The Impact of Workers' Compensation Laws on Entrepreneurial Activity

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Research Summary

Government policy that aims to stimulate business activity often overlooks its indirect impacts on entrepreneurial entry. In particular, the role of free time, especially in concert with liquidity constraints, remains an underexplored factor. In this paper, we exploit two exogenous shocks to workers' free time to furnish plausibly causal effects on entrepreneurial activity: (random) injury and the 2011 amendments to the Illinois workers' compensation laws. Utilizing a two-way fixed effects estimation, we find that as workers' compensation becomes less generous, i.e., by limiting both financial resources and an employee's time away from work, entrepreneurial activity within a specific geographical region is significantly reduced. Thus, we provide evidence of an unintended and negative impact on entrepreneurial activity caused by an indirect policy change. Further, this result unduly affects the recently injured or otherwise disabled. Our results are robust to alternative specifications and data sources, suggesting an important incidence of compensatory insurance regulation on entrepreneurial activity and, as a result, important considerations for future policymaking.

Managerial Summary

Workers' compensation is a state-level program that provides replacement wages to workers injured on the job. In 2011, amendments to Illinois' workers' compensation laws made this program less generous in terms of both financial benefits and time out of work. We study the impact of these amendments on entrepreneurial activity. We find that less generous workers' compensation has a large adverse effect on entrepreneurial activity because it constrains two important factors required for experimentation with entrepreneurship: financial resources and time. Our results hold up to several statistical models and controls, including local innovative and high-tech firms, as well as alternative datasets. Our findings yield important insights for policymakers in other states drafting such regulations and for researchers studying the incidence of such policies.

INTRODUCTION

Understanding which resources spur entrepreneurial activity is a central inquiry within entrepreneurship research. Scholars have explored various factors—such as wealth (Fairlie and Krashinsky, 2012), liquidity (Bianchi and Bobba, 2013; Holtz-Eakin, Joulfaian and Rosen, 1994; Hurst and Lusardi, 2004), and personality traits (Cardon *et al.*, 2009)—as potential drivers. More recently, attention has turned to the role of entrepreneurship among individuals with disabilities, who often exhibit a distinct preference for self-employment as a career path (Pagán, 2009; Renko, Parker Harris and Caldwell, 2015). This preference is shaped by several benefits associated with entrepreneurship, including improved work-life balance, such as a reduction of two to

three work hours per week (Gurley-Calvez, Williams and Kapinos, 2020), enhanced opportunities to escape poverty (Barnes and Sheldon, 2010), greater job satisfaction (Pagán-Rodríguez, 2011), and a lower risk of work-related injuries (Zwerling *et al.*, 1996). In parallel, prior research has shown that disability benefit policies significantly influence labor supply decisions (Autor *et al.*, 2019; Autor *et al.*, 2016; French and Song, 2014; Maestas, Mullen and Strand, 2013). These government programs can exert a dual influence: while they may reduce overall labor force participation, they can also serve as a form of social insurance, mitigating the downside risk associated with entrepreneurial entry (Coile, Duggan and Guo, 2016). As such, understanding the relationship between disability benefit programs and entrepreneurship is not only important for identifying factors that shape entrepreneurial decisions (Klangboonkrong and Baines, 2022), but also for advancing a more inclusive and equitable entrepreneurial ecosystem that accommodates diverse experiences and needs (Bakker and McMullen, 2023).

To that end, while [federal] disability compensation programs and disability insurance programs have been examined in the labor supply literature (Autor *et al.*, 2019; Autor *et al.*, 2016; Broten, 2020; Coile *et al.*, 2016; French and Song, 2014; Gurley-Calvez *et al.*, 2020; Maestas *et al.*, 2013; Pagán, 2009; Pagán-Rodríguez, 2011; Ramnath, Shoven and Slavov, 2017); there remains limited empirical evidence on the impact of Workers' Compensation (WC) programs on entrepreneurial activity. WC is a form of compensatory disability program designed to provide wage replacement to workers who are injured or disabled on the job. Importantly, these WC programs are administered at the *state level*, resulting in meaningful variation across jurisdictions that are otherwise demographically and geographically similar (Fishback and Kantor, 1998; Fortin and Lanoie, 2000; Guyton, 1999; Meyer and Viscusi, 1995; Sengupta *et al.*, 2012).

This substantial cross-state variation provides a unique natural laboratory to *quantify* the effect of changes in these programs on entrepreneurial activity.

Building on the literature of institutions (Baumol, 1990; North, 1990; Sobel, 2008; Williamson, 2000), our research underscores the pivotal role of changes in state-level regulatory framework with respect to WC law and the costs associated with venturing into entrepreneurship, with a particular focus on regulatory [dis]incentives. In this paper, we study the impact of a less generous workers' compensation law on state-level entrepreneurial activity. Our hypothesis centers on the idea that, similar to federal compensation programs[1], WC can exert a discernible influence on entrepreneurial activity by either increasing or decreasing the costs associated with entrepreneurial activities and by affecting the resources and time potential entrepreneurs can allocate to their entrepreneurial pursuits.

Specifically, we estimate the causal impact of the 2011 reforms to the Illinois WC law on entrepreneurial activity. We utilize a Two-Way Fixed Effects (TWFE) estimation to obtain causal effects of the amendment, which, while not changing the eligibility requirements, made WC in Illinois demonstratively less generous in both pecuniary and non-pecuniary benefits (time out of work). We utilize Indiana as a comparison group. Indiana is geographically and demographically similar to Illinois (Dube, Lester and Reich, 2010; Kong, Qin and Xiang, 2021; Rohlin, 2011), yet Indiana's WC laws are less generous at baseline and underwent no concurrent reforms during our sample window. In other words, we estimate the entrepreneurial impact of Illinois becoming *more similar* to Indiana in workers' compensation. To measure entrepreneurial activity, we use multiple data sets on establishment-level business registration data, with a rich set of company demographics, including company description, industry code, and credit rating.

[1] For example - Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI) programs, administered by the U.S. Social Security Administration

We collect data for 2007-2016 and further control for spatial and demographic factors that could potentially impact the rate of entrepreneurship (Burtch, Carnahan and Greenwood, 2018).

We find that a less generous WC program has an adverse impact on entrepreneurial activity. Specifically, we find that as workers' compensation becomes less generous, i.e., by limiting the financial resources and an employee's time away from work, new business registrations are significantly reduced. Our results are robust to alternative specifications and datasets, even after controlling for the largest metropolitan areas of Chicago and Indianapolis. Similarly, the relationship holds after controlling for proportions of creative, high-credit, and innovative high-tech firms. We propose that two frictions explain this negative impact on entrepreneurial activity: first, reduced disability benefits limit the financial cushion that supports entrepreneurial risk-taking (Coile *et al.*, 2016); and second, shorter recovery periods constrain the time available to explore entrepreneurial opportunities (Burtch *et al.*, 2018; Core, 2020; Gottlieb, Townsend and Xu, 2016; Meyer and Viscusi, 1995).

Our study makes two main contributions. First, we contribute to the literature on institutional theory (Baumol, 1990; North, 1990; North, 1991; Williamson, 2000) by providing causal evidence that regulatory changes, specifically, a less generous WC program, can depress entrepreneurial activity (Scott, 1995; Stenholm, Acs and Wuebker, 2013). We show that regulations related to indirect government support, such as WC benefits, play a critical role in shaping the entrepreneurial landscape by altering financial incentives and constraining non-financial resources like discretionary time (Armour and Cumming, 2008; Lee *et al.*, 2011; Schulz, Schwens and Fisch, 2021). These constraints act as disincentives, reducing the regional supply of entrepreneurs (Minniti, 2008). By limiting access to these resources, such policies can unintentionally discourage individuals from pursuing entrepreneurship. This underscores the need for policies

that reflect diverse occupational preferences and motivations (Burton, Sørensen and Dobrev, 2016; Klapper and Parker, 2010; Parker, 2009), especially for individuals with disabilities who are more likely to opt for self-employment (Gurley-Calvez *et al.*, 2020; Renko *et al.*, 2015).

Second, we also contribute to the literature on determinants of entrepreneurship (Evans and Jovanovic, 1989; Levine and Rubinstein, 2018). We lend evidence to the theory of entrepreneurial activity (Kerr, Nanda and Rhodes-Kropf, 2014; Koch, Park and Zahra, 2021; Lindholm-Dahlstrand, Andersson and Carlsson, 2019; Manso, 2016; Mérida and Rocha, 2018; Wiklund and Shepherd, 2011) by investigating the causal impact of temporary interruptions in wage work (Christiansen and Lounsbury, 2013) on new venture creation. Specifically, our study speaks to the literature on slack time as a determinant of entrepreneurial activity (Agrawal *et al.*, 2018; Bird and West III, 1998; Lévesque and Stephan, 2019; Markowska, Ahl and Naldi, 2022). To the extent individuals have flexibility when they report back to work (either in the original position or a less physically demanding post), more stringent reforms reduce the time available to experiment with entrepreneurship (Boden and Ruser, 2003; Meyer and Viscusi, 1995). So far, the literature has mainly focused on slack time as a determinant of innovation within the firm (Medase, 2020; van Uden, Knoben and Vermeulen, 2017); our study underscores the importance of time as an understudied determinant of entrepreneurial activity as well (Agrawal *et al.*, 2018; Gottlieb *et al.*, 2016).

THEORETICAL BACKGROUND

The Institutional Environment and Entrepreneurial Activity Nexus

Theories of determinants of entrepreneurial activity, measuring new venture creation (Marcotte, 2013), buttress the finding that entrepreneurship contributes positively to growth and innovation (Audretsch and Keilbach, 2008; Decker *et al.*, 2014; Haltiwanger, Jarmin and Miranda, 2013). Policymakers have accordingly paid much attention to identifying factors and devising policies

that contribute positively to entrepreneurial activity (e.g., Caliendo *et al.*, 2015; Cumming, 2007; Fairlie, Karlan and Zinman, 2015; Joshi, Inouye and Robinson, 2018). The relationship between the institutional framework and entrepreneurship is characterized by a significant degree of inter-dependence, in which a modification in one component triggers consequential changes in the other (Congregado, Golpe and Parker, 2012; Minniti, 2008; Robson, Wijbenga and Parker, 2009; Urbano, Aparicio and Audretsch, 2019a).

While entrepreneurship is essentially an individual endeavor, the entrepreneurial process is context-specific and is governed by its societal, institutional, and environmental nexus (Welter, 2011). The decision to start an entrepreneurial venture represents a complex interplay of economic behaviors, which exhibit considerable variability across different temporal, spatial, and social contexts (Tolbert, David and Sine, 2010). Baumol and Strom (2007) argue that while entrepreneurs are guided by goals to create wealth or acquire power or gain prestige, these goals and entrepreneurial endeavors are moderated, both directly and indirectly, by the rules set forth by policymakers. Emphasizing the pivotal role of institutions in an entrepreneurial context, Meyer and Rowan (1977) stress that entrepreneurs must adhere to established institutional regulations to secure the requisite foundational elements for building a legitimate entrepreneurial structure.

Williamson (2000) underscores the essential role of institutions in social analysis by outlining a comprehensive framework consisting of four distinct levels. At the foundational level is embeddedness, which encompasses informal institutions such as customs, norms, traditions, and religious practices—elements that are deeply rooted in society and slow to change (Estrin and Mickiewicz, 2011; North, 1990). The second level focuses on formal institutions, or the rules

that structure the broader societal framework. The third level, governance, pertains to the mechanisms through which these rules are implemented and enforced. Finally, the fourth level addresses resource allocation and employment, focusing on how incentives are structured and resources distributed. While the embeddedness level is relatively static as it necessitates an extended period to effect meaningful change, our study focuses on the second level, formal institutions, which define and enforce the "rules of the game" (North, 1990), as well as the allocation of resources designed to create incentives for fostering entrepreneurial activity.

Institutions wield significant influence by delineating the expectations that dictate appropriate courses of action for entities (Meyer and Rowan, 1977). These institutions perform the crucial role of objectively defining what actions are deemed acceptable or not acceptable, and in some cases, even extend beyond contemplation (Powell and DiMaggio, 1991), thereby establishing a framework that delimits the norms and boundaries within which entrepreneurs and organizations function (Bruton, Ahlstrom and Li, 2010). These formal rules, regulations, and policies affect not only the sheer volume of entrepreneurial activity but also its quality (Aidis, Estrin and Mickiewicz, 2008; Chowdhury, Audretsch and Belitski, 2018; Sobel, 2008; Stenholm *et al.*, 2013; Urbano *et al.*, 2019b). The "rules of the game," defined by formal institutions, often set boundaries that influence the supply (North, 1990) and allocation of entrepreneurship (Baumol, 1990). Rules and regulations are designed to mitigate uncertainty and risk, both essential prerequisites for entrepreneurial endeavors (Chowdhury *et al.*, 2018).

Policymakers craft tailored rules, regulations, and policies that directly and indirectly promote and support entrepreneurship. Scholars have studied the relationship between direct regulatory changes and entrepreneurship using a wide variety of variables (Bosma *et al.*, 2018), including job training (Fairlie *et al.*, 2015), formal and informal support programs (Parker, 2009;

Storey, 2003), and startup subsidies (Caliendo and Kritikos, 2010). However, it is essential to recognize that not only do regulations and policies explicitly aimed at entrepreneurship influence its dynamics, but those targeting other areas can also have indirect impacts. For example, financial support programs, including unemployment insurance (Hombert *et al.*, 2020; Rapp, Shore and Tosun, 2018), cash transfers (Bianchi and Bobba, 2013), social security benefits (Ramnath *et al.*, 2017; Xu, 2022), and food stamps (Olds, 2016), can substantially influence entrepreneurial activity. Likewise, labor market policies, including extended job-protected maternity leave programs (Gottlieb, Townsend and Xu, 2021), reduce the risks associated with maternity (Core, 2020) and create pathways that facilitate entrepreneurial endeavors, particularly for women. Similarly, firm restructuring policies, like bankruptcy exemption (Schulz *et al.*, 2021) and entry-deregulation policies (Schulz, Urbig and Procher, 2016), can significantly impact the engagement of hybrid entrepreneurs. In a dynamic and interconnected landscape, regulations and policies have a far-reaching impact on entrepreneurial activity, influencing its various dimensions and extending their effects even to areas not explicitly focused on entrepreneurship.

An intriguing question arises: What are the factors by which these regulations and policies, initially designed for purposes beyond entrepreneurship, exert their influence on entrepreneurial activity? The underlying mechanism hinges on how rules and regulations either facilitate or impede access to resources and risk-taking, the fundamental elements essential for entrepreneurial experimentation (Stenholm *et al.*, 2013). In the four-layer framework introduced by Williamson (2000), resources play a pivotal role within the institutional framework, significantly influencing the quality of entrepreneurship. In particular, the allocation and availability of these resources play a defining role in shaping the entrepreneurial landscape, affecting the decisions and actions of aspiring entrepreneurs (Chowdhury *et al.*, 2018). Specifically, when these policies

reduce transaction costs in accessing these resources, they can potentially reduce the barriers to experimenting with entrepreneurship (Kerr *et al.*, 2014). In other words, these policies effectively lower the cost of entrepreneurship by mitigating certain risks and resource constraints, making it more accessible for aspiring entrepreneurs.

While these resources are mainly pecuniary (e.g., funding availability) (Hurst and Lusardi, 2004; Kerr and Nanda, 2009) or ease out the monetary burden on the overall household (e.g., food stamps (Olds, 2016) and affordable health insurance (Ruddy, 2020)), the availability of non-pecuniary resources, such as time (Agrawal *et al.*, 2018; Core, 2020; Gottlieb *et al.*, 2016), and flexibility in work hours (Gurley-Calvez *et al.*, 2020; Hurst and Pugsley, 2011) can also impact an individual's engagement with entrepreneurship. The essence of entrepreneurial activity lies in an individual's endeavor to be an entrepreneur, moderated by the level of risk aversion (Kihlstrom and Laffont, 1979) and availability of resources (Evans and Jovanovic, 1989). The cost of entrepreneurial entry is high in the early stages, often because of the limited availability of resources (Evans and Jovanovic, 1989). These examples emphasize that the institutional framework significantly impacts the cost and resource availability for individuals considering entrepreneurship, thereby affecting their decision-making and engagement in entrepreneurial activities.

Furthermore, in line with Baumol (1990), it is crucial to recognize that institutions play a pivotal role in creating a system of incentives that can influence an individual's preference for entrepreneurship as an occupational choice; however, policies with dissimilar incentives may deter an individual's intention to pursue entrepreneurship. Additionally, the enforcement of these policies is often carried out by agents whose own utility functions can exert a considerable influence on the resulting outcomes (North, 1990). These agents, who may not necessarily be neutral,

can be influenced by their own interests, thus operating with a degree of autonomy from other societal actors (Scott, 1995). Institutional policies that favor specific value-adding activities and simultaneously impede other activities hurt entrepreneurial activity (Stenholm *et al.*, 2013). In other words, while the primary goal of these regulations is to promote productive entrepreneurship, a weaker regulatory framework—characterized by excessive administrative burdens, bureaucratic obstacles to business entry or exit (Stenholm *et al.*, 2013), misaligned incentive structures (Minniti, 2016), or overly autonomous institutional behavior (Scott, 1995)—can discourage individuals from engaging in entrepreneurial activity (Estrin, Korosteleva and Mickiewicz, 2013).

Consequently, our research examines the impact of changes in the Workers' Compensation program, arising from on-the-job injury and disability benefits, on entrepreneurial activity. Specifically, we identify how changes in the workers' compensation program can affect entrepreneurial engagement, particularly when these changes lower the resources, both financial and non-financial, necessary for individuals to experiment with entrepreneurship.

Compensatory Disability and Workers' Compensation

Scholars have exhibited a keen interest in entrepreneurship as an occupational choice for marginalized individuals who have been subjected to discrimination (Khurana *et al.*, 2023; Simarasl *et al.*, 2022). The context of disabilities has received limited attention in entrepreneurship research (Klangboonkrong and Baines, 2022; Renko *et al.*, 2015) compared to factors such as gender (Castellaneta, Conti and Kacperczyk, 2020; Simarasl *et al.*, 2022), race (Köllinger and Minniti, 2006), and immigration (Fairlie and Lofstrom, 2015), which have been more extensively studied for their inclusivity in entrepreneurial studies. Individuals with disabilities face a unique set of challenges. Beyond the conventional obstacles, such as liquidity constraints, encountered

when initiating a business, they grapple with a multitude of societal barriers, including those of a cultural, attitudinal, educational, economic, and physical nature, all of which can significantly influence their decision to engage in entrepreneurship as a viable career choice (Renko *et al.*, 2015).

Despite these formidable challenges, there is empirical evidence suggesting a preference among individuals with disabilities for self-employment as their chosen occupational path (Pagán, 2009; Pagán-Rodríguez, 2011; Renko *et al.*, 2015). This preference can be attributed to the flexible nature of self-employment, which allows for a more accommodating balance between disability status and occupational engagement (Pagán, 2009). Our primary objective in this study is to explore whether changes in institutional frameworks affecting the reduction of benefits available to injured and disabled workers through WC have consequential impacts on entrepreneurial activities at the state level.

WC is a class of compensatory disability programs providing replacement wages and other benefits to injured workers on the job (Fishback and Kantor, 1998; Guyton, 1999). Importantly, these programs can be seen as a sort of insurance, providing compensation benefits after an on-the-job injury or disability. Germany enacted the first WC law in 1884, followed by England in 1897 and eventually the U.S. in 1908 (Sengupta *et al.*, 2012). WC laws are often considered to be one of the first social insurance programs (Krueger, 1990) and one of the major tort reforms in the U.S. that shifted the "negligence liability" from employers to a "shared strict liability" between the employer and the injured worker (Fishback and Kantor, 1998). Before the WC laws were commonplace, an injured worker had to prove that their injury was caused by the employer's negligence and file a suit against them. Essentially, by accepting a WC benefit, an

injured worker gives up the right to sue the employer (Fishback and Kantor, 1998; Fortin and Lanoie, 2000; Sengupta *et al.*, 2012).

WC typically covers lost wages and wage replacement, as well as medical expenses, including treatment and rehabilitation, and other benefits to employees or their dependents resulting from a work-related injury, including funeral expenses in the event of death. Specifically, disability benefits fall under seven broad categories (i) temporary total disability (TTD) when an employee is recovering from an injury, (ii) permanent total disability (PTD) where an employee is permanently unable to work, (iii) permanent partial disability (PPD) where an employee has a partial permanent disability but can work, (iv) temporary partial disability (TPD) where an employee is recovering from a sustained injury but is working on less physically demanding duty, (v) medical care, (vi) vocational rehabilitation, and (vii) death benefits.

While the U.S. Department of Labor, through the Office of Workers' Compensation Programs, administers four federal disability compensation programs that directly oversee compensation for workers in energy, longshore and harbor, coal mines, and federal agencies, individual states administer policies and regulations related to WC for workers that do not fall under these four categories.[2] Notably, there is no federal mandate on how states administer the computation or disbursement of disability benefits resulting from work-related injury or disability (Sengupta *et al.*, 2012). In the absence of a standardized WC law across the country, differing policies exist across states (Krueger, 1990; Krueger and Burton, 1990; Meyer and Viscusi, 1995) concerning compensation, the burden of proof, and allotted reporting and claimant time, typically between 30 to 90 days.[3]

[2] For details, see, https://www.dol.gov/general/topic/workcomp.
[3] Texas is the only state where workers' compensation is not mandatory. However, businesses that have contracts with Government entities must buy workers' compensation for their employees. For details, see, https://www.tdi.texas.gov/wc/act/index.html.

Changes in WC benefits influence not only the total number and nature of claims filed (Krueger, 1990) but also the workers' productivity (Fortin and Lanoie, 2000) and optimal behavior (Dionne and St-Michel, 1991). In contrast to the limited evidence we have on [state level] WC programs (Krueger and Burton, 1990; Meyer and Viscusi, 1995), the [federal] disability compensation program for veterans, administered by the U.S. Department of Veteran's Affairs and Disability Insurance programs, e.g., Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI) programs, administered by the U.S. Social Security Administration have been studied extensively by scholars (Autor *et al.*, 2019; Autor *et al.*, 2016; Broten, 2020; Coile *et al.*, 2016; French and Song, 2014; Gurley-Calvez *et al.*, 2020; Maestas *et al.*, 2013; Pagán, 2009; Pagán-Rodríguez, 2011; Ramnath *et al.*, 2017).

The federal programs follow a standardized protocol for ascertaining the disability, computing, and disbursing disability benefits across the country. Scholars have examined the impact of such disability benefits on household labor supply, earnings, and consumption expenditure for veterans (Autor *et al.*, 2019; Autor *et al.*, 2016). These benefits adversely impact the overall supply of labor (Autor *et al.*, 2019; Autor *et al.*, 2016); nevertheless, they encourage veterans to opt for entrepreneurship when disability benefits are made more generous (Coile *et al.*, 2016). Likewise, disability insurance programs, e.g., (SSDI and SSI), have had a mixed impact on the labor supply overall and the supply of entrepreneurs in particular (Gurley-Calvez *et al.*, 2020). To illustrate, Ramnath *et al.* (2017) showed that eligibility to receive social security benefits increased individuals' probability of switching from wage employment to entrepreneurship. A steady income stream through government programs can encourage individuals to switch from wage employment to entrepreneurship (Bianchi and Bobba, 2013).

In this context, Scott (1995) acknowledges the temporal and spatial variations in institutional rules and their varying impacts on diverse actors, including firms and entrepreneurs. Emphasizing the distinctions in institutional norms across the United States, Europe, and Asia, Scott (1995) contends that these disparities give rise to heterogeneous industry structures. Furthermore, scholarly studies have demonstrated that divergences in institutional regulatory frameworks result in variations in entrepreneurial activity within a particular country, impacting both firms and entrepreneurs (Stenholm *et al.*, 2013). To that end, Minniti (2016) highlights that, in the short term, institutions exhibit limited capacity to affect the overall quantity of entrepreneurs on a macro level. However, their influence on the aggregate supply of entrepreneurs within specific geographical regions remains substantial. This phenomenon emerges from the understanding that entrepreneurial intent primarily arises from the prevailing incentive structure rather than the inherent inclination of the population toward entrepreneurship. Tolbert *et al.* (2010) link regional differences in entrepreneurship with the literature on regional economic clusters (Sorenson and Audia, 2000), which suggests that with certain circumstances, in specific geographical areas and industries, entrepreneurship flourishes; however, in contrast, in other regions, even when relevant resources are available, entrepreneurial ecosystems fail. The underlying institutional disparities between regions play a significant role in explaining these variations in entrepreneurial behavior.

In this paper, we exploit state-level changes to a WC program as a special case of compensatory disability programs and examine their impact on entrepreneurial activity, emphasizing regional differences in entrepreneurial behavior to [dis]incentives within the broader institutional context.

DATA AND CONTEXT

Research setting: Amendment to the Illinois Workers' Compensation Act, 2011

We study the impact of reducing WC benefits in Illinois on entrepreneurial activity. Given the lack of a standard policy, we obtain plausibly causal estimates using the neighboring state of Indiana as a control group (Dube *et al.*, 2010; Kong *et al.*, 2021; Rohlin, 2011). In 2011, after considerable Chamber of Commerce lobbying, policymakers in the state of Illinois made sweeping changes to the Illinois Workers' Compensation Act that rendered its statewide program substantially less generous to employees.[4] Conditional on an individual's participation in the labor force and on-the-job injury or disability, these reforms, while not changing the eligibility requirements, severely curtail the amount of disability benefits available. In our discussion, we focus on three indemnity changes that bear special mention: First, Section 8(d)1 capped the award for wage differentials after 2011, at five years or 67 years, whichever is later. Earlier, there was no cap on the wage differentials, and they were payable for life. Second, Section 8(e)9 capped the benefits on permanent partial disability caused by carpal tunnel. The amendment now uses 190 weeks instead of 205 weeks to calculate the disability benefits. Third, Section 8(a) uses gross wages earned at an alternate job to calculate benefits from temporary partial disability. Further, in addition to these quantifiable changes following the 2011 reforms, there were several intangible changes, which nonetheless made the state's WC program less generous, such as limiting a disabled worker's choice of medical care, increasing the disabled worker's burden of proof, and terminating the state's existing bullpen of arbitrators.

Changes in WC have been shown to impact the time spent out of work (Boden and Ruser, 2003; Meyer and Viscusi, 1995). Meyer and Viscusi (1995) compared increases in weekly WC benefits in Kentucky and Michigan and found that the time out of work increased for workers eligible to receive higher WC benefits. In a similar study, Boden and Ruser (2003) examined the

[4] See https://www2.illinois.gov/sites/iwcc/about/Pages/workers.aspx to access Illinois Workers' Compensation Act.

changes to WC laws across different states in the United States and showed that increased restrictions reduced the time out of work for injured employees. Relatedly, work in entrepreneurial activity suggests that individuals are more likely to engage when they earn less or otherwise have a lower opportunity cost of time (Amit, Muller and Cockburn, 1995). The idea of higher wages implies there is more missed value when experimenting with entrepreneurship.

Workers' compensation programs thus directly impact these opportunity costs through two channels. First, by providing replacement wages, they decrease the monetary differential between time spent away from work and time on the job. Second, by allowing for time to convalesce, individuals can explore potential upsides of entrepreneurial activity without necessarily sacrificing wage employment.[5] Taken together, these reforms, which reduce WC benefits, limit a potential entrepreneur's ability to opt for entrepreneurship during their time away from paid employment in Illinois.[6] For comparison, we use the neighboring state of Indiana, which was at the time less generous than Illinois in terms of compensation but enacted no comparable reforms over the time period under consideration. As a result, we would expect to see a decline in entrepreneurial activity relative to a neighboring state in the period immediately following the enactment of the changes. We summarize these changes in Table 1 with a side-by-side comparison to the Indiana Law.[7]

Further, Indiana is a plausible control group, given that Indiana and Illinois are remarkably similar. In addition to their physical closeness (they share 270 miles of border), they have comparable age and gender distributions within their populations. Illinois is slightly less white and has a

[5] A potential counterargument is the sheer negative impact of on-the-job injury. However, in our informal discussions with WC lawyers, specialists, and recipients, this was indeed the inciting incident to entrepreneurial activity. In other words, the benefit of wage employment was not worth the risk of injury.
[6] See pre- and post-amendment comparison of indemnity changes and total benefits in Appendix Table A1. In the Appendix section, we also report the increasing penalty (lost wages) by age in Figure A3.
[7] Importantly, other laws that came into effect in this time period did not similarly impact workers or labor and employment settings, nor business registrants.

slightly higher income per capita, but these differences disappear when we control for the large MSAs in either state, a point we discuss later. Further state comparisons are illustrated in Table 2.

[INSERT TABLE 1 AND 2 ABOUT HERE]

Data

Our primary data comes from Data Axel , a historical business database that compiles establishment-level business registration data, including company description, industry code, and credit rating.

From this database, we collect all verified records of privately registered new businesses that were established in either Illinois or Indiana from 2007 to 2016 (inclusive). Businesses with verified records are called over the phone and hand-checked for quality by our data provider. This is their most stringent data compilation process and affords us a rich set of demographics not accessible from traditional state-level records. Altogether, we have data on 57,097 unique enterprises across 2,525 zip codes. Table 3 presents summary statistics on our dataset.

[INSERT TABLE 3 AND FIGURE 1 ABOUT HERE]

Throughout our data, entrepreneurship becomes more popular over time, with business registrations increasing. The average business in our data was established a little before 2015. Sixty-four percent of the companies are established in Illinois, with 53 percent located in the Chicago-Naperville MSA. Thirteen percent of the companies are located in the Indianapolis MSA. Only 43.6 percent of companies have a male executive listed. Interestingly, relatively few companies have either a creative (1 percent) or technology-based (6.6 percent) industry code (National Science Board, 2014), and 16.7 percent of companies have a credit score of "B+" or above.

In Figure 1, we further examine our sample by presenting the industry breakdown across states as classified by the SIC division. The most popular industries for entry in both Illinois and

Indiana are services, retail trade, and public administration, respectively. By and large, this is comparable to the industry mix across the United States overall, although with less representation from businesses in Construction and Finance, which tend to lend themselves to established firms rather than new entrants (Becker, Chen and Greenberg, 2013). We further explore the implications of entrepreneurial entry by industry classification in Table 5, discussed below.

RESULTS

Difference-in-Differences

Our hypothesis is that due to the 2011 reforms, we will see a decline in entrepreneurial activity (measured through new business registrations) in Illinois. We assess this hypothesis using a difference-in-differences framework. Much of the standard empirical toolkit for assessing the suitability of this framework collapses to our assessment of parallel trends. Parallel trends suggest (though they do not necessarily guarantee) that any significant differences we observe in the data are the result of the treatment and no other unobservable changes to the underlying data-generating process. In first assessing the impact of these reforms, we collect data on all verified new businesses in Indiana and Illinois. We aggregate counts of new business formation up to the zip code level and first plot an event study graph of the treatment effect by year. In Figure 2, we plot the estimates of β_3 from estimating the model:

$$Y_{it}=\beta_1 * IL+\Sigma(\beta_2 * \mathbb{I}_{year}+\beta_3 \mathbb{I}_{year} * IL)+\alpha+\varepsilon \qquad (1)$$

where Y_{it} is new businesses registered. Thus, the β's track how Illinois and Indiana zip codes differ in their new business registrations relative to their 2011 difference. Importantly, not only do we see limited to no indication of a differential trend in business registrations in the years leading

to the implementation of new WC regulations (except for the year 2010), but we also observe a sharp and persistent decrease in Illinois business registrations around the policy date.[8]

[INSERT FIGURE 2 AND TABLE 4 ABOUT HERE]

Figure 2 supports a causal effect of the reforms on new business registrations. The benchmark year is 2011, the year the law went into effect. While there is no indication of differential trends in Illinois and Indiana registrations in the years prior to the WC reforms, we observe a sharp and persistent decrease in new business registrations in Illinois after the policy implementation. Importantly, other concurrent major legislative changes that took place during this time period are unlikely to have impacted business dynamism.[9]

However, as the event study has limited controls, the reported magnitudes are likely to be inflated. Accordingly, we proceed with our study by calculating our main estimation, a TWFE Poisson regression, implemented using the Stata command—*ppmlhdfe* (Poisson pseudo-maximum likelihood (PPML) regression models with high-dimensional fixed effects (HDFE)). Briefly, in the case of Poisson regression, we have:

$$E(Y_{it}) = exp(\beta \boldsymbol{X}_{it}) \qquad (2)$$

Where Y is the count of new businesses formed indexed by zip code, i, and year, t. β is a vector of coefficients, with the coefficient of interest being on the difference-in-differences interaction term: whether a particular zip code is in Illinois after the 2011 reforms. The vector X contains two notable fixed effects: a spatial fixed effect (usually county, but our results are robust to zip code level analysis) and the temporal fixed effect, in this case, year. The results from estimating this equation are presented in Table 4.

[8] In the appendix, we plot Figures A1 and A2, which similarly show parallel trends. We further note that these trends differ on levels, but that is to be expected given the underlying differences between the two states.
[9] We discuss these changes and their potential impacts in the appendix.

The difference-in-differences coefficient (β_1, henceforth) is consistently negative and significant, suggesting that fewer new businesses were established as a result of the 2011 WC reforms. The coefficient on the *Illinois* × *Post* interaction term represents the log change in expected business registrations post-reform. Starting with column 1, the coefficient of -0.375 corresponds to an incidence rate ratio of approximately 0.687, implying a 31.3% decrease in new business formation in Illinois following the policy change. This negative effect remains consistent and statistically significant across all specifications (Columns 1–8), further reinforcing the robustness of our findings. Importantly, the significance of this result holds in column 2 when we control for the proportion of high technology and creative businesses (as indicated by their NAICS coding) and the average business credit rating in the zip code at the time of establishment.

However, one important difference between Illinois and Indiana is the presence of Chicago as a major metropolitan statistical area. While Indiana has a major metropolitan area in Indianapolis, Chicago's MSA is roughly 3.5 times larger per the 2020 census. This difference is important given the propensity of entrepreneurs to co-locate. Indeed, there is much evidence on the importance of so-called "entrepreneurial hubs" (Fallick, Fleischman and Rebitzer, 2006; Saxenian, 1996).

For this reason, we control for zip codes in Chicago or Indianapolis MSAs in column 3. We use a dummy variable that takes a value of 1 if Chicago/Indianapolis is located within the county. The results on β_1 remain significant ($\beta_1 = -0.377, p < 0.01$) and at a similar magnitude to column 1. This result holds in column 4 ($\beta_1 = -0.463, p < 0.01$) when we control for (log) population at the zip code level and column 5 ($\beta_1 = -0.469, p < 0.01$) when we include the full set of business, demographic, and location controls, where the magnitude of the coefficient looks stronger than the results in column 2, suggesting a decrease in expected count of new business

registrations in Illinois zip codes by approximately 37.5% compared to the control group, holding other factors constant.

As an alternative specification, we limit the sample to exclude Chicago zip codes in column 6 and both Chicago and Indiana zip codes in column 7. In both limited-sample estimations, we still see a significant reduction in new businesses in Illinois in the post-period, at stronger magnitudes ($\beta_1 = -0.587, p < 0.01$ *in column* (6); ($\beta_1 = -0.477, p < 0.01$) *in column* 7) to those seen throughout Table 4. Finally, in column 8, we re-estimate the kitchen-sink regression from column (4), using zip code-level fixed effects (instead of the county-level found in columns 1-7). The results remain robust to this alternative specification ($\beta_1 = -0.496, p < 0.01$), suggesting that the expected number of new business registrations in Illinois zip codes decreased by approximately 39.1% compared to the control group. These results are robust to alternative pre-period lengths in Appendix Table A2, and hi-tech business sub-groupings in Appendix Table A3. Appendix Table A2 varies pre- and post-treatment windows. Results remain negative and significant with a one-year pre-period (Model 3) and shorter post-periods (Model 4), confirming our findings are not driven by specific temporal choices. Appendix Table A3 stratifies ZIP codes by high-tech firm presence. The policy's negative effect persists across all subsamples and is strongest in high-tech areas—suggesting the dampening impact was particularly acute in innovation-intensive regions. These checks strengthen the credibility and generalizability of our results.

In Appendix Table A4, we split the sample roughly along the median zip code-level population to estimate our Two-way Fixed Effects Poisson regressions. Consistent with the above results, the main coefficient is significantly negative in both specifications ($\beta_1 = -0.387, -0.536;$ *respectively* $p < 0.01$), though the magnitude of the effect is much stronger in more

populous zip codes (>5,500 residents), with a 41.5% decline compared to a 32.1% decline in smaller zip codes (≤5,500 residents).

In Appendix Table A5, we further re-estimate the model from Table 4, incorporating year-state fixed effects to address potential variations in the general environment between the two states over the sample period. Our analysis shows that the results remain robust with the inclusion of year-state fixed effects in both the sparse and comprehensive (kitchen sink) models. This adjustment strengthens our confidence in the reliability of our findings, confirming that the observed effects are not merely coincidental with external state-level changes.

New registrants are obviously important to business dynamism. However, different entrepreneurs are likely to respond to this policy differently. Importantly, new business registrations may be different across various industries, as these subgroups are characterized by unique challenges, opportunities, and dynamics. Further, while the overall impact of a change to WC policy on an economy is crucial to assess, a deeper understanding of its effects within distinct industry subgroups has the potential to both unveil further insights, while also confirming that our prior results are robust to the industry mix within the sample under consideration. In Table 5, we replicate our Poisson estimation, but restrict the sample by SIC industry division. For instance, in Table 5, column A only considers new businesses with an SIC code reflecting agriculture, forestry, or fishing, while Table 5, column J restricts the sample to new entrants within the SIC division of public administration, thus providing a more nuanced perspective on how the policy resonates within different sectors.

[INSERT TABLE 5 ABOUT HERE]

Across the table, the coefficients on β_1 are negative. The exceptions in column 1 (agriculture), column 4 (manufacturing), and column 6 (wholesale) are all instances where the β_1 coefficient is not statistically significant. In contrast, all the industries with a negative sign on the β_1 coefficient also yield statistically significant results. These industries (agricultural, manufacturing, and wholesale) also reflect the areas where entrepreneurial entry is least common, suggesting that their null results may be more reflective of power issues rather than an industrial outlier driving our results.[10] To that point, we note that all three insignificant industries have fewer than 1,000 observations in our data. As a further case in point, Appendix Table A6 presents total WC claims by industry (2011-2016) in the state of Florida (where data are publicly available), and the top three compensatory industries in Florida (Retail, Construction, and Public Administration) all map to highly negative and significant β_1 coefficients in Table 5.

[INSERT TABLE 6 ABOUT HERE]

Robustness and Sensitivity Analyses

Endogeneity Bias Assessment

Though endogeneity is frequently a concern in entrepreneurship and strategy research (Maula and Stam, 2020), we have tried to mitigate these concerns by exploiting exogenous shocks to furnish plausibly causal estimates. Indeed, our event study in Figure 2 is suggestive of parallel trends, while our estimates employ zip code, county, and state-level fixed effects. These various fixed-effects structures help to control for unobserved heterogeneity across different geographical levels and should account for other relevant changes that could influence our results.

However, to the extent that omitted variable bias may cause additional endogeneity concerns, we use Stata's *konfound* command to estimate the threshold for invalidating our inferences

[10] Please note, that "Public Administration," is somewhat of a misnomer as these are still privately-registered enterprises, and the most common SIC code within "Public Administration" is 999977 or "Nonclassifiable Establishments." In our data, these are typically these are real estate holding companies that we might otherwise expect to see with the primary SIC code "Finance," (Column H) which is also significantly negative.

(Frank, 2000; Xu *et al.*, 2019). To invalidate the causal inference of the 2011 reforms, 73.05% (5,173) of the cases would have to be due to bias. This estimated effect is much larger than the threshold for omitted variable bias, suggesting that there is little concern regarding this form of endogeneity. We summarize all our robustness checks in Table 6.

Alternate Data Source

While the litany of results above is telling, it may be worthwhile to question if they are artefactual to our dataset. After all, while the set of verified businesses affords us a great deal of additional data (credit rating, industry coding, etc.), it necessarily understates the number of new businesses registered with either the Illinois or Indiana Secretaries of State. To this end, we conduct a robustness check using data from an alternative source: the Startup Cartography Project (Andrews *et al.*, 2020), which directly aggregates state-level administrative data, and has been used to assess regional differences in entrepreneurial activity (Guzman and Kacperczyk, 2019; Yu and Fleming, 2022). We confirm that these data demonstrate parallel trends in Appendix Figure A2.

If anything, the figure using SCP data appears more consistent with the difference-in-differences assumption of parallel trends. Next, we re-estimate equation (1) using startup formation rate, defined as the number of new business registrants within a given population, as the outcome variable Y_{it}. Our results are presented in Table A7.

The results in Table A7 are consistent with Table 4, where after the 2011 reforms, Illinois had a significantly lower startup formation rate in column 1 ($\beta_1 = -5.806, p < 0.01$). This continues in column 2 ($\beta_1 = -7.228, p < 0.01$) when we control for the number of equity growth events per the SCP data. Additionally, we see significant and negative results in column 3 ($\beta_1 = -5.800, p < 0.01$) when we control for zip codes in the Chicago MSA, column 4 ($\beta_1 = -5.797, p < 0.01$) when we control for both the Chicago and Indianapolis MSAs, and

column 5 ($\beta_3 = -8.073, p < 0.1$) when we include all of the above controls. As with the data axel data, in columns 6 and 7, we restrict the sample to exclude the Chicago zip codes and both Chicago and Indianapolis zip codes, respectively. Neither restriction changes the significance or sign of the results in column 6 ($\beta_1 = -6.941, p < 0.01$). Though the β_1 coefficient in column 7 is somewhat smaller in magnitude ($\beta_3 = -3.943, p < 0.01$), this result is consistent with the idea that we would see increased entrepreneurial activity in areas with more favorable WC laws.

To examine the robustness of the startup cartography results, we conduct three additional estimations in Table A7, controlling for (log) population in column 8 ($\beta_1 = -3.943, p < 0.01$) and population with equity growth in column 9 ($\beta_1 = -6.942, p < 0.01$). Finally, we re-estimate column 1 with zip-code (instead of county-level) fixed effects ($\beta_1 = -5.625, p < 0.01$). Throughout the table, the β_1 coefficient remains significantly negative with similar and economically meaningful magnitudes. The results in Table A7 are robust to when we aggregate the unit of observation to the county level in Appendix Table A8.

While our paper mainly focuses on entrepreneurial activity writ large, we acknowledge that entrepreneurial activity is a nuanced construct, and at times, it can be helpful to consider startup quality in addition to quantity. We, therefore, consider the Regional Entrepreneurship Cohort Potential Index (RECPI), which is defined as the number of startups within a particular location or region expected to later achieve a significant growth outcome. This index is calculated as the Startup Formation Rate (which we utilize in Tables A7 and A8), multiplied by the Entrepreneurial Quality Index (EQI)—the average growth potential (or "quality") within a group of startups. To examine, in Appendix Table A9, we replicate the first six columns from Table A7, with RECPI as the outcome variable. One possible implication of the lack of significant results in

Table A9 is that changes in WC influence not only the quantity but also the quality of entrepreneurial activities. Since many recipients of WC benefits are engaged in physically demanding occupations, reductions in benefits are likely to disproportionately affect those in such roles—potentially discouraging entrepreneurial entry among individuals with limited capacity to absorb physical risk. However, as with any empirical claim, some concerns may remain that our results are capturing some sort of underlying trend in the data. We discuss these alternative mechanisms in Section 2 of the Online Appendix.

Placebo Tests

To further assess, we estimate two high-powered placebo tests: one spatial and one temporal. These placebo tests were selected based on data availability, ease of understanding and implementation, and consistency with prior literature. Thus, we selected our placebos in a way that the underlying comparison group was not affected by the treatment, yet the underlying comparison itself remained similar to our initial exploration.

For our temporal placebo tests, we backdated the window of consideration by ten years. That is, we examined new businesses established in Illinois and Indiana from 1997 to 2006 with a fictitious "post" period measured from 2001 onwards .[11] Since the actual reforms were implemented in 2011, we would not expect to see a comparably negative and significant sign. The results, presented in columns 1 ($\beta_1 = 5.933,\ p > 0.10$) and 2 ($\beta_1 = 6.809,\ p > 0.10$) of Table A10, show positive and statistically insignificant coefficients. If anything, there were more new businesses established in Illinois during this time period—further supporting the credibility of our identification strategy.

[11] Polyakov et al. (2020) similarly utilized a 10-year window.

Similarly, in columns 3 and 4 of Table A10, we conducted a spatial placebo test, using Ohio as the treated state instead of Illinois. Since Ohio had no comparable reform during this time period, we would not expect to see any significant results on the β_1 term, and indeed the result is both positive and insignificant, even in column 4 when we control for growth events.

Alternate Methodology

Though our comparison is between treated and untreated groups, focusing on how business registration patterns converge, we estimated a reverse difference-in-differences[12] (DDR model) (Kim and Lee, 2019). Specifically, we re-parameterize the treatment indicator (previously calculated as IL*WC) as *D*, defined below as:

$$D=1-IL+(IL*WC) \qquad (3)$$

Where *IL* is an indicator that a zip code is in Illinois and *WC* is an indicator that the year under consideration took place after the 2011 reforms. Conceptualizing the treatment variable, *D*, in this way captures the structure of DDR estimation, where one group (Indiana) is "always treated" and Illinois switches to treated after the reforms. Following Kim and Lee (2019), we calculate our DDR models as follows:

$$Y_{it}= \beta_t +\beta_q Q_t +\beta_d D_{it}+ \beta_p P_{it}+\varepsilon_{it} \qquad (4)$$

Where β_t is a time-varying intercept, β_q is state-level effect (Q=1 in Illinois zip codes), β_d is the constant effect parameter on the DDR treatment indicator described above, β_p is the slope on a population covariate (in practice DDR models have limited covariates) and ε_{it} is the mean zero error. We report the estimates for the β_d coefficient from our DDR models in Table A11. Consistent with the main results of the paper, we observe a negative and statistically significant coefficient at a similar magnitude.

DISCUSSION

[12] We thank one of the reviewers for suggesting estimating the model using a DDR approach.

This paper examines the causal impact of the 2011 reforms to the Illinois WC law on entrepreneurial activity. We estimate that the average Illinois zip code registers 1.47[13] fewer new businesses because of the less generous workers' compensation reforms in 2011. Our results hold even after controlling for Chicago and Indianapolis, the largest MSAs in Illinois and Indiana, respectively. We further explored the impact on entrepreneurial activity across various industries and found a similar negative impact in industries where entrepreneurial entry is most common (construction, retail, finance, services, and public administration). As a robustness check, we used alternate data from the Startup Cartography Project and found consistent results. Our study highlights the effects of institutional changes in the context of government policies on the creation of new ventures.

Contribution to the Literature on Institutional Theory

First, our study makes a contribution to the body of knowledge that explores the intricate relationship between institutions and entrepreneurship (Bjørnskov and Foss, 2013; Bjørnskov and Foss, 2016; Chowdhury, Audretsch and Belitski, 2019; Estrin *et al.*, 2013; Jennings *et al.*, 2013; Urbano *et al.*, 2019a). We examine the role of "institutions," which pertain to the establishment and enforcement of formal rules shaping societal interactions and the allocation of resources strategically designed to incentivize and nurture entrepreneurial endeavors (Williamson, 2000). In particular, we shed light on how the divergence in regulatory frameworks across different regions can give rise to significant regional variations in entrepreneurial activities (Stenholm *et al.*, 2013). Within this context, we emphasize that while incentives play a pivotal role in fos-

[13] This number represents a 31.3% decrease in the average number of new business registrations in an Illinois zip code.

tering entrepreneurial endeavors, our research elucidates that disincentives can exert a counteractive influence. We argue that an institutional framework that inadvertently curtails overall disability benefits (essentially acting as a disincentive) unintentionally imposes restrictions on individuals, limiting their ability to pursue entrepreneurship as a career path. Additionally, our research underscores the vital role of regulations and policies in impacting entrepreneurial activity, especially those pertaining to indirect government support and benefits (Williamson, 2000).

Second, our study goes beyond the broader populace and focuses on bringing inclusivity by delving into the connections between disabilities and entrepreneurial activity, an area that has received relatively less attention within entrepreneurship research (Bakker and McMullen, 2023). This exploration is highly significant given the growing demand for inclusive entrepreneurship, where individuals with disabilities aim to participate more actively, highlighting the need for a deeper understanding of the unique challenges they face and the potential disincentives they encounter on their path to entrepreneurial experimentation (Pagán, 2009; Pagán-Rodríguez, 2011; Renko *et al.*, 2015).

Additionally, there is extensive research on federal disability compensation programs, but there is limited research that examines the impact of state-level policies surrounding WC on entrepreneurial activity. Overall, in our study, temporary disability (partial or total) is the potential mechanism that explains the negative impact of less generous WC on entrepreneurship. While our study focuses on the amendment to Illinois WC, it raises an important question for further research on changes in WC laws across the country, especially policies related to disabled workers and individuals. Our study attempts to fill this gap by highlighting that state-governed policies regarding workers' compensation can have a differential impact on entrepreneurial activity.

Contribution to the Literature on Determinants of Entrepreneurship

Our study highlights time as an important context in entrepreneurship literature (Bird and West III, 1998; Burmeister-Lamp, Lévesque and Schade, 2012; Lévesque and Stephan, 2019; McMullen and Dimov, 2013; Wood, Bakker and Fisher, 2021). Theories of determinants of entrepreneurial activity, measuring new business registrations or new venture creation (Marcotte, 2013), highlight the positive role of entrepreneurship in economic growth and innovation. In this vein, scholars have explored wealth, liquidity, and personality as various determinants of entrepreneurial activity; however, the combined lack of pecuniary and non-pecuniary resources (such as time) has remained unexplored in the literature, most likely due to data limitations. Further, policies intended to stimulate business or target resources directly can often have unintended consequences.

The opportunity cost of an individual's time is an important determinant of entrepreneurial activity (Agrawal *et al.*, 2018; Gottlieb *et al.*, 2016). Specifically, changes in WC have been shown to impact the time spent out of work (Boden and Ruser, 2003; Meyer and Viscusi, 1995). Furthermore, there is evidence that increased time spent out of work allows individuals to experiment with entrepreneurship (Agrawal *et al.*, 2018; Gottlieb *et al.*, 2016). Agrawal *et al.* (2018) find that the number of crowdfunding campaigns—a proxy for entrepreneurial activity—increased by about 45 percent during the school break across U.S. universities. Similarly, prior research shows that slack time among employees can increase new product innovation (Medase, 2020; van Uden *et al.*, 2017). Anecdotal evidence also suggests that free-time policies implemented at companies like 3M and Google have led to the development of new products and services (Agrawal *et al.*, 2018; Kerr *et al.*, 2014). Building on this literature, our study provides empirical support for the role of time availability as a critical, yet often overlooked, determinant of entrepreneurial activity.

Implications for Policy

Our study highlights that restrictive institutional policy reforms through less generous workers' compensation can severely dampen the overall entrepreneurial activity in a region. Our study shows that such policies can have a long-lasting impact on the entry of individuals into entrepreneurship. To the extent these policies are designed with a narrow aim for a specific program, they can negatively impact the broader entrepreneurial ecosystem. Baumol and Strom (2007) argue that good policy should "redesign of institutions so as to attract entrepreneurial activity to beneficial directions." As such, our results highlight the importance of considering the costs of entrepreneurial activity when devising new policy instruments. Because entrepreneurial activity is conducive to other positive outcomes, policy instruments such as more generous compensatory disability can also indirectly improve entrepreneurial and societal well-being. Given that Illinois—the state of focus in this paper—has a startup density of 69.1 (Howe, Desai and Murray, 2021), the results have implications for existing and would-be entrepreneurs, as well as policymakers, who must carefully assess the costs and benefits associated with proposed changes to policy and regulatory instruments. While reductions in Workers' Compensation (WC) costs may yield immediate fiscal advantages for states, the trade-off manifests in diminished new venture creation, accompanied by consequential medium and long-term costs for the states.

To that end, we hope our study encourages policymakers to be cautious about making future changes in the workers' compensation laws and to consider the broader impact of such changes on the overall economy. Taken together, these findings suggest that policymakers should reduce the transaction cost of acquiring resources (Audretsch, 2004) and make it desirable for individuals (with or without disabilities) to experiment with alternative forms of occupations, including entrepreneurship (Renko *et al.*, 2015; Tihic, Hadzic and McKelvie, 2021). In addition

to disability programs, we also contribute to the literature on unemployment benefits, i.e., the unemployment protection programs (Rapp *et al.*, 2018) and unemployment insurance (Hombert *et al.*, 2020), and show that WC can have a similar impact on entrepreneurial activity. We also believe these results are timely, given the pandemic (COVID-19) and changes in WC policy in some other countries (NSW Government, 2021).

In summary, it is evident that the impact of regulations and policies on entrepreneurship transcends their primary target areas. Policymakers and researchers alike should recognize these indirect effects, as they play a crucial role in shaping entrepreneurial activity and the broader economic landscape. By understanding how various policies influence entrepreneurship, we can better design and implement strategies that promote entrepreneurial growth and economic development.

Limitations of the Study and Directions for Future Research

While this paper furnishes robust causal evidence on the impact of a reduction in workers' compensation benefits on entrepreneurial activity, it is not without shortcomings that future research might address. Our study explores the impact of a policy change on macro-level business formation. In this vein, we focus on the *quantity* of entrepreneurial activity rather than the *quality* (Andrews et al., 2022). Future research should investigate the impact of such policy changes at the firm level, which could also provide evidence on other outcome variables of interest, such as changes to firm quality and success. Many of these legislative changes are implemented without a clear understanding of their direct and indirect impacts on new ventures. Investigating these effects more deeply could provide valuable insights into how regulatory environments influence the success and sustainability of new businesses.

Although we were unable to conduct a formal sub-analysis of the effects of less generous WC laws across different ages due to data limitations and privacy, our calculations suggest that

the 2011 amendment to the WC law reduces payouts across all age groups, with older individuals experiencing the most significant reductions (see Figure A3 in Appendix). Notably, older workers with disabilities are more likely to turn to entrepreneurship (Gurley-Calvez *et al.*, 2020), and recent findings challenge the idea that youth is a key factor in entrepreneurial success (Azoulay *et al.*, 2020), thereby underscoring the investigation into how age-related policy changes influence entrepreneurial decisions and opportunities, particularly in the context of older individuals. We speculate that the Illinois reforms serve as a barrier to entrepreneurship[14] and encourage scholars to examine the impact of such policy changes at an individual level across gender, age, and income. Similarly, our study does not examine individual-level changes post-injury. There is again an instance where data privacy concerns may trump research needs to access and analyze detailed individual-level data. Such studies, however, would be instrumental in establishing a clearer link between workers' compensation laws and specific economic outcomes at the individual level. Advancing our understanding could provide more targeted insights for policymakers and stakeholders, particularly in indirect policy measures and entrepreneurship.

While our identification strategy and use of administrative data eliminates several challenges related to sample selection bias and reverse causality, as with any empirical paper, the potential for time-variant unobservable variable remain. We attempt to mitigate these concerns by utilizing multiple data sets and conducting placebo tests, and thus believe our findings provide several important insights.

CONCLUSION

In this paper, we draw upon two plausibly exogenous shocks to an entrepreneur's free time: (random) injury and the 2011 amendments to Illinois's workers' compensation laws. These

[14] We thank an anonymous referee for pointing this out.

amendments objectively increased the cost of entrepreneurial activity to injured workers. Relying on multiple administrative data sources, we furnish causal estimates of the impact of these reforms. A key feature of this research is that while similar studies examine entrepreneurial entry per individual worker, we provide causal effects on macro-level business dynamism by measuring new business registrations.

We find that following the restrictions brought about by the 2011 WC reforms, Illinois furnished significantly fewer new business registrations relative to neighboring Indiana. Importantly, these results are robust to multiple data sources and cannot be explained by changes in industrial composition or decreased business dynamism in the major cities (e.g., Chicago and Indianapolis) (that may be unrelated to the impact of the reforms). Overall, these findings suggest that when WC policies become more restrictive, we see a 33 percent zip-code level decrease in entrepreneurial activity accounted through new business registration.

Our study has three main contributions. First, we build on the literature of institutional policy reforms by providing causal evidence that less generous workers' compensation has an adverse impact on entrepreneurial activity. Second, we highlight the importance of slack time as an important determinant of entrepreneurial activity. Third, we utilize a methodologically powerful approach robust to multiple data sources and specifications. In doing so, we provide empirical support for the theory of entrepreneurial activity.

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TABLE 1: Side-by-Side Comparison of Illinois Reforms to Indiana Law

State	Waiting Period	Temporary Partial Disability (TPD): Calculation of benefits wages	Wage cap differentials	Permanent Partial Disability (PPD): Carpal Tunnel Syndrome (CTS)
Indiana	7 days	TPD is payable at two-thirds (66 2/3%) of the difference between pre-injury Average Weekly Wage and **Gross** amount in the alternate job, with a set maximum	500 weeks	500 weeks
Illinois: before 2011 amendment	3 days	Section 8(a): TPD is payable at two-thirds (66 2/3%) of the difference between pre-injury Average Weekly Wage and **Net** amount in the alternate job	Section(d)1: Wage differentials are payable for **life**	Section 8(e)9: Carpal Tunnel Syndrome (CTS): **No cap** on benefits, Value determined at **205 weeks**
Illinois: after 2011 amendment	3 days	Section 8(a): TPD is payable at two-thirds (66 2/3%) of the difference between pre-injury Average Weekly Wage and **Gross** amount in the alternate job	Section(d)1: Wage differentials are payable till the age of **67 or 5 years** from the award data, whichever is later	Section 8(e)9: CTS: Cap on benefits from PPD CTS: **15% of the hand for 190 weeks**, maximum allowable 30% of the hand

TABLE 2: State-Level Comparisons

Variable	Indiana	Illinois
Population (total)	6,483,802	12,830,632
Age <18	0.234	0.224
Age 65+	0.158	0.156
Female	0.507	0.509
White	0.851	0.769
Black or African American	0.098	0.146
Latinx	0.071	0.174
Owner-occupied housing rate	0.689	0.66
Building permits (total)	21,480	21,510
Persons per household	2.53	2.59
Households with a computer	0.872	0.883
High school graduation rate	0.886	0.889
Labor force participation rate	0.638	0.651
Labor force participation rate (female)	0.591	0.603
Mean commute time (minutes)	23.6	29
Median household income	$54,325	$63,575

Source: Census Data, 2010-2018, percent listed unless otherwise noted

TABLE 3: Descriptive Statistics and Correlations

Variable	Mean	SD	1	2	3	4	5	6	7
1. Year Established	2013.09	2.693							
2. Illinois Company	0.586	0.493	-0.180						
3. Chicago MSA	0.487	0.499	-0.074	0.6349					
4. Indianapolis MSA	0.155	0.362	0.108	-0.510	-0.418				
5. High Credit Score	0.218	0.413	-0.196	0.040	0.015	-0.025			
6. Creative Industry	0.012	0.110	-0.026	0.011	-0.005	-0.016	-0.017		
7. High Tech Industry	0.070	0.254	-0.036	0.028	0.048	0.006	-0.005	-0.016	
8. Average Registrations/Zip	4.838	6.637	0.195	-0.024	0.191	0.144	-0.029	0.203	0.644

TABLE 4: Generalized Difference-In-Differences Results (Poisson)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Illinois*Post	-0.375***	-0.380***	-0.377***	-0.463***	-0.469***	-0.587***	-0.477***	-0.496***
	(0.0548)	(0.0547)	(0.0545)	(0.0486)	(0.0484)	(0.0539)	(0.0564)	(0.0330)
High Tech		0.166**			0.222***	-0.00400	0.0144	-0.0639
		(0.0653)			(0.0659)	(0.0832)	(0.0723)	(0.0557)
Creative		-0.130			-0.0697	-0.0843	-0.207**	-0.158*
		(0.101)			(0.0978)	(0.106)	(0.102)	(0.0897)
High Credit		0.111***			0.0804**	-0.0310	-0.0504	-0.0971***
		(0.0373)			(0.0365)	(0.0414)	(0.0396)	(0.0335)
Chicago			0.487***		0.401***			0.510
			(0.174)		(0.113)			(0.712)
Indianapolis			0.201		0.157			0.308
			(0.131)		(0.0979)			(0.406)
Population				0.540***	0.539***	0.624***	0.591***	
				(0.0270)	(0.0270)	(0.0231)	(0.0183)	
Constant	1.972***	1.941***	1.705***	-2.767***	-3.012***	-3.583***	-3.502***	1.996***
	(0.0294)	(0.0306)	(0.0914)	(0.245)	(0.251)	(0.204)	(0.155)	(0.356)
Observations	7,303	7,303	7,303	7,259	7,259	4,619	3,925	7,082
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Spatial FE	County	County	County	County	County	County	County	Zip

Robust standard errors in parentheses

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

Notes: This table presents our main difference-in-differences results using two-way fixed effects Poisson regressions. The unit of observation is a given zip code-year, and the dependent variable is the count of new businesses registered within said zip code during said year. Illinois×Post is an indicator variable that equals one if the zip code under consideration is in Illinois after the 2011 reforms were enacted. Column 6 excludes all zip codes in the Chicago MSA, n=4619. Col-

umn 7 excludes both Chicago and Indianapolis zip codes, n=3925. Control variables in the regressions include the proportion of creative, high-tech, or high-credit businesses, whether or not the zip code is in the Chicago or Indianapolis MSA, and the (log of) zip code population.

TABLE 5: Results by Industry (Poisson)

	SIC DIVISION:									
	Agriculture	Mining	Construction	Manufacturing	Transportation	Wholesale	Retail	Finance	Services	Public Administration
Variable	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
IL*Post	-0.000827	-	-0.106**	0.0404	-0.197***	-0.0683	-0.159***	-0.297***	-0.184***	-0.443***
	(0.0288)	-	(0.0454)	(0.0400)	(0.0586)	(0.0488)	(0.0388)	(0.0619)	(0.0421)	(0.102)
Constant	0.0638***	-	0.354***	0.108***	0.340***	0.137***	0.720***	0.654***	1.280***	1.280***
	(0.0200)	-	(0.0227)	(0.0179)	(0.0349)	(0.0243)	(0.0226)	(0.0295)	(0.0239)	(0.0487)
Observations	111	11	1,452	736	955	606	3,634	1,861	5,346	1,953
Year FE	YES	-	YES	YES	YES	YES	YES	YES	YES	YES
County FE	YES	-	YES	YES	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

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

Notes: This table presents difference-in-differences results using two-way fixed effects Poisson regressions. The unit of observation is a given zip code-year, and the dependent variable is the count of new businesses registered within said zip code during said year. Illinois×Post is an indicator variable that equals one if the zip code under consideration is in Illinois after the 2011 reforms were enacted. All regressions include year and county-fixed effects. The column headings are letters corresponding to a given SIC division. For instance, A refers to SIC Division A: Agriculture, Forestry, and Fishing. There are no results reported for column B, Mining, due to a lack of new businesses registered within this SIC division in the universe under consideration.

TABLE 6: Summary of Robustness Checks

Check No.	Robustness Check Description	Methodology	Result Consistency	Reference Tables
1	Policy change verification	Illustrative payout scenarios showing pre- vs. post-2011 benefit schedules	Demonstrates substantial payout reductions (up to −85%)	Table A1
2	Pre- and post-period sensitivity checks	Restricts the sample to alternate pre-treatment (year > 2008 or 2009) and post-treatment windows (year < 2016/2015/2014)	DID estimates remain large and significant across most trims; effects attenuate only with shortest window	Table A2
3	Subsample: High-tech intensity	Stratifies ZIPs by proportion of high-tech firms	Effect larger and significant in high-tech ZIPs, confirming robustness across industry mix	Table A3

4	Subsample: Population size	Splits ZIPs by population (≤5,500 vs >5,500)	Negative and significant effects in both subsamples	Table A4
5	Controlling for state-specific macro trends	Adds year × state fixed effects to capture macro shocks	IL×Post remains robust and significant; controls for unobserved state-level variation	Table A5
6	Alternative dataset replication (Startup Cartography data)	Replicates Table 4 using Startup Cartography Data (county-year), adding covariates stepwise	Effect remains negative and statistically significant; magnitude larger than Table 4	Table A7
7	Aggregated estimation using Startup Cartography data	Supplements Table A7 analysis using Startup Cartography Project (county-level) data	Effect remains negative and statistically significant	Table A8
8	Entrepreneurial quality check	Uses RECPI index (startup growth potential) as dependent variable	No significant change → policy affected entry volume, not startup quality	Table A9
9	Placebo: temporal & spatial falsification	Fake reform (2001) and alternative treated state (Ohio)	Null results → supports causal interpretation	Table A10
10	Alternative estimator: DDR model	Reverse DiD specification (county & ZIP)	Results remain negative and significant	Table A11

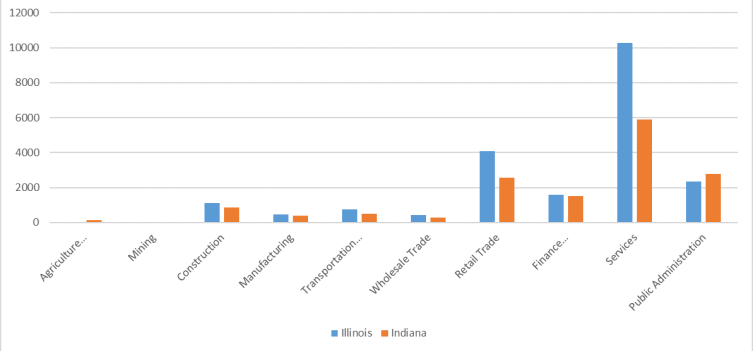

FIGURE 1: Industry Breakdown

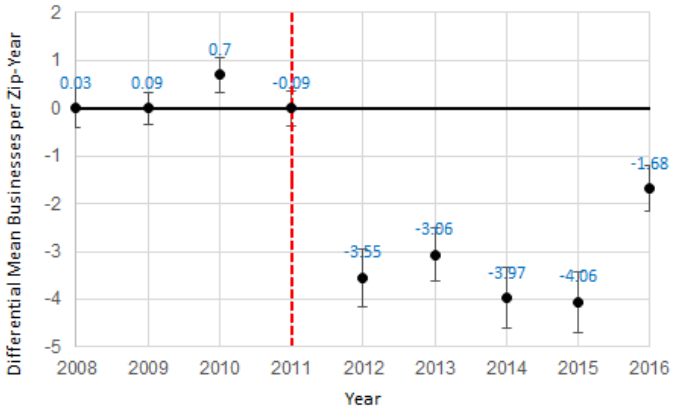

FIGURE 2: Event Study Plot: Differential Mean Businesses per Zip-Year