

Before and Beyond Divergence:
The Politics of Economic Change in China and Europe

R. Bin Wong

Visiting Senior Research Fellow, Center for Southeast Asian Studies, Kyoto University

University of Tokyo

CIRJE

Economic History Seminar

18 May 2010

[The paper for this presentation is a draft of chapter 4 of Jean-Laurent Rosenthal and R. Bin Wong, *Before and Beyond Divergence: the Politics of Economic Change in China and Europe*, Harvard University Press, forthcoming]

Warfare, Location of Manufacturing, and Economic Growth in China and Europe

Introduction

Our analysis of contracting arrangements put a significant emphasis on the size of the Middle Kingdom and importance of long distance trade in explaining why China relied on informal arrangements more than Europe did. That the size of the Chinese empire encouraged the early rise of long distance markets is well established (Pomeranz 2000). Upon reflection it should cast doubts on a common thesis in economic history that political competition is directly beneficial to economic growth. Political competition historically has meant violent and expensive domestic and international conflict rather than well ordered and cheap elections or even armed peace. Empires, like China, have little political competition and, for a long time in the past, they were rich. In contrast, regions with multiple polities bear the cost of war time and again, and even in peacetime bear distortions to trade that reduce the volume of long distance trade. Economists would do well to remember that most of the restraints to trade that Adam Smith or David Ricardo identified as reducing economic efficiency simply did not exist within Ming-Qing China.

In this chapter we explore the relationship between political competition and economic change further. In particular we focus on the role of war in the rise of mechanical technologies

in Europe starting at the end of the seventeenth century. Our diagnosis of the proximate source of divergence accords with a large literature (most recently Joel Mokyr 2009 and Robert Allen 2009): England and later Europe's per capita income began to rise rapidly after 1750 because that part of the world was more successful in implementing mechanical techniques of production. However, we differ as to the reasons why Europe sprang to leadership. Some have argued for environmental (Diamond 1997), cultural (Mokyr 1990, 2009), and political factors (Jones 1981). To our mind each of these arguments suffers from problems of chronology. While romantically attractive, Mokyr's focus on European enlightenment and openness to new ideas seem to put aside the extensive religious and political conflicts that crippled many parts of the Europe both before and after the Reformation. Enlightenment ideas may have sustained growth but it certainly did not cause it. Much the same can be said of the environmental bonanza that Europe reaped from the colonization of the America (Pomeranz 2000, Jones 1981).

To our minds the causes of economic divergence between Europe and China emerged earlier. By 1500, the European and Chinese economies were on structurally different paths. Leonardo's sketch books may mostly contain drawings of machines that could not be built, but they represent an early manifestation of Europe's love of machines. The passion for mechanical innovation that would blossom over the next three hundred years was far scarcer if present at all in China. The class of potential explanations is very large, but examining key facts about manufacturing before the Industrial Revolution helps us focus the analysis:

- It is now well established that China had an early lead in technology and that its technology continued to evolve long after the famed peak of the 1350s. (Needham 1954)

- By 1000, although low-skill, low-capital handicrafts were rural in both areas and high-skill high-capital industries were urban in both areas, the range of manufacturing that was sustained in cities was much larger in Europe than in China (Van de Wee 1988)
- By 1600, Europeans were developing and deploying machinery more intensely than the Chinese. (Mokyr 1990)
- By 1700, the technology was such that it paid to adopt the new machinery only in a small area of Europe where particular relative price ratios favored capital over labor. (Allen 2007)

Rather than build a theory to explain the fourth or even the third of these points, as is common, we focus on the second and take the first as given. We do so because we want an argument that allows technical leadership to move from one location to another, say from China to Europe or vice versa. We must allow both societies to be technically creative to avoid developing a trivial theory in which Europeans will succeed from the outset. It therefore eliminates all possible arguments that make European cultural or political arrangements superior to those found in China (e.g. Landes 1998). Indeed if coastlines or formal law favored Europe, then why was Europe so poor a dozen centuries ago? It also eliminates all the arguments that focus on European institutions like the corporation, which diffused throughout the world but only came to be important after 1700. These include many arguments that focus on political and cultural developments like the Enlightenment or representative democracy (Mokyr 2002, North and Weingast 1989); while they may have provided powerful boost to the process, they occurred too late to matter. Instead we need to a social process that first gives an advantage to China and then at some point allows Europe to take over.

Our argument has two parts: first, war was responsible for Europe's urban manufacturing; second, Europe's urban bias is precisely what produced the high rate of capital investment and the adoption of machinery in ever greater areas of Europe. In contrast, China's peaceful economy experienced neither the pressure to protect its artisans behind city walls or the consequent inducement to use machines to save on expensive labor. We highlight these long-term tendencies rather than a moment of critical invention, like the appearance of the steam engine in the 1690s because no one critical event in the seventeenth or eighteenth century propelled England or Europe towards mechanization. Moreover, in the fourteenth century, Europe does not appear to have much of a mechanical advantage over China, nor is there any evidence that wages were much higher there than elsewhere in the world. The urban bent of European manufacturing relative to its Chinese counterpart is, however, extremely old. What produced this bias is the focus of this chapter.

Cities and Economic Growth

Rather than ask what pushed Chinese manufacturing to be overly rural, we ask what pushed European manufacturing to be urban early on. While the distinction appears academic it has important analytical implications. In the first case, one sets up the European pattern as efficient and then looks for a Chinese pathology. Such an approach might be appropriate for the mid-nineteenth century when urban industries had clearly become a critical element to growth, but that was far from obvious in 1200. It is more historically relevant to seek out what pushed Europeans to choose urban locations for activities that could have been accomplished equally well in the countryside where food was cheaper, raw material were easier to access, and diseases were less prevalent. It has the additional advantage of allowing us to recognize that China's

economic centers were likely more efficient and prosperous than were Europe's in the fifteenth and sixteenth centuries. Such a reorientation will prove quite fruitful.

The question of why Europeans had so much more of their manufacturing in cities than the Chinese did has three broad potential classes of answers. First, there are demographic and economic factors that could make cities more attractive in one place than another. Second, it could be that differences in political economy led rulers to favor cities at one end of Eurasia rather than another. Finally, there are the consequences of regional differences in political structure, in particular the spatial scales of polities. In our view it is this third set of explanations that is correct, but unlike earlier scholars, we do not view Europe's surge to mechanical leadership as the direct outcome of benevolent policies but rather as the unintended consequence of a regional political system embroiled in costly conflict.

Let us begin by dispensing with some simple questions that might explain what Chinese entrepreneurs might have preferred the countryside. The most obvious candidate is demography. In particular, urban mortality might be responsible for the lack of manufacturing cities in many parts of the world. Prior to 1800, cities everywhere had such high mortality rates that they had to import people from near and far to sustain their populations (Grantham 1993, Wrigley 1967). Artisans might have been tempted to choose rural locations for their shops simply to avoid the pernicious disease environment of cities. Such mortality problems were perhaps more severe in warmer climates (where waterborne diseases tend to proliferate) than in colder ones. But then cities should have been larger and manufacturing more urban in northern areas of China and Europe than in southern ones. In fact, cities and towns grow more rapidly in southern parts of China than in the north after 1100, while Europe's larger cities with more urban manufacturing

were in the south rather than the north before 1500. This demographic argument does not lead to a divergence between China and Europe.

A second possibility for the lack of urban manufacturing in China, was envisaged by Adam Smith; it focuses on the poverty of China's larger population. In other words, capital was more abundant in Europe than in China, and because capital markets were more active in cities, the cost of capital was both lower in Europe than in China and in cities relative to the countryside. To a large extent this is the argument developed by Robert Allen to explain the early adoption of machinery in England (Allen 2007, 2009). While it is very appealing for England in 1730, it is more difficult to sustain for Europe before the Black Death when interest rates were considerably higher than they would later become and wages lower, yet manufacturing was already very urban in Europe (Epstein 2000). While there is little or no data on Chinese wages and interest rates for this early era, the qualitative evidence strongly supports the notion that the empire's manufacturing was already becoming increasingly rural after the founding of the Ming dynasty in 1368.

Beyond simple factor prices one could seek an explanation for the concentration of manufacturing in cities in Europe from economic geography. Research on urban systems has long emphasized the beneficial effects on costs and productivity growth of industrial clusters. In economics parlance manufacturing derives increasing returns from network externalities (see Fujita et al 2001). The idea is that production processes are more efficient when they are spatially concentrated. These externalities have been argued to come from thicker and more specialized input markets, greater competition among firms, and the willingness of workers to acquire job specific skills, because if their firm treats them badly, they can find another employer desirous of their skills next door. It is important to stress, that the existence of such externalities

alone is not sufficient for a divergence between China and Europe. In fact, if the returns from urban location are large and ancient enough they should have been discovered at both ends of Eurasia and the location of manufacturing should have been similar. Furthermore, given the existence of large cities in Asia and in China in particular by 1000, one would assume that China would have embarked on an urban path for manufacturing *prior* to Europe. To obtain a divergence that favors Europe we need to differentiate across economic sectors in order to identify industry-specific externalities with those benefiting from agglomeration economies accounting for a larger share of output in Europe than in China. The one industry that long differentiated Europe from China is probably weapons production (Hoffman 2009). But the scale of those activities was another consequence of Europe troubled politics which we will take up below. On the whole, economics alone is unlikely to explain this urban bias.

The second class of explanations comes from domestic political economy. The range of such theses is wide because either ‘bad’ policies in China or ‘good’ ones in Europe could be responsible for the European bias towards urban manufacturing. If we found Chinese emperors making it difficult for manufacturers to locate in cities (and thus preventing their subjects from taking advantage of the externalities associated with urban manufacturing), we could argue that Chinese entrepreneurs preferred to locate in cities. If we discovered that Chinese emperors suppressed capital markets, thus negating the possibly cheaper costs of capital in cities, then we could argue that bad policies hindered Chinese economic development. Chinese emperors did valorize an ideal of men plowing the fields and women weaving at home, but this political preference did not lead to real constraints on geographic mobility. Nor were people prevented from lending money; prohibitions on extremely high interest rates did not affect the cost and hence availability of funds.

On the European side, medieval historians have long stressed the explicit policies of rulers of Northwest Europe that aimed to attract skilled workers to their territories and to their towns (e.g. Duby 1974, 1979). These policies surrendered some of the sovereign's authority to municipalities or more directly to groups of craftsmen or merchants organized as guilds. There is also evidence that cities and guilds actively attempted to limit the capacity of rural manufacturers to compete with urban producers (Van Der Wee 1988, Vardi 1993, Epstein 2000 ch. 5). Although one might make guilds responsible for the urban structure of production, one should bear in mind that each town had not one but many guilds, and even in a given industry they favored quite different policies. Towns were sufficiently small that no guild controlled the production of any good over any geographically significant market. As we shall see below, the boundary between rural and urban manufacturing was never fixed in Europe. Moreover, European guilds also served to protect their members from the rapacity of the ruler. Indeed, kings and princes were often tempted to confiscate the goods of merchants and craftsmen when they needed cash. As Greif (2006) notes in his examination of the conditions under which merchants might travel to distant markets, individuals have little power to resist rulers' temptation to tax or steal; in fact only groups can stop such expropriation. A broader consideration of this matter leads us to the observation that both the relative scarcity of skilled workers and rulers' rapacity had their root cause, not in some flaw in the domestic political process, but in the ceaseless warfare that Europe experienced. Domestic political economy, like economics, drives us to consider international politics and, in particular, war.

The last class of explanation focuses on regional differences in political structure. For simplicity we take China to be a region of unified political control where war and civil disturbances were infrequent (except on the frontiers), and Europe to be an area of competitive

politics where the likelihood of war and civil strife were much higher and more local. Even in peacetime Europeans and their rulers had to prepare for war; in China that problem was left to the emperor and his generals. Unlike other arguments that emphasize the benefits of political competition without measuring its costs, we recognize that political conflict was not a mere threat in a bargaining game, but something that happened and, when it happened, was expensive. In our view the primary reason for European manufacturing's urban bent was war. Although everyone wanted to escape war's ravages, farming was necessarily tied to the land and peasants to villages. Manufacturing, meanwhile, was both more mobile and more prone to pillage, in particular in activities that produced objects of high value per weight. European artisans therefore sought the protection of city walls rather than the more modest defenses available in villages. In China, by contrast, during the long centuries of dynastic stability the low frequency of warfare led manufacturers to choose their locations according to a different calculus. The relative prices they perceived were less affected by the anticipated ravages of war. The next section develops this argument and begins to trace the long-term impact of differences in the location of manufacturing.

Factor Costs and Manufacturing

We begin with the general observation that in most handicraft activity, firm size is tiny relative to the market, thus competition prevails. As a result, over the long run enterprises will locate where the costs of production are lowest. While the long run may not be a good way to analyze modern economies because factor costs and technologies are constantly changing, it will work well for our case because we are interested in secular tendencies in an era when

technologies and factor costs generally changed slowly but the latter could be subject to shocks that changed the relative costs of capital and labor.

Sixteenth and seventeenth-century cities had advantages and disadvantages relative to the countryside. Urban dwellers faced increased risk of death and illness because concentrated populations are good loci for disease. People who lived in cities also faced higher food prices because staples have to be brought in from rural areas. Thus nominal wages must be higher in cities than the countryside. In consequence an entrepreneur's cost of labor will be lower in rural areas than in urban ones. Evidence for such cost differentials is particularly abundant for the nineteenth century, but can be seen in earlier periods from the correlation between nominal wages and city size. If we consider capital, the reverse relationship will hold: rural projects are more costly to monitor because they are dispersed and (we may assume) individually smaller in scale. The higher costs will bear on borrowers and interest rates in the countryside will be higher than in cities. Evidence for such cost differentials is harder to grasp because in most pre-industrial economies interest rates were not specified in contracts. One can turn to data about the geographic structure of credit market: The systematic pattern of rural individuals going to towns and cities to borrow rather than to lend (and of city dwellers making more loans in the countryside than borrowing there) strongly argues that the cost of capital was lower in cities (Hoffman et al. 2010).

To evaluate the impact of these relative prices we must define the production technology. To keep things simple we begin with a production function where the ratio of capital to labor is fixed (in economist's terms a Leontief technology). For example, assume there is one kind of loom and one type of worker: a Leontief technology arises if the only way to combine workers

and loom is one worker per loom. In the case of fixed factor proportions, the entrepreneur who is seeking to minimize his costs simply picks the location where the input he uses most is cheapest: capital intensive activities locate in cities, while labor intensive activities are in the countryside. In fact, as the analysis in box 4.1 shows, there is a unique level of capital per worker k^* such that all industries (or firms) that use more capital than k^* are in cities while those that use less are in the countryside. This first step produces the classic differences in capital intensities between urban and rural areas, but the proposition on its own offers no help for understanding why China and Europe took different paths.

Warfare creates the difference in factor costs that can cause a divergence in the location of manufacturing between the two ends of Eurasia. War matters because rural projects are more likely to suffer from either civil disturbance or international warfare than urban enterprises. This is particularly true for capital invested in movable goods (equipment, tools, supplies and people) because they can be appropriated by bandits, warlords, or foreign armies during unsettled times. Cities are not immune to warfare. Among other things, war disturbs the trade networks that are essential to cities, and of course their wealth makes them attractive places to pillage. Yet cities can be fortified and resist redistribution through violence. To be sure building walls and hiring guards was expensive, but many manufacturers found it preferable to locate behind city walls than in undefended rural areas. Our interpretation is that war increases the cost to capital in both cities and rural areas but that the rural increment is larger than the urban one. While cities can protect capital they are not as successful with labor because a disturbed peace will hinder economic exchanges between city and countryside, further raising food prices.

In a region beset by threats of warfare, the entrepreneur decides where to locate according to a different set of relative prices and thus a new critical level of capital per worker k_w^* decides what firms are urban or rural (see Box 4.1). Because war has made capital cheaper in cities than in the countryside, that threshold is lower than in the peaceful economy ($k_w^* < k^*$). Simply put, some industries, those with capital labor ratios between k_w^* and k^* , are urban in the warring economy but rural in a peaceable economy. The industries remaining in the countryside during unsettled times are the least capital intensive of all.

[Box 4.1 about here]

Because China had few civil and international disturbances between the mid-fourteenth and mid-nineteenth centuries, it gives us our base line. All industries with $k < k^*$ are in the Chinese countryside. Because Europe had lots of war, only European industries with $k < k_w^*$ are rural. Because $k_w^* < k^*$, more industries in China locate in the countryside. Thus, war produces the urban bias that characterizes Europe from the fall of the Roman Empire forward. If warfare is sufficiently severe, the bias will also be large. Although the Leontief technology can be combined with war to explain differences in the location of manufacturing, it has limited implications for technical change. In such a technology, factor proportions are fixed, (k the capital per worker describes the technology fully) and as a result capital labor ratios in the same industry are identical in urban and rural firms. If Europe's primary characteristic is that it is a warring economy, then relative to peaceful China it would be poorer and have less manufacturing over all.

The fixed proportion production model is unfair to Europe because it does not allow entrepreneurs to substitute cheap factors for expensive ones, even though such substitutions are

ubiquitous in reality. To return to the example of the weaver, it is in fact possible to employ more than one worker per loom (in particular women and children as helpers) and it is also possible to have more or less capital per worker (because looms vary in quality). In each case the combination of labor and capital is different. The simplest class of production functions that allow such substitution have constant factor shares¹ (rather than proportions) and are known in economics as Cobb-Douglas production functions ($Q=K^aL^{1-a}$, where Q is output, K is capital and L is labor, and a is the factor share of capital). We will not carry out the mathematical analysis here but the interested reader can find it in Box 4.2. Just as in the Leontief case, entrepreneurs locate their production based on relative prices and there is a unique factor share of capital a^* such that industries with larger capital factor shares locate in cities and industries with lower capital intensity locate in the countryside. Similarly the war economy has a smaller threshold factor share of capital a_w^* than the peaceful economy. So far we have reproduced the substance of the lessons of Leontief model. But Cobb-Douglas technologies allow us to go further. Indeed, when we allow for capital-labor substitution more industries locate in cities in the warring economy. Box 4.2 provides the technical details, but the intuition for this result is that Cobb Douglas technologies give firms two ways of mitigating the impact of war: choosing their location and adjusting their factor proportions.

[Box 4.2 about here]

The adjustment of factor proportions to urban locations is a general phenomenon. Any firm that locates in a city will operate with a higher capital labor ratio than if it had been in the countryside. Urban firms face cities' high labor costs and low capital costs, so they will want to

¹ A factor share is the ratio of expenditure on one factor to total expenditure. Thus the factor share for labor is $wL/(wL+rK)$ while the factor proportion is simply L/K .

substitute capital for labor. Thus, when a firm locates in a city rather than a village it uses more capital and less labor. In our model, because all firms in the same industry choose the same location this extends to the industry. Relative to the fixed proportion model, the key difference is that industries pushed into cities by war become more capital intensive. If Europe is the war torn economy, it has a more capital intensive manufacturing sector relative to China, because more of its manufacturing sector is imprisoned in cities by warfare. As we argue below it was this capital bias that set Europe off on a different path towards machine-based innovation: urban manufacturers in Europe created more machines than their rural Chinese counterparts because they had more use for them.

The chain of causation in our model has two parts. The first is static and runs from war through relative prices, urban versus rural location, and then to factor intensity. The second is more classic and dynamic; it runs from factor intensity to technical change, falling into the broad class of induced innovation theories of technical change. The rest of the chapter defends the plausibility of this causal chain, in particular the static elements.

Such a defense is required because although our model is plausible, it is but one of many narratives of economic change one could construct. Moreover, the model's theoretical purpose is to produce the divergence we highlight. To do so, we need an appropriate friction in relative factor costs and war is just one of the processes that can potentially produce such friction. Because there are many other differences between China and Europe, candidates to act as friction are numerous. Yet we can eliminate all those that were of such long standing that they would have given a lead to Europe from the outset since Europe was not always ahead of China economically. Similarly we can set aside any friction that would have made it impossible for China to be ahead early on or to grow extremely rapidly later. Finally, sharp changes in Europe

(like the Glorious or French Revolutions) are of limited relevance because the process of technical divergence took centuries not decades. We find that warfare has a singular advantage over other long-term factors: its intensity waxes and wanes, and if we are correct the location of manufacturing in each region should reflect the ebb and flow of political disturbances—not just technology. The ebb and flow of warfare, in fact, turn out to be just what we need to put our argument at risk of falsification.

Long-Term History before the Industrial Revolution.

Here we focus on the static or direct effects of war. Insecurity (to put war and civil violence in more neutral or euphemistic terms) is very costly. Indeed as war costs increase and manufacturing shifts more and more to cities, the economy and the manufacturing sector also shrink because of the toll that warfare imposes. By implication the economies of societies in which warfare is prevalent are smaller and have smaller manufacturing sectors. Thus, up to the sixteenth century and perhaps beyond that, war should make Europe poor relative to China. For similar reasons China's manufacturing should be larger and more rural than Europe's after the Mongols reunified the Empire in 1279. Conversely in Europe, should the intensity of warfare decline, some manufacturing should move back to the countryside. Finally, should technology become more capital intensive Chinese (and European) manufacturing should become more urban. In tracing out the urban rural competition for manufacturing location we must explicitly deal with a comparison between China and Europe and a comparison between England (the cradle of industrialization) and the rest of the world. It would be particularly desirable for our

model to have implications not just for the divergence between Europe and China but also for variation in the location of manufacturing within each region.

The accounts of early European travelers, as well as the flow of technology, also suggest that early on China was far more economically advanced than Europe, and that Europeans went to the Far East in search of manufactured goods, not raw materials or precious metals. That China was technologically ahead of Europe at the end of the first millennium CE is generally accepted in the literature and forms the core of the China puzzle—namely why an economy that was so advanced should fall progressively behind after 1300 (Elvin 1972). Could the connection between warfare and urbanization help explain this? In the mid-thirteenth century China's cities may have amounted to between 6 and 7.5% of the total population. The empire certainly had a number of very large cities. Yet by the nineteenth century a very small proportion of the population lived in walled cities, as little as 3-5% of the total population (Skinner 1977: 227, 287). Over the same six centuries, urbanization rates increased in Europe. (De Vries 1984).

But on its own, this contrast is insufficient. We must look more closely within the two regions.

Let begin with a careful examination of urbanization and war in China. The Middle Kingdom certainly had its share of military troubles, for instance in the mid-seventeenth century with the collapse of the Ming dynasty and the establishment of the Qing dynasty, and again around the mid-nineteenth century when there were widespread peasant rebellions. But, for most of the three centuries preceding the Ming-Qing transition, and for the two centuries before the mid-nineteenth century rebellions, Chinese society was generally quite peaceful. Thus, Chinese entrepreneurs did not usually need to anticipate warfare disrupting their production and distribution operations. They were spared the costs of warfare not only in the direct sense of

having to pay taxes to support war-making initiatives, but also in the less obvious way of not having to pay for protection from the threats of confiscation and destruction.

If we take a broader sweep of history, China's instances of political fragmentation show patterns of urban manufacturing similar to those of Europe. Recall that prior to its unification under the Qin dynasty in 221 BCE, China was the theater of severe political competition for more than two centuries. During this time China was divided among seven major warring states, each anchored around great cities that hosted both commercial and manufacturing activities. Rulers minted coins to facilitate trade, which they taxed in order to mobilize resources to pay for warfare. They expanded agricultural output through irrigation and improved iron tools in order to feed the cities housing their governments and urban craftsmen. We lack adequate information on urban and rural locations of craft industries for the first twelve centuries of imperial rule that began with the Qin dynasty. The long stretches of political division and military competition between the periods of imperial integration and grandeur account for more than forty percent of the entire period. It is therefore not likely that rural manufacturing enjoyed the kinds of advantages it would starting in the late fourteenth century. We do know that the commercial expansion of the Song dynasty (960-1279) was powered by a combination of improvements in agriculture, transportation technologies and urban-centered craft production (Shiba 1970). This was also an era of great political insecurity for the regime, forcing a move in the early twelfth century from the north to Hangzhou, which became a great center of manufacturing and wealth (Gernet 1962). Thus through the fourteenth century, it is likely that competition between rural and urban manufacturing was intense in China. By the fifteenth century, with the advent of Mongol rule, rural handicrafts began to play an increasingly important role in manufacturing. A

clear contrast of relative peace in China and frequent warfare in Europe comes to characterize the early modern era at the two ends of Eurasia.

Although, internal and international violence was less prevalent in China than in Europe, even a casual glance at early modern renderings of Chinese cities would convince skeptics that they were walled and gated. Yet relative to Europe, the number of such cities was limited, as was the size of their fortifications. Indeed, imperial officials seem to have perceived investments in urban defense as having low returns. For their part, most people appear to have felt little need to locate within the confines of a walled city since some ninety-five percent of the population lived in rural areas and some ninety seven percent lived outside of walled cities as late as 1843 (Skinner 1977: 227, 287). Chinese with capital did not seek out cities to protect their investments in the same way that Europeans did because of the threat of warfare. Instead, for most Chinese dynasties the threat of warfare came from the steppe; armies were routinely deployed along the northern frontier. In both early and late imperial times the fortifications collectively known as the Great Wall symbolized the state's commitment to assuring peace from foreign marauders and invaders for the whole of the empire--town and country alike. Before the tenth-century shift of China's population toward the south, what little industry that did exist seems to have had more urban locations perhaps in part because the northern locations of industry made them more vulnerable to foreign military threats.

Within the empire, especially after 1000, domestic social order did not usually entail large investments in fortifications. Chinese officials pursued a variety of normative, material and coercive strategies to promote and enforce both rural and urban social order (Wong 1997, 105-26). When growing numbers of bandits and rebels threatened domestic social order in the second half of the nineteenth century, increasing numbers of villages and towns built walled

fortifications. In other words, the Chinese had no culturally based opposition to military defenses. Their response to insecurity was indeed very similar to that of Europeans in the waning days of the Roman Empire. They built fortifications when and where they deemed defense works desirable. For the vast bulk of the population across the empire between 1000 and 1800 it simply turns out that city walls were not necessary for the pursuit of economic activities, including manufacturing.

Artisans in the late imperial empire chose to remain in villages with little or no defense. Doing so certainly did not prevent the rise of dense networks of markets for inputs and outputs. In fact, it appears that such markets were central to the functioning of Chinese handicrafts (Elvin 1973). It is also not the case that there was no manufacturing in cities whatsoever, for jewelry, silk and other luxury products seem to have been urban activities. In the lower Yangzi region cycles of commercial expansion after 1000 created a sophisticated marketing network and considerable amounts of manufacturing, especially in cotton and silk textiles. The growth of handicraft production was largely a rural phenomenon. Goods were produced by agrarian households also engaged in agriculture or by rural households who specialized in craft activities. Cities and towns marketed more craft goods with a rural origin than goods of urban origin (Elvin 1973: 268-84; Nishijima 1984; Tanaka 1984). As a consequence, increased manufacturing did not lead to a corresponding increase in urbanization.

The rural bias of craft manufactures does not mean that Chinese entrepreneurs disregarded urban technologies when clear advantages accompanied their use. Indeed, after the Industrial Revolution's techniques had diffused to East Asia, the Chinese predilection for rural manufacturing waned. Neither then nor in China's earlier history can we find evidence for cultural or political hindrances to locating enterprises in cities when new institutions and

technologies made urban-based production more profitable. The growth of urban-based manufacturing in Shanghai during the first four decades of the twentieth century makes abundantly clear that certain areas of the country did shift from rural manufacturing to urban production. But in China, as in Europe, these developments were unanticipated—in 1500 much less in 1000 no one knew that mechanization would succeed. There were no reasons to create large industrial centers in China before the nineteenth century. Furthermore, as in continental Europe, rural manufacturing remained competitive, especially in labor-intensive activities and where entrepreneurs could respond to urban innovations. A good example of this phenomenon comes from the northern cotton textile-producing county of Gaoyang where rural weavers purchased iron gear looms to install in their homes. (Grove 2006)

For Europe the relationship between urban manufacturing and war is complex. At first glance, one might even think that the dominant chain of causation involves war causing destruction of both cities and manufacturing. After all, the Roman Empire was based on cities. In places like Gaul, Britain, and Germania new cities grew under the imperial peace. These cities collapsed and many disappeared during the Great Invasions only to revive slowly during the Middle Ages. It was during this revival that the pattern of urban, capital-intensive manufacturing came to become an integral part of the European economy. By the Renaissance, the most urbanized areas of Europe were also those where conflict had raged the most often: the band of territories from Flanders to Rome, including the Burgundian estates, Western Germany and Northern Italy.

From Charlemagne forward, as cities slowly reemerged, rulers focused on providing security for skilled artisans. Strife, however, continued and it made rural manufacturing a risky proposition in Europe, thereby driving a larger range of manufacturing activities into cities

where protection was available. In contrast, the countryside was open terrain for provisioning, thievery and wanton destruction. J.R. Hale leaves little doubt that, "in terms of personal impact the burdens of wars certainly afflicted the rural more than the urban population."(Hale 1985:196) Although the images of towns sacked by conquering armies have a great hold on our imagination we must bear in mind that all military campaigns ravaged the countryside whether or not they succeeded in capturing cities. Evidence is abundant that in Europe the countryside was ravaged by warfare and that cities were relatively spared (Gutmann 1980). While Parisians may have thanked Saint Genevieve for protecting them from Attila, it is more likely that the city was able to repulse invaders because of its walls. Paris maintained its walls, and they would also defeat the Normands, Joan of Arc, and Henri IV.

The history of Italian cities like Sienna and Padua highlight the value of urban residence in times of conflict from the late Middle Ages to the Renaissance (Caferro 1998, Kohl 1998). Padua faced both civil war and the threat of outside invasion; Sienna had to defend itself from the attacks of Florence and the raids of mercenary companies. In both cases strife devastated the countryside but it typically spared the city (Sienna was never conquered and Padua only fell twice in one hundred years of conflict). Each invading army seized whatever it could find in the fields and the villages. Historians have noted the deleterious effects of such raiding on agriculture because little could be done to protect farmland. In areas like Italy, even villages were fortified in fear of localized raids. But walls that were not supplemented by a large body of soldiers did not afford much protection against a determined foe.

The siege warfare that prevailed in Flanders and the Low Countries more generally, from the Hundred Years' War until the peace of Utrecht in 1713, also points to war's differential treatment of town and country. What made the sack of Antwerp in 1685 so surprising was that

the Spanish armies visited the kind of destruction on an urban population that they and their foes normally imposed on peasants, but it was certainly not the first instance in that conflict of armies taking civilians' property. From the point of view of merchants, the sack itself was not a signal to give up trade, or to set up in the countryside, but rather to seek a new, safer location in the Northern Netherlands (Gelderblom 2000). That location, Amsterdam, quickly became the largest city in the region. In manufacturing the movement was less concentrated, but what the Southern Netherlands lost was gained by Dutch cities (De Vries and Van der Woude 1997 279-334).

The opposing forces of war acting to reduce the scale of the economy and of war pushing manufacturing in cities have made tracing out the interaction between warfare and manufacturing difficult. In particular, Acemoglu, Johnson and Robinson (2005) find no relationship between war and the growth of cities. That negative result provides support for the kind of balance our argument favors. Had cities' provided superb protection or been systematically destroyed one would have found either a clear positive or negative relationship. We are interested in a more subtle and slow moving effect: how war reorganizes the supply of manufactured commodities. This process may well not affect the scale of cities.

If the general pattern of warfare and urbanization holds in Europe, Britain presents somewhat of an anomaly. It is one that we must consider because, after all, that is where the Industrial Revolution occurred. With the departure of the Roman legions in 407, cities collapsed and did not reemerge for a long time. The Saxon period as well as the two centuries when the Danelaw was in effect could hardly be called peaceful. While the Norman conquest may have been the last successful invasion of England up to 1688, the throne of England was hotly contested (including landings from Normandy) throughout the Tudor period. Moreover, the

border lands to the North were subject to Scottish raids well in the seventeenth century. During this time England appears to have been a heavily rural frontier of Europe (De Vries 1984). It was not until the Tudors that English cities, and in particular, London began to grow. Even then, as Wrigley, has pointed out urban centers were few and small (Wrigley 1985). They were largely administrative and commercial centers. Urban craft industries by contrast, remained undeveloped because England was an economic periphery whose main export was wool. London's rise as the largest city in Europe can hardly be attributed to insecurity in England since there was little of it after 1600. In a country that was protected from its enemies by a fleet rather than a standing army, manufacturing did not have to locate behind city walls. The singular genius of the British Navy may well have been its capacity to afford equal protection to city and countryside—thus destroying the long standing advantages of cities. Thus London did not afford better protection from war than other towns or locations in Britain. Not surprisingly, much of the early growth of manufacturing in England was carried out in the North, areas favored by endowments of coal and where wages were lower than in London. The pacification of England did not set off urban industrialization; but rather a dash for cheap labor. As many have pointed out, the early growth of manufacturing in England was as much a rural as an urban phenomenon. But by the mid seventeenth century the technological impact of centuries of urban manufacturing was already large and England's rural population was too small to change the path of technical change.

Beyond, England, there is abundant evidence that in Europe the location of manufacturing was indeed a set of marginal decisions that varied over time. The key drivers to such change were the evolution of technology, changes in capital labor ratios, and changes in

military technology. As a result the history of manufacturing location is one that is different across the different polities of Europe.

Let us begin with the Low Countries. Although Van der Wee does not detail the effect of the wars that ravaged that area from the Renaissance to the 1720s, he does identify urban and rural activities (1988). Three points are worth emphasizing: first, over time, urban activities tended to become rural as entrepreneurs made every effort to find methods of producing goods with fewer skills and less capital. 'New' industries were therefore urban but, as they matured they tended to become rural. Thus prior to the industrial revolution, the urban nature of manufacturing was not a foregone conclusion. Second, in the absence of any urban response we would anticipate a fully rural manufacturing sector and in some periods there were real declines in urban manufacturing. At other times urban workers reoriented their activities towards higher quality goods (implicitly higher skill and higher capital). Third, during the period of the Dutch revolt, "the armies ravaged the countryside, occupying and sometimes plundering the towns and disrupting communications. For **reasons of security** [emphasis added] and in order to have easier access to raw materials and markets, many rural industrial workers migrated to the neighboring towns (Van der Wee 1988: 347-8)." This last point emphasizes both the negative impact of war (town and country suffer) and its differential effect (people seek refuge in towns).

In the northern Low Countries the spread of putting-out industries seems to have followed the vagaries of warfare. De Vries and van der Woode document the spread of rural manufacture in Holland after 1720. They view the near doubling of the proportion of non-agricultural households as a result of population pressure but to our mind the timing, after the end of the wars of Louis XIV, when the Low Countries had been under constant threat of invasion is telling (de Vries and van der Woode 1997:55-7). After peace 'broke out' in the Low

Countries entrepreneurs could more easily rely on a cheaper rural labor force than in the uncertain times of the late-sixteenth and early-seventeenth centuries. The pattern we see both in the Southern and in the Northern Low Countries is not the inevitable march of manufacturing towards capital intensive urban production. Rather, we observe a secular competition between two modes of craft production, one rural with low wages and low capital, the other was urban high wage and more capital intensive.

The same story can also be told for England. While it may have been the cradle of the industrial revolution it was first an area of widespread putting-out, and that activity grew rapidly during the long period of internal peace that followed the end of the Civil War. Further as shown by Berg (1994), the putting-out industry remained a strong competitor to urban/centralized manufacturing. In the case of textiles, at least part of the expansion of industrial manufacturing was a rural expansion, driven by the search for cheap waterpower and cheap labor. The long period of institutional stability that followed the Glorious Revolution (and in terms of violence largely runs from 1660) reduced cities' security advantages so that the competition between urban and rural manufactures was quite fierce between 1730 and 1830. The first response was the rise of the putting-out industries. Later in the eighteenth century a similar phenomenon seems to have taken place in the Low Countries (Gutmann 1980, Ch. 3) and France (Vardi 1993).

For many the spread of putting-out industries in Northwest Europe was a precursor to industrialization. Scholars have, in fact, dubbed it proto-industrialization. From the technological point of view, however, putting out was an altogether different path than the industrialization that followed. Putting-out relied on the spatial division of labor to produce large quantities of goods of moderate quality. Inherently the organizational innovations that

allowed the putting-out industries to flourish were labor rather than capital using and thus following a path that was quite different from those that characterized the Industrial Revolution. Contrary to those who see proto-industrialization as a step towards modern manufacturing, in the light of our model, putting out was making Europe more like China not less so. Moreover the Chinese evidence argues against any notion that sophisticated rural manufacturing networks (proto-industrialization) were critical precursors to sustained growth. Both China and Europe had a significant labor force in rural manufacturing, but only one region went on to develop industrial technologies

The historical evidence strongly supports both the assumptions and the implication of our model: warfare mattered and made European manufacturing more urban. The effects of violence were contingent on its intensity, on technology, and the urbanization of manufacturing. Thus while over the long term they pushed entrepreneurs into cities, these effects could easily be reversed. In the secular interplay between warfare and manufacturing a surprisingly subtle rule emerges: too much violence (as during the Great Invasions, the Thirty Years' war, and other brutal conflicts) and manufacturing collapses; too little violence and manufacturing runs to the countryside.

Long-term History through the Industrial Revolution

We must now move from asking how entrepreneurs adjusted to changes in violence to investigating the consequences of these adjustments for the path of technical change. So far, to keep the analysis simple, we have developed a model that is static; it takes as given technology in each industry and allows entrepreneurs to choose their input mix (how much capital per worker) and where their shop or factory operates. Now we turn to the consequences of choices of

location on technical change. To do so we borrow from the literature on induced innovation that has derived how factor scarcity might affect the pace and direction of technical change (Allen 2009).

The argument is simple: where labor is relatively cheap (in our case in the countryside) entrepreneurs will prefer to adopt new techniques that are labor using rather than labor saving. Thus the demand for new techniques that increase or decrease capital per worker depends on relative prices. To be sure entrepreneurs are happy to adopt any input saving techniques, but the relative demand will be greater for new techniques that accord with relative prices.

The relative demands for different technologies translate into technical change through one of two mechanisms. First, learning by doing: in an industry that is capital intensive, entrepreneurs are more likely to discover new processes that improve the productivity of capital than that of labor. Second, conscious directed change: investments in research and development that lead to new machines are more likely to be undertaken where the price of capital is low relative to that of labor. That is not to say that in the process of industrialization there were no labor-using innovations—but rather in Europe a larger fraction of all innovations were associated with capital deepening than in China.

These two pathways are reinforced by external economies: Indeed, in economies in which the bulk of manufacturing relies on little capital, there are few capital intensive industries from which entrepreneurs in other activities can learn about the value of machines. There will also be fewer skilled workers who can build equipment and deploy a varied set of solutions for adopting capital using methods in a particular industry. On the other hand, in the same economy

there are many industries that manufacturers can observe to develop labor-using improvements in their firms.

The importance of factor costs in inducing technical change has been noted by many. Kenneth Sokoloff's work on a radically different distortion—agricultural seasonality—is particularly relevant because of its spatial dimension. Sokoloff emphasized the importance of firms' incentives to adopt and create capital goods (Sokoloff and Dollar 1997). He argued that the need to bring in the harvest created seasonality in rural wages as workers were drawn out of other activities to work on farms for a few weeks in the summer. Firms could either raise wage or shut down for the summer. Where seasonality was intense firms had little choice but to shut down. In turn, they avoided deploying costly machinery that would lie idle for part of the year. Seasonality in his framework is a cost to capital that acts exactly like Δ in our model. Because Sokoloff was primarily interested in the contrast between the U.S. and British economies he did not emphasize urban-rural issues. But other scholars (e.g. Postel-Vinay 1994, Magnac and Postel-Vinay 1997, Van der Wee 1988) have done so and noted the lower capital levels of rural firms even as late as the later nineteenth century and its close connection with the variation in rural wages over the months of the year. Sokoloff concluded that the U.S. deployed more machinery in manufacturing early on than England precisely because agriculture was less seasonal in America than in Britain.

More recently Robert Allen (2007) has put forth the argument that relative prices played a fundamental role in the development of the key machines of the Industrial Revolution. Only where capital costs were particularly low and wages high did it pay to invent machinery that would increase capital intensity several times over. These conditions, he argues, prevailed in England after 1650 or so but nowhere else. Allen demonstrates that after 1650, wages in

England (and particularly in London) were the highest in Europe. Conversely, the cost of energy was remarkably low after 1700 because the English were reaping the rewards of several centuries of technical adaptation that transformed coal from a dangerous product into one that could be easily used for home heating and in manufacturing. While differences in capital costs may have been less, they too favored England. By 1700, Allen concludes that the rewards to adopting mechanized techniques were highest in England, and that is why they were developed there.

Our question does not involve the path of technical change during industrialization, or why the key inventions were developed in England but instead why the structure of manufacturing was so different between Europe and China. In our view war's concentration of manufacturing behind city walls produced a series of biases that raised the cost of labor and in particular unskilled labor, and in the long run would lower the cost of capital by making capital markets more efficient. These relative prices induced individuals to seek to substitute capital for labor. In turn, urban entrepreneurs provided a steady demand for specialized tools and later machines. Thus cities' higher capital intensity was an important source of demand for machinery and provided incentives to make more machines. In the countryside such incentives did not exist.

Prior to 1400, the relatively high cost of capital throughout the world combined with the limited supply of skilled artisans, made the path of innovation daunting because the machines many inventors imagined simply could not be built. In contrast, innovation achieved by transforming a production method from using skilled labor to less skilled labor and moving it to the countryside promised considerable savings (This dynamic remains an important element of economic activity to this day as the migration of world manufacturing to China bears witness). No one in China or Europe could forecast in 1400 the tremendous success we have had at

creating capital using technologies. Thus the Chinese path of rural handicraft is eminently reasonable. And it should be no surprise to see that much of Europe's manufacturing followed the same path as we have seen for a long time Europeans themselves were attracted to low wages/ labor intensive manufacturing—after all the putting-out system is nothing more than outsourcing beyond city walls. Hence, China's technological path is a very common process in economic growth; the deviation was that of Europe.

Again, the development of European manufacturing highlights the intensity and length of the competition between the two approaches. The best evidence for this comes from French industrial surveys carried out in the middle of the nineteenth century. At that time seasonal manufacturing was so widespread that the agents of the French Ministry of Industry gathered data about the phenomenon (Postel-Vinay, 1994 Magnac and Postel-Vinay 1997). Here two facts stand out. First, urban manufacturers faced intense competition from rural firms. That competition endured into the twentieth century, in particular in labor-intensive product lines. Nevertheless capital/labor ratios of rural enterprises were significantly lower than those of urban firms. Within France, the regions where the seasonal variation in agricultural wages was largest had the highest share of rural industrial firms that shut down during summer months. It was also in those areas that capital labor ratios were smallest. Over time, France saw a co-evolution of agriculture and manufacturing, as increased specialization in wheat in the eastern and central regions encouraged seasonal manufacturing to locate there, while in the West specialization in livestock did not provide many part-time industrial workers. It was not until France began to mechanize harvest tasks for its very large grain production that labor could move into permanent industrial employment.

The second fact that stands out from the French data is that the rise of rural manufacturing pre-dated the advent of severe seasonality in agriculture. In the eighteenth century such seasonal labor migration was small, and strictly local, because local agriculture was quite diversified. Rural manufacturing may have begun to spread under Louis XIV. Such an early start suggests that, for a large country like France, the location of manufacturing was more sensitive to internal disorder than to war. Indeed the Sun King came to power after the last major revolt, the Fronde, had been put down but wars with other countries raged almost continuously from 1620 to 1713. Those wars were mostly not on French soil, and internal peace was largely maintained until the Revolution. Interestingly, the number of rural weavers in Northeastern France seems to have grown significantly as early as the 1690s, even though their expansion did not come into full bloom until after the treaty of Utrecht (Vardi 1993).

Warfare thus proved to be a valuable irritant for economic progress. By changing the share of crafts that located behind city walls war encouraged the adoption of production techniques that were friendly to further machine improvement. This included skilled artisans capable of making parts accurate enough to avoid the crippling burden of friction (Landes, 1983). For most of European history the center of these developments lay in the continent. It began in Italy and over six centuries spread through parts of Germany and the Low Countries before coming into full bloom in England as the Industrial Revolution. To examine the conditions that prevailed in England after 1700 alone requires us to assume that the growth of skills and technical change that occurred before was somehow different. Only those who are terminally Anglophile would suppose that the forces behind improved water wheels, the printing press, the pistol, or the knitting frame are somehow different from those that led to the spinning jenny or the steam engine. The key difference between these latter developments and those that occurred

earlier was economic value: the demand for cotton textile and motive power is simply massively larger than that for pistols or woolens (Clark). Although the magnitude of demand for coke or cotton textiles explains the visible success of the new technologies, it masks the fact that they developed in ways that were very similar to those older, less economically rewarding, technologies.

The technical breakthroughs of the Industrial Revolution are but one step in a long process—one that was far more European than it was English. Thus the study of England will allow us to answer some important questions: for instance why was it that technical leadership moved to England after 1650? But such a narrow inquiry will lead us astray in considering why Europeans discovered the importance of machines. To our mind the narrower question has largely been answered by Allen (2009). As Allen has argued the relative price context goes a long way towards explaining the specifics of the miraculous inventions of the Industrial Revolution. Yet high English wages in 1650 do not seem likely to explain structural changes whose most intensive locus varied over time and that began in Italy in the late Middle Ages.

We see Allen's analysis of the sources of high English wages to indicate politics and warfare as major forces explaining capital-intensive technical changes. Two key elements in his account, the rise of the New Draperies (a more versatile and lighter wool fabric) and the massive expansion of English trade were in fact the result of political change. The rise of the New Draperies in England, did depend upon a series of technical changes (that moved from carded to combed wool to produce a lighter fabric), but one wonders why such an industry grew up in a land abundant, labor scare economy that prior to this period exported most of its commercialized wool to the Low Countries. Given that the Low Countries were the dominant producers of woolens and had all the infrastructure to weave and finish cloth, one would have expected the

new techniques to be deployed there rather than in England. But as John Munro has observed, an English industry arose because wars interfered with the market. On the one hand, wars on the continent tended to reduce the demand for English wool, while at the same time reducing the supply of high quality textiles in Britain. Worse yet, the Crown had long relied on taxing English wool exports, in effect protecting English artisans (Munro 2005). Finally the move of artisans from the Low Countries and northern France to England in the late sixteenth century is likely to have been spurred by the instability provoked by the Dutch revolt and the French Wars of Religion. Had England and the Low Countries been in the same polity (as would have been the case in a China-like empire) the rise of the new draperies in England would have been unlikely at the very least.

The second key element of Allen's explanation is the capture of an ever increasing share of international commerce by the English commercial fleet. Yet the economic logic of London becoming Europe's entrepot seems farfetched since any goods unloaded there would have to be reloaded onto a ship to cross the Channel. Amsterdam would seem better located. Of course the competition between Amsterdam and London was not simply economic but also political. That there were two Anglo-Dutch wars precisely at the time that London forged ahead is not mere coincidence. That Rotterdam rather than London emerged as the largest port in Europe after World War II is simply further testimony to the distorting impacts of political competition on the economics of geography. Rotterdam (like its forbears Antwerp and Amsterdam) is simply much better situated to serve the European hinterland than London. It is not such a surprise that the city on the Thames declined as a transshipment point once the Royal Navy lost its relevance.

In fact one would do well to ponder just how long high English wages would have persisted if politics had not made it difficult for English entrepreneurs to locate their enterprises

on the continent rather than in Northern England. It is not much farther from London to Mons in Belgium or Maubeuge in France than it is from the same city to Manchester or York. It seems doubtful that English entrepreneurs would have deployed their textile devices in high wage Northern England rather than in the cheaper continental settings had they had that option. Even more likely they would have avoided the costs of developing such devices if they could have relied on the cheaper wages that prevailed on the continent. Such traitorous outsourcing was precluded by politics.

Just as one should not take the English pattern of technical change in the eighteenth century out of its longer, European, context, one should be wary of lessons learned by restricting the comparison of political systems to China and Europe exclusively.

While there is no doubt that political competition altered the location of manufacturing in Europe, it is also abundantly clear that reaping the benefits of this alteration is difficult. In most points of time and in most places, the destruction brought about by war simply outweighed the positive benefits coming from either war's relative price implications or government spending on technology. A glance around the globe will find many places beyond Europe where political fragmentation endured and warfare was endemic. Southeast Asia, Meso-America, and Africa between 500 and 1500, all come to mind. Yet by 1500 when European contact occurred, none had embarked on the transformative process that would produce the Industrial Revolution. On the contrary, although abundantly endowed with valuable resources, most of these territories were relatively poor. For Southeast Asia at least, the evidence is consistent with the notion that warfare when it occurred was very intense and very destructive of both persons and private capital—much like the periods Europeans know as the Dark Ages. We should also bear in mind that the expansions centered in Italy and the Low Countries were brought to a halt by warfare

and that the Thirty Years War so devastated Germany that its economy spent much of next century and a half in recovery. We conjecture that further research may make more precise just what kind of political competition is tolerable if one seeks to produce economic change.

Coda: China and Europe Diverging Greatly

The model of economic change analyzed above is not the first to argue that political economy is essential to understanding why the structures of the European economy departed from those of China starting the Middle Ages. Many authors (Deng 1993, Mokyr, 2002 Diamond 1997, Jones, 1981, Landes 1998) favor of Europe because political competition there avoided costly and abrupt policy reversals as occurred under the Ming. They also put politics before economics. Our conclusions are starkly different: political competition unlike economic competition is no panacea; the benefits of warfare, were indirect, contingent, and secured at tremendous cost.

The narrative we construct from the model has several advantages over traditional narratives. Because it is based on a very small number of parameters, investigating whether its assumptions are reasonable and its implications consistent with the historical record is easy. For instance, if the cost of capital in cities and the countryside were the same, we would have been hard pressed to maintain the argument. But, as we have seen such cost differences did exist, and war exacerbated them.

From a dramatic narrative point of view our approach has severe drawbacks. It fails, for example, to point to specific actors as responsible for failure or success: neither politicians nor culture are responsible for China not taking the path towards mechanical innovation. Indeed, in our view, China failed to do so because its entrepreneurs had no reason to forego the advantages

of handicraft labor in the countryside. Similarly, Europeans can take little credit for the countless discoveries that led up to the Industrial Revolution. Ours is a tale without heroes or villains, in which the unintended consequences of political conflict are what matter most. A second drawback of our narrative from a dramatic point of view is that it is not deterministic. War made it both more likely that Europe would be poor (if war was too destructive) and more likely that it would embark on the path towards capital deepening earlier than China. In contrast, China was more likely to stay an agrarian handicraft economy, but less likely to experience the Dark Ages or the devastation that followed the Hundred Years War for instance. As Needham and many others have shown, technology was far from static in China, and it may well have been that given another several hundred years or so machine invention would have sprouted there too. From our point of view, the political economies of the far ends of Eurasia made it significantly more likely that such processes would emerge at the western end of the land mass than at its eastern end.

What makes for poor drama, though, might actually make for good economic history. Indeed, it would be remarkably unjust to expect Chinese governments of the Early Qing to implement policies promoting a kind of economic change that Adam Smith, the foremost economist of the eighteenth century did not even perceive. The *Wealth of Nations* is not an ode to the Workshop of the World, it is far more an apology for light taxes and unfettered trade in an agrarian economy. Those are precisely the policies pursued by the Qing emperor. They were not those of European rulers because the fiscal requirement of war interfered with trade, an issue we will take up in Chapter 6.

If removing lead actors makes sense so does accepting contingency. And this would be true not just for us, but for authors who advocate the importance of endowments (Pomeranz,

2000 Jones 1981), or culture (Landes 1998). Consider culture, it is the same social norms, religion and ideas that first made China the most advanced economy by 1300, then held China back before 1900 that must be permitting it growth by leaps and bounds in the last three decades. How can a culturally deterministic approach account for all this change?

This chapter has linked political economy with relative prices over the very long term. There are other accounts of the impact of politics on relative prices that also focus on the long term. Unlike our framework which emphasizes differences in relative prices within a particular geographic area, these tend to focus on differences in relative prices across regions. The most eloquent exponent of these arguments has been North (North 1981, North and Weingast 1989). In his view, capital costs were lower in certain parts of Europe than elsewhere on the continent and elsewhere on the globe because political arrangements like representative government reduced the risk of expropriation. The idea that growth was precluded in China by the cost of capital has such a long lineage and its interaction with political economy runs so deep that we devote the next chapter to this problem.

BOX 4.1

Costs of production are $C=wL+rK$, if the entrepreneur hires L workers at wage W and K capital at cost r . The Leontief technology is linear, so the analysis can be carried out on a per worker basis. Costs are then $w+rk$ where k is capital per worker. As discussed above, wages are higher in cities so $w_c < w_u$ where the subscript c denotes the countryside and u denotes urban areas. Capital costs are higher, so $r_c > r_u$. A manufacturer seeks the lowest cost location. He compares $C_c = w_c + r_c k$ versus $C_u = w_u + r_u k$. He picks the countryside if the fall in labor costs ($w_u - w_c$) more than offsets the increased cost of capital ($(r_c - r_u)k$). This is equivalent to $k < w_u - w_c / (r_c - r_u)$. Let $k^* = w_u - w_c / (r_c - r_u)$. If capital per worker is less than k^* then this manufacturer is in the countryside.

Denote the unit increment in rural capital costs due to war as Δ .² Rural capital cost in the warfare-prone economy will be $r_{cw} = r_c + \Delta$. Now the manufacturer who decides where to locate examines not $k < w_u - w_c / (r_c - r_u)$ but $k < w_u - w_c / (r_{cw} - r_u)$ or $k < w_u - w_c / (r_c + \Delta - r_u)$. This implies a threshold capital intensity of $k_w^* = w_u - w_c / (r_c + \Delta - r_u)$. Clearly $k_w^* < k^*$.

² Obviously war raises costs everywhere, and cities' walls can protect both capital and labor. The specification above that only considers the effects of war on the relative price of capital thus understates the extent of the bias towards urban manufacturing.

BOX 4.2

What is key is a , the factor share of capital. It is a measure of the underlying capital intensity of the industry (if a is 1 then all expenses are made on capital and if a is 0 then all go to labor). If we look at entrepreneurs in a peaceful economy (labor cheaper in the countryside, capital is cheaper in cities) we again find a threshold value of a , a^* , such that industries with $a < a^*$ are in the countryside. Industries with $a > a^*$ are urban. We also find that industries with a less than a_w^* will be in the countryside in the war-torn economy and $a_w^* < a^*$.

The first result follows by letting firms choose where to locate in the war torn economy. Then, if we fix each industry's factor proportions to what it would be with rural relative prices, that determines a first threshold value (a_w^*) for moving to cities. If we now allow firms to adjust their factor proportions when they move to cities, all those who already wanted to move to cities will still want to, and some who did not will, hence $a_w^* < a_w^{*'}$. The war-torn economy (Europe) has an even larger urban manufacturing sector relative to the peaceful economy (China) when factor proportions are adjusted to reflect relative prices than when they are not.

Bibliography

- Acemoglu, Daron, James Robinson, and Simon Johnson. 2005. "The Rise of Europe: Atlantic Trade, Institutional Change, and Economic Growth," *The American Economic Review* 95, no. 3: 546-79.
- Allen, Robert C. 2007. "The Industrial revolution in Miniature: the Spinning Jenny in Britain France and India." Mimeo Oxford.
- _____, 2009. *The British Industrial Revolution in Global Perspective*. Cambridge: Cambridge University Press.
- Allen, Robert C., Jean-Pascal Bassino, Debin Ma, Christine Moll-Murata, and Jan Luiten van Zanden, 2007. "Wages, Prices, and Living Standards in China, 1738-1925: in comparison with Europe, Japan, and India," Mimeo Oxford.
- Cafferro, William. 1998. *Mercenary Companies and the Decline of Siena*. Johns Hopkins Press.
- de Vries, Jan, 1984. *European Urbanization, 1500-1800*. Harvard University Press.
- de Vries, Jan and Ad van der Woude. 1997. *The First Modern Economy*. Cambridge University Press.
- Deng Gang. 1993. *Development versus Stagnation: Technological continuity and agricultural progress in pre-modern China*. Greenwood Press.
- Diamond, Jared. 1997. *Guns, Germs, and Steel : The Fates of Human Societies*. W W Norton.
- Duby Georges, 1974. *The Early Growth of the European Economy ; Warriors and Peasants from the Seventh to the Twelfth Century*. Ithaca: Cornell University Press
- _____, 1979. *L'économie rurale et la vie des campagnes dans l'Occident médiéval, France Angleterre Empire IX-XVE siècles essai de synthèse et perspectives de recherches*. Paris: Flammarion Champs.
- Elvin, Mark. 1973. *The Pattern of the Chinese Past*. Stanford University Press.
- _____. 1972. "The High Level Equilibrium Trap: the Causes of the Decline of Invention in the Traditional Textile Industries. In E. Willmott (ed.) *Economic Organization in Chinese Society*. Stanford: Stanford University Press.
- Epstein, Stephan R. 2000. *Freedom and Growth: The Rise of States and Markets in Europe, 1300-1750*, Routledge, London.
- Fujita, Masahisa, Paul R. Krugman, and Anthony Venables. 2001. *The Spatial Economy: Cities, Regions and International Trade*. Cambridge Mass: MIT Press
- Gelderblom Oscar, 2000. *Zuid-Nederlandse kooplieden en de opkomst van de Amsterdamse stapelmarkt (1578-1630)*. Hilversum 2000.

- Grantham, George. 1993. "Divisions of Labour: Agricultural Productivity and Occupational Specialization in Pre-Industrial France." *The Economic History Review*, New Series, Vol. 46, No.3, pp. 478-502.
- Greif, Avner. 2006. *Institutions and the Path to the Modern Economy; Lessons from Medieval Trade*. Cambridge University Press.
- Grove, Linda. 2006. *A Chinese Economic Revolution: Rural Entrepreneurship in the Twentieth Century*. Rowman & Littlefield.
- Gutmann, Myron. 1980, *War and Rural Life in the Early Modern Low Countries*. Princeton, Princeton University Press.
- Hale, J. R. 1985. *War and Society in Renaissance Europe*. Johns Hopkins University Press.
- Hoffman, Philip T. 2009.
- Hoffman, Philip T., Gilles Postel-Vinay, and Jean-Laurent Rosenthal. 2010
- Jones, Eric Lionel. 1981. *The European Miracle: Environments, Economies, and Geopolitics in the History of Europe and Asia*. Cambridge University Press.
- Kohl, Benjamin. 1998. *Padua Under the Carrara, 1318-1405*. Johns Hopkins University Press.
- Landes, David S. 1983. *Revolution in Time; Clocks and the Making of the Modern World*. Cambridge Mass: Belknap.
- _____. 1998. *The Wealth and Poverty of Nations: Why Some Are So Rich and Some So Poor*. W.W. Norton.
- Magnac, Thierry, and Gilles Postel-Vinay, 1997. "Wage Competition between Agriculture and Industry in Mid-Nineteenth Century France," *Explorations in Economic History*, vol. 34(1), pages 1-26.
- Mokyr, Joel. 1990. *The lever of riches: technological creativity and economic progress*. New York : Oxford University Press.
- _____. 2002. *The gifts of Athena : historical origins of the knowledge economy*. Princeton, N.J. : Princeton University Press.
- Munro John, 2005. "Spanish Merino Wools and the Nouvelles Draperies: An Industrial Transformation in the Late Medieval Low Countries." *Economic History Review*, Vol. 58, No. 3, pp. 431-484, August 2005
- Needham, Joseph, ed. 1954. *Science and Civilization in China*. Cambridge: Cambridge University Press.
- Nishijima Sadao. 1984. "The Formation of the Early Chinese Cotton Industry," in Linda Grove and Christian Daniels, eds., *State and Society in China: Japanese Perspectives on Ming-Qing Social and Economic History*. University of Tokyo Press.

- North, Douglass C, and Barry R. Weingast 1989. "Constitutions and Commitment: Evolution of the Institutions Governing Public Choice in Seventeenth-Century England." Journal of Economic History 49: 803-32.
- Pomeranz, Kenneth. 2000. *The Great Divergence: Europe, China, and the Making of the Modern World Economy*. Princeton, N.J. : Princeton University Press.
- Postel-Vinay, Gilles. 1994. "The Disintegration of Labour Markets in Nineteenth Century France." In G. Grantham and M. MacKinnon, eds. *Labour Market Evolution*. Routledge.
- Shiba Yoshinobu. 1970. *Commerce and Society in Sung China*. Ann Arbor: University of Michigan Press.
- Skinner, G. William. 1977. *The City in Late Imperial China*. Stanford University Press.
- Sokoloff, Kenneth, and David Dollar. 1997. "Agricultural Seasonality and the Organization of Manufacturing in Early Industrial Economies: The Contrast Between England and the United States." *Journal of Economic History* 57.2: 288-321.
- Tanaka Masatoshi. 1984. "Rural Handicraft in Jiangnan in the Sixteenth and Seventeenth Centuries," in Linda Grove and Christian Daniels, eds., *State and Society in China: Japanese Perspectives on Ming-Qing Social and Economic History*. University of Tokyo Press.
- Van der Wee, Herman. 1988. "Industry Dynamics and the Process of Urbanization De-Urbanization in the Low Countries from the Late Middle Ages to Eighteenth Century, A Century. in Van der Wee, ed. *The Rise And Decline of Cities in Italy and the Netherlands*. University of Leuven Press.
- Van der Wee, Herman, and Monique Verbreyt. 1997. *The General Bank, 1822-1997: A continuing Challenge*. Tiel.
- Vardi, Liana. 1993. *The Land and the Loom; Peasants and Profif in Northern France 1680-1800*. Duke University Press.
- Wrigley E. Anthony. 1967. "A Simple Model of London's Importance in Changing English Society and Economy 1650-1750," *Past and Present*, No. 37, pp. 44-70
- _____, 1985. "Urban Growth and Agricultural Change: England and the Continent in the Early Modern Period," *Journal of Interdisciplinary History*