Labor Markets After the Black Death: Landlord Collusion and the Imposition of Serfdom in Eastern Europe and the Middle East

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From 1346 to 1353, the Black Death raged across Europe and the Middle East, killing over one half of all Europeans and Middle Easterners, leading to a period of great labor scarcity. Labor scarcity should have given peasants relatively more power and in Western Europe it did. The Black Death lead in Western Europe to the end of Serfdom and the creation of new political and economic rights for the average European. In Eastern Europe and the Middle East, however, serfdom became entrenched. The question this paper tries to answer is how were the political and economic leaders, the nobility, of Eastern Europe and the Middle East collude against scarce labor while the nobility of Western Europe was not. I argue that there are three factors that affected the ability to collude: the greater number of cities in Western Europe, the greater security threats in Eastern Europe and the Middle East, and the fewer competitive pressures between the nobility in the Middle East. Cities gave peasants more options for employment; if the landlord did not offer great enough payment, the peasant could always move to the city for employment. External threats pushed peasants towards landlords, increasing their ability to collude. Multimarket holdings made sustaining collusion easier for landlords in the Middle East.

The differences in the imposition of serfdom led to different economic and political effects for the peasantry in Europe. In Western Europe, wages rose, grain prices fell, and the consumption of meat, dairy products, and beer increased. More and more peasants moved into a widening “middle class” that could afford to buy manufactured goods. At the same time, the nobility, who earned most of their money from land rents, saw their income decline. Less able to afford luxuries and competing for status with a new middle class, the nobility tried, often to no avail, to enact sumptuary laws to keep their place in society (Platt 1996, 63). The rising fortunes of the peasantry in combination with the declining fortunes of the nobility led to an increase in the consumption of manufactured goods and a decrease in consumption of luxury goods. The
scarcity of labor ensured that the new demand for manufactured goods, such as books, would have to be met with technological advances, such as the movable type printing press (Herlihy 1997, 50). In addition to the economic effect, the peasantry gained more political rights after the Black Death. In England, serfdom was alive and well in the early fourteenth century (Aberth 2001, 142), yet by the beginning of the seventeenth century, it had disappeared (Cheyney 1900, 24). With the demise of serfdom peasants gained the freedom of movement and the ability to challenge the nobility in the king’s court. As Platt argues,

> However, the greatest of all the poor’s benefits were the choices they now enjoyed – of another lord, of another job, of whether to stay in the country or migrate to the towns, of how long to remain if they did go away, and of when to set up house and start a family. If winning freedom of choice is what revolutions are all about, I prefer to put my money on the Black Death. (Platt 1996, 192)

In contrast, the peasantry of Eastern Europe and the Middle East saw none of these benefits. In Egypt, wages dropped while grain prices rose (Borsch 2005, 91). The higher standards of living, the greater landholdings, and labor-saving devices that Western European peasants enjoyed were not available to the peasants of the Mamluk Empire (Aberth 2005, 70). Peasants in Egypt and Syria were subjected to more forced labor, not less (Borsch 2005). In Eastern Europe, not only were peasants forced to perform more unpaid labor for their lord, they also, quite often, lost their political rights as well. A new serfdom was imposed in Eastern Europe, robbing the peasant of his freedom of movement and his rights to access the king’s courts (Blum 1957, 1961; Domer 1970; Kaminski 1975; Makkai 1975; Wright 1975). Landlords in Eastern Europe and the Middle East were, therefore, able to continue to profit from the land without relying on labor-saving devices or new modes of production.

What accounts for the differences in landlords responses to the Black Death? It is not the case that landlords in Western Europe chose technology as a first choice. Labor laws were passed – to little effect – by local and national government in Italy, England, France and Spain to
keep workers on the land and wages low (Aberth 2005, 69). The failure of these laws was based on the failure of the nobility in Western Europe to act collectively (Borsch 2005, 48).\(^1\) Had the nobility of Western Europe been able to act collectively, they could have kept wages low and the peasants tied to the land.

However, every landlord had an incentive to renege on the collective bargain. The nobility’s struggle for agricultural workers can be thought of as a situation of Bertrand price competition between firms. Instead of naming prices, however, the lord names wages for workers. Analogous to the situation of price competition, the lord who offers the highest wage could gain all the “customers” (in this case workers) and produce agricultural goods, leaving his fellow lords without workers. The wage for a worker would then be bid up to the point where the lord was indifferent between producing with the workers at this wage and not producing. At this wage, the lord could make no profit. Nonetheless, we know from models of repeated interaction that, given a high enough discount rate, the lords could have used various punishment regimes to induce cooperation and keep wages low (Bernheim 2007, 182).

As history suggests Western European nobility could not, for the most part, maintain collusion whereas Eastern European nobility and the Mamluk rulers were able to maintain collusion. I will argue that for both Western and Eastern Europe the competition between lords for agricultural workers follows a model of Bertrand Competition with Price Wars. In this model, there is not a constant supply of workers, but in any time period there may be a low supply or a high supply of workers. Therefore, at a given time period a lord may not have enough workers either due to the low supply of workers or because his neighbor is siphoning

\(^1\) Throughout the paper, I use the terms landlord, nobility, and landowner interchangeably as most of the large landholders whose actions affected the changes were part of the nobility.
away his workers with a higher wage. Hence, monitoring defections from the collusive strategy is imperfect.

In this model, the supply of workers becomes the critical factor in determining the ability of landlords to cooperate. I will argue that the supply of workers was artificially decreased by the presence of cities and towns that would take in runaway serfs, as was often the case in Western Europe. Yet not all towns wanted workers at all times. Workers, especially those with few skills, within towns had an incentive to keep the labor market artificially scarce by keeping peasants out or by helping to return runaway serfs to their landlords (Brenner 1976, 55-56). The owners of capital in the town, of course, wanted more workers to keep wages low and returns to capital high. Thus, there would have been a tug of war between the urban laborers and urban capital holders. Who would win these battles was not often clear and would have been hard for a landlord to discern. Thus, at any given time period, towns may, or may not, have been accepting new settlers from the countryside. In the West, where there were more towns, it would be more likely that a peasant could find work in a town. In Eastern Europe, given that there were fewer towns, it would have been less likely that a peasant could find a town to accept him.

As well to having fewer towns and hence fewer outside options, external threats in Eastern Europe, such as invaders from Central Asia, often pushed peasants toward the protection of the lord, artificially increasing the supply of labor. Lord had retinues of armed men who could protect the lords’ lands and the lords’ serfs in times of invasion. Peasants living on their own did get receive the same type of protection.

In contrast to the European model, I will argue that it was not the artificial supply of labor in Mamluk Egypt that sustained cooperation, but that the model of collusion followed a Bertrand model with multi-market competition. In multi-market competition, when there is more
enforcement power than needed to achieve cooperation in one market, the additional enforcement power can be used in another market where firms have incentives to deviate (Bernheim 2007, 193). Mamluks, unlike most European nobility, did not hold their land in one concentrated area. In order to protect himself from the power of the Mamluks, the Sultan purposefully gave the Mamluks land in several different areas. Thus, most Mamluk landlords owned land in several different areas. As the Egyptian and Syrian labor market at this time was not an integrated, modern labor market, Mamluks could use their power – namely, profits from farms in high yielding areas – in one labor market to ensure cooperation in another market – low yielding areas – by sponsoring military operations to return run-away peasants and stop peasant rebellions. I will argue through a model of multi-market competition that “although English landlords were unable to maintain the status quo, Egyptian landholders managed to go beyond it and raise the financial burdens on the peasantry” (Borsch 2005, 49).

This paper continues as follows. Next, I will describe the biology of the plague in order to show that the Black Death was an exogenous shocked that affected these three regions in similar ways. Second, I will present evidence of the differences in the economic and political effects of the plague across Europe and the Middle East. Third, I will discuss the alternative explanations for the differential effects in the historical and economic history literature and show why Bertrand models of collusion provide a better explanation. Finally, I will conclude.

**Biology of the Plague**

The Black Death was caused by the spread of bubonic plague (*yersinia pestis*) across Central Asia into the Middle East and Europe.² The plague is spread by either a bite from a black rat flea or from inhaling infected droplets (Benedictow 2004, 27). Infected fleas were

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² Although a few biologists and historians argue that bubonic plague was not the cause of the Black Death (Scott and Duncan 2001), there is a consensus in the scholarly community that the Black Death was indeed caused by bubonic plague.
transported from Central Asia and across Europe and the Middle East by pilgrims, those fleeing the plague, and most importantly international traders, especially grain merchants. Black rats are primarily grain eaters and thus were often present in shipments of grain. Additionally, rat fleas have adopted the ability to live off grain and grain debris for long periods of time, allowing them to survive long after the plague has killed their rat host (Benedictow 2004, 20). Moreover, rat fleas, as fur fleas, can easily ride in clothing of human beings (Benedictow 2004, 19). Thus traders, pilgrims, and those fleeing the plague, without knowing it, carried plague infected fleas with them to new destinations, accounting for the metastatic spread of the plague from one area to another (Benedictow 2004, 20).

The outbreak of plague known as the Black Death likely had its origins in Central Asia sometime in the late 1330s or early 1340s (Benedictow 2004; Aberth 2005, 11). From Central Asia, it infected the Mongols of the Golden Horde in what is now southern Russia (Benedictow 2004). At the time, the Mongols were besieging Caffa (Kaffa, now Feodosiya), a trading post of Genoese and Venetian merchants (Benedictow 2004, 50-51). Contemporary accounts of the siege argue that the Mongols, as their army was beginning to disintegrate due to the plague, threw dead bodies over the city walls, spreading the plague to the Italians (Benedictow 2004, 60; Aberth 2005, 13). While corpses are not contagious (Benedictow 2004, 53) and it is unclear if rat fleas could survive being catapulted over city walls (Aberth 2005, 13), it is clear that the Italian merchants contracted the plague in Caffa, probably due to rats, and rat fleas, entering the city that the Mongols could not (Benedictow 2004, 53). Once the Mongol army had disintegrated, Genoese merchants fled the city and headed for Constantinople, to promptly infect that city as well (Benedictow 2004). From Constantinople, the plague was spread along the customary trade routes throughout Europe and the Middle East, striking much of the Mamluk
Empire, Greece, the former Yugoslavia, and Italy by the end of 1348 (Benedictow 2004). By the end of 1349, the plague had moved into upper Egypt and into Baghdad, modern day Spain, France, England, Ireland, Wales, and Norway (Benedictow 2004). By the 1352 or 1353, the Black Death had made its way into Russia (Benedictow 2004). Thus, by 1353 the Black Death had hit the vast majority of Europe and the Middle East.³

In addition to striking most of Europe and the Middle East, the Black Death seems to have rendered a similar level of mortality across these areas (see Table 2). One issue with determining mortality rates of the Black Death is that the archival record mostly records the wealthy. In Europe, much of the data comes from tax rolls, censuses, and other official claims that dealt with wealth. Many tax rolls did not capture those who were too poor to pay any tax and also many people evaded the tax collector (Benedictow 2004, 261). Thus, many archival sources underestimate the number of poor prior to the plague. The poor, however, due to poor nutrition and generally worse health were more likely to be killed in the plague (Benedictow 2004, 261).

This undercount of mortality has been borne out by the recent literature on English mortality. Due to the problems counting the poor, Aberth argues that the usual English mortality rate of 27%, pulled from inheritance records, is biased downward (2001, 124). He found that clerical mortality was almost 50% in some places reaching above 70% (Aberth 2001, 125). Although clerics tended to be better fed and had better overall health, they were also more exposed to the disease due to their clerical duties (Aberth 2001, 126). Thus, Aberth believes that

³ There is some dispute among historians as to whether Poland and Bohemia, two areas in which serfdom was imposed after the Black Death, suffered from the plague (Aberth 2001, 120), it is clear that the plague hit to the East and West of Poland and that prices right after the plague followed a similar trajectory as prices in Western Europe with wages rising (Benedictow 2004, 221-222). Similarly, the limited archival evidence from Bohemia shows that the plague had struck in sometime in 1349 or 1350 (Benedictow 2004, 222-223). As the plague struck to the north, south, east, and west of these areas, it is hard to believe that these two areas were isolated enough to miss the plague. It does appear that the plague skipped Iceland, much of Finland (Benedictow 2004, 216, 217), and Medina (Dols 1977, 63) and that it did not affect the Bedouins to a great extent (Benedictow 2004, 67).
clerical data probably reflects better the true level of mortality in England (2001, 126); although, it is hard to know if these two factors, better health but more exposure, would add up to similar mortality. Moreover, manorial records show between 4% and 70% mortality (Aberth 2001, 127). For example, in Essex overall mortality in the Black Death was likely around 45%, which compares well with mortalities in other regions (Platt 1996, 9). Similarly at the Bishop of Worcester’s estates, the reduction of tenants was as high as 80% with an overall average loss of 42%, due to a few estates that had mortalities as low as 19% to 21% (Platt 1996, 9). Thus, more recent studies on England have shown that the death rate was indeed much higher than previously thought.

The mortality rate for the rest of Europe, as far as the archival record allows us to know, is about the same as England’s mortality rate. Using archival records from Spain, Italy, France, Norway, and England, Benedictow estimated the general mortality rates for most of Europe at about 60% (2004, 383). Aberth confirms that the Continental European mortality was similar to the English mortality rate (2001, 128). Benedictow’s data shows that only northern Italy had lower mortality rates that are statistically significant, of 50% to 60% (2004, 381) (see Table 2). He argues that the Italian city-states improved administrative capacity allowed the city government to better provide services in the time of the plague, especially to the poor. The provision of relief likely gave the vast majority of poor citizens a better chance in fighting the disease (Benedictow 2004, 381).

Unfortunately, there is little data on the mortality rates in Eastern Europe. Nonetheless, we can make inferences given the biology of the spread of the plague. The plague was spread, mostly, by merchants, pilgrims, and those fleeing from plague stricken areas (Benedictow 2004). It spread faster in areas with more trade (Benedictow 2004, 97, 99), but it still spread to areas
which had very little trade, such as Norway. Thus given that Eastern Europe tended to have few connections to major trading centers, we can infer that the plague may have spread more slowly. But given the evidence that even states with few connections to world trade (Norway) lost similar numbers of people as those with many connections to world trade (France), we can infer that Eastern Europe would likely have lost a similar 50-60% of its population.

The data on mortality rates in the Mamluk Empire show a similar mortality rate as the mortality rate in Europe. In Dols’s seminal work from the 1970s, he estimates that the urban mortality rate was between one-third and two fifths and that the rural mortality rate was approximately one-third (1977, 215, 216). Similar to the traditional European estimates of one-third that have been shown to undercount the mortality (Aberth 2001, 124), the estimates of rural mortality may undercount the number of dead. Additionally, the methods he uses to derive this number may undercount the total mortality. He derives the urban estimates from the number of coffins leaving Cairo, number of victims prayed over by an oratory, and data from later medieval plagues. However, Cariene officials only sporadically kept the records from the city gates (Dols 1977, 207). Additionally, although in the Muslim world it was customary to have an oratory perform a service, it is not clear that the records contain all the oratories or even a representative sample (Dols 1977, 207). Finally, Dols uses estimates of later plagues to gain a sense of how many would have died in the earlier plague (Dols 1977). Yet, the later outbreaks of plague would have had a lower mortality rate than the Black Death. Those who had survived the earlier outbreaks would have had some level of immunity that no one had in the occurrence of the Black Death. Thus, it is not surprising that in 865 AH (1460 or 1461) more than half of the Sultan’s newly bought Mamluks died but only a third of the other Mamluk classes died (Ayalon 1977, 71).
The rural data is suspect as well, as it was derived from mostly from tax rolls, which would undercount the poor, and from contemporary qualitative reports, which tended to exaggerate (Dols 1977), leading to a biased mortality rate. Thus, Dols’s estimates of mortality may undercount the true mortality levels. More recent scholarship confirms this conjecture, arguing that the Mamluk Empire and other areas of the Middle East must have suffered a similar 50-60 percent death rate as Europe (Borsch 2005, 25; Benedictow 2004, 383).

In addition to the mortality wreaked by the Black Death, the plague continued to haunt Europe and the Middle East for about 150 years. Evidence shows that it is not likely that these later plagues significantly reduced the population of these areas further, but that they served to reverse any population gains made since the last plague (Benedictow 2004, 382; Aberth 2001, 131, 135). In England these reoccurrences are once again seen in its well-kept records. At Canterbury from 1395-1505, there were no fewer than 17 times in which the crude death rate soared to above 40 per thousand (Platt 1996, 8). In towns like Walsham-le-Willows, which was overcrowded before the Black Death, the pre-plague population was between 1,250 and 1,500 people (Platt 1996, 10). By 1851, its next and final population peak, its population still numbered only 1,297 (Platt 1996, 10). Thus, if the plague in England had only occurred during the Black Death, towns may have simply gotten rid of their “unwanted surplus of impoverished people;” however, due to the continued outbreaks, towns could not regain their previous pre-Black Death numbers (Platt 1996, 10). Hence at any given time, the gains in population made since the last outbreak could be wiped out by a seemingly random occurrence of the plague.

Similar outbreaks of the plague occurred in Egypt. In the 174 *hijrah* years (168 Gregorian years) after the Black Death, there is a possibility of 28 outbreaks of plague (Dols 1977, 224). Dols further argues that these later plagues did more damage to the population than

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4 Although, it would be hard to know which way the bias would run.
the Black Death and that they decreased the population to a much greater extent than did the reoccurrence of the plague in Europe (Dols 1977, 4, 224, 231). If Dols is correct and population further decreased in the Mamluk Empire than in Europe, then we would expect that the Mamluks would have had a harder time acting collectively to stem the rising power of an ever shrinking working class.

In addition to losing increasing numbers of peasants, the reoccurrence of the plague led to increased deaths of the Mamluks themselves relative to the general population (Dols 1977, 10-11, 185, 187). The Mamluk Empire was based on a military government. Instead of conscripting soldiers from the local population, however, the Mamluks imported slaves from Central Asia and the Balkans to fill their ranks. Slaves would be imported at a young age, converted to Islam, and trained in military schools. Upon the completion of their education, they would be manumitted and serve the man who had manumitted them, either the Sultan or one of the many emirs, who were originally Mamluk slaves as well. Originally, one would rise through the ranks of the Mamluks to become an emir and then maybe a Sultan by one’s ability to serve. However, as time went on, one gained his place through aligning with the right faction. Due to this factional warfare, control of Cairo became critical to controlling the state. In times of plague, therefore, Mamluks would not abandon the cities for safer locations for fear that rival Mamluks would gain control and rob them of their property and status (Dols 1977, 190).

While few emirs died during the plague, due to their wealth and good nutrition (Irwin 1986, 135), newly imported Mamluks died in large numbers largely due to poor diet (Irwin 1986, 136-137). Indeed, in 1315 there were 8,932 knights residing in Cairo whereas by 1418 there were only about 400 (Poliak 1939, 9). The reason for the higher mortality rate is that the newly imported Mamluks were young, often including several hundred pupils of the military schools.
These Mamluks had not been exposed to the plague in either their homeland or in Egypt (Ayalon 1977, 71). Thus, for example in 865 (1460 or 1461) AH more than half of the Sultan’s Mamluks died but only a third of the other Mamluk classes died (Ayalon 1977, 71). These deaths were occurring, of course, at a time when the Balkans and Central Asia were also hit by the plague, reducing the availability of slaves and increasing their cost. Thus, at the same time the peasant population was decreasing, the ruling class was finding it more and more costly to replenish its ranks with fresh soldiers, making their triumph over the peasantry even more difficult.

Thus, the vast majority of Europe and the Middle East had similar mortality rates from the Black Death and from later bouts of the plague. One reason for the similar mortality rates is that both Christian and Muslim societies had the same level of medical knowledge at the time of the plague. Prior to the fourteenth century, this may not have been true. However, largely due to their interactions with, and learning from, Muslims during the Crusades and Muslims in modern day Spain, European physicians had caught up to their Muslim counterparts by the fourteenth century (Aberth 2001, 117). Given their shared scholarship, it is not surprising that the scientific community in both societies believed that the disease was spread by miasma, a fouling of the air (Aberth 2001, 115; Dols 1977, 100).

Similarly, the religious communities in both societies also believed in a similar source for the plague: god’s punishment for wicked behavior (Aberth 2001, 114; Dols 1977, 23) or god’s punishment for non-believers in the community (Dols 1977, 23; Aberth 2001, 158). In Europe, this belief in punishment for non-believers often led to pogroms against the Jews living in the community, instead of taking steps to prevent the plague’s spread (Aberth 2001, 156, 158). Thus, no society, except maybe the city-states of Italy, had advanced enough in its medical
knowledge or care for its citizens to prevent catastrophe. The backwards societies of Europe suffered just as much as the advanced societies of Europe and the Middle East.

Additionally, the Black Death was not a Malthusian trap, as the plague did what previous famines could not. In both Europe and in the Middle East, there had been robust population growth prior to the Black Death. In England, the population had been stable at very high numbers over several generations, leading to a “Malthusian deadlock” of low wages and short life expectancy (Herlihy 1997, 34). The Black Death “appeared as an exogenous intervention; it owed its power not to social factors but to its still obscure nature … But in spite of the havoc it wrought, it did a service to the West. It broke the Malthusian deadlock that medieval growth had created and which might have impeded further growth” (Herlihy 1997, 38). The great mortality of the Black Death in England was not, therefore, some natural consequence of previous population growth.

Nor was the English population growth exceptional. The Mamluk rulers had produced robust growth in the agrarian sector prior to the Black Death, expanding arable land by 50%, setting the agrarian economy on a growth-promising path, and leading to a increase in population (Borsch 2005, 15-16). Population growth in Germany in the twelfth century had launched a great eastern migration (Blum 1957, 817; Haddock and Kiesling 2002, 7). Eastern European landowners provided incentives including reduced fees and rents to attract migrants (Blum 1957, 818). Thus, throughout Europe and the Middle East, the population, prior to and after the plague, followed a similar trajectory regardless of the government, economy, or culture.

Finally, the effects of the plague were not determined by non-political factors, such as the environment. The most prominent argument of environmental determinism in the aftermath of the plague is that the decline of Egypt was based on variations in the flow of the Nile River
Dols has argued that the severe, historically unprecedented fluctuations of the Nile caused a further loss of revenue, making the Mamluks more predatory (1977, 166). However, the lowered output of Egyptian agriculture was not due to fluctuations in the Nile flood but to the maintenance of, or lack thereof, the Nile irrigation system. After the Black Death, maintenance of irrigation canals, which controlled the flood and ensured that its waters were spread equally and as need, was lacking (Borsch 2005). As landlords sought to squeeze out as much from their holdings that they could, they neglected canal maintenance (Borsch 2005). The neglected maintenance also meant that the flood basins in Upper Egypt (used to collect flood waters for use later in the year) could not contain as much water (Borsch 2005, 42). Hence, although the Nile River seems to have varied normally in this time period, its effects were more destructive due to the lack of maintenance. Furthermore, this lack of maintenance was not inevitable. Given longer time horizons, such as those under the English landholding system, landlords may have invested in the irrigation system to maintain long term profitability.

The second environmental determinism argument underlies the first argument, namely that the special features of the Nile determined the type of landholding system. But the Nile neither determined the landholding system of Egypt nor did its flow determine the agricultural output of Egypt (Borsch 2005, 18). Egypt during the time of the plague used the iqta landholding system. In this system, soldiers and other members of the ruling class were paid by rents from short-term landholdings. These holdings were held for a short time and were spread throughout the lands controlled by the Mamluks. The reason for this system was to keep large landholders from gaining an independent power base. Yet, this system was not determined by the special features of the Nile flood. In Roman times, the plantation system of Egypt mirrored that of medieval Europe. Borsch argues that “if fourteenth-century Egypt had had a landholding
system like that of Roman Egypt (similar to the one that predominated in late-medieval England), Egypt would have weathered the plagues just as well as England did in the fourteenth and fifteenth centuries” (Borsch 2005, 19). Thus, neither the environment nor prior cultural, political, or economic achievements of the various societies affected the mortality of the Black Death nor did environmental effects lead to the differential outcomes.

**Effects of the Plague on the Economy and Politics of the Middle Ages**

The Black Death and its subsequent reoccurrences had profound, yet opposite, effects on prices and wages in Western Europe, Eastern Europe, and the Middle East. The large drop in population in the West would eventually lead to declining land values, declining grain prices, and increasing wages. In the East, grain prices remained high, increasing in some areas, and wages fell. In addition to falling wages, the nobility in the East imposed increasing amounts of forced labor whereas Western nobility found their ability to impose unpaid labor duties severely reduced and finally abolished. In the West, the outcome was that peasants gained the freedom of mobility whereas in the East landlord collusion was strong enough to largely curtail peasant mobility with the re-imposition of serfdom. Thus, in the West, the market responded largely as classical economic theory would predict – a decrease in labor led to an increase in the cost of labor and a decrease in the returns to capital. In the East, the nobility was effectively able to collude to prevent market forces from eating away at their profits.

In the immediate aftermath of the plague throughout Europe and the Middle East, the status quo was preserved. Most people assumed that after the disease had run it course, the markets would return to normal. It is possible that this lack of understanding explains, in part, why prices did not fall and wages did not rise immediately after the plague (Benedictow 2004,
Nonetheless, within a few decades, there was a fundamental change in prices and wages in the West. Due to the great mortality, many estates were left without heirs, increasing the availability of plots. At the same time, the mortality also decreased the number of people looking to buy land. These two factors led to a decrease in land prices. In England, the low land prices allowed nascent yeoman farmers to steadily increase the size of their holdings. In Coltishall, half-acre plots had been the normal amount of land exchanged prior to the plague. By the end of the fourteenth century, the average amount of land transacted had increased to 1.4 acres and within two more generations had increased to 6.8 acres (Platt 1996, 11). Similarly, rents fell in English towns as well. In Wells, rents from community owned properties had fallen by almost fifteen percent by 1427 and continued to fall even as the community brought more properties. By 1551, the Wells community owned more properties than it had ever owned before but brought in less rents than it had in the 1420s (Platt 1996, 26). In farming communities in England, landlords had to make special arrangements to attract new tenants, including reduced entry fines, small cash incentives, and waived services (Platt 1996, 39-40).

In addition to lower rents and lower land prices, landlords also had to face lower grain prices. After the Black Death, demand for foodstuffs dropped dramatically as there were fewer consumers of food. Using data from England, Borsch estimates that between 1300-1347 and 1440-1490, the average price of wheat in silver dropped 49 percent, the average price of barley in silver dropped 53 percent, and the average price of peas dropped 57 percent (2005, 97-98) (see Table 3). This drop in grain prices occurred at the same time that the supply of grain may have dropped as well due to the decrease in agricultural labor. One reason why grain prices continued to fall even though there was less labor to produce grain is that consumers shifted from grain to

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5 Although classical economic theory would argue that people would not need to understand the equilibrium effects of the change in the labor supply for the new equilibrium to occur (Smith 1776, Book IV, Chapter II).
more expensive foodstuffs such as mean, dairy, and beer, illustrating the higher average peasant income that resulted after the plague (Benedictow 2004, 220). Thus, it is no surprise that after the plague, a 100-acre plough land was no longer profitable (Platt 1996, 52). In England, therefore, the markets followed what we would expect, namely as demand for land and food decreased due to the loss in population, prices for land and food decreased.

In the Middle East, however, grain prices never decreased like they did in Western Europe. The immediate outcome of the plague was a supply shock and concomitant an increase in grain prices due to a decrease in grain reserves caused by the decrease in trade during the plague and the inability to harvest grain immediately after the plague (Dols 1977, 260). After the immediate crisis, grain prices in the Middle East did not fall as they did in Western Europe. The stability and even increase in grain and other food prices resulted in part from government monopolies on goods. Borsch calculates that between 1300-1350 and 1440-1490 the price of wheat in silver in the Mamluk Empire rose 56 percent in stark contrast to the movement of prices in England (Borsch 2005, 95) (see Table 4). Prices rose even further in the sugar industry, which was fully controlled by the Mamluk regime (Dols 1977, 262). The increase in foodstuff prices led to an increase, rather than a decrease as in the case of England, in the cost of living in Damascus (Tarawneh 1987, 123). The monopoly on foodstuff and their corresponding high prices also led to twelve urban revolts in Damascus province in 1382-1516 (Tarawneh 1987, 63, 111). Thus, while the English nobility was at the mercy of market forces, the Mamluk nobility was successfully colluding to beat market forces on the price to consumers. As I will show, they were the only group willing, and able, to employ this collusion. While not the focus of this paper, it is interesting to note that the ability to collude in the market of final goods to consumers
may have made collusion easier in the labor market as profits from the consumer market could pay for enforcement in the labor market.

Similarly to land and grain markets, labor markets in Western Europe followed classical economic models whereas labor markets in Eastern Europe and the Middle East followed the opposite trajectory. In England, gains to peasants were not seen until the 1370s, possibly due to shortage of coin, bad weather, or simple laziness (Aberth 2001, 133) or a fundamental lack of understanding of the effects of the new labor market (Benedictow 2004, 114). Nonetheless, peasants did begin to press for higher wages and more rights. English lords sought to use all of their political and economic power to squelch the demands of the peasants. This included the increased imposition of fines on their serfs and the increased exploitation of all traditional seigniorial incidents at their disposal (Poos 1991, 245-246). The imposition of these demands by the nobility were the crux of the demands of peasants during their many revolts against serfdom in the late fourteenth century (Poos 1991, 245). Nonetheless, English landlords could not hold the line for long.

The English landlords sought increased protection for their profits from the law in the aftermath of the plague. Labor laws specified the punishment of workers who received higher than posted wages and the punishment of lords who paid more than the law required (Aberth 2005, 69). Similar laws were enacted in Italy, France, and Spain (Aberth 2005, 69). Yet court rolls were long, likely a sign of rampant evasion. In Halesowen’s bondsmen “departed for nearby manors where – no questions asked – they could readily sell their labour and live as freeman” (Platt 1996, 36-37).

The rampant evasion illustrates that serfdom is not an exogenous institution with its own power, but an equilibrium in which collusion is maintained. Rampant evasion of labor laws is a
sign that collusion cannot be maintained in equilibrium. If serfdom is the equilibrium outcome, with is associated government-enforced return of runaway peasant, then rational peasants, knowing that they will be returned to their master and likely punished for their defection, would not run away in the first place and court rolls would be short. Yet, the fact that court rolls were long shows that peasants believed that they would not be caught abandoning their manor and taking a higher paid position elsewhere. Additionally, where wages did not rise or prices rose to a similar extent, English manorial records suggest that peasant laborers may have been compensated in other, “hidden” ways that raised their standards of living, such as increased leisure time and freedom of employment, as suggested by labor laws that complained that peasants were idle (Aberth 2005, 69). Yet, the English landlord could not hold back market forces. Social critics complained about the laziness of peasants, but it is “entirely possible that what angered and frightened [them] the most was not the peasants themselves, but the changing nature of the market: one that anticipated modern capitalism with its inexorable laws of supply and demand and the opportunism of the workforce that went along with it” (Aberth 2001, 138-9).

English landlords, and their compatriots in France, Spain, Italy, and Western Germany, faced a shrinking labor force and were forced to respond with higher wages and more freedom for their peasants, illustrating the breakdown in the prior equilibrium of serfdom. Using English data, Borsch found that tradesman’s wages rose after the Black Death (Borsch 2005, 104-105) (see Table 5). The combination of rising wages and falling grain prices meant that an English tradesman’s purchasing power in terms of wheat increased 102 percent between 1300-1350 and 1440-1490 (Borsch 2005, 108) (see Table 6). Rising wages also allowed Western European peasants to shift consumption from grains to more expensive foodstuffs such as meat, dairy, and beer and to consume more ready-made goods (Benedictow 2004, 390).
In addition to rising wages, peasants gained more political freedom as well. Prior to the Black Death in many areas of Western Europe, peasants were under the condition of serfdom, which restricted their ability to move, their access to courts and other freedoms, and imposed fines for activities such as marriage. In England, “earliest to go were the rents usually associated with unfree status: the merchets and heriots (fines at marriage and on death), pannage and herbage (payments for rights of pasture), ‘work silver’ (for commuted labour services), and occasional grants-in-aid” (Platt 1996, 128-129). After the Great Revolt of 1381 in England, further restraints on personal freedom were abolished. By the mid-1400s, most of the restraints had been lifted (Platt 1996, 189).

The Great Revolt of 1381 in England and other smaller peasant revolts throughout Europe were a further sign that landlords were losing their grip on their serfs. Although authoritarian tactics were used to put down the Great Revolt (Aberth 2001, 150), lighter punishments were issued for rebellion than before the plague (Platt 1996, 47). English landlords were beginning to understand the effects of a smaller labor force; namely, if they did not treat their peasants well, their peasants would migrate to a farm or city where they would be better paid and better treated, regardless of the existence of laws limiting their freedom (Platt 1996, 47). Similar peasant revolts were found on the continent at this time, with similar consequences for the landlords of Western, but not Eastern, Europe (Aberth 2001, 143). After the Black Death, serfdom largely disappeared from Western Europe (Benedictow 2004, 391; Brenner 1976, 52).

In Eastern Europe and the Middle East, prices and wages at first moved in concert with Western Europe; however, soon afterwards they were on their own trajectory. Prices and wages moved in Krakow as they did in England, France, or Germany with a fall in grain prices and an increase in real wages and a switch in consumption from grains to meat, dairy, and beer.
Yet this dominance of market forces did not last long. “Instead of reducing obligations, as was the general practice in the West where lords tried to hold their peasants and attract new ones by asking less of them, seigneurs in Bohemia, Silesia, Poland, Brandenburg, Prussia, and Lithuania imposed new and heavier obligations, notably in the form of labor dues and cash payments” (Blum 1957, 820). Serfdom was extended and deepened in Poland, Bohemia, Prussia, or Russia after the Black Death as “a new imposition organized by rulers or a concert of nobles rather than a piecemeal attempt to revive earlier practices fallen into desuetude” (Freedman and Bourin 2005, 6). Serfdom was, therefore, a new equilibrium outcome produced by the struggle between the peasants and the landlord, requiring a level of landlord collusion not seen before, not simply the tightening of an old system based on prior landlord collusion. Additionally, after the Black Death, leaders in some parts of Eastern Europe, particularly in Pomerania, Brandenburg, East Prussia, and Poland, were able to enserf peasants who before had been relatively free (Brenner 1976, 41).

Examples of the imposition of serfdom after the Black Death can be found throughout Eastern and Central Europe. Throughout southwest Germany up to the mid-fourteenth century, serfs and other peasants were free to move where they pleased; however, after the Black Death, their freedoms were curtailed and the economic demands of their landlords increased (Scott 2005, 123). Likewise in Wurttemberg (Germany) by 1500 all residents were changed from freeman to serfs (Scott 2005, 120). Similarly in Denmark, the judicial subjugation of the peasants “grew even harsher during the two centuries following the Black Death” (Netterstrom 2005, 370). Serfs could not be forced to move to another holding but they could not move on their own either without first paying a fine to their landlord (Netterstrom 2005, 371). In Poland, Prussia, Bohemia, Moravia, Silesia, and Lithuania peasants could not leave without permission
of their masters and in Russia they could only depart at certain times. Additionally, severe punishments were ordained in Prussia, Poland, and Bohemia for runaways and indebtedness was used in Livonia and Russia to hold peasants (Blum 1957, 821).

The situation of the peasantry in the Mamluk Empire mirrored that of the peasantry in Eastern Europe. Peasants’ wages, at first increasing after the Black Death, decreased due to the ability of the Mamluks nobility to keep wages low (Dols 1977, 271). Borsch’s data on tradesmen’s wages in Egypt shows that between 1300-1350 and 1440-1490, wages declined at least fifty percent (see Table 5). In addition to low wages, the peasantry was more often subjected to forced labor (Borsch 2005, 44).

Agriculture in Mamluk Egypt relied upon the Nile irrigation system, which was maintained by peasant labor. Prior to the Black Death, peasants were often paid for their labor, but as agricultural profits began to decrease, the Sultan and Emirs demanded more and more free labor (Borsch 2005, 44). Even so, there was often not enough labor available to keep the irrigation system working which meant that the Nile flood became harder to control, leading to parching or water logging of soil and a decline in yield per acre (Borsch 2005, 40). Additionally, the Mamluks fiscal regime became more strained at the time due to the increased funds needed to pay for new Mamluks, leading to even less money for the irrigation system on which agricultural productivity relied (Borsch 2005, 41). The decrease in arable land and productivity due to uncontrolled Nile flooding led to increased strain on the peasants (Borsch 2005, 47). Peasants paid fixed and unchangeable yearly rents, with additional rents paid on sugar cane plantations, in addition to other taxes in money, not in kind, which meant that lowered agricultural productivity led to a decrease in income for the peasants (Poliak 1939, 66). “That share of the produce which remained to the peasants was so small that they were always in debt. Under the Mamluks they
received every year from the lords loans of grain, as seed and as food until harvest. The interest amounted to 10-11 per cent, though the lords received for this purpose in their turn advances of gram from the sultan” (Poliak 1939, 68-69). The combination of decreased agricultural productivity, increased forced labor, and low wages led to peasant revolts in Egypt (Dols 1977, 277). Devaluation in late 14th and early 15th centuries led to increase in cash rents and perpetual agrarian revolts (Poliak 1939, 66).

Due to the labor shortage and the revolts, peasants were subject to laws very similar to those governing serfs in Eastern Europe. They could not leave without permission of the lord; authorities were obliged to help bring back wayward serfs; lord decided civil suits between serfs and punished them in criminal suits; serfs could not bring case against the lord; and the lord could demand that the authorities punish his serf if he could not (Poliak 1939, 64-65). Thus, “while the pandemic may have accelerated the decline of European manoralism and the shift to modern contractual relationships, no such change took place in the centralist landholding system of Egypt and Syria …Except for the urban laborers, the economic evidence of the later Mamluk period indicates a marked decline in per capita income” (Dols 1977, 283).

Beyond the imposition of serfdom, the economic incentives created by either a market-based labor system or a feudal, serf-based labor system lead to different allocations of capital. In Western Europe cheap land and capital were substituted for labor, for example in the conversion of wheat fields to pasturage, the purchase of oxen for plowing and fertilizer, and increased use of machines for urban workers (Herlihy 1997, 49). Landlords and other owners of capital in Western Europe had to find new strategies of using labor to obtain profits. One strategy was enclosure for animal husbandry. Haddock and Kiesling show that meadow, pasture, and use of woods increased in England, as “farming would have consumed more labor than did herding.
Since it was relatively land intensive, animal husbandry would have expanded more as a result of the fall in land rents” (Haddock and Kiesling 2002, 17-19) (see Table 7). Landlords also diversified by exploiting under-used resources, such as timber, stone, salt, slate, lead, coal, and iron (Platt 1996, 74), or by growing new crops for proto-industry such as flax, dye plants, and hemp (Borsch 2005, 63). Landlords were forced to manage properties better (Platt 1996, 50), leading to growing professionalism (Platt 1996, 57). In England, “all these factors taken together – increased per capita income, shifts in income distribution, changes in demand- and supply-factor utilization, and growing opportunities for almost all social segments below the top of the socioeconomic pyramid – made for an economy that was more efficient on a per capita basis and more open to economic change” (Borsch 2005, 65).

In contrast, there were no technological advances in Eastern Europe or Egypt as there was in England. In Egypt this was due in part to government controlled monopolies and fears of government confiscation (Dols 1977, 265; Abu-Lughod 1989, 236-237). More importantly, the lack of technological development was due to the different incentives landlords faced in these societies. The different incentives were created because landlords in Eastern Europe and the Middle East “had an alternative, ‘exploitative’ mode available to them: the use of their position of power over the peasants to increase their share of the product…the peasantry was by and large unable to use the land they held in a free and rational manner” (Brenner 1976, 49). Additionally, men could not move to where labor would be most productive (Brenner 1976, 48). In Egypt, “the native industries – suffering from oppressive Mamluk control and capriciousness, lack of technological innovation, and the periodic destruction of workers by plague - encountered a greatly limited market from the late fourteenth century” (Dols 1977, 266). Similarly, Eastern Europe became the bread bowl of the West rather than develop similar industrial products. Thus,
the imposition of an extractive labor system, serfdom, in the East lead to economic stagnation and backwardness whereas the inability to impose such as system in the West lead to economic innovation and eventually growth.

**Landlord Collusion**

The central problem for landlords, including the nobility, in the aftermath of the plague was that land was cheap and that labor was expensive. Most of the nobility, whether it is the classical European nobility or the Mamluk slaves, earned their living from rents, paid in cash or in kind, from the farmland that they owned or were given. Thus increasing labor costs in combination with decreasing demand for foodstuffs, both a result of the high mortality of the plague, led to a squeezing of profit margins. If landlords were subjected to market prices for labor and foodstuffs, the only way to profit would be to increase the productivity of labor either through the use of technology or switching what crops or animals they produced. On the other hand, if landlords could collude, they could force the price of foodstuffs up, the price of labor down, or both. In this sense, the landlords were like firms engaged in Bertrand competition, naming prices (wages) for both consumers and laborers. As models of Bertrand competition have shown, collusion on prices can be achieved in a situation of repeated interaction of firms (in this case landlords) if firms have a high enough discount factor (Bernheim 2007, 182). If the discount factor is not high enough, the firms will each have an incentive to renege on the bargain.

The goal of this paper is to show why landlords had a harder time colluding in Western Europe than in Eastern Europe or the Middle East. I argue that the ability to collude was not due to any difference in the time horizons of landlords as I assume that landlords throughout Europe and the Middle East had the same time horizons. Instead the ability to collude was based on
features of the markets in which landlords had to compete. In Europe, I will argue landlords faced a situation akin to price wars where demand for work (i.e. supply of laborers) was not constant and where the labor market conditions and wages paid by other landlords could not be observed. In Western Europe, landlords faced more demand shocks due to the greater number of outside options given to peasants by the rise of trade in the twelfth and thirteenth centuries. Thus, it was harder for Western European landlords to maintain collusion and we see collusion breaking down quickly. Similarly to Western Europe, the Mamluk nobility faced demand shocks because peasants at this time could easily integrate into Bedouin tribes (Borsch 2005, 51). However, due to Mamluks ownership of lands in several different areas, they faced multimarket competition for laborers, which allowed for increased ability to cooperate (Bernheim 2007, 193).

One question, however, is why did landlords in Europe try to collude in competition for workers rather than consumers. The answer may be that the nobility was afraid that colluding on the price of foodstuffs would result in urban revolts – a more dangerous prospect than rural revolts. In fact, one set of nobility did collude on the price of foodstuffs. The Mamluk owned monopolies drove up the price of foodstuffs, especially sugar (Dols 1977, 262; Tarawneh 1987, 185). The cost of foodstuffs, indeed, was one of the causes of urban riots within the Mamluk empire (Tarawneh 1987, 111). Legislatures throughout Western Europe, understanding this threat, sought to keep prices down in the aftermath of the plague, as seen in an English ordinance of 1349 tried to keep prices “reasonable” (Aberth 2005, 69). Landlords may have felt, therefore, that the peasantry was a more controllable body and thus sought to exert its collusion in the labor market rather than in the goods market.

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6 In the Mamluk Empire, the landlords colluded successfully in competition for both consumers and workers.
Explanations for the Varied Responses to the Plague

Several previous works have tried to understand the outcomes of this collusion – namely the imposition of serfdom in Eastern Europe and the decline of the Mamluk Empire in Egypt – rather than try to understand how the collusion was maintained in the first place. Borsch (2005) in his study on Egypt and England argues that the different landholding systems in the two countries account for the difference in outcomes. In England, landlords tried to revert back to the Norman and early Plantagenet era when landlords had “tightly the reins of serfdom during a time of relative labor scarcity” (Borsch 2005, 57). However, “the two periods of labor scarcity were separated by an unbridgeable gap of profound socioeconomic changes. Many of these changes had had a dramatic impact on the mentality and assertiveness of peasant communities” (Borsch 2005, 57). These changes included commercialization, increased rule of law, improved estate management, the transition to a cash economy, and a transition away from labor dues in kind to dues in cash. Thus, “the calculus of exploitation and customary restraints was now easier for the peasant to understand,” making it harder for the landlords to use the traditional fees and obligations to obtain more output from their peasants (Borsch 2005, 57). Yet “it is worth noting that all these changes had taken place in Egypt long before” (Borsch 2005, 57). Thus, the inability of the English landlords to collude could not be based on temporal changes in the economy within England. The factor that enabled the Mamluks to collude, but not the English, must be found elsewhere.

Borsch (2005) argues that due to the nature of ownership, English landlords more were attune to revenue problem and that each landlord, as an individual economic actor, was faced with direct effect of demand and supply. English landlords were individual agents and so competition for laborers was “increasingly fierce” and attempts at collective action broke down
In contrast due to the constant shifting of land ownership in the iqta system and the ownership of scattered parcels, “Mamluk landlords formed a unified body that would often act together to support their interest in the rural scene, regardless of whose estate or revenue was involved” (Borsch 2005, 33). Yet, Bertrand models of competition of individualistic firms attuned to the revenue problem show that collusion can occur in equilibrium if discount factors are high enough (Bernheim 2007, 182). The unified response of the Mamluks, thus, was the outcome of their ability to collude not the basis on which their power was derived. In addition, there is no reason that English nobility as revenue seekers would not be able to collude. English nobility were in a situation of repeated interaction with each other, especially with their close neighbors. Furthermore, given that they could hold their land for their life and pass it to their children (i.e. they had high discount rates) unlike the Mamluks (i.e. they had lower discount rates), one would expect that the English landholding system would make landlords more likely, not less likely, to collude. In fact, in Eastern Europe, which used a landholding system similar to England’s system, collusion was maintained.

A second theory is that the imposition of serfdom represents a triumph of the nobility over the central authority (Freedman and Bourin 2005; Blum 1957). Serfdom was more than an economic system; it was also a devolution of power, especially judicial power, from the central government to the nobility. At the same time western kings were asserting themselves over the nobility, in Eastern Europe, with the exception of Russia, sovereigns sold land to nobles to raise cash, borrowed from nobles, granted them broader powers in state administration in return for support for new fiscal measures, and supported nobles in their struggle over cities and in demands for greater powers over peasants (Blum 1957, 822). To gain noble support and fiscal revenue, kings gave more seigneurial jurisdictional and administrative privileges to nobles (Blum
1957, 823). “The result was the gradual exclusion of the crown in the lord-peasant relation. This explicitly recognized by the throne in the early sixteenth century when the [Polish] king ordered that the royal courts would no longer hear cases between peasants and their lords” (Blum 1957, 824). “For all practical purposes the peasants on privately owned estates became more the subjects of their lords than of the throne…Through entirely legal means the lords were able to set themselves up as the despots of their villages and to press their people into a condition of subjection and dependence upon them” (Blum 1957, 826).

The problem serfdom presented for the central authority was that state revenues often were collected by the noble and passed to the state or could not be collected from the serfs under the nobility at all. Thus, the king or sultan had an incentive to reassert his authority over the peasantry to gain revenue. For instance in Denmark, the royal government increased its tax revenues from the peasantry and control of state finances by eliminating serfdom (Netterstrom 2005, 383). But the reassertion of authority and the concomitant ability to raise taxes led to diminished the revenues of the lords and were bitterly resented, and resisted, by them (Poliak 1939, 73). Hence, where possible, the nobility sought to restrict the king’s ability to tax their serfs. Therefore where the centralized state was strong, serfdom was not imposed as it was against the King’s interests to do so. In England,

The doctrine of villeinage, which emerged in the late twelfth century, was based on a compromise between the common law of the king’s court and the customary law of the lords…in the late fourteenth century lords and the state became close allies, and that helped the lords to plan the imposition of a second serfdom. After 1381 the state saw dangers in its association with seigneurial reaction. The peasants’ demands in 1381 showed that they perceived, correctly, that only the king could abolish serfdom. (Dyer 2005, 434)

Thus, for authors like Blum (1957) and Freedman and Bourin (2005) the cause of serfdom or freedom was based on the power struggle between the King (or Sultan) and the nobility.
There are two key problems with this theory. First, the power of the king vis-à-vis the nobility is predicated on the ability of the nobility to be united against the king. If the nobility is not united, a subgroup of the nobility can be co-opted to support the king.\(^7\) Assuming that issue linkage makes cooperation in one area, peasant control, easier, the problem of cooperation vis-à-vis the king, returns us to the issue of how can cooperation between the nobility be sustained. The second issue is empirical. Serfdom was imposed in Russia during a time when the tsar was quite strong (Kaminski 1975, 258). Additionally, if the central power argument is correct, we would expect serfdom to be imposed in the aristocratic republics of the time, which had no central power. Yet, serfdom was absent in aristocratic republics of Venice and Dubrovnik (Kaminski 1975, 258).

Other theories on the rise of serfdom also ignore the collective action problem of the nobility. One such theory pits the small landowner versus the large landowner. Small landowners had a smaller profit margin because they could not utilize the same returns to scale as large landowners. They, therefore, needed the cheap labor that their control over the peasants would grant them more than the large landowners. For instance, in Russia, the small holder who had heavy obligations to the states, “had to demand more than the great proprietor who could afford to take less from the individual peasant because he had so many of them” (Blum 1957, 832). Yet, large landowners could have benefited from keeping the cost of labor low throughout the labor market. The question is how did the king or the peasantry keep the nobility from colluding. Historically, this theory did not hold either. In England “within less than five decades of the great pestilence of 1348-9 it was the county members at Westminster and their stay-at-home cousins on the bench who had plainly emerged as the ‘dominant political force in the

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\(^7\) The king can co-opt the nobility by offering selective incentives for some, but not all members of the nobility. See Weingast (1997) for an example for this behavior.
shires,’” not the large landowners (Platt 1996, 67). Consequently, if the small landowner vs. large landowner theory is correct, we should have seen serfdom re-imposed in England.

Similarly, Brenner argues that it was peasant solidarity of the West that allowed peasants to resist the “seigneurial reaction” (1976, 56-58). Although peasant revolts were successfully quashed, “what was successful … throughout most of Western Europe, was the less spectacular but ultimately more significant process of stubborn resistance, village by village, through which the peasantry developed its solidarity and village institutions” (Brenner 1976, 59). Yet, this type of stubborn resistance was seen in Egypt, only to be put down by a “collective body of urban military power” (Borsch 2005, 32). Thus if the nobility in the West had been more collectively organized, they may have withstood the peasant resistance.

Finally, Domar argues that the incentive for the imposition serfdom (and similar systems) exists whenever there is free land, free peasants, and non-working landowners. These three factors exist in a trilemma – states can only have two. But they can choose which two to have; the combination that exists depends on government measures. Without government intervention free land leads to free farmers rather than serfs (Domer 1970, 21). With government intervention, serfdom is possible, but it hinges on a collective action problem – namely, the landowners must be able to act collectively. In his description of England after the Black Death, Domar argues,

Serfdom could not be restored unless the landowners were reasonably united in their pressure on the government, and unless the latter was willing and able to do their bidding. But it is most unlikely that every estate lost the same fraction of its peasants. Hence, those landowners who had suffered most would welcome the freedom of peasant movement, at least for a while, while those who had suffered least would oppose it. If so, the landowners could not be united. (Domer 1970, 29)

While Domer’s argument is correct, it does not account for the rise of serfdom in the East, where landlords had the same incentive. It is likely that landowners everywhere suffered different
levels of loss and that the landowners who lost the most peasants would seek peasant freedom the most. Therefore, we must determine how landowners were able to collude in some areas but not in others.

A Model of Landlord Collusion

I begin with the European model of Bertrand Competition with Price Wars. Landlords, and other capital owning members of society, in the aftermath of the Black Death were competing with each other for workers. I focus on rural landlords because I am interested in the rise of a political system, serfdom, that arose in rural areas. I assume that there are \( N \) landlords in the area. The spatial area in which these \( N \) landlords compete is a large area with many peasants akin to a statewide market. Landlords could offer workers some combination of wage, reduced rents, fringe benefits, and political freedoms as inducements to obtain workers. Without loss of generality, I assume that all these benefits could have a numerical weight given to them and that the sum of these benefits can be expressed numerically as \( w \). I further assume that peasants’ utility functions are monotonically increasing in \( w \); thus, the more benefits a landlord is willing to part with, the happier the peasant is to take the job. When considering taking a position with (or renting land from) two different landlords, the peasant will take the position with the landlord who offers the highest \( w \). In contrast, the landlord’s utility function is monotonically decreasing in \( w \); thus, the more benefits the peasant can extract from him, the less likely he is to give the peasant a job.

Landlords, however, face constraints in how high a \( w \) they can offer peasants. I assume that landlords all produce the same good. I further assume that no one landlord produces enough of the good to be a price setter. All landlords are thus price takers. The market price for the

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8 I am using the term “state” to denote the territory controlled, more or less, by the central authority – whether the central authority be a king, sultan, or some type of representative body as in the Italian city-states.
good is the same throughout the market. Thus, for every one unit of the good, the landlord gets the market price. Assuming that the landlords are rational, the landlord will produce for market up to the point where marginal cost equals marginal revenue. Assuming that the landlords costs consist of labor costs and agricultural inputs, such as the marginal cost of animals for plowing and fertilizer, tools, and seeds, the landlord can only afford to offer the peasants a wage up to the point where he can cover his other costs and not lose money, \( w' \).

In order to make a profit, the landlords, of course, would want to offer a wage lower than \( w' \). However, as we know from Bertrand competition in a one shot game, if \( N - I \) landlords offer \( w'' < w' \), the \( N \)th landlord can offer \( w'' + \varepsilon \) and have all the peasants he needs work for him and still make a profit. The other landlords would be able to hire the remainder of the peasants, but in this time of labor scarcity, I assume that these “leftover” peasants would not be enough for each of the \( N - I \) landlords to produce, forcing some out of the market. Every other landlord has an incentive to deviate, until the wage is \( w' \).\(^9\)

Landlords, however, would interact with each other in the labor market over several periods. Given the high number of interactions, I assume that the landlords interact over an infinite time period.\(^{10}\) In the basic repeated Bertrand model, \( N \geq 2 \) landlords simultaneous select wages and laborers work for whichever landlord offers the highest wage, dividing equally in the event of a tie. The quantity of work is given by a continuous, strictly increasing function; therefore, the higher the wage, the more labor the landlord will get. Landlords face the same price, \( p \), per unit of good. Assuming that each landlord has the same cost for all other inputs, (without loss of generality set at zero), their profit function is

\[
\pi(w) = (p - w)Q(p).
\]

\(^9\) See Bernheim for these results (2007, 182).
\(^{10}\) This assumption is necessary because in over finite time period Bertrand collusion cannot be sustained.
As all landlords are price takers, they cannot affect the price or the quantity of what they sell and therefore to make a profit, they must keep the wage, \( w \), as low as possible. To use Nash reversion as punishment for defection involves setting \( w = p \). In this case, no landlord will make any profits and is thus the most severe punishment possible (Bernheim 2007, 181). Assume that all the landlords agree to set the wage to some \( w' < p \). In equilibrium, in every period all landlords get some workers, produce some level of goods, and profit from their endeavor. If a landlord decided to defect, he would get all the workers, produce all the goods in the market, and make a huge profit for one period, but then never make a profit again. Therefore, cooperation turns on how much landlords value the future. Solving this model implies that competition can be sustained as long as each landlord’s discount factor, \( \delta \), is:

\[
\delta \geq (N-1)/N. \tag{11}
\]

However, to impose a political solution to collusion, landlords from the entire state had to agree (or at least not disagree) to impose the solution. Yet, due to the spatial variation in mortality and in the reoccurrence of the plague, demand for employment would be somewhat random and uncertain. Landlords would never be able to know if the demand for employment was strong or weak. This is not a strong assumption as there was little market data available to landlords, especially on the national level. Thus the situation after the Black Death, mirrors that of Bertrand models of price wars. Assume that there are two landlords, for instance, two neighboring landlords or two groups of homogenous landlords. Demand for employment in each period can be either high or low. Landlords do not observe what the other landlord is paying his works. This is not a strong assumption given that there was little central information gathering during this time and given that landlords and workers had incentives, especially in the face of

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labor legislation, to lie about compensation. Low demand periods occur with probability $\alpha$ and high demand period occur with probability $1-\alpha$. In the low demand period, without loss of generality, landlords have no workers. In a high demand period, each landlord has some workers. Each landlord can only observe the wage he pays his workers and the number of workers he has. None of this information, additionally, would give him information about the idiosyncratic market conditions of that period. The problem for sustaining collusion is that if a landlord has no workers it could be a result of low demand or of deviation by another landlord. Using punishment phases (price wars) when a landlord has zero workers in which the wage reverts to $p$ (and landlords make no profit) for $T$ periods, the best collusive equilibrium can be maintained, but only if

$$\delta \geq 1/(2(1-\alpha)).$$

Only if $\alpha$ is zero will the discount factor, $\delta$, needed for cooperation be the same as in the standard infinite Bertrand competition model (Bernheim 2007, 200). Thus, the more likely a state is in a low period of demand for employment (i.e. there are few available workers), the more unlikely will competition be sustained.

For the price wars model to be the right model for landlord collusion, we must show that $\alpha$ was greater in Western Europe than in Eastern Europe or the Middle East. I hypothesize that the reason $\alpha$ was greater in Western Europe is that peasants in Western Europe had greater outside employment options than peasants in Eastern Europe. One place where employment opportunities could be found was in the towns. Towns and other urban centers had developed to a much greater extent in Western Europe in the twelfth and thirteenth centuries due to increased

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12 The above discussion and results are from Bernheim (2007, 196-200). Additionally, less efficient collusive agreements could be maintained if the punishment phase was longer, but equilibrium only holds if $2\delta(1-\alpha)>1$, which implies the conclusion above.
trade, especially around the Champagne fairs in France, the Flemish cities of Bruges and Ghent, and the Italian Ports of Genoa and Venice (Abu-Lughod 1989). Additionally, towns developed throughout southeast England and Western Germany as trade networks expanded out from France, Italy, and Flanders (Abu-Lughod 1989, 48). These were towns based upon manufacturing, especially fine woolen cloth, for international trade (Abu-Lughod 1989, 47).

After the Black Death, the owners of productive capital in the towns must also have been desperate for workers. Wages rose in the cities and were often higher than in rural areas, enticing peasants to move (Platt 1996, 132). As can be seen in the example of Wells above, rents were also substantially lowered to attract new residents (Platt 1996, 26). Yet workers and renters (often one in the same) would have wanted to keep peasants out because an increase in the towns population would have led to a decrease in wages and an increase in rents. Where landlords and other owners of capital won, peasants would have been able to find protection in towns. Yet this outcome in favor of the owners of capital was not secure nor predictable as seen in the urban participation in revolts in England (Platt 1996, 123). The protection that towns offered, and therefore the number of peasants willing to move, must have seemed somewhat random to rural landlords, increasing in times of peace but decreasing in times of seemingly random urban upheavals. As serfs were entering towns, no landlord could be sure whether it was the neighboring town or their neighbor that stole their peasants. Thus under this low state of demand for rural employment, collusion became harder and harder to maintain. When pushed by the crown after the 1381 revolt, landlords backed off of their demands to re-impose serfdom (Dyer 2005, 434).

In Eastern Europe, there were fewer towns in which the peasants could find work. Eastern Europe lagged behind Western Europe in terms of urbanization and the creation of a
middle class at this time (Makkai 1975, 236). When Eastern Europe finally did enter into international trade, it did so mostly in the grain trade, not manufacturing that would have necessitated an urban labor force (Makkai 1975, 237). Nonetheless, this pattern of unsustainable collusion in areas with more urban centers and sustainable collusion in areas without urban centers can be seen in Eastern Europe where urban centers did exist. In Poland, some areas followed the “‘Dutch’ model of rich peasants, strong cities, and hired labor,” while areas without strong cities fell to serfdom (Kaminski 1975). Similarly in areas of Transylvania surrounding market centers, serfdom could not be imposed to the same degree as in other parts of Transylvania. Market centers and towns were “always eager to replenish their ranks. They were also well endowed with means for protecting escaped serfs – indeed, for a time the towns enjoyed the privilege of not having to extradite persons who had fled there” (Verdery and Prodan 1990, 7). Thus, within states in Eastern Europe, serfdom was imposed to a lesser degree where cities offered an available employment option for peasants.

Cities were not the only outside option for the peasantry. In Transylvania, the constant warfare with invaders from the East led to the need for large armies. Serfs in Transylvania could join the army, which would not send them back to their landlords (Verdery and Prodan 1990, 8). Similarly, Hungary was the Eastern European exception that highlights the role of outside options in the demise of serfdom. After the Black Death, the government tried to enforce collusion by prohibiting the recruiting of peasants from other landlords (Bak 2005, 392). The peasant revolt in 1514 was brutally and barely suppressed and peasants were supposed to “lose their liberty to move from one place to another, and be subject to the lords of their land in unconditional and eternal servitude” (Bak 2005, 395). Yet, the development of towns and markets led to an improvement in the legal status of peasantry, helping to break the collusion of
the nobility (Bak 2005, 393). Additionally, the major exports of Hungary, wine and cattle, were produced outside of feudal system, giving peasants an outside option and making collusion more difficult (Bak 2005, 398). By 1538, the decree against peasant movement was removed and in 1547 freedom of movement was restored, albeit that through the use of loopholes movement was restricted to some degree (Bak 2005, 397).

Just as international forces could make collusion more difficult by stimulating production outside of the feudal system or by necessitating a large army, international forces could make collusion easier by reducing the outside options and making the lords protection seem more appealing. In Poland, “the peasants, harried by domestic and enemy armies alike … fell ever more into dependence on the manor, which helped him our in need, but which never ceased to raise the level of robot labor” (Kaminski 1975, 262). Similarly in Bohemia the Thirty Years War led to an increase in refugees willing to take on movement restrictions in return for protection (Wright 1975, 245). In Russia, although there was plenty of land to settle, due to invading nomads, these lands were not often safe, pushing the peasants back toward civilization and the nobility (Blum 1961). Finally, in Denmark, the threat to peasant security was not external, but internal. The king was, by comparison to the nobility and ecclesiastical lords, weak and thus unable to stem feuds between the lords, which became common and widespread (Netterstrom 2005, 372). Lords protected their peasants by acting as their advocates, both defending and prosecuting claims; “thus, the protection system was in part caused by noble feuding, and at the same time the lords protected their peasants by means of waging feuds” (Netterstrom 2005, 373). But the imposition of serfdom in Denmark was only on the peasants of the province of Sealand. “Because of a less dramatic population crisis, the peasant holding system was stabilized earlier in Sealand than was the case in Jutland. This meant that the competition for resources and labour
between the landowners was settled earlier in Sealand than in Jutland” (Netterstrom 2005, 381). Thus in Jutland, there was still low enough demand for employment (a high $\alpha$) that collusion could not be maintained. Thus, security threats to the peasants could often thrust them into the arms of the lords, making collusion easier by lowering $\alpha$.

If the role of cities and other outside options along with security threats explain the ability to collude in Europe, then what explains the ability to collude in the Mamluk Empire? Egypt was the main shipping route from the East to Europe (Abu-Lughod 1989). There were large cities, including Cairo and Damascus, and towns, including Aleppo and Alexandria. Additionally, peasants could, and often did, join with Bedouin tribes (Borsch 2005, 52; Irwin 1986, 140) or move into the cities (Dols 1977, 16) when their landlords were not meeting their needs. Even if army regulations in Damascus forced peasants back from the cities to till soil, the cities still represented an outlet for the peasants (Tarawneh 1987, 125). Thus, the price war model would suggest that collusion would be very hard for the Mamluks to maintain.

Nonetheless, there was a special feature of the iqta system that would have made collusion easier to maintain, namely the spatial distribution of landholdings. Because Mamluks controlled properties in several different areas (Borsch 2005, 27), they were competing for workers in several different labor markets. Those landlords who have slack enforcement power in one market can use their resources to ensure competition in markets where competition was not possible before (Bernheim 2007, 195). In the model of multi-market competition, each landlord produces the same good. Once again, each landlord is a price taker for the final consumer price of the good, $p$, which is the same across all markets. Each landlord, however, produces in different labor markets. Without loss of generality, assume that there are two labor
markets and that there are $N$ firms in market 1 and $N+1$ firms in market 2. Furthermore, assume that

$$(N-1)/N < \delta < N/(N+1),$$

namely collusion is possible in market 1 but not in market 2. Thus, if single market landlords operate in both markets, market 1 will be monopolized and market 2 will be competitive (Bernheim 2007, 194). Now suppose that $N$ Mamluks operate in both markets and one Mamluk only operates in market 2 (this Mamluk would be a very lowly Mamluk who has his first iqta assignment). Let $1-\alpha$ denote the share of the market that the single Mamluk has. The other $N$, more powerful Mamluks would seek to divide the rest of the market, $\alpha$, equally. For cooperation to be possible, the powerful Mamluks would have to cede at least $1-\delta$ to the weak Mamluk to deter him from deviating to a higher wage (Bernheim 2007, 194). For the powerful Mamluks, the profits from colluding in both markets are greater than the profits of colluding in one market and competing in the second (Bernheim 2007, 195). Thus, through multi-market contracting, it is possible to sustain a wage less than the wage at which zero profits are made (Bernheim 2007, 195).

Thus, landlords could use slack profits in one market to pay to keep peasant revolts down in another. This is exactly what they did: “Mamluk landholders formed a unified body that would often act together to support their interests in the rural scene, regardless of whose estate or revenue was involved” (Borsch 2005, 33). Thus, “the scattering of estates in Egypt … intended to prevent local landed power from establishing bases from which to foment rebellion” (Borsch 2005, 55) prevented peasants from fomenting rebellion and gaining political freedoms as well.

Collusion between landlords was maintained in some areas but not in others not because landlords in different cultures had different time horizons, but because of the structural
differences in the economies. Because trade had developed in Western Europe, unskilled and semi-skilled peasants did not have to rely on the rural landlords for employment opportunities. This created additionally pressure on western landlords in their struggle to maintain collusion. In contrast, in Eastern Europe, peasants had, for the most part, only one option for employment, as rural laborers. Collusion was, therefore, much easier to maintain in Eastern Europe. In the Mamluk regime, the special feature of the spatial distribution of landholding made cooperation easier in a society where time horizons would have been very short. As seen in Western Europe, without the ability to collude, landlords in the East would have had to face market forces just as their counterparts in the West did.

Conclusion

Serfdom was enacted after the Black Death in some areas because landlords could collude to keep their peasants from moving away or rebelling. Once serfdom became the equilibrium outcome, it became a self-enforcing equilibrium. The economic advantages of the system provided the incentive to keep serfdom and the political and social benefits provided the means to do so. The aristocrat’s “lordship and jurisdiction over the peasant interposed him between the king (the central state power) and the majority of the population and served as the foundation of the aristocrat’s political strength” (Wright 1975, 251). Only later in the eighteenth and nineteenth centuries when collusion began to fail, possibly due to the new outside options for migration presented by the New World, did serfdom in Eastern Europe begin to fail. At this point, central rulers began to have the power to enact reforms. Therefore, reforms were “not the result of blind economic laws working insensible, but were rather the product of designs calculated to change agrarian relations to the economic benefit of the peasant and of the state” (Wright 1975, 251).
Regardless of how Eastern nobility was able to collude, their collusion had long-term effects on the economic and political development of their societies. In the West, the inability to keep down wages led the owners of capital (nobility, but also merchants and industrialists) to use cheap capital to increase the marginal product of labor. This led to the creation of labor saving devices, including larger ships that could be sailed with fewer men (Herlihy 1997, 50) and the development of large-scale animal husbandry (Haddock and Kiesling 2002). The development of animal husbandry would later lead to the enclosure movement (Brenner 1976) and, if Moore (1966) is correct, the rise of democracy in England. The inability of Western nobles to collude also led to the demise of serfdom in the West, granting the peasantry more political rights and a greater say over their labor.

Ironically, although the lords of Western Europe lost power vis-à-vis their own peasants, they gained power vis-à-vis the rest of the world. Western European economies grew faster after the Black Death than Middle Eastern economies. The GDPs of England and Egypt were about the same at the start of the fourteenth century (Borsch 2005, 80-81) but by the early sixteenth century, England had recovered from the Black Death to a much greater extent (Borsch 2005, 90) (see Table 1). The slower growth in Egypt was due to the government revenue policy of enserfing the peasantry and monopolizing trade, which led to slower and slower economic growth (Dols 1977, 151). Similarly, “Eastern Europe’s relative economic backwardness is explained by the long-term subjugation of its peasantry to manorial lords’ arbitrary demands for labor, made possible by the great political power of a shortsightedly selfish gentry” (Kaminski 1975, 255). In his study on Bohemia, Wright argues that serfdom “insured that the labor force would be nearly static, not just stable, and that it would be too immobile to meet the varied demands for quantity and quality of labor which would be necessary for the industrial revolution
to begin” (1975, 247). Furthermore, serfdom did not allow the factors of production to be allocated efficiently or the accumulation of capital (Wright 1975, 250). Thus, the demise of serfdom and the rise of wage labor in Western Europe helped to increase its power over its trading partners and led to its ability to dominate the world. Additionally, as peasants were given rights much earlier than in the East, Western European rulers had to be responsive to these groups at a much earlier date, likely helping to foster the rise of democracy in the West.
Appendix: Tables

Table 1: Comparative GDPs of England and Egypt

<table>
<thead>
<tr>
<th>Country</th>
<th>GDP (total agrarian GDP in ardabbs)</th>
<th>GDP (total GDP in pounds sterling deflated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egypt</td>
<td>1315 38,337,056</td>
<td>1517 15,993,603</td>
</tr>
<tr>
<td>% Change</td>
<td>-58</td>
<td>-17</td>
</tr>
</tbody>
</table>

England

<table>
<thead>
<tr>
<th>Year</th>
<th>GDP</th>
<th>GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1300</td>
<td>4,660,000</td>
<td>3,800,000</td>
</tr>
<tr>
<td>% Change</td>
<td>-17</td>
<td></td>
</tr>
</tbody>
</table>

Source: Borsch (2005, 89)

Table 2: Mortality Rates across Europe

<table>
<thead>
<tr>
<th>“State”</th>
<th>Mortality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingdom of Navarre</td>
<td>60%-65%</td>
</tr>
<tr>
<td>Catalonia</td>
<td>60%-70%</td>
</tr>
<tr>
<td>Modern Day Spain</td>
<td>60%-65%</td>
</tr>
<tr>
<td>Florence</td>
<td>60%</td>
</tr>
<tr>
<td>Tuscany</td>
<td>50-60%</td>
</tr>
<tr>
<td>Piedmont</td>
<td>52.5%</td>
</tr>
<tr>
<td>Modern Day Italy</td>
<td>50%-60%</td>
</tr>
<tr>
<td>Provence</td>
<td>60%</td>
</tr>
<tr>
<td>Languedoc and Foraise</td>
<td>60%</td>
</tr>
<tr>
<td>County of Savoy</td>
<td>60%</td>
</tr>
<tr>
<td>Modern Day France</td>
<td>60%</td>
</tr>
<tr>
<td>England</td>
<td>62.5%</td>
</tr>
<tr>
<td>Norway</td>
<td>62.5%-64%</td>
</tr>
</tbody>
</table>

Source: Benedictow (2004, 383)

Table 3: Price Data for England (in Silver)

<table>
<thead>
<tr>
<th></th>
<th>Wheat</th>
<th>Barley</th>
<th>Peas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1300-1347</td>
<td>0.336</td>
<td>0.258</td>
<td>0.224</td>
</tr>
<tr>
<td>1440-1490</td>
<td>0.172</td>
<td>0.120</td>
<td>0.096</td>
</tr>
<tr>
<td>% Change</td>
<td>-49</td>
<td>-53</td>
<td>-57</td>
</tr>
</tbody>
</table>

Source: Borsch (2005, 97-98)

Table 4: Price Data for Egypt (in Silver)

<table>
<thead>
<tr>
<th></th>
<th>Wheat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1300-1347</td>
<td>0.2316</td>
</tr>
<tr>
<td>1440-1490</td>
<td>0.3610</td>
</tr>
<tr>
<td>% Change</td>
<td>+56</td>
</tr>
</tbody>
</table>

Source: Borsch (2005, 95)
Table 5: Tradesmen’s Wage Data for England and Egypt

<table>
<thead>
<tr>
<th>Year</th>
<th>Carpenter Pence</th>
<th>Slater/ Tiler &amp; Helper Pence</th>
<th>Thatcher Pence</th>
<th>Thatcher’s helper Pence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1330-1350</td>
<td>767</td>
<td>1331.5</td>
<td>725.0</td>
<td>287.5</td>
</tr>
<tr>
<td>1340-1490</td>
<td>1379</td>
<td>2330.0</td>
<td>1681.10</td>
<td>925.0</td>
</tr>
<tr>
<td>% Change</td>
<td>+80</td>
<td>+75</td>
<td>+84</td>
<td>+222</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Carpenter Silver</th>
<th>Slater/ Tiler &amp; Helper Silver</th>
<th>Thatcher Silver</th>
<th>Thatcher’s helper Silver</th>
</tr>
</thead>
<tbody>
<tr>
<td>1330-1350</td>
<td>1021.64</td>
<td>1773.56</td>
<td>965.70</td>
<td>667.39</td>
</tr>
<tr>
<td>1340-1490</td>
<td>994.95</td>
<td>1681.10</td>
<td>965.01</td>
<td>667.39</td>
</tr>
<tr>
<td>% Change</td>
<td>+80</td>
<td>-3</td>
<td>+75</td>
<td>-5</td>
</tr>
</tbody>
</table>

Average Wages of Egyptian Tradesmen

<table>
<thead>
<tr>
<th>Year</th>
<th>Custodian Dinars</th>
<th>Doorkeeper Dinars</th>
<th>Water Carrier Dinars</th>
<th>Reader Dinars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1330-1350</td>
<td>15.80</td>
<td>21.00</td>
<td>18.00</td>
<td>13.5</td>
</tr>
<tr>
<td>1440-1490</td>
<td>6.02</td>
<td>8.12</td>
<td>8.65</td>
<td>4.7</td>
</tr>
<tr>
<td>% Change</td>
<td>-62</td>
<td>-68</td>
<td>-61</td>
<td>-65</td>
</tr>
</tbody>
</table>

Source: Borsch (2005, 107)

Table 6: Purchasing Power (in liters of wheat) for English and Egyptian Tradesmen

<table>
<thead>
<tr>
<th>Year</th>
<th>English Tradesmen</th>
<th>Egyptian Tradesmen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1300-1347</td>
<td>3,096.99</td>
<td>3,141.56</td>
</tr>
<tr>
<td>1440-1490</td>
<td>6,268.80</td>
<td>627.13</td>
</tr>
<tr>
<td>% Change</td>
<td>+102</td>
<td>-80</td>
</tr>
</tbody>
</table>

Source: Borsch (2005, 108)

Table 7: Land Use in England, Mean Acreage (Percent of Acreage)

<table>
<thead>
<tr>
<th>Date</th>
<th>Arable</th>
<th>Meadow</th>
<th>Pasture</th>
<th>Wood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1272-1307</td>
<td>242.9 (90.2)</td>
<td>8.5 (3.2)</td>
<td>11.2 (4.2)</td>
<td>6.8 (2.5)</td>
</tr>
<tr>
<td>1377-1399</td>
<td>164.5 (76.1)</td>
<td>9.7 (4.5)</td>
<td>27.9 (12.9)</td>
<td>14.1 (6.5)</td>
</tr>
<tr>
<td>1461-1485</td>
<td>143.0 (68.4)</td>
<td>15.8 (7.6)</td>
<td>30.5 (14.6)</td>
<td>19.9 (9.5)</td>
</tr>
<tr>
<td>Arden, Warwickshire</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1345-1355</td>
<td>1,790 (70.4)</td>
<td>209 (8.2)</td>
<td>182 (7.2)</td>
<td>328 (12.9)</td>
</tr>
<tr>
<td>1496-1500</td>
<td>1,193 (34.5)</td>
<td>299 (8.6)</td>
<td>1,319 (38.1)</td>
<td>646 (18.7)</td>
</tr>
<tr>
<td>Avon Valley and Feldon, Warwickshire</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1345-1355</td>
<td>2,533 (95.1)</td>
<td>118 (4.4)</td>
<td>12 (0.5)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>1496-1500</td>
<td>2,850 (56.7)</td>
<td>475 (9.4)</td>
<td>1,654 (32.9)</td>
<td>48 (1.0)</td>
</tr>
<tr>
<td>Gloucestershire</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1349-1354</td>
<td>2,122 (83.1)</td>
<td>214 (8.4)</td>
<td>55 (2.2)</td>
<td>81 (3.2)</td>
</tr>
<tr>
<td>1485-1500</td>
<td>1,390 (46.0)</td>
<td>410 (13.6)</td>
<td>1,042 (34.5)</td>
<td>181 (6.0)</td>
</tr>
<tr>
<td>Bromsgrove and King’s Norton, Worcestershire</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1386-1396</td>
<td>409 (81.3)</td>
<td>76 (15.1)</td>
<td>12 (2.4)</td>
<td>6 (1.2)</td>
</tr>
<tr>
<td>1494-1504</td>
<td>848 (53.3)</td>
<td>278 (17.5)</td>
<td>352 (22.1)</td>
<td>114 (7.2)</td>
</tr>
</tbody>
</table>


