

The Evolution of Criminal Law and Police During the Industrial Revolution

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ABSTRACT

Increased standardization of goods was a by-product of the technical innovations triggering the Industrial Revolution. A side effect of standardization was the new abilities it allowed for theft and embezzlement. Two significant modern institutions radically evolved during the 18th to mid 19th centuries to control these costs: criminal law and public police. These institutions strongly interacted with the pace of the Industrial Revolution. Our argument explains this evolution, and helps to explain several historical facts: the role of early police; the fall of the watch system; the removal of possession immunity; the rise and fall of factory colonies; the fall and rise of court cases during the 18th century; and the delay of per capita income in response to technical innovations in the Industrial Revolution.

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1. Introduction

The startling number is 544 — the number of years that passed between the Statute of Winchester in 1285, which established private policing of criminal activity in England, and the Metropolitan Police Act in 1829, which created a public police force in London. Public police did not arise *ex nihilo*, they were the capstone of a hundred years of criminal law reform and experiments with various forms of quasi-public policing efforts. Figure 1 highlights the time line of events. Over the span of 600 years the final emergence of public police appears relatively sudden. However, the institutional changes were gradual. Significant changes to criminal law began in the early part of the 18th century as Parliament dealt with increases in property theft rates. Early types of police also emerged by the mid-18th century, as do early forms of factories. But it was an evolution. It would take almost 100 years for criminal law and public police to take on a form we would recognize today as modern.

We examine the transition from private to public police, and from civil to criminal law, in light of the movement towards standardized goods.¹ Standardized goods were the signature of the Industrial Revolution, and yet these goods were often mismatched with earlier legal institutions that were designed for more idiosyncratic commodities.² We argue that the growth of criminal law and the emergence of public police are tied together by the emergence of uniform, standardized goods that

¹ Each of these evolutions has been documented elsewhere. Here we trace the changes, but our contribution is to provide an explanation of the change at a fundamental level: standardization. Thus we provide an efficiency explanation for the institutional transition. This contrasts sharply with the social historical interpretation that views the changes in law, firms, and police as successful efforts of the wealthy to usurp the traditional customary rights of the working poor and enforce social control based on bourgeoisie values. See Linebaugh (2003) or Becker (1983), as examples. It also contrasts with the older Whiggish historical view (eg Radzinowicz (1948), which viewed the arrival of the police as a “logical” and “rational” progression towards a modern world.

² Although we argue the Industrial Revolution led to previously unparalleled increases in standardization, this does not imply standardized goods did not exist previously. For example, loans had long been standardized and subject to anonymous exchange and court enforcement. Indeed, money was always relatively standardized.

developed during the Industrial Revolution. Our thesis is that as standardization developed, the gains from anonymous exchanges increased; however, along with these gains the losses due to theft and embezzlement increased, and the evolving law and police were responses to this.³

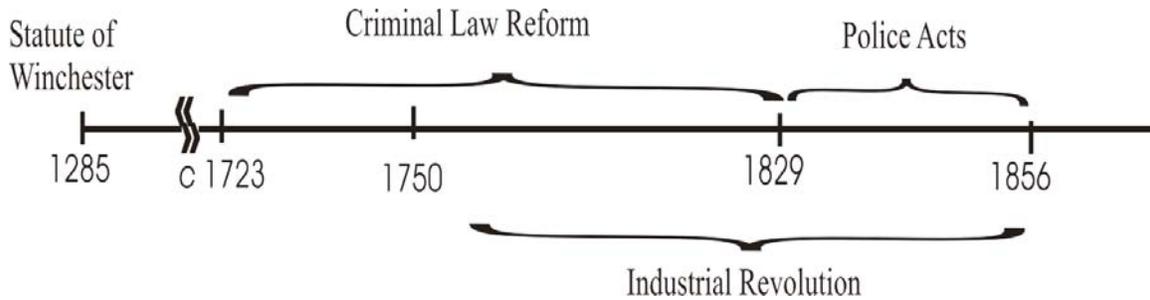


Figure 1

Although we do not formally test our model, we do use it to explain several historical observations of the period. First, we show that our hypothesis is consistent with the activities of the new police. Second, we explain how the emergence of public police is consistent with the decline of the watch and ward system of private policing. Third, we explain the switch in rights of possession for goods held by agents and employees. Fourth, our argument is also consistent with the fall of civil litigation throughout the 18th century. Rather than interpreting this to a rise in civility, it is seen as a result of the inability to civilly prosecute crimes related to standardized goods. Fifth, we explain the evolution of the factory. Industrialists initially responded to increased embezzlement by operating in isolated “factory colonies” which employed workers in a form of voluntary servitude. The creation of public police and the expansion of criminal law, however, altered the constraints faced by factory owners and facilitated their move to the modern forms of organization — the large scale urban centered factory. Finally, we provide a plausible mechanism for explaining how various technical and other innovations

³ Legally embezzlement refers to an employee appropriating money or goods *received* by him on account of the employer. We use the term more generally to refer to any theft by employees. We use the term “theft” for items stolen between strangers.

could have led to the growth in per capita income associated with the Industrial Revolution and why this growth was “delayed.” Technical innovations, improved transport and trade, and increased specialization (which economic historians have shown are inadequate to explain the income growth) all increased standardization, which effected the entire economy through growth in anonymous exchanges. Thus, our argument suggests the Industrial Revolution would have been more modest had the creation of the modern police and the growth of criminal law not occurred along with the mechanical innovations. Without the appropriate legal institutions to support it, the Industrial Revolution would have been confined to the isolated factories in the countryside that emerged in the 18th century and continued to operate until the legal changes matured.

2. Standardization

In its pre-modern era, before the turn of the 19th century, Britain was a country laced with odd and old institutions like venal office holdings, dueling, public patronage, and private criminal investigation.⁴ One might ask: what critical event triggered our modern institutions? Why was the organization of life so different in 1750 compared to 1850, but hardly different between 1850 and our present day? The short answer: the declining role of variability.

Variability in the quality of goods has two sources: natural and man-made. Variability can be reduced by aggregating commodities, by sorting into different classes, or guaranteeing that a good will meet some level of performance. It can also be reduced by using more homogeneous inputs, better tools, careful monitoring, and measurement of quality. However, the need to take such actions results from variability that arises in nature. Large variances caused by nature often raise the

⁴ As were other countries in pre-modern Europe. We focus on Britain because the industrial revolution had its origins there. Mokyr (2007, p. 26), in a similar spirit to us, claims that Britain had a series of institutions which fostered investment in human and social capital investment which lead to their leading the way industrially. See Allen (2005) for a discussion of four of these pre-modern institutions.

cost of human efforts to reduce variability. Prior to the Industrial Revolution, *everything* in life involved a large natural component — variance was everywhere, and this led to high variability in product quality.

Large roles played by variability meant there were large opportunities for capture. If a load of wares headed for a distant market could be lost at sea or lost to pirates, it could easily be lost to opportunistic agents. Such problems were well known, and the pre-modern institutions were the means by which these problems were dealt with. The Industrial Revolution began to change the degree to which variability interfered in life. For the first time it became possible to leave nature outside the production process. Not perfectly, of course; indeed, by modern standards perhaps not very well at all. However, variability was reduced enough to allow sufficient measurement at a reasonable cost, and reliable replication; that is, the beginning of standardization. Standardization is an important element of the Industrial Revolution because it is the key to understanding the source of modern institutions.

2.1. Measurement Costs, Theft, and Embezzlement

Standardization reduces the costs of measurement for the purpose of identifying the attributes of a product, and as a result, lowers the costs of exchanging these commodities through formal contracts. Contracts, enforced by the state, are used for well-measured commodities, especially when standardized. Thus, standardization has enormous value, and opens the door for large gains from anonymous market exchange.⁵ Improved uniformity allows the use of large levels of physical capital in the form of machines, which in turn create even smaller variances in output. Standardization allows firms to alter their marketing methods, and changes the way they organize their workforce. Without standardization goods are more difficult to measure, and may often be evaluated subjectively. Under these conditions exchanges

⁵ Greif (2006) generally argues that the emergence of widespread anonymous exchange is one of the key factors of modern growth.

will tend to be enforced informally through reputations. Disputes regarding such agreements must be resolved directly by the parties to the agreements, as the courts are unlikely to know what the parties agreed to.⁶

However, standardization brings with it new problems. With standardization new opportunities for theft arise because the very feature of standardization that *lowers* the costs of exchange through markets and contracts, also *lowers* the cost of fencing stolen goods and *increases* the costs of protecting goods from theft — including theft by employees. Standardization lowers the cost of fencing stolen goods for thieves because the thief selling a standardized good can transact anonymously and reduce his exposure. Standardized goods make those fencing and purchasing stolen goods less vulnerable to being caught. The opposite holds for artisan goods. Thieves selling artisan goods must use their reputation to get a good price. This requires them to identify themselves, increasing the chance of being caught. Furthermore, intermediaries and final consumers of stolen goods are more at risk dealing with artisan goods that could be identified at any time by their legitimate owner.

The reciprocal side to this is that legal owners of standardized goods have no advantage in discovering, investigating, or prosecuting theft. There are several reasons for this. First, uniform quality of goods slightly hinders the owner from discovering a theft, but drastically hinders him from investigating it. Second, when the transportation costs of standardized goods are low and their markets wide, owners are hindered because they have little knowledge of far away markets. Third, preventing the theft of standardized goods is a public good, at least in part. Any private effort to reduce theft and black market sales of standard goods provides a benefit to all owners of standardized goods, thus leading to an under provision of their private protection.

⁶ For example, when a buyer who transacted by contract the purchase of 10 lb bags of sugar claims that the sugar is not up to specifications and the seller disagrees, the courts are reasonably able to adjudicate the dispute. On the other hand, when a buyer who commissioned a painting is displeased about its quality, he is unlikely to be helped by the courts and his only recourse is to tarnish the painter's reputation. See Barzel (2004) for a discussion.

Contrast this with the protection and theft of artisan goods. Non-standard, artisan goods are often identified *with* their owner, and certainly are likely to be identified *by* their owner. That is, the owner has a comparative advantage in identification. This would hold true for both intermediate and finished goods. Thus, the legal owner of artisan goods will tend to be the efficient “protector/investigator” of the goods. Artisan owners are familiar with their goods, have asymmetric information over their legal status, are best able to determine when and what has been stolen, and are best able to recognize their goods when in the possession of others. These factors make them the efficient owners of the protection rights of the good. This comparative advantage of the artisan owner is enhanced when the markets for these goods are more local due to high transportation costs.⁷

One implication of the theft problem caused by standardization relates to the legal status of “possession.” Since owners of standardized goods are unable to identify one specimen from another, and thus unable to identify goods sold legitimately or stolen, possession will tend to be synonymous with legal ownership. That is, if someone is in possession of a standardized good, he will be the presumed legal owner. The opposite is true about an artisan good. Someone in possession and claiming ownership of a nonstandard good will be required to have some type of proof of ownership beyond mere possession. This may be in the form of a title, registration, receipt, or perhaps local specific knowledge of ownership. In the case of an artisan good a legal owner is able to identify a specimen, stolen or not, even though the specimen is in the possession of someone else. For artisan goods ownership and possession can be easily separated.

⁷ Consider, for example, an extreme case of an artisan good : children. When a child is missing, the parent is the first to know. Likewise, seeing one’s child in the unauthorized possession of another adult is sufficient for the parent to know a theft has taken place. Parents, quite naturally, are still the primary “police” of their children because they have a strong comparative advantage in protection, and because the value of their children to others is generally low. Third parties require much more information to identify a given stolen child, and only become involved after the efforts of parents are unsuccessful, or when the parents request their services.

2.2. The Industrial Revolution Increased Standardization

The unprecedented levels of 19th century income had its beginnings a century earlier. The effect of 18th century technical innovations, both the great and the practical, on economic growth and social behavior has been analyzed at length.⁸ That there was a change in the rate of growth of output between 1760–1840 no one questions. Quite apart from the actual volume of production, another fundamental feature of the Industrial Revolution was the dramatic increase in the standardization of output and inputs of manufacture.⁹

Technological improvements had been ongoing for a long time prior to the Industrial Revolution. However, until the late 18th and early 19th century, the role of variability had been so large in every productive process that it had been impossible for different workers to produce identical goods. Starting with the source and control of power, energy came from humans, animals, wind, or water. These natural sources were seasonal and varied considerably across space. Tools of measurement were often crude, and the hand tools mostly used led to a very artisan form of production and non-uniformity in final output. Given the high costs of transportation, inputs were often local and varied from one jurisdiction to another, leading to wide ranging variation in output. No refrigeration, no dependable transportation, and often no reliable means of knowing where you were — especially at sea — meant that everything about life involved enormous elements of chance. Production supervision was minimal and small scale, leading to less specialization and less uniform products. Heaton notes the variability in the production of a simple product like yarn before the Industrial Revolution:

It is well nigh impossible to secure uniformity of yarn. The clothier asked for a definite standard when giving out the wool to be spun, but the tendency would be for each house and each spinner to vary a little in the thickness and firmness of

⁸ See Mokyr extensive editor's introduction (1999) for an excellent modern survey.

⁹ Though the topic is generally ignored, Szostak (1991) has an excellent and extensive discussion of standardization during the Industrial Revolution.

the yarn; some sent in hard-twisted, others soft-twisted, and it was very difficult to reduce the work to one standard.

[p. 335, 1965]

The same could be said of virtually all production prior to 1700: standardization was uncommon.¹⁰

Throughout the 18th century and early part of the Industrial Revolution a steady stream of new tools were developed that allowed standardization even in industries where artisan workmanship prevailed. Berg discusses how improvements in stamping technology, though not designed for mass-production, improved the ability to manufacture uniform goods in engineering, cutlery, and hardware.¹¹ As the Industrial Revolution progressed, the creation of steam power, continuous supplies of coal, and new methods of production meant that some industries could free themselves from the rhythm of natural power sources. Increased travel and road safety meant markets became bigger, supplies more regular, and inputs more consistent across long distances. Thus, the increased division of labor, the increased use of machines, the use of non-seasonal sources of power, the better roads and use of standard inputs, all led to increased standardization of products throughout the Industrial Revolution.¹² At the same time that the types of goods available and their average quality increased, the quality variance decreased.

Szostak (1991) makes a compelling case that standardization was related to improvements in road and water transportation that increased market size and the

¹⁰ High volume of production and standardization seem to be complementary. Mokyr (1999, p. 106) notes that “Standardization and uniformity demanded a special kind of quality control, which required continuous supervision and thus factories.” Langlois (1996) also notes that large volumes make investments in jigs and dies worthwhile, and these contribute to standardization.

¹¹ Berg, pp. 269-270, 1994. Rosenberg (1963) provides a detailed discussion of the machine tool industry and how the development of special milling machines, turret lathes, and other instruments led to precision in manufacture.

¹² In reference to iron Szostak states “...one of the major advantages of puddling and rolling was that it was capable of producing a homogeneous output...” (p. 127, 1991). He also documents changes in weaving, bleaching, and supplies of clay, that led to increases in the standardization of clothing, nails, and dishes.

method of distribution, and that it was initiated not by technological changes alone. Better transportation led to more standardized goods, which allowed goods to be marketed and sold anonymously or by third parties. Early in the 18th century sales by contract were uncommon and manufacturers traveled with their artisan wares to sell directly to buyers. By the end of the 18th century a national network of common carriers had developed that allowed producers to sell at a distance by sample and by taking orders.¹³ This increased sale of goods at farther distances required standardization.¹⁴ Thus, the initial and subsequent forces of standardization reinforced each other and accelerated the trend.

However, the arrival of standardization amid pre-modern institutions created new theft problems.¹⁵ Old institutions designed to deal with large roles of variability were often no longer appropriate for standardized goods because standardization allowed workers and thieves new opportunities for embezzlement and theft, while at the same time hindering property owners from protecting their goods. We argue that two major institutions were responses to the increased costs of identifying stolen goods brought about by increased standardization. First, standardization led to changes in the law with respect to the definition of crime and personal freedom. Past practices that had not been criminal, were made so, and punishments and

¹³ Szostak pp. 13–15, 168–169.

¹⁴ Elsewhere Szostak states:

Of special importance here is the need for standardization. Selling goods face to face does not require a standardized product; selling by sample does. In order to take advantage of new and better methods of distribution, then, it was necessary to produce a standardized product.

[p. 355, 1989]

¹⁵ Szostak (1989) briefly discusses the role transport had on embezzlement. “As the number of materials increases, the cost of detecting foul play by inspecting the final good rises sharply. Thus the relative advantage of factories in this regard became increasingly important. Workers were not only watched while working, but could be, and were, searched when leaving. Direct supervision of employees in a centralized workplace would become increasingly attractive as the number of materials being dealt with increased.” (pp. 354-355).

the form of punishment changed. Second, standardization led to the formation of public police forces.

3. The Evolution of Criminal Law

What constitutes a “crime” is a matter of state definition. Prior to the Industrial Revolution offenses were generally civil matters. An individual violating the property rights of another would most often be privately arrested, brought to a court to be privately prosecuted before a judge who owned the court offices, and if found guilty would generally pay restitution and court expenses. This system of torts, dating back before the Norman invasion, slowly and steadily evolved as many torts became classified as crimes against the King, punishable by either a fine, beating, possibly incarceration, transportation, or death. This evolution significantly accelerated throughout the 18th century — especially with respect to property crimes. The state increased its ability to search and arrest, offenses which had historically been torts began to be classified as crimes, and the number of capital offenses increased.¹⁶

3.1. Examples of Criminal Law Evolution

The practice of gleaning is an example of the 18th century evolution of a legal practice (which if excessive could be tortious) becoming criminal. In the early 18th century it was common and lawful for workers to glean scrap material from production.¹⁷ These scraps could be assembled and resold, or sold as inputs to someone else. These gleanings were considered perquisites, and were acceptable to

¹⁶ This transformation has been thoroughly documented by Becker (1983) in the context of embezzlement statutes, and by Fletcher (1976) in the context of larceny.

¹⁷ For example:

The mates of the West Indianmen had a right to the sweepings of sugar and coffee from the hold of the ship; the gangsmen and coopers established a claim to the drainings of molasses and split sugar on the floor of the warehouse; At the Royal Yards, the shipwrights were allowed to take for firewood the chips that fell from the axe

employers.¹⁸ If an employer felt the gleaning was carried too far their only remedy was to sue for damages in a civil trial for breach of trust. As the century wore on, these practices were defined as crimes and made illegal.¹⁹

In the 18th century the legal status of gleaning evolved into pilfering or embezzling and might be called “clicking,” “bugging,” “scraping,” “chippings,” “vails,” “sweepings,” or even “cabbage” with the particular term depending on what industry was being referred to. These names often appear as the titles to legislation that criminalized the behavior.²⁰ The Clicking Act of 1723 allowed a magistrate or agent to search the premises of a leather shoe-making journeyman who was suspected of clicking.²¹ The Bugging Act of 1749 criminalized the practice of substituting inexpensive fur for beaver pelts in hat making, and introduced prison punishments for the crime. This and the Worsted Act of 1771, further increased the powers

[Ashton, p. 208, 1966]

The practice of gleaning extended beyond the employment relation. Between lord and peasant there were gleaning rights to grazing (Common of Pasture), hay after harvest (Common of Shack), wood from forests (Common of Estover), and peat and turf (Common of Tubary) to name a few (Ditton, p. 40 1977). These rights were removed and made illegal (wood theft, poaching, trespass, etc) through the enclosure acts.

¹⁸ Wage packages composed partly by moral hazard payments are inefficient compared to a first best scheme. If manufacturers could have reduced the gleanings at no cost, both real wages and gains to the manufacturer would have increased.

¹⁹ For example, Hay (1980) notes:

... groups of workers entered the criminal court records through activities which suddenly became illegal. ... One form this took was a prolonged campaign, ... to rationalize wage payment. The motive was to eliminate traditional perquisites, that part of the raw materials or finished product claimed by the worker as part of the wage. Perquisites, although sanctioned by long custom, were therefore increasingly redefined, in many trades, as theft. Parliament enacted a large number of embezzlement statutes in the course of the century, to allow easier prosecution of workers taking materials, and justices and juries enforced them.

[pp. 70–71, 1980]

See Phillips (pp. 188–189, 1977) for a similar discussion.

²⁰ According to Soderlund (p. 647, 1998), fourteen acts covering fifteen industries were enacted during the 18th century to deal with the conversion of gleaning to embezzlement.

²¹ As Linebaugh (p. 234, 2003) puts it, although a historical practice, “clicking was criminalized.”

of search and made “ordinary tasks of the labour process such as sweeping out the room, snipping weft ends ... potentially criminal offences.”²² These acts were designed to “put an end to the customarily acknowledged appropriations of workers.”²³ The Truck Act of 1831 outlawed payment of wages in goods rather than cash. Indeed, Becker (pp. 1499–1500, 1983) discusses eight different embezzlement statutes related to the woolen industry alone that extended criminal sanctions to what had earlier simply been normal practice or the civil wrong of breach of trust.

Gleaning was not the only criminalized action. Prior to 1692 it was not a crime to possess stolen goods.²⁴ Throughout the 18th century penalties were increased for “receivers” of stolen goods, and in 1827 possession of stolen property became a felony. Until 1799 it was the civil wrong of breach of trust, not a criminal offense for a servant to “convert to his own use money for goods received from a third person for his master.”²⁵ Indeed, by the early 19th century most embezzlement was prosecuted criminally as larceny. This avoided the complication of gleaning issues and matters of trust between masters and servants.²⁶ By 1855, the Criminal Justice Act allowed a summary trial of indictable thefts of small value, which

²² Linebaugh, p. 268, 2003. Elsewhere he points out that “The Bugging Act, like the Clicking Act preceding it or the Watch Scraping Acts following it, was designed to put an end to the customarily acknowledged appropriations of workers who had not yet been fully alienated from the means and materials of production.” (p. 239, 2003).

²³ Linebaugh, p. 239, 2003.

²⁴ Phillips, p. 221, 1977.

²⁵ Phillips, p. 225, 1977. Phillips goes on to note how the creation of the factory assisted in this changing relationship:

...the development of the industrial system and the concentration in factories and workshops simplified the legal position on ownership and theft of raw material; there was no longer the legal problem which outwork posed, that while the ownership of the raw material remained with the master, the possession was with the outworker. Once all the material was worked up within the factory or workshop, this legal confusion disappeared.

[p. 189, 1977]

²⁶ Phillips, p. 225, 1977.

further extended the prosecution of embezzlement which was often of small individual values.²⁷ Styles notes that during the 18th century the burden of proof was often shifted to the accused, and that this resulted from the difficulty of identifying embezzled materials.²⁸

3.2. Criminal Law and Standardization

The natural question to ask is: why would historical practices be made criminal in the 18th and early 19th centuries, and why would civil wrongs be converted to crime? Our answer is that the evolution of criminal law is the consequence of the emergence of standardized goods. Goods that had always been standardized, like currency, had always had their theft criminalized.²⁹ Goods that had always been artisan had their disputes remain in the civil courts. Rather, it was the standardization of the ordinary products of life that led to the changes in criminal law. Consider the question of gleaning. The practice of gleaning places some fraction of goods in the public domain, to be captured by workers. Historically, workers were limited in their ability to glean too much by the owners ability to identify stolen merchandise. Once inputs and outputs became standardized throughout the early Industrial Revolution, however, stolen goods become easier to fence and the costs of gleaning increased considerably. Thus Randall (p. 193, 1990) states “Embezzlement was rife in the manufacturing industries of eighteenth– and early nineteenth–century England.”³⁰ At the same time, the ability of employers and owners to privately investigate and prosecute the theft of standardized goods fell.

²⁷ Becker (p. 1487, 1983) also notes that Parliament eliminated the grounds of proving discovered materials were actually stolen. This further allowed property owners to attack the practice of embezzlement.

²⁸ Styles, p. 195, 1983a.

²⁹ Though coins could be clipped and counterfeited, they were relatively standard.

³⁰ He documents the rise in complaints to Parliament between 1750 and 1840, and notes that this rise was not correlated with economic growth (p. 201, 1990). He estimates that in the woolen industry embezzlement amounted to about 2% of the finished cloths value (p. 201, 1990).

Black markets increased, and a owners were unable to civilly litigate due to the failure in identification.³¹

In earlier centuries stolen goods were idiosyncratic. Since the legal owner was the low cost identifier of these goods, the task of retrieving them was assigned to him, and the civil procedures allowed for restitution to compensate.³² The early changes to the law increased the legal authority of the few existing public officials (constables, justices of the peace, watchmen) to intervene in the form of searches and arrests.³³

³¹ Embezzlers would sell purloined goods to networks of black market dealers, known in the wool industry as “slingers.” Randall notes the problem introduced by standardized goods.

Prosecution of the slingers, however, was more difficult since proof of ownership could not always easily be established. This had been a principal complaint of the clothiers to the 1774 committee. Cooper told them “that he had in searching of suspected persons’ houses, found a large quantity of wool and yarn of various sorts, different colours, different wools, and in many small quantities, and not being able to swear to the identity of any of it, the persons could not be prosecuted.

[p. 207, 1990]

³² Again, Randall provides an example in the woolen industry.

Occasionally it was possible for the victim of embezzlement to provide watertight evidence of fraud. Thus the wool bought from John Pobjoy by Thomas Blackburn, a small Bradford on Avon clothier, was readily recognized by its owner, John cooper, as wool stolen from his slubbing shop because it was a peculiar German wool, finer than was common, and used by no other clothier in Trowbridge.

p. 208, 1990]

³³ In addition to the acts counted as crimes, the 18th and 19th centuries saw enormous changes to the nature of criminal punishment. Prior to this, conviction resulted mostly in restitution. The introduction of “crime” led to the removal of criminals from society. The Black Act essentially made all crimes capital offenses. By the turn of the 19th century many of these were reduced to either transportation, or more likely, incarceration. After 1841 executions were carried out only for murder. [Phillips, p. 47, 1977.] It is beyond this paper to develop a separate theory of the form of punishment. However, the general issue is a Coasean one: is it better to build a wall around the criminal or the victim? With public enforcement of criminal law, the former is optimal. Criminal prosecution means that the thief must be removed from society, either through death, transportation, or incarceration. To allow them to remain at large would mean individuals would have to privately protect themselves without recourse to restitution.

4. The Emergence of Public Police

Until the 19th century policing in England was mostly privately provided. There was a steady decline in violent offenses from the middle ages on, and so the emergence of the public police in England in the first half of the 19th century was not in response to a sudden increase, or continuing high levels, in violent crime.³⁴ Our conjecture is that the rise of police resulted from two factors induced by specialization. First, increased criminal law increased the demand for public police. With crimes, those found guilty were punished or fined, with the fine going to the treasury. A crime requires the investigation and prosecution by a public official because the absence of restitution and the public good nature of enforcement removed the major incentives for the private investigation and prosecution of a theft.³⁵ Second, the

³⁴ England in the 13th century was a rather violent country. Malcolm estimates that the homicide rate was 18-23 per 100,000 population, and that violent deaths accounted for 18.2% of all criminal indictments. (Malcolm p. 21, 2002.) However, the trend in violence from this period until World War I is steadily downward. By the 17th century homicide rates had fallen by half, and this continued throughout the 18th century until by 1890 “only three people in all of England and Wales were sentenced to death for murder committed with a revolver.” Malcolm p. 91, 2002. Malcolm notes that although all of this was done in the context of private provision of police and justice:

Violent crimes continued their steady, indeed dramatic, decline in the [late 16th to 18th centuries] ... by the third quarter of the eighteenth century the convicted murder rate for London and Middlesex was on average only four a year. And as the eighteenth century drew to a close, foreign visitors traveling through England commented on its very low level of violent crime.

[Malcolm, p. 80]

This is confirmed as well by Beattie (1974) who analyzed indictments in Surrey and Sussex from 1660 to 1800 and concluded that violent crime rates generally fell throughout the century, while property crimes rose (p. 61, 1974). However, as discussed in the previous section, he recognizes that the rise in property crime was influenced by the changing definition of crime. Hay (1982) finds similar results.

³⁵ Styles (1983b) provides an interesting examination of one aspect of criminal investigation that involves a public good: the dissemination of information on the incidence and character of offences. The 18th century saw an “information explosion” in the form of advertisements, newspapers, and handbills to replace the ancient hue and cry. Despite this, private efforts at criminal prevention and prosecution did not exploit the new technology. Styles points to four information problems with private investigation: criminals could easily “escape discovery by flight” (p. 132), local magistrates were “profound[ly] ignoran[t] ... of places and people ... in distant parts of the country” (p. 133),

reduced ability of private individuals to deal with the theft of standardized private property led to a demand for public police.

4.1. From Private to Public Police

Prior to the 19th century there was no public police force as we know them today, and investigation, arrest, and prosecution were primarily the responsibility of private individuals, aided by owners of venal offices in the local court.³⁶ Hay and Snyder note how these officials contrasted with the future police:

...both constabulary and watch were far more dependent on the justices for direction than the new police were to be, and that activities were usually limited to patrolling and assisting private citizens in the immediate apprehension of offenders. The enforcement of the law, in the sense of bringing offenders before the courts and convicting them there, depended primarily on the activities of the bench, and of the private prosecutor.

[Hay and Snyder, p. 16, 1989]

Preventing crime was not exclusively an act of individual private citizens. Larger firms employed security guards and organized their firms to prevent theft. Groups within a community would form prosecution associations, hire private police patrols and investigative services, and use systems of rewards for capture. These private efforts dealt with the entire spectrum of criminal activity.³⁷

finding information was expensive and inconvenient, and there was no “official facility for distributing information” (p. 134). It was not until the publicly funded magistrate, John Fielding of the Bow Street office, instituted his General Preventative Plan in 1772 that any attempt to forward criminal information was made. When his funding was cut, the practice was not taken up again until later in the next century.

³⁶ There were no public servants in the pre-modern era. Court officials owned their office and charged fees for service. Two court officials would have been a constable and sheriff. Hay and Snyder state: “In England in the eighteenth century apprehension was the task of the victim of crime, aided (where he could get such help) from a parish constable or town watchman.” [p. 18, 1989] For a discussion of the evolution of public service, see Allen (2005).

³⁷ For example:

Thus not only assaults, but *virtually all thefts* and even some murders were left to the general public. That meant that responsibility for the initial expense and entire conduct of the prosecution was thrown on the victim or his or her family. [emphasis added]

The public police did not arise out of a public vacuum, however.³⁸ There were parish constables, watchmen, and justices of the peace. These were quasi-public offices, which assisted private individuals, and in the 18th century it often fell on them to enforce the growing number of criminal offences. Over the course of the 18th century efforts were made to enhance these positions or find complementary means to assist in their police function. For example, the 1777 Worsted Act allowed an employers' association to organize an industrial police force which could "regulate virtually every aspect of the production process. But their chief function was to detect and prosecute acts of embezzlement."³⁹ In addition, for a period in the 1760s London magistrates were paid out of Treasury funds to investigate crimes. The Bow street magistrates office formalized this into a force known as the "Bow Street Runners," often considered London's first professional constables. Though similar in function to private police and thief-takers, they were paid by the magistrate with government funds. Although not well funded towards the end of the century, the office kept criminal records and made public horse patrols to guard London roads.⁴⁰

The system of private enforcement of law was clearly second best.⁴¹ Although it lasted for centuries, it slowly evolved into a public system. Public police forces were

[Hay and Snyder, p. 23, 1989]

Private crime prevention was often organized around horse thieves: "A number of the early societies were aimed specifically against horse thieves — horses being very valuable property which were easy to steal and easy to move away quickly." [Philips, p. 125, 1989]

³⁸ See Jones (1983) for a discussion of early forms of police.

³⁹ Soderlund, p. 647, 1998. Prior to the Worsted Act, various private organizations attempted to police embezzlement. In Yorkshire, for example, a group formed a voluntary association in 1764 to reduce short and false reeling. The voluntary force was funded through subscriptions based on enterprise size. Soderlund (p. 654, 1998) notes that "Despite its success, however, the Yorkshire manufacturers' undertaking remained vulnerable. In the end it failed, victim of inter-capitalist rivalry ...". By 1776 it was finished. Soderlund concludes (p. 661, 1998) by noting that "For several decades the inspectors failed to fundamentally challenge the pattern of workplace appropriation practiced by thousands of woolcombers and handloom weavers."

⁴⁰ Linebaugh, pp. 221-222, 2003.

⁴¹ Of course, a public police and prosecution hardly is first best. Most notably police have less personal incentive to solve crimes, and must be monitored. Because with police and public criminal prosecution there is no retribution to the victim, the victim also has a reduced incentive to prevent and prosecute. Starting with Becker and Stigler (1974), there have been several articles discussing

created through several pieces of legislation: the *Metropolitan Police Act* (1829) which established a paid police force in London; the *Municipal Corporations Act* (1835) which required all incorporated boroughs to have a police force; the *County Police Acts* (1839 and 1840), and the *County and Brough Police Act* (1856) which ultimately required all jurisdictions to be publicly policed. By the end of the 19th century, the system of public police, courts, and prosecutors had become completely entrenched.

As Phillips points out, the transition was quite fast:

In 1835, there was no police force in the Black Country; in 1860, it possessed four police forces with a total strength of 262. It had changed from being an ‘unpoliced society’ — where police functions were carried out (if at all) by citizens or their appointed constables, to a ‘policed society’ in which a paid police force operated.

[pp. 53–54, 1977]

After generations of no police, the transformation must have seemed revolutionary to the people of the time. And yet the new institution, once introduced, was accepted quickly. Indeed, the police existed on the “moral assent of most of the population to the role of a police force as enforcer of law and order.”⁴²

4.2. Standardization and the Police

We hypothesize that the creation of the police is a response to the increased standardization of goods brought about by the Industrial Revolution. When communities were isolated, local, and stolen goods artisan, such issues had been sufficiently handled without police. As the Industrial Revolution progressed, the ability of private individuals to investigate crimes declined because of their inability to identify stolen standardized property.

the merits or shortcomings of a public police force. For example, Landes and Posner (1975) argue that private enforcement is unlikely to be efficient, while Friedman (1984, 1995) argues that a private system can be efficient. Our view is that, whereas both systems were second best, the private system, efficient in its time, was replaced by a public one when standardization became common.

⁴² Phillips, p. 54, 1977.

Other factors also existed. First, there is the mere logistical problems of finding offenders. This problem was exacerbated with the improvement of roads in the 18th century.⁴³ Second, the long standing system of rewards provided an incentive to stage offenses or entrap others to commit them.⁴⁴ However, had goods remained artisan, the problems of traveling thieves and collusion to collect rewards could still be managed by some type of private policing system. Standardization eliminated the private sector's comparative advantage in policing.

5. Historical Evidence

We've argued that standardization was a by-product of the industrialization. Standardization changed the costs and benefits of theft and protection and we've argued this led to the evolution of public police and criminal law. Here we briefly discuss some evidence supporting our hypothesis.

5.1. Policing in the Black Country

If public police emerged to enforce the new criminal law with respect to property crimes, then the activities of the early police should reflect this.⁴⁵ Detailed evidence

⁴³ "... many property-owners had great difficulty finding and arresting offenders against them in the days before organized professional police forces — particularly if the offenders had traveled any distance from the scene of the crime." [Philips, p. 117, 1989]

⁴⁴ Consider the role played by bounty hunters called "thief-takers." Paley (pp. 301-302, 1989) tells the tale of two young men on trial for highway robbery. However, it turned out the two had been enticed into the crime by a thief-taker and his partners who staged the robbery. The "victim" identified the two, but before the reward could be collected the plot was uncovered. According to Paley:

It is difficult to escape the conclusion that the major effect of the provision of £40 rewards was to provide an incentive not to the detection of crime but to the organization of thief-making conspiracies. ... The result was that thief-takers were in business not to detect crime but to commit it.

[Paley, p. 323, 1989]

⁴⁵ Consistent with this hypothesis is the emergence of police in Japan. Prior to the industrial revolution, Japan had no public police. With the industrial revolution standardized goods from

of what types of activities parish constables and the new police were up to is not readily available. However, Phillips (1977) provides such a detailed account in his examination of virtually all indictable offenses brought to trial between the years 1835–1860 in an area known as the “Black Country.”⁴⁶ The Black Country, named such because of the intense coal mining and iron works of the area, stretches across 100 square miles just northwest of Birmingham. It held a population of 211,323 in 1831, and grew to 473,946 by 1871.⁴⁷ Phillip’s study begins before the introduction of public police and prosecution, during the time when parish constables assisted private individuals in the investigation and prosecution of crime. He generally finds the constabulary effective in dealing with crimes where the “victim either knew, or had a fairly strong suspicion who the offender was” (p. 60). On the other hand he finds that parish constables were relatively inefficient at “...finding the perpetrators of crimes of which the victims could not name the offenders ...” (p. 60). In the early days of the Black Country, Phillips states that most larcenies were of the former type, and that “all the constable had to do in such cases was take into custody the offender caught red-handed, or search the belongings of the suspected offender and, if the stolen property was found, arrest him.” (p. 61).

Europe entered the country and a European style public police force was formed in 1874. According to Aldous:

The Japanese word for ‘police’ – *keisatsu* – was coined at the beginning of the Meiji period (1867–1912). The need for ‘the new nomenclature’ and the novel institution that it described – or anticipated – reveals as much about the situation before the restoration as it does about the priorities of the new regime. According to J.B. Leavell, ‘Tokugawa Japan was an unpoliced society.’

[p. 19, 1997]

Other non-European countries developed European police forces around the same time, but we cannot distinguish whether these are in response to the nature of the goods or just a colonial import. With Japan, the colonial explanation is absent.

⁴⁶ In general there is evidence that the police were more involved with property crimes than violent ones. As mentioned, violent crimes fell throughout this period. Crimes against property, however, were increasing. Linebaugh, in his in depth study of criminals hanged in London during the 18th century, states that most were hung for property crimes (p. XXII, 2003).

⁴⁷ Phillips, p. 25, 1977.

Presumably, the victim was able to identify the stolen goods because they had an artisan character.⁴⁸ Phillips concludes “the system continued to work until the 1840s without any serious breakdown of law and order in those communities which relied on parish constables” (p. 62).

Criminal activity in the Black Country changed with the continued growth of factories and larger mines. With the industrial growth came an increase in “industrial theft.” Phillips reports that property crimes without violence accounted for 85% of the indictable committals handled by the new police, and that 80% of these cases were larceny. Industrial theft consisting of inputs like coal, iron, and tools, was the most common, accounted for 28.2% of all committals. The second highest category was theft of clothing, which accounted for 17.2% of committals.⁴⁹ Of the industrial thefts, Phillip notes that the increase over time in this category stemmed from “the expansion of large-scale capitalist mining and manufacturing production” (p. 180) and that

This offensive continued to gather momentum; over the period 1835–60, there was a continual and marked increase in industrial theft prosecutions — in absolute numbers, as a ratio per 100,000 population, and as a percentage of all prosecutions brought for any indictable offence and of all larceny prosecutions brought.

[p. 189, 1977]

A major problem with industrial thefts and theft of clothing was the inability of the original owners to identify their goods. Phillips notes that clothing was “easy to get at, easy to carry away, and *relatively difficult for the owner to identify with certainty*” (p. 196, emphasis added).

5.2. The Watch and Ward System

⁴⁸ Randall (p. 210, 1990) notes the same thing in the woolen industry. Local constables could search the home of a spinner or weaver suspected of embezzlement, but were ineffective at dealing with the network of black market dealers. This trade was only stopped with the introduction of police.

⁴⁹ Phillips p. 177, 1977.

A watershed moment in the development of private policing in pre-modern England was the Statute of Winchester, 1285.⁵⁰ Among other things it created the Watch and Ward system. The watch was made up of as many as 16 men who patrolled and guarded the gates of walled towns during the night.⁵¹ All men of the town were on the roster to volunteer their turn, and all were privately armed to some extent. Their chief duty was to arrest strangers when ‘they find cause for suspicion’ and deliver the stranger to the parish constable in the morning. If a stranger resisted arrest, then a hue and cry was made and everyone in the town was to assist in arrest. This system was in place until the end of the 18th century.

The watch was useful only to prevent theft of artisan goods. Prior to the Industrial Revolution, when most goods were artisan, a watchman could effectively police theft because they could likely identify goods in the possession of strangers. However, with the coming of standardized goods (including the increased use of money payments rather than truck) the watchman is relatively ineffective in identifying stolen property. The watchman was a patrolman, on the look out for strangers or strange activity. He was not an investigator or detective. With standardized goods the watchmen, along with the walls they patrolled, ceased to be effective and were replaced by a professionalized police force.

5.3. Possession Immunity

Our model predicts that standardization changes the presumption of ownership as related to possession. When goods are artisan, ownership is less likely to be linked to possession because individuals are known to be matched with particular assets. Although this may not help with the detection of crime it greatly simplifies proof of a crime since witnesses could persuasively testify that an object belonged to a particular party. When goods become standardized, this is no longer possible, and

⁵⁰ Critchley (p. 7, 1978) notes that it “... was the only general public measure of any consequence enacted to regulate the policing of the county between the Norman Conquest and the Metropolitan Police Act, 1829”

⁵¹ These duties were called the “ward” when conducted in the daytime.

possession becomes a signal of ownership. Throughout the 18th century, as goods became more standardized, there were changes in the criminal law that reflected this.

For example, a long-standing common-law doctrine in master-servant relations was “possession immunity.” According to Fletcher this meant “transferring possession of an object conferred immunity from the criminal law on the party receiving possession, for subsequent misuse or misappropriation of the entrusted object.”⁵² Possession immunity meant that a worker could receive possession of working material, knowing that the owner could not lay criminal charges of theft. Possession immunity formalized in law the fact that ownership could be separated from possession in a time when goods were easily identified with their owner. Artisan goods that were stolen or embezzled could be identified and recovered through civil actions. The embezzlement acts of Parliament of the 18th century removed immunity in various industries and Parliament finally eliminated it in 1857.⁵³ With standardized goods it is efficient to have possession identified with ownership, but this exacerbates the embezzlement problem with such goods, and thus it would make no sense to maintain the immunity provision.⁵⁴

With the elimination of possession immunity came other charges for possessing stolen goods. Styles notes that this reflected the difficulty of identification:

Another obstacle to detection was the difficulty of identifying embezzled materials. The 1749 act, the 1774 wool act and the 1777 general act created a range of catch-all offences out of mere possession of suspicious materials. The burden of proof was placed on the accused, reversing the normal relationship between prosecutor and defendant in later-eighteenth-century English law.

[Styles p. 195, 1983a].

⁵² Fletcher, p. 472, 1976.

⁵³ Fletcher, p. 483, 1976.

⁵⁴ Consistent with our theory is the phrase “possession is nine tenths of the law.” According to Garner (1995, p. 674) this layman’s phrase arose in the English setting between the 17th and 19th centuries. Presumably, prior to this the popular notion of ownership did not immediately follow from possession.

5.4. The Pattern of Court Cases

Measuring the frequency of crime and civil disputes is never simple and doing so in the 18th and 19th century is even more problematic. However, studies have been done and some generalizations are possible. For example, Brook (1989) conducts a comprehensive survey of civil litigation in England between 1640–1830 and finds a dramatic fall in litigation in both the King’s Bench and court of Common Pleas until the end of the 18th century, followed by an increase. Mokyr (2007) uses this as evidence that trust was increasing among Englishmen during the period. He notes that “Whether eighteenth century Britain was really becoming a kinder and gentler place is a difficult issue, but at least within the circles of commerce, finance and manufacturing, trust relations and private settlement of disputes seem to have prevailed over third party enforcement.”

This is a difficult interpretation to reconcile with the increased legislation regulating thefts at places of employment and the steadily increasing amount of crime over the same period.⁵⁵ We offer an alternative explanation. The steady increase in standardization meant that former civil law institutions were incapable of handling the rise in property violations. Local constables and magistrates were less effective, and individual property owners less able to identify stolen goods. The result was less use of the courts to prosecute “crimes” through civil courts. As the criminal law was adapted, theft was dealt with through criminal courts and this is reflected in the growth in criminal indictments.

5.5. The Transition of the Factory

As embezzlement increased over the 18th century, industry owners were left with carrying the burden of enforcement and prosecution.⁵⁶ Protection, however, has

⁵⁵ There were no criminal statistics kept at this time. However, Beattie (1974) conducted an enormous study of indictments in Surrey and Sussex over this time period and concludes that for property crime there was “a gentle rise over the course of the [18th] century.”

⁵⁶ According to Becker (p. 1511, 1983), “Manufacturers formed associations, entered into subscriptions, and hired inspectors.”

a public good element, and though attempts to privately organize it were made, these coalitions were unstable, and Parliamentary testimony suggests they were ineffective.⁵⁷ *Private* efforts to lower *general* theft and embezzlement problems often only help one's competitors, and as a result there was always an incentive to free ride on private enforcement of investigations that had public benefits. Consequently, as the gains from specialization were increasing and driving capitalists to bringing workers more and more together, a private response was required to deal with the immediate rise in theft and embezzlement.

Prior to the Industrial Revolution most production took place in family operated cottage industries. When larger volumes of output were required, work was "put-out" to independent sub-contractors. Products produced in these cottage industries and the inputs used to make them were artisan in nature.⁵⁸ Embezzlement and various types of shirking were common because payments were made through gleaning and truck.⁵⁹ Payment in kind, when the payments are in terms of raw materials, made it difficult to avoid embezzlement of these materials at the margin. Ashton puts it this way: "In each case the workers saw to it that the crumbs from the masters table were ample. Casks were handled not too gently; sacks were liable to burst open.... The line of demarcation between the extension of established rights

⁵⁷ See Becker pp. 1509-1512.

⁵⁸ Ashton describes it:

... in many industries the boundaries of the firm were ill-defined, the structure loosely organized, and the workers remote from the center of control. In the textile trades, in particular, there must have been thousands of workers who never set eyes on their employer. The notion that the coming factories meant a 'depersonalisation' of relations in industry is the reverse of the truth.

[pp. 102-103, 1966]

⁵⁹ Linebaugh, in the context of silk production, states "These customs, latitudes or cheats arose either between the merchant and the master to whom the silk was put out for work, or between the master and his workers. Allowance was made for waste, or negotiated in either case. The techniques of production appeared to be highly wasteful." (p. 264, 2003). See also Styles (p. 179, 1983a).

and barefaced robbery is difficult to draw” (p. 208, 1966). Given the artisan nature of goods prior to the Industrial Revolution, these embezzlements were likely small.

As the advantage of large scale economies increased, and as goods became more standardized, the already existing problem of embezzlement increased dramatically.⁶⁰ A major part of this problem was that factory authorities had no jurisdiction outside their yard, and as a result resale markets could flourish. That lack of jurisdiction represented a major problem for the factory system.

Further evidence for this is found in the testimony of manufacturers who lobbied throughout the 18th century for criminal sanctions against the truck system.⁶¹ Long run solutions would need to be found, but the first large firms did not have the luxury of using later institutional resolutions. The immediate, radical, solution was to create “factory colonies.” In a factory colony workers and their families move to an isolated part of the countryside where they could work and live together.⁶² This exploited the benefits of the factory system, while containing the problem of

⁶⁰ Whether in textiles, cutlery, needle production, ironwork or nails, “in some of England’s major industries, the embezzlement of raw materials was a serious and growing problem.” (Jones, p. 131, 1982). Knight discusses this problem in the context of a naval shipyard during the American War of Independence.

The next difficulty was to prove the stores were in fact the Kings, and also that they had not been legally bought at a dockyard sale of old stores. Cordage made for the King was to have a white thread ... canvas had a “blue streak,” and all metal goods had the broad arrow stamped on to them. However, these marks could easily be remove; ... Brine employed a copper-smith in pickling and cleaning coppersheets, two blacksmiths in beating out the broad arrow mark from bolts and the yard foundry for filing the mark from brass pieces.

[p. 221, 1975]

⁶¹ See Becker (1983, pp. 1510–1511) for a discussion.

⁶² A factory colony was not possible for the Navy. Instead they attempted to deal with the problem in other ways. For example, the navy began selling scrap wood directly and used the funds to supplement wages. In 1767 the British Navy earned £100,000 doing this, “twice the cost of the wage increase” (Dobson, p. 99, 1980). The navy also denied wives (who could steal material under garments) permission to come on site to collect chips and deliver food to the workers. Finally, by 1805 the practice of chips [gleaning] was completely eliminated.

embezzlement.⁶³

For example, consider cotton factories, which are among the first associated with the Industrial Revolution. Though these and other factories eventually dominated the industrial cities of England, the first factories were located in remote isolated parts of the country.⁶⁴ For example, the Burrs Mill, established in 1801 in Bury, was nine miles north of Manchester; the Styal Mill built by Samuel Greg in 1784 was in a location “with a very scanty population.”⁶⁵ Isolated, the owners of these private communities erected houses, shops, churches, schools, and other amenities for their workers.⁶⁶ Fitton and Wadsworth emphasize the private nature of these

⁶³ We distinguish between merely bringing groups of independent workers together to minimize transport costs, and operating a factory where workers were controlled. Berg documents how many *artisan* groups worked under a single roof in “workshops” or “proto-factories,” but the true factories were ones that controlled worker behavior to prevent embezzlement:

Both systems of production — artisan and capitalist — could, therefore, generate centralized production ... But ... factory systems ... clearly differed in their social relations of production. ... factories [were] founded ... with the stated purpose of greater supervision, quality control and prevention of embezzlement. Contemporaries were clearly aware of a big distinction between the two types of establishment.

[p. 226, 1994]

Others have also noted the role of the factory in solving theft problems. For example, see Williamson (1980).

⁶⁴ Collier, in her detailed study of several early factories notes: “The factory system first made its appearance not in the large towns where it later became concentrated, but in the country districts.” (p. 14, 1964). Fitton and Wadsworth note (p. 106, 1968) that the locations of many of the surviving buildings of these early factories are *still* remote.

⁶⁵ Collier, p. 39, 1964.

⁶⁶ Chapman notes how common this was:

... experience soon showed that big wage packets were not the only solution, particularly where it was necessary to attract workers to isolated mill sites. At Cromford, Arkwright found it necessary to offer employment to whole families, and to build houses before they could be induced to move from Nottingham, Derby or Manchester. By 1790 he was providing a public house, a weekly market and garden allotments to retain his work-force. The Strutts at Belper, David Dale at New Lanark, the Evanses at Darley Abbey, the Gregs at Styal, and other factory colony builders had to offer comparable incentives ...

[p. 55, 1972]

towns:

They were, it is easy to forget today, a deliberate creation, without assistance from the State or local authority and with no public services. The factory, the weirs and dams, the machine-shop, the roads and bridges, the inn, the truck-shop, the church and chapel, the managers mansion all were devised by and grew up under the owners eye.

[p. 98, 1968]

Within these communities there was friction among both skilled and unskilled workers, not just over long shifts and wages, but also over the “insistence on close and continuous supervision of work by overseers.”⁶⁷ Wages in the mill were generally higher than agricultural wages, but the workers surrendered a certain amount of civil liberties to work there. Known as “factory discipline,” behavior within and outside the mill was monitored. Workers would sign contracts which committed them to work at the factory for several years.⁶⁸ Failure to stay could lead to bounties advertised in local papers, and to prosecution. Factory owners also instituted local forms of justice in the form of fines or “forfeits.” In the Strutt Mills these were issued for such offenses as “absence from work without leave,” “destruction of mill property,” “failure to do work as required” (the largest category), “misconduct outside working hours,” and “theft of mill property.” In Fitton and Wadsworth reporting of these forfeits (p. 234), the theft category includes “stealing packethread; having waste found on body; stealing candles, yarn, rolers, nails, pincers, etc.; and making good yarn into waste and pockiting (sic) it.” In some sense, the factory colony was like a voluntary prison. Workers accepted the higher wages in exchange for a reduction in their civil liberties which reduced their ability to embezzle the firm.⁶⁹

⁶⁷ Chapman, p. 54, 1972. Szostak notes that “The individual factory labourer was almost always supervised by someone ... supervision of production workers by foreman and capitalists, developed simultaneously with the shift to factories.” (pp. 343-344).

⁶⁸ Huberman (p. 29, 1996) states that apprentice contracts in the colonies were for 7 years. See also Fitton and Wadsworth (p. 233, 1968).

⁶⁹ Gregory Clark points out that “A puzzling aspect of factory discipline was that instead of

Though the factory colonies lasted well into the 19th century, there seems to be no evidence money was made on community development. Factory owners had no special cost advantages in building schools and churches. Indeed, “they found that the establishment of a new community was an expensive and often frustrating experience, and labour turnover continued at a very high rate.”⁷⁰ We venture that the gain must have been in the ability to supervise workers and prevent the sale of property stolen from the factory.⁷¹ The remote locations, the monitoring of behavior outside of working hours, the supply of shops and the removal away from open markets, all would have reduced the ability and benefits of individuals within the firm to steal. These drastic measures were necessary because the factory system gave workers access to large supplies of standardized inputs and outputs. Once beyond the factory gates, possession of the standardized good would have amounted to *de facto* ownership. Without modern institutions to prevent theft, isolation was the best method of protection.⁷² As effective as this must have been in reducing theft, the costs would have been enormous. These costs represent a

rewarding workers according to their output, it used behavior of workers as a measure of performance.” (p. 132, 1994). He concludes that firms had to act as a social coordinating device because workers lacked self control when they had personal freedom. Our interpretation is that the loss of civil liberties and ease of interacting with outsiders was a constraint on employee theft.

⁷⁰ Chapman, p. 55, 1972. Collier notes: “It seems hardly credible, however, that a firm of the dimensions of Peel, Yates and Peel in 1801-1802 would trouble itself with the minute details of retail shop keeping, solely because of the profit that could be made.” (p. 30, 1964).

⁷¹ Jones notes that:

There seems to be a general consensus amongst both contemporaries and historians that the adulteration and embezzlement of raw materials constituted a major problem during England’s Industrial Revolution. ... by the nineteenth century a regular trade had developed in embezzled yarn.

[p.129, 1982]

⁷² Large enterprises had occasionally existed prior to the Industrial Revolution and the arrival of the factory: the silver mines of Laurium in ancient Greece; the Roman silver mines in Rio Tinto, Spain; or the tremendous *latifundia* landed estates of the Roman Empire. All of these were run using slaves, prisoners, and indentured servants. Our interpretation is that this type of labor force prevented the workers from stealing the precious metals and other valuable goods.

minimum measure of the gains from the new organization of production and the eventual advantage of moving to cities. As a result of these costs, this colony form of organization was relatively sparse and short lived. By the middle of the 19th century urban manufacturing had begun to dominate.⁷³

From 1820 to the 1860s the factory moved back to the city — a move that coincides with the emergence of police. The critical difference between the urban factory and its colony predecessor, was their organization. Long-term contracts and indentured apprentices were gone, labor generally became less skilled and less family related, and the entire colonial community disappeared. Large plants were more likely to pay their workers in money than in kind. In particular, the paternalism shown by the colonies had started to wane:

... the scale and intensity of the textile masters involvement in the patronage of philanthropy and culture changed widely from the 1840s. ... Elsewhere the change came later. ... In all this, the factory owner was no longer confined to the role of patriarch superintending the welfare of his immediate band of workers ...

[Howe, p. 272, 1984]

Technical changes increased the optimal scale of the factory as well as the number of low skilled workers required. To continue the colony system under the larger scale, and given the emergence of the police, simply proved too costly.⁷⁴ At the same time, increased mechanical production was creating more and more standardized outputs, which, as argued, increased embezzlement opportunities.

What allowed the factory to move back to the city, however, was the presence of a public police force that could investigate and reduce theft outside the factory gates. With the changes to the criminal law, the police could crack down on public markets where stolen property could be resold. Laws on search, the criminalization of gleaning, and cash payments over truck all helped to reduce theft problems at work and facilitate the modern urban factory to come into existence.

⁷³ Chapman, p. 57, 1972. Collier states “The factory system first made its appearance not in the large towns where it later became concentrated, but in the country districts.” (p. 14. 1964).

⁷⁴ Huberman: “For many firms the apprenticeship system proved costly to maintain, and by the turn of the [19th] century it was breaking down.

5.6. The Industrial Revolution

Starting somewhere in the late 18th century something dramatic happened: per capita income began to increase. The increase was so small — just less than 1% per annum — that major economic figures would miss it for over 150 years. Still, it continued until by 1860 per capita income in England had doubled, along with a doubling of the population. Such an event had never happened before in history, and of course, the real growth in per capita income was about to explode even more.

Economic historians have struggled to explain this growth in per capita income we now call the Industrial Revolution. McCloskey (1994) demonstrates the slow take off in growth, but also argues that traditional explanations fail to explain it. He summarizes that “industrialisation was not a matter of foreign trade, not a matter of internal reallocation, not of transport innovation, not investment in factories, not education, not science.” (p. 253, 1994). Crafts and Harley (1992, p. 705) put it this way: “it seems impossible to sustain the view that British growth leapt spectacularly in one generation as a result of innovations in manufacturing.”

The fundamental problem is that any given industry is just too small to account for changes in aggregate growth. This has led many economic historians to look for “feedbacks” or “dynamic” effects to account for the Industrial Revolution. McCloskey (p. 269, 1994) suggests that “free speech and an openness to persuasion leads to riches.” Mokyr (2007) argues that growing trust and social capital lead to leadership and growth. Finally Clark (2007) provides a Darwinian argument that the Englishman of the 18th century had survived a selection process and ended up with strong middle class values of thrift and industry, which allowed for the Industrial Revolution.

Standardization provides another plausible and complementary explanation for the Industrial Revolution. As we’ve argued, standardization led to an enhanced role for criminal law and the eventual emergence of the police. These two institutional

developments efficiently mitigated the problems of property theft and embezzlement. Moreover, the presence of police further encourages innovations that lead to more standardization. Standardization in general, unlike any specific innovation, effected the economy as a whole, and the institutional solutions to the theft problem had similar widespread effects. Thus, although the factory no doubt created enormous gains from complementarities in investments, supervision, and quality control (Geraghty 2007), these benefits could not be fully exploited until the full arrival of criminal law and public police.

6. Conclusion

The institutional changes that took place between 1750 and 1850 are remarkable, and they separate our modern world from its pre-modern predecessor.⁷⁵ The evolution of criminal law, the arrival of public police, and the transformation of the modern factory, though not alone, all stand as examples of this transition. Historians have often viewed the pre-modern era as one of graft and corruption, and that the modern era embodies “progress” on the institutional front. But the Englishmen of 1700 were just as interested in wealth as their descendants 200 years later, and their actions and choices were just as rational. Thus, the institutions they designed have just as much economic logic as do modern ones.

⁷⁵ It is also what separates the developed from the undeveloped world. Gabre-Madhin (2001) provides a fascinating report on Ethiopian grain trade, and argues that a lack of standardization is a major contributor to poverty among Ethiopian grain farmers. She describes markets that are remarkably similar to English markets prior to the Industrial Revolution:

...grain is highly differentiated because there is no formal standardization and classification system, contracts are oral and nonstandardized, grain shipments are not inspected or certified officially, and there are very limited means of legally enforcing contracts (Dadi, Negassa, and Franzel 1992; Kuwab Business Consultants 1994). These constraints cause grain traders to be highly vulnerable to being cheated with respect to market prices, quality and quantity of the delivered grain, and other contractual terms such as the timing of delivery and grain spoilage or loss during transport ...

[p. 36–37, 2001]

Though others have documented the changes in criminal law, police, and factories, we have provided a theory for their simultaneous evolution. Our claim is that the standardization of goods led to increases in theft opportunities, and that our modern institutions are the response to this reality. The ability to control theft and embezzlement, while still accommodating the increased standardization, allowed industry to expand. This contributed to the eventual growth in per capita incomes that resulted from the technical changes in the Industrial Revolution.⁷⁶ Had the 18th century institutions remained in place, the Industrial Revolution would have been severely hampered, and perhaps restricted to isolated factory colonies.

⁷⁶ Our study parallels North's (1968) classic study on the sources of productivity growth in ocean shipping. He found that the conquest of piracy in the Atlantic was more important than technical changes and best explains the expansion of shipping trade from 1600–1850.

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