditional Chinese volume measure, equals to 100 liters.

1 *shi* rice weights 150 catties (*jin*), or 75 kg.

⁶⁶ *Song History*, *juan* 194, military section.

⁶⁷ Wang, Zengyu, 1983, 220-4.

⁶⁸ For a detailed discussion, see Appendix A.

through the Ming. 1 *shi* has been taken as the standard monthly payment of the soldiers in the Ming armies, which can be converted into 75 kg, or 100 liters, of rice. Although many scholars choose this standard, I must emphasize that it should be viewed as the *ideal* standard according to the policy, not the real wage in general. From a financial perspective, the Ming military system was basically self-sustaining, as over half of the soldiers were sent to farm in order to procure enough food. The early Ming armies probably had 2.76 million soldiers at full strength, and if seven-tenths were engaged in farming, it would be equal to 1.93 million agricultural laborers.⁶⁹ Many contemporary descriptions show that soldiers were paid below this ideal standard in the late-fourteenth and fifteenth centuries. The de facto decline in soldiers' wages became noticeable in the early fifteenth century, especially in the Yongle Reign (1403-24) under Emperor Zhu Di. After Zhu Di usurped the throne, he moved the capital from Nanjing to Beijing, which had been a major military base on the northern frontier and which was located thousands of miles away from the central regions of the Ming economy. Sharply increased costs in long-distance transportation made the grain supply problem even worse. As recorded in the data, the soldiers and artisans who were enlisted to build the palaces and infrastructure at Beijing were paid 0.4-0.6 *shi* (40-60 liters) of rice per month.⁷⁰ In the succeeding reigns, such as Hongxi (1425), Xuande (1426-35) and Zhengtong (1436-49), wages were often adjusted in many regions but remained lower than 1 *shi*.

⁶⁹ According to the military section in *Ming History*, the military guard (*Wei*) in the late fourteenth century was increased as many as 493, each guard had 5,600 soldiers at its full length. Supposing all the guards were in full size, which is quite possible at the beginning of the Ming system, then the soldiers in the Ming troops would be 2.76 million. Although this is a large number, it only includes the soldiers, not all the people involved in or regulated by the military institutions, including the relatives, the households registered as military professions, and the reserves. Cao Shuji has estimated the population in the military system was about 6.2 million, about 8.5 per cent of the total population in early Ming. (Cao Shuji, 2000a, 247).

⁷⁰ According to Hucker, the base pay of a Ming soldier in a guard was one bushel, thus 36.4 liters, of grain per month. Hucker also believes all clothing, weapons, and equipment were provided by the government, which I doubt was the case (Hucker, 1998, 67).

In fact, the drop in soldiers' pay was less obvious than the reports disclosed, and from the Ming official view, wages were not declining at all because of the adoption of the *wage-compensation* approach. From high-rank officials in the Ming central government down to soldiers and artisans at camps, their wages were normally measured in rice units. However, the payments were often made in more than one form, including clothing, millet, and even cinnamon. Nonetheless, the normal means available through the *wage-compensation* approach was paper currency. The Ming state continued to issue paper currency as the preceding dynasties had, and often used it as the means of payment for officials, soldiers and merchants. However, the new paper notes, known as *Daming Baochao*, had no reserves to back their value, and were disfavored by society. When the Ming state in the Yongle Reign began to issue enormous quantities of paper notes, far more than its yearly revenues, the real value of the Ming paper currency was soon debased to 1/30 of its nominal value, 1/100 in the Zhengtong Reign, 1/500 in the Jingtai Reign (1450-6) and 1/1,000 later. Regardless of the severe inflation, the Ming government insisted the compensation (non-grain) part of the officials and soldiers' salaries should be paid with paper currency at its nominal value. Thus, the income of soldiers in fact depended upon the exchange value of the compensation part, and it is also true that the Ming soldiers' salary before the sixteenth century could hardly exceed 1.0 *shi* of rice per month, surely below the ideal standard set up by the first Ming emperor.

We have already seen that, within this payment system, not only the income of the soldiers but also that of officials was eroded. In fact, the compensation policy was particularly harsh on officials. Ming officials at the very beginning enjoyed a salary much lower than that of their counterparts in Song China. A low-ranking Ming official, for

instance, was paid about 8 *shi* per month. A Song official at the corresponding level was paid monthly about 7,000 *wen* in cash, or 10.3 *shi* (1030 liters) of rice in real wages; besides that, he would have received different kinds of allowances and compensations no less than his regular salary.⁷¹ However, a Ming official really received only 5.5 *shi* of rice, with the other part being paid in paper notes. Later, Zhu Di made the policy stricter: for low-ranking officials, 40 per cent of the salary would be paid in rice, and for high-ranking as well as middle-ranking officials 30 per cent. Hence lower ranking officials were paid only 3.2 *shi* (320 liters) per month, just 15-31 per cent of the salary of a Song official of similar rank.

The pay of Ming officials and soldiers shed light on the idea of a standard wage in a non-market economy. In pursuit of security, the early Ming government diminished the influence of the market economy and solely relied upon direct control of population and resources. Wages were not decided by labor supply and demand. Modern surveys of prices and wages in the early Ming, including the present one, depend greatly upon government-regulated prices and wages in official documents, which only came to be recorded when policy changed. Thus, in data on both grain prices and soldiers' wages the records shows a very stable, and even motionless, trend for over a century. No doubt there was an underground economy. The officials and soldiers in the troops stationed at Suzhou and Songjiang, for instance, were reported to involve themselves in illegal businesses such as salt smuggling and the sale of military equipment. And outbursts of the so-called Japanese pirates along the coastal areas in southern China in the mid-sixteenth century were initially attributed to long-standing sea smuggling, which eventually dislodged the official prohibition of foreign trade that had been in place for

⁷¹ Peng, 1965, 408, 674-5.

over two hundred years. However, it is impossible to combine incomes from the two parts, the regulated part and the part from the illegal sources, into a *real* one.⁷² In general, I believe, the low efficiency of the Ming administration and the failure of monetary policy worsened the living standard of the common families in the fourteenth and fifteenth centuries.

The next question is about the wages of the Ming soldiers since the sixteenth century. Following the Single—Whip Reform (*yitiao bianfa*), except for the grain tax that was still to be transferred directly to Beijing and the other administrative centers, the Ming government permitted people to pay silver in place of labor service. Even the army recruited soldiers from local society by paying cash monthly, and the percentage of these recruits may have been as high as 70 per cent in some armies of the Lower Yangtze Delta.⁷³ By the end of the sixteenth century, the Ming court had to send 3,800,000 taels (i.e., 190 tons) of silver to cover the salaries of the troops at the northern frontier, which exhausted all state reserves. The wage data shows that soldiers did benefit from this pay reform, especially in the Jiajing Reign (1522-1566), but it was not enough to catch up with the wage level of Song soldiers before the mid-twelfth century. The payment at that time for a soldier was 0.6-0.8 tael of silver per month. Given that the rice price swung between 0.5-0.94 tael of silver per *shi* of rice, the real wage could hardly have exceeded 1.0 *shi* of rice by much.⁷⁴ Monthly pay above 1 tael was issued only along the northern frontier, especially to those carefully selected soldiers at the Nine Guards (*Jiubian*). In the

⁷² A similar challenge comes from the study of the average incomes in communist China until the beginning of reformation era in the late 1980s. Except for the fixed salary and housing regulated at a national standard, decided by high officials at Beijing, one can hardly estimate how much a person could make good for himself by exploiting the government resources.

⁷³ Fan Zhongyi, 1998, 130.

⁷⁴ Huang Miantang reports that the average rice price in the Lower Yangtze Delta in the mid-Ming was 0.5 tael, while Quan estimates 0.94 tael for the mid- and late-Ming altogether (Huang Miantang, 1985, 355).

mid-seventeenth century, the salary of a soldier stationed on the border of Manchuria had risen to 2 taels per month.⁷⁵ However, the northern frontier in Ming was a line dividing the nomadic life and agricultural settlements and was surrounded by the mountains, deserts and barren land. Food and material had to be conveyed from afar at a very high cost. According to Quan, the grain price on the northern frontier rose about nine times in the near 200 years after the mid-fifteenth century.⁷⁶ This price inflation far exceeded the increase in the soldiers' wages and, in many cases, one finds that the soldiers sold weapons, clothes, and even their children and wives, in order to make a living. The origin of the great rebellion in late Ming is the failure of the Ming fiscal system to support its troops along the northern frontier, which caused mobs of suffering soldiers to turn against the government.

5. Estimates on national income in pre-industrial China

Changes in national income in pre-industrial China concern us in several important ways. They can indicate the dependence (or independence) of change in the economy from change in aggregate population. The increase in population, for instance, might lead to an expansion of the economy, but without an increase in real income per capita; or, as was the case during the Tang-Song transition, the increase in real income per capita could occur along with an increase in population over a long period. One can identify the latter type, as Jones does in his comparative study, as *intensive growth*. It also helps us to discern structural change in a market economy, since national income directs both the

⁷⁵ Liang Miaotai, 1997, 46.

⁷⁶ Quan, 1967d, 678.

supply and the demand side. The variance in national income between Song and Ming, for instance, would shed light on the differences in demand patterns if changes in population cannot account for the variance alone. This will provide many insights for the study of aggregate demand in a pre-industrial society.

5.1. Estimates of national income: 1120-1776

The study in Section 1 and 2 raises the subject of national income. The comparison of the monetary economy in Song, Ming and Qing China has provided an idea of the monetary size of the economies. With the price data, one can speculate on national income for the three dynasties. The results are displayed in Table 6.

Table 6. National income in Song, Ming and Qing China*

	M	V ^a	P ^b	T ^c	I
Song (1120)	193.4-262	1	366	1-1.35 (0.53-0.72)	0.61-0.71
Ming (1550)	46.5-71.5	1	165	0.53-0.81 (0.28-0.43)	0.27-0.68
Ming (1600)	124-145	1	203	1.15-1.33 (0.61-0.71)	0.58-1.11
Qing (1776)	376-400 ^d	1	458	1.55-1.64 (0.82-0.87)	0.50-0.53

*M= money supply, V= Velocity of money in circulation, P= average price level, T= transactions in total.

a. For convenience, I assume V remains constant over time.

b. I use the index of grain prices here; the grain price in 961-970 is 100.

c. The figures in this column are those of relative value—indicating the degree of transactions in total depending upon the other variables: M, V and P. Figures in brackets are arithmetical values from the calculation $T=MV/P$. I chose the Song figure 0.53 as 1 for convenience of comparison. Thus, 1.55-1.64 in the last row stands for 1.55-1.66 times the bottom value (0.53) of the Song estimates.

d. I use the figure of 1750 here.

If one looks at T (transactions in total), the variance becomes much smaller than it

appeared in the money supply. This decrease can be attributed to the relative low price level in the Ming, which certainly gives weight to national income in real terms. However, the estimates of Ming national income diverge greatly owing to varying selection of years for measurement. The same problem exists, one remembers, in estimating the money supply in late Ming. In comparison, national income in the Song and Qing are well-grounded estimates.

5.2. Estimates of real income per capita: 1120-1776

Changes in real income per capita is another concern here. One may recall the estimates of the population over time in Section 1: the populations stood at about 120 million in the 1120s, 120—200 million around the late sixteenth century, and 311 million in 1776. Simply dividing the values in the T column by these figures respectively, one will get the results in Column I. Once again, the values in 1600 are unusually high—even the bottom value is higher than that in 1776—and only a little lower than that of Song. The top value in 1600 is in fact the highest among those figures: it is about 50 per cent higher than that in the 1120s, and 100 per cent higher than that in 1776. The top value means the development of the market economy in late Ming enjoyed a very slow population growth—it would have taken more than 200 years for the Ming population to double from 60 million in 1393 to 120 million in 1600. How Ming China could have maintained such slow population growth so that it experienced a burst only at the last phase of the Ming dynasty is mystery to researchers. If it is true, then it implies that, for two centuries, the Ming economy was too backward to sustain a population as large as that of Song or Qing China. In this case, the above-standard performance in late Ming

should be secured by an astoundingly slow pace in population growth rather than by an expansion of the monetary economy. In fact, this pattern is often recognized in the literature of economic history as a post-crisis phenomenon.

However, if we set aside the estimate for late Ming in 1600, which looks like an outlier for the whole pattern, and is based too much, as one may recall, on speculation, we would see a greater consistency among the remaining part. The Song and Qing cases would point to an economic expansion that went along with a sizeable growth in population, and a rise in prices owing to the increases in money supply and transactions. One peculiar feature of the Song case is that, in terms of money supply and price level, the Song economy achieved almost the same level of economic performance as the Qing with only one-third of the Qing population in 1776. This is an unusual success in economic growth in the pre-industrial world. Although many Chinese historians doubt the efficacy of the application of quantitative approaches to Chinese economic history prior to 1600, the conventional paradigm of the Tang-Song transition in Chinese historiography agrees with quantitative research on Song economic history.

Thus far, I have discussed national income through a comparison of the monetary economy over Song, Ming and Qing times. Much of the comparison is based on the serial data in population, prices and money supply reported before. In Section 4 of this paper I have outlined a general trend in soldiers' wages over time. Each is obtained from independent sources, but they are interrelated in regard to changes in real income per capita. Conjectures from the two perspectives mostly match-- except for the optimistic and speculative estimate of the late Ming case in 1600. There was no sign in the documents of a rise in soldiers' payments around 1600. They were at least no higher than

that in 1550s, if not lower.

Another problem concerns the soldiers' payments in the Qing. The current wage data on soldiers pays less attention to payments in Qing, because the present research is targeted at comparing Song and Ming. Thus, only when the data on late Ming is lacking do we need a retrospective-analysis from the point of view of the eighteenth century to postulate what likely had happened in the preceding two centuries. Also, because the current scholarship on the Qing economy and state has provided much useful information, one need not start the analysis from very basic levels (such as data collection). The case of the market economy and state in eighteenth-century China deserves independent study. One has the chance to discover tremendous details on prices and wages from the eighteenth century on, which permit us to look into the inequality within society and across professions. The wage data I extract from current research provides several examples, most of which involve non-skilled laborers in handicraft and agriculture. Scholars have shown that, along with the rising trend in prices, the nominal wage during most of the eighteenth century remained stable, and therefore, resulted in a decline in real wages.⁷⁷ Day laborers towards the end of the nineteenth century, according to a foreign observer, were paid at 0.03 tael.⁷⁸ This was actually pretty close to the standard nominal wage of day laborers in the late sixteenth century; however, prices had risen dramatically over the three centuries, which suggests a worsening living standard for commoners.

5.3. The Qing Soldiers' real wages

⁷⁷ Song Xuwu gives a general survey on the wages for labors and craftsmen in eighteenth-century China (Song Xuwu, 1997). Also see Wu Liangkai, 1983; Hu Cheng, 2000; Cheng Chaoyong, 2003.

⁷⁸ Martin Miller reports this case. See Chung-li Chang, 1962, 101.

A little should be added regarding Qing soldiers' wages in the seventeenth and eighteenth centuries. The majority of Qing troops in the eighteenth century were the so-called the Green Standard (*Luying*) troops stationed across the country. The Eight-banner troops, the traditional Manchu system, were responsible for safeguarding Beijing. Soldiers in the Green Standard troops, according to Luo Ergang, totaled about 650,000.⁷⁹ These soldiers were paid 0.9 tael of silver plus 0.25 *shi* of rice for each month. Civilian candidates (*Yuding*), who also lived at military campus and would replace the soldier when needed, were paid 0.5 tael of silver plus 0.25 *shi* rice per month. At the end of the seventeenth century this would mean 2.2 *shi* rice or 165 kg for an ordinary soldier, and 1.25 *shi* rice or 93.8 kg for a civic candidate. Thus, a Qing soldier in the seventeenth century was paid even higher than a Song soldier in a local troop in the early twelfth century.⁸⁰ As the grain price went up to 1 tael per *shi* rice in the early-eighteenth century and to 1.5 tael in the mid- and late-eighteenth centuries, the real wage for a soldier would have become 0.92-1.25 *shi* or 69-93.8 kg of rice. This payment would be lower than that of a Song soldier in the thirteenth century.⁸¹ It became popular in the eighteenth century for soldiers, many of whom had a family, to find a second job.⁸² As one can see, a soldier in the Qing at his best received payment close to his counterpart in the twelfth century. Could this be a sign that the real income per capita in the early Qing rivaled the high standard of the Song case in the twelfth century? A careful examination casts doubt on this optimistic conjecture. Civil wars ended finally in 1678. In the Kangxi reign (1662-1722), population growth and the market economy began to recover slowly, a

⁷⁹ Luo Ergang, 1945, 158.

⁸⁰ For a soldier serving in a local troop in Northern China, then, this would be 143 kg of rice per month (see the previous calculation). However, a soldier in Song central armies received about 180 kg of rice.

⁸¹ The average pay for a Song soldier in the thirteenth century can be estimated as 120-150 liters or 90-112.5 kg of rice per month.

⁸² Luo Ergang, 1939, 4-6.

phenomenon to which scholars refer as the “Kangxi Depression” or the “Seventeenth-century Crisis”. Thus, owing to an inactive economy during the recovery rather than being a consequence of economic growth along with increases in population and economy, high-level real wages were caused by rather low prices. When the recovery came to an end and the economy boomed again in the eighteenth century, it is obvious that real wages fell much behind the rising trend in prices.

6. Conclusion

As the discussion of changes in both the real wage and in the monetary economy points to a gap in real income per capita between the Song and post-Song eras, one could conclude that economic performance made a breakthrough in Song China. The criteria for the post-Song era, though indicating an expansion of the market economy, argues against a new phase of intensive growth. To put it in quantitative terms, the variance in real wages between China in 1120 and later, in 1771, shows a decline of about 50 per cent. The comparison from the analysis of the monetary economy suggests it was close to 30 per cent, a decline relatively moderate but still obvious.

This view will challenge the current wisdom of the Chinese economic development in 1500-1800, the so-called Ming-Qing transition. As the Skinner thesis bases itself on the expansion of rural markets, it assumes that the more rural markets appeared, the more advanced was the market economy. This leads those who follow the Skinner thesis to take the Ming-Qing as the example of full development in traditional China, since the total number of rural markets from 1500-1800 is unmatched. However,

such a linear relationship between the number of rural markets and the development of a market economy oversimplifies the working of a market economy.

The other major trend in the study of Ming-Qing economic history is to exaggerate the role of agricultural development as a fundamental and single cause of the development of the market economy in pre-industrial China. It distorts the real working of a market economy by focusing only on the supply side, and on farm yield in particular—or, in Marxist terms, production.⁸³ One can agree that agriculture, or more specifically, agricultural yield per capita, is fundamental to society and economy. But it is short-sighted to see agriculture and even farm yield alone as the direct cause of long-term changes across diverse dimensions. The market economy even in pre-industrial times was complicated enough to rule out this kind of linear explanation.

In contrast, the survey of long-term changes here has to deal with income—national income and real income per capita. I weigh the demand side more than the supply. Wages, indirect taxes on merchandise and on monopoly goods such as tea, salt and alcohol, were all data related to consumption. Technically, the advantage is obvious: it is too difficult to measure the output of a pre-industrial economy. In addition, the Song data, and to certain degree the Qing data, show consistency with each other as well. But is it possible that the variances in real income per capita shown in the comparison can be accounted for not only by real differences in the market economy but also by how those

⁸³ The Song data show a correlation in a positive way in almost all dimensions of the market economy. Nonetheless, some scholars pick up farm yields, which show an increase in the Lower Yangtze delta in the Ming time, as a yardstick to argue for the relative underdevelopment of the Song economy. Farm yields in the Lower Yangtze delta also increased apparently in the eighth and ninth centuries. However, scholars still debate if the increase in farm yields was absent in the twelfth and thirteenth centuries in the Lower Yangtze delta. Even if one takes Li Bozhong's view, it does not necessarily lead one to believe in the relative underdevelopment of the Song economy. The first breakthrough in agriculture in the Lower Yangtze delta, according to Li, had occurred in a time preceding to the Song. In opposite to the agricultural fundamentalism, changes in agriculture usually could not require an immediate response from other dimensions simultaneously. A useful comparison is British Industrialization which saw no agricultural revolution at the same time, but followed agricultural developments in preceding centuries.

data were produced? A state weak in the realm of finance and taxes such as the late Ming leaves no records helpful in indicating changes in real demand. However, it is a well-known fact that late sixteenth century communities in the Lower Yangtze delta witnessed the building of gardens, villas, schools and bridges and appreciated luxurious food and clothing. Were those local projects a sign of the improvement in living standards? It could be. To prove that, however, we need to examine numerous events recorded by local communities and translate them in a manner appropriate to quantitative analysis. Nonetheless, the prosperity was probably regional—a typical case occurring only in the Lower Yangtze delta.⁸⁴

Several problems may affect the accuracy of my estimates. Firstly, we have less than sufficient information on demographic change, especially for Ming, and this is the weakest link in the chain of the reasoning. Secondly, we should not let ourselves be biased by dynastic divisions. It is only for convenience that I continue to use terms such as “Song China” and “Ming China” in the estimates of real income per capita. In the first case, the Tang-Song transition will be a more significant concept to demonstrate what changes happened in society and economy from the tenth century through the thirteenth century. As for the fourteenth century crisis—which I think lasted through the fifteenth century—it marks a beginning of a new phase. Within these stages one can still find variances by arguing for more divisions, such as the invasion of the Jurchens which ended Song governance in North China. But such divisions make sense only at a secondary order.

Ecological factors, including natural disasters and epidemic diseases, also play an

⁸⁴ For the economy and society in the Lower Yangtze Delta after 1400, see Fujii, 1953-4; Fu Yiling, 1956, 1957; Fan Shuzhi, 1990; Chen Xuewen, 1993; Li Bozhong, 1998, 2000.

important role in long-term change. Unfortunately, we have few case studies on epidemic diseases and their impact upon local economies and communities prior to 1800. Nor can we rely on any survey of the general trend of the outbursts of epidemic diseases. As a variable beyond the immediate influence of human activities, they had a significant impact on those activities. The current study of the Ming economy depends too much on the regional case of the Lower Yangtze delta. We are left with little idea of what was going on in North China between the fourteenth and sixteenth centuries. Was it doomed to be backward owing to irreversible damage to the environment brought on by wars and epidemics in the thirteenth and fourteenth centuries?⁸⁵ The answer depends on future research. Transportation matters as well. Pre-industrial China was a land empire with only a few waterways that could play a significant role in long-distance trade. In the Song, however, we have ample evidence to support an obvious decline in transportation costs in waterway transportation.⁸⁶ The water way canal system centered around Kaifeng linked many natural waterways to constitute a very developed network at a national scale.⁸⁷ Comprehensive research on transportation over Song-Ming times will help us greatly in examining the sources of economic growth in a pre-industrial economy.

The reader who keeps all these questions in mind will, I believe, find that the estimates here are consistent, and they show the superiority of the Song economy.

⁸⁵ For the study of ecological changes in northern China, see Zou Yilin, 1978, 1997. Also see Appendix C.

⁸⁶ See Table AD-1 in Appendix C.

⁸⁷ Quan, 1944; Ikeda Shizuo, 1939-40. See also the transportation section in Shiba, 1968.

Prices and the Money Supply

1. Peng's index of rice prices

Although a few scholars have studied a specific dynasty's prices, such as that of the Song prices (960-1279), Ming prices (1378-1644) or Qing prices (1644-1912), the only comprehensive study to cover all periods of later imperial China's prices is Peng's work, *A Monetary History of China*.⁸⁸ Peng's and others' data series cannot give us a detailed account of short-term fluctuations (such as seasonal changes and regional variances) in grain prices, because for every 3-4 years one can find only one record, which was often not at the same site but in close proximity. Nonetheless, the general trend described by Peng's observation of long-term changes in prices (such as that of grain and textile goods) has been supported by all the other data series based on a specific dynasty. But even Peng failed to make an explicit cross-dynastic comparison that would allow us to view changes at the different price levels from the tenth century down to the twentieth century through a single index, and therefore, to link changes in prices to changes in the real economy.⁸⁹ In order to provide such an index, I have tabulated a series of Peng's indexes of rice prices into a single index—the Peng index—as following.

Table AA-1. Peng's index of rice prices, 960-1910

⁸⁸ For the study of the Song prices, see Wang Shengduo (1987), Miyazawa (1998), Long Denggao (1993); for the Ming prices, see Quan (1967), Atwell (1990, 1998), Huang Miantang (1985); for the Qing prices see von Glahn (1996), Kishimoto (1997).

⁸⁹ Peng certainly acknowledges at some places of his book the rising trend in grain prices during the Tang-Song transition and the extraordinarily low level of grain prices in the fourteenth and fifteenth centuries.

Period	Index*	Price**	Period	Index	Price
961-70	100	12.39	1181-90	359	44.5
971-80	153	19.02	1191-1200	510	63.19
981-90	95	11.76	1201-10	775	96.08
991-1000	119	14.73	1211-20	367	45.56
1001-10	184	22.76	1221-30	401	49.66
1011-20	95	11.79	1231-40	306	37.9
1021-30	98	12.21	1241-50	306	37.9
1031-40	159	19.67	1251-60	305	37.83
1041-50	382	47.33	1361-70	89.7	11.12
1051-60	136	16.81	1371-80	280	34.73
1061-70	207	25.7	1381-90	140	17.35
1071-80	444	55.1	1391-1400	105	13.02
1081-90	260	32.25	1401-10	85.4	10.59
1091-110	283	35.04	1411-20	*	*
1101-10	481	59.61	1421-30	104	12.87
1111-20	366	45.37	1431-40	78	9.63
1121-30	2141	265.42	1441-50	84	10.41
1131-40	1960	243	1451-60	100	12.38
1141-50	243	30.18	1461-70	122	15.07
1151-60	346	42.84	1471-80	124	15.33
1161-70	355	44.05	1481-90	148	18.39
1171-80	297	36.81	1491-1500	180	22.31

1501-10	172	21.3	1731-40	301	37.37
1511-20	144	17.83	1741-50	344	42.69
1521-30	162	20.14	1751-60	493	61.06
1531-40	172	21.3	1761-70	518	64.22
1541-50	165	20.48	1771-80	458	56.75
1551-60	184	22.75	1781-90	484	60.01
1561-70	182	22.6	1791-1800	591	73.28
1571-80	159	19.66	1801-10	654	81.13
1581-90	203	25.18	1811-20	647	80.19
1591-1600	203	25.22	1821-30	584	72.44
1601-10	215	26.6	1831-40	728	90.19
1611-20	182	22.57	1841-50	679	84.13
1621-30	293	36.37	1851-60	514	63.72
1631-40	271	33.57	1861-70	789	97.84
1641-50	380	47.11	1871-80	523	64.88
1651-60	361	44.81	1881-90	468	58.04
1661-70	258	31.94	1891-1900	724	89.72
1671-80	196	24.31	1901-10	1172	145.28
1681-90	260	32.22			
1691-1700	223	27.5			
1701-10	290	36.01			
1711-20	279	34.53			
1721-30	265	32.84			

Sources: Peng, 1965, 505, 705, .498; 850.

*Index: 961-70=100.

**The price is rice per hectoliter in gram of silver in silver value. The Song rice prices are reported by Peng in silver-tale, and I convert them into silver-gram at the rate: 1 tale of silver weighs 37.68 g.

In the Peng index (Table AA-1) the price of 961-970 is set at 100, it is apparent that the Song grain price gradually climbed up to 200 over nearly a hundred years. By the beginning of the thirteenth century, it had risen to 3.5-4 times the early Song grain price. During the three centuries, Song rice prices continuously rose to 4-5 times that in pre-Song times. However, the long upward trend in prices came to an end in the late fourteenth century. During the Ming, prices moved in the opposite direction. The Peng index demonstrates that, by the early Ming time, it had almost returned to the original low level of the mid-tenth century. Yet it was not the lowest point—grain prices bottomed out in the first half of the fifteenth century. Not until the mid-sixteenth century did the grain price reach 250. And it was only in the second quarter of the eighteenth century that the grain price attained the highest level in the Song grain prices. The two peaks were five hundred years apart.

2. Estimates of the amount of Song coins and the Ming money supply before 1550

By the Fisher Equation, changes in prices are expected to be closely related two other variables at the macro-level: money supply and population. If changes in money supply vary, for instance, much greater than demographic change, then, much of the gap between the Song and the early Ming prices, should be defined as changes in nominal prices, and need to be adjusted for inflation. Meanwhile, a decline in aggregate population could be a consequence of the crisis of the real economy, which in turn indicates a real decline in

living standards and a shrinking of the size of the market economy. Therefore, the emergence of the two price regimes, the Tang-Song and the Ming-Qing, should be further examined under the highlights of changes in both money supply and population over the Song-Ming-Qing time.

But I will focus on changes in money supply over the Song-Ming transition.⁹⁰ A few questions concern the estimates of money supply. First, one has to make sure the means of exchange between the different periods must be comparable before making any comparison; secondly, was there disparity of the circulation of money between the Song and Ming? This will shift our focus from the amount of money supply to the circulation of money, which is certainly more indicative of the total volume of traded goods made in a specific period. If holders of the money in the Song time, for instance, were likely to keep money, then, the total volume of trade would be smaller than what one can expect about. Under such a circumstance, aggregate demand also tended to be constrained.

I can only attempt to tackle the first question here. There are several hints to the second question. In terms of per capita head money supply, the Song consumers had more money than those in the Ming-Qing time until the nineteenth century. Although contemporary opinions in the eleventh-century contemporary often complained the scarcity of bronze coins, and the dearth of money (*qianhuang* 錢荒) was heard in many local communities, it was the period that the Song court produced the largest amount of coins ever in Chinese history.⁹¹ Such a paradox between the Song money circulation and money supply implies an extraordinary size of the Song economy, thus money demand

⁹⁰ The central point with regard to demographic change is that, there was an overall decline for demographic changes during the Song-Ming transition. It is widely accepted that the early Ming suffered a huge loss in population due to wars and natural disasters.

⁹¹ For the dearth of money, see Hino, 1935, 1936, reprinted in 1983, 367-77, 443-7; Gao Chongming, 2000, 333-44.

must be huge then. This will in turn push Song money-holders to spend faster than what one can usually expect for a pre-industrial economy. However, I will assume at this moment that the velocity of money remained constant between the Song and Ming to make the comparison easier to conduct.

The first question points to a variety of means of exchanges during the Song-Ming time. The Song state can be viewed as a regime with active monetary policy. Precious metals such as gold and silver, and the bronze coins produced by the imperial mints would account for the major body of money in circulation. In addition, bills of exchange (*feiqian* 飛錢 or *bianqian* 便錢) began to be widely used in the tenth century and later the government initiated paper money in the twelfth century. The Ming state continued to issue paper money (*baochao*), but only ended up with hyperinflation that caused the *baochao* worthless in transactions. This gave rise to the using of silver and bronze coins for exchange.

To make a conservative estimate of the Song money supply, I will only include bronze coins produced by the imperial mints. This will severely downplay the total amount of Song China's money supply, since I include both silver and bronze coins in my estimates of money supply in the Ming. In fact, silver output in Song was much more than Ming China's domestic output. However, even so, the conclusion drawn later from in this comparison demonstrates that the total amount of money supply in the Song far exceeded that of the Ming.

Hino has collected the data on Song imperial coinage. The Song imperial mints for bronze coins amounted to 19 in the late eleventh century. The average amount of yearly minted coins is displayed in Table AA-2.

Table AA-2. Average minted coins per year, 995-1119
(000,000 strings)

Year	Amount	Year	Amount	Year	Amount
995	0.8	1021	1.05	1077	3.73
1000	1.25	1030	1.00	1080	5.06
1007	1.83	1050	1.46	1105	2.89
1015	1.25	1065	1.70	1119	3.00

Source: Hino, 1936, in *HKTSR*, Vol.6, 345.

The production of the imperial mints in fact depended upon the sufficient supply of the metals, especially copper and tin. Hino also surveyed the yearly output of copper. The production of the imperial mints in fact depended upon the sufficient supply of the metals, especially copper and tin. Hino also surveyed the yearly output of copper controlled by the Song state, and found that there was a very small margin between the reported copper output and average amount of yearly minted coins.⁹² Therefore, the imperial mints could maintain their production at full scale. Based on Hino's estimates of average yearly minted coins, Gao Congming multiplied them by years to get the amounts for different periods.

Table AA-3. The amount of minted bronze coins, 995-1119
(000,000 strings)

Period	Amount	Period	Amount
976-82	0.49	1016-48	33.0
983-96	4.20	1049-73	40.0
997-999	2.40	1074-85	54.0
1000-15	18.75	1086-1125	109.20
Total:	262.04		

⁹² Hino, 1936, in *HKTSR*, Vol.6, 357-666.

Source: Gao Congming, 2000, 103.

I also estimate the total amount of the bronze coins produced by the Song imperial mints based on Peng's data. Peng collects 16 figures of yearly imperial minting output for 15 reigns.⁹³ I multiply them by the years of each reign, and the sum is 193.4 million strings. This estimate could be underestimated, either because I exclude iron coins, which had been officially minted and circulated in several regions in the Song, or because of the years (94 years from 15 reigns) taken into account here comprised of only 64 per cent of the total years in the Song prior to 1127. However, the figures show a significant increase in coin minting in the early twelfth century, the New Policy era; the mints had produced 106.8 million strings bronze coins.⁹⁴ This aggregate figure would exceed all of the Song coins minted before. Peng estimates the total amount of the bronze coins produced by Song imperial mints prior to 1127 was 140-150 million strings, and if including privately-minted coins and coins produced by previous dynasties, the size of Song money supply would reach 250-260 million.⁹⁵

Either of the two figures, Gao Congming's estimates and mine, can be hardly taken as the real output of Song bronze coins, but they indicate a spectrum within which the real output could probably fall in. In considering other means of exchanges in circulation such as paper notes, silver and gold, iron coins, Song money supply would at least reach Peng's estimates, thus, 250-60 million strings.

The Ming imperial minting went into decline: it is usually thought to have produced only a small number of coins in the late imperial history. The government was neither willing nor able to produce a large amount of coinage. The peak number of coins

⁹³ Peng, 1965, 451.

⁹⁴ The annual minting output during the New Policy period is given by Peng (Ibid, 401-2, 416).

⁹⁵ Ibid, 451.

annually produced in the early Ming period was about 0.22 million *string* in 1372, which was only 4.3 per cent of the Song annual production in the 1070s. It is estimated that, for the first 174 years, the average annual output was less than 35,000 strings of coins.⁹⁶ As the “monetary contraction” became so apparent, the Ming governments had made no serious attempt to resolve coin dearth in the economy: for the century between the 1430s and the late fifteenth century there was only a few official minting if not at all. The Jiajing reign (1522-1566) launched new attempts to regulate the circulation of coins, which had been then dominated by counterfeiting and coins from previous dynasties, by opening up new mints in Beijing, Yunnan and other provinces. It turned out only a little increase in coin output. It is estimated that for the first 174 years the average annual output of was less than 35,000 strings. This would add up to 4-6 million strings altogether for the aggregate output of the Ming imperial minting from 1368 through 1572, a figure roughly matching the annual output of the Song state in the 1080s.

However, coins, including those from previous dynasties and even counterfeiting, were admitted to be used in small transactions by the imperial authority in most time. Given the scarcity of the coinage from the Ming imperial mints, the majority of coins in circulation were in fact those Song coins preserved into the day. The Ming hoarding discovered today is without exception in possession of a large quantity of Song coins. The special report on the hoarding in Henan, for instance, tells over ten thousands kilograms of Song coins excavated in 3,000 sites across the whole province.⁹⁷ In comparison the excavation of the Ming coins is much limited. For the purpose here we need to know how many Song coins were preserved and used again in the Ming time.

⁹⁶ Wang Yuxun, 2001, 3.

⁹⁷ *Xinyang Zhumadian qianbi faxian yu yanjiu*, 10.

This might be found by checking the proportional size of the Song coins in excavation sites of the Ming hoarding. It is unfortunate that no research has been carried out on the whole quantity of the Song coins from excavation in proportion to that of the Ming coins at the aggregate level. However, Japanese scholars have investigated hoarding sites of Chinese coinage in late sixteenth-century Japan, and finds that the size of the Song coins is about 10 times of the Song coins.⁹⁸ Chinese coinage had been for long time used in Japan as common currency until the mid-seventeenth century. This ration would give a clear implication of how many Song coins in circulation along with Ming coins. Considering that the trade between Ming China and Japan were officially either retarded by the state monopoly or forbidden, most Chinese should flow through smuggling channels into Japan, this probably reduced the potential inflow of Ming coins, which were usually issued through official occasions. Thereafter I will lower the rate to be 8:1 as the normal pattern of Song coins and Ming coins in circulation over the Ming time. However, coins, including those from previous dynasties and even counterfeit currency, were admitted by the imperial authority to be used in small transactions most of the time. I assume the rate of 8:1 as the normal ratio between Song and Ming coins in circulation during the Ming dynasty.⁹⁹ This will increase the total money stock to 36-54 million strings of coins, an amount roughly 15-27 per cent of that in the Song money supply prior to 1125, but already far exceeding the usual expectation of bronze coins in circulation in Ming.

In addition to coins in circulation, silver was used as a major currency. Aggregate silver output from domestic mining then, according to an optimistic view, would reach 25

⁹⁸ Ichiko, 55-61; Peng, 1965, 446-7.

⁹⁹ For how can I reach such a ratio, see Appendix A.

million taels. A second thought will suggest 15-25 million taels silver instead. Therefore, before significant imports of silver into China began in the late sixteenth century, the money supply from the domestic side can be estimated to be 46.5-71.5 million strings of coins in total value: 15-25 million taels of silver plus 36-54 million strings of coins.¹⁰⁰ This figure is only half of the money supply of the Song state prior to 1043. In the succeeding decades of the New Policies the output of coinage outstripped all that had ever been produced previously in the Song imperial mints.¹⁰¹

¹⁰⁰ I estimate 1 tael of silver as being equal to 0.7 string of coins according to the contemporary price of coins in silver.

¹⁰¹ I have dismissed the preservation of silver from previous dynasties into the Ming circulation. Certainly the Ming economy inherited certain precious metals from previous dynasties, but contrary to the case of Song coins, precious metals such as gold and silver, because of its precious value in relatively small volume, had more likely been transferred outside China or disappeared over nearly three centuries of wars before the establishment of the Ming state. To make the estimate convenient, I also dismiss silver from the Song money supply, and step still further to dismiss the potential inheritance of silver by the Ming. This dismissal would underestimate more severely the Song money supply than it does for the Ming.

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