Monetary And Real Aspects Of The Great Divergence Between Europe And Asia, 1500-1800

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***Abstract*:**

Silver wages were substantially higher in Europe than in Asia during the early modern period. We show that this was not simply the result of inflation in Europe following the inflow of bullion from the New World, since this "price revolution" affected all regions, including Asia. Higher silver wages in Europe reflected higher productivity in the traded goods sector and afforded European consumers greater command over traded goods. Drawing on the new economic geography literature, we link this higher European productivity to agglomeration effects associated with urbanisation.

I. Introduction

Silver wages in Asia were a small fraction of those in Europe during the early modern period. Broadberry and Gupta (2005) argue that this reflected real differences in the level of economic development, along the lines of the modern relationship between a developed country and a less developed country (LDC). The fact that grain wages in early modern Asia were much closer to European levels, despite the low level of silver wages, is analogous to the modern situation, where: (1) Wages in the LDC meet the food needs of the population given the price of food in the LDC, but would not purchase sufficient food in the developed country at developed country prices (2) Manufactures produced in the LDC are relatively expensive within the LDC at LDC prices, but are competitive on world markets because of the low wages measured in developed country prices. Higher silver wages in north-western Europe can thus be seen as

providing greater purchasing power over traded goods and hence delivering higher real consumption wages. This interpretation conflicts strongly with the claim of writers such as Pomeranz (2000) and Parthasarathi (1998) that the most developed parts of Asia were on the same development level as the most advanced parts of Europe as late as the end of the eighteenth century. However, it is supported by the recent work of Allen et al. (2005) and Bassino and Ma (2005),who find considerably lower real consumption wages in Asia throughout the eighteenth century.

Our earlier paper focused on establishing the extent of the silver wage gap between Europe and Asia during the early modern period, and demonstrating that it could be explained by real productivity differences. Space constraints did not allow us to explore fully the role of monetary factors or to pursue the sources of the productivity differences. Both issues are explored in this paper. Dealing first with monetary factors, we provide quantitative evidence to demonstrate that the higher silver wages in northwest Europe cannot be explained simply by inflation following the inflow of bullion from the New World since: (1) Bullion flows from the New World entered Europe via Spain, but price levels moved together in most European countries, consistent with the monetary approach to the balance of payments (2) While price levels moved together, silver wages diverged, with Britain and the Netherlands pulling ahead of Spain and Italy (3) There were also significant bullion inflows to Asia, consistent with significant changes in Asian price levels, and again consistent with the monetary approach to the balance of payments. (4) Although there were long periods of disequilibrium in bimetallic exchange ratios between Europe and Asia, arbitrage ensured an eventual return to equilibrium. No such equilibration occurred between European and Asian price levels. (5) Silver wages remained low, even in the most advanced parts of Asia, including the Yangzi delta region of China and south India.

Turning, secondly, to the sources of productivity differences between Asia and Europe, we draw on the new economic geography literature to explore the link between higher productivity in Europe and agglomeration effects associated with urbanisation (Ciccone and Hall, 1996). Core and peripheral regions emerge in this framework, with increasing returns to scale leading to high productivity in areas with high economic mass as a result of Marshallian external economies despite the presence of constant returns to scale at the level of the individual firm (Fujita et al, 1999; Fujita and Thisse, 2002).

The paper proceeds as follows. The next section sets out silver wage differences between Europe and Asia, extending the results presented in Broadberry and Gupta (2005) to include more cities and regions. This is then followed in sections III and IV by an investigation of monetary explanations of the "price revolution" in Europe, the Near East and Asia. Section V examines real aspects of the silver wage gap, focusing on the link between urbanisation and productivity, while Section VI concludes.

Ii. Silver Wages In Europe And Asia

Table 1 presents data on the daily silver wage of unskilled labourers in Europe and Asia between the early sixteenth century and the mid-nineteenth century. This is the daily money wage, expressed in local currency units, converted to reflect their silver content. Before 1500, the highest silver wages within Europe were paid in the south, particularly in northern Italy and Spain. Between 1500 and 1850, there was little positive trend in the south European silver wage, and silver wage leadership passed to north-western Europe, particularly the Netherlands and England. England emerged as the clear silver wage leader by the early nineteenth century. In central and eastern Europe, silver wages followed

the south European trend of fluctuations with little positive trend, but starting from a lower level. Hence central and eastern Europe remained the low wage part of Europe throughout the early modern period.

Data from Özmucur and Pamuk (2002) on the Ottoman Empire suggest that silver wages in Istanbul followed roughly the south European path. Silver wages in India were low, even by central and east European standards, and Chinese wages were little higher. However, we cannot rule out some overlap between the Yangzi delta and parts of central and eastern Europe, such as Leipzig, given uncertainties over the data.[1] The central issue is thus how to explain how silver wages in north-western Europe diverged from other parts of Europe and from the Near East and Asia. This is the Great Divergence.

III. Bullion Flows And The Price Revolution In Europe

1. The "price revolution" in Europe

The rising silver wages in Table 1 cannot simply be taken as indicative of rising living standards, because prices also increased. Table 2 shows the extent of the increase of the price level in a number of European countries, based on a common basket of goods that includes bread, other food items, cloth and fuel, and with all prices measured in terms of silver (Allen, 2001: 421). A substantial increase in the price level occurred all over Europe between the beginning of the sixteenth century and the middle of the seventeenth century. This is known in the literature as the "price revolution", and it has been linked widely to the inflow of bullion from the New World, using the quantity theory of money as a theoretical justification (Hamilton, 1934; Braudel and Spooner, 1967).

[1] These issues are discussed in more detail in Broadberry and Gupta (2005).

2. The quantity theory of money and the classical price-specie-flow mechanism

In Fisher's (1926) formulation of the quantity theory of money, used by Hamilton (1934) the supply of money (*M*) times the transactions velocity of circulation (*V*) is equal to the real volume of transactions (*T*) times the price level (*P*):

$$M.V = P.T \qquad (1)$$

In this formulation, an increase in the money supply may be expected to lead to an increase in the price level so long as the velocity of circulation is stable and the level of transactions remains fixed.

Table 3 provides data on the bullion flows into and out of Europe between 1500 and 1800. Although the growth rate of bullion imports into Europe from the New World was at its peak during the sixteenth century, it remained strongly positive during the period of price stability in the seventeenth and eighteenth centuries. Also, note that there were significant exports of bullion from Europe.

The influx of bullion from the New World entered Europe via Spain. However, as is apparent from Table 2, the "price revolution" was a wider European affair. The traditional way in which this has been understood is via the price-specie-flow mechanism (Hamilton, 1934). An initial increase in the price level in Spain was seen as making Spanish exports less competitive in other European markets and imports from the rest of Europe more competitive in the Spanish market. This then led to a deficit on current account, which brought about an outflow of bullion from Spain to other European countries with a surplus on current account. The bullion inflow into these other European countries then raised prices and restored equilibrium in the balance of payments.

Some doubt was cast on the details of Hamilton's (1934) approach by detailed study of the size and timing of these bullion flows and the start of the inflationary process, however. First, Hamilton (1928: 35) himself

noted that the correlation between the bullion inflows and inflation became weaker over time, which he ascribed to the fact that it was the stock of bullion that was crucial, with a given scale of bullion inflow having a progressively weaker effect as the stock increased. Second, Hamilton (1934) also acknowledged that Spanish prices were already rising before the influx of bullion from the New World, while Cipolla (1955) showed, in turn, that prices in Italy began rising decades before any influx of bullion from Spain.

3. Stock-flow distinctions and the Cambridge equation

The importance of the stock of money can be dealt with by reformulating the quantity theory of money in its modern Cambridge form, as noted by Doherty and Flynn (1989):

$$M = k.P.Y \qquad (2)$$

In the Cambridge equation, M is now the stock of money, k is the income velocity of circulation and Y is the level of income. An increase in the stock of money, brought about by an inflow of bullion, will increase the price level so long as the income velocity is stable and the level of income remains fixed. However, this formulation now makes clear that it is the stock of money interacting with the demand for money that determines the price level, and a clear distinction is maintained between the flow supply and the existing stock. This stock-flow distinction is important in understanding how disequilibrium was able to persist for some time in the presence of arbitrage opportunities.

4. The monetary approach to the balance of payments

To overcome the problems of the timing of bullion flows and the start of inflation, the argument can be reformulated in terms of the monetary approach to the balance of payments (Flynn, 1978). In this approach, the initial impact of the inflationary monetary shock in Spain

was transmitted abroad via the law of one price, which means that traded goods must sell at the same price in all countries. This is justified by the arbitrage opportunities that would otherwise exist. Clearly, in the early modern period, this should be seen as a long run equilibrium condition. To the extent that the law of one price can be seen as holding approximately, the increase in traded goods prices in other countries raised the demand for money, without necessarily requiring the equilibrating bullion movements of the price-specie-flow mechanism (Craig and Fisher, 2000: 70-71). Similarly, it was not necessary for the bullion flows into Spain to precede the rise of prices there.

5. Trends in wages and prices

Bullion flows cannot offer an explanation of the regional pattern of silver wage trends within Europe in Table 1. For although prices appear to have followed similar trends in most European countries, wages diverged. Hence deflating the daily silver wages from Table 1 by the cost of the basket of commodities used to construct the consumer price index in Table 2 leads to a pattern of daily real consumption wages in Table 4 that is similar to the pattern of silver wages, with a divergence between the northwest and the rest of Europe.

As Broadberry and Gupta (2005) note, the pattern of real wages in Europe would become more optimistic if allowance were made for (1) the increasing number of days worked per year with the Reformation of the sixteenth century and the “industrious revolution” of the eighteenth century and (2) the structural shift to higher wage occupations associated with urbanisation. Furthermore, this more optimistic picture would undoubtedly be strengthened if some luxury products were included in the basket of commodities used to compare the cost of living across both space and time. For, as Hoffman et al. (2002: 334) note, the relative price

of luxuries was declining, and luxuries were becoming more important in the nations of northwestern Europe.

IV. Money, Prices And Wages In The Near East And Asia

1. Bullion flows to Asia

India's main import from the sixteenth century to the early part of the eighteenth century was bullion. These inflows of silver and gold could be converted into coins at a large number of mints and also by private traders. In Table 3, we provided data on the annual outflow of bullion from Europe, so as to obtain an estimate of the annual net inflow of bullion into Europe. Some of these bullion exports from Europe went to the Baltic, but the majority went to Asia via the English East India Company (EIC) or the Dutch *Verenigde Oostindische Compagnie* (VOC). These flows are shown in Table 5, along with a rough estimate of further bullion exports from Europe via the Levant, most of which also ended up in Asia (Chaudhuri, 1978).[2] To these flows of bullion into Asia must be added direct shipments from the Americas to the Philippines (Barrett, 1990).

For most of the period 1600-1800, the annual inflow of bullion into Asia was roughly half the net inflow into Europe. Since the population of Asia was between three and four times the population of Europe between 1500 and 1820, this added up to a considerably smaller per capita bullion inflow into Asia than into Europe (Maddison, 2001: 241). Any analysis based upon the Fisherian quantity theory of money and the price-specie-flow mechanism, then, would have to predict a smaller increase in Asian than in European prices. On this analysis, we would expect the price revolution in Asia to be a more modest affair than in Europe, and this is

[2] Subrahmanyam (1994: 198-203) is critical of the assumption of a fixed annual flow of 50 tonnes via the Levant, but his alternative estimates for a number of years between 1622 and 1710, although showing quite sharp fluctuations, are not obviously inconsistent with an average annual flow of 50 tonnes over the period as a whole.

consistent with the greater controversy over the applicability of the term to Asian experience.

However, using the Cambridge equation, if the stock of money was initially smaller in Asia, a relatively small bullion inflow could lead to a large proportional change in the money stock. Furthermore, an analysis based upon the monetary approach to the balance of payments, would predict an increase in the price of traded goods in Asia similar to that in Europe. One further point to bear in mind when assessing the applicability of the price revolution to Asia is that it has long been common practice to convert European prices into silver prices throughout the early modern period. But as Flynn (1984: 409) notes, this is not always the case in Asia, where inflation in silver prices may be masked by changes in the relative price of other metals used as money.

This brings us to a further important point. Although we have discussed bullion flows in terms of silver equivalent, lumping together gold as well as silver, it should be noted that inflows to Asia were largely in the form of silver, since there were periods when the relative price of silver was substantially higher in Asia than in Europe (Flynn, 1986). This has been explained by an increase in the Asian demand for silver as a result of the conversion of the Chinese monetary and taxation systems to silver (Flynn and Giráldez, 1995; von Glahn, 1996). Such problems of disequilibrium are common in bimetallic monetary systems, and can exist over quite long periods when bullion flows are small relative to stocks (Flynn, 1986: 49).

2. The price revolution in the Ottoman Empire

Pamuk (2000) provides an up-to-date quantitative overview of the price revolution in the Ottoman Empire. The price index for Istanbul, based largely on food and raw materials, is shown in Table 6, derived from Özmucur and Pamuk (2002). Although there was a very sharp

increase in prices measured in nominal *akçes* during the conventional period of the price revolution, between the beginning of the sixteenth century and the middle of the seventeenth century, the bulk of this was due to the debasement of the currency. Measured in silver, the price index recorded a much more modest increase, of the same order of magnitude as the least inflationary of the European cities shown in Table 2, Naples and Krakow. Although the debasements became more extreme over time, with the price index in nominal *akçes* increasing by a factor of nearly sixty by the mid-nineteenth century, prices in silver remained remarkably stable. Similar price increases were observed in Bursa, Edirne and other cities of the Marmara basin (Pamuk, 2000: 125).

3. The price revolution in India

There is a substantial literature on the applicability of the idea of a price revolution to India. We have already noted in Table 5 the inflows of bullion to Asia via the English and Dutch East India Companies, and the inflows to India have been studied in detail by Chaudhuri (1978) for the EIC and Prakash (1985) for the VOC. The effects of these bullion flows on the money supply in Mughal India are estimated by Moosvi (1987), building on Hasan's (1969) pioneering use of catalogued coin finds. Moosvi (1987: 79, 84) finds that the per capita stock of silver coins almost doubled between 1595 and 1637. Although the accuracy of these estimates has been questioned by Prakash (2001: 70-72), the fact that there was a substantial increase in the money supply is not in doubt. What is more controversial is the effect of these bullion flows on prices, with scholars coming to different conclusions on the basis of regional price data.

Historians of Mughal India find evidence of a price revolution in the seventeenth century, with grain prices in northern India doubling between 1595 and 1637, in line with the doubling of the per capita stock of silver

coins noted by Moosvi (1987). Habib's (1982: 373) data for Agra are reproduced here in Table 7. Although it may be objected that 1637 was a year of scarcity, when prices were abnormally high, the price level was even higher in 1670, a year of plenty (Habib, 1999: 90-93). This increase in the price level from the 1595 benchmark is demonstrated for a wider range of products and years in the recent study by Haider (2004). Moosvi's (2001) data for Surat in Table 7 are also consistent with a seventeenth century price revolution, despite the later base of 1609-30 for the price index.

Table 7 also includes price data for a number of other regions. Since the data are patchy and refer to different time and spatial points, we have reported averages over 50-year periods, as with the European data. The data for the South, Bengal and East Rajasthan point to a second period of rising prices during the eighteenth century. The claim of Prakash (1994: 165) that there was no statistically significant upward trend in the price of rice, wheat, sugar and clarified butter in Bengal appears to depend on the consideration of a relatively short period, 1657-1714. Similarly, Subrahmanyam's (1994: 203-209) claim of no clear upward price trend in Bengal, Surat or East Rajasthan depends on the selection of particular periods during parts of the seventeenth and eighteenth centuries. For the eighteenth century as a whole, recent work by Datta (2000: 440-445) shows a clear upward trend in the price of rice and other food products in Bengal.

One further point concerning the scale of the price revolution in India relates to the trend in interest rates. Prakash (1985: 13) argues that to the extent that transactions were increasing, bullion inflows need not have led to a higher price level. However, if the transactions demand for money was increasing in line with the increase in the money supply (resulting from the bullion inflows), we should not expect to see the downward trend in interest rates noted by Moosvi (2002) between the

seventeenth and early eighteenth centuries in all four main regions of India.

4. The price revolution in China

Data for the price of rice in China are available on a continuous basis back to the fourteenth century. The silver price of rice between 1500 and 1800 is shown here in Table 8 on a fifty-year average basis for China as a whole, taken from Cartier (1981). The increase in the silver price of rice between the mid-sixteenth and mid-seventeenth centuries is clearly visible, and mirrors the price revolution occurring at the same time in Europe. Graph 1 charts the same data on a decade average basis, indexed on 1381-90=100. Note, however, that the price increase from the base year is smaller if prices are expressed in terms of bronze cash, since the exchange ratio between bronze cash and silver was also changing. Cartier's (1981) work is thus important in showing how the choice of monetary units affects the extent to which Asia can be seen as having experienced a price revolution (Flynn, 1984: 409).

Pomeranz (2000) argues that the Yangzi delta region should be seen as more developed than the rest of China, so it is useful to consider data for this region alone. Wang (1992: 40-47) presents data for the Yangzi delta region on an annual basis for the period 1638-1935, which forms the basis of the fifty-year averages in Table 9. As in the rest of China, rice prices were at a high level in the first half of the seventeenth century, and experienced a sharp downward movement from the middle of the seventeenth century before resuming an upward trend in the eighteenth century. Wang (1992: 57-58) assembles data on the stock of silver at a number of points in time, and shows that rice prices moved broadly in line with silver stocks, consistent with the quantity theory of money.

5. Real consumption wages in the Near East and Asia

Özmucur and Pamuk (2002) and Allen et al. (2005) provide estimates of real consumption wages for unskilled labourers in the Ottoman Empire and in China on a comparable basis to the European real consumption wages in Table 4. The price of a similar basket of commodities, dominated by food, is constructed for each country, to deflate the daily silver wage of an unskilled labourer. For China, real consumption wages in Beijing were on a par with Milan during the eighteenth century, at around one third of the London level, and the situation was a little bit worse in Canton. In the Ottoman Empire, the real consumption wage on this basis was around half the London level between 1500 and 1800, before falling further behind during the nineteenth century (Özmucur and Pamuk, 2002: 312).

6. Bimetallic exchange ratios

Bimetallic exchange ratios were substantially different in Europe and Asia for long periods between 1500 and 1800, and to understand these persistent differences, it is essential to keep a clear distinction between stocks and flows of bullion (Doherty and Flynn, 1989). Flynn and Giráldez (2002: 392) identify two “silver cycles” when the bimetallic exchange ratios were substantially different in Europe and Asia, and these can be seen in Table 10. The “Potosí/Japan cycle” is seen as running from the 1540s to the 1640s, when the gold-silver exchange ratio was substantially lower in Asia than in Europe. At the peak of the disequilibrium, the gold-silver exchange ratio was about twice as high in Europe as in Asia, creating a strong incentive for European merchants to pay for Asian goods in silver. Hence equilibrium had been restored by the mid-seventeenth century, as a result of arbitrage. A second “Mexican cycle” is also seen by Flynn and Giráldez (2002: 392) as covering the first half of the eighteenth century. Here the peak European gold premium

was only around 50 per cent, and equilibrium had been restored by the mid-eighteenth century.

Doherty and Flynn (1989) attribute the persistence of the disequilibria to the fact that even substantial flows of bullion take a long time to have a large effect on stocks. Flynn and Giráldez (2002: 399) also stress the importance of dynamic demand factors, with the conversion of the Chinese monetary and fiscal systems to silver seen as playing an important role in raising the relative price of silver in Asia between the mid-sixteenth and mid-seventeenth centuries (von Glahn, 1996). Rapid Chinese population growth is seen as playing a similar role in the first half of the eighteenth century (Flynn and Giráldez, 2002: 406; Maddison, 1998: 169).

All this represents a welcome correction to existing accounts in the European literature, where countries as large as China and India are often portrayed as playing a purely passive role in the early modern world economy. However, note that this does not mean that there was no difference in the level of development between Europe and Asia. Remember that we are seeking an explanation for levels of wages and prices in Asia that were lower than in Europe throughout the early modern period. Showing that there were disequilibria in the gold-silver exchange ratios for long periods is not sufficient for this purpose if equilibrium was eventually restored, as in the mid-seventeenth century and again in the mid-eighteenth century.

It must also be borne in mind that the countries which acquired the bullion by colonisation were not the countries which prospered. Indeed, Spain and Portugal stagnated during the early modern period and were overtaken by Britain and the Netherlands, which acquired their silver for export to the east through intra-European trade. Indeed, it must not be forgotten that intra-European trade dwarfed inter-continental trade at this

time, so that a full understanding of the Great Divergence requires an examination of the institutions of short distance trade.

V. Real Aspects Of The Silver Wage Gap

1. The Balassa-Samuelson model

Although we accept a role for monetary forces in the rise of the general price level, in line with the quantity theory of money and the monetary approach to the balance of payments, we have seen on closer examination that this does not offer a satisfactory explanation of the higher silver wages in Europe than in Asia. Broadberry and Gupta (2005) offer an explanation based on divergent developments in the real economy, and originally proposed by Balassa (1964) and Samuelson (1964) to explain the observation of a higher price level in developed countries compared with LDCs.

The basic argument is that high silver wages in the European traded goods sector were the result of high productivity in that sector. This then led to high silver wages in the European non-traded goods sector, as well as the traded goods sector, because of the integration of national labour markets. For simplicity, the economy was divided up into two sectors, and the non-traded sector equated with grain, which is bulky and difficult to transport over long distances. Asian countries were able to export to Europe despite lower productivity in the traded goods sector, because of the low silver wages in Asia. Note also that grain prices were kept low in Asia because of the low silver wages, so that Europe-Asia differences in grain wages were much smaller than the differences in silver wages.

2. Urbanisation and agglomeration effects

The Balassa-Samuelson model explains how higher productivity in Europe can be used to provide a real explanation of the higher silver wage in Europe. In this section we note how this higher productivity in Europe can be explained in turn by agglomeration effects arising from the greater extent of urbanisation. Ciccone and Hall (1996) seek to explain differences in wages within a single country, but their model can also be used to explain differences between countries where there are differences in levels of urbanisation. They begin with an equation relating output per acre to employment per acre at the county level:

$$\frac{q_c}{a_c} = \left(\frac{n_c}{a_c}\right)^{\gamma} \qquad (3)$$

where q_c is output, n_c is employment and a_c is the area, all in county c. Ciccone and Hall (1996: 56) treat the parameter γ as the product of two effects, combining congestion costs and agglomeration benefits. If $\gamma > 1$, the agglomeration effect dominates and an increase in the density of economic activity leads to increasing returns to scale. Solving (3) for county level output yields:

$$q_c = n_c^{\gamma} a_c^{1-\gamma} \qquad (4)$$

Aggregating to output at the state level (Q_s), and dividing by state level employment (N_s) yields state level labour productivity:

$$\frac{Q_s}{N_s} = \frac{\sum_{c \in C_s} \left(\frac{n_c}{a_c}\right)^{\gamma} a_c}{N_s} \qquad (5)$$

which depends positively on the density of employment at the county level so long as $\gamma > 1$. This model is used by Ciccone and Hall (1996) to motivate empirical analysis which relates variations in state level labour productivity to variations in the density of economic activity within those states. Similarly, the model can be used to explain variations in labour

productivity between countries in terms of variations in the density of economic activity within countries.

One natural measure of the density of economic activity is the level of urbanisation. As well as providing systematic quantitative evidence on comparative levels of wages and prices in early modern Europe and Asia, Broadberry and Gupta (2005) noted that there were also important differences in levels of urbanisation, both within Europe and between Europe and Asia. The data are summarised here in Table 11. As van Zanden (1999: 181) notes, there is a strong positive correlation ($R^2=0.65$) between the silver wage by country and the urbanisation ratio by country within Europe. Adding China to the picture confirms this pattern, with urbanisation stagnating in China while accelerating in much of Europe.

3. Urbanisation and the price level

Urbanisation has also been linked to higher prices in the literature on the price revolution of the seventeenth century. Although writers such as Brenner (1961) had always pointed to population growth rather than bullion inflows as the cause of rising prices in Europe, the argument was criticised by McCloskey (1972: 1333) as confusing a relative price change with a change in the overall price level. Indeed, without an increase in the money supply, the quantity theory of money predicts that population growth will lead to a rise in transactions and hence a fall in the price level, so long as velocity is stable (McCloskey, 1972: 1334). As Goldstone (1984) argues, however, urbanisation may be expected to lead to an increase in velocity since the greater density of population and household specialisation leads to more frequent and smaller transactions. Lindert (1985: 623-626) argues that just such an increase in velocity occurred in England during the inflation of the sixteenth century.

The new economic geography literature offers a more general analysis of the positive association between urban density and the price level, grounded in agglomeration economies (Fujita et al., 1999; Fujita and Thisse, 2002). The basic idea is set out clearly by Rice and Venables (2003; 2004) in the context of regional variations within the UK, where both nominal wages and the price level are notoriously much higher in London and the south-east than in the rest of the country. Their model contains many regions, each containing workers of different skills or occupational types, and with at least as many sectors as skill/occupational types. If firms operate under conditions of perfect competition with constant *internal* returns to scale, and face the same price of capital everywhere, they will equate prices and marginal costs in all sectors and all regions.

Rice and Venables (2004) then assume that labour productivity varies across regions in proportion to economic mass, creating increasing returns at the regional level, despite constant returns to scale at the level of the individual firm. The economic geography literature offers three basic reasons for such Marshallian external economies, due to learning (knowledge spillovers between firms), matching (thick markets making it easier to match employers and employees) and sharing (giving firms better access to customers and suppliers in the presence of significant transport costs) (Duranton and Puga, 2004).

With these assumptions, any spatial variation in labour productivity leads to a corresponding variation in wages, with the mobility of production bidding up wages in high productivity regions, so that all the benefits of the higher productivity accrue to labour in the form of high real wages. However, if in addition, labour is mobile across regions, this bids up land and property prices in high productivity regions with high wages, until real income is equated across regions. The core region then has

high productivity and high money wages, but this does not translate into high real wages on account of the higher price level.

The models are based on strong assumptions, but relaxing them tends to add more detail without changing the main conclusions. Thus, for example, to the extent that labour is less than perfectly mobile across regions, there would be some increase in real wages as well as money wages in high productivity regions. Also, the Rice-Venables model assumes distinct occupational types paid different wages. Relaxing this assumption in a world with labour mobility across occupations would lead to results more in line with the Balassa-Samuelson model, with high wages in the high-productivity traded goods sector spreading to the low-productivity non-traded goods sector and raising the price level in the core region.

VI. Conclusion

Silver wages were substantially higher in Europe than in Asia during the early modern period, just as they were higher in northwest Europe than in other parts of Europe (Broadberry and Gupta, 2005). Higher silver wages in northwest Europe cannot simply be explained by inflation following the inflow of bullion from the New World, since: (1) Bullion flows from the New World entered Europe via Spain, but price levels moved together in most European countries, consistent with the monetary approach to the balance of payments (2) While price levels moved together, silver wages diverged, with Britain and the Netherlands pulling ahead of Spain and Italy (3) There were also significant bullion inflows to Asia, consistent with significant changes in Asian price levels, and again consistent with the monetary approach to the balance of payments. (4) Although there were long periods of disequilibrium in bimetallic exchange ratios between Europe and Asia, arbitrage ensured

an eventual return to equilibrium. No such equilibration occurred between European and Asian price levels. (5) Silver wages remained low, even in the most advanced parts of Asia, including the Yangzi delta region of China and south India.

High silver wages in north-western Europe cannot thus be dismissed as simply the result of monetary factors, but must be seen as reflecting real economic development (Broadberry and Gupta, 2005). Europe had higher productivity in the traded goods sector. High productivity in traded goods led to high silver wages in Europe, in the non-traded goods sector as well as the traded goods sector, due to the integration of labour markets. Asian countries were nevertheless still able to export to Europe despite lower productivity in the traded goods sector because of the low silver wages in Asia combined with the high productivity of the European distribution system. Higher silver wages in Europe hence yielded purchasing power over traded goods and led to higher real consumption wages despite the similarity of grain wages in Europe and Asia. Drawing on the emerging theoretical literature on new economic geography and building on the empirical observations that Europe was more urbanised than Asia, and north-western Europe was the most urbanised part of Europe, we link the higher productivity in Europe to agglomeration effects.

Table 1: Silver Wages Of Unskilled Labourers In Europe And Asia, 1500-1849 (Grams Of Silver Per Day)

	1500-49	1550-99	1600-49	1650-99	1700-49	1750-99	1800-49
North-western Europe							
London	3.2	4.6	7.1	9.7	10.5	11.5	17.7
Southern England	2.5	3.4	4.1	5.6	7.0	8.3	14.6
Amsterdam	3.1	4.7	7.2	8.5	8.9	9.2	9.2
Antwerp	3.0	5.9	7.6	7.1	6.9	6.9	7.7
Paris	2.8	5.5	6.6	6.9	5.1	5.2	9.9
Southern Europe							
Barcelona	4.7	5.3	6.2	7.0	5.4	6.0	--
Valencia	4.2	6.6	8.8	6.9	5.7	5.1	--
Madrid	--	6.3	8.0	--	5.1	5.3	8.0
Milan	--	--	5.9	4.1	3.2	2.9	3.1
Florence	2.9	3.8	4.7	--	--	--	--
Naples	3.3	3.5	5.3	4.8	4.8	3.8	3.8
Central & eastern Europe							
Gdansk	2.1	2.1	3.8	4.3	3.8	3.7	4.8
Warsaw	--	2.5	3.2	2.7	1.9	3.4	4.9
Krakow	1.9	2.9	3.4	2.9	2.2	2.9	2.4
Vienna	2.7	2.6	4.4	3.5	3.2	3.0	2.1
Leipzig	--	1.9	3.5	3.9	3.7	3.1	4.4
Augsburg	2.1	3.1	4.0	4.7	4.2	4.3	--
Ottoman Empire							
Istanbul	3.3	3.3	3.9	4.0	3.5	3.8	5.5
India							
Northern & western	--	0.7	1.1	1.4	--	--	1.8
Southern	--	--	1.2	1.4	1.5	1.2	--
China							
Yangzi delta	--	1.5	1.5	--	--	1.7	1.7

Source: Derived from Allen (2001: 416) and Broadberry and Gupta (2005). Additional data for Barcelona from Feliu (1991: 107-108) and for Istanbul from Özmucur and Pamuk (2002: 301).

Table 2: Consumer Prices In Europe, 1500-1799 (1500-49=100)

	1500-49	1550-99	1600-49	1650-99	1700-49	1750-99	1800-49
North-western Europe							
London	100.0	168.9	277.8	315.6	297.8	364.4	566.7
Amsterdam	100.0	193.5	239.1	265.2	254.3	287.0	358.7
Antwerp	100.0	218.6	267.4	265.1	244.2	255.8	306.9
Paris	100.0	203.1	245.3	251.6	201.6	223.4	335.9
Southern Europe							
Valencia	100.0	196.0	268.0	246.7	208.0	232.0	--
Florence/Milan	100.0	151.5	197.0	171.2	143.9	178.8	251.5
Naples	100.0	142.2	168.8	--	120.3	165.6	254.7
Central & eastern Europe							
Gdansk	100.0	155.3	205.3	221.1	192.1	226.3	439.5
Krakow	100.0	137.5	182.5	152.5	132.5	162.5	210.0
Vienna	100.0	141.9	234.9	181.4	172.1	197.7	251.2
Augsburg	100.0	181.3	302.1	218.8	222.9	252.1	316.7

Source: Derived from Allen (2001: 426).

Table 3: Average Annual Bullion Flows To And From Europe, 1501-1800 (Tonnes Of Silver Equivalent Per Year)

	Imports to Europe	Exports from Europe	Net balance
1501-25	40		
1526-50	105		
1551-75	205		
1576-1600	205		
1601-25	245	100	145
1626-50	290	125	165
1651-75	330	130	200
1676-1700	370	155	215
1701-25	415	190	225
1726-50	500	210	290
1751-75	590	215	375
1776-1800	600	195	405

Source: Barrett (1990: 242-243).

Table 4: Real Consumption Wages Of European Unskilled Labourers, 1500-1849 (London 1500-49 = 100)

	1500-49	1550-99	1600-49	1650-99	1700-49	1750-99	1800-49
Northwestern Europe							
London	100	85	80	96	110	99	98
Amsterdam	97	74	92	98	107	98	79
Antwerp	98	88	93	88	92	88	82
Paris	62	60	59	60	56	51	65
Southern Europe							
Valencia	79	63	62	53	51	41	--
Madrid	--	56	51	--	58	42	--
Florence/Milan	62	53	57	51	47	35	26
Naples	73	54	69	--	88	50	33
Central & eastern Europe							
Gdansk	78	50	69	72	73	61	40
Warsaw	--	75	66	72	45	64	82
Krakow	67	74	65	67	58	63	40
Vienna	88	60	61	63	61	50	27
Leipzig	--	34	35	57	53	44	53
Augsburg	62	50	39	63	55	50	--

Source: Derived from Allen (2001: 428).

Table 5: Annual Bullion Flows To Asia, 1601-1800 (Tonnes Of Silver Equivalent Per Year)

	From Europe			Direct from Americas	Total imports
	Via VOC	Via EIC	Via Levant		
1601-25	8	--	50	17	75
1626-50	9	10	50	16	85
1651-75	10	10	50	6	76
1676-1700	21	32	50	15	118
1701-25	43	42	50	15	150
1726-50	45	56	50	15	166
1751-75	51	50	50	15	166
1776-1800	34	40	50	20	144

Source: Barrett (1990: 249, 251).

Table 6: Prices in Istanbul, 1469-1849 (1500-49=100)

	Price in Akçe	Price in silver
1469-99	75	101
1500-49	100	100
1550-99	166	138
1600-49	309	154
1650-99	443	156
1700-49	468	110
1750-99	1,009	151
1800-49	5,729	157

Source: Özmucur and Pamuk (2002: 301).

Table 7: Prices In India, 1595-1800

	Agra (1595 =100)	Surat (1609-30 =100)	South (1610-13 =100)	Bengal (1650-1700 =100)	E. Rajasthan (1650-1700 =100
1595	100				
1609-1630		100			
1610-1613			100		
1637	218				
1641-1700		143			
1650-1700			200	100	100
1670	273				
1701-1750			526	202	183
1751-1800				355	

Sources: Agra: Habib (1982: 373); Surat: Moosvi (2001: 335); South: Arasaratnam (1986: 335-339); Bengal: Prakash (1985: 252-253), Moosvi (2001: 342); Eastern Rajasthan: Subrahmanyam (1994: 209)

Table 8: Price Of Rice In China, 1500-1800

	g of silver per 100 kg rice
1501-1550	20.21
1551-1600	23.08
1601-1650	33.24
1651-1700	32.16
1701-1750	36.69
1751-1800	63.06

Source: Derived from Cartier (1981: 464).

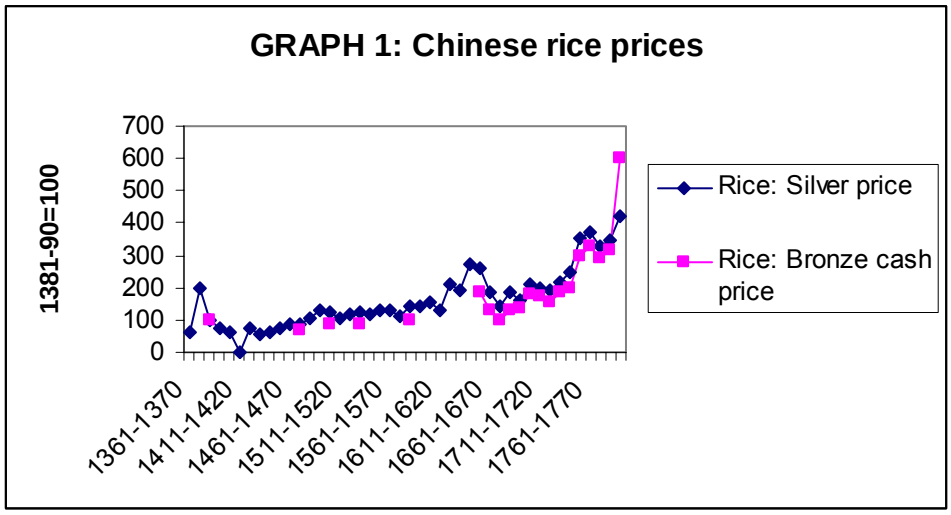

Table 9: Price Of Rice In The Yangzi Delta, 1638-1849

	(1638-49=100)
1638-49	100.0
1650-99	42.2
1700-49	39.8
1750-99	60.5
1800-49	81.6

Source: Derived from Wang (1992: 40-47).
Note: Original prices reported in taels of silver per shi of rice.

Table 10: Gold-Silver Exchange Ratios, 1500-1800 (Units Of Silver Per Unit Of Gold)

	England	France	European average	China	India
1500	12	12	11	9	
1525	12	12	11	7	
1550	12	12	11	6	
1575	12	12	12	6	9
1600	12	12	12	7	10
1625	14	13	13	8	13
1650	14	14	14	14	14
1675	15	15	15	15	15
1700	15	15	15	11	13
1725	15	15	15	10	12
1750	15	15	15	15	14

Sources: Craig (1953: 413-417); Spooner (1972: 330); Braudel and Spooner (1967: 459); von Glahn (1996: 128; 1998); Habib (1982: 367).

Table 11: Urban Shares Of The Population, 1500-1850 (%)

	1500	1600	1700	1800	1850
Europe					
England & Wales	3.1	5.8	13.3	20.3	40.8
Netherlands	15.8	24.3	33.6	28.8	29.5
Belgium	21.1	18.8	24.3	18.9	20.5
France	4.2	5.9	9.2	8.8	14.5
Spain	6.1	11.4	9.0	11.1	17.3
Italy	12.4	15.1	13.2	14.6	20.3
Poland	0.0	0.4	0.5	2.4	9.3
Austria/Bohemia	1.7	2.1	3.9	5.2	6.7
Germany	3.2	4.1	4.8	5.5	10.8
Total Europe	5.6	7.6	9.2	10.0	16.7
Asia					
Yangzi delta					5.6
Total China	4.9	4.9	6.0		3.8

Note: Based on the percentage of the population living in towns of at least 10,000 inhabitants.
Source: Derived from de Vries (1984: 30, 36, 45); Rozman (1973: 282-283, 205-247).

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