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Master Thesis Financial Economics

Economic Implications of Limited Liability: Evidence from Homestead Exemptions in the United States, 1850 – 1880

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Abstract

Homestead exemption laws protect the homestead of families against seizure by creditors in the case of bankruptcy. I study the impact of homestead exemption laws on the operations of firms in the United States from 1850 to 1880 by regressing the exemption level on firm variables. This research design is possible because each state enacted exemptions at different moments and exempted different dollar amounts. I find that the limitation of personal liability in the form of homestead exemptions increases the number of steam horsepower per employee and a firm's leverage. The results become larger for higher exemption levels and are stronger for firms in credit-dependent industries. These results indicate that the limitation of personal liability can stimulate economic development.

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1 Introduction

Limited liability is the ability to walk away from one's debts. Multiple types of limited liability exist in today's world. Two well-known examples are that stockholders are only liable up to the amount of their shares and that in limited liability partnerships individual partners are not liable for another partner's misconduct. Several academic authors argue that limited liability has been of great importance for economic development (Easterbrook, 1985; Hillman, 1997; Kraakman, 2017; Woodward, 1985). Interestingly, surprisingly little is known empirically. One area where research has been conducted is on the impact of personal bankruptcy protections. These protections shield certain assets during potential bankruptcies.

In short, this literature finds two opposing effects of personal bankruptcy protections. On the one hand, exemptions lead to tighter credit supply, worse credit conditions, and a redirection of credit towards households with more assets and large incorporated firms (Alston, 1984; Amore et al., 2013; Benfratello et al., 2008; Berger et al., 2011; Berkowitz & White 2004; Cerqueiro et al., 2017; Cerqueiro & Penas, 2017; Cornaggia et al., 2015; Gropp et al., 1997; Gross et al., 2021; Koudijs & Salisbury, 2020; Lin & White, 2001; Link, 2004; Pence, 2006; Scott & Smith, 1986). This effect is called the credit-supply effect. On the other hand, many researchers find proof that bankruptcy protections increase investor's willingness to make risky investments, increase credit demand, increase the number of startups, lead to more self-employment, and increase innovative activity (Acharya & Subramanian 2009; Cerqueiro et al., 2017; Chatterji & Seamans 2012; Fan & White 2003; Hurst & Lusardi, 2004; Koudijs & Salisbury 2020; link, 2014; Manso, 2011; Severino & Brown 2017; Tian & Wang 2014). Together these effects are called the tolerance-for-failure effect. If the tolerance-for-failure effect outweighs the credit-supply effect, this will be positive for American firms since this will increase risky corporate investment in innovative sectors.

Most related literature studies recent data. Moreover, most researchers focus on the impact on household's investing decisions, the credit market, or innovation. An unexplored field of research is to examine the origins of personal bankruptcy protections and the influence they had on firm variables at the time. The analysis of these historical laws can give valuable insights into the role of limited liability in the economy. These insights have implications for academics and lawmakers alike because they help determining the optimal degree of limited liability that stimulates economic development. One of the first forms of limited liability in America is the homestead exemption. This exemption is a typical American type of limited liability. In short, the homestead exemption is a legal provision that shields the home from creditors following a bankruptcy or the death of the homeowner. Most American states enacted homestead exemptions during the nineteenth century to protect American families from homelessness.

Homestead exemption laws in the second half of the nineteenth century offer a unique opportunity to measure the impact the limitation of personal liability has on the operations of firms for two reasons. First, homestead exemption regimes were determined by the states, not the federal government. As such, the timing of the enactment of homestead exemption laws deviated significantly from state to state. Moreover, the exemptions varied strongly in the number of dollars in homestead equity that they protected. Second, the second half of the nineteenth century was a time of fast economic progress. For example, the diffusion of steam power and the industrial revolution happened to a considerable extent within this period. With these ideas in mind, I create the following research question for my master thesis:

Did the enactment and expansions of homestead exemptions in several U.S. states from 1850 to 1880 significantly impact the operations of firms?

To study the impact of homestead exemptions on manufacturing firms, this thesis uses the protection level per state and decade on the decennial censuses of manufacturing establishments in the United States from 1850 to 1880. The census data for these four decades contain nationally representative samples of all manufacturers in America. Therefore, these data can be used to measure the economic effects of legislative developments. These data were created by the U.S. government to be able to introduce effective legislation that was needed to protect the U.S. manufacturing sector from foreign competition. The data of the censuses of 1850 to 1880 have been collected by Fred Bateman, James Foust, Thomas Weiss, and Jeremy Atack (Atack & Bateman, 1999a; Bateman & Weiss, 1981). They published the created nationally representative datasets to be used by other researchers.

This thesis finds that the amount of steam horsepower per employee, conditional on a firm having a steam engine, and the output per dollar in equity, a proxy for leverage, increase significantly over the exemption level. The number of firms with a steam engine only increases for firms in credit-dependent industries and larger firms. Therefore, investments in steam power predominantly operate on the intensive margin, with firms that already had a steam engine investing in more horsepower when exemptions are enacted or increased, while few firms invest in a new steam engine. The investments in larger steam engines seem to have been funded by an increase in firm leverage. The above results are robust for the inclusion of region time decade effects, the exclusion of the far western sample, and the calculation of the effects with an exemption dummy variable.

The effects of exemptions on the amount of steam horsepower per employee and a firm's leverage become larger if the exemptions become more sizeable. This finding implicates that the increasing appetite to invest of American households outweighs the retraction in credit supply at each exemption level. In other words, the tolerance-for-failure effect exceeds the credit-supply effect for the lower exemption levels and exceeds the credit-supply effect even more for the higher exemption levels.

The homestead exemption level has a larger impact on firms that are active in credit-dependent industries compared to firms in more equity-dependent industries. This result implicates that firms that need external financing will experience a larger impact when credit becomes more available. This finding is further proof that exemptions increase firm investment through a greater availability of credit.

Homestead exemptions do not significantly impact the overall amount of water and steam horsepower per employee, nor the average firm size or the productivity per employee. Regional differences seem to impact the findings, although the different findings per region might also result from differences in the average exemption level between the regions. I find mixed results for the effect exemptions have on firms of different sizes. This effect might be found because the regressions on the steam horsepower per employee variable are on the intensive margin, while the regression on the steam variable is on the extensive margin.

For the largest exemption levels, and in the most credit-dependent industries, the productivity of firms decreases over the exemption level. These effects can be explained by the fact that exemptions increase the number of startups. Other researchers that use more recent data also find that bankruptcy exemptions increase entrepreneurial entry and self-employment (Chatterji & Seamans 2012; Fan & White 2003; Paik (2013); Severino & Brown 2017). These startups probably did not have the financial resources to invest in new steam engines right away and therefore reduce the average firm's productivity and the significance of the effect homestead exemptions have on the steam engine variable.

This thesis complements existing literature in multiple ways. First, this thesis uses historical data of firms and one of the first types of the limitation of personal liability in the United States. As such, the results are less likely to be impacted by other forms of limited liability that were enacted simultaneously as the studied legal changes. Second, this thesis studies the impact on the operations of firms, not the changing investment behavior of households that most related research studies. Third, the results of this thesis show that the effects of exemptions become stronger over the size of the exemption. This finding implies that the optimal exemption level might be higher than previously assumed.

The results of this thesis can be valuable for society as well. The finding that personal bankruptcy protections impact the operations of firms, and that the tolerance-for-failure effect exceeds the credit-supply effect for higher exemption levels, could spur debate among lawmakers about the optimal decisions regarding the implementation and level of exemptions. Moreover, the results implicate that the economy might be better off if households have more economic security.

The second chapter of this thesis addresses the theoretical background and related research that have been conducted. Based on this related literature I will also formulate testable hypotheses. In chapter 3, I describe the data that is used and provide summary statistics of the data. Hereafter, chapter 4 will explain the empirical analysis that is performed. Chapter 5 will present and discuss the results of this

analysis. This chapter is followed by a chapter where an answer to the research question and suggestions for further research are given.

2 Theoretical Background and Related Literature

2.1 Underlying Theory

Homestead exemptions provide a form of a safety net for American families. The law protects families from losing their homes after the death of the homeowner and during bankruptcies. In this thesis, I study if the implementation of this law led to changes at a firm's operational level. Two opposing effects of this legislation can be expected. On the one hand, exemptions encourage enterprise by lessening the penalty of failure. This could lead to households making more (risky) investments and starting more businesses. On the other hand, bankruptcy exemptions reduce the amount that creditors can receive in repayment of debt. This makes creditors more unwilling to lend, redirects credit to households with more collateral, and increases the average interest rate. This thesis will examine if these effects can be observed in nineteenth-century firm-specific data. Hereby, I will test if these effects significantly influence firm-specific variables like the power type used, the number of horsepower per employee, and the value of output, output per employee, and output per invested dollar.

In this chapter, I will lay out the theoretical background that is needed to answer the research question. To be able to understand the various outcomes of the homestead exemption, it is needed to identify this legislation's history. Therefore, the first part of this chapter will cover the general characteristics of homestead exemption laws, the reasons for implementation, the opposition and support for the exemption at enactment, the economic and social relevance of the exemption for American households, and the evolution of the homestead exemption from the 19th century until the 21st century. Secondly, I will cover related literature that examines the different effects exemptions and other forms of limited liability have on household finances and investment decisions. These papers provide an idea of the results that can be expected in this thesis. The third part of this chapter will cover the hypotheses of this thesis. These will be based on the findings of the related literature.

2.2 The Homestead Exemption

General characteristics of homestead exemption laws

The homestead exemption laws differ from state to state. Who and which type of property was eligible, the procedures, and the number of acres or dollars exempted differed per state and year. However, there are several basic characteristics that all homestead exemption laws share. First, to receive the protection from the exemption a home should be designated as a homestead which is only possible if the household

lives in the homestead. The designation could be done through preregistering a property as exempt at the country clerk (Priest, 2006). Next to the dwelling itself, the law of most states also protected land, stores, shops, mills, and outbuildings. Therefore, the laws generally did not only cover the home of the insolvent debtor, but also the means of making a living (Balleisen, 2001). The law provided protection in two circumstances. First, the equity in the homestead (value of homestead minus mortgage on the homestead) could not be seized by creditors during the life of the head of the family, and second, the immediate family of the family head could continue to live in the homestead, undisturbed by creditors of the deceased, after the passing of the family head. The latter holds even when their inheritance is not large enough to cover the entire homestead or when (other) heirs inherited the homestead (Morantz, 2006). The wife could continue to live in the homestead as long as she wished and minor children could do so during their minority (Thompson, 1878).

In some states, homestead exemptions took precedence over mortgages. In those states, it was always possible to waive the exemptions for the mortgage loan to make it possible to borrow the amount needed to buy a house (Vukowich, 1974). Bachelors could usually only receive coverage if they had dependents (Goodman, 1993). Most states protected the homestead against all debts, in those states the homestead could be designated before the creditor would sell the land or before the sheriff levies on the land. In a few other states, the exemption only protects the homestead from debts that originated after the homestead was acquired or designated.[1]

In many states the exemption covered more dollars for family heads than for persons without a family, emphasizing that homestead exemptions were especially meant to protect families. The legislation allowed people to sell one homestead and to buy another homestead without having to use the proceeds of the sale to pay creditors. Most states gave six months to a year for debtors to reinvest the proceeds into a new home (Vukowich, 1974).

When the exemption covered the entire equity of the homestead, creditors could no longer force the household to sell the homestead. When states had both a dollar and an acre amount the homestead must meet both criteria to be protected. If the acre limitation is exceeded a creditor has the right to force the debtor to sell the number of acres above the limit. If the dollar limit is exceeded the first option is to sell a part of the land surrounding the house to lower the value of homestead equity to the exemption limit. If this is not possible since the home alone is worth more than the dollar limit, the entire homestead is sold. The value of the exemption should then be paid to the evicted family from the proceeds of the sale. This is done to allow the debtor to reinvest in a new homestead and to prevent families from becoming homeless (Thompson, 1878).

[1] Kentucky, Missouri, and Vermont did not protect debts that originated from before the acquisition date of the homestead. The New York, Maine, and West Virginia laws only protected debts that occurred after the homestead was formally declared. These formalities were not a part of the original homestead exemption laws of these states, but have been made clear during lawsuits (Vukowich, 1974).

The homestead exemption, contrary to chattel exemptions, offered permanent security. Another distinct feature is that it specifically targeted families as the beneficiaries (C. W. Wright, 1941). Since the protections of the legislation applied to a considerable extent to women, the wife also had to give her consent to the sale of the homestead in nearly every U.S. state. Moreover, most U.S. states allowed wives to independently designate their husband's land or house as their homestead. By doing so, the husband could no longer sell the property without the consent of his wife. That this feature of the law was so prevalent can be explained by the goal of the legislation. The main goal was to protect the entire family, not merely the husband, from destitution. By opting for joined alienation states made sure that feckless actions of the husband could no longer put the family survival at risk (Morantz, 2006).

Reasons for implementation

The Republic of Texas was the first nation to implement a homestead exemption law on January 26, 1839. This law exempted 500 Texas dollars in homestead equity from seizure by creditors. In past literature, six reasons are given why this law was implemented and, specifically, why Texas was the first to do so.

First, the panic of 1837 led to a severe depression in the United States and Texas. This depression led to foreclosures of family homes and farms, thus increasing the need to protect families from poverty and homelessness. Moreover, during the years after the panic, the views toward debtors changed from the wrongdoer to honest, but unfortunate, individuals that deserved help to get back on their feet. (Goodman, 1993; London, 1954; McKnight, 1983; Priest, 2006). According to Gray (1895), the dislike of urban creditors also played a role in the popularity of the homestead exemption in the south and rural west.

Second, protecting the home of the impoverished and honest debtor would remove the inducements of fraud, theft, and other crimes. By providing some means to debtors the law would also help to prevent families to become a burden upon the public (McKnight, 1983).

Third, the author Goodman (1993) argues that the popularity of the homestead exemption can also be seen as part of the Christian culture that emphasized help to the poor and family security. The market revolution generated an enormous increase in wealth and consumption. However, there was significant opposition against materialism, the credit system, and the speculative mentality that the market revolution also created. In a way, the homestead exemption was a method of combining the at times contradictory goals of economic progress and the protection of old religious and communitarian norms. It mitigated the negative side effects that the market revolution and laissez-fair politics of the nineteenth century gave rise to, while still preserving the wider economic system.

A reason Texas was the first state to enact a homestead exemption law was that Texas used to be a scarcely populated country that needed to attract new settlers for both economic development and

defense purposes against a possible Mexican invasion. Homestead exemptions were a way to attract these settlers (Goodman, 1993; Haskins, 1950; London, 1954; Smyth, 1875).

Fifth, Texas already had several chattel exemptions which protected specific types of personal property and stay laws which protected the possessions of a debtor from seizure during a specific period, for example during military service, or protected the seizure of land due to out of state debt that accrued before the acquisition of land in Texas. Colonial Texas gave these lands to settlers willing to relocate and did not want the land to fall into the hands of U.S. creditors. The Texas law was also built upon Mexican and Spanish laws that protected the estates of the nobility. The familiarity with chattel and land exemptions in Texas led to the evolution of real estate exemptions that are known as homestead exemptions (Goodman, 1993; London, 1954; McKnight, 1983). According to Vukowich (1974), the Spanish history of states like Texas and California and the familiarity with liberal Spanish exemption laws also led to more generous exemption laws in these states.

Lastly, in Texas the homestead exemption was seen as a way to protect the freedom and independence of the pioneers who moved to the country, thus making frontier life attractive (London, 1954).

As can be seen, the Texas homestead exemption law was a logical sequence of circumstances that were specific for this time and the Republic of Texas. Furthermore, it fits into a trend of reforms that improved debtors' rights, i.e., the abolition of imprisonment for debt, chattel exemptions for personal property, and stay laws that temporarily exempted property for existing out of state debts (Coleman, 1974; B. H. Mann, 2009; Morantz, 2006).

Interestingly, the Texas legislators argued that homestead exemptions would increase the availability of credit for poor households since the debtor would be able to retain the means to earn income during bankruptcies. They thought that this would increase the ability to raise money for debt repayment for the poorer households. It was thought that this would make the collection of debts easier and would increase the availability of credit to poor families (London, 1954).

The opposition and support for the homestead exemption at enactment

The first Texas homestead exemption law of 1839 faced very little criticism when proposed and there was almost no discussion about the legislation in the Texas congress at the time. The author Lena London (1954) argues that none of the Texas legislatures seem to have been aware of the far-reaching precedent they created. The reasons for this lack of opposition and attention are the need for debtor relief after the panic of 1837 and the severe subsequent depression, the changing views toward debtors from criminals to unfortunate individuals, and the need to attract settlers for economic and defense purposes for the newly formed republic. The minor opposition that did exist brought forth that husbands could no longer alienate the homestead without the approval of their wife or that the exemption also protected what they called 'the dishonest debtor' (Smyth, 1875). Despite this minor opposition, the law quickly

spread to other states. The first group of states were southern states that, just like Texas, suffered a large economic downturn during the forties and saw many of their citizens relocate to Texas. After the civil war, the remaining southern states quickly enacted a homestead exemption law. This was not only done to protect American families, but also to prevent land from falling into the hands of freedmen (Waples, 1893).

In northern and western states homestead exemptions also proved to be popular legislation. During the forties and fifties of the nineteenth century, many states in these regions also adopted homestead exemptions. While in Texas and other southern states the legislation was mainly regarded as a debtor issue at the time, states in these regions enacted this legislation under public pressure of the land and abolitionist movements who strived for a free and secure homestead for all, the labor movement which fought for the rights of the working class and even the temperance (women) movement who hoped that the homestead exemption would protect families from misfortunes and mistakes of the male breadwinner (Morantz, 2006; C. W. Wright, 1941). Interestingly, while southern states adopted and enlarged homestead exemptions to keep land in possession of (white) plantation owners, many northern states adopted these exemptions at least partly to appeal to the abolitionist movement (London, 1954; Morantz, 2006).

While the original Texas law faced very little criticism at the time, opposition grew when the exemption became more widespread. Most opposition came from conservative politicians, merchants, and creditors (Goodman, 1993). According to Morantz (2006), several complaints about the legislation developed. The first was that dishonest debtors would also be protected, thus encouraging dishonesty and fraud. Another point that has been made is that creditors would become unwilling to lend which would lower investment and economic progression. Especially small farmers would be subject to a shortage of credit (Goodman, 1993). The third complaint was that the law substituted self-reliance for state paternalism, causing the moral fiber to weaken. Hereby the opponents of the law directly attacked the view of the proponents that the law provided independence and freedom to Americans (McKnight, 1983). Another reason to oppose homestead exemptions was that it would weaken respect for property rights (Goodman, 1993). The last major point of opposition was that many homestead exemption laws provided clauses that women had to consent to the sale of the homestead. This increased a wife's influence over arrangements that previously were solely a concern to her husband (Morantz, 2006). The opposition had some effect: South Carolina and Connecticut repealed their homestead exemption law, and three other states never implemented a homestead exemption in the first place.[2] South Carolina repealed the law under pressure of small farmers and creditors, Connecticut did the same to stop the protection of the fraudulent debtor (Goodman, 1993).

[2] These states were Delaware, Rhode Island, and Maryland.

The homestead exemption caused many lawsuits. Over time the number of lawsuits about homestead exemptions grew so strongly that justices even began to complain that the laws were too vague (Thompson, 1878). In general, judges tended to implement homestead exemptions very liberally (Vukowich, 1974). These lawsuits were often about the question of which persons could claim the protection offered by the exemptions. Most states gave the benefits of the exemption to family members. This description gave room for interpretation. Over time judges began to explain this term as the nuclear family. Another issue that sparked lawsuits was the question of who could be counted as a 'family head'. In practice, women could also be regarded as family heads if they were the primary providers for dependents. However, this did depend on which judge ruled the case (Morantz, 2006).

To conclude, most authors argue that widespread political support for homestead exemptions existed in different states and time periods. The legislation proved so popular since it allowed people to reap the benefits of the free market and speculation without having to face the risk. Moreover, homestead exemptions fitted well with the Christian and communication roots of the United States. The legislation brought America stability of land ownership and reduced financial risk (Priest, 2006). From Texas colonizers to abolitionists and from labor reformers to southern planters, the law had diverse supporters over long periods of time. This is the reason that almost every American state adopted a homestead exemption law over the course of the nineteenth century.

The relevance of the homestead exemption for American households

Homestead exemptions had multiple, sometimes unintended, consequences. The author Goodman (1993) states that homestead exemptions increased the attractiveness of risk-taking and therefore encouraged creative enterprise and industrial capitalism. This could mean that the characteristics of American firms changed significantly following the enactment of homestead exemptions and the resulting change in investment decisions of American households.

Another example of the importance of the exemption for Americans is that Texas, the first state to enact a homestead exemption law, became known as a debtor's haven across the country (Hynes et al., 2004). Historians also agree that the homestead exemption helped Texas with attracting new settlers, especially from other southern states. There were some doubts about the type of people that relocated to Texas. One historian called Texas "a noted asylum for all the desperadoes in the country".[3] The success and popularity of the Texas law forced southern state legislatures to draft their own homestead exemption laws soon after.

Although the exemptions had a stabilizing effect on families in a time of laissez-fair politics, the homestead exemption was not always effective in protecting the homesteads of American households. Goodman (1993) argues that mass dispossessions still occurred and that the laws did not protect

[3] Quote from Prather, "Economic Effects of Homestead and Exemption Laws", as cited in Goodman (1993).

everyone in practice. One reason for this is that most states required people to dedicate their property as their homestead at the country clerk before receiving protection. Many people were unaware of this and could not receive protection during bankruptcies. Another reason is that some states allowed homestead exemptions to be waived to make it easier to borrow against homes. Therefore, some people were not protected at times of financial distress. A last reason is that mortgage lenders were sometimes able to make use of loopholes in the law (Thompson, 1878).

According to Lukowich (1974), the homestead exemptions also encouraged debt repayment and the rehabilitation of the debtor. The exemptions allowed people to keep the means to make a living. Therefore, these homestead exemptions made it possible for debtors to keep earning income after bankruptcies and to prevent possible future bankruptcies that could have happened otherwise.

Evolution of the homestead exemption from the 19th century until the 21st century

In southern states, homestead exemptions were mostly seen as a way to prevent debtors and their families from destitution. The exemptions were part of a set of reforms that improved the right of debtors. Although southern states also enacted the legislation to attract migrants. Later, especially in the Northeast, the land and labor movement also became great advocates of homestead exemptions. The temperance movement and abolitionist movement began to support the law as well. The widespread support led almost all states to enact homesteads exemption laws before the end of the nineteenth century. Some states, for example, Texas, even incorporated the homestead exemption in their constitution. This was done to formalize the spirit of independence and to protect the law against capricious legislators (London, 1954). The largest increase in the number of states that passed a homestead exemption was in the years between 1848 and 1852. In these years eighteen states enacted homestead exemption laws. Southern states were the first group of states who passed the exemptions. The northeastern and western states followed soon after. The years in which each state passed its first homestead exemption law are included in Table 4.

Interestingly, southern states tended to enact and liberalize their exemptions during times of depression, while northern and western states passed exemptions during times of economic expansion (Goodman, 1993). An example is that the largest group of southern states enacted homestead exemptions after the panic of 1837 and during reconstruction. Moreover, they tended to strongly increase the size of the exemptions during reconstruction. This was done to protect planters from total ruin. Some states also argued that debtors and creditors were equally responsible for the calamity (Lukowich, 1974). In comparison, all eight northeastern states passed their exemptions between 1847 and 1852, which were years of strong economic growth. Moreover, midwestern states passed homestead exemptions between 1848 and 1858, years were the economy performed significantly better as well (Waples, 1893).

Homestead exemptions were especially important in the nineteenth century since no long-lasting bankruptcy laws existed in that age. The short-lived bankruptcy laws that have been enacted did not

include provisions for the discharge of debts, the exemption of any assets, or the payment of debt out of future income.[4] The first bankruptcy act that survived was the bankruptcy act of 1898. Before this time homestead exemptions were the only type of legislation that could avert destitution for bankrupt families (Luckett, 1988).

In the nineteenth century, the homestead exemptions were quite sizeable and were also significantly increased in size several times. In the twentieth century, exemptions have not kept up with the strongly increased housing prices. Therefore, the laws often do not protect families from foreclosure anymore (Shames, 1999). The author Lukowich (1974) even goes as far as to say that the dollar values in some states are so low that the laws sort almost no effect. This is still the case in many U.S. states. For example, Kentucky has a homestead exemption in place that only covers 5000 dollars, while the average home price in Kentucky is over 165,000 dollars as of 2021.[5] However, there are also seven states that have unlimited homestead exemptions.[6] In these states people are always able to keep their house during bankruptcies, given that the person did not commit fraud, no federal tax debts exist, and the house is in possession for several years. The exact number of years needed differs per state (Rivera, 2004).

Several authors also argue that the need for homestead exemptions is currently lower than it was in the nineteenth century. First, in the nineteenth century renting was uncommon and home ownership was the norm. Nowadays renting forms a good alternative for home ownership. Therefore, home ownership is no longer needed for debtor rehabilitation and family protection (Lukowich, 1974). Secondly, the importance of homestead exemptions has decreased significantly due to the development of a public safety net in the twentieth century. Often, homestead exemptions are now seen as a complement to bankruptcy laws instead of an important part of the welfare state (Goodman, 1993).

2.3 Related Literature

This part of chapter two examines the findings of related literature. I focus on past empirical research that investigated the various effects the enactment or the size of homestead exemptions have on firms, household investment decisions, bankruptcy rates, and the economy at large. The past research is ordered on their findings and subject. First, I will examine the literature that studies the effect bankruptcy exemptions have on the availability of credit. This effect is called the credit-supply effect. The following three findings are the most common: creditors become unwilling to lend because bankruptcy exemptions reduce the amount that creditors can receive in repayment of debt, creditors redirect credit to households with more collateral, and third, the average interest rate increases. Second, I cover literature that describes the reactions of households on increases or implementations of exemptions. In short, these

[4] These laws were passed in 1800, 1842, and 1867 in times of depression, but were all repealed soon after enactment.
[5] The average home price is retrieved from the popular home site Zillow; https://www.zillow.com/ky/home-values/.
[6] These states are Arkansas, Florida, Iowa, Kansas, Oklahoma, South Dakota, and Texas.

effects are that people make more (risky) investments, which leads to more innovation, economic growth, and the start of more businesses. Together these reactions are called the tolerance-for-failure effect. These two branches of literature give a good understanding of the effects I might find on the firm-specific implications of homestead exemptions. The last two sections of this part cover the effect homestead exemptions have on bankruptcy rates and the economy at large.

Credit-supply effect

The theoretical underpinning of my thesis is that homestead exemptions influence both the willingness to invest at the household level and the availability of credit. Creditors can seize less in the case of bankruptcy when exemptions are in place. Moreover, debtors have more to gain by declaring bankruptcy when certain assets are examined from seizure, which can exacerbate moral hazard problems in credit markets. These two effects can lead to a lower availability of credit. This effect is called the credit-supply effect by Cerqueiro et al. (2017).

The first influential paper about the relation between credit availability and exemptions is the paper of Gropp et al. from 1997. They use the Survey of Consumer Finance of 1983 and find that states with more generous exemptions face worse credit terms, and that homestead exemptions redirect credit to households with more assets. This means that richer households benefit from the enactment of exemptions, even though they receive less protection relative to their total wealth. Similarly, Lilienfeld-Toal et al. (2012) find that exemptions change the credit market equilibrium in a state. Berger et al. (2011) measure the effect of exemptions on each firm and find that increases in exemptions lead to less credit, and that small unlimited liability firms have less access to credit and face tighter credit terms in debtor-friendly states. Examples of tighter credit terms are lower loan maturities and the need to use collateral to be able to borrow. Multiple other authors also find that increases in exemptions lead to less credit (Alston, 1984; Berkowitz & White 2004; Cerqueiro & Penas, 2017; Link, 2004; Pence, 2006; Scott & Smith, 1986). In line with the research of Gropp et al. (1997), Berkowitz and White (2004) also find that small unincorporated firms are more likely to be denied credit in states with unlimited homestead exemptions.

Cerqueiro and Penas (2017) use state-level changes in exemption laws and find that credit availability and employment of firms owned by mid-wealth entrepreneurs go down if their assets become fully protected by exemptions. Gross et al. (2021) and Lin and White (2001) find higher interest rates and lower mortgage application acceptance in states with more bankruptcy protection. Cerqueiro et al. (2017) use state- and year-level variation in exemptions and find an inverse relationship between bankruptcy protections on the one hand, and start-up performance and the number and quality of patents acquired on the other hand. Their finding exemplifies the importance of external financing for innovation.

Homestead exemptions are especially likely to impact credit availability for small firm owners since they are the most likely type of owners to use personal liabilities and guarantees to finance their business (Hvide & Møen, 2010). Moreover, small firms depend more on debt financing because these firms tend to have less access to other forms of financing compared to mid-sized and large firms (Hochberg et al., 2014; W. Mann, 2018). Cerqueiro et al. (2017) argue that the credit-supply effect is less strong in large corporations since these corporations have more access to equity markets and public debt. In line with this reasoning, the research of Amore et al. (2013), Benfratello et al. (2008), and Cornaggia et al. (2015) argue that the credit-supply effect is the most pronounced for small firms in capital-intensive industries with a dependence on external funding.

Personal bankruptcy laws like the homestead exemption are directly applicable to unincorporated firms like sole proprietorships since these firms have unlimited liability. Incorporated firms, like corporations or limited liability companies (LLCs), are separate entities. Therefore, homestead exemptions do not directly impact the credit supply of these firms. However, owners of firms can either borrow money in their own name and use the proceeds to finance the firm or can cosign or personally guarantee firm loans. In these ways, homestead exemptions can still lead to a reduction of credit at the firm level (Cerqueiro et al., 2017). Berkowitz and White (2004), Berger et al. (2011), and Cerqueiro and Penas (2017) find evidence that exemptions impact the availability of credit for unincorporated businesses and small incorporated firms.

The research of Severino and Brown (2017) examines households' borrowing behavior following bankruptcy protection changes in the United States between 1999 and 2005. They find that increasing bankruptcy protection increases borrower credit demand and decreases credit supply. Although overall household debt stays the same, the share of unsecured debt increases. Exemptions do not apply to secured debt like mortgage debt. Debtors succeed in converting secured debt into unsecured debt if bankruptcy protections increase. Like the previously discussed papers, Severino and Brown (2017) also find that the interest rate goes up in states that increase their bankruptcy protection. Interestingly, their findings suggest that the increase in credit demand is higher than the retraction of credit supply following an increase in bankruptcy protection.

Several papers examine the role of collateral on firm investment. Exemptions lower the amount of collateral. Therefore, they might decrease the amount of available credit and investment. Past literature found that this is indeed the case. Chaney et al. (2012) find that firms invest more when their collateral increases. Adelino et al. (2015) find proof that collateral in the form of higher real estate values predicts firm growth. Mian and Sufi (2011) conclude that higher collateral is used to increase leverage. Those findings suggest that investment, (firm) growth, and leverage decrease when homestead exemptions are enacted since they lower collateral.

A wide variety of research exists that explores the relation between creditor rights and credit availability. In general, this literature finds that credit becomes more available when creditor rights increase (Davydenko & Franks, 2008; Djankov et al., 2007; Levine, 1998; Qian & Strahan, 2007). Since homestead exemptions lower the rights of creditors, a lower credit availability can be expected following the enactment or increase of homestead exemptions.

Tolerance-for-failure effect

Homestead exemptions do not only influence the availability of credit, but also households' willingness to invest in risky projects. This effect is called the tolerance-for-failure effect by Cerqueiro et al. (2017). As previously said, Severino and Brown (2017) find that the increase in credit demand is even higher than the decrease of credit supply following an increase in bankruptcy protection. This effect is present since exemptions increase the amount that debtors can keep in bankruptcy. As such, exemptions offer a type of wealth insurance. An influential research that examines this effect is the research of Fan and White from 2003. They find that the probability of starting a small business goes up after an increase in homestead exemptions. Moreover, they find that states with higher exemptions have a higher share of unincorporated businesses. The research of Paik (2013) and Severino and Brown (2017) find that debtor protection leads to more self-employment. Interestingly, Hurst and Lusardi (2004) find that for the largest part of the wealth distribution, the relationship between wealth and entrepreneurship is essentially non-existent. Only for the richest 5% of people wealth begins to predict entrepreneurship. This suggests that the increase in entrepreneurial activity is driven by an increase of safe assets of households that already had more assets than the average household before the enactment of the exemption.

The finding that exemptions lead to more small businesses and self-employment of Fan and White (2003), Paik (2013), and Severino and Brown (2017) can be explained by the fact that exemptions have a direct effect on the riskiness of unincorporated businesses. Therefore, high exemptions increase the attractiveness of the unincorporated form of business but do not directly impact limited liability firms. This finding fits well with the finding of Severino and Brown (2017) that households increase their amount of unsecured debt after increases in exemptions and the finding of Link (2004) that the possibility to receive a discharge of debt distorts the borrowing choices of individuals. All these findings implicate that households increase their exposure to risks that become more attractive due to the enactment of exemptions.

There are also other implications of (higher) bankruptcy protections. Chatterji and Seamans (2012) link deregulation to the probability of entrepreneurial entry. Manso (2011) argues that higher tolerance for failure leads to more innovative activity. Consistent with this finding, Tian and Wang (2014) find that firms funded by failure-tolerant venture capital investors are more innovative. This effect increases for firms with an elevated risk of failure. Acharya and Subramanian (2009) find that debtor rights increase

patenting. This finding is directly opposed to the finding of Cerqueiro et al. (2017). The difference might result from the different data that is used since Acharya and Subramanian (2009) mostly look to large corporations where the credit-supply effect is less relevant.

The findings of the above literature make it reasonable to expect that (more generous) homestead exemptions lead to more entrepreneurship, investment, and innovation. Especially smaller firms seem to enter the market after an increase in exemptions.

Effect of homestead exemptions on personal bankruptcy filing rates

Exemptions only affect households during potential bankruptcies. Therefore, my thesis is related to literature that examines the relation between exemptions and bankruptcy rates. Agarwal et al. (2003), Agarwal et al. (2005), Hynes et al. (2004), Link (2004), and White (2007) find that households are more likely to file bankruptcy if their state has more generous bankruptcy exemptions. Agarwal et al. (2003) also find that garnishment and property exemptions increase informal bankruptcy, while homestead exemptions increase formal bankruptcies. Agarwal et al. (2005) find that the risk of both small businesses and their owners filing for bankruptcy increases remarkably over the size of homestead exemptions. These findings suggest that there is a significant moral hazard problem in the credit market that is caused by homestead exemptions. Argyle et al. (2020) come to the same conclusion. They find that people strategically accumulate specific types of debt before filing bankruptcy. Homestead exemptions provide the incentive for this since they only cover unsecured debt. If creditors give away all their non-exempt assets during bankruptcy, they do not have to pay back creditors with post-bankruptcy income. This provides incentives to lower the amount of non-exempt assets before filing bankruptcy. These two types of moral hazard are expenses for creditors and are passed on to debtors in the form of higher interest rates (White, 1987).

Although filing bankruptcy can be beneficial for debtors, it is not without profound consequences. Fisher and Lyons (2010) and Jagtiani and Li (2013) find that people who file bankruptcy face significantly lower credit scores and long-lasting difficulty with attracting credit.

Effect of homestead exemptions on the wider economy

My thesis is also related to literature that, both theoretically and empirically, examines what the most optimal form of bankruptcy law is for society at large. Dávila (2020) studies U.S. data from 2008 to 2016 and finds that overall welfare improves over the size of the exemption level. Hereby he investigates household debt, bankruptcy rates, the relative valuation of resources across states, and credit supply reactions to exemption changes. He does state that state-to-state differences of welfare gains are significant. Link (2004) finds that bankruptcy protections increase consumer welfare on average. However, he also argues that policymakers should carefully consider the tradeoff between the benefit of wealth insurance against the costs of increasing credit constraints. Chang and Schoar (2008) find that

pro-debtor judges are negative for future firm outcomes. Firms that face a pro-debtor judge in bankruptcy have lower sales growth and credit ratings after bankruptcy and are more likely to file for bankruptcy again than firms that face pro-creditor judges.

Concluding the findings of related literature

Overall, past literature finds mixed results. It finds evidence for both the credit-supply effect and the tolerance-for-failure effect. On the one hand, investors become more willing to make (risky) investments and start businesses after the enactment or increase of homestead exemptions. On the other hand, exemptions seem to tighten credit supply, increase interest rates, and redirect credit to households with more assets. If the tolerance-for-failure effect dominates the credit-supply effect, the adoption of the steam engine and the subsequent number of horsepower will increase, since both require significant investment. Furthermore, this would lead to a disproportionate increase in smaller firms, thus decreasing the average firm size.

2.4 Hypotheses

The main research question of this thesis is: *Did the enactment and expansions of homestead exemptions in several U.S. states from 1850 to 1880 significantly impact the operations of firms?* To answer this research question multiple hypotheses are formulated that will be tested in later chapters of this thesis. As we saw in part 2.3, related research finds multiple and sometimes conflicting results regarding the effects homestead exemptions have on the availability of credit, households' willingness to invest, and the overall welfare. This thesis will build on those findings by exploring the effects homestead exemptions have on firm-specific variables. On the one hand, exemptions decrease the amount that creditors can seize during bankruptcy and increase the likelihood of personal bankruptcy (Agarwal et al., 2003; Hynes et al., 2004; Link, 2004; White, 2007;). Therefore, creditors react by tightening credit supply and worsening the credit terms for borrowers (Alston, 1984; Berger et al., 2011; Berkowitz & White, 2004; Cerqueiro & Penas, 2017; Gropp et al., 1997; Link, 2004; Pence, 2006; Scott & Smith, 1986). This effect is called the credit-supply effect (Cerqueiro et al., 2017). On the other hand, exemptions lower the penalty of failure for households. This increases households' willingness to invest in (risky) projects (Acharya & Subramanian, 2009; Link, 2004; Manso, 2011; Paik, 2013; Severino & Brown, 2017). Cerqueiro et al. (2017) call this the tolerance-for-failure effect. Homestead exemptions directly impact unincorporated businesses, since the potential loss of money in those firms is directly covered by exemptions, but also indirectly impacts (small) incorporated firms through individuals cosigning or personally guaranteeing firm loans, or by individuals borrowing money in their own name and using the proceeds to finance businesses (Hvide & Møen, 2010). I expect the greater risk-tolerance of households and the subsequent increase in willingness to invest to be the most impactful on risky operations and assets that require significant investment. For businesses, the adoption toward production

with a steam engine was such a large investment (Atack et al., 2008; Hunter, 1985). As such, I hypothesize that:

Hypothesis 1: The adoption and size of homestead exemptions are positively associated with the number of firms that use steam engines and the associated amount of steam horsepower per employee.

Several researchers find that the probability of starting a small business goes up after the enactment of a homestead exemption (Chatterji & Seamans, 2012; Fan & White, 2003; Paik, 2013; Severino & Brown, 2017). First, smaller firms rely more on external financing since large firms have more access to equity and public debt than larger firms (Cerqueiro et al., 2017; Hochberg et al., 2014; W. Mann, 2018). Second, exemptions are denoted in absolute dollar or acre amounts and are therefore more relevant for poorer households. Third, incorporated firms, which tend to be larger, are not directly impacted by the protections of homestead exemptions. Therefore, it can be expected that smaller firms that are started by poorer households become more numerous and that the average firm size will decrease after a homestead exemption gets enacted. Moreover, this would imply that the effect of homestead exemptions is more sizable for smaller firms than for larger firms. However, other researchers find that exemptions redirect credit to individuals with more assets and higher credit scores (Berkowitz & White, 2004; Gropp et al., 1997; Lilienfeld-Toal et al., 2012) and that the credit-supply effect is the most pronounced for small firms (Amore et al., 2013; Benfratello et al., 2008; Berger et al., 2011; Cerqueiro & Penas, 2017; Cornaggia et al., 2015). These findings would implicate that larger firms started by the upper class outgrow smaller firms after the enactment of a homestead exemption. In short, past literature implicates that both the tolerance-for-failure effect and the credit-supply effect are larger for poorer households. The paper of Severino and Brown (2017) finds that the increase in credit demand outweighs the decrease in credit supply. This means that the tolerance-for-failure effect is larger than the credit-supply effect. Therefore, I hypothesize that:

Hypothesis 2: Smaller firms benefit more from the enactment of homestead exemptions than larger firms.

When states enacted homestead exemptions the size of the exemption varied strongly. Florida exempted just $200 in 1845 while California exempted $5000 just six years later (Goodman, 1993). It could be the case that, similarly to the finding of Koudijs and Salisbury (2020), the unwillingness to lend begins to outweigh households' increasing appetite to invest for the largest homestead exemptions. If this is true, we should observe a decrease of firm-specific variables that require investment like the number of horsepower available in production in states with large homestead exemptions, relative to firms in states with no or smaller homestead exemptions. Thereby, I hypothesize that:

Hypothesis 3: For the largest homestead exemptions the credit-supply effect begins to outweigh the tolerance-for-failure effect.

Amore et al. (2013), Benfratello et al. (2008), and Cornaggia et al. (2015) find that the credit-supply effect is the most pronounced for small firms in capital-intensive industries with a large dependence on external funding. This would mean that homestead exemptions are more relevant for credit-dependent firms. Theoretically, I hypothesize that firms that need external financing will experience a larger impact when credit is drying up due to the credit-supply effect, or when credit becomes more available due to the tolerance-for-failure effect. Thereby, I predict that:

Hypothesis 4: The impact of homestead exemptions on firm-specific variables is larger for credit-dependent firms.

3 Data and Summary Statistics

This chapter consists of two parts. The first part will describe the data that is used to research the research question and to test the hypotheses. This part also outlines the history of the dataset of manufacturing firms that is used. The second part of this chapter provides summary statistics of the data.

3.1 Data Description

This thesis uses the decennial federal manufacturing censuses of 1850, 1860, 1870, and 1880. These censuses are nationally representative samples of all manufacturing firms in the United States in those decades. As such, these censuses offer a unique historical record of American enterprise. The data of the implementation of homestead exemptions are derived from Farnam (1938) and Goodman (1993), and various state session laws when these two sources contradict each other. The diffusion of both steam power and homestead exemptions happened to a considerable extent between 1850 and 1880 (Atack et al., 2008; Priest, 2006). Therefore, these decades are well suited to examine the effect homestead exemptions had on the adoption of steam power and the subsequent number of horsepower available during production. The data on manufacturers make it possible to research which effects the implementation and increases of homestead exemptions had on America's manufacturing businesses. The first section of part 3.1 describes the manufacturing censuses, the second the data on homestead exemptions, and the third the classification system that is used to classify firms into a credit-dependent group, which is needed for hypothesis 4.

Census of Manufacturers

The U.S. population is counted every decade to determine each state's tax obligation and representation in congress. The obligation to hold a federal population census every ten years is written down in the U.S. constitution. The first census was held in the year 1790. New censuses have been taken at least every 10 years since (Ferrie, 1995).

In the nineteenth-century lawmakers strived to strengthen the American manufacturing industry. Heavy competition from European manufacturers and an embargo in 1807 threatened to undermine the development of a mature and future-proof manufacturing sector that could be of vital importance for America's development into a stable autonomous nation. Therefore, legislators wanted to protect and help America's manufacturers. At the time, however, it was not known how many and what kind of manufacturers existed. This information was needed to adopt appropriate legislation that could help the sector effectively. Therefore, it was decided to render an accounting of the manufacturing establishments and manufacturers in the entire country. To reduce costs, lawmakers decided to perform the manufacturing census at the same time and by the same enumerators as the federal population census. The enumerators had the position of assistant marshals (Atack & Bateman, 1999a; Walsh, 1970)

In 1810, the first manufacturing census and the fourth population census were conducted. Unfortunately, the marshals did not get any directives from the government. They did not even receive a set of standard questions to ask the manufacturers' managers or owners. As a result, the data of the first census are not uniform, nor complete, and therefore of limited use for researchers. To collect information for future policy decisions, a new manufacturing census was performed in 1820. This census provided guidelines for the marshals and contained detailed open-ended and closed-ended questions. Most of the closed-ended questions, for example those about capital invested, the number of employees, output, and input, have also been asked in the later censuses. This census is of high quality, but regrettably, the south and west were mostly overlooked by the marshals. Therefore, this census does not give an accurate view of manufacturing in all areas of the United States. Due to dissatisfaction with the censuses of 1810 and 1820 no complete manufacturing census has been made for 1830. The 1840 manufacturing census contains many irregularities. For example, many industries only provided the quantities produced, not the produced goods' value. In several other industries the capital invested is not given, or all variables except the value produced, are missing. Therefore, the 1840 census is generally perceived as less useful for research purposes than the later censuses (Atack & Bateman, 1999a; Bateman & Weiss, 1981; Walsh, 1970). The census of 1890 was destroyed during a fire in 1921. Later censuses were deliberately destroyed by congressional authorization to protect privacy (Fishbein, 1973).

From 1850 to 1900 the manufacturing census was held every decade. From 1900 to 1920 the census was executed quinquennially. After 1920 the census was performed biannually until the U.S. government temporarily stopped enumerating during World War II. After World War II manufacturing censuses were held in different intervals until 1967. From 1967 until this day manufacturing censuses are held quinquennially. The censuses from 1963 onwards are machine-readable, although data that betrays the identity of the company are omitted (Atack & Bateman, 1999a).

The data that this thesis uses are the manufacturing censuses of 1850, 1860, 1870, and 1880. These censuses contain a comprehensive overview of all manufacturers,[7] given that the firm produced at least $500 of goods in the census year. Atack and Bateman (1999a) state that the questions of the manufacturing census became more detailed and precise at the census of 1850. This higher quality is persistent for the later censuses as well. Therefore, the censuses become more trustworthy and useful for research from 1850 onwards. The amount of money and time spent on manufacturing censuses also increased over the years. For example, the census was partly collected by a professional labor force from 1880 onwards.[8]

The data between 1850 and 1880 have been collected by Fred Bateman, James Foust, Thomas Weiss, and Jeremy Atack (Atack & Bateman, 1999a; Bateman & Weiss, 1981). They created both state samples, where enough firms were part of each state's sample to be able to perform in-state analysis, and national samples, where the chance of a firm appearing in the national sample is equal for each state. The chance of firms appearing in the national sample does differ per decade. Therefore, the national samples do not require post-sample weighting. The created datasets of these researchers have been made available to the public. This thesis uses their nationally representative samples as a dataset to measure the impact homestead exemptions had on economic development during and in the years just after the exemptions were enacted.

The manufacturing census allows research to be conducted at the micro-level. Because it is a sample of all manufacturing firms from all states for a 40-year period, it becomes possible to measure the impact legislation, enacted in different years, in different forms, and different states, had on manufacturing activity. Therefore, the characteristics of firms in states that did enact and that did not enact a homestead exemption can be compared. Different regions of the United States can be divided in the research if needed. The effect exemptions have on different industries can be measured. And the effect of exemptions on the type of power used during manufacturing can also be researched. As such, the manufacturing census offers a unique opportunity to examine the main research question and to test the four hypotheses of this thesis.

Unfortunately, the manufacturing data for the years 1850 to 1880 are not entirely complete. First, data from some states and decades are missing or have become unreadable. For example, many counties from Ohio and Tennessee are not readable for the samples of 1860 and 1870, since they were used to wrap other manuscripts (Atack, 1985; Atack & Bateman, 1999a). The Georgia and Louisiana records of 1850, 1860, and 1870 are missing completely. Other data that are no longer available are the data of Maryland of 1870, and Nebraska and Washington from 1860 and 1870. For the 1870 census, some southern

[7] Agricultural companies are not included in the manufacturing census. These data can be found in separate agricultural censuses.
[8] The industries where the data were collected by industry specialists for the 1880 census are: cotton, woolen, worsteds, mining, iron, glass, steel, silk, beer, liquor, and coke (Atack & Bateman, 1999).

records have also become missing. Next to some states, counties, and records missing in specific decades, all the data from industries that have been collected by industry specialists in 1880 have also gone missing (Atack & Bateman, 1999a). This leads to a shortage of large firms in 1880 and makes this sample less representative of all manufacturing companies in the U.S (Atack & Bateman, 2008; Delle Donne, 1973).

More concerns about the quality of the censuses exist. For example, the marshals might have excluded isolated businesses that are far away from other corporations, since they got paid a small fixed amount of 15 cents for each firm they collected the data from (Atack & Bateman, 1999a). Moreover, there are questions about the technical expertise of the marshals that collected the data (C. D. Wright & Hunt, 1900). However, the marshals tended to write down their findings carefully, and Atack and Bateman (1999a) argue that the data are internally consistent and that the errors seem to appear only at random. Other errors that also happened are printer errors and the alteration of some data by government officials. Fred Bateman, James Foust, Thomas Weiss, Jeremy Atack, and the people who worked for them might also have made some transcription errors (Atack & Bateman, 1999a). In general, however, the data are seen as representative and of high quality, and multiple authors have used the data for their research in the past (examples are: Atack et al., 2003; Atack et al., 2008; Atack & Bateman, 2008; Goldin & Sokoloff, 1982; Healey, 2016; Kim, 2006).

Table 1 defines all variables of the census of manufacturers that are used in this thesis. The exact questions asked to firm managers or owners changed over the years. However, the answers of different decades are generally comparable with each other. The census of 1880 does not contain the power type variable but does give the amount of horsepower available in steam and water engines. Therefore, I can deduct if manufacturers made use of either steam or waterpower during production in 1880. Whether manufacturers used (a combination of) hand or animal power can no longer be extrapolated from the data of the 1880 census. The choice to no longer report these data can be explained by the decreasing importance of hand and animal as the only source of power during production. Where 64% of firms only used animal or hand power in 1850, this number dropped to 38% in 1860, and 37% in 1870. Moreover, these sources of power were mostly used at the smaller and less productive facilities and were therefore less important for lawmakers (Atack et al., 2008; Hunter, 1985).

The observations with negative or zero output or capital, or a negative value of input, employees, wages, or amount of horsepower are removed from the sample. This means that 689 observations are deleted and that 23,772 firms remain in the sample.

Data on homestead exemptions

The data of homestead exemptions are retrieved from Farnam (1938) and Goodman (1993). When these

sources contradict each other, the state session laws are consulted and followed.[9] Table 4 contains the value of each state's homestead exemption at each census year and the year that each state passed its first homestead exemption law.

In three cases a homestead exemption was enacted at the same year a manufacturing census was conducted.[10] In these three circumstances, further analysis in this thesis works with the exemption levels of the previous decade, since increases in household investment caused by homestead exemptions are not expected to influence firms at an operational level within one year. Table 4 does give the value of the newly implemented exemptions in the same year they were enacted. When new exemptions were enacted in another year than the census year, the new value is reported in the next census year.

Homestead exemptions generally do not only provide exemptions for the homestead, but also for various other types of personal assets, like clothing, furniture, guns, and livestock. The specific type of assets that are protected varied widely from state to state. Moreover, many states provided unlimited exemptions for some types of personal assets (Cerqueiro et al., 2017). This makes it difficult to base an econometric analysis on those assets. Therefore, this thesis focuses entirely on the part of homestead exemption laws that protected homesteads, and not on protections of other assets.

Some states had homestead exemptions with a maximum protection denoted in acres. Sometimes these acre exemptions existed next to dollar maxima. In further analysis, the acre amounts are converted into dollar amounts using the average land prices reported in the work of Barnard and Jones (1987), who based these values on the U.S. agricultural censuses, which were published by the U.S. Department of Commerce, Bureau of Census. Table A2 of the Appendix contains the dollar values obtained by multiplying the dollar value per acre in a state and year by that state's acre exemption in the same year. This thesis uses the obtained values if they are lower than the dollar exemptions, or when no dollar exemption exists for a specific observation. States with both an acre maximum and a dollar maximum only protected the number of acres if the value did not exceed the dollar maximum. Therefore, in states where the acre amount is worth more than the dollar values, the dollar values are still used. If both a farm acre amount and a town lot acre amount are exempt in a state, the calculations are made with the farm acre amount, since this allows the value of the acres to be calculated with the average land price of a state.[11]

Credit dependence

Hypothesis 4 states that homestead exemptions have a larger effect on firm-specific variables for credit-dependent firms. Theoretically, I hypothesize that credit-dependent companies are impacted more

[9] This happens 8 times. These are: Mississippi's law of 1841, Georgia in 1845, Wisconsin in 1848, Iowa in 1849, Connecticut in 1860, Minnesota in 1866, North Carolina in 1868, and Arkansas in 1871.
[10] These three cases are: New York in 1850, Connecticut in 1860, and Washington in 1860.
[11] Since the town lot acre values are always significantly smaller than the farm acre amounts, making calculations with the town lot acre amounts would give unreasonably low values when the average land price of a state is used.

strongly than the average firm when credit becomes more abundant or when credit dries up. To measure the credit dependence of firms, I look to output per employee.

Charles Cobb and Paul Douglass developed the Cobb-Douglas production function (Cobb & Douglas, 1928). This function describes the amount of output that is produced using two or more inputs. Generally, the Cobb-Douglas production function is represented by the following formula:

1. $F(K, L) = AK^{\alpha}L^{1-\alpha}$

In the above formula, 'A' is the productivity parameter. This parameter represents how much will be produced given the amounts of capital and labor used in production. 'α' is a parameter called the 'capitals share'. It represents the output elasticity of the capital used in production. 'K' and 'L' are the capital and labor input in production. When the derivatives of K and L are taken, the marginal productivity of labor and capital are obtained. The derivates are presented in the formulas below. As can be seen, the more of one of the two inputs is used, the higher the productivity of the other input.

2. $MPL = \frac{\partial F}{\partial L} = (1-\alpha)A(\frac{K}{L})^{\alpha}$
3. $MPK = \frac{\partial F}{\partial L} = \alpha A(\frac{L}{K})^{1-\alpha}$

The census of manufacturers provides the value of the produced goods and the total number of employees for each observation. Therefore, it is possible to calculate the output per employee, which is a substitute for the marginal productivity of labor. As can be seen in formula two, the marginal productivity of labor increases when α decreases, and when the amount of capital used in production goes up. The latter is used to quantify the capital dependence of industries. The industries with the lowest output per employee, which together make up roughly one-third of the sample, are classified in the low credit dependence tercile. The industries with the highest and average output per employee are classified in the highest and middle credit dependence terciles. Both terciles make up roughly one-third of all firms in the sample, although the middle group is larger than the highest group because the leather industry which makes up 16% of the sample is directly in between these two groups. The credit dependence group of each industry is presented in Table 3, panel C.

3.2 Summary Statistics

Table 3 presents the summary statistics of the variables that are used in the econometric analysis of this thesis. Noticeable from Table 3, panel A, is that each of the five variables that represent the size of companies, i.e., capital, employees, wage bill, input, and output, all have significantly lower median values than mean values, and high maximum values compared to the 90th percentile. For example, the maximum value for capital and input is over 350 times higher than the 90th percentile of these two variables. This means that the distributions of the measures of firm size are strongly skewed to the right. Therefore, further analysis in this thesis makes use of the log value of these variables.

As can be seen in Table 3, panel B, the sample is heavily influenced by manufacturing firms in the Northeast, since this region makes up over half of all firms in the sample. Interestingly, southern and midwestern states are more likely to have a steam engine than northeastern states, and also have more horsepower available per employee. On the other hand, northeastern manufacturing businesses tend to be larger than those in the other regions, especially in terms of employees. The average northeastern firm has more than double the number of employees than the average firm of one of the three other regions (Table A1). Next to differences per region and state, differences between industries also exist. For this reason, further analysis will control for state, year, and industry fixed effects and will include specifications with industry and region time decade effects. For the classification of states into regions, I use the same system as Goodman (1993). The classification is presented in Table 2.

The diffusion of steam power happened to a substantial extent between 1850 and 1880. In 1850, just 7.3% of the manufacturers had a steam engine. This increased to 21.3% in 1880. The diffusion of steam engines has probably fueled the quintupling of output per firm between 1850 and 1880. Other measures of firm size like the number of employees, total yearly wage bill, and paid-in equity capital increased as well but did so significantly weaker than firm output (Table 3, panel A).

Table A3 contains the decade in which states enacted or increased their homestead exemption levels. Except for Missouri in 1880, each state that changed their exemption increased the number of dollars or acres that was protected under the law.[12] Nebraska is the only state that increased its homestead exemption twice. Connecticut and South Carolina repealed their first homestead exemption law before the end of the decade. Therefore, Table 4, which presents the exemption level per state for each census year, does not give a value for these two states in 1850 and 1860.[13]

Notably, states tended to closely follow other states in their region in terms of the timing and value of their homestead exemptions. Many Southern states enacted homestead exemptions before 1850 in reaction to the pioneering Texas law. The remaining four southern states that still lacked homestead exemptions, passed them during or soon after the American civil war. Moreover, during reconstruction eleven out of the fourteen states classified as a southern state by Goodman (1993) increased their exemption level. Table 2 shows into which region each state is classified. Northeastern states followed soon after the southern states with enacting homestead exemptions. By 1852, all but three northeastern states had enacted a homestead exemption. Each midwestern state did the same before 1859. Except for California, western states enacted homestead exemptions in the 1860s (Table 4).

The average southern homestead exemption was lower than the average northeastern homestead exemption in 1850 and 1860 but ended up being significantly higher in the last two censuses due to a

[12] Missouri had an exemption in place of 160 acres in 1870, but also added a 1500-dollar limit in 1875, which was lower than the dollar value of 160 acres in Missouri at the time. Table A2 contains the dollar values of all acre exemptions.
[13] Connecticut repealed their first homestead exemption law in 1848, South Carolina did the same in 1858.

wave of exemption increases in the years after the civil war. The average southern homestead exemption had risen to 1710 dollars in 1880, while at this time the northeastern states had an average homestead exemption of 770 dollars (Table 5). Sometimes, homestead exemptions reached as high as 5,000 dollars in the south and far west (Table 4). This was an immense amount at the time, given that the average unskilled worker earned a little over one dollar a day in 1880.[14] The average homestead exemption per region and decade is presented in Table 5. The high average for the far west is heavily influenced by the Californian exemption of 5000 dollars that was implemented in 1851.

In short, the summary statistics show that the enactment of homestead exemptions and the emergence of the steam engine happened to a substantial extent between 1850 and 1880. Moreover, the American economy developed quickly in these years. Therefore, this time frame is an ideal period in history to study the effect the limitation of personal liability has on economic development. Furthermore, the summary statistics show that the level of the exemptions, the associated number of horsepower, and the average firm size varied strongly from region to region. Therefore, the analysis in this thesis will also examine the effect of homestead exemptions on firm-specific variables for each region separately.

4 Empirical Strategy

This chapter describes the empirical strategy of this thesis. Except for part 4.2, each section discusses the methodology that is used to measure one of the four hypotheses. First, the regressions of the general effects of homestead exemptions on the size and operations of firms are discussed. This is the methodology that is used to test hypothesis 1. Second, the analysis of the regional differences within the United States is laid out. The third part of this chapter describes the analysis of the impact of homestead exemptions on firm variables for firms of different sizes. This analysis is used to test hypothesis 2. Fourth, I will describe the regression that is used to test whether the effects of homestead exemptions on firms are homogenous over the size of the exemption. This regression tests hypothesis 3. Lastly, this chapter lays out how this thesis studies whether credit-dependent firms react stronger to changes in exemptions than the average firm in the sample. As such, part 5.5 describes the methodology that is used to test hypothesis 4.

4.1 Effects on the Size and Operations of Firms

The first hypothesis states that the adoption and size of homestead exemptions are associated with a

[14] Arkansas, California, and Texas had homestead exemptions of 5000 dollars in 1880. According to the census of manufacturers of that year, the daily wage of an unskilled worker at the time was 88 cents in Arkansas, 1 dollar in Texas and 1.58 dollar in California. Given that people worked each day of the week except for Sundays, the exemption was worth 18 years of work in Arkansas, 16 in Texas, and 10 years in California.

larger number of firms who use steam engines and more steam horsepower per employee, due to an increase in households' willingness to make (risky) investments. This hypothesis is tested with formulas 4 and 5. Each formula is executed three times per dependent variable. Standard errors are clustered at the state and year level. The subscripts of the independent variables represent the level of the variables. As such, S stands for state, t for the decade, I for 2-digit industry, and R for region. The dependent variables are measured at the firm level and therefore do not have a subscript. The two formulas are:

4. $$Steam\ engine \mid Steam\ horsepower\ per\ employee \mid Horsepower\ per\ employee \mid Log\ Output \mid Log\ Output\ per\ employee \mid Log\ Output\ per\ invested\ dollar = \beta_0 + \beta_1 Homestead\ exemption_{S,t} + \sum_I Industry\ fixed\ effects_I + \sum_S State\ fixed\ effects_S + \sum_t Year\ fixed\ effects_t + \left[\sum_{I,t} Industry\ time\ decade\ effects_{I,t} + \sum_{R,t} Region\ time\ decade\ effects_{R,t}\right] + \varepsilon_{S,t}$$

5. $$Steam\ engine \mid Steam\ horsepower\ per\ employee \mid Horsepower\ per\ employee \mid Log\ Output \mid Log\ Output\ per\ employee \mid Log\ Output\ per\ invested\ dollar = \beta_0 + \beta_1 \$\_Homestead\ exemption_{S,t} + \sum_I Industry\ fixed\ effects_I + \sum_S State\ fixed\ effects_S + \sum_t Year\ fixed\ effects_t + \left[\sum_{I,t} Industry\ time\ decade\ effects_{I,t} + \sum_{R,t} Region\ time\ decade\ effects_{R,t}\right] + \varepsilon_{S,t}$$

Dependent variables

In the above formulas, the dependent variables are steam engine, steam horsepower per employee, horsepower per employee, log output, log output per employee, and log output per invested dollar. Steam engine is a dummy variable that takes the value of one if a firm has a steam engine in each decade, and zero when no steam engine is present. Steam horsepower per employee is defined as the amount of horsepower a firm has available in a specific decade, given that a steam engine is present, divided by the total number of employees in the same decade. As such, steam horsepower per employee only has observations when steam engines are present. This is the case when an observation has the value of 1 for the power type variable in census years 1850 to 1870 or a positive value for the steam horsepower variable in the 1880 census. The horsepower per employee variable equals the number of steam or water horsepower divided by the number of employees. This variable gives a value for each observation of the studied sample. The log output variable is measured as the log value of a firm's yearly output in dollars. The log output per employee and log output per invested dollar variables are measured as the log value of output per employee, and output per invested dollar, respectively. This means that the logarithm of the entire output per employee and output per invested dollar ratios are used to calculate these variables.

By using these dependent variables, it will become clear whether homestead exemptions lead to more steam engines and (steam) horsepower per employee, and whether they increase firm size, workers productivity, and a firm's leverage. When exemptions lead to more output per invested dollar, it can be

expected that firms increased their external debt relative to their equity.[15] Therefore, log output per invested dollar is a partial substitute for leverage.

Explanatory variables

In each of the two formulas, the β_1 coefficient is the main variable of interest. In formula 4, homestead exemption is a dummy variable that takes the value of one if there is a homestead exemption in place in a specific state and decade, and zero otherwise. In formula 5 the homestead exemption in thousands of dollars is used. By examining the effect of the dollar value of homestead exemptions, I also take expansions and different starting values of the exemptions into account, these expansions and differences might impact the finding. Except for the measure of homestead exemption, both formulas are identical. In both formulas, industry, state, and year fixed effects are included to account for fixed differences in firm characteristics of each industry, state, and decade. Industries are measured as 2-digit SIC codes. Each industry is presented in panel C of Table 3. All state dummies are presented in panel B of Table 3. Year fixed effects capture each decade dummy.

Both formulas will be run three times per dependent variable. In the second specification per dependent variable, the regressions also include industry time decade effects. These are interaction terms of the industry dummies and the decade dummies. These interaction terms allow the effect of each industry on the dependent variables to differ per time period. This improves the model if the effects of each industry vary over the years. In the third specification per dependent variable, the regressions also include region time decade effects. These are interaction terms between the region and decade dummies.

4.2 Regional Differences Within the United States

From the descriptive statistics, it becomes clear that firm variables develop differently in the different regions of the United States over the years of the sample. Especially the average firm size in the Northeast, which was already larger than the other regions in 1850, outgrew the average firm size in the other regions over the years (Table A1). Part of the reason for the major differences between the regions is that the American civil war (1861 - 1865) happens in the middle of the studied years. After the civil war, the south went through a stage of deindustrialization (Atack & Bateman, 1999a; Bateman et al., 1974). As a result of the economic destitution following the civil war, southern legislatures increased exemption levels to amounts not seen in any northern state (Goodman, 1993; Priest, 2006). These differences in economic circumstances and legislative action might also impact the effect homestead exemptions have on firm variables in each region. To measure this difference, formula 4 is executed on the northeastern, southern, and midwestern subsample separately. The far western region is not used for separate analysis, since this region contains too few observations, and because the region is dominated

[15] Invested capital is a variable that gives the total equity value of a firm (Table 1). To increase output a firm must invest money. Firms can either fund their business with equity, or with debt. As such, when the output per invested dollar (of equity) is higher it can be deducted that a firm has more leverage.

by just one state (California). Because the average homestead exemption and firm variables in the far west deviate significantly from the other regions, formula 4 is also run on a sample where the far western states are excluded.

4.3 Effect on Firms of Different Sizes

Formulas 4 and 5 will already give the result of the effect the limitation of personal liability in the form of homestead exemptions has on the average firm size. However, to fully test hypothesis 2, it is also needed to examine whether homestead exemptions impact firm variables differently for firms of different sizes. To test this, the entire sample is divided into three tercile groups based on firm size. Each tercile group consists of one-third of the entire sample of firms. The smallest one-third of the sample, measured as a firm's yearly output in dollars, is categorized in the small tercile group. The middle and largest one-third of observations are categorized in the middle and large tercile groups, respectively. The summary statistics of the size terciles are presented in Table 3, panel A. Formula 6 includes interaction terms of the homestead exemption in thousands of dollars and the three tercile groups. This formula is used to measure if exemptions impact the studied firm variables differently for firms of different sizes. Formula 6 is run on the steam engine dummy and the amount of steam horsepower per employee to measure the impact of exemptions on the costliest assets of firms for firms of each size tercile. Except for the terms including the tercile dummies, formula 6 uses the same explanatory variables, transcripts, and method of adding variables as formulas 4 and 5. Standard errors are clustered at the state and year level. This leads to the following formula:

6. $$Steam\ engine \mid Steam\ horsepower\ per\ employee = \beta_0 + \beta_1 \$\_Homestead\ Exemption_{S,t} * Smallest\ tercile + \beta_2 \$\_Homestead\ Exemption_{S,t} * Middle\ tercile + \beta_3 \$\_Homestead\ Exemption_{S,t} * Largest\ tercile + \sum_s Size\ fixed\ effects_s + \sum_I Industry\ fixed\ effects_I + \sum_S State\ fixed\ effects_S + \sum_t Year\ fixed\ effects_t + \left[\sum_{I,t} Industry\ time\ decade\ effects_{I,t} + \sum_{R,t} Region\ time\ decade\ effects_{R,t}\right] + \varepsilon_{S,t}$$

4.4 Homogenous Effect over the Size of Homestead Exemptions

The third hypothesis states that the credit-supply effect begins to outweigh the tolerance-for-failure effect for the largest homestead exemption levels. To test this hypothesis three dummy variables are created. The first is a dummy called small that takes the value of one if a state has a homestead exemption of fewer than 1000 dollars. The second is a dummy called middle that is equal to one if the exemption is equal to or in between 1000 and 2500 dollars. The third dummy takes the value of one if the exemption is higher than 2500 dollars. The first dummy predominantly captures the initial exemptions. The second captures most of the expansions in exemption levels. The last dummy captures the largest exemption levels. The first dummy takes a value of 1 for roughly half of the firms with an exemption. The second

for 45% of firms with an exemption, and the third for 5% (Table 3, panel A). As such, the β_3 coefficient of the formula below will provide information about the economic effects of the largest homestead exemptions in the researched sample. Formula 7 is run on the same dependent variables as formulas 4 and 5. Except for the three variables with the exemption dummies, formula 7 uses the same explanatory variables, transcripts, and method of adding variables as formulas 4, 5, and 6. Standard errors are clustered at the state and year level. The formula to test the third hypothesis is:

7. $$Steam\ engine \mid Steam\ horsepower\ per\ employee \mid Horsepower\ per\ employee \mid Log\ Output \mid Log\ Output\ per\ employee \mid Log\ Output\ per\ invested\ dollar = \beta_0 + \beta_1 HE\ small_{S,t} + \beta_2 HE\ midle_{S,t} + \beta_3 HE\ large_{S,t} + \sum_I Industry\ fixed\ effects_I + \sum_S State\ fixed\ effects_S + \sum_t Year\ fixed\ effects_t + \left[\sum_{I,t} Industry\ time\ decade\ effects_{I,t} + \sum_{R,t} Region\ time\ decade\ effects_{R,t}\right] + \varepsilon_{S,t}$$

4.5 Effect on Credit-dependent Firms

The last hypothesis states that the effects of homestead exemptions on firm-specific variables are stronger for credit-dependent firms. The credit dependence section of part 3.1 of chapter 3 describes which industries are categorized in each of the three credit dependence terciles. For each tercile, a dummy variable that takes the value of one if a firm is part of that tercile is created. Each credit dependence dummy, abbreviated as cp terciles in the formula below, is interacted with the homestead exemption level in thousands of dollars. Formula 8 is run on the same dependent variables as formulas 4, 5, and 7. Except for the terms including the credit dependence terciles, formula 8 uses the same explanatory variables, transcripts, and method of adding variables as formulas 4, 5, 6, and 7. Standard errors are clustered at the state and year level. The following formula is adopted:

8. $$Steam\ engine \mid Steam\ horsepower\ per\ employee \mid Horsepower\ per\ employee \mid Log\ Output \mid Log\ Output\ per\ employee \mid Log\ Output\ per\ invested\ dollar = \beta_0 + \beta_1 \$\_Homestead\ Exemption_{S,t} * Lowest\ cp\ tercile + \beta_2 \$\_Homestead\ Exemption_{S,t} * Middle\ cp\ tercile + \beta_3 \$\_Homestead\ Exemption_{S,t} * Highest\ cp\ tercile + \sum_C Credit\ dependence\ tercile\ fixed\ effects_C + \sum_I Industry\ fixed\ effects_I + \sum_S State\ fixed\ effects_S + \sum_t Year\ fixed\ effects_t + \left[\sum_{I,t} Industry\ time\ decade\ effects_{I,t} + \sum_{R,t} Region\ time\ decade\ effects_{R,t}\right] + \varepsilon_{S,t}$$

If my hypothesis is correct, the β_3 coefficient should be significant and should deviate further from zero than the β_1 and β_2 coefficients for the dependent variables where the β_1 coefficient of formula 4 gives a significant value. This would mean that the exemption level impacts the studied firm variables stronger for the most credit-dependent firms, compared to the average and equity-dependent firms.

5 Results and Discussion

This chapter describes the results of the empirical analysis of this thesis and will discuss the findings. The results are presented in Tables 6 to 9 and A4 to A6. These tables can be found at the end of this thesis. This chapter will follow the same outline as the methodology chapter. Therefore, part 5.1 describes the results of formulas 4 and 5 about the general effects of exemptions on the size and operations of firms. Part 5.2 describes the analysis of the regional differences within the United States. Part 5.3 reports the results of formula 6. Part 5.4 narrates the results of the effect homestead exemptions of different sizes have on firm variables. Lastly, part 5.5 describes the results of the analysis on the effects homestead exemptions have on credit-dependent firms. Each part consists of a results and a discussion section. If applicable, each part also accepts or rejects the relevant hypotheses.

5.1 Effects on the Size and Operations of Firms

Results

Table 6 presents the results of formula 4. In this formula, and all the following formulas that present the results of the regressions that are covered in chapter 4, the first specification per dependent variable uses state, year, and industry fixed effects. The second specification per dependent variable adds industry time decade effects, and the third specification adds region time decade effects. Therefore, the third specification per dependent variable uses state, year, and industry fixed effects, and industry and region time decade effects.

Panel A gives the results on the steam engine dummy and the amount of steam horsepower per employee, conditional on a firm having a steam engine. Noticeable, the coefficients of the homestead exemption level on these two dependent variables are positive for each specification. The coefficients of the exemption level on the steam variable all have roughly the same size. However, none of the coefficients are significant. For the steam horsepower per employee variable, the results show a sizeable and significant effect for the homestead exemption level. In the first specification, every 1000 dollars in homestead exemption leads to over 0.6 horsepower per employee more (Table 6, panel A, column 4). This coefficient is significant at the 1% level. Since the average firm with a steam engine has only 1.2 horsepower per employee, an increase with 0.6 horsepower per employee for every 1000 dollars in exemption is substantial. In the second specification where industry time decade effects are included, the value of the coefficient stays roughly the same and is still significant at the 1% level. In the third specification that includes year, industry, and state fixed effects, and industry and region time decade effects, the value and significance of the homestead exemption coefficient on the steam horsepower per employee variable drop notably. However, the effect stays significant at the 10% level and is still sizeable compared to the average and median value of the steam horsepower per employee variable.

Table 6, panel B, presents the findings of the regression of the exemption level on the total amount of horsepower available per employee and the log value of output. Notably, the coefficients of the exemption level on the horsepower per employee variable do not have the same sign for each specification. Moreover, none of the coefficients are significant. For the log output variable, all specifications give positive signs, meaning that exemptions increase the average firm size. However, none of the coefficients are significant.

Panel C of Table 6 presents the results of the effect homestead exemptions have on the log output per employee and the log output per invested dollar variables. On the productivity variable, namely log output per employee, the homestead exemption level gives negative results for each specification. The coefficients of the first two specifications are significant at the 5% level. The value of the coefficients imply that every 1000 dollars in exemption decrease the productivity parameter by 6% to 7%. The third specification gives a smaller result and is no longer significant. The coefficients of the exemption level on the log output per invested dollar variable are all positive. The coefficient of the first specification is significant at the 5% level, and the coefficient of the second specification at the 1% level. Both coefficients have approximately the same value. The results of these two specifications imply that every 1000 dollars in homestead exemption increases the output per dollar variable by 8% to 9%. Again, the last specification is not significant. The fact that the third specification gives insignificant results for the log output per employee and log output per invested dollar variables, while the first two specifications do give significant results, suggests that changing differences between regions have a considerable impact on the studied firm variables.

As indicated in chapter 4, the regressions of homestead exemptions on the six dependent variables are also executed using the homestead exemption dummy. The results of these regressions are presented in Table A4. Again, the first specification uses state, year, and industry fixed effects, the second specification adds industry time decade effects, and the third specification adds region time decade effects. Overall, the results of the regressions that use exemption dummies are similar to the results of the regressions that use exemption levels. However, most of these results become insignificant when the exemption dummies are used. For instance, none of the coefficients of the log output per employee variable are significant. Notably, the exemption dummy does have a significant and positive result on the log output per invested dollar variable for all three specifications. The result in the third specification implies that output per employee is 5% higher if a state has a homestead exemption.

The average homestead exemption and the average value of firm variables in the far west deviate significantly from the other regions. To test if this region impacts the findings, formula 4 is also run on a sample where the far western states are excluded. The results of these regressions are presented in table A5. Virtually all the coefficients of each specification and dependent variable have the same sign and significance as the regressions that include the far western states. Moreover, the values of the

coefficients are roughly similar for both sets of regressions. Overall, the similarity between the results imply that the results of Table 6 are not merely driven by the far western observations.

Hypotheses

I hypothesized that the adoption and the size of homestead exemptions increase the number of firms that use steam engines and the associated amount of horsepower per employee. The amount of steam horsepower per employee significantly and sizably increases over the exemption level. However, although the steam variable is positively impacted by the exemption level and exemption dummy, the results of these regressions are also insignificant. Therefore, I reject hypothesis 1.

Discussion

Each specification, whether it is executed with the exemption level or with the exemption dummy, and with or without the far western states, gives a significant and strongly positive result for the steam horsepower per employee variable. This means that firms invest more in their steam engine power if exemptions get enacted or increased. The protection of the homestead from creditors during potential bankruptcies increases household's willingness to invest in companies, leading to more corporate investments in (larger) steam engines. The number of steam engines also increases in each regression. However, this result is not significant in any of the regressions. Therefore, I cannot conclude that the larger appetite to invest of households also increases the number of firms with a steam engine. This finding might be explained by an increase in small firms without steam engines since exemptions are known to increase the number of startups (Chatterji & Seamans 2012; Fan & White 2003; Paik (2013); Severino & Brown 2017). The increase in the number of newly established companies without steam engines does not impact the steam horsepower per employee variable, because this variable only has observations for firms with a steam engine.

The total amount of horsepower per employee gives insignificant results. This finding can be expected since this value captures both the steam and the water horsepower of firms. The availability of water horsepower during production is mostly determined by nature. Therefore, larger corporate investments have less influence on the number of water horsepower per firm. Moreover, exemptions probably increase the number of small firms without a steam engine since more small firms are being founded. Because the horsepower per employee variable has an observation for all firms in the sample, the increase in the number of startups without steam or water engines lowers the amount of horsepower per employee, and thus lowers the coefficient of the exemption level on this variable. The results on the log output variable are insignificant as well. Therefore, it is not possible to say whether homestead exemptions lead to smaller firms because more small firms are being founded, or that exemptions lead to larger firms because bankruptcy exemptions redirect credit to households with more assets who tend to invest in larger firms.

The productivity per employee decreases over the exemption level in each specification. The first two specifications also give significant results for the exemption level. However, the third specification of the exemption level regression and all specifications of the exemption dummy regressions give insignificant results. Therefore, I cannot make a clear-cut conclusion regarding the effect of homestead exemptions on this variable. The negative signs of the results do implicate that there is a negative correlation between the exemption level and the output per employee. This result might be found because the decrease of entrepreneurial risks for poorer households when exemptions get enacted, increases the number of small and relatively inefficient firms, leading to a decrease in the output per employee variable in those states. The fact that exemptions also increase the number of steam horsepower per employee might decrease the significance of the results for this variable. Overall, I cannot conclude the effect homestead exemptions have on a firm's productivity due to the insignificant results of the exemption dummy regressions and the third specification of the exemption level regression. The output per invested dollar variable is positively impacted by the exemption level and the exemption dummy in all specifications. The exemption level gives significant coefficients for the first two specifications, the exemption dummy for all three specifications. These results imply that homestead exemptions increase the average firm's leverage. This result is expected. Homestead exemptions increase the attractiveness of risk-taking of (small and unincorporated) businesses since they provide a partial wealth insurance for the owners of the firms. If businesses go bankrupt in states that enacted a homestead exemption law, the owners of the bankrupt firms can keep their homestead or get paid out the value of the exemption if their homestead is worth more than the exemption and their homestead cannot be split into two parts. Therefore, the owners of firms become willing to take on more risk in the form of higher debt levels. Overall, I can conclude that homestead exemptions have a significant and sizeable effect on firms.

5.2 Regional Differences Within the United States

Results

Table A6 presents the results of the execution of formula 4 on three regional samples of states. This execution is performed to measure if the main results, presented in Table 6, are also present in each subsample of states. The first specification per dependent variable includes state, year, and industry fixed effects as control variables. The second specification adds industry time decade effects.

Panel A presents the findings of the analysis on the subsample of northeasters states. This region consists of 10 states that together represent over half of all firms in the sample (Table 2 & Table 3, panel B). The effects of the exemption level on the steam and steam horsepower per employee variables are insignificant for both specifications. Moreover, the effect on the steam engine dummy is negative. This suggests that the positive effect of exemptions on the power type used by firms is not present in the northeastern region of the United States. The coefficients of the exemption level on the horsepower per

employee, log output, and log output per employee variables are all insignificant. The coefficient on the log output per invested dollar variable is significant at the 1% level and double the size of the coefficient of the regression that is performed on the entire sample.

Panel B of Table A6 presents the results of the regressions for the subsample of southern firms. Noticeable, the coefficients of the exemption level on the steam engine dummy and the steam horsepower per employee variable are significant and positive. The coefficient of the steam engine dummy implies that each 1000 dollars in exemption increases the percentage of firms with steam engines by 4%. This coefficient is three times larger than the coefficient of the regression that uses the entire sample. The coefficient on the steam horsepower per employee variable is smaller than the coefficient of the regression that uses the entire sample. However, it still implies that each 1000 dollars in exemption increases the number of steam horsepower per employee with 0.3 horsepower. These results imply that exemptions have a positive effect on firm investments in more modern power types in the southern states. On all other dependent variables that are studied the exemption level does not have a significant effect.

Table A6, panel C, presents the findings of the exemption level on the six dependent variables for the midwestern region. The only significant results in this panel are the coefficients on the steam dummy. This coefficient is strongly negative for both specifications, which means that in the Midwest exemptions hurt the adoption of the steam engine. The coefficient implies that each 1000 dollars in exemption decreases the percentage of firms with a steam engine by 7%. Interestingly, the effects on the steam horsepower per employee and log output per invested dollar variables are (strongly) positive.

Discussion

The results of the regional analysis show that the homestead exemption level has a different effect on firm variables per region. For example, in the Northeast and Midwest, the exemption level hurts the adoption of the steam engine, while this effect is strongly positive and significant in the South. The steam horsepower per employee increases over the exemption level in each region, however, this effect is only significant in the south. The log output per invested dollar increases significantly in the Northeast, and insignificantly in the Midwest. In the South, the coefficient of the exemption level for this dependent variable is negative. These results suggest that the South significantly deviates from the Northeast and Midwest in terms of the impact homestead exemptions have on firm variables. One plausible reason for this difference might be that the South lost the American Civil War (1861-1865) and suffered a severe depression during reconstruction (1865-1877). Another reason could be that the South increased their homestead exemptions to levels not seen in any northeastern or midwestern state. On the other hand, the midwestern region deviates from the South and Northeast for the log output and log output per employee variables. Therefore, I can conclude that it is not merely the southern regional effect that impacts the findings. Overall, the results implicate that regional differences have an important impact on the

findings. Therefore, the third specification per dependent variable of Tables 6 to 9, A4, and A5 that controls for region time decade effects is the preferred specification.

5.3 Effect on Firms of Different Sizes

Results

Table 7 presents the results of the effect homestead exemptions have on firms of different sizes. This analysis is executed on the steam dummy and the steam horsepower per employee variable. The analysis controls for industry, state, year, and size fixed effects in the first specification, adds industry time decade effects in the second specification, and adds region time decade effects in the third specification.

The homestead exemption level impacts the steam engine variable more for the largest firms in the sample. The coefficients of the exemption level are larger and more significant for the largest tercile of firms compared to the two other terciles. In addition, the middle tercile gives larger and more significant results than the smallest tercile of firms. These results are observable for each specification. In the last specification the exemption level still significantly and positively impacts the steam dummy, while the coefficient of the exemption level of the other two size terciles becomes insignificant.[16] The value of the coefficients for the largest tercile of firms are roughly equal for each specification and imply that the percentage of firms with a steam engine increases by 3% for every 1000 dollars in exemption. For the middle tercile, the effect drops to 2% more firms with a steam engine for every 1000 dollars in exemption. I also test the significance of the difference of the coefficients of the smallest and the largest size tercile of the third specification. The result of this test is that the effect of the exemption level on the largest tercile of firms is significantly different from the coefficient of the exemption level for the smallest tercile of firms ($F(1,130) = 8.02$, $p < 0.01$).

For the steam horsepower per employee variable, the results are different. For each of the three specifications, the homestead exemption level impacts the amount of steam horsepower per employee more for the small terciles compared to the larger terciles. In other words, the smaller the tercile the higher the effect and the significance of the effect. This holds for each of the three specifications. In the last specification, the coefficients of the smallest and middle tercile are still significant, while the effect of the largest tercile loses its significance. The value of the coefficient for the smallest tercile in the third specification implies that every 1000 dollars in homestead exemption increases the number of steam horsepower per employee with 0.45 horsepower. I also test if the coefficients for the smallest and largest

[16] When I classify the smallest 10% of firms in the small group and the largest 10% of firms in the large group the effect of the exemption level for the small group is significantly negative for each of the three specifications. This means that at the lower tail of the size distribution of firms exemptions negatively impact the adoption of the steam engine. The results of Table 7 show that the effect becomes insignificant and positive if I classify the smallest one-third of the sample in the smallest size group.

terciles of the third specification are significantly different from each other. I find that this is not the case ($F(1,123) = 1.87$, $p > 0.1$).

Hypothesis

I hypothesized that smaller firms are the primary beneficiaries of homestead exemptions and that exemptions increase entrepreneurial activity of poorer households, leading to a decrease in the average firm size. The results that are needed to accept or reject the first part of this hypothesis are described above. The results of the second part about the average firm size are described in part 5.1.

For the steam horsepower per employee variable, the first part of hypothesis 2 holds. However, the steam engine dummy only significantly increases over the exemption level for the largest two terciles of firms. Moreover, the difference between the coefficient of the largest tercile and the coefficient of the smallest tercile is statistically significant. The results regarding the log output variable are mixed. If anything, specification three of panel B of Table A4 make me believe that exemptions increase the average firm size. As such, I reject hypothesis 2.

Discussion

The results of Table 7 implicate that exemptions increase the percentage of firms with a steam engine mostly for the largest firms of the sample while impacting the steam horsepower per employee variable mostly for the smaller firms. It might be the case that firms that invest in new steam engines invest into smaller steam engines on average. Therefore, the average number of steam horsepower per employee, conditional on a firm having a steam engine, increases less for the larger firms where the percentage of firms with a steam engine increases more. Another explanation for this finding is that larger firms with steam engines already had an optimal amount of horsepower per employee and that a further increase in the availability of credit for these firms is not used for investments in larger steam engines, but used for overall increases in production in order to gain market power and to lower the average cost per produced good.

5.4 Homogenous Effect over the Size of Homestead Exemptions

Results

Table 8 presents the findings of the analysis that examines whether a homogeneous effect over the size of the exemption is observable in the data. The table has three dependent variables of interest: the small, midsized, and the large homestead exemption dummy. The smallest dummy takes a value of one for all observations where an exemption of fewer than 1000 dollars is in place. The midsized group captures exemptions that are equal to or in between 1000 and 2500 dollars. Large exemptions are higher than 2500 dollars. As was the case with Tables 6 and 7, Table 8 consists of three specifications per dependent

variable. The first specification includes industry, state, and year fixed effects. Specification two adds industry time decade effects, and specification three adds region time decade effects.

For the steam dummy, the largest coefficients are present for the largest exemptions (Table 8, panel A). The small and midsized exemption dummies have a roughly equal effect on the adoption of the steam engine. The only significant coefficient is the coefficient of the large exemption in the first specification. The coefficient of this specification is equal to 0.099, which means that when a state has a homestead exemption of over 2500 dollars in place, the percentage of firms with a steam engine increases by 9.9 percentage points. This effect is stronger than the result of any other regression for this variable. For the last two specifications, the impact of a large homestead exemption is still 6.3 percentage points more steam engines. As was the case in the previous tables, the exemption level has a large and significant impact on the amount of steam horsepower per employee (Table 8, panel A). For each of the three specifications, the largest and most significant impact is observable for the large exemption dummy. These coefficients are significant at the 1% level for the first two specifications and the 10% level for the third specification. In the third specification, a large exemption increases the amount of steam horsepower per employee by 1.6 horsepower. This is sizeable given that the average firm of the sample only has 1.2 horsepower per employee (Table 3, panel A). For each specification, the small and midsized exemptions also have a positive impact. However, these effects are only significant for the midsized exemptions. Moreover, the coefficient of the midsized exemption is larger than the coefficient of the small exemption for each of the three specifications. These results implicate that the effect of homestead exemptions increases over the size of the exemption.

Panel B of Table 8 contains the results of the regressions with the horsepower per employee and the log value of output as the dependent variables. As was the case in the previous formulas, the results for these dependent variables are mixed. Moreover, most of the coefficients of the exemption dummies are insignificant. Therefore, I cannot conclude which effect exemptions have on these two variables.

Table 8, panel C, presents the results for the log output per employee and the log output per invested dollar variables. Virtually all the coefficients of the exemption dummies decrease the log output per employee variable. The coefficients of the large dummies are at least five times larger than the coefficients of the midsized and the small dummies. Moreover, only the coefficients of the large exemption dummy are significant in all three specifications. These results imply that larger exemptions decrease the productivity per employee by 19%, and that larger exemptions have a larger impact on the log output per employee variable than smaller exemptions. The results for the log output per invested dollar variable show that the largest exemptions have double the effect of the midsized exemptions. The coefficients of the largest exemption are also significant in each specification. The third specification implies that large exemptions increase firm leverage by 19%. The coefficients for the midsized exemptions are larger than the coefficients of the small exemption dummy and are significant in each

specification. The coefficients of the smallest exemptions are the smallest and insignificant. Overall, the results for the log output per invested dollar variable provide proof that the effects of the exemptions are stronger when the exemptions increase in size.

Hypothesis

I hypothesized that the credit-supply effect begins to outweigh the tolerance-for-failure effect for the largest homestead exemptions. The results of formula 7, presented in Table 8, show that the effects of homestead exemptions become stronger over the size of the exemption. Therefore, I can conclude that it is not the case that the effect of exemptions on firm variables becomes weaker for the strongest homestead exemptions because the credit supply becomes severely restricted at these exemption levels. As such, I reject hypothesis 3.

Discussion

Past literature has found two opposing effects. On the one hand exemptions and other bankruptcy protections increase the willingness to take on risks. This effect leads to more investments on a firm level which results in more steam engines, more steam horsepower per employee, and more output per invested dollar. On the other hand, exemptions also decrease the credit supply. Exemptions lower the number of dollars that creditors can seize during bankruptcies. This results in creditors tightening credit supply and worsening credit conditions. Both the credit-supply effect and the tolerance-for-failure effect become stronger at higher exemption levels.

This thesis finds that larger exemptions lead to larger effects on firms than smaller exemptions. For example, the effect on the log output per employee variable becomes stronger for higher exemption levels. Moreover, higher exemptions increase the amount of steam horsepower per employee, and a firm's leverage stronger and more significant than smaller exemptions. The tolerance-for-failure effect dominates the credit-supply effect at the lower exemption levels and dominates the credit-supply effect even more if the exemption level rises. Although creditors worsen credit supply if exemptions increase, this effect is not strong enough to offset the greater appetite to invest of households at higher exemption levels. This means that firms benefitted from larger personal bankruptcy exemptions in the studied years.

5.5 Effect on Credit-dependent Firms

Results

So far, this thesis has addressed the impact homestead exemptions have on firms in general, on firms in different regions, firms of different sizes, and the difference in the impact of large and small exemptions. The last part of the empirical analysis studies if homestead exemptions influence firm variables more for the most credit-dependent firms. Theoretically, credit-dependent firms benefit more if credit becomes more abundant. To test whether this theory is also observable in the studied data three credit

dependence terciles are created. Each tercile consists of roughly one-third of the sample. How each industry is classified into credit dependence terciles can be found in part two of chapter 3. Again, the first specification per dependent variable uses state, year, and industry fixed effects. The second specification adds industry time decade effects, and the third adds region time decade effects.

The results of the analysis are presented in Table 9. Panel A of this table contains the results on the steam and steam horsepower per employee variables. The steam dummy increases over the exemption level stronger and more significant for the largest credit dependence tercile. In this tercile, the percentage of firms with a steam engine increases by almost 5% per 1000 dollars in homestead exemption. The coefficient for the most credit dependent tercile is significant at the 1% level in each specification. The effects for the middle and low credit dependence terciles are insignificant and half the size of the effect of the high credit dependence tercile. The coefficient of the high credit dependence tercile in specification three is significantly different from the coefficient of the low credit dependence tercile of the third specification ($F(1,130) = 4.24$, $P < 0.05$). As such, exemptions significantly increase the percentage of firms with a steam engine for the most credit-dependent firms, while having a small and insignificant effect on the middle and low credit-dependent tercile of firms. These characteristics are also observable for the steam horsepower per employee variable. For each specification, the effect of the homestead exemption level becomes larger and more significant going from the small to the middle, and from the middle to the large credit dependence group. For the third specification, the exemption level is associated with a sizeable increase in the amount of steam horsepower per employee. Interestingly, the coefficients of the low and high credit dependence terciles are not statistically different from each other for the steam horsepower per employee variable in the third specification ($F(1,123) = 2.35$ $P > 0.1$).

Panel B of Table 9 contains the results for the horsepower per employee and the log output variable. The results on these two variables are mixed and insignificant. Therefore, as was the case for previous regressions, these variables do not give room to make clear-cut conclusions.

Panel C of Table 9 presents the effects on the log output per employee and the log output per invested dollar variables. For the regressions on the log output per employee variable, the exemption level has a larger and more significant impact for the highest credit dependence tercile compared to the other two terciles. In the third specification, the coefficient for the highest credit dependence tercile is the only significant coefficient. This result implies that homestead exemptions have a sizeable impact on the productivity of credit-dependent firms. The coefficient of the high credit dependence tercile is significantly different from the coefficient of the lowest credit dependence tercile in the third specification ($F(1,130) = 6.73$, $p < 0.05$). Again, the log output per employee variable is negatively impacted by the exemption level. This effect can be explained by the possibility that many smaller (credit-dependent) firms are being founded if exemptions get enacted or increased, resulting in a

decrease in the average output per employee. The log output per invested dollar variable is the only variable where the significant effects that are found in Table 6 are not stronger and more significant for the most credit-dependent tercile. Because the preferred third specification gives insignificant results for each tercile, no conclusion can be made regarding the log output per invested dollar variable.

Hypothesis

Hypothesis 4 stated that credit-dependent industries are impacted more strongly than other industries, when credit becomes more abundant or when credit dries up. The results of formula 8 show that this is indeed the case. The percentage of firms with a steam engine, the amount of steam horsepower per employee, and the log output per employee all give larger results for the most credit-dependent tercile of firms. Moreover, the coefficient of the high credit dependence tercile is the only coefficient to be significant for these three variables. In addition, the difference between the coefficient of the high credit dependence tercile and the coefficient of the low credit dependence tercile for the steam engine and the log output per employee variable in the third specification is also statistically significant. Therefore, I can accept the hypothesis that credit-dependent industries are impacted more over the exemption level than the industries that are less credit dependent.

Discussion

For the steam, steam horsepower per employee, and log output per employee variables the results are most pronounced for the highest credit dependence tercile. The effects on these three variables for this tercile also have the same sign as the results of formula 4. This means that the exemption level impacts firm variables more for the most credit-dependent firms. Exemptions increase the availability of credit, therefore, firms that are in the greatest need of credit benefit the most when exemptions get enacted or increased.

6 Conclusion

This thesis examined if the limitation of personal liability between 1850 and 1880 in the form of homestead exemptions influenced American enterprise. The research question was: *Did the enactment and expansions of homestead exemptions in several U.S. states from 1850 to 1880 significantly impact the operations of firms?* To answer this research question this thesis uses the protection level per state and decade, and the decennial censuses of manufacturing establishments in the United States from 1850 to 1880.

This thesis finds that the amount of horsepower per employee, conditional on a firm having a steam engine, goes up over the level of the exemption. This increase seems to be funded by an increase in leverage since the log output per invested dollar of equity increases significantly over the exemption

level. These results imply that the owners of firms became willing to take on more risk in the form of higher debt levels when exemptions were enacted or increased and suggest that these investments were at least partly invested in larger steam engines. These effects are more pronounced for the largest homestead exemption levels and for firms in credit-dependent industries. Homestead exemptions do not significantly increase the number of firms with a steam engine. Therefore, investments in steam power predominantly operate on the intensive margin, with firms that already had a steam engine investing in more horsepower when exemptions are enacted or increased, while few firms invest in new steam engines.

I used various checks to make sure that the results are robust. First, the regressions of the general effects of exemptions are also run with the exemption dummy instead of the exemption level as the explanatory variable of interest. Second, I executed the main regression on a sample without the far western states to test if the results are explained by the far western region which has higher exemption levels and different firm characteristics. Both alterations do not lead to changes in the results as they are discussed in this chapter. Third, each regression of this thesis is also executed with region time decade effects as an extra control variable. All the conclusions of this chapter are based on significant coefficients that are obtained in regressions that include this control variable. As such, the results are not driven by changing differences between the regions of the United States.

The results of this thesis implicate that the greater appetite to invest of American households impacted America's manufacturing sector significantly. At the financial level, firms increased their leverage if exemptions were in place. At the operational level, homestead exemptions increased the amount of horsepower per employee if firms had a steam engine available during production. As such, I conclude that homestead exemptions indeed impacted the operations of firms in the studied sample and years.

The results of this thesis implicate that the limitation of personal liability not only impacts the societal goals they were enacted for, like limiting homelessness in the case of homestead exemptions, but can also lead to more economic development. The limitation of liability increases the attractiveness of risk-taking. This thesis shows that this has the potential to make a (positive) change for firms at an operational level. These results also have implications for other areas of law and economics. For instance, the limitation of liability of households and investors can be used to increase investment and economic growth. It is important to keep the potential downsides in sight as well. For example, the limitation of liability can exacerbate moral hazard in the credit market.

The scope of this thesis can be expanded by further research in multiple ways. First, a potential topic of further research is to examine if there are preexisting state-specific trends in firm characteristics observable for states that enact homestead exemptions that are not present in other states. If the enactment of homestead exemptions did not happen at random, this could infer with the findings of this thesis. Secondly, future research could examine whether the effects of exemptions are stronger for riskier

firms. On the one hand, the chance to lose an investment is larger in riskier firms, which suggests larger effects should be observable. On the other hand, the credit terms for these firms will be even more uninviting after homestead exemptions are enacted. Further research can examine which effect dominates. Third, this thesis finds that higher exemptions impact firm investments in steam engines and firm leverage stronger than smaller exemptions do. Other authors could examine which exemption level is optimal based on economic and societal determinants. Fourth, regional differences seem to be relevant for the effect the limitation of personal liability has on firms. However, these results might also be driven by the fact the average exemption level deviated significantly per region. Further research could examine whether the differences in the results per region result from economic, legal, and cultural differences per region and state, or from differences in the average exemption level. Finally, another area for future research is to examine the effects different forms of limited liability have on entrepreneurship, firm characteristics, and economic development. This thesis researched the effects for one form of personal liability, however, the effects for other forms of limited liability are only scarcely researched and can form an exciting field of future research.

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Table 1. Definition of variables

Variable	Availability per census	Definition
Industry	Each census	3-Digit SIC code
State	Each census	Code of 1 to 37 for each state and the District of Colombia
Capital	Each census	Capital invested in real and personal estate in business
Men	Each census	Average number of male hands
Women	Each census	Average number of female hands
Children	1870 & 1880, occasionally available for 1850 and 1860	Average number of children and youth employed
M_Wages_MO	1850 & 1860	Average monthly cost of male labor
F_Wages_MO	1850 & 1860	Average monthly cost of female labor
C_Wages_MO	Sometimes occasionally reported in 1850 & 1860	Average monthly cost of child labor
Wage bill	1870 & 1880	Total amount of wages paid in year
Power type	1850, 1860 & 1870	6-digit code of the power type used
Horsepower	Each census	Number of HP available in production
Water HP	1880	Water HP available in production
Steam HP	1880	Steam HP available in production
Inputs	Each census	Aggregate value of raw materials including mill supplies and fuel
Outputs	Each census	Aggregate value of produced goods including jobbing and repairing

The variables in the table form a complete list of the variables of the census of manufacturers of 1850 to 1880 that are used in this thesis. For each variable, the availability per census and the definition are given. For the industry variable, a 2-digit code with a trailing zero is used when more detailed classification is impossible. Employees are counted as men if they are over 16 years old and as women if they are over 15 years old in the censuses of 1870 and 1880. All financial amounts are in U.S. dollars. The power type gives a value of zero to six where 0 stands for not given, 1 means steam, 2 means water, 3 means hand, 4 means animal, and 5 stands for a combination of power types 1 to 4. The definitions of the variables are direct quotes from the documentation on coding document that correspond to the census of manufacturers, 1850-1880, and are written by Jeremy Atack and Fred Bateman in 1999.

Table 2. Region classification

Region	States per region	States that are classified into this region
Northeast	10	Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Vermont
South	14	Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Texas, Virginia, West Virginia
Midwest	9	Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Nebraska, Ohio, Wisconsin,
Far west	3	California, Oregon, Washington

The table contains the classification of states into regions and the number of states per region. The classification is adopted from Goodman (1993).

Table 3. Summary statistics

A. Summary statistics main variables

Variable	n	Mean	SD	Min	10th	50th	90th	Max
Homestead exemption	23,772	0.657	0.617	0	0	0.5	1	5
Exemption dummy	23,772	0.792	0.406	0	0	1	1	1
Small exemption	23,772	0.402	0.490	0	0	0	1	1
Midsized exemption	23,772	0.381	0.486	0	0	0	1	1
Large exemption	23,772	0.023	0.095	0	0	0	0	1
Steam	23,772	0.156	0.362	0	0	0	1	1
Steam HP per employee	8,691	1.216	3.902	0	0	0	4	87
HP per employee	23,772	1.110	4.488	0	0	0	2	100
Capital	23,740	8,334	52,474	1	200	1,200	11,000	4,000,000
Employees	17,299	10.845	50.963	0	1	3	17	2,510
Wage bill	23,772	3,192	14,740	0	150	660	5,400	936,473
Input	23,772	10,219	67,571	0	200	1,200	15,100	5,600,000
Output	23,772	17,056	88,823	45	750	3,000	28,000	6,000,000
Output per employee	16,936	2,038	3,952	3	400	1,002	4,190	163,000
Output per dollar	23,714	5.346	86.848	0	1	3	10	13,200
Log Output	23,772	8.238	1.441	4	7	8	10	16
Log Output per employee	16,936	7.059	0.956	1	6	7	8	12
Log Output per dollar	23,714	1.041	0.884	-4	0	1	2	9
Smallest size tercile	23,772	0.335	0.472	0	0	0	1	1
Middle size tercile	23,772	0.348	0.476	0	0	0	1	1
Highest size tercile	23,772	0.317	0.465	0	0	0	1	1
Lowest credit dependence tercile	23,772	0.357	0.479	0	0	0	1	1
Middle credit dependence tercile	23,772	0.399	0.490	0	0	0	1	1
Highest credit dependence tercile	23,772	0.244	0.430	0	0	0	1	1

Panel A contains the summary statistics of the main variables that are used in this thesis. The panel shows the number of observations (n), mean, standard deviation (SD), minimum (Min), the 10% and 90% tail range (10^{th} & 90^{th}), median (50^{th}), and the maximum (Max) for the data of 1850 to 1880. The deleted observations are not included for the calculation of the summary statistics of this table. The summary statistics of the state and region dummies are presented in panel B, the industry dummies in panel C. The summary statistics of the main variables per region are presented in Table A1.

B. Summary statistics state and region dummies

State or region	Share of all obs.
Alabama	0.9%
Arkansas	0.4%
California	1.6%
Connecticut	2.3%
Delaware	0.4%
Florida	0.2%
Georgia	0.5%
Illinois	4.5%
Indiana	4.3%
Iowa	2.0%
Kansas	0.6%
Kentucky	2.5%
Louisiana	0.2%
Maine	2.6%
Maryland	2.1%
Massachusetts	6.3%
Michigan	3.1%
Minnesota	0.8%
Mississippi	0.7%
Missouri	3.4%
Nebraska	0.2%
New Hampshire	1.8%
New Jersey	3.1%
New York	17.5%
North Carolina	2.0%
Ohio	8.8%
Oregon	03%
Pennsylvania	15.3%
South Carolina	0.9%
Tennessee	2.0%
Texas	0.9%
Vermont	1.4%
Virginia	3.1%
Washington	0.0%
West Virginia	0.6%
Wisconsin	2.4%
Northeast	53.0%
South	18.3%
Midwest	26.8%
Far west	1.9%

Panel B shows the percentage of observations that belong to each of the state and region dummies for the data of 1850 to 1880. The deleted observations are not included for the calculation of the summary statistics of this table. The classification of states into regions is presented in Table 2.

C. Summary statistics industry dummies

Industry	cd	Share of all obs.
Agricultural services	Low	0.4%
Special trade contractors	Middle	5.3%
Food and Kindred products	High	15.0%
Tobacco products	Low	2.2%
Textile mill products	Low	2.2%
Apparel and other textile products	Low	4.6%
Lumber and wood products	Middle	17.3%
Furniture and fixtures	Low	3.0%
Paper and allied products	Low	0.6%
Printing and publishing	Low	1.4%
Chemicals and allied products	Low	2.2%
Petroleum and coal production	Low	0.0%
Rubber and miscellaneous plastic products	Low	0.0%
Leather and leather products	Middle	15.8%
Stone, clay, glass and concrete products	Low	3.1%
Primary metal industries	Low	3.2%
Fabricated metal products	Low	2.5%
Industrial machinery and equipment	Low	3.2%
Electronic and other electric equipment	Low	0.1%
Transportation equipment	Low	4.4%
Instruments and related products	Low	0.2%
Miscellaneous manufacturing industries	Low	2.1%
Electric, gas and sanitary services	Low	0.3%
Miscellaneous repair services	High	9.3%
Unclassifiable establishments	Middle	1.5%

Panel C contains the summary statistics of each industry dummy. The panel shows the credit dependence group each industry is classified in (cd) and the percentage of firms that belong to each industry dummy for the data of 1850 to 1880. Each 3-digit SIC code given in the census of manufacturers is converted into a 2-digit SIC code to limit the number of industries. The deleted observations are not included for the calculation of the summary statistics of this table.

Table 4. Homestead exemption laws

State	Date of first law	Amount exempt in 1850	Amount exempt in 1860	Amount exempt in 1870	Amount exempt in 1880
Alabama	1843	400	400	400	2000
Arkansas	1852	N/A	160 acres	160 acres	5000
California	1851	N/A	5000	5000	5000
Connecticut	1847	N/A	700	700	700
Delaware	-	N/A	N/A	N/A	N/A
Florida	1845	200	200	1000	1000
Georgia	1841	200 / 50 acres	200 / 50 acres	1600	1600
Illinois	1851	N/A	1000	1000	1000
Indiana	1852	N/A	300	300	600
Iowa	1849	500 / 40 acres	500 / 40 acres	500 / 40 acres	500 / 40 acres
Kansas	1855	N/A	1000	160 acres	160 acres
Kentucky	1866	N/A	N/A	1000	1000
Louisiana	1852	N/A	1000	2000	2000
Maine	1849	500	500	500	500
Maryland	-	N/A	N/A	N/A	N/A
Massachusetts	1851	N/A	800	800	800
Michigan	1848	1500	1500	1500	1500
Minnesota	1858	N/A	1000 / 80 acres	1500	1500
Mississippi	1841	1500	1500	4000	4000
Missouri	1863	N/A	N/A	160 acres	1500 / 160 acres
Nebraska	1855	N/A	500	160 acres	2000
New Hampshire	1851	N/A	500	500	500
New Jersey	1852	N/A	1000	1000	1000
New York	1850	1000	1000	1000	1000
North Carolina	1859	N/A	500 / 50 acres	1000	1000
Ohio	1849	500	500	1000	1000
Oregon	1868	N/A	N/A	1000	1000
Pennsylvania	1849	300	300	300	300
South Carolina	1851	N/A	N/A	1000	1000
Tennessee	1852	N/A	500	1000	1000
Texas	1839	2000	2000	2000	5000
Vermont	1849	500	500	500	500
Virginia	1867	N/A	N/A	1200 / 160 acres	1200 / 160 acres
Washington	1860	N/A	500	500	500
West Virginia	1864	N/A	N/A	500	1000
Wisconsin	1848	40 acres	40 acres	40 acres	40 acres

The table contains the date of the first homestead exemptions for each state of the sample and the amount in dollars that was exempted at the start of each decade. Delaware and Maryland did not enact a homestead exemption law before 1880. Connecticut repealed their first homestead exemption law in 1848, South Carolina did the same in 1858. N/A stands for not applicable. If the exemption law contains acre values of both town lots and farms, only the farm acre amount is given. The data are derived from Farnam (1938) and Goodman (1993). When these sources contradict each other the state session laws are followed. Table A2 contains the dollar values of each acre exemption.

Table 5. Average homestead exemption per region and decade

Region	States per region	1850-1880	1850	1860	1870	1880
All regions	36	744	175	615	972	1086
Northeast	10	505	124	606	661	667
South	14	994	117	307	1475	1709
Midwest	9	832	409	678	929	1017
Far west	3	3767	0	4110	4207	4209

The table contains the number of states per region and the average homestead exemption in dollars for each region of the United States. For the classification of states into regions, the classification of Goodman (1993) is adopted. The classification is presented in Table 2.

Table 6. Effect on the size and operations of firms

A. Steam and Steam horsepower per employee

	Steam			Steam horsepower per employee		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Exemption level	0.017	0.015	0.017	0.613***	0.595***	0.369*
	(0.011)	(0.011)	(0.013)	(0.185)	(0.205)	(0.192)
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y	Y		Y	Y
Region TDE			Y			Y
R-squared	0.16	0.18	0.18	0.14	0.15	0.16
No. of obs.	23,772	23,772	23,772	8,690	8,690	8,690

B. Horsepower per employee and Log Output

	Horsepower per employee			Log Output		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Exemption level	0.233	0.119	-0.180	0.005	0.013	0.061
	(0.169)	(0.150)	(0.166)	(0.047)	(0.046)	(0.046)
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y	Y		Y	Y
Region TDE			Y			Y
R-squared	0.17	0.24	0.24	0.22	0.23	0.24
No. of obs.	23,772	23,772	23,772	23,771	23,771	23,771

Panel A shows the coefficient of the exemption level in thousands of dollars on the steam engine dummy, which takes the value of 1 if a firm has a steam engine and zero otherwise, and the amount of horsepower per employee, conditional on a firm having a steam engine. Panel B gives the coefficient of the exemption level on the total amount of horsepower available per employee and the log value of a firm's yearly output in dollars. The first column per dependent variable uses industry, state, and year fixed effects. Industries are measured using 2-digit SIC codes. The second column adds industry time decade effects. The third column adds region time decade effects. Table A4 presents the findings of this table when the exemption dummies are used. Table A5 presents the findings when the far western states are excluded. Table A6 presents the findings if only the northeastern, southern, or midwestern states are included in the sample. The sample period is from 1850 to 1880. *p <0.1; **p <0.05; ***p <0.01 (clustered at the state and decade level).

c. Log Output per employee and Log Output per invested dollar

	Log Output per employee			Log Output per invested dollar		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Exemption level	-0.072**	-0.063**	-0.035	0.079**	0.087***	0.020
	(0.031)	(0.028)	(0.027)	(0.032)	(0.031)	(0.029)
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y	Y		Y	Y
Region TDE			Y			Y
R-squared	0.33	0.34	0.35	0.13	0.14	0.15
No. of obs.	16,935	16,935	16,935	23,714	23,714	23,714

Panel C gives the coefficient of the exemption level in thousands of dollars on the log value of output per employee and the log value of output per invested dollar. The first column per dependent variable uses industry, state, and year fixed effects. Industries are measured using 2-digit SIC codes. The second column adds industry time decade effects. The third column adds region time decade effects. Table A4 presents the findings of this table when the exemption dummies are used. Table A5 presents the findings when the far western states are excluded. Table A6 presents the findings if only the northeastern, southern, or midwestern states are included in the sample. The sample period is from 1850 to 1880. *p <0.1; **p <0.05; ***p <0.01 (clustered at the state and decade level).

Table 7. The effect per size tercile

	Steam			Steam horsepower per employee		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Exemption level *	0.001	0.001	-0.000	0.711***	0.686***	0.450**
Smallest tercile	(0.012)	(0.012)	(0.014)	(0.189)	(0.205)	(0.202)
Exemption level *	0.026**	0.019	0.020	0.648***	0.613***	0.384*
Middle tercile	(0.012)	(0.012)	(0.013)	(0.199)	(0.210)	(0.202)
Exemption level *	0.031**	0.028**	0.029**	0.435*	0.461*	0.251
Largest tercile	(0.014)	(0.013)	(0.014)	(0.1221)	(0.245)	(0.228)
Size FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y	Y		Y	Y
Region TDE			Y			Y
R-squared	0.23	0.25	0.25	0.14	0.15	0.16
No. of obs.	23,772	23,772	23,772	8,690	8,690	8,690

The table shows the coefficients of the interaction terms of the exemption level in thousands of dollars and the three tercile dummies on the steam engine dummy, which takes the value of 1 if a firm has a steam engine and zero otherwise, and the amount of horsepower per employee, conditional on a firm having a steam engine. The smallest one-third of the sample, measured as a firm's yearly output in dollars, is categorized in the smallest tercile group. The middle and largest one-third of the sample are categorized in the middle and largest tercile group, respectively. The first column per dependent variable uses size, industry, state, and year fixed effects. Industries are measured using 2-digit SIC codes. The second column adds industry time decade effects. The third column adds region time decade effects. The classification of states into regions is presented in Table 2. The sample period is from 1850 to 1880. *p <0.1; **p <0.05; ***p <0.01 (clustered at the state and decade level).

Table 8. The homogeneous effect over the size of the exemption

A. Steam and Steam horsepower per employee

	Steam			Steam horsepower per employee		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Small	0.006	0.009	0.012	0.269	0.442	0.373
exemption	(0.020)	(0.019)	(0.013)	(0.393)	(0.325)	(0.312)
Midsized	0.001	-0.000	-0.002	0.931**	1.058**	0.425
exemption	(0.015)	(0.015)	(0.013)	(0.433)	(0.480)	(0.549)
Large	0.099*	0.083	0.065	3.013***	3.043***	1.676*
exemption	(0.055)	(0.053)	(0.056)	(0.827)	(0.887)	(1.021)
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y	Y		Y	Y
Region TDE			Y			Y
R-squared	0.16	0.18	0.18	0.14	0.15	0.16
No. of obs.	23,772	23,772	23,772	8,690	8,690	8,690

B. Horsepower per employee and Log Output

	Horsepower per employee			Log Output		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Small	0.192	0.378*	0.188	0.066	0.068	0.093
exemption	(0.279)	(0.228)	(0.262)	(0.062)	(0.056)	(0.059)
Midsized	0.468	0.343	-0.023	0.071	0.075	0.126**
exemption	(0.325)	(0.285)	(0.259)	(0.072)	(0.068)	(0.056)
Large	0.975	0.353	-0.563	-0.238*	-0.208	-0.028
exemption	(0.509)	(0.468)	(0.574)	(0.135)	(0.141)	(0.138)
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y	Y		Y	Y
Region TDE			Y			Y
R-squared	0.17	0.24	0.24	0.22	0.24	0.24
No. of obs.	23,772	23,772	23,772	23,771	23,771	23,771

Panel A shows the effect of the small, medium, and large exemption dummy on the steam engine dummy and the amount of horsepower per employee, conditional on a firm having a steam engine. Small homestead exemptions are exemptions of less than 1000 dollars. Medium exemptions are equal to or in between 1000 and 2500 dollars. Large exemptions are higher than 2500 dollars. The steam engine dummy takes the value of 1 when a firm has a steam engine in place, and zero otherwise. Panel B works with the same explanatory variables for the total amount of horsepower available per employee and the log value of yearly output in dollars. The first column per dependent variable controls for industry, state, and year fixed effects. Industries are measured using 2-digit SIC codes. The second column adds industry time decade effects. The third column adds region time decade effects. The classification of states into regions is presented in Table 2. The sample period is from 1850 to 1880. *p <0.1; **p <0.05; ***p <0.01 (clustered at the state and decade level).

c. Log Output per employee and Log Output per invested dollar

	Log Output per employee			Log Output per invested dollar		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Small	0.008	0.003	0.009	0.025	0.032	0.022
exemption	(0.053)	(0.045)	(0.033)	(0.043)	(0.039)	(0.032)
Midsized	-0.034	-0.026	0.037	0.158***	0.169***	0.092***
exemption	(0.064)	(0.054)	(0.033)	(0.053)	(0.049)	(0.031)
Large	-0.390***	-0.362***	-0.205*	0.289**	0.309***	0.172*
exemption	(0.127)	(0.122)	(0.108)	(0.139)	(0.119)	(0.102)
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y	Y		Y	Y
Region TDE			Y			Y
R-squared	0.34	0.35	0.35	0.13	0.14	0.15
No. of obs.	16,935	16,935	16,935	23,714	23,714	23,714

Panel C shows the effect of the small, medium, and large exemption dummy on the log value of output per employee and the log value of output per invested dollar. Small homestead exemptions are exemptions of 1000 dollars or less. Medium exemptions are equal to or in between 1000 and 2500 dollars. Large exemptions are higher than 2500 dollars. The first column per dependent variable controls for industry, state, and year fixed effects. Industries are measured using 2-digit SIC codes. The second column adds industry time decade effects. The third column adds region time decade effects. The classification of states into regions is presented in Table 2. The sample period is from 1850 to 1880. *p <0.1; **p <0.05; ***p <0.01 (clustered at the state and decade level).

Table 9. The effect per credit dependence tercile

A. Steam and Steam horsepower per employee

	Steam			Steam horsepower per employee		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Exemption level *	0.025	0.028	0.025	0.176	0.255	0.028
Lowest cp tercile	(0.013)	(0.011)	(0.012)	(0.214)	(0.212)	(0.207)
Exemption level *	0.039**	0.021	0.024	0.695***	0.629***	0.397*
Middle cp tercile	(0.016)	(0.015)	(0.016)	(0.205)	(0.218)	(0.212)
Exemption level *	0.032**	0.046***	0.048***	0.787***	0.755***	0.530**
Highest cp tercile	(0.015)	(0.014)	(0.016)	(0.231)	(0.258)	(0.237)
Cp tercile FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y	Y		Y	Y
Region TDE			Y			Y
R-squared	0.16	0.18	0.19	0.14	0.15	0.16
No. of obs.	23,772	23,772	23,772	8,690	8,690	8,690

B. Horsepower per employee and Log Output

	Horsepower per employee			Log Output		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Exemption level *	-0.439**	0.059	-0.241	-0.036	-0.034	0.010
Lowest cp tercile	(0.204)	(0.114)	(0.158)	(0.056)	(0.055)	(0.054)
Exemption level *	0.208	0.097	-0.211	0.068	0.062	0.114**
Middle cp tercile	(0.159)	(0.174)	(0.176)	(0.053)	(0.052)	(0.098)
Exemption level *	0.827***	0.194	-0.098	-0.020	0.006	0.054
Highest cp tercile	(0.299)	(0.248)	(0.257)	(0.056)	(0.059)	(0.061)
Cp tercile FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y	Y		Y	Y
Region TDE			Y			Y
R-squared	0.17	0.24	0.24	0.22	0.24	0.24
No. of obs.	23,772	23,772	23,772	23,771	23,771	23,771

Panel A shows the coefficient of the exemption level in thousands of dollars times the three credit dependence terciles on the steam engine dummy and the amount of horsepower per employee, conditional on a firm having a steam engine. The lowest, middle, and highest cd terciles represent the three credit dependence terciles. Each tercile consists of industries with the lowest, middle, or highest output per employee and represents roughly one-third of the entire sample of firms. The steam engine dummy takes the value of 1 when a firm has a steam engine in place in each decade, and zero otherwise. Panel B works with the same explanatory variables for the total amount of horsepower available per employee and the log value of yearly output in dollars. The first column per dependent variable controls for credit dependence group, industry, state, and year fixed effects. Industries are measured using 2-digit SIC codes. The second column adds industry time decade effects. The third column adds region time decade effects. The classification of states into regions is presented in Table 2. The sample period is from 1850 to 1880. *p <0.1; **p <0.05; ***p <0.01 (clustered at the state and decade level).

c. Log Output per employee and Log Output per invested dollar

	Log Output per employee			Log Output per invested dollar		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Exemption level *	-0.059*	-0.055*	-0.028	0.057	0.115***	0.045
Lowest cp tercile	(0.031)	(0.031)	(0.030)	(0.036)	(0.037)	(0.036)
Exemption level *	-0.029	-0.023	0.011	0.108***	0.102***	0.037
Middle cp tercile	(0.036)	(0.032)	(0.030)	(0.034)	(0.030)	(0.028)
Exemption level *	-0.118***	-0.107***	-0.079**	0.069	0.048	-0.017
Highest cp tercile	(0.036)	(0.038)	(0.037)	(0.041)	(0.037)	(0.035)
Cp tercile FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y	Y		Y	Y
Region TDE			Y			Y
R-squared	0.33	0.34	0.35	0.13	0.14	0.15
No. of obs.	16,935	16,935	16,935	23,714	23,714	23,714

Panel C shows the coefficient of the exemption level in thousands of dollars times the three credit dependence terciles on the log value of output per employee and the log value of output per invested dollar. The lowest, middle, and highest cd terciles represent the three credit dependence terciles. Each tercile consists of industries with the lowest, middle, or highest output per employee. Each tercile consists of roughly one-third of the entire sample of firms. The steam engine dummy takes the value of 1 when a firm has a steam engine in place in each decade, and zero otherwise. The first column per dependent variable controls for credit dependence group, industry, state, and year fixed effects. Industries are measured using 2-digit SIC codes. The second column adds industry time decade effects. The third column adds region time decade effects. The classification of states into regions is presented in Table 2. The sample period is from 1850 to 1880. *p <0.1; **p <0.05; ***p <0.01 (clustered at the state and decade level).

Appendix

Table A1. Summary statistics per region

A: Northeast

Variable	n	Mean	SD	Min	10th	50th	90th	Max
Homestead exemption	12,592	0.504	0.384	0	0	0.3	1	1
Exemption dummy	12,592	0.778	0.416	0	0	1	1	1
Small exemption	12,592	0.491	0.500	0	0	0	1	1
Midsized exemption	12,592	0.287	0.452	0	0	0	1	1
Large exemption	12,592	0.000	0	0	0	0	0	0
Steam	12,592	0.116	0.320	0	0	0	1	1
Steam HP per employee	3,889	0.618	2.763	-1	0	0	1.25	75
HP per employee	12,592	0.858	4.150	0	0	0	1	83
Log Output	12,592	8.348	1.494	4	7	8	10	16
Log Output per employee	7,638	7.081	0.921	1	6	7	8	12
Log Output per dollar	12,541	0.951	0.992	-4	0	1	2	9
Smallest tercile	15,592	0.317	0.465	0	0	0	1	1
Middle tercile	15,592	0.333	0.471	0	0	0	1	1
Highest tercile	15,592	0.350	0.477	0	0	0	1	1
Lowest cd tercile	15,592	0.394	0.489	0	0	0	1	1
Middle cd tercile	15,592	0.388	0.487	0	0	0	1	1
Highest cd tercile	15,592	0.218	0.413	0	0	0	1	1

B: South

Variable	n	Mean	SD	Min	10th	50th	90th	Max
Homestead exemption	4,342	0.988	1.099	0	0	1	2.24	5
Exemption dummy	4,342	0.678	0.467	0	0	1	1	1
Small exemption	4,342	0.119	0.323	0	0	0	1	1
Midsized exemption	4,342	0.509	0.500	0	0	1	1	1
Large exemption	4,342	0.050	0.218	0	0	0	0	1
Steam	4,342	0.192	0.394	0	0	0	1	1
Steam HP per employee	1,747	2	4	0	0	0	6	65
HP per employee	4,342	1.732	5.461	0	0	0	6	100
Log Output	4,341	7.980	1.358	4	6	8	10	14
Log Output per employee	4,018	6.915	1.011	3	6	7	8	12
Log Output per dollar	4,341	0.986	1.023	-4	0	1	2	7
Smallest size tercile	4,332	0.396	0.489	0	0	0	1	1
Middle size tercile	4,332	0.350	0.477	0	0	0	1	1
Highest size tercile	4,332	0.254	0.435	0	0	0	1	1
Lowest cd tercile	4,342	0.286	0.452	0	0	0	1	1
Middle cd tercile	4,342	0.386	0.487	0	0	0	1	1
Highest cd tercile	4,342	0.328	0.470	0	0	0	1	1

Panels A and B contain the summary statistics of the main variables used in the empirical analysis of this thesis for the northeastern and southern regions. The panel shows the number of observations (n), mean, standard deviation (SD), minimum (Min), the 10% and 90% tail range (10^{th} & 90^{th}), median (50^{th}), and the maximum (Max) for the data of 1850 to 1880. The lowest, middle, and highest cd terciles represent the three credit dependence terciles. The deleted observations are not included for the calculation of the summary statistics of this panel. The classification of states into regions is presented in Table 2. Table 3 contains the summary statistics of the entire sample of firms.

C: Midwest

Variable	n	Mean	SD	Min	10th	50th	90th	Max
Homestead exemption	6,376	0.774	0.376	0	0.3	0.92	1	2.08
Exemption dummy	6,376	0.945	0.227	0	1	1	1	1
Small exemption	6,376	0.448	0.497	0	0	0	1	1
Midsized exemption	6,376	0.497	0.500	0	0	0	1	1
Large exemption	6,376	0.000	0	0	0	0	0	0
Steam	6,376	0.214	0.410	0	0	0	1	1
Steam HP per employee	2,852	2	5	0	0	0	6	87
HP per employee	6,376	1.204	4.432	0	0	0	3	87
Log Output	6,376	8.163	1.356	5	7	8	10	15
Log Output per employee	4,839	7.101	0.938	4	6	7	8	12
Log Output per dollar	6,370	0.955	0.990	-4	0	1	2	7
Smallest tercile	6,376	0.338	0.473	0	0	0	1	1
Middle tercile	6,376	0.376	0.484	0	0	0	1	1
Highest tercile	6,376	0.287	0.452	0	0	0	1	1
Lowest cd tercile	6,376	0.330	0.470	0	0	0	1	1
Middle cd tercile	6,376	0.433	0.496	0	0	0	1	1
Highest cd tercile	6,376	0.237	0.425	0	0	0	1	1

D: Far west

Variable	n	Mean	SD	Min	10th	50th	90th	Max
Homestead exemption	462	3.787	2.021	0	0	5	5	5
Exemption dummy	462	0.870	0.337	0	0	1	1	1
Small exemption	462	0.019	0.138	0	0	0	0	1
Midsized exemption	462	0.119	0.324	0	0	0	1	1
Large exemption	462	0.732	0.444	0	0	1	1	1
Steam	462	0.132	0.339	0	0	0	1	1
Steam HP per employee	231	0.687	2.226	0	0	0	1.875	18
HP per employee	462	0.845	3.212	0	0	0	2	40
Log Output	462	8.710	1.412	6	7	9	11	13
Log Output per employee	440	7.545	0.988	4	6	7	9	11
Log Output per dollar	462	1.281	1.277	-4	0	1	3	5
Smallest tercile	462	0.201	0.401	0	0	0	1	1
Middle tercile	462	0.348	0.477	0	0	0	1	1
Highest tercile	462	0.450	0.498	0	0	0	1	1
Lowest cd tercile	462	0.390	0.488	0	0	0	1	1
Middle cd tercile	462	0.338	0.473	0	0	0	1	1
Highest cd tercile	462	0.273	0.446	0	0	0	1	1

Panels C and D contain the summary statistics of the main variables used in the empirical analysis of this thesis for the midwestern and far western regions. The panel shows the number of observations (n), mean, standard deviation (SD), minimum (Min), the 10% and 90% tail range (10^{th} & 90^{th}), median (50^{th}), and the maximum (Max) for the data of 1850 to 1880. The lowest, middle, and highest cd terciles represent the three credit dependence terciles. The deleted observations are not included for the calculation of the summary statistics of this panel. The classification of states into regions is presented in Table 2. Table 3 contains the summary statistics of the entire sample of firms.

Table A2. Dollar values of the acre homestead exemptions

State	Number of acres exempt	Year	Dollar value per acre in state in decade	Dollar value of number of acres	Higher or lower than dollar limit
Arkansas	160	1860	10	1600	N/A
Arkansas	160	1870	4	640	N/A
Georgia	50	1850	4	200	Equal
Georgia	50	1860	6	300	Higher
Iowa	40	1850	6	240	Lower
Iowa	40	1860	12	480	Lower
Iowa	40	1870	20	800	Higher
Iowa	40	1880	23	920	Higher
Kansas	160	1870	13	2080	N/A
Kansas	160	1880	11	1760	N/A
Minnesota	80	1860	10	800	Lower
Missouri	160	1870	14	2240	N/A
Missouri	160	1880	13	2080	Higher
Nebraska	160	1870	11	1760	N/A
North Carolina	50	1860	6	300	Lower
Virginia	160	1870	9	1440	Higher
Virginia	160	1880	11	1760	Higher
Wisconsin	40	1850	10	400	N/A
Wisconsin	40	1860	17	680	N/A
Wisconsin	40	1870	21	840	N/A
Wisconsin	40	1880	23	920	N/A

The table contains the states that had a homestead exemption denoted in acres in place between 1850 and 1880. For each decade that these states had such an exemption, the dollar value per acre, and the total dollar value of the entire acre exemption are presented. The last column states whether the calculated value of the number of exempted acres is higher, equal, or lower than the dollar limit of the exemption in that state and decade. N/A means not applicable, this means that no dollar limit was set in that state and decade. For Nebraska, no value per acre is available for 1870, therefore the dollar value per acre of 1880 is used. The average dollar value of an acre of land per state and decade is based on the work of Barnard and jones (1987) who base their findings on the U.S. agricultural censuses which were published by the U.S. Department of Commerce, Bureau of Census.

Table A3. States enacting and increasing homestead exemption levels, <1850 – 1880

Time	States enacting a homestead exemption for the first time	States changing homestead exemption levels
<1850	AL, CT, FL, GA, IA, ME, MI, MS, OH, PA, TX, VT, WI	
1850 – 1860	AR, CA, IL, IN, KS, LA, MA, MN, NE, NH, NJ, NY, NC, SC, TN	
1860 – 1870	KY, MO, OR, VA, WA, WV	CT, FL, GA, KS, LA, MN, MS, NE, NC, OH, SC, TN
1870 – 1880		AL, AR, IN, MO, NE, TX, WV

The table shows which states enacted and increased homestead exemptions between 1850 and 1880. The data are derived from Farnam (1938) and Goodman (1993), and various state session laws when these two sources contradict each other. Table 4 contains the date that each state enacted its first homestead exemption law and the exempted value at each census year.

Table A4. Exemption dummy effect on the size and operations of firms

A. Steam and Steam horsepower per employee

	Steam			Steam horsepower per employee		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Exemption dummy	0.002	0.003	0.002	0.480	0.637*	0.066
	(0.014)	(0.014)	(0.011)	(0.371)	(0.354)	(0.304)
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y	Y		Y	Y
Region TDE			Y			Y
R-squared	0.16	0.18	0.18	0.14	0.15	0.16
No. of obs.	23,772	23,772	23,772	8,690	8,690	8,690

B. Horsepower per employee and Log Output

	Horsepower per employee			Log Output		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Exemption dummy	0.334	0.359	0.118	0.073	0.076	0.115**
	(0.265)	(0.236)	(0.236)	(0.061)	(0.057)	(0.049)
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y	Y		Y	Y
Region TDE			Y			Y
R-squared	0.17	0.24	0.24	0.22	0.23	0.24
No. of obs.	23,772	23,772	23,772	23,771	23,771	23,771

Panel A shows the coefficient of the exemption dummy on the steam engine dummy, which takes the value of 1 if a firm has a steam engine and zero otherwise, and the number of steam horsepower per employee. Panel B gives the coefficient of the exemption dummy on the amount of horsepower per employee and the log value of a firm's yearly output. The first column per dependent variable uses industry, state, and year fixed effects. Industries are measured using 2-digit SIC codes. The second column adds industry time decade effects. The third column adds region time decade effects. The classification of states into regions is presented in Table 2. Table 6 presents the findings of this table using the exemption level. The sample period is from 1850 to 1880. *p <0.1; **p <0.05; ***p <0.01 (clustered at the state and decade level).

c. Log Output per employee and Log Output invested dollar

	Log Output per employee			Log Output per invested dollar		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Exemption dummy	-0.005	-0.003	0.035	0.095**	0.104**	0.050*
	(0.054)	(0.046)	(0.030)	(0.045)	(0.043)	(0.030)
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y	Y		Y	Y
Region TDE			Y			Y
R-squared	0.33	0.34	0.35	0.13	0.14	0.15
No. of obs.	16,935	16,935	16,935	23,714	23,714	23,714

Panel C gives the coefficient of the exemption dummy on the log value of output per employee and the log value of output per invested dollar. The first column per dependent variable uses industry, state, and year fixed effects. Industries are measured using 2-digit SIC codes. The second column adds industry time decade effects. The third column adds region time decade effects. The classification of states into regions is presented in Table 2. Table 6 presents the findings of this table using the exemption level. The sample period is from 1850 to 1880. *p <0.1; **p <0.05; ***p <0.01 (clustered at the state and decade level).

Table A5. Results excluding the far western region

A. Steam and Steam horsepower per employee

	Steam			Steam horsepower per employee		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Exemption level	0.018	0.015	0.017	0.616***	0.591***	0.371*
	(0.011)	(0.011)	(0.013)	(0.186)	(0.208)	(0.192)
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y	Y		Y	Y
Region TDE			Y			Y
R-squared	0.16	0.18	0.18	0.14	0.15	0.16
No. of obs.	23,253	23,253	23,253	8,460	8,460	8,460

B. Horsepower per employee and Log Output

	Horsepower per employee			Log Output		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Exemption level	0.208	0.095	-0.200	-0.012	-0.005	0.062
	(0.169)	(0.150)	(0.167)	(0.045)	(0.044)	(0.047)
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y	Y		Y	Y
Region TDE			Y			Y
R-squared	0.17	0.24	0.24	0.22	0.24	0.24
No. of obs	23,310	23,310	23,310	23,310	23,310	23,310

Panel A shows the coefficient of the exemption level in thousands of dollars on the steam engine dummy, which takes the value of 1 if a firm has a steam engine and zero otherwise, and the amount of steam horsepower per employee. Panel B gives the coefficient of the exemption level on the amount of horsepower per employee and the log value of a firm's yearly output in dollars. The first column per dependent variable uses industry, state, and year fixed effects. Industries are measured using 2-digit SIC codes. The second column adds industry time decade effects. The third column adds region time decade effects. The classification of states into regions is presented in Table 2. Table 6 presents the findings when the entire sample is used. The sample period is from 1850 to 1880. The three far western states are excluded from the sample. *p <0.1; **p <0.05; ***p <0.01 (clustered at the state and decade level).

c. Log Output per employee and log Output per invested dollar

	Log Output per employee			Log Output per invested dollar		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Exemption level	-0.095***	-0.085***	-0.035	0.060**	0.069**	0.022
	(0.026)	(0.024)	(0.027)	(0.028)	(0.028)	(0.029)
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y	Y		Y	Y
Region TDE			Y			Y
R-squared	0.34	0.35	0.35	0.12	0.13	0.14
No. of obs.	16,495	16,495	16,495	23,252	23,252	23,252

Panel C gives the coefficient of the exemption level on the log value of output per employee and the log value of output per invested dollar. The first column uses industry, state, and year fixed effects. Industries are measured using 2-digit SIC codes. The second column adds industry time decade effects. The third column adds region time decade effects. The classification of states into regions is presented in Table 2. Table 6 presents the findings when the entire sample is used. The sample period is from 1850 to 1880. The three far western states are excluded from the sample. *p <0.1; **p <0.05; ***p <0.01 (clustered at the state and decade level).

Table A6. Regional Differences

A. Northeast

A1. Steam, Steam horsepower per employee, and Horsepower per employee

	Steam		**Steam horsepower per employee**		**Horsepower per employee**	
	(1)	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
Exemption level	-0.006	-0.011	0.030	0.154	-0.186	-0.021
	(0.011)	(0.018)	(0.169)	(0.241)	(0.348)	(0.339)
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y		Y		Y
R-squared	0.10	0.12	0.06	0.07	0.13	0.21
No. of obs.	12,592	12,592	3,861	3,861	12,592	12,592

A2. Log Output, Log Output per employee, and Log Output per invested dollar

	Log Output		**Log Output per employee**		**Log Output per invested dollar**	
	(1)	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
Exemption level	0.096	0.094	-0.020	-0.013	0.112***	0.136***
	(0.067)	(0.066)	(0.033)	(0.036)	(0.029)	(0.030)
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y		Y		Y
R-squared	0.23	0.24	0.31	0.32	0.13	0.14
No. of obs.	12,592	12,592	7,638	7,638	12,541	12,541

Part 1 of panel A shows the coefficient of the exemption level in thousands of dollars on the steam engine dummy, which takes the value of 1 if a firm has a steam engine and zero otherwise, the amount of horsepower per employee, conditional on a firm having a steam engine, and the total amount of horsepower available per employee. Part 2 of panel A gives the coefficient of the exemption level on the log value of a firm's yearly output in dollars, the log value of output per employee, and the log value of output per invested dollar. The first column per dependent variable uses industry, state, and year fixed effects. Industries are measured using 2-digit SIC codes. The second column adds industry time decade effects. The sample period is from 1850 to 1880. The sample of Panel A only consists of the northeastern states. Table 6 presents the findings of the analysis when all regions are included. *p <0.1; **p <0.05; ***p <0.01 (clustered at the state and decade level).

B. South

B1. Steam, Steam horsepower per employee, and Horsepower per employee

	Steam		**Steam horsepower per employee**		**Horsepower per employee**	
	(1)	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
Exemption level	0.047***	0.043***	0.271*	0.287*	-0.305	-0.302
	(0.015)	(0.015)	(0.177)	(0.180)	(0.228)	(0.195)
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y		Y		Y
R-squared	0.25	0.29	0.19	0.20	0.24	0.33
No. of obs.	4,342	4,342	1,746	1,746	4,342	4,342

B2. Log Output, Log Output per employee, and Log Output per invested dollar

	Log Output		**Log Output per employee**		**Log Output per invested dollar**	
	(1)	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
Exemption level	0.036	0.048	-0.043	-0.055	-0.055	-0.044
	(0.065)	(0.062)	(0.035)	(0.037)	(0.035)	(0.032)
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y		Y		Y
R-squared	0.23	0.27	0.35	0.37	0.14	0.17
No. of obs.	4,341	4,341	4,018	4,018	4,341	4,341

Part 1 of panel B shows the coefficient of the exemption level in thousands of dollars on the steam engine dummy, which takes the value of 1 if a firm has a steam engine and zero otherwise, the amount of horsepower per employee, conditional on a firm having a steam engine, and the total amount of horsepower available per employee. Part 2 of panel B gives the coefficient of the exemption level on the log value of a firm's yearly output in dollars, the log value of output per employee, and the log value of output per invested dollar. The first column per dependent variable uses industry, state, and year fixed effects. Industries are measured using 2-digit SIC codes. The second column adds industry time decade effects. The sample period is from 1850 to 1880. The sample of Panel B only consists of the southern states. Table 6 presents the findings of the analysis when all regions are included. *p <0.1; **p <0.05; ***p <0.01 (clustered at the state and decade level).

C. Midwest

C1. Steam, Steam horsepower per employee, and Horsepower per employee

	Steam		**Steam horsepower per employee**		**Horsepower per employee**	
	(1)	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
Exemption level	-0.078**	-0.068*	1.040	2.059	-0.554	-0.364
	(0.034)	(0.037)	(1.279)	(1.411)	(0.703)	(0.697)
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y		Y		Y
R-squared	0.25	0.27	0.17	0.20	0.17	0.23
No. of obs.	6,376	6,376	2,852	2,852	6,376	6,376

C2. Log Output, Log Output per employee, and Log Output per invested dollar

	Log Output		**Log Output per employee**		**Log Output per invested dollar**	
	(1)	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
Exemption level	-0.065	-0.041	0.013	-0.013	0.093	0.109
	(0.127)	(0.131)	(0.076)	(0.076)	(0.080)	(0.078)
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry TDE		Y		Y		Y
R-squared	0.24	0.26	0.39	0.41	0.14	0.16
No. of obs.	6,376	6,376	4,839	4,839	6,370	6,370

Part 1 of panel C shows the coefficient of the exemption level in thousands of dollars on the steam engine dummy, which takes the value of 1 if a firm has a steam engine and zero otherwise, the amount of horsepower per employee, conditional on a firm having a steam engine, and the total amount of horsepower available per employee. Part 2 of panel C gives the coefficient of the exemption level on the log value of a firm's yearly output in dollars, the log value of output per employee, and the log value of output per invested dollar. The first column per dependent variable uses industry, state, and year fixed effects. Industries are measured using 2-digit SIC codes. The second column adds industry time decade effects. The sample period is from 1850 to 1880. The sample of Panel C only consists of the midwestern states. Table 6 presents the findings of the analysis when all regions are included. *p <0.1; **p <0.05; ***p <0.01 (clustered at the state and decade level).