LUND UNIVERSITY
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The Effects of Non-Compete Agreements Enforceability on Entrepreneurship in the United States, 1995-2011

by
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Abstract: Restrictions of future employment in the form of non-compete agreements (agreements that restrict an employee from joining, forming, associating, or starting a competing firm) are commonly used in the American labor market. Yet their effects on entrepreneurship is not fully understood. Specifically, the relationship between non-competes and entry of firms is somewhat neglected. Therefore, an attempt to provide additional insights on the links between NCA enforceability and entrepreneurship will be made in this work. The lack of a unitary approach to the enforcement of NCA across time and states permitted an estimation of an econometric model, utilizing this state-year variation. The datasets used in this work, covering all states between 1995-2011, are the Business Dynamics Statistics and the Current Population Survey. The main results of this research suggest that a shift from the lowest to the highest enforceability level holds a 3.4% negative effect on the entry rate of firms. This effect varies across different occupations, dimensions of NCA enforceability, and metropolitan status. Alongside a humble contribution to the academic debate, this research might equip policymakers with additional knowledge regarding the effects of NCA enforceability.

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1

Introduction

"...Now, guys, tell me, give me an economic reason why a sandwich maker has to sign a non-compete clause. Tell me, other than drive down and keep down wages ... I call it greed. Give me an economic justification for that." (Biden, 2019, 00:36:07)

For many years, scholars and policymakers debated on the effects non compete agreements have different economic outcomes. Also expressed in the quote above, by the former vice president, Joe Biden, the democratic party's candidate for president of the United States. Non compete agreements (NCA) are agreements between an employer and an employee, restricting the employee's future employment. In the United States, enforcing these agreements is in the jurisdictional of the different states[1], whilst the level of enforceability changes between states and across time. The focus on the effects NCA have on employers, employees, firms, regions, and states accelerated in recent years, when more evidence of these effects was presented. However, much of the existing empirical evidence deals with specific case studies or industries, lacking the nation-wide approach offered in this research.

Noncompetes are fairly prevalent in the US labor force, and the interest in their effects on the economic performance grew through the years. According to scholars' estimations, 20% of the American labor force was bound by an NCA in 2014, while almost two-fifths of it had signed an NCA at some point in their employment history (Starr et al., 2019). In some occupations, the estimated share of workers bound by an NCA could climb up to a more than 70% (Bishara et al., 2015a).

The roots of the economic academic discussion over the effects of NCA could be traced back to the work of Saxenian (1994). The author compared the economic development of two famous industrial districts, Massachusetts's Route 128 and California's Silicon-Valley, and argued knowledge spillovers played a major role in the second divergence from the first. Gilson (1999) expended her ideas and argued California's ban of NCA allowed this knowledge spillover to occur uninterruptedly, while

[1] Throughout this work, the District of Colombia will be regarded as a state.

Massachusetts's hard-line approach hindered it.

While the works following Gilson (1999)'s publication were characterized in their attempt to support his thesis (Stuart and Sorenson, 2003; Fallick et al., 2006), the research revolving around the effects of NCA boomed in the past ten years. On the individual level, NCA enforceability was found to have an effect on, among other indicators, wages, mobility, training and human capital investments (Marx et al., 2009; Lavetti et al., 2014; Hausman and Lavetti, 2015; Balasubramanian et al., 2018; Lipsitz and Starr, 2019; Jeffers, 2019; Johnson et al., 2019; Starr, 2019). More closely related to this work, scholars researched the effects of NCA enforceability on the business dynamics, firms entry and entrepreneurship (Kang and Fleming, 2017).

Nevertheless, many of these works lacked a national view of the effects of NCA enforceability. One of the main shortcomings of the economic literature on these effects is the absence of reliable and sensitive measurement of levels of NCA enforceability across time and states. This, in turn, led economists to exploit sporadic changes in states' legal regimes to facilitate a semi 'natural experiment' setting. However, the work of Bishara (2011) addressed this deficiency and offered a measurement method for NCA enforceability. This method was later used by Hausman and Lavetti (2015) who constructed an NCA enforceability index opening the door for more nuanced research on the matter.

This research aims to position itself within the growing body of literature, using the state-year variation of NCA enforceability to estimate its impact on entrepreneurship. The analysis conducted in this work will be on the state level and will cover 1995-2011. The main research question of this work would be: *How and to what extent does NCA enforceability affect entrepreneurship in the United States?*

In an attempt to answer this question, an estimation of multiple periods, groups, and treatment intensities difference-in-difference model will be conducted. Relaying on the state-year variation provided by Hausman and Lavetti (2015)'s index, the effects NCA enforceability has on entrepreneurship would be captured using the methodology presented in Johnson et al. (2019). In accordance, the Business Dynamics Statistics and the Current Population Survey, two commonly used datasets, are to be used in this work.

Understanding how and to what extent entrepreneurship is being affected by the enforceability is of great value. Academically, this work is the first one (to the best of my knowledge) to estimate the effect NCA enforceability holds on entrepreneurship using a state-year variation. This work also contributed to the existing literature by conducting the analysis on the occupational level, using the Current Population Survey. In addition to its contribution to the academic debate, this work is of value to policymakers in the state and federal level. Policymakers at the state level, such as state legislators, governors, or for this matter even judges, could be interested in a

better understanding of the externalities of changes in NCA enforceability. Similarly, on the federal level, a growing interest on the matter has been demonstrated from the white house, leading the Obama administration to publish a report on the matter, suggesting policy changes[2].

Following this introduction, four chapters constitute this work. The next chapter will begin by equipping the reader with historical and legal background followed by a review of features, prevalence, and measurement methods of NCA. Closing the second chapter is a review of the literature dealing with the effect of NCA enforceability. The third chapter will start with a review of the relevant theoretical framework, followed by a presentation of the three data sources used in this research: the Business Dynamics Statistics, the Current Population Survey and the NCA enforceability index. This work uses a quantitative approach, conducting an estimation of an econometric model as its identification strategy. A presentation of this empirical strategy will close the third chapter. The fourth chapter will present the results and discussion of this econometric analysis. Lastly, the fifth chapter concludes this research.

[2]See: https://www.treasury.gov/resource-center/economic-policy/Documents/UST%20Non-competes%20Report.pdf [accessed: May 8th, 2020].

2

Historical Background and Literature Review

Being interdisciplinary in nature, non-compete agreements had been researched from different angels throughout the years. This chapter will start by covering the legal-history of NCA from the English guilds system to our times. Afterward, a review of the prevalence, and some common features of NCA will be conducted. The third subsection will evaluate previous attempts at measuring NCA enforceability. Closing this chapter is a presentation of previous literature dealing with the economic effects of NCA. The main goal of this chapter is to provide the needed historical, legal, and contextual knowledge related to NCA.

2.1 Non-Compete Agreements' Enforceability: Historical Perspective

Enforcement of NCA in the United States is under the jurisdiction of individual states. The governing sources courts rule in the light of are the common-law or states' statutory law (Bishara, 2011). Understanding these sources and their development over the years might improve any analysis of the impacts of NCAs. This section will shortly review the origins and historical development of NCA enforceability starting with preindustrial English common-law.

Scholars of the law traced the origins of non-compete agreements back to England's guilds system, where the relationship between masters and apprentices was central to economic development. England's social order of masters, journeymen, and apprentices during the fifteenth and sixteenth centuries had two main economic goals, ensuring the availability of labor, needed by the masters, and securing the training, expertise, and passage of knowledge (Blake, 1960). Mutual interest was the driver of this relationship, where the master enjoyed the apprentice's labor, and

the apprentice received a chance to climb up the social ladder and become master craftsmen himself (Glick et al., 2002).

During the "early common-law" (Glick et al., 2002, p. 360) period, future employment restrictions were viewed as unlawful. The earliest documented case dealing with an attempt to restrict future employment, the *Dyer's* case, took place in 1414 and dealt with a master's attempt to restrict his former apprentice's ability to practice his trade in the same town with him. The two had an agreement of such nature, and the defendant argued he met the restrictions included in the agreement. The court in this case and similar court battles to follow, ruled such restrictions on future employment are illegal and therefore void (Blake, 1960; Glick et al., 2002).

If one wants to understand the reasoning behind such a hard-line stand of the English common-law against any form of future employment, one should understand the societal and historical context of that time. According to Glick et al. (2002) During the aftermath of the black death, labor became extraordinarily scarce, leading to many legal and societal adjustments such as the criminalization unemployment and a ban of restrictions on mobility. The scholars argued that the rising power of guilds occurring at the same time posed a risk to mobility and to provisions of services and goods to the public. As a result, courts took a hard-line on the restriction of trade and future employment (Fisk, 2000; Glick et al., 2002).

However, the changes brought about by the transition to capitalism infiltrate the courts and the common-law. The most significant and regarded ruling was the 1711's *Mitchel v. Reynolds* (Blake, 1960). A rent agreement of a bakery was at the heart of this court battle, the first side of the agreement was the owner of the bakery, who offered to rent it to the tenant. The owner, a baker, agreed not to work in his profession for five years after the deal was made. The agreement also states a penalty to be paid to the tenant if the baker breached the agreed terms. The tenant asked the court to intervene, arguing for a violation of this agreed restriction, while the baker argued such restriction on his future-employment was illegal under the common-law (Blake, 1960; Fisk, 2000; Glick et al., 2002). The court, in a ground-breaking opinion by lord Macclesfield, ruled in favor of the plaintiff. The *Mitchel v. Reynolds* opinion is the first documented deviation from the common-law's tradition, baning any post-employment restrictions.

In addition to the importance of such deviation from the traditional view on future employment restrictions, the *Mitchel v. Reynolds* opinion formulated "the role of reason" (Blake, 1960, p. 646) test. A test to be used when assessing the validity of post-employment restrictions. Being the common law's most cited opinion in this field for 250 years (Blake, 1960), the guidelines of "balancing the social utility... against their possible undesirable effects upon the covenantor and the public" (Blake, 1960, p. 630) were found to be extremely influential on future judges.

Moreover, Glick et al. (2002) described how as time progressed the transition from feudalism to capitalism increased the usage of contracts in the industrial labor market. They argued that ideas of economic freedom grew to be fundamental in the new social order, and courts hereby had to adjust their rulings in accordance. The scholars claimed courts still relied on the Macclesfield opinion but gave a more flexible and up-to-date interpretation of the 'role of reason' test. These developments were in line with the new risk-taking capitalistic and entrepreneurial spirits of the early industrial days.

On the other side of the Atlantic, American court rulings on post-employment restrictions were closely linked to the English ones. Blake (1960) points out two main differences between the American and the English approach at the eve of the industrial era. First and rather technical, American courts focused on definitions of national and state borders and questions of jurisdiction resulted from them. According to the author, a second difference was the American courts' tendency to protect the employee while focusing less on the contracts and their technicalities. Whereas these differences were significant, by the beginning of the twentieth century, both in American and English courts, the spirit of the 'rule of reason' (Blake, 1960, p. 646) still guided the enforcement of post-employment restrictions.

The winds of structural change accelerated in the nineteenth century and increased the pressure for a legal infrastructure that could meet the growing need of corporations to protect their trade secrets. Fisk (2000) reviewed the early attempts of firms to challenge the common law's lack of sufficient protection of trade secrets. Resulting in the establishment of a new doctrine in American courts, the trade secrets doctrine. The author argued "[t]he doctrine also reflected the growing conflict between the free labor ideology and the demands of industrialization which increasingly called for the corporate control of every tangible and intangible product of work" (Fisk, 2000, p. 535).

Additionally, during the second half of the nineteenth century, faster growth in the American common-law had occurred marking the departure from the English one. Among the noteworthy developments were several major state's supreme courts' rulings practically expending the legal basis of NCA enforceability (Blake, 1960; Fisk, 2000). Contrasting to the ruling trend of this period, in 1872 California's legislators prohibited almost all forms of post-employment restrictions (Fisk, 2000). Overall, between 1800-1930, American courts helped employers to protect their intellectual property mainly by enforcing non-disclosure agreements but also by expending the reasons allowing greater enforcement of non-compete agreements (Fisk, 2000).

Furthermore, on the federal level, several attempts to regulate and lay a unitary legal basis on future employment restrictions had failed over the years. One worth

mentioning legislation of the United States Congress, aiming to address questions of fair competition took place in 1890. "The Sherman Act" (Glick et al., 2002, p. 368) was promoted in capitol hill as a result of the rise of cartels in the post-civil war US economy. Initially, parts of the suggested act were an adoption of the common-law's hard-line principals preventing restraints on trade. However, as a result of a political compromise, some parts of the bill used vague language, giving the courts room for interpretations. Most importantly for the purpose of this paper, "post-employment restraints remained one of the few areas that continued to fall within the domain of common-law restraints of trade" (Glick et al., 2002, p. 370).

Since the enactment of the Sherman Act and well into the twentieth century, the United-States experienced high levels of variability in the enforceability of NCA, leading to low levels of predictability of courts' rulings. A significant difference between the states and federal polices, high variation between the different states, and different rulings from different judges applying the reasonableness test are all reasons for this unpredictability (Glick et al., 2002). Today, only eighteen states applied statutory acts related to NCA (Bishara, 2011). The lack of a unified federal policy of post-employment restrictions' enforceability is a main cause of the between states' variance in enforceability at the heart of this research.

2.2 Features and Prevalence of Non-Compete Agreements

The growing interest in NCA and their effects on different economic outcomes led scholars to research the spread of these restrictive tools alongside some of their common features. Sadly, there is no available statutory registration of NCA, making it difficult for scholars to estimate its prevalence in the American labor market. However, some scholars in recent years conducted surveys among different clusters of the working American population and offered some estimates and interesting insights, to be covered in this sub-section.

Generally, in their quest to limit the spillover of knowledge to competitors, non-compete agreements restrict the employee from joining, forming, associating, or starting a competing firm (Blake, 1960; Bishara, 2011; Starr et al., 2019). Such agreements usually include time and geographical limitations. For example, figure 2.1[1] provide an example of a non-compete clause in an Amazon employment contract. Observable in this clause is its eighteen months after the separation limitation and the absence of a geographical limitation.

Some early evidence of widespread use of NCA in segments of the American

[1]This figure was taken from Starr et al. (2019)'s appendix E, figure E1, p. 77.

4. RESTRICTIVE COVENANTS.

4.1 Non-Competition. During employment and for 18 months after the Separation Date, Employee will not, directly or indirectly, whether on Employee's own behalf or on behalf of any other entity (for example, as an employee, agent, partner, or consultant), engage in or support the development, manufacture, marketing, or sale of any product or service that competes or is intended to compete with any product or service sold, offered, or otherwise provided by Amazon (or intended to be sold, offered, or otherwise provided by Amazon in the future) that Employee worked on or supported, or about which Employee obtained or received Confidential Information.

Figure 2.1: An Amazon Non-Compete Clause

labor market were presented in recent years. According to Kaplan and Strömberg (2001), venture capital firms include restrictions on future-employment for 90% of the entrepreneurs funded by them in an attempt to reduce their risks. Schwab and Thomas (2006), Garmaise (2011) and Bishara et al. (2015a) presented estimation of the prevalence of NCA in top executives employment contracts, and suggested 67.5%, 70.2% and 78.7% of them had signed one, respectively. Other works estimated NCAs' prevalence among technical professionals (Marx, 2011) or physicians (Lavetti et al., 2014), the first suggested 43.3% were bound by NCA while the second argued 45.1% were at this situation. While all of the above dealt with higher-paid occupations, Johnson and Lipsitz (2019) conducted a survey among a sample of hair salon owners. One of their results shows that 30% of newly hired hairstylists were asked to sign an NCA, suggesting NCA are common among lower-paid professions as well.

Hence, one might argue this body of work is rather scattered and provides information related to specific clusters of the labor force. The most comprehensive and systematic attempt to estimate the prevalence of NCA among the entire American labor force was conducted by Starr et al. (2019). The scholars conducted a nation-wide survey, using a representative sample in their quest to uncover the characteristics of NCA in the United States. Among their main results, they found that 20% of the American labor force had a non-compete restriction in their employment contract in 2014, while 38.1% of American workers were at least once bound by one. They also found higher use of NCA among high skills and high wages positions, yet NCA were also common among lower-paid employees (Starr et al., 2019).

Additionally, Starr et al. (2019)'s work also shed some light on the ways NCA are introduced to candidates. According to them, only 10% of workers bound by NCA negotiate their terms, while a third of NCA are introduced after the job was accepted. This is found to be a key element, more training, higher wages and greater satisfaction was reported when the NCA was introduced before the acceptance of the job (Starr et al., 2019). The reason firms, according to some scholars, wait with the introduction of an NCA until candidates accept the offered jobs, is that it weakens the bargaining power of the candidate (Marx, 2011).

Another contribution of their work was an analysis of NCAs' prevalence in different occupations and industries. The occupations which NCA are most common in (more than 35%) are architecture, engineering, computer and mathematical jobs. Additionally, the industries which demonstrated high use of NCAs are information; mining and extraction; professional and scientific services (more than 30%). While the use of NCAs varied across occupations, frothy eight states, following the American Bar Association position, restricted the use of NCA for those practicing the law. Interestingly, the state's level of enforceability was argued to have no effect on the prevalence of NCA within the state (Starr et al., 2019).

2.3 Measuring Non-Compete Agreements Enforceability

As mentioned above, the enforcement of NCA lacks uniformity between the different states. This variance led to several attempts by scholars to measure or utilize states' strictness in enforcing such agreements. This section will begin with a review of some of these works, to be followed by a presentation of Bishara (2011)'s method, evaluating NCA enforceability across the United State.

As mentioned above, Saxenian (1994)'s work triggered Gilson (1999) to offer a thesis, suggesting non-competes played an important role in the development of high-tech industrial districts. This ignited an academic debate over the effects of such agreements. Gilson (1999) compared between two relatively similar districts, Massachusetts's route 128 and California's silicon valley. The scholar concluded, among other things, that California's lack of NCA enforcement helped accelerate knowledge spillovers and circulation, not observed in Route 128, where NCA are enforceable.

In his seminal thesis, Gilson (1999) analyzed the legal infrastructure of the two regions. As a start, he found both held a similar approach to trade secrets protection. Afterward, he turned to analyze the legal differences in NCA enforceability between Massachusetts and California. The results of this analysis were a crucial part of his research and were used to explain the differences in the economic outcomes of the two regions. Thus, the importance of Gilson (1999)'s work was double. First, he centered his arguments on the importance of NCA to economic outcomes and triggered a body of academic work following his footsteps. The second was his attempt to measures, compare, and utilize levels of NCA enforceability in two different states.

Following Gilson (1999), Stuart and Sorenson (2003) examined the effects of NCA enforceability on the funding of biotechnology start-ups. They found weaker enforcement of NCA resulted in higher entrepreneurial activity in the biotechnology

sector. A very significant contribution was the authors' attempt to expend Gilson (1999)'s narrow examination of NCA enforceability. Stuart and Sorenson (2003) used a dummy variable to identify weak or strong NCA enforcement regimes. This method was later criticized by Bishara (2011) who argued using a dummy variable lacks sensitivity to a wide variety of enforcement levels. Yet, they were the first, to the best of my knowledge, to evaluate enforceability levels across all 50 states and utilize it in an empirical research.

Another work aiming to facilitate an empirical basis to Gilson (1999)'s thesis was conducted by Fallick et al. (2006). Focusing on labor mobility, the researchers used a "California" and "Massachusetts" dummy variables in order to estimate the potential effect of NCA enforceability levels. Their findings identified a positive effect of the California dummy variable, corresponding with Gilson (1999)'s predictions. However, Fallick et al. (2006)'s method failed to separate the effects of non-competes from other constant state-level elements, and the authors noted they found "no direct evidence that the California effect on mobility is due to the absence of enforceable non-compete agreements." (Fallick et al., 2006, p. 481)

In addition, Marx et al. (2009) used a 'natural experiment' design, capitalizing on a specific change in legislation. The scholars used changes to Michigan's legal approach towards NCA in their quest to identify their impact on inventors' mobility. The work of Marx et al. (2009) included an estimation of a difference-in-difference model, using the change in Michigan's law as an exogenous intervention. Yet, the model's need for a control group forced them to classify states according to their NCA enforcement status similar in spirit to the attempts made by Stuart and Sorenson (2003). However, Bishara (2011) argued both attempts lacked the sensitivity needed in order to capture differences between states.

Moreover, an attempt to developed an NCA enforceability index, closer in nature to one of Bishara (2011) was conducted by Garmaise (2011). The scholar used twelve questions in an attempt to capture different aspects of states' enforceability of NCA. For each question in a certain year and state, his method rewarded one point for an answer above a declared threshold. This approach was more nuanced than previous attempts, and partly addressed the sensitivity problem. Notwithstanding, Bishara (2011) criticized this index due to "the lack of a comprehensive approach and a subtle legal analysis of the material ... It also lacks a theoretical basis for the setting of thresholds and the omission of an associated weighting option for each factor"(p. 766). On the whole, Garmaise (2011) and the previously mentioned works demonstrated a growing academic need to develop a reliable NCA enforceability measurement.

In an influential work, Bishara (2011) offered a coherent, thorough, nuanced, and sensitive approach of capturing the variation in NCA enforceability across all

51 states. His work suggested measuring changes in enforceability levels across time, allowing to present the within and between states trends in the enforceability of NCA. The rest of this section deals, present, and discuss Bishara (2011)'s NCA enforceability index, on which this work's treatment variable is based.

Constructing a sensitive and reliable measurement of NCA enforceability required Bishara (2011) to review the legal developments, both in statutory laws and in each state's case-law. Therefore, Much like previously reviewed works (such as Stuart and Sorenson (2003) and Garmaise (2011)), Bishara (2011) used Malsberger's *Covenants Not to Compete: A State-by-State Survey* as his main legal source. Malsberger's treatise is an impressive documentation of the legal foundations of NCA enforceability. For each of the fifty-one states, the treatise answers twenty five questions and sub-questions. Using his knowledge of the law, Bishara (2011) analyzed and coded the legal sources in order to produce a much needed reliable NCA enforceability index.

Exploiting his legal expertise, Bishara (2011) chose seven questions representing seven dimensions of strictness in NCA enforceability. Each state in each year[2] receives a score, calculated as the weighted sum of the grades given in each of the seven questions. The questions, detailed in Table 2.1, sought to incorporate all legal aspects of NCA Enforceability. They range from statutory acts to the burden of proof during the litigation process, arguably capturing most of the variation in enforceability.

The first question (Q1) examines the existence of a state statutory act. States were graded ten points if they had in place an act determining strict enforcement of NCA, five if they had no statue or a neutral one, and zero if they had an act prohibiting enforcement. The second question (Q2) evaluates states' recognition of employers' protectable interests. Where ten points were given to states who widely define such interests, five were given to those with a balanced approach, and zero to states who limit such interests (Bishara, 2011).

The third question (Q3) weights the burden of proof in NCA trials, where ten, five, and zero points were given to week, balanced and strong burden on the employer, respectively. The fourth question (3a) deals with the timing of signing the NCA. Ten points were given to states who accept NCA signed at the beginning of the employment period. Five points for a mixed approach while zero points were given if signing at the beginning of the employment period is not sufficient for enforcement of NCA (Bishara, 2011).

The fifth question (Q3bc) considers both changes in employment conditions and the duration of it. Ten points were granted in cases where duration or changes in

[2] Bishara (2011) only produced his index for 1991 and 2009.

Table 2.1: Seven Questions Measuring NCA Enforceability According to Bishara (2011)

Question Number	Weight	Question
Q1	10	"Is there a state statute that governs the enforceability of covenants not to compete?" (Bishara, 2011, p. 773)
Q2	10	"What is an employer's protectable interest and how is that defined?" (Bishara, 2011, p. 774)
Q3	5	"Does the signing of a covenant not to compete at the inception of the employment relationship provide sufficient consideration to support the covenant?" (Bishara, 2011, p. 775)
Q3a	10	"Does the signing of a covenant not to compete at the inception of the employment relationship provide sufficient consideration to support the covenant?" (Bishara, 2011, p. 775)
Q3bc	5	"Will a change in the terms and conditions of employment provide sufficient consideration to support a covenant not to compete entered into after the employment relationship has begun? Will continued employment provide sufficient consideration to support a covenant not to compete entered into after the employment relationship has begun?" (Bishara, 2011, p. 776)
Q4	10	"If the restrictions in the covenant not to compete are unenforceable because they are overbroad, are the courts permitted to modify the covenant to make the restrictions more narrow and to make the covenant enforceable? If so, under what circumstances will the courts allow reduction and what form of reduction will the courts permit?" (Bishara, 2011, p. 776)
Q8	10	"If the employer terminates the employment relationship, is the covenant enforceable?" (Bishara, 2011, p. 777)

This table could also be found in (with more details), Hausman and Lavetti (2015), Balasubramanian et al. (2018) and Johnson et al. (2019).

terms allowed enforcement of NCA. Five points are granted to a more balanced approach, and zero to cases were neither could be a cause for enforcement (Bishara, 2011).

The sixth question (Q4) reviews the courts' ability to modify contracts when necessary for enforcement. A score of ten was given to states where courts are generally allowed to modify contracts in order to maximize the possibilities to enforce it, a score of five is given to a balanced ability of the courts to modify contracts[3]. Zero was granted to states were no modification is allowed (Bishara, 2011).

The seventh and last question (Q8), analyze the effect of involuntary termination of the contract. A grade of ten points was given in cases where it makes no difference who ended the employment. Five points were given if the court has to analyze the reason for termination and zero in cases where involuntary termination made the NCA unenforceable (Bishara, 2011).

To conclude, Bishara (2011) offered a sensitive, thematic, and systematic way to analyze, measure, and quantify the levels of NCA enforceability across time and states. His index allowed scholars to research the effects of these agreements and the legal structure governing them. This work, as discussed in section 3.4 will use his method in the pursuit of the impact NCA might have on entrepreneurship.

2.4 The Effects of Non-Compete Agreements Enforceability

In recent years there has been a growing interest in the economic effects of NCA enforceability, and an increasing number of publications attempted to enrich the academic knowledge in this field. Inspired by Saxenian (1994), Gilson (1999)'s thesis connected the legal infrastructure of NCA enforceability to the economic success of California's silicon valley. Later, scholars sought to estimate NCAs' effects on different economic outcomes. This section will review some of those works, with an attempt to provide the reader with an overview of the academic writing in this field.

The relationship between NCA enforceability and economic indicators, such as wages, mobility, human capital, training, and investments was researched by several scholars. A commonly used approach in the literature is to exploit the exogenous nature of legislation changes in order to facilitate a natural experiment. Utilizing the Michigan 1985 legislation changes, Marx et al. (2009) found mobility was negatively affected by an increase of enforceability. They also found that the more specific individuals' specialization is, the stronger the negative effect they would experience (Marx et al., 2009). Balasubramanian et al. (2018) used such an approach following

[3]Also known as the "blue pencil" doctrine.

the Hawaiian ban of NCA for high-tech workers. The scholars observed that the ban caused an increase of 11% and 4% in mobility and wages of newly hired, respectively. In addition, they found higher wages in states where the NCA enforceability level was low.

Lipsitz and Starr (2019), following the Oregon ban of NCA for hourly-paid workers, found a strong positive effect of the ban on these workers' wages (an increase of 2-3%). Also, scholars found an increase in labor mobility (12-18%). Jeffers (2019), in a recent work, used a dataset obtained from LinkedIn in order to identify effects on mobility. She found that in knowledge-intensive occupation, lower mobility and fewer starts of new companies were associated with an increase of NCA enforceability.

Focusing on physicians, Lavetti et al. (2014) observed higher productivity for those bound by an NCA (40%), wages (14%), and return for tenure (12%) relative to those not bound by one. These results, according to the scholars, were driven by an increase in human capital investment for those under NCAs. Following, Hausman and Lavetti (2015) argued an acceleration in NCA enforceability caused an increase in physicians prices. Here one should mention Hausman and Lavetti (2015) produced an enforceability index, in accordance with Bishara (2011)'s guidelines, their index will be used in this work.

In a compelling paper, Johnson et al. (2019) provided a strong indication for the negative effect NCA enforceability has on earnings. They estimated a 3-4% drop in earnings associated with a shift from low to high enforceability of NCA. Starr (2019), presented supporting results, arguing higher enforceability resulted in a 2.3% wage decrease in occupations where higher NCA litigation was observed. In addition, Starr (2019) found a positive effect of harsher enforceability on training paid by the employer. Further, an analysis of specific fractions of the labor force produced different results, for example, Kini et al. (2019) found higher compensation for CEOs bound by an enforceable NCA. Kini et al. (2019)'s findings were also compliant with the earlier work of Garmaise (2011), who indicated an increase in executive stability, a shift from compensations to wages for executives, and a reduced per worker capital expenditure, all associate with stricter NCA enforceability. The Johnson et al. (2019) research holds particular importance for this paper, due to its use of both the Current Population Survey and the NCA enforceability index, to be discussed below.

The effects stricter enforcement of NCAs had on entrepreneurship were the center of several academic works. First, the work of Samila and Sorenson (2011) estimated a fixed-effects model raveling growth of venture capital in states with lax enforcement had a higher positive effect on the number of patents, firms start and employment. Their main argument was for a strong linkage between NCA legal regime and the

economic environment. More on the firms' level, Conti (2014), following a legislation change in Florida, found stricter enforceability led to an increase in companies' investment in relatively risky research and development projects. He reasoned this finding by the reduced worry of companies' from losing valuable knowledge but also from gaining valuable knowledge even in cases of a failure of a specific project, thus mediating the loss (Conti, 2014).

An important and relevant work is the one of Kang and Fleming (2017). Similar to Conti (2014), followed by the Florida legislation change and estimated a Difference in Difference model, revealing the effects on the business environment of the state. Firstly, they found the change caused an increase in Florida's number of large establishment registrations. Secondly, it also caused an increase in the portion of big firms' employment. Thirdly, they found a smaller chance to establish a start-up in the state after the legal change and the share of those employed by them decreased as well. Fourthly, the authors found a 7.5% decrease in the entry of small (1-4 employees) firms, as a result of hardening NCA enforceability. Kang and Fleming (2017)'s work is of special value to this paper due to its use of the business dynamics statistics database, to be used in this work.

Furthermore, Marx et al. (2015) suggested NCA enforceability is also linked to "brain drain" (p. 394). Joining other works using the Michigan legislation changes, the scholars suggested a movement from states with high NCA enforceability to those with a lax one is evident. This effect is more significant for highly capable workers (Marx et al., 2015). Another effect on highly educated workers (engineers), presented by Marx (2011), found them to be more likely to take career detours, working in another occupation or industry, if bound by an enforceable NCA. Moreover, stricter enforceability was linked to a reduction of "within-industry-spinouts" (Starr et al., 2018, p. 552). Yet those who managed to start enjoyed a relatively high survival rate (Starr et al., 2018).

In summary, the role of NCA enforceability was the center of a growing body of economic academic work. The first works, igniting the discussion were published in the 1990s and were followed by a small number of publications. The research of the economic impact of NCA accelerated only after 2009 when works seeking to quantify levels of enforceability were published and opened the door for intensive empirical research. This work would strive to add new insights into the effects of NCA on different aspects of entrepreneurship.

3

Theoretical Framework, Data and Econometric Model

This chapter will be divided into three parts, theoretical framework, data and the econometric model. The first subsection will present the main relevant theory, its mechanisms and predictions. The second third and fourth subsections with cover the three main data sources used in this work: the Business Dynamics Statistics, the Current Population Survey, and the NCA enforceability index. The first two are published by the US government and are commonly used for economic research. The third is a private dataset, in which access to it was generously granted for the purpose of this paper. This section will present and analyze these sources and will point out some of its strengths and weaknesses. The last subsection will present an econometric model, to be used in order to identify the effect of NCA enforceability on entrepreneurship.

3.1 Theoretical Framework

Modeling the mechanisms driving the effects of non-competes on entrepreneurship allowed a better understanding of them, and simplified scholars attempt to uncover these effects. Several theories were developed through the years, all in an attempt to describe the different channels in which NCA affect different economic outcomes. This subsection will present Starr et al. (2018)'s model of the connection between high NCA enforceability and firms' starts.

In their quest to expose the effects of NCA on entry, exist and size of firms, Starr et al. (2018) developed a two-stage model. The scholars based it on previous works on firm dynamics and NCA, they specifically mentioned those of Hopenhayn (1992) and Franco and Mitchell (2008). Though, for most of the purpose of this work, Starr et al. (2018)'s model gives a rather simple and elegant theoretical basis.

The "formation" (p. 555) period is the first of two in this model, Starr et al. (2018) assumed each starting of a new firm costs a specific fixed price while the founder has a certain level of human capital. If a founder of a new firm remains in the same industry of his previous employer[1] a share λ[2] of his expected profits would come at the expense of his previous employer. The magnitude of this share is driven by the level of overlap between the two firms' activities. The second period, the "growth" phase (Starr et al., 2018, p. 555), begins when interest from possible investors arise leading to a potential expansion of the firm.

Whether the firm was established in the same industry as the parent firm or not is crucial in understanding the effects of NCA on firms' entry. In cases when the founder stays in the same industry it is likely he would be sued by the parent firm, asking the court to enforce his NCA. The litigation process costs a specific sum to both sides. NCA enforceability level is marked in this model as the probability of the NCA to be enforced, ρ. If so, the parent firm has chances of *1* - ρ to lose both the fixed litigation cost and the share of its future profits, to be gained by the new firm. This while founders of new firms face the contrasting costs and profits structure (Starr et al., 2018).

As a result, at the formation stage, parent firms in states with stricter enforcement enjoy higher chances of winning litigation over their employee's NCA. This, in turn, raises the barriers faced by potential founders of new firms (Starr et al., 2018). Intuitively, when starting a new firm in a different industry, the relevance of the founder's NCA declines and enforceability becomes unimportant. Hereby, NCA enforceability plays a great role in the formation of within industry firms.

Moreover, opposing effects of NCA enforceability are predicted in the growth period of the model presented by Starr et al. (2018). At this period, the effects of NCA are similar whether the firm was formed (in the formation period) within the same industry or not. The "hiring costs effect" (Starr et al., 2018, p. 556), that is, an increase in hiring costs the founder faces when attempting to recruit additional workers. This increase in costs is a result of a possible NCA signed by future employees. Contrary to the negative nature of the hiring effect, the "investment protection effect" (Starr et al., 2018, p. 556) holds a positive impact on the founder of the new firm. This, by NCAs' assistance in preventing leakage of knowledge and secrets from the new company.

By identifying these three effects, Starr et al. (2018)'s model could be used to uncover the ties between higher levels of NCA enforceability and several outcomes. Firstly, stricter enforceability is predicted to cause higher firm formation costs and

[1] Starr et al. (2018) called it "parent firm" (p. 555)

[2] In order to maintain consistency and uniformity with the model presented in Starr et al. (2018), this section will use the same marks as in their work.

thereby hinders the formation of new firms. Secondly, in the growth phase, the predictions of the model depend on the strength of each of the two contrasting effects, this, in turn, affects the survival rates of new firms. Thirdly, the firm's size and profits are positively linked to the founder's human capital.

This work departs from Starr et al. (2018)'s theoretical framework in several ways. To start, a separation between within and between industry firm-starts will not be conducted. Additionally, unlike the scholars' high attention to founders' human capital, this work is focusing on the macro-effect (state-level) of NCA enforceability and therefore would not include an individual-level analysis of that sort. Notwithstanding, Starr et al. (2018)'s model describes the ways NCA enforceability impacts entrepreneurship in a sufficient way for the purpose of this work.

3.2 Business Dynamics Statistics

The Business Dynamics Statistics is produced and published by the United States Census Bureau and includes information on firms, establishments, employment, and their dynamics. The source of the database is statutory, meaning, it includes only administrative data. Importantly, this dataset covers almost the entire private sector, and excludes most of the government's economic activity. Additionally, the agriculture sector and the self-employed are excluded (Haltiwanger et al., 2009).

The BDS is using administrative data on American firms and establishments. According to the US Census Bureau, a firm is defined as "a business organization consisting of one or more domestic establishments that were specified under common ownership or control." while establishments are "A single physical location where business is conducted or where services or industrial operations are performed"[3] Therefore, while establishments are also of value for a higher resolution analysis (for example, county-level analysis), at the state level, firms are a more suitable variable for this analysis.

In addition, each firm's administrative information includes details of the date it was first registered, the number of individuals employed in the firms, and the firm's address. Using the address allows one to assign a firm to a state, and to determine it's metropolitan status. Using firms' date of registration allows determining the age of the firm while using the number of employees permits the classification by a firm's size (Haltiwanger et al., 2009).

Moreover, the BDS is accessible freely, and the user could choose between different levels of analysis. This work is conducted on the state level, and therefore

[3]Both definitions were taken from the Census Bureau BDS Glossary page, available here: https://www.census.gov/programs-surveys/bds/documentation/glossary.html [accessed: May 8th, 2020].

several BDS subsets were utilized. The first groups the data by state, firm size, and firm age. The second and third groups it by size and state, and age and state, respectively. The forth organizes the data by age, size, state, and metropolitan status (whether the firm is located in or out of a metropolitan). These different diminutions would allow checking the robustness of the results.

Identifying entrepreneurship in the BDS is made easy when using the subsets that include state, size, and age levels. The BDS codebook describes how firms are clustered into twelve age groups, while new firms are labeled as having the age of 0. Also, firms are clustered into twelve groups according to their size (number of employees), the smallest size group is of 1-4 employees. Firms at the age of 0 and the size of 1-4 will be regarded as a new entrepreneurial activity in this work.

However, using the gross number of firm entry in a given year in a given state poses a challenge due to the difference in the (economic) size of each state. As a result, the main outcome variable constructed in this work is *firms entry rate*, a scaled indicator produced using the following formula:

$$Firms\ Entry\ Rate = \frac{firms_t}{mean(firms_t, firms_{t-1})} \tag{3.1}$$

Where for a given size and age in a specific state and year t, *Firms Entry Rate* is defined as the number of firms in year t divided by the average of the number of firms at year t and $t-1$. Using a two year mean helps avoid fluctuations, this corresponds to the US Census description of the establishments' entry rate variable[4].

The developments in the *Firms Entry Rate* variable are presented in Figure 3.1. The figure present *Firms Entry Rate* for each state in each year by their Census division. The late 1990s demonstrate a steady firms entry rate, with a little downturn corresponding with the burst of the dotcom bubble. Following, the five years leading to the financial crisis (2001-2006) illustrated a stable growth of the entry rate in most states. These five years came to an end with a three years fall in *Firms Entry Rate* due to the 2007's financial crisis, clearly viable in the figure. Less visible in this figure is a pattern within the different divisions.

One previous work, to the best of my knowledge, used the BDS dataset in the context of NCA research. Kang and Fleming (2017) capitalized on Florida's 1996 legal changes in order to reveal their effect on the state's business environment[5]. In their review of the BDS, they stated the lack of dataset dividing firms by state, age, size, and the industry as one of its shortcomings. This work will address this shortcoming of the BDS by using the Current Population Survey. And will conduct

[4]The US census provides an entry rate variable for establishments and not for firms; This method is described in the US Census Bureau BDS Glossary page, see previous comment.

[5]See in Section 2.4.

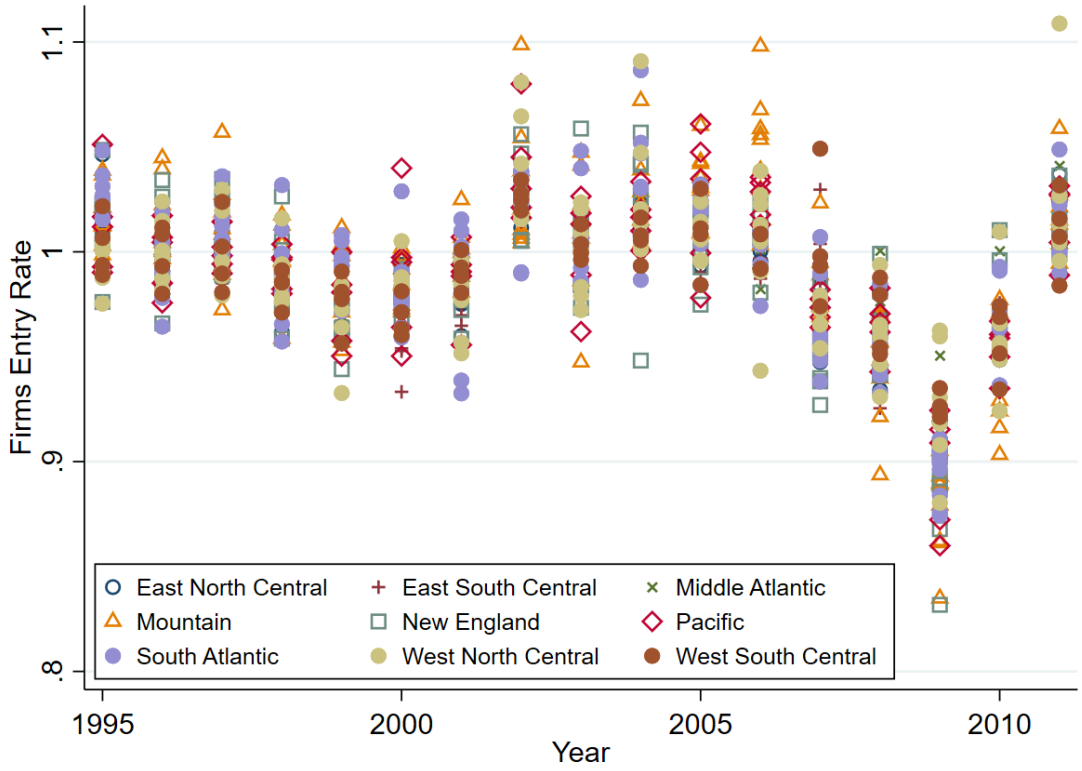


Figure 3.1: Firm Entry Rate - Yearly Changes, by Census Division

a nation-wide analysis, departing from the one case-study approach of Kang and Fleming (2017).

Furthermore, the *Firms Entry Rate* variable seems to be quite stable in all five subsets of the BSD, to be used in this work. Table 3.1 present summary statistics of the *Firms Entry Rate* variable by Census division in all five BDS subsets. The lack of fluctuations in the average *Firms Entry Rate* across all samples means the entry of new firms is not subjected to dramatic changes between divisions. The means of entry rate of firms at the age of 0 with a size of 1-4 are almost identical in all subsets. Yet, the non-metropolitan one, who's mean is a bit lower, indicating for a lower firms' entry outside of the metropolitans.

The fact that the BDS is based on administrative records of firms, is one of its main strengths. It makes it less vulnerable to some common survey related sampling errors. Haltiwanger et al. (2009) detailed some errors might occur when firms do not report the information on time or due to innocent errors yet the authors state that "[s]uch errors, however, are likely to be distributed randomly throughout the dataset" (p. 8). To conclude, the BDS is a reliable standardized dataset, allowing for an analysis of new firms' entry, making it suitable for the aims of the work.

Table 3.1: Summary Statistics - Firms Entry Rate from the BDS Samples by Census Divisions

US Census Division		Firms Entry Rate				
New England	Mean	0.988	0.988	1.000	0.988	0.988
	Std. Dev.	0.039	0.040	0.009	0.059	0.044
Middle Atlantic	Mean	0.996	0.996	1.002	0.993	0.996
	Std. Dev.	0.030	0.030	0.007	0.039	0.029
East North Central	Mean	0.988	0.988	0.999	0.981	0.989
	Std. Dev.	0.031	0.031	0.007	0.038	0.031
West North Central	Mean	0.990	0.990	1.001	0.988	0.991
	Std. Dev.	0.033	0.034	0.008	0.047	0.033
South Atlantic	Mean	0.992	0.992	1.003	0.982	0.993
	Std. Dev.	0.056	0.058	0.012	0.056	0.059
East South Central	Mean	0.986	0.986	0.999	0.983	0.987
	Std. Dev.	0.031	0.033	0.008	0.037	0.032
West South Central	Mean	0.991	0.990	1.001	0.986	0.992
	Std. Dev.	0.026	0.027	0.009	0.033	0.027
Mountain	Mean	0.995	0.995	1.009	0.990	0.997
	Std. Dev.	0.045	0.046	0.013	0.058	0.046
Pacific	Mean	0.992	0.992	1.004	0.987	0.993
	Std. Dev.	0.037	0.038	0.009	0.049	0.037
Total	Mean	0.991	0.991	1.002	0.986	0.992
	Std. Dev.	0.040	0.041	0.010	0.049	0.042
Firms Size		All	1-4	1-4	1-4	1-4
Firms Age		0	0	All	0	0
Metropolitan		YES	YES	YES	NO	YES
Non-Metropolitan		YES	YES	YES	YES	NO

Divisions as defined by the US Census Bureau, see A.1.

3.3 Current Population Survey

In addition to the BDS dataset, the United States Census Bureau publishes a monthly dataset named the Current Population Survey (CPS). Freely available, the survey includes a representative sample of the US population and is collecting data on both individual and households level. This work will use this dataset for two main purposes, the construction of control variables and the occupation level analysis of the effects NCA enforceability on entrepreneurship.

Participation in the CPS takes a total of sixteen months, from which the respondent answers the questionnaire eight times. Each participant in the CPS answers the survey for four months in a row, followed by an eight months break, and end-

ing with additional four months of active participation. At the forth and the eight months of the active participation (the edges of each period), each participant is asked several extra questions related to his earnings and work (Lipsitz and Starr, 2019). These are fairly constant features of the CPS while other elements of the survey were subject to changes throughout the years.

The main reason this work time scope starts in 1995 is the dramatic revisions made in 1994 in the CPS questionnaire. The 1994 changes in the CSP format made it easier to merge the monthly samples in order to create a panel data useful for economic research. This led several scholars specialized in working with the CPS to published manuals, explaining how to merge the CPS monthly files into one dataset (Rivera Drew et al., 2014). For the purpose of the analysis provided in this work, a merged panel data, running from January 1995 until December 2011 was constructed. Furthermore, this work's design, attempting to estimate the impacts of changes in enforceability, made the identification of changes in the dataset crucial. Thus, Neumark and Kawaguchi (2001) analysis, contradicting the argument for the existence of bias when using CPS in a longitudinal analysis is an important reinforcement making the CPS suitable for this work.

As noted above, the model estimated here (see Chapter 3.5) includes characteristics of each of the states in each year. These demographic and socioeconomic indicators are included in this individual-level survey. As a result, after merging all the monthly CPS files, calculating each state's yearly average in each of these variables was rather straight forward. For example, in order to calculate the share of African-Americans in each state, the following algorithm was applied:

1. Constructed of a dummy variable 'African-American', receives 1 if the relevant CPS variable indicates an individual is African-American. And 0 otherwise.

2. Calculated for each month and each state the weighted average of this variable.

3. Calculated the yearly average of the 'African-American' variable. This average is the share of the African-American population in each state.

The income per capita and the unemployment rate are the only control variables to be taken from another source. The income per capita for each state in each year was obtained from the United States Bureau of Economic Analysis. The state unemployment rate over time was gathered from the United States Bureau of Labor Statistics. Table 3.2 presents summary statistics of the seven control variables obtained from the CPS dataset and the two additional control variables.

The second feature of the CPS to be used in this work is base on the work of Levine and Rubinstein (2016) and Levine and Rubinstein (2018). In their studies on

Table 3.2: Summary Statistics - Control Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
% Gender (Male)	867	0.488	0.008	0.455	0.510
% Hispanic	867	0.081	0.094	0.003	0.453
% African American	867	0.113	0.119	0.002	0.727
% Asian-American	867	0.037	0.085	0.001	0.748
% Other Racial Groups	867	0.028	0.040	0.001	0.281
% High-School Graduates	867	0.453	0.036	0.291	0.555
% University Greaduates	867	0.182	0.044	0.097	0.421
% Unemployed	867	5.457	1.944	2.3	13.608
Real Income per Capita	867	32734.73	8170.463	17488	67419

the individual characteristics of entrepreneurs they offered a way to identify and separate entrepreneurs from other self-employed. The CPS questions the participants if they are self-employed, and for those who responded positively, an additional follow-up question, related to their incorporation status, is asked. The scholars concluded that incorporated self-employed could be considered as entrepreneurs.

The CPS also includes classifications of occupations for each employed participant. This will be used when an analysis of the effects of NCA enforceability on sub-samples by occupations will take place later in this work. Following previous works (Levine and Rubinstein, 2016, 2018; Johnson et al., 2019), individuals working in agriculture, the government (local, state and federal), and the US military were excluded from those sub-samples. In addition, these samples only included working ages individuals (25-64). All of these modifications left this dataset only with private-sector, non-agriculture working-age American workers.

Tables 3.3 and 3.4 present summary statistics of the incorporated self-employed variable, by occupations and divisions. The highest share of entrepreneurs is observed in the management and legal occupations, with, on average, more than 10% of the total labor force. Additionally, the share of entrepreneurs ranges between 3.1% and 4.3% in the different divisions, with a national average of 3.6%. Most importantly, Tables 3.3 and 3.4 present the existing variation between the different occupations and divisions.

Table 3.3: Summary Statistics - Share of Incorporated Self-Employed, by Occupation and Divisions, 1995-2011 (a)

		East North Central	East South Central	Middle Atlantic	Mountain	New England	Pacific	South Atlantic	West North Central	West South Central	Total
Management	mean	0.119	0.107	0.115	0.154	0.115	0.125	0.122	0.113	0.127	0.124
	Std. Dev.	0.021	0.028	0.019	0.036	0.028	0.025	0.035	0.026	0.034	0.033
Business & Financial Operations	mean	0.042	0.045	0.046	0.069	0.049	0.046	0.046	0.038	0.044	0.048
	Std. Dev.	0.016	0.029	0.016	0.031	0.026	0.026	0.027	0.021	0.025	0.027
Computer & Mathematical	mean	0.025	0.025	0.032	0.035	0.027	0.027	0.027	0.020	0.021	0.027
	Std. Dev.	0.022	0.045	0.016	0.040	0.022	0.030	0.026	0.024	0.034	0.030
Architecture & Engineering	mean	0.023	0.023	0.030	0.038	0.032	0.040	0.031	0.025	0.035	0.031
	Std. Dev.	0.016	0.033	0.023	0.033	0.024	0.029	0.032	0.025	0.035	0.029
Life, Physical, Social Science	mean	0.041	0.031	0.034	0.064	0.031	0.041	0.043	0.054	0.052	0.045
	Std. Dev.	0.039	0.054	0.020	0.072	0.034	0.057	0.049	0.072	0.062	0.057
Community & Social Service	mean	0.007	0.003	0.005	0.016	0.007	0.006	0.007	0.008	0.009	0.008
	Std. Dev.	0.022	0.012	0.009	0.031	0.011	0.012	0.016	0.014	0.024	0.019
Legal	mean	0.122	0.127	0.086	0.132	0.113	0.095	0.109	0.125	0.132	0.117
	Std. Dev.	0.063	0.102	0.037	0.091	0.081	0.084	0.071	0.092	0.082	0.082
Education, Training & Library	mean	0.005	0.005	0.008	0.009	0.005	0.006	0.009	0.005	0.005	0.007
	Std. Dev.	0.007	0.009	0.008	0.013	0.007	0.008	0.011	0.009	0.008	0.010
Arts, Design, Entertainment, Sports, Media	mean	0.063	0.056	0.067	0.072	0.058	0.061	0.069	0.048	0.066	0.062
	Std. Dev.	0.039	0.054	0.032	0.043	0.039	0.041	0.048	0.040	0.055	0.044
Technical Healthcare Practitioners	mean	0.045	0.045	0.051	0.067	0.039	0.059	0.049	0.036	0.052	0.049
	Std. Dev.	0.017	0.024	0.016	0.031	0.018	0.022	0.027	0.018	0.026	0.025
Healthcare Support	mean	0.003	0.001	0.002	0.006	0.003	0.006	0.005	0.004	0.002	0.004
	Std. Dev.	0.006	0.003	0.003	0.014	0.007	0.011	0.010	0.009	0.007	0.009
Protective Service	mean	0.010	0.002	0.006	0.007	0.005	0.006	0.006	0.004	0.010	0.006
	Std. Dev.	0.017	0.006	0.011	0.021	0.014	0.014	0.013	0.014	0.023	0.016

Table 3.4: Summary Statistics - Share of Incorporated Self-Employed, by Occupation and Divisions, 1995-2011 (b)

		East North Central	East South Central	Middle Atlantic	Mountain	New England	Pacific	South Atlantic	West North Central	West South Central	Total
Food Preparation & Serving Related	mean	0.016	0.004	0.012	0.010	0.016	0.013	0.010	0.015	0.008	0.012
	Std. Dev.	0.013	0.010	0.009	0.012	0.015	0.015	0.011	0.026	0.012	0.015
Building, Cleaning & Maintenance	mean	0.023	0.015	0.023	0.022	0.022	0.016	0.024	0.022	0.013	0.021
	Std. Dev.	0.018	0.015	0.018	0.023	0.020	0.017	0.024	0.021	0.014	0.020
Personal Care & Service	mean	0.040	0.030	0.043	0.036	0.041	0.032	0.047	0.028	0.030	0.037
	Std. Dev.	0.027	0.029	0.022	0.033	0.036	0.024	0.030	0.021	0.025	0.029
Sales & Related	mean	0.076	0.072	0.081	0.081	0.076	0.066	0.075	0.076	0.071	0.075
	Std. Dev.	0.017	0.023	0.019	0.023	0.020	0.017	0.024	0.023	0.019	0.022
Office, Administrative Support	mean	0.017	0.015	0.012	0.031	0.017	0.024	0.017	0.023	0.023	0.021
	Std. Dev.	0.006	0.008	0.004	0.013	0.009	0.012	0.009	0.009	0.011	0.011
Construction, Extraction	mean	0.056	0.034	0.054	0.053	0.059	0.040	0.050	0.049	0.039	0.049
	Std. Dev.	0.022	0.021	0.021	0.029	0.023	0.021	0.027	0.027	0.020	0.025
Installation, Maintenance & Repair	mean	0.023	0.022	0.035	0.027	0.031	0.020	0.030	0.023	0.027	0.026
	Std. Dev.	0.014	0.017	0.019	0.020	0.019	0.018	0.021	0.017	0.023	0.019
Production	mean	0.008	0.006	0.015	0.020	0.013	0.020	0.014	0.009	0.012	0.014
	Std. Dev.	0.004	0.006	0.009	0.016	0.009	0.017	0.014	0.008	0.008	0.013
Transportation	mean	0.023	0.023	0.022	0.028	0.023	0.019	0.028	0.029	0.022	0.025
	Std. Dev.	0.013	0.020	0.013	0.020	0.018	0.015	0.018	0.018	0.019	0.018
Material Moving	mean	0.004	0.004	0.005	0.009	0.015	0.005	0.006	0.005	0.006	0.007
	Std. Dev.	0.007	0.008	0.006	0.016	0.023	0.010	0.010	0.010	0.012	0.013
Total	mean	0.035	0.031	0.035	0.043	0.037	0.034	0.037	0.033	0.036	0.036
	Std. Dev.	0.040	0.047	0.035	0.052	0.046	0.042	0.044	0.045	0.047	0.045

3.4 Non-Compete Agreements Enforceability Index

This work's treatment variable is an index of NCA enforceability, similar to the one used in Hausman and Lavetti (2015). Applying Bishara (2011)'s methods, Hausman and Lavetti (2015) created a dataset that includes, for each state in each year between 1991-2009, the score in each of the seven questions proposed by Bishara (2011), in accordance with his grading system. Later, Hausman and Lavetti (2015) calculated the weighted sum, using Bishara (2011)'s weights[6], presented in Equation 3.2.

$$NCA_{st} = 10{\cdot}Q1_{1,s,t}{+}10{\cdot}Q2_{st}{+}5{\cdot}Q3_{st}{+}10{\cdot}Q3a_{st}{+}5{\cdot}Q3bc_{st}{+}10{\cdot}Q4_{st}{+}10{\cdot}Q8_{st} \quad (3.2)$$

Finally, the weighted sum was scaled (see Equation 3.3[7]) so that NCA enforceability index of 1 represents the stricter enforceability, while 0 represents the loosest one.

$$\frac{NCA_{st}}{MAX(NCA)} \quad (3.3)$$

In addition, an extension to this dataset was made possible thanks to Jeffers (2019) recent publication. In her work, she presented states' changes in NCA enforceability between 2009-2014, all of which were a result of court rulings. Johnson et al. (2019), also using Hausman and Lavetti (2015) dataset, exploited Jeffers (2019) extension, and documented it in a way this work could benefit from[8].

Analyzing the index at the heart of this work might cast some light on potential patterns in NCA enforceability across time and states. First, for the model estimated in this work, the state-year variation is a key element. This could easily be observed in Figure 3.2, where each cell of the table represents a state-year observation, the colors vary between white to dark red, the darker the color - the stricter the enforceability. In Figure 3.2, one could see the stable light color in two states on the lower end of the enforceability index, California and North-Dakota. Also, Florida's unchanged dark red color demonstrates the state's strictest approach to NCA enforceability. A visual examination of the NCA enforceability index indicates a fairly strong variance between the different states, but also within the states.

Throughout the years, as lengthy discussed in the previous sub-sections, states' enforceability of NCA changed due to court rulings or legislation. Bishara (2011)'s measurement design, capable of capturing the within states variation seems to be proven effective. Sixty-seven changes of the index are observed, visible in Figures

[6]The questions and their weights are presented in Table 2.1.

[7]MAX(NCA) is the highest NCA enforceability score in the dataset.

[8]Johnson et al. (2019) translated the legal developments documented in Jeffers (2019) into changes of the relevant questions' score.

3.2 and 3.3. Figure 3.3 presents the number of positive and negative changes made each year, alongside trends in the enforceability index average.

A few interesting insights are raveled from Figure 3.3. A concentration of an upwards changes in enforceability occurred in the late 1990s[9], peaking in 1996 when six states experienced an increase in their enforceability index. As a result, a sharp increase in the national average of the index is notable at that time, followed by a moderate yet steady increase of the index during the 2000s. In total, about two thirds (45) of the index's changes were upwards, while a third (22) marked downwards changes.

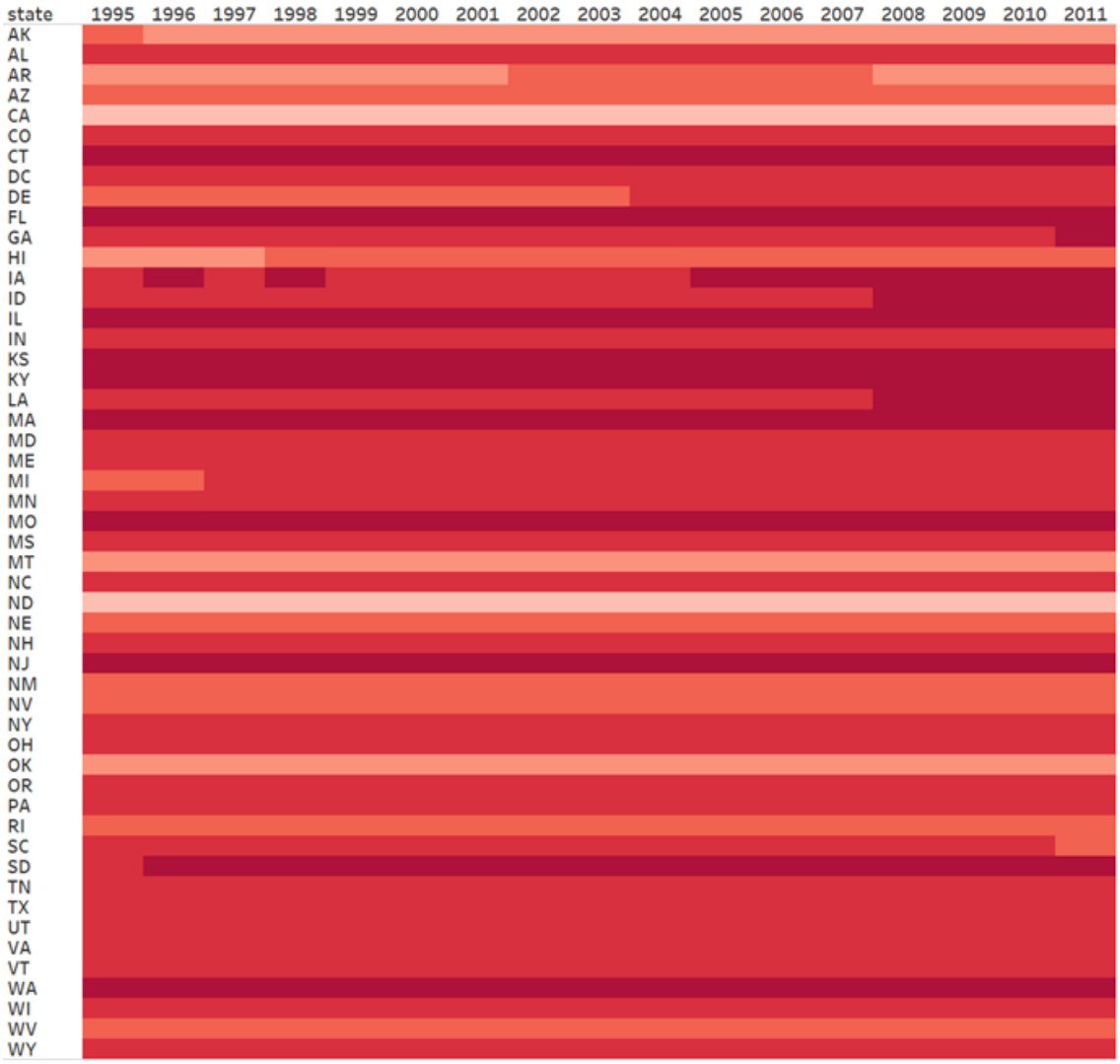


Figure 3.2: Non-Compete Agreements Enforceability Index - Yearly Changes

Another relevant perspective when analyzing this state-level index is its geographic dispersity. Figures 3.4a and 3.4b present two snapshots of the NCA enforceability index using the USA map while allowing a visual comparison between

[9]This is consistent with the findings of Johnson et al. (2019).

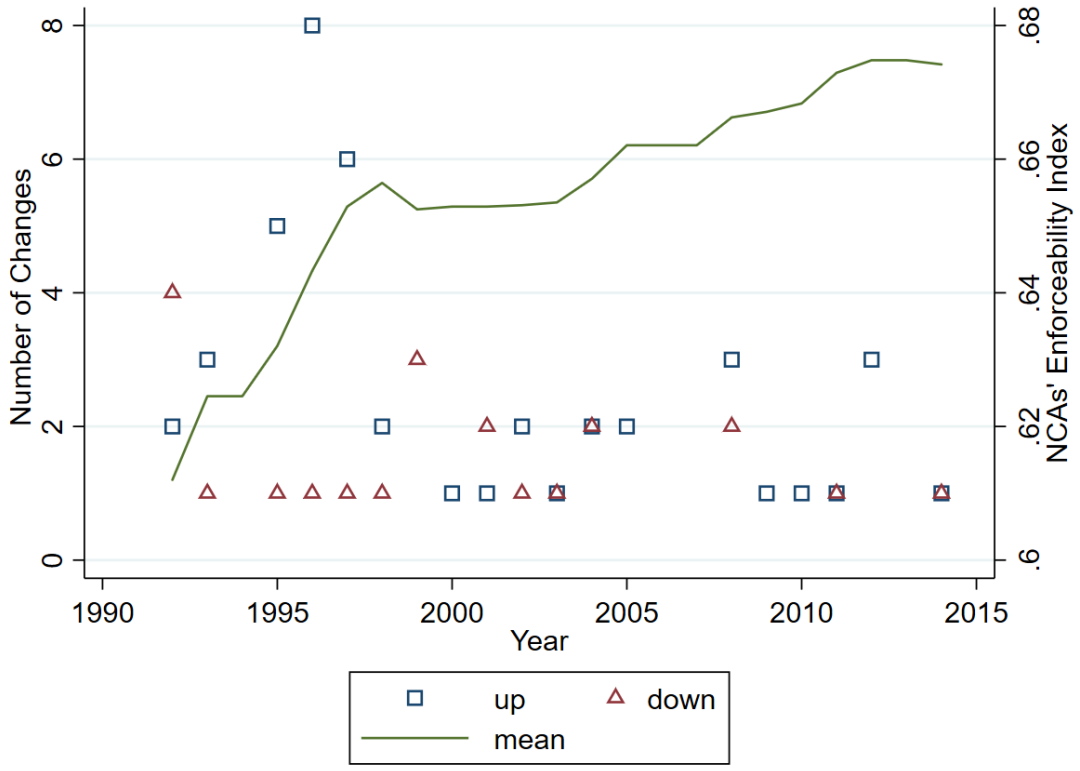
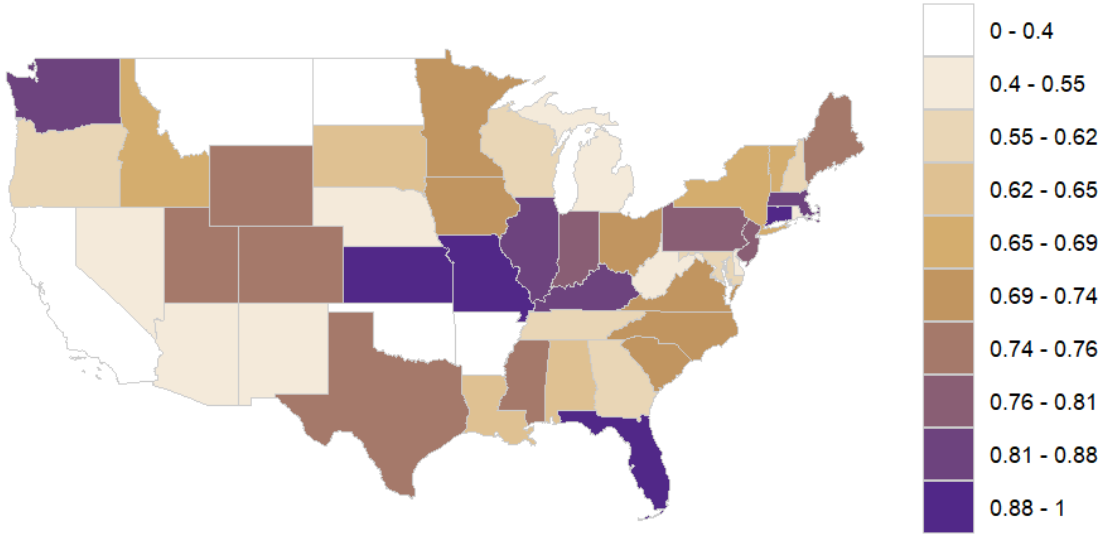


Figure 3.3: Developments of the Non-Compete Agreements Enforceability Index

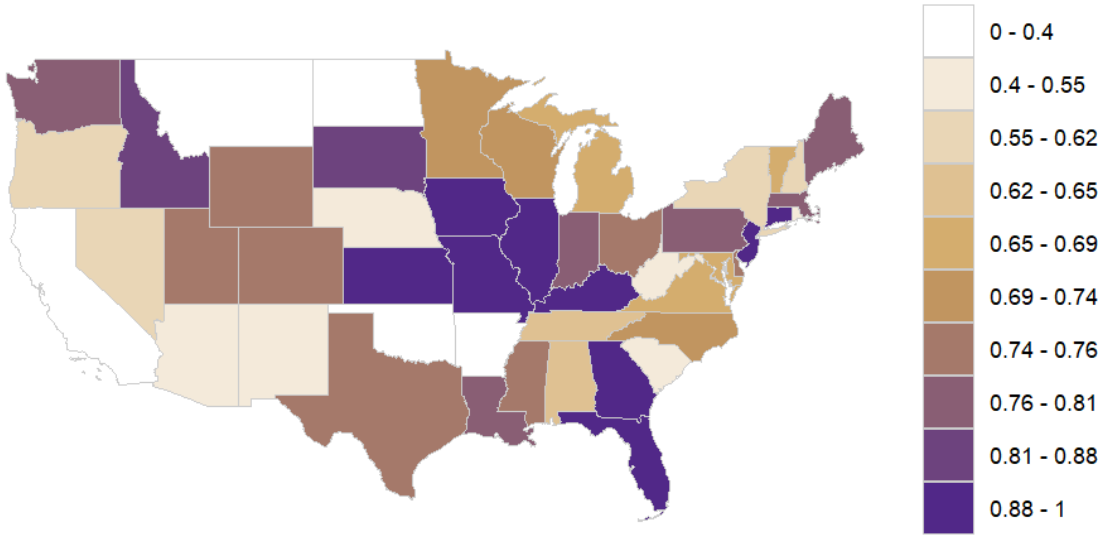
1995 and 2011. In addition to the observed above, these figures also demonstrate a shift towards higher levels of enforceability. Moreover, no strong geographic over-time trend is clearly observed, yet some regions are slightly more significant in their characteristics, for example, the west coast and the north, excluding Washington state, are visibly looser on enforcement of NCA, while the southeast and some parts of the mid-west are stricter. Overall, the general trend in NCA enforceability leans towards stricter enforcement, but this trend is not uniform.

Interestingly, Johnson et al. (2019), using a similar index, examined whether political and socio-economic characteristics could account for the state-year variation of the index. All of the socio-economic factors they examined (state minimum wage, union membership, health-care, population, etc.) and all but one political factor were found to have no effect on the index. The one factor that had a small negative statistically significant effect on the index is the "[s]enate [d]emocrats [i]deology [s]core" (Johnson et al., 2019, p. 38). The authors also checked if their results are sensitive to courts partisanship, and found them stable. Therefore, there is no known clear factor that could predict the NCA enforceability index on the state-year level.

To conclude this section, summary statistics of all seven dimensions of enforceability, alongside the final NCA enforceability index by the US Census Bureau divi-



(a) 1995



(b) 2011

Figure 3.4: Non-Compete Agreements' Enforceability Index - Geographical Perspective

**Not included: Alaska, Hawaii and the District of Columbia*

Table 3.5: Summary Statistics - NCA Enforceability Index and its Dimensions by Census Division

		East North Central	East South Central	Middle Atlantic	Mountain	New England	Pacific	South Atlantic	West North Central	West South Central
NCA	mean	0.735	0.736	0.759	0.612	0.711	0.456	0.683	0.678	0.568
	Std. Dev.	0.102	0.097	0.091	0.156	0.170	0.264	0.134	0.315	0.196
Q1	mean	0.560	0.425	0.500	0.463	0.500	0.460	0.490	0.499	0.593
	Std. Dev.	0.121	0.084	0.000	0.112	0.000	0.226	0.206	0.240	0.229
Q2	mean	0.607	0.722	0.594	0.688	0.665	0.453	0.722	0.577	0.543
	Std. Dev.	0.144	0.088	0.150	0.154	0.127	0.199	0.148	0.308	0.196
Q3	mean	0.508	0.663	0.514	0.686	0.730	0.403	0.638	0.573	0.631
	Std. Dev.	0.203	0.239	0.111	0.139	0.077	0.269	0.160	0.331	0.247
Q3a	mean	0.976	0.925	0.829	0.800	0.817	0.600	0.933	0.855	0.725
	Std. Dev.	0.152	0.084	0.270	0.321	0.369	0.493	0.125	0.351	0.218
Q3bc	mean	0.688	0.850	0.733	0.554	0.716	0.382	0.731	0.757	0.310
	Std. Dev.	0.402	0.151	0.172	0.359	0.347	0.342	0.257	0.371	0.396
Q4	mean	0.547	0.850	0.867	0.315	0.568	0.420	0.348	0.564	0.381
	Std. Dev.	0.332	0.050	0.048	0.296	0.261	0.409	0.260	0.380	0.250
Q8	mean	0.680	0.275	0.594	0.425	0.517	0.140	0.530	0.481	0.350
	Std. Dev.	0.351	0.297	0.150	0.443	0.387	0.282	0.340	0.327	0.360

Divisions as defined by the US Census Bureau, see A.1.

sions is provided in Table 3.5. The national enforceability index average across time is 0.657. The Pacific division (including California, Alaska, Hawaii, Oregon, and Washington) has the lowest average (0.457). And the Middle Atlantic division (including New-York, New-Jersey, and Pennsylvania) had the highest average (0.759). The analysis provided in this subsection strengthens the assertion standing in the heart of this work, arguing for a substantial variance of NCA enforceability both between and within the states over time.

3.5 Econometric Model

Previous scholars, as reviewed above, attempted to uncover the links and causal mechanisms between NCA and various economic outcomes. However, due to the absence of reliable measurement of NCA enforceability, most of these works, especially those published prior to Bishara (2011), suffered from shortcomings in their internal and external validity. In many cases, the empirical research design applied by these scholars, took advantage of a particular law change or court ruling, and regarded it as an exogenous shock, enabling them to estimate its effects. To the best of my knowledge, the first to apply this approach was Marx et al. (2009), who exploited the Michigan legislation changes regarding NCA during the mid-1980s (other followed: Marx et al. (2015) on Michigan; Conti (2014) and Kang and Fleming (2017) on Florida; (Balasubramanian et al., 2018) on Hawaii; Lipsitz and Starr (2019) on Oregon). Nevertheless, the nature of these works might provide some indication

or suggestions for causal effects, but it is usually limited in its geographic, time, occupation, or industry scope, making it difficult to draw definitive conclusions.

However, Bishara (2011)'s work allowed for the development of a continuous, comparable across time and states measurement of NCA enforceability, and thereby opened the door for new research designs in this field. The availability of the NCA enforceability index allowed scholars to exploit its state-year variation in order to address some of the external validity shortcomings of their predecessors. Namely, the first ones to use this state-year variation were Hausman and Lavetti (2015), who used a similar model to the one presented below to estimate the effects of NCA enforceability on physicians' "organizational outcomes and market concentration" (p. 16). Alike, Johnson et al. (2019) estimated such a model to identify the effects of NCA enforceability on mobility and wages.

The empirical design of this work is based on the works of Hausman and Lavetti (2015) and Johnson et al. (2019), using the state-year variation will apply a multiple time periods, groups, and treatment intensities difference in difference approach. Specifically, seeking to identity the effects of NCA enforceability on entrepreneurship, the following model will be estimated:

$$y_{st} = \alpha + \beta_1 NCA_{s(t-1)} + \gamma X_{st} + \rho_s + \delta_{division(s)} + \varepsilon_{st} \tag{3.4}$$

Where s indexes the different states and t is a year index. y_{st} is the outcome variable, this could be firms entry rate, in the estimations using the Business Dynamics Statistics dataset, or share of incorporated self-employed in case of the Current Population Survey sample. α represents the intercept and NCA stands for the treatment variable, NCA enforceability index or its dimensions. Due to the lagging nature of changes in legal infrastructure effects (Hausman and Lavetti, 2015), the NCA variable is one year lagged.

Importantly, the coefficient β will indicate a possible causal effect between the treatment and the outcome in this setting. Additionally, X_{st} represents a set of observable time-varying characteristics of states. ρ_s represents a set of state fixed effects and $\delta_{division(s)}$ represents a set of division-year fixed effects. The standard errors are clustered at the state levels (corresponds to the treatment level). Lastly, ε_{st} represents the error term.

The following state-year controls are included in X_{st}:

- Macro-economic:
  - Unemployment rate
  - Income per capita
- Demographic:

  - Gender (Share of men)
  - Race:
    * Share of African-American
    * Share of Asian-American
    * Share of Hispanic
    * Share of Others

- Socioeconomic:
  - Share of high-school graduates
  - Share of academic graduates

Changes to the outcome variable, following fluctuations in levels of enforceability relative to the relevant Census divisions states, are identified and quantified by β. Making β the main estimator of interest in this model. Additionally, the lack of correlation between the error term ε_{st} and the treatment, conditioned on the state, and division-year effects is a crucial assumption made by Johnson et al. (2019). In other words, this assumption is made to promise the exogeneity of the NCA enforceability index. The scholars used a similar index to the one used here and conducted an analysis confirming this assumption holds. Hence, this work, based on Johnson et al. (2019), will also assume this assumption stands.

4

Empirical Analysis

Estimations of different specifications of the model presented in the previous chapter will be presented in this section[1]. In the first subsection, the results using the BDS will be presented and described, followed by the results using the CPS. The second subsection will include a discussion of their meaning in light of the theory and previous literature.

4.1 Results

Before presenting the estimation of the econometric model, one might be interested in a visualization of the relationship between NCA enforceability and *Firms Entry Rate*. Figure 4.1 presents the relationship between *Firms Entry Rate* and a one year lag of the NCA enforceability index. Several patterns are visible in this figure, first, one could see the two states on the lower end of the NCA enforceability spectrum, North Dakota and California. Second, a simple linear trend line indicates a downwards trend in *Firms Entry Rate* associated with higher levels of enforceability. Thirdly, the figure might indeed suggest for a possible negative link between enforceability and *Firms Entry Rate*, however, the data seems quite scattered[2] and within states and divisions patterns are not visible in it.

The effects of NCA enforceability, as estimated using Equation 3.4 on five subsets of the BDS, are presented in Table 4.1[3]. The first column is using a subset of new (age 0) firms with 1-4 employees (the smallest size group) in both metropolitan and non-metropolitan locations. The results indicate that a change in enforceability, from

[1]Stata's REGHDFE package was used for all estimations in this paper due to its ability to absorb a large number of fixed effects in linear models.

[2]Due to two relatively extreme values, and in order to present a clean image to the reader, the District of Colombia was excluded from the figure. The same figure, including DC, is available in Appendix A Figure A.2.

[3]This paper only presents the coefficient of interest, in accordance with the relevant literature.

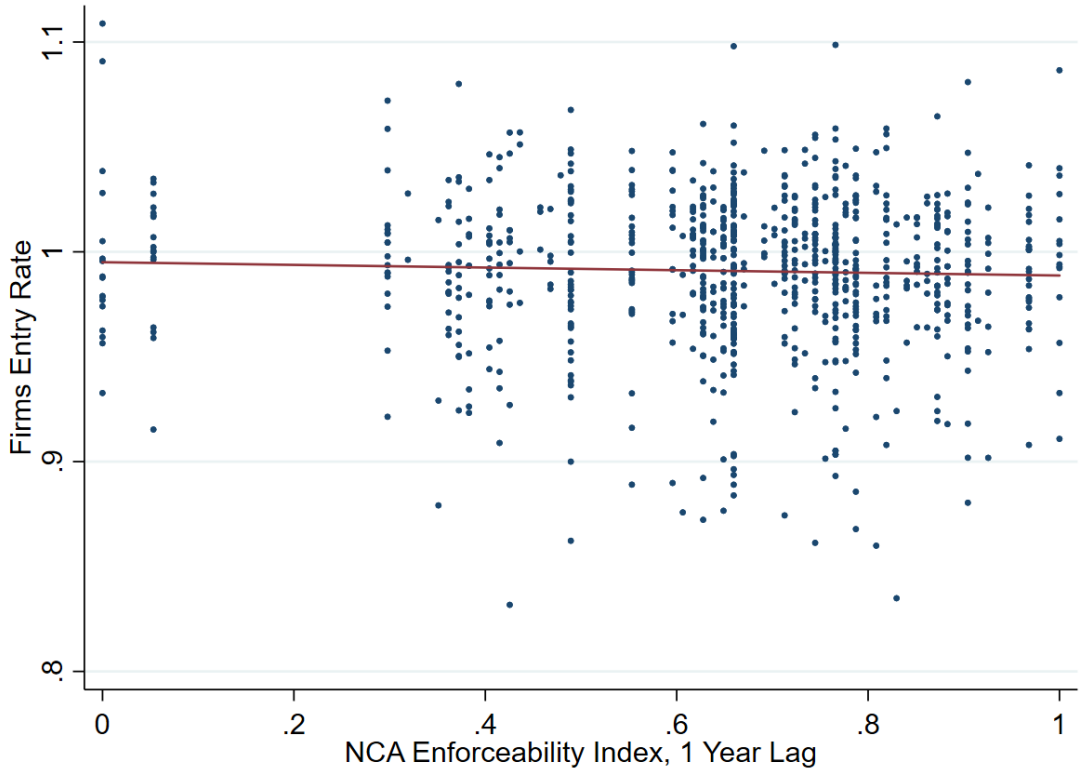


Figure 4.1: The NCA Enforceability Index and Firms Entry Rate

the lowest index level to the highest, leads to a 3.4% decrease in *firms entry rate*, and this result is statistically significant in a 10% level.

Similarly to the presented in column (1), the second column in Table 4.1 estimate the model on a subset of age 0 firms, without a metropolitan separation. However, in this subset, all firm sizes are included. Consistent with previous results, a statistically significant 3.1% negative effect of enforceability changes on firms' entry is revealed. This similarity is expected due to the similar nature of the two subsets. At the age of 0, most firms are rather small, so there should not be a significant difference between this subset and the one used in column (1)[4].

The negative effect lost its statistical significance in the third estimation (column (3)). The third subset includes all firms at the size of 1-4, with no firm age limitation. It could be viewed as a subset of the small (1-4 employees) firms' stock in each state. The lack of statistical significance might be explained by the two contrasting forces, affecting the stock of small firms in a state, to be discussed in the next subsection.

Moreover, metropolitan status is found to be relevant to the effect of NCA enforceability on entrepreneurship. Columns (4) and (5) presents the results of the model's estimation on two subsets, the first includes metropolitan firms, and the

[4]This similarity is also observed in Table 3.1.

Table 4.1: The Effects of NCA Enforceability on Firms Entry Rate

Dependent Variable:	Firms Entry Rate				
	(1)	(2)	(3)	(4)	(5)
NCA, 1 year lag	-0.034*	-0.031*	-0.014	-0.043*	-0.013
	(0.019)	(0.018)	(0.010)	(0.023)	(0.026)
Observations	867	867	867	867	816
Non-Metropolitan	YES	YES	YES	NO	YES
Metropolitan	YES	YES	YES	YES	NO
Firms Size	1-4	ALL	1-4	1-4	1-4
Firms Age	0	0	ALL	0	0
Demographic Controls	✓	✓	✓	✓	✓
Socioeconomic Controls	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓
Division-Year FE	✓	✓	✓	✓	✓
Adj R-sq.	0.526	0.540	0.723	0.469	0.489
R-sq. Within	0.0176	0.0185	0.0965	0.0137	0.0199
Num. States	51	51	51	51	48

Standard errors clustered by state in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

second includes non-metropolitan firms. The negative effect of NCA enforceability on *firms entry rate* is found to be stronger if the data is restricted only to firms located within a metropolitan. A statistically significant decrease of 4.3% in *firms entry rate*, caused by an upwards shift in enforceability is introduced in column (4). This negative effect is 0.9% stronger than column (1)'s estimated effect lacking such separation.

In contrast, the coefficient is losing its statistical significance when the sample includes only non-metropolitan firms. Further, a decrease in the number of observations is notable in column (5). Leading to this fall in observations are three states where all firms are registered in metropolitan areas: Rhode-Island, New-Jersey, and the District of Colombia. The results in column (5) indicate the negative effect of NCA enforceability on *firms entry rate* does not hold for non-metropolitan firms.

Furthermore, in order to evaluate the effects of different dimensions of NCA enforceability, an estimation of Equation 3.4 was conducted, using the indexed score in each of the seven questions proposed by Bishara (2011). The results of this

estimation are presented in Table 4.2. The subset used there includes all small (1-4 employees) new firms (age 0) without a metropolitan separation. The effects of the different dimensions seem to vary in economic and statistical significance.

Four dimensions of NCA enforceability are found to have a statistically significant effect on *firms entry rate*. Firstly, Table 4.2 column (1) demonstrate a positive lagging effect of 5.2% in *firms entry rate* driven by the passage of new statutory acts increasing the enforceability of NCA. In other words, a shift from 0 to 1 in this dimension, results in an increase of 5.2% in the entry rate of firms in the following year. This finding is statistically significant at a 1% level.

However, the effect of Q1 is the only positive statistically significant one. Two rather small negative effects on *firms entry rate* are the ones presented in Table 4.2 columns (4) and (5). An increase in the indexed score of Q3a, dealing with the role of signing an NCA at the beginning of the employment relationship play in court enforcement, is found to have an up to 1.5% negative effect on firms' entry. A smaller negative effect of 0.9% is found for Q3bc. This dimension is also associated with the timing of the signature (courts' approach to NCA signed in the midst of the employment period), but also to the effect of the duration of the employment period.

The most significant negative effect is related to the ability to modify NCA in order to make them more enforceable. Table 4.2 column (6) presents a statistically significant 5.3% reduction in *firms entry rate* resulted by a shift from no modification to full modification, maximizing courts' ability to enforce NCA. The results presented in Table 4.2 allowed for a more sensitive evaluation of the effects different dimensions of NCA enforceability have on the entry rate of small firms.

In addition to the BDS based analysis, this work exploits the CPS sample in order to identify the effects of NCA enforceability on different occupations. As mentioned in sub-section 3.3, the CPS allows to identify incorporated self-employed workers, argued to represent entrepreneurs (Levine and Rubinstein, 2016, 2018). Therefore, Equation 3.4 was estimated on twenty-two subsets, each includes the state-year share of entrepreneurs in each occupation. Hereby, the outcome variable in these estimations do not represent the entry rate, but the stock of entrepreneurs. The results of these estimation are presented in Tables 4.3 and 4.4

The results in Tables 4.3 and 4.4 reveals a negative and statistically significant effect of NCA enforceability on entrepreneurship in three occupation. First, column (4) demonstrates that an increase from 0 to 1 in the NCA enforceability index leads the share of entrepreneurs in architecture and engineering occupations to decrease in 4.9%. Second, column (11) presents a negative effect of 2.4% on the share of entrepreneurs in healthcare support occupations. Third, column (20) revels a 3% decrease in the share in production occupations entrepreneurs. To conclude, in

Table 4.2: The Effects of Different Dimensions of NCA Enforceability on Firms Entry Rate

Dependent Variable:	Firm Entry Rate						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Q1, 1 year lag	0.052***						
	(0.015)						
Q2, 1 year lag		-0.000					
		(0.008)					
Q3, 1 year lag			0.003				
			(0.009)				
Q3a, 1 year lag				-0.015***			
				(0.003)			
Qbc, 1 year lag					-0.009**		
					(0.004)		
Q4, 1 year lag						-0.053***	
						(0.009)	
Q8, 1 year lag							-0.011
							(0.009)
Observations	867	867	867	867	867	867	867
Demographic Controls	✓	✓	✓	✓	✓	✓	✓
Socioeconomic Controls	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓
Division-Year FE	✓	✓	✓	✓	✓	✓	✓
Adj R-sq.	0.526	0.525	0.525	0.525	0.525	0.528	0.526
R-sq. Within	0.00359	0.000781	0.000824	0.00178	0.00176	0.00634	0.00193
Num. States	51	51	51	51	51	51	51

Standard errors clustered by state in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

only three occupations share of entrepreneurs seems to be negatively affected by an increase of NCA enforceability.

Table 4.3: The Effects of NCA Enforceability on The Share of Incorporated Self-Employed, by Occupation (a)

	(1)	(2)	(3)	(4)	(5)	(6)
	Management	Business & Financial Operations	Computer & mathematical	Architecture, Engineering	Life, Physical, Social Science	Community & Social Service
NCA, 1 year lag	-0.020	-0.016	-0.051	-0.049**	0.025	-0.008
	(0.033)	(0.032)	(0.052)	(0.021)	(0.067)	(0.024)
Observations	867	867	867	867	867	867
Adj R-sq.	0.511	0.241	0.0678	0.205	0.0640	0.0788
Adj R-sq. Within	0.00574	0.00360	0.00208	0.0192	-0.00106	0.00182
Num. States	51	51	51	51	51	51
	(7)	(8)	(9)	(10)	(11)	(12)
	Legal	Education, Training, Library	Arts, Design, Entertainment, Sports, Media	Technical Healthcare Practitioners	Healthcare Support	Protective Service
NCA, 1 year lag	0.003	0.014	0.044	-0.048	-0.024**	-0.006
	(0.129)	(0.011)	(0.059)	(0.028)	(0.012)	(0.016)
Observations	867	867	867	867	867	867
Adj R-sq.	0.126	0.129	0.121	0.276	0.136	0.0160
Adj R-sq. Within	0.0229	0.00890	-0.00606	0.00737	0.0158	0.00339
Num. States	51	51	51	51	51	51
Demographic Controls	✓	✓	✓	✓	✓	✓
Socioeconomic Controls	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Division-Year FE	✓	✓	✓	✓	✓	✓

Standard errors clustered by state in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Table 4.4: The Effects of NCA Enforceability on The Share of Incorporated Self-Employed, by Occupation (b)

	(13) Food Preparation & Serving Related	(14) Building, Grounds Cleaning & Maintenance	(15) Personal Care & Service	(16) Sales & Related	(17) Office, Administrative Support
NCA, 1 year lag	-0.055	0.035	0.040	-0.012	0.007
	(0.057)	(0.023)	(0.034)	(0.025)	(0.009)
Observations	867	867	867	867	867
Adj R-sq.	0.136	0.425	0.237	0.308	0.466
Adj R-sq. Within	0.00967	0.0161	0.00477	0.0145	0.00441
Num. States	51	51	51	51	51
	(18) Construction, Extraction	(19) Installation, Maintenance & Repair	(20) Production	(21) Transportation	(22) Material Moving
NCA, 1 year lag	0.005	-0.010	-0.030**	-0.002	0.001
	(0.019)	(0.028)	(0.015)	(0.024)	(0.011)
Observations	867	867	867	867	867
Adj R-sq.	0.492	0.191	0.299	0.123	0.0984
Adj R-sq. Within	0.00958	0.0001	0.0226	-0.00089	-0.00626
Num. States	51	51	51	51	51
Demographic Controls	✓	✓	✓	✓	✓
Socioeconomic Controls	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓
Division-Year FE	✓	✓	✓	✓	✓

Standard errors clustered by state in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

4.2 Discussion

In the United States, the legal infrastructure of NCA enforceability lacks uniformity across time and states. Utilizing a measurement of this state-year variation, an estimation of the effects NCA enforceability has on entrepreneurship was provided in this work. The main results stand in line with previous works conducted in the field and with the theoretical predictions.

The main result of this research is the one illustrated in Table 4.1, a 3.4% statistically significant negative effect of NCA enforceability on firms' start. This result stands in line with the theoretical framework, presented in sub-section 3.1. The theory outlined stricter enforcement of NCA increases the costs facing a potential founder of a new firm. Causing, as validated in this research, to a decrease in firms starts.

Generally, The result corresponds to Kang and Fleming (2017)'s findings, utilized Florida's legislation change, and argued for a negative effect of NCA enforceability on entrepreneurship. However, the authors found a 7.5% decrease in the entry of small firms (1-4 employees), more than twice the size of the estimated effect found in this paper. This could be a result of several differences between the two works, their focus on a specific legislation change is only one of them.

Further, hidden behind the statistically insignificant coefficient presented in Table 4.1 column (3) is a possible struggle between two contrasting effects. As noted above, Table 4.1 column (3)'s subset represents the stock of states' small firms (1-4 employees). Therefore, the *firms entry rate* variable should be interrupted as the change in the stock of small firms in each state. Hence, the stock of small firms in a given state is potentially driven by two main forces. The first is firms entry, which has a positive effect on the stock of firms. The second is firms' survival or firms' exit, which has a negative effect on states' stock of firms. While the finding of this work indicates *firms entry rate* is negatively effected by NCA enforceability, less was revealed about firms exit.

As outlined in Chapter 3.1, stronger enforceability of NCA has two contrasting effects on young firms in their growth period, *the hiring costs effect* and *the investment protection effect*. If the investment protection effect is stronger than the hiring costs effect, it might increase firms' survival chances, causing an increase in the stock of firms. However, this will be in contrast with the negative effect of enforceability on the entry rate. These two contrasting factors could possibly be the reason no significant result was found in Table 4.1 column (3).

Worth mentioning results are presented in 4.1 column (4) and (5), indicating for the role NCA enforceability plays in metropolitan areas. These results resonate with the early works of Saxenian (1994) and Gilson (1999) dealing with the drivers

of the difference between regions' economic performance. Saxenian (1994) argued the mobility of knowledge was a key element in the development of successful industrial areas. Adding to this, Gilson (1999) argued NCA hinder this movement of knowledge, and therefore harm the economic performances. The results presented here support this notion when for metropolitan-based firms a strong negative effect on entrepreneurship was found to be associated with stricter NCA enforceability.

The second part of the BDS based analysis aimed to find the effect each of the seven dimensions constructing the NCA enforceability index has on $firms\ entry\ rate$. The first of two interesting strong effects revealed in this estimation is presented in Table 4.2 column (1). A possible explanation of this effect is associated with the transparent nature of the legislation process. The duration of the political process and its transparency, compared to court rulings, allows potential entrepreneurs to adjust their plans in accordance. For example, say a certain state legislative body is working on a statutory act aiming to strengthen the state's NCA enforceability. The process might encourage potential entrepreneurs, bound by NCA, to seize the opportunity and start new firms. Therefore, the effect of the legislation change on entrepreneurship into the following year will be positive.

Changes in courts' ability to modify NCA is the second dimension with a strong effect on entrepreneurship, in this case, a negative impact. Hausman and Lavetti (2015) found that the higher ability of the courts to modify NCA in order to make them more enforceable led to market concentration in the American healthcare industry by deterring physicians from breaking their NCA commitments. Those results are supported by this research when such a negative effect is observed in the aggregated state-level.

Besides the BDS based results, this work also presented the effects of NCA enforceability on the stock of entrepreneurs in different occupations. These results join the existing knowledge in the filed. The negative effects presented in Table 4.3 column (4) is in light with the results of Marx et al. (2009) and Balasubramanian et al. (2018). While a 2.4% decreased in the stock of entrepreneurs in healthcare support occupations (presented in Table 4.3 column (11)) corresponds with Hausman and Lavetti (2015) results.

Interestingly enough, in their work Starr et al. (2019) argued for a higher use of NCA in some occupations than others. One might expect the share of entrepreneurs in these occupations to be affected by changes in the level of enforceability. This is true in some cases, such as for engineers or for healthcare support occupations. However, within management or computer and mathematical occupations no statistically significant effect was estimated (see 4.3 and 4.4). Hereby, this calls for further research, centering around the occupation level.

In the conclusion of this chapter, the results of this research join a growing body

of works on the effects NCA enforceability has on different economic indicators in the United States. Most of the results presented here correspond with previous works, and expend their findings with a nationwide approach. The results of this paper could also open the door for further research on the effects of NCA.

5

Conclusions

This study aimed to expand the knowledge related to the effects NCA enforceability has on entrepreneurship in the United States. NCA are agreements that allow firms to restrict their employees' ability to join, form, associate, or start a competing firm. At the beginning of this work, a short presentation of the historical development of NCA enforceability was provided, followed by a review of the prevalence, features, and previous economic literature on the matter. The variation in the way states enforce NCA is a result of a historical process, dating back to the preindustrial English common-law.

Unfourunatly, there is no administrative record of the prevalence of NCA in the United States. However, several attempts of estimating the use of NCA were made in recent years. According to Starr et al. (2019) 20% of the American labor force were bound by NCA in 2014, and 38% had signed one at least once in their career. The use of NCA is more common in higher paid occupations, for example, scholars estimated more than 70% use of NCA in the case of top executives (Schwab and Thomas, 2006; Garmaise, 2011; Bishara et al., 2015b).

In order to identify the effect NCA enforceability have on entrepreneurship, a multiple time periods, groups, and treatment intensities difference-in-difference model was estimated. Utilizing the state-year variation caused by differences in enforceability levels among states and over the years (between 1995-2011). This variation was quantified into an NCA enforceability index, produced by Hausman and Lavetti (2015) based on Bishara (2011) proposed method, and used in this study. Additionally, two main data sources used in this research are the Business Dynamics Statistics and the Current Population Survey.

The results of this work confirm the theoretical predictions and stand in line with the conclusions of previous scholarly works. The main results presented here indicated a shift from the lowest to the highest levels of NCA enforceability cause a reduction of 3.4% in small (1-4 employees) firms entry rate. When a subset of

metropolitan-only firms was used, this effect accelerated to 4.3%. These negative effects of NCA enforceability on entrepreneurship is slightly smaller in magnitude than the ones found in previous publications, but it is indeed in line with the theoretical predictions.

An interesting finding presented in this research regards the contrasting effects posed by different dimensions of NCA enforceability. A positive effect of 5.2% was documented on firms' entry rate following the passage of statutory acts aiming to increase the level of NCA enforceability. The transparent nature of the legislation process combined with a relatively long period of time it takes to change laws is a possible explanation of this finding. Once such political process begins, it gives possible entrepreneurs enough time to start a firm before the legal regime becomes stricter, raising their entry costs. Therefore, the year following a legislation change demonstrate a rise in firms entry rate. However, one might argue this effect is only a short-term effect, calling for further research on the nature of this effect in a longer prospect. Contrarily, an increase in courts' ability to modify NCA, making them more enforceable pose a 5.3% negative effect on the small firms' entry rate.

This research contributes to both the academic debate over effects of NCA enforceability and the knowledge policy-makers have on such effects. The main contribution to the academic debate is the use of the state-year variation in order to identify the impact NCA hold on entrepreneurship. This work, to the best of my understanding, is the first one to conduct such estimation. Estimating the effects changes in different dimension of enforceability hold on entrepreneurship might be of value to different policy-makers on the state and federal level, when they seek to advance changes in the legal regime of NCA enforceability.

Future research dealing with the effects of NCA enforceability on entrepreneurship could use some of the findings of this study. First, the observed contrasting affects different dimensions of enforceability had on small firms entry rate, calls for further examination. Second, this research focused mainly on the entry of new entrepreneurial activity, opening the door for possible additional studies on firms' exits. Third, due to data limitations of the BDS, the occupation-based analysis provided above only focused on the stocks of enraptures. Future research could also focus on the effects of NCA enforceability on the entry of firms in different occupations. Studying these three issues might contribute to a further understanding of the effects NCA enforceability has on entrepreneurship.

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Appendix A

Additional Tables and Figures

Table A.1: States by Divisions

1	New England	Maine
		New Hampshire
		Vermont
		Massachusetts
		Rhode Island
		Connecticut
2	Middle Atlantic	New York
		New Jersey
		Pennsylvania
3	East North Central	Ohio
		Indiana
		Illinois
		Michigan
		Wisconsin
4	West North Central	Minnesota
		Iowa
		Missouri
		North Dakota
		South Dakota
		Nebraska
		Kansas
5	South Atlantic	Delaware
		Maryland
		District of Columbia
		Virginia
		West Virginia
		North Carolina
		South Carolina
		Georgia
		Florida
6	East South Central	Kentucky
		Tennessee
		Alabama
		Mississippi
7	West South Central	Arkansas
		Louisiana
		Oklahoma
		Texas
8	Mountain Division:	Montana
		Idaho
		Wyoming
		Colorado
		New Mexico
		Arizona
		Utah
		Nevada
9	Pacific Division:	Washington
		Oregon
		California
		Alaska
		Hawaii

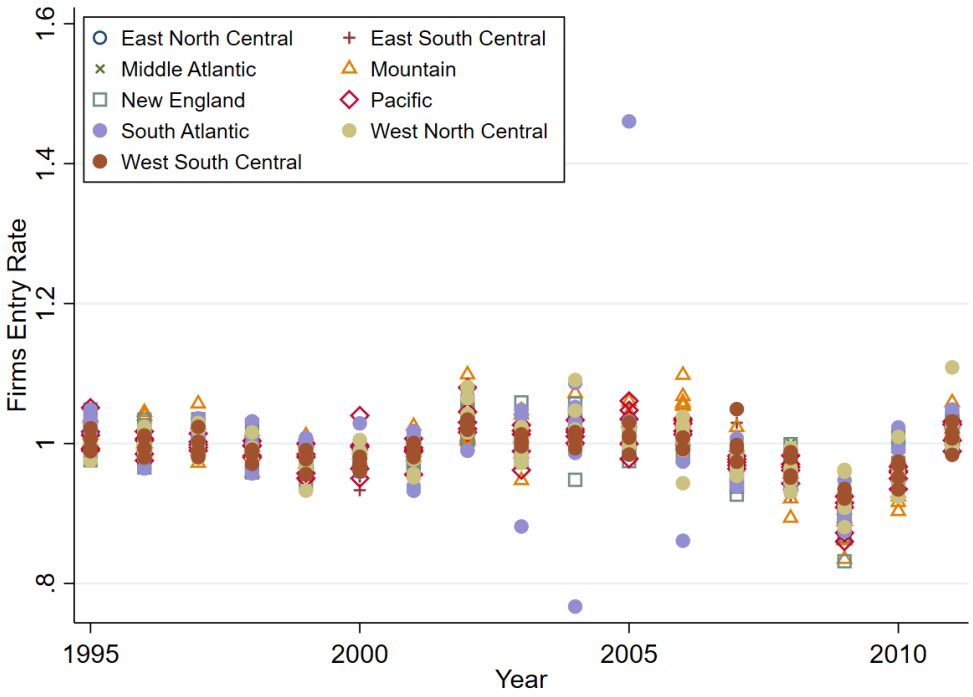

Figure A.1: Firm Entry Rate - Yearly Changes, by Census Division (Including DC)

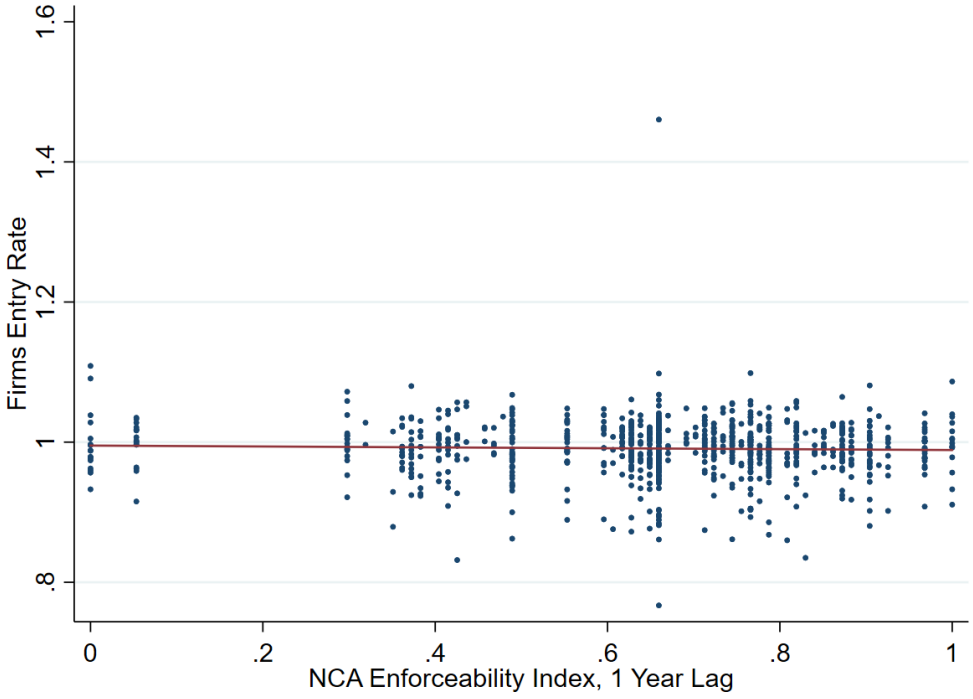

Figure A.2: The NCA Enforceability Index and Firms Entry Rate (Including DC)