Local Human Capital and Firm Creation

Evidence from the Massification of Higher Education in France

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Abstract

Do college expansion policies promote local economic development? This paper exploits the massive construction of new colleges in France over the 1990s to assess the local effect of higher education establishments. I start by studying their impact on education, firm dynamics, employment and wages at the city level. Leveraging the staggered implementation of the policy in an event-study design, I find a persistent rise in the level of education of the local workforce. Firm creation subsequently increases by 10% on average across all major industries. The rise in tradable and skill-intensive industries indicates that the supply of educated workers played a major role in increasing firm entry. Incumbent firms experienced lower growth and a higher exit rate following the policy, suggesting displacement effects. Overall, the positive effects dominate, resulting in increased economic activity in treated cities. Employment stays constant but is subject to large composition effects: it increases for young skilled workers but decreases for older workers. In addition, province-level analysis suggests that new colleges had non-negative spillover effects on surrounding areas. Finally, I complement city-level results with findings on the long-run individual effects. Relying on differences between cohorts induced by the timing of the policy, I find that cohorts directly exposed to new colleges became more educated, more likely to be employed and hold more skilled positions.

Keywords: Human capital, local labor markets, college expansion policy, firm dynamics

JEL Codes: J24, I25, R12, M13.

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1 Introduction

Most countries are characterized by large regional differences in schooling and economic opportunities, which translate into sizeable long-run effects on individuals' earnings.[1] In particular, one's place of birth plays an important role in one's success on the labor market (Chetty & Hendren 2018*a*).[2] Geographic mobility could mitigate initial differences, especially if people are able to move from lagging to booming cities, but it is usually very costly and subject to various frictions.[3] Alternatively, governments have tried to attract new businesses and foster local economic activity in poorer territories by implementing place-based policies. However, these policies have produced mixed results (Kline & Moretti 2013, Neumark & Simpson 2015) and there is still much to learn on the factors that foster local development in the long run.

In this paper, I consider the effects of higher education establishments on local economic activity and business dynamism. I exploit a massive college expansion policy, implemented in France over the 1990s, to assess the causal effects of colleges on individuals, firms and cities. The policy consisted in the construction of hundreds of new colleges and in the expansion of existing colleges to new fields, mostly scientific ones, all over the country. Between 1989 and 1995, the number of students increased by more than 40%, resulting in a massive shock to human capital. With nearly 150 cities treated, this setting provides a unique framework to study the *local* effects of higher education. This paper tackles three main questions. First, does the construction of new colleges foster firm entry and growth? Second, through what mechanisms do they affect local economic activity? Third, do local colleges increase access to employment and high-skilled jobs for individuals born in receiving cities?

I start by assessing the short and medium-run impact of the policy on education and local economic activity at the city level.[4] To do so, I combine data on all public higher education establishments in France with a firm registry of both existing and new firms, balance sheet data, linked employer-employee data, the labor force surveys and census data. In terms of methodology, I exploit the staggered implementation of the policy in an event study design, using later treated areas as a control for early treated ones. While treated and untreated areas tend to differ

[1] See for example Kramarz et al. (2022) for France and Breau et al. (2022) for an international comparison on geographic inequality.

[2] For example, a child from a poor family moving from Cook County (the city of Chicago) to DuPage County (the western suburbs) at birth would experience on average an increase in income by about 30% (Chetty & Hendren 2018*b*). See also Bergman et al. (2019), Bilal & Rossi-Hansberg (2021), Chetty et al. (2016) on the effects of geographic mobility on labor market outcomes.

[3] Recent estimates suggest a cost of mobility ranging from several dozens of thousands of dollars to a few hundreds of thousands (Kennan & Walker 2011, Diamond et al. 2019). See also Schmutz & Sidibé (2018) on the role of search frictions in mobility decisions.

[4] I define the medium-run impact of the policy as the effect of new colleges 5 to 10 years after their opening.

in terms of observable characteristics, the timing of the policy provides exogenous variation. To asses the validity of the design, I first run a series of placebo tests and show that the level of education, employment, wages, firm entry and growth were evolving similarly in early and later treated areas over the pre-treatment period. These results indicate that the government did not systematically target booming (respectively lagging) areas to receive new colleges first. Consistently with the placebo tests, I find that the date of treatment is not correlated with cities' demographic characteristics: early and later treated areas had similar characteristics before the policy. Finally, qualitative evidence indicates that the timing of the policy was affected by factors orthogonal to economic activity such as administrative delays or the availability of public land (DATAR 1998). As a result, later treated areas provide a good control group for early treated ones. To account for potential heterogeneity of treatment effects, I implement the robust estimators designed by Callaway & Sant'Anna (2021) and de Chaisemartin & D'Haultfœuille (2020). These estimators provide unbiased estimates even if the effect of new colleges varies over time and between areas.

First, I find that the construction of new colleges led to a large and persistent increase in the level of education of the local workforce. The share of university graduates rose by 2 percentage points after six years, which corresponds to a 15% increase in the baseline stock of education. This indicates that treated areas were able to retain at least part of the new graduates who decided to stay and work in the cities where they were educated.

Second, the policy resulted in a steady rise in business entry. The effect is driven by companies created *ex-nihilo* (i.e. new registrations), which increased by 10% on average over the period. The firms are created in all major industries including manufacturing, retail and services. Using the construction of new colleges as a shifter for the share of college graduates, I estimate that an increase of 1 percentage point in the share of graduates entails an increase in firm creation by approximately 6%. This implies an elasticity of about 0.85. Moving from the 25^{th} to the 75^{th} percentile in the distribution of cities' college share would result in an increase in the number of new firms by about 30%. Turning to the characteristics of new firms, I show that the increase in entry is not driven by the creation of lower quality firms. New firms employ a larger fraction of high-skilled workers and pay higher wages on average following the policy. These results already indicate that new firms took advantage of the supply of skilled workers. In addition, I find that the increase in new firms is not driven by local displacement effects between cities within provinces. This indicates that the policy had non-negative spillovers effects on surrounding cities.[5] Leveraging the large number of treated areas, I find that cities which

[5]According to the SINE survey of entrepreneurs, more than 80% of French entrepreneurs create their firm in the province where they live. This suggests that provinces are a relevant level of analysis for local displacement

were initially less dense benefited more from the policy in terms of firm creation.

While firm creation increased following the construction of new colleges, incumbent firms experienced more exits and lower growth, resulting in little impact on the total number of firms. I estimate a negative impact on sales, value-added and profits for older firms, likely due to increased competition from new firms. Overall, I find that positive effects dominate negative ones. Treated cities experience a moderate increase in firms' sales and value-added with little impact on employment and wages. These results indicate that new colleges resulted in creative destruction and provide new evidence on the role of new firms in driving economic development (Dent et al. 2016).

I consider three potential mechanisms explaining the rise in firm entry: (i) the supply of skilled workers, (ii) the demand from new students and university staff, and (iii) the direct effect of new colleges through research and innovation. I study separately tradable and non-tradable industries and exploit differences in industry demand for skilled workers to disentangle mechanisms (i) and (ii). First, I find that the availability of skilled workers to potential entrepreneurs is an important driver of the rise in firm entry. The increase in firm creation in tradable industries and the rise in the share of high-skilled workers employed in new firms are consistent with this mechanism. To provide direct evidence, I leverage the differential demand for skilled labor between industries in a triple difference setting. I find that new colleges had indeed a higher impact on firm entry in industries that were *ex ante* more intensive in high-skilled workers. Moreover, using a survey of entrepreneurs, I show that the rise in entry is not driven by new graduates creating new firms. Indeed, following the policy, new entrepreneurs are even less likely to be former students, tend to be older, and are more likely to have previous experience in business management. Second, new colleges may attract students from other territories, increasing cities' population and hence local demand. The increase in the retail industry and in the services suggests that local demand for goods and services may have increased following the policy. However, I find no effect on population size at the province level, suggesting that the inflow of students and university staff from other areas only played a minor role. Finally, I find little support for a direct impact of colleges either through their own demand to local firms or trough research and innovation. While previous papers have found large effects of research universities (Hausman 2021, Tartari & Stern 2021, Babina et al. 2022), this paper studies the construction of small local colleges. These establishments are mainly teaching colleges and hence are unlikely to produce new patents and spin-out companies. Using again the survey of entrepreneurs, I find that new firms are not more likely to have administrations as their main clients: the new firms are not

effects.

created to supply goods and services to the new colleges. As a result, empirical evidence point towards a prominent role for the supply of skilled workers in explaining the rise in firm entry.

Turning to the effects on employment, I find no effect at the city level in the medium run. This result masks large heterogeneity. The construction of new colleges increased employment for young workers, driven by a rise in high-skilled jobs, while it decreased employment for older workers in both skilled and unskilled occupations. This suggests some substitution between the two groups of workers and confirms that, while the construction of colleges benefited new entrants, both workers and firms, it had significant negative impact on incumbents. I then consider the effects on wages. I find little effect on both young and older workers after the policy. Controlling for gender, age and education provides similar results. This result suggests that the policy did not have positive spillover effects on wages in the medium-run.

Finally, I complement city-level results with findings at the individual level to estimate the long-run effects of the policy and assess its consequences on people born in treated cities. To do so, I exploit the progressive implementation of the policy and variations in exposure between cohorts. Using an event study design, I compare the outcomes of cohorts young enough to study in the new colleges to slightly older cohorts, born in early versus later treated areas. I consider the effects of new colleges on education and labor market outcomes, observed in census data, up to 25 years after the beginning of the policy.

I find long-run positive effects at the individual level. People young enough to study in the new colleges benefited from a large increase in their probability to go to college. People aged 15 at the time of the policy experienced an average increase in the probability to get a university diploma of 4 percentage points. This result confirms that the policy actually improved access to higher education for people who would not have gone to college otherwise. Exposed cohorts also benefited from a higher probability to be employed in the long-run. They tend to have more skilled occupations, such as skilled technicians, and more supervisory roles. Interestingly, the policy did not affect the probability to migrate to other areas. As a result, the policy increased access to higher education and to (high-skilled) employment for people born in treated areas.

This paper contributes to several strands of the literature. First, I shed new light on the impact of higher education establishments on local economic activity. Previous papers have found sizeable effects of the proximity to universities on GDP growth (Valero & Van Reenen 2019), innovation (Stern et al. 2000, Abramovsky et al. 2007, Toivanen & Väänänen 2016, Azoulay et al. 2018, Andrews 2019, Hausman 2021, Babina et al. 2022, Bergeaud et al. 2022) and income (Moretti 2004*a*,*b*,*c*, Aghion et al. 2009, Kantor & Whalley 2014, Liu 2015, Carneiro et al.

2018, Glaeser & Lu 2018).[6] These papers typically study the effects of large, historical, research-oriented universities. Instead, I focus on the local impact of *regional* colleges. The study of "marginal" colleges is particularly relevant in terms of public policy because of their lower cost and ease of implementation. This paper also contributes to the literature by exploiting a different identification strategy. Finding a suitable control group for cities with historical universities has proven to be hard.[7] I overcome this challenge by leveraging the staggered implementation of the policy over a decade to estimate the causal effects of local colleges. In addition, this paper sheds new light on a mechanism that has been overlooked in the literature: the effects of a more educated workforce on firm creation. The rich administrative data on workers and firms allow me to provide a comprehensive assessment of the margins though which colleges affect local growth. Finally, this paper identifies detrimental effects on incumbents, both workers and firms, not documented previously in the literature.

Second, this paper contributes to the literature on the impact of place-based policies on local development (Kline & Moretti 2013). I provide new evidence that investment in higher education establishments can promote youth employment and result in creative destruction. While enterprise zones may also promote employment and firm entry, these policies usually generate displacement effects on surrounding areas (Givord et al. 2013). In contrast, I show that the construction of new colleges had non-negative spillover effects on neighboring cities. In addition, the large geographic variations provide a unique setting to study the heterogeneity of the effects and to identify places with higher economic gains.

Third, this paper contributes to the literature on the effects of education on labor market outcomes. The distance to existing universities has been exploited in various settings as an instrument for the level of education (see in particular Card (1993, 2001) for a discussion). However, the distance to historical universities is likely to be correlated with other factors that may also affect employment and wages. Exploiting the staggered implementation of the policy and the differential exposure of various cohorts provides plausibly exogenous sources of variation in access to higher education. In this paper, I show that the construction of local colleges resulted in an actual increase in the level of education, on top of potential substitution and diversion effects (Mountjoy 2022). This increase in education had consequences in terms of labor market outcomes with large positive effects on the probability to be employed and to hold a skilled occupation.[8]

[6] See also Howard et al. (2022) on the impact of historical colleges on the resilience of cities to shocks.

[7] Moretti (2004*a*) argues that the location of land grant colleges was not dependent on natural resources or other factors that would make cities wealthier. Liu (2015) implements synthetic control methods to construct control counties with similar characteristics as the counties that received land grant colleges. Finally, Andrews (2019) identifies "runner-up" locations that were considered for new universities but ultimately not chosen.

[8] In future work, I plan to exploit detailed fiscal data to estimate the private returns to higher education.

Fourth, a large literature documents the role of young firms for economic dynamism (Walsh 2020, Haltiwanger et al. 2013). Yet, we need a better understanding of the factors that promote firm creation.[9] In particular, little is known about the role of local human capital on the entry of new firms. Providing causal evidence has proven difficult and previous papers have mainly relied on correlational evidence.[10] I contribute to the entrepreneurship literature by providing causal estimates of the effect of the level of education of the local workforce on firm creation, based on a natural experiment.

Finally, the literature on the link between human capital and new firms has found a positive impact of very high-skilled workers, such as researchers and inventors (Zucker et al. 1998, Balsmeier et al. 2020, Uhlbach et al. 2022), on start-up formation. This paper shows that the effect is not restricted to top-human capital. I find large positive effects on firm entry following a supply shock of workers with an "intermediate" level of education.

The paper is organized as follows. Section 2 describes the institutional background and the policy. Section 3 presents the data and some descriptive statistics. The empirical strategies are described in section 4. The effects of new colleges on local economic activity are presented in section 5 while the long-run impact at the individual level is discussed in section 6.

2 The Massification of Higher Education in France

2.1 Background

The French higher education system experienced large changes over the past century. Compared to other developed countries such as the United States, the expansion of higher education in France started late, in the second half of the 20^{th} century, with three successive waves of "massification". This section provides a brief overview of the factors that contributed to the large increase in the level of education of the French population.

The first major expansion took place at the end of the 1960s as a direct response to the social

[9] Prior studies have considered factors including financial development (Black & Strahan 2002, Cetorelli & Strahan 2006, Bertrand et al. 2007, Michelacci & Silva 2007, Ji et al. 2021, Fonseca & Matray 2022), access to Venture Capital (Gompers & Lerner 2001, Chen et al. 2010, Samila & Sorenson 2011, Kerr et al. 2014, Lerner & Nanda 2020), value of collateral (Adelino et al. 2015, Schmalz et al. 2017), proximity to small suppliers (Chinitz 1961, Glaeser et al. 2015), entry regulation (Djankov et al. 2002, Klapper et al. 2006), labor market institutions (Acs et al. 2016, Hombert et al. 2020).

[10] For example, Glaeser & Kerr (2009) assess the effect of several potential factors on the entry of U.S. manufacturing firms and find that the composition of the local labor force is crucial for new entrepreneurs. In addition, Doms et al. (2010) find a positive correlation between cities' share of college graduates and firm creation.

movements of May 1968. The "Faure Law" (November 12, 1968), named after the Minister of National Education, played an important role in this process. The law stated that the French higher education system should allow all high school graduates to enroll in university. As a result, public universities were mandated to accept high school graduates living in the same region and willing to go to university. In addition to these legislative changes, fourteen regional universities were constructed to promote access to higher education and relax the capacity constraints that fueled students' involvement in the social movements of May 1968. The combination of the Faure law, the construction of new universities and the low tuition fees, equivalent to approximately 150 euros (less than 200 U.S dollars) per year, resulted in a significant increase in enrollment, even though the share of the population with a university diploma remained pretty low until 1990 (see Section 2.2 for more details).

At the end of the 1970s, higher education establishments were still mainly located in big cities despite the previous reforms. In particular, Paris had a prominent role with most of the major universities and "Grandes Ecoles" such as the Sorbonne, the Ecole Normale Supérieure and Sciences Po. A second wave of massification took place during the 1980s. Contrary to its predecessor, it was mainly at the instigation of local governments which started the construction of several small satellite campuses in medium-sized cities. The scale of the policy was however limited and these constructions were criticized for the absence of a nationally consistent plan. Ultimately, the new capacities were insufficient to face the rise in university enrollment driven by the demography and the strong increase in the supply of high school graduates in the 1980s. Indeed, the pool of potential students was particularly large due to a high number of births in the 1960s: the children of the baby-boomers (see Figure 1).[11] This demographic factor was amplified by the increasing access to high school education fostered by several reforms. In 1985, Jean-Pierre Chevènement, the minister of National Education, set the objective of 80% of a generation with the "Baccalauréat", the French high school diploma. Even though this objective was not reached until the 2010s, a strong and rapid increase in the share of high school graduates took place during the second half of the 1980s.[12]

After a decade of small and decentralized initiatives, the central government decided in 1990 a vast construction plan of new colleges entitled the "Plan Université 2000" (*Universities of the 21st century*). The policy was designed as a nationally consistent response to the rising demand for higher education and a tool to promote local access to university.

[11] The demographic factor was however only temporary. The number of births strongly decreased following the oil shock of 1973 and stayed at a lower level since then.

[12] The rise resulted both from the creation of a vocational diploma (the "Baccalauréat Professionnel") and from the increase in the number of students enrolled in pre-existing high school diplomas.

2.2 Universities of the 21^{st} Century

The "Plan Université 2000" was launched in 1990 by the socialist Minister of Education, Lionel Jospin. The policy was initially announced as a five-year construction plan (1991-1995) of new higher education establishments with a budget of about 8.2bn€ (USD 9.3 bn.) in 2018 value. It extended an emergency construction plan of temporary capacities implemented between 1989 and 1990. While the emergency plan only provided a short-term response to the mismatch between students' enrollment and available capacities, the objective of th *Universities of the 21^{st} Century* plan was to provide a permanent solution. The policy consisted in the construction of eight full universities and of a large number of small and medium-sized higher education establishments specialized in scientific and technical education. Originally designed as a five-year investment plan, the policy was finally extended by the following right-wing government with additional capacities constructed until the beginning of the 2000s.

Objectives. The goals of the policy were threefold. First, it aimed to significantly increase capacities by constructing both new higher education establishments and by opening new fields in pre-existing universities and colleges. Second, the policy was an attempt to correct territorial imbalances by constructing new capacities all over the country. Indeed, Paris hosted a disproportionate share of university students while many big and medium-sized cities had only limited or no capacity. Third, this college expansion policy was thought by the Government as a tool to foster long-run economic growth and to face competition from other European countries.

Two main factors motivated the implementation of this massive policy: (i) the political will of the socialist government to make higher education more accessible, and (ii) the mismatch between the large pool of potential students and the available capacities.[13] Indeed, the Ministry of Education was expecting 300,000 additional students by 1995 whilst universities were already close to full capacity. This can be seen on Figure 2, which plots the ratio between the surface area of French public higher education establishments (in m^2) and the number of students. While the ratio stayed at a relatively high level during the 1970s, it continuously decreased over the 1980s until reaching its lowest level since the demonstrations of May 1968. This figure indicates that the French higher education system was already crowded and would not have been able to cope with these additional students in the absence of the policy.

Finally, the actual increase in the number of students was twice as big as the one expected by the government. This suggests that the policy not only allowed universities to meet the rising

[13]The demography combined with the rise in the share of high school graduates during the 1980s created a need for new capacities in many regions.

demand for education but also had a positive impact on the decision to go to university.[14]

Implementation. The policy resulted in a huge increase in the number of higher education establishments. Between 1990 and 2003, about 360 new colleges were constructed and 480 departments were opened in existing higher education establishments, especially two-year technical colleges (IUT[15]). Over the period, 8 full universities ("Universités Nouvelles"[16]), 36 two-year technical colleges, 163 satellite campuses, 46 engineering schools and a hundred "Instituts Universitaires Professionnalisés" (IUP) were created. Section 3.1 provides more details about the new colleges opened during the policy. In the following Sections of the paper, I will refer to both new departments and new universities as *colleges*. Figure 3 plots in dark blue the urban areas which received new capacities between 1990 and 2003. Consistently with the goals of the policy, new colleges were spread all over the French territory. They were not only constructed in big cities but also in many small and medium sized areas. While higher education was very concentrated before (more than 27% of the students lived in the Paris region in 1990, 17.6% in the Paris municipality alone), the policy contributed to make higher education more available locally. The share of students in the municipality of Paris decreased to 14% in 2000 while the share of students in the Paris region (excluding Paris) increased due to the creation of four new universities in the suburbs.

The construction of higher education establishments during the 1990s was massive compared to the previous and following decades. Figure 5 plots the cumulative number of new establishments (i.e. excluding new departments) constructed between 1980 and 2010. During the 1980s, around 100 new colleges were constructed in total. This figure has been multiplied by three during the 1990s. The construction of new colleges continued during the 2000s but at a much lower rate. Indeed, the plan "Universities of the 21^{st} Century" was followed by a second investment policy entitled "University of the Third Millennium" (U3M).[17] Contrary to the policy considered in this paper, the focus of U3M was less on the construction of new colleges and more on the renovation of existing ones. A sizeable share of the budget was dedicated to the improvement of old infrastructures and to the construction of libraries, housing and cafeterias for students.

In addition to the construction of new capacities, the higher education budget also experi-

[14]The causal effect of new colleges on education outcomes is presented in Section 6.

[15]The "Instituts Universitaires de Technologie" (IUT) provide undergraduate education and award two-year technical diplomas called "Diplomes Universitaires de Technologie" (DUT). Students educated in IUT typically work as skilled technicians or middle managers under the supervision of engineers.

[16]Four of them were created in the Paris region (Cergy, Evry, Marne-la-Vallée, and Versailles-Saint-Quentin-en-Yvelines). Two were constructed in the North: the University of Artois, located in the cities of Arras, Béthune, Douai and Lens, and the University of the Littoral in Boulogne sur Mer, Calais, Saint-Omer and Dunkerque. Finally two were opened in the west in La Rochelle and Britanny (Vannes and Lorrient).

[17]"Université du 3è millénaire".

enced a significant and lasting increase. Figure 4 plots the evolution of higher education spending in France (a) as a share of GDP and (b) in billions of 2017 euros. Focusing on (a), we observe that the evolution in spending is hump-shaped starting in 1990. While the budget had been stable, around 1.1% of GDP, since the mid-1980s, it rose to 1.35% in 1995 and oscillated around 1.3% in the following decade. This increase is also observed when considering spending in euros. There is a clear and permanent step from 16bn.€ per year in 1989 to 22bn.€ in 1995.

Finally, the number of faculty strongly increased to face the rise in demand for higher education. Appendix Figure A.1 depicts the evolution of the number of faculty by status. The increase is observed at every level including graduate students, assistant, associate and full professors.[18] It started in 1989 and continuously increased afterwards. In addition, the government also relied on both high school teachers and professionals to increase rapidly the supply of higher education. First, the most qualified high school teachers can teach in the first few years of higher education. Their number jumped in 1992 and significantly increased until the end of the 1990's. Second, because the objective of two-year technical colleges is to provide a short but concrete education, half of the faculty must also work in the private sector. These two margins provided additional flexibility in order to increase the number of faculty. Surprisingly, there is no evidence in the National Archives that the massive demand for faculty was discussed by the government. This suggests that the constraint was initially more on the demand for new faculty than on the supply of graduate students willing to become professors.

Allocation process. The number and the location of the new colleges resulted from a complex decision making process led by the government in collaboration with local elected officials. The selection process took place in three main steps. First, state's local representatives (the *Préfets*), local elected officials, and superintendents of schools worked on separate regional plans to identify local needs and to make recommendations regarding the number and the potential location of new facilities. Second, working groups of experts from various ministries (e.g. education, economy, spatial planning) worked on a national policy based on the regional plans and on projections of expected enrollment by 1995 and 2000 computed by the French National Institute of Statistics (INSEE). Finally, there was a last round of negotiations at the local level before the final version of the plan was submitted to the government and to the president for approval. The budget decided by the central State for each region and the location of the new establishments were decided taking three main factors into account: (i) the expected number of future students

[18]The historical French higher education system only includes two status: Assistant Professor ("Maître de conférence") and Full Professor ("Professeur des Université"). Both positions are tenured since professors are civil servants.

(i.e. potential demand), (ii) the existing stock of higher education establishments (i.e. supply), and (iii) the objective of improving access to education locally. *Ex ante* studies of the potential economic impacts of the policy were very rare, which suggests that the designation process was mostly driven by demographic factors and potentially by the ability of local politicians to tilt the balance in favour of their city. Descriptive statistics on the selected areas are provided in Section 3.1.

Level of education. The level of education of the French population experienced a large increase starting in the 1990s. Between 1989 and 1995, the number of students enrolled in higher education establishments rose by about 640,000, an increase of approximately 43%. The share of the population with a university diploma also experienced an unprecedented rise as depicted in Figure 6. While the share of college graduates was quite low in 1990, around 15% of the population aged 25-55, it reached 24% in 2000 and 33% in 2010.[19] As shown in Sections 5 and 6, the policy strongly contributed to the rise in the level of education and can be considered as one of the main drivers of the "massification" of higher education that took place in France at the end of the 20^{th} century. This policy offers a unique example of a contemporary college expansion reform that resulted in a massive increase in education. The size of the policy, the large geographic variations, and its staggered implementation over time provide an ideal framework to study the impact of new colleges, both on local labor markets and on young individuals.

3 Data and Descriptive Statistics

In order to assess the impact of new colleges on local economic activity, I combine (i) administrative data on higher education establishments, (ii) an administrative registry of firms, (iii) firms' balance-sheet data, (iv) a survey of entrepreneurs, (v) linked employer-employee data (LEED), (vi) census data and (vii) the labor force surveys (LFS) for the period 1987-2001. The empirical analysis carried in this paper mainly relies on cross-city comparisons. To do so, I aggregate the data at the urban area level ("aire urbaine") with boundaries defined by the National Institute of Statistics (INSEE) as of 2010.[20] While municipalities are defined by administrative boundaries, urban areas provide a definition of cities based on economic activity and commuting patterns.

[19] The respective figures are 18% in 1990, 31% in 2000, and 43% in 2010 when focusing on people aged 25-34.

[20] An urban area is a group of connected municipalities. It is the broadest definition of a city in France. It is composed of an urban center with at least 1,500 jobs and of adjacent municipalities among which at least 40% of the employees work in the urban center. Urban areas are typically smaller than commuting zones (CZs) except for major cities such as Paris, Lyon, and Marseille. They exclude most of rural municipalities while CZs include both rural and urban municipalities. As a robustness check, I reproduce the analysis using CZs and show that the conclusions are similar.

They include most of the French population and economic activity.[21] In addition, all but 3 colleges constructed during the policy were located in a urban area. Contrary to municipalities, they also account for new colleges constructed in suburban areas. Finally, data for Corsica and Overseas departments are not available for the whole period. As a result, I restrict the sample to the 759 urban areas located in Continental France.

3.1 Higher Education

To identify the local treatment induced by the policy, I exploit administrative data on all public universities and colleges constructed in France since 1880. This registry is managed by the ministry of higher education, research and innovation. It provides information on the date of construction, the precise location and the fields of study of all public higher education establishments (i.e. universities, satellite campuses, two-year technical colleges (IUT), and engineering schools).[22] The registry also records the creation of new departments in existing universities (e.g. humanities in Dunkirk) except for two-year technical colleges. I complement the registry with hand collected data on new fields opened in two-year technical colleges from the official gazette of the French Republic ("Journal Officiel"). See Appendix Figure A.2 for the list of departments opened during the policy. In the remaining of the paper, I consider both the effect of new colleges and new departments.

An important limitation of the registry is that it does not provide information on the size of the new establishments created during the policy. Ideally, one would like to know the maximum capacity of these colleges and universities when created (i.e. independently from the realized enrollment by students). While such measure is not available, the dataset records the number of students enrolled in 2016 in establishments still active at this date.[23] I complement the registry with information on enrollment from two historical sources: the "Atlas Régional" of higher education and the evaluation reports produced by the National Comity of Evaluation. I predict the size of the remaining establishments, separately for each type, using city characteristics observed in the 1990 Census. The data-sources and the estimation procedure are described in more details in Appendix Section C.1.

The policy resulted in the construction of 8 full universities, 187 technical colleges and en-

[21] In 1990, 85% of the French population was living in a urban area and 90% of the new firms were created there. Like municipalities, they are very heterogeneous, with sizes ranging from about 2,000 inhabitants to more than 11 million (Paris). Due to its high urban density, the area of Paris almost corresponds to the "Ile de France", the Paris region.

[22] While the data cover only the public sector, the private sector represents only a small fraction of total enrollment over the period: 12.88% in 1990 and 12.84% in 2000 (DEPP & SIEP 2010, 2021).

[23] The information is missing for all the establishments which closed or merged between their creation and 2016. Data on two-year technical departments are also missing.

gineering schools, 163 satellite campuses and almost 480 new departments of universities and technical colleges between 1990 and 2003. Table 1 provides detailed information on the number and the type of higher education establishments created. Importantly, a large fraction of these new colleges is composed of "small" teaching colleges. For example, university satellite campuses typically offer two-year diplomas (*Diplôme d'Etudes Universitaires Générales* (DEUG)), while full universities offer diplomas ranging from two to eight years. Satellite campuses are comparable to Community colleges except that they depend administratively on existing universities. They were constructed mostly in small and medium-sized areas located around major regional cities. Technical colleges are also small teaching colleges. They award two-year technical diplomas (*Diplôme Universitaire de Technologie* (DUT)) and offer a mix of formal education and internships. These establishments typically train skilled technicians and middle managers. Finally, *Instituts Universitaires Professionnalisés* (IUP) and Engineering Schools offer respectively four and five-year engineering diplomas. Contrary to engineering schools, IUP depend administratively on universities.[24] Appendix Section C.2 provides detailed descriptive statistics on new graduates' labor market outcomes by diploma. Interestingly, the retention rate of new graduates (i.e. the probability that they stay and work where they were educated) is high for every diploma, and particularly high for lower levels of skills. It is above 70% for two and three-year university diplomas and 64% for two-year technical colleges. This implies that the construction of new colleges should have large effects on the level of education of the local workforce.

In order to describe the location of the new colleges, I regress an indicator variable which takes the value 1 if the area received at least some capacities during the policy, 0 otherwise, on 1990 areas' observable characteristics. Table 2 provides the results of both logit and probit models. I find that bigger, younger and less educated areas were more likely to receive new capacities. This indicates that the new colleges were not constructed in very small cities. Indeed, while the policy also targeted medium-sized areas, almost no colleges were created in cities smaller than 20,000 inhabitants in 1990.[25] Second, places with many youth and with a high share of individuals dropping out after finishing high school were also more likely to be treated during the policy. Indeed, the number of inhabitants, their age and the share of high school graduates are three important drivers of the demand for higher education. In addition, I find that university towns also received new capacities. This result reflects that part of the policy consisted in increasing pre-existing capacities by opening new departments in older establishments. Finally, I find little

[24]The "Instituts Universitaires Professionnalisés" were invented in 1991 with the goal of providing advanced technical education to university students. Former students of IUP typically occupy jobs with levels of skills between skilled technicians and engineers. These programs disappeared in the middle of the 2000's and became masters programs.

[25]It corresponds to the 5^{th} percentile in the distribution of treated areas but the 68^{th} percentile in the French city-size distribution.

correlation with initial economic conditions such as unemployment rate, industry composition, average wage and the entry rate of firms.[26] These results suggest that the decision to construct new colleges was mainly driven by cities demographic characteristics instead of economic conditions.

Finally, Table 3 provides descriptive statistics for areas which received new capacities during the policy, areas which already had at least one college before the policy and for all the 759 urban areas.[27] Among the treated areas, around two thirds already had some higher education capacities while one third received their first establishment during the policy. Consistently with the objective of spreading higher education over the territory, treated areas are on average smaller than former university towns and less educated. They are otherwise very similar in terms of age structure and entry rate of firms.

3.2 New firms, Incumbents and Entrepreneurs

I use the National Entreprise and Establishment Register Database (*Sirene Register*) to identify the entry, the survival and the exit of firms. This registry is an administrative database which contains the universe of firms in the private sector since 1987. It also records the creation of new establishments and new firms every month, apart from the agriculture and finance industries.[28] The registry is managed by the French National Institute of Statistics (INSEE). For each firm, it provides the precise date of creation (defined as the registration date), the location of the headquarter at the municipality level, a four-digit industry code and the number of employees when created.[29] I define the first time a firm appears in the registry as its date of creation.[30] In this paper, I focus on the creation of firms incorporated, "SA" and "SARL", because these firms are the most likely to contribute to economic growth and to employ (educated) workers.[31] On the other hand, sole proprietorships usually correspond to "subsistence entrepreneurship" and hence are unlikely to grow (Schoar 2010, Hurst & Pugsley 2011).[32]

[26]The entry rate of firms is defined as the ratio between the number of firms created in a given year and the number of active firms.

[27]The first two groups are not mutually exclusive. Several areas receiving new colleges had already higher education establishments before the policy.

[28]Establishments correspond to new locations opened by existing firms while new firms are defined as new registrations, created *ex nihilo*.

[29]Following Glaeser & Kerr (2009), I compute the initial size of firms as the number of employees plus one, the entrepreneur.

[30]The Sirene register also records firms which start operating again after a period of inactivity. I do not consider this event as a firm creation.

[31]SA: "Société Anonyme" (Corporation). SARL: "Société à Responsabilité Limitée" (Limited Liability Corporation). They correspond to firms incorporated with the legal categories "54, 55, 56" in the INSEE classification. The results stay unchanged when I consider all corporations (legal categories starting by "5") and not only "SA & SARL".

[32]In section 5, I show that most of the new firms created are indeed companies and not sole proprietorships.

Table 4 reports the average yearly number of new firms and new establishments opened by existing firms created in Continental France over the period 1987-2001. New firms represent on average 75% of all the creations in a given year. They usually start small: half of them start with only one member, the entrepreneur. They are on average smaller than establishments created by existing firms: 2.5 employees in new firms against 4.6 in new plants. Hence, new firms account for 60% of all the jobs created by new units every year. Finally, most firms are created in the retail industry (31.5%), in the real estate and firm services industry (30.6%), in the manufacturing (10.6%) or in the construction industry (9.8%). To avoid counting new firms which could "mechanically" result from the construction of new colleges, I exclude the construction industry from the main results. Construction firms are only considered when investigating the impact of the policy on each industry separately.

I complement the *Sirene Register* with the *SINE* survey on French entrepreneurs.[33] This survey provides detailed information on the characteristics of both new entrepreneurs (age, education, experience, labor market history) and new firms (industry, size, main clients, growth expectations). It is run every 4 years by INSEE and covers a representative sample of around a third of all newly created firms in the first semester of survey years. Data are available from 1994 onward.[34] I use the SINE data to study the characteristics of new entrepreneurs such as their level of education and their labor market history. In particular, I rely on this survey to estimate whether new firms are created by new graduates, experienced workers or serial entrepreneurs. I also exploit SINE data to study the main clients of new firms and the market in which they operate (e.g. individuals, firms or administrations, local vs. international markets). It allows me to investigate whether new firms are supplying goods or services to public administrations and hence potentially to new colleges. Because the survey starts in 1994, I am only able to compare areas treated between 1994 and 1998 to areas treated after 1998.

Finally, I use firms' balance sheet data to analyse the effects of new colleges on firms' growth. The BRN ("Bénéfice Réel Normal") are corporate tax files collected by the Treasury. They cover all firms with sales above 1.1M francs in the services and above 3.8M in the other industries.[35] Firms with sales below these thresholds can also decide voluntarily to opt for this tax regime. The data contain information on employment, the wage bill, turnover, value-added, investment, capital, profits at the firm level, and the precise location of their headquarter. Consistently with the previous datasets, I exclude firms that belong to the agriculture, finance, and construction industries as well as to the non-market sector. I drop firms with gaps in their reporting. Overall,

[33] SINE: "Système d'Information sur les Nouvelles Entreprises"
[34] See Landier & Thesmar (2009) for a detailed description of this survey.
[35] This corresponds approximately to 265,000 and 916,000 euros of 2018 (respectively 260,000 and 898,000 USD).

I observe on average 365,000 unique firms per year. The main issue is that balance sheet data are declared at the firm level while firms may have establishments located both in treated and untreated areas. To overcome this issue, I focus on firms that are either mono-establishment or with various establishments located in the same urban area. The sample includes the vast majority of firms but excludes the biggest ones.[36] Since linked employer-employee data are available at the establishment level, I show that the results on employment and wages found with mono-establishment firms are similar to the effects found when considering all firms.

The analysis is conducted in two steps. First, I focus on a balanced sample of firms observed between 1989 and 2001 which are mono-establishments in 1989. This sample allows me to study the impact of the policy on the growth of incumbent firms conditionally on their survival. Second, I consider the overall effect of new colleges on firms at the city level. I keep an unbalanced panel of mono-establishment firms and aggregate the data at the urban area level. This allows me to quantify the overall effect on local growth taking into account various margins of adjustment including entry, exit and the growth of surviving firms.

3.3 Local Labor Markets

Information on local labor markets and on the workforce level of education is provided by three datasets. First, I exploit the French linked employer-employee data (DADS) to investigate the effects of new colleges on employment, wages and education.[37] The data are based upon mandatory employer reports of the earnings of each employee subject to French payroll taxes. It contains information on workers' demographic characteristics, on their jobs, and on the firms and establishments in which they work.[38] There are two versions of the French linked employer-employee Data. The first version is a random sample of $1/24^{th}$ of the French labor force available since 1976 (the "Panel DADS").[39] These data allow me to study the evolution of local labor markets following the opening of new colleges. Importantly, the Panel DADS can be merged with census data (the "Echantillon Démoraphique Permanent", hereafter EDP) to recover workers' level of education.[40] I complement information on education with the occupation code, available for the

[36]Mono-establishment firms represent approximately 92% of firms in the sample but account for 41% of employment.

[37]DADS: "Déclarations Annuelles de Données Sociales".

[38]It contains a worker and a firm identifier, the age and the gender of the worker, the total gross and net wages for each employment spell, the occupation category of the worker, her place of work and residence, the size and the industry code of the establishment she works in.

[39]This sample of $1/24^{th}$ corresponds to individuals born in October on an even year.

[40]The EDP provides information on worker's highest diploma based on census data for a sample of about 13% of the workers in the DADS (i.e. workers born on the first 4 days of October). See Abowd et al. (1999) for more details.

whole sample.[41] Second, a comprehensive version of the DADS is available from 1994 onward. I use these data to study new firms' growth and the composition of their workforce after creation.[42] I restrict the analysis to mainland France over the period 1985-2014. I keep all workers aged between 18 and 60 years old employed in the private sector, outside of the construction industry. This allows to exclude potential mechanical effects coming from the construction of new colleges (e.g. through the recruitment of university staff or the actual construction of the new buildings). This provides a conservative estimate of the causal effect of colleges on local employment. I keep all individuals who earn at least the equivalent of a month of full-time minimum wage during the year. The Panel DADS includes on average 550,000 workers per year.

I complement the linked employer-employee data with the French Labor Force Surveys (LFS). While the LEED only provide information on the total number of jobs, the LFS allow me to study the evolution of the population and the unemployment rate in cities receiving new colleges. Every year in March, around 75,000 of households are surveyed by INSEE based on a stratified sample. It includes around 140,000 individuals per year aged at least 15 years old. While the national sample is large, it is relatively small at the urban area level. As a result, the analysis can only be conducted at the province level ("département"). Again, I restrict the sample to the 94 provinces of continental France. The LFS experienced several changes over time, including a modification of the questionnaire in 1990. However, the main variables of interest (population, level of education, and unemployment rate) were not affected by these changes. The variables are computed using the sampling weights provided by INSEE.

Finally, the population Censuses contain information on the main demographic characteristics of the French population: age, place of residence, education, occupation and industry.[43] I use the 1990 census to recover the pre-reform characteristics of the population at the urban area level.[44] Then, I exploit the 2015 census to study the long run *individual* impact of the policy on education and labor market outcomes observed 25 years after the beginning of the policy. The census provides detailed information on the date of birth and the municipality of birth which allow me to identify cohorts that were directly exposed to the new colleges (i.e. young enough to study there). Contrary to the 1990 census, the 2015 census is not comprehensive. It is based

[41] The French occupation code has a hierarchical structure and can be used as a proxy for the level of skill of the job. I divide the workforce into 4 categories: blue-collars, clerks, intermediate white-collars and high-skilled white collars, based on the 1-digit occupation code. Intermediate white-collar occupations typically correspond to technicians and supervisors while high-skilled occupations include engineers and managers.

[42] While the register of new firms starts in 1987, the comprehensive DADS are only available since 1994. As a result, I study the composition of the workforce in firms created since 1987, observed at age seven or more.

[43] It is available for the years 1968, 1975, 1982, 1990, 1999, and for every year since 2006.

[44] The information on the population and the age structure is based on a comprehensive census of the population. The level of education, occupations and industries are available for a subsample of 40% of the population. Education is divided into 4 categories: *no diploma*, *vocational technical school*, *high school* ("Baccalauréat") and at least a *two-year college diploma*.

on a representative sample of the population interviewed over a five-year period (2013-2017).[45]

4 Empirical Strategies

The objectives of this paper are twofold: first to quantify the effects of new colleges on local economic activity and second, to assess the impact of improved access to higher education establishments at the individual level. To do so, I leverage the staggered implementation of the policy over the 1990s using an event study design. In this setting, I use later treated areas as a control group for early treated areas. I start by estimating the effects of new colleges, at the urban area level, on the level of education of the labor force, firm creation, firm growth, employment and wages. I then exploit differences between industries in their exposure to the reform (i.e. their pre-reform demand for high-skilled labor) to test whether the results are driven by high- or low-skilled industries, using a triple difference framework. Finally, I assess the long-run impact of the new colleges on individuals' outcomes, focusing on people born in treated cities. I leverage differences between cohorts induced by the timing of the policy to identify its impact on exposed individuals (i.e. young enough to study in the new colleges).

4.1 Staggered Event Study Design at the City Level

My main strategy relies on the comparison of early and later treated areas. While the allocation of higher education establishments between areas is likely endogenous, it is credible to assume that the timing of treatment is exogenous.

There are several reasons to think that areas receiving new colleges may differ from the ones not receiving any. For example, the government may have decided to construct new higher education establishments in booming areas in order to fuel local growth. In this case, universities might be the consequence, and not the cause, of the increased economic activity. On the contrary, the government may have chosen to build new colleges in depressed areas in order to foster their economic development. The descriptive statistics presented in Section 3 show that treated areas systematically differ from untreated ones based on 1990 observable characteristics, suggesting a strategic allocation of the new colleges. As a result, comparing treated and untreated areas would likely lead to biased estimates of the impact of new colleges. On the other hand, the date at which establishments were constructed provides a plausible exogenous source of variation. Using

[45]The survey is comprehensive for all municipalities with fewer than 10,000 inhabitants. It covers 40% of the population living in bigger municipalities.

two types of tests, I show that later treated areas are likely to provide a good counterfactual for early treated ones in the absence of the policy. First, I run a series of placebo tests on the pre-treatment period to check whether early and later treated areas experienced similar trends before the policy. The results are presented in Section 5. The placebo coefficients are small and not statistically significant at conventional levels: education, employment, wages, firm creation and firm growth were evolving similarly in early and later treated areas. These results indicate that the parallel trend assumption holds before the policy. New colleges were not systematically constructed in booming or lagging areas first. Second, I show that the timing is not correlated with cities' initial characteristics. To do so, I regress the year of treatment on areas' demographic and economic characteristics observed in 1990. Table 6 displays the results of the regression for the first year of treatment (column (1)) and for all years of treatment (column (2)).[46] Focusing on column (1), we observe that none of the 23 coefficients are significant at the 5% level and only two are significant at 10%: the share of workers aged between 55 and 64 and the unemployment rate. There is no systematic pattern regarding the age structure. The coefficient for the 45-54 age group is of similar magnitude to that of the 55-64 age group but of opposite sign, while the coefficient for people older than 65 years old is close to zero and not significant. Turning to column (2), none of the coefficients are significant at conventional levels which shows that the timing of treatment is not driven by systematic differences in observable characteristics. These tests confirm that later treated areas provide a suitable control group for early treated ones.

In addition to the statistical tests, various qualitative elements suggest that the timing of treatment was affected by factors orthogonal to economic activity. First, the decision process was complex and took time because of the multiple administrations involved in the policy.[47] While the policy started in 1990, the final plan was not signed until 1992 in some areas. In addition, the constructions suffered sizeable delays. Table 7 compares, for every year between 1991 and 1995, the number of m^2 of higher education establishments that the government was expecting to build and the actual capacities constructed. We observe large discrepancies between the two, both at the beginning and at the end of the period, introducing some randomness in the timing of treatment. Finally, anecdotal evidence suggest that the availability of public buildings (e.g. former fire stations) allowed the rapid construction of higher education capacities in some cities while the absence of public land led to longer delays in other cities (DATAR 1998).

[46] The first year of treatment is defined as the first year a given area received new capacities. Since areas may get more than one new college or new department during the policy, column (2) includes all the years when an area received some new capacities.

[47] In particular: the national government, the three levels of local governments, superintendents of schools, and various ministries including the ministry of education, the ministry of economics, and the ministry of regional planning.

I estimate the city-level impact of the policy using a staggered event study design. I restrict the sample to urban areas receiving some new capacities between 1990 and 2003 and exploit the progressive implementation of the policy over time. Figure 7 plots for every year the number of areas treated for the first time and Table 5 displays the first year of treatment for each urban area. I consider the following model:

$$Y_{at} = \alpha_a + \delta_t + \sum_{\substack{i=-6 \\ i \neq -1}}^{6} \gamma_i . 1\{t = \text{Year treatment}_a + i\} + \epsilon_{at} \quad (1)$$

where Y_{at} is the outcome of interest in area a in year t. α_a is an area fixed effect which accounts for all the time-invariant characteristics of the area. δ_t is a year fixed effect, controlling for the time varying shocks that affect all areas in a similar way. *Year treatment*$_a$ corresponds to the year area a received new higher education capacities for the first time. Finally, ϵ_{at} is the error term.

Outcome variables include the share of the workforce with a university diploma, firm creation, firm growth, employment and wages in area a at time t. I use two measures of firm creation. First, I compute the log of the number of firms created. Because some areas might not experience firm creation every year, I also compute the inverse hyperbolic sine transformation (hereafter IHS).[48] Second, I use the entry rate, defined as the ratio between the number of new firms and the number of existing firms, as an alternative measure of firm creation.[49] Since census data are only available for the years 1990 and 1999, I use the French employer-employee data to study the annual share of university graduates, employment and wages in urban areas. I exclude firms and workers in the construction industry and people working in the public sector to avoid a mechanical effect driven by the construction of new colleges and the hiring of university staff. The regressions on firms and labor market outcomes are respectively weighted by the number of firms in the area in 1990 and the size of the workforce in 1990. These weights allow the results to be representative of the economic contribution of the various areas. The standard errors are clustered at the urban area level.

The parameters of interest are the γ_i. They provide the dynamic effect of the policy i years before or after an area received its first new college. The γ_i correspond to the causal impact of new colleges under the assumption that, in the absence of the policy, the outcome would have evolved similarly in early and later treated areas. While this assumption cannot be tested, the event study specification allows one to run placebo tests to check that the parallel trends

[48] The IHS transformation is defined as: $f(x) = ln(x + \sqrt{1 + x^2})$. It provides an approximation of the logarithm when the outcome is large while flexibly dealing with zeros.

[49] The entry rate is less skewed than the logarithm of firm creation, which is strongly correlated with city size.

assumption holds on the pre-treatment period. This setup also allows one to study the dynamic effects of the policy and especially how long it takes for the outcome to respond to new colleges and how long the effect lasts.

I implement estimators of γ_i that are robust to new colleges having heterogeneous effects over time and between areas. The literature on two-way fixed effect models has shown that staggered event study designs may lead to biased estimates when the effect of the treatment is heterogeneous over time or between groups (see in particular de Chaisemartin & D'Haultfœuille (2020), Borusyak et al. (2021), Callaway & Sant'Anna (2021), Goodman-Bacon (2021),Sun & Abraham (2021)). In this case, the standard two-way fixed effects estimator estimates weighted sums of average treatment effects with potentially negative weights. This may lead to negative estimates even when all the treatment effects are positive and vice versa. In this paper, treatment effects are likely to be heterogeneous both over time and between urban areas. First, the effect may be small during the first few years following the construction of a new college because of the time needed to educate the new students. The effect might then grow over time with the accumulation of cohorts of new graduates. Second, it may be heterogeneous between areas depending on the characteristics of the city, such as the initial level of education of the workforce, the accessibility to other education establishments, the industry mix, etc. To overcome this issue, I use the robust estimators designed by de Chaisemartin & D'Haultfœuille (2020) and Callaway & Sant'Anna (2021). The authors offer alternatives to the standard linear estimator which are unbiased even when the effect of the policy varies over groups and periods. In this setting, the estimators rely on the comparison of areas that already received the treatment to not yet treated areas.

The previous specification allows me to estimate the yearly impact of the policy on local economic activity. However, it does not exploit the fact that industries might be heterogeneously affected depending on their demand for skilled labor. If the effect of new colleges is driven by the supply of educated workers, one should observe a higher impact in skill-intensive industries (i.e. industries structurally employing more educated workers). To test this hypothesis, I use a triple difference strategy where I compare the evolution of the outcome in high and low-skilled industries in treated versus untreated areas. I estimate the following model:

$$Y_{ait} = \psi \text{ Exposure}_i \text{ x After}_t \text{ x } \text{ New Colleges}_{at} + \alpha_{at} + \delta_{it} + \lambda_{ai} + \epsilon_{ait} \tag{2}$$

where Y_{ait} is the outcome in area a, industry i and year t. $Exposure_i$ corresponds to the share of high-skilled workers in the 2-digit industry i computed *before* the policy using the French

LEED. I use either the share of workers with a university diploma or the share of workers with a "high-skilled white-collar" occupation as a proxy for skill-intensive industries.[50] New Colleges$_{at}$ is either a dummmy variable which takes the value one if the area received at least some new capacities during the policy or the number of higher education establishments constructed. ψ provides the effect of the triple interaction of the exposure variable with the after and treated variables. It estimates the additional impact of new colleges on firm creation for industries which employ a 1 percentage point higher share of skilled workers. Figure 8 displays the top and bottom ten 2-digit industries, based on their share of university graduates. High-skilled industries include R&D activities, Manufacturing of office machinery and computers, IT, Telecommunications and Business services. On the other hand, low-skill industries gather Textile, Leather and Wearing apparel industries, Personal services, Waste management and Land transport.

The triple difference is estimated in long difference. Because of the large number of industries and areas, I average the outcome over a three-year period centered around 1988 and 2000 to reduce measurement error. Regressions are then weighted by the number of firms in the area-industry cell observed in 1988.

Finally, the model is saturated with fixed-effects. The area-by-year fixed effects, α_{at}, control for area-specific shocks that affect simultaneously all industries in area a. Industry-by-year fixed effects, δ_{it}, account for national changes in industry business dynamism. It ensures that the estimated effect of new colleges are not driven by differential trends in high and low skill industries. Finally, the area-by-industry fixed effects, λ_{ai}, control for area-specific time-invariant differences in industry's business dynamism.

These specifications allow me to estimate the medium-run impact of the construction of new colleges on economic activity at the city level. In the following Section, I turn to the long-run effects of the policy on individuals born in these areas. In particular, I wonder whether the construction of local colleges facilitated access to higher education for exposed cohorts and whether it improved their labor market outcomes.

4.2 Staggered Event Study Design at the Individual Level

The previous Section focused on the impact of new colleges on the economic activity of treated cities. However, it does not provide information on the impact of these higher education establishments on people born in these cities. Especially, new colleges could benefit to "natives"

[50] "High-skilled white-collar" occupations include engineers and managers. Contrary to the level of education, the occupation code is available for all workers.

without increasing local economic activity if new graduates decide to work in other cities. In addition, the previous specification only allows me to study the short and medium-run effects of the policy while the individual analysis provides a long term approach. Due to the staggered methodology, the maximum length of analysis at the city level is constrained by variations in the timing of the policy. There is a trade-off between the number of periods used in the analysis and the size of the control group (i.e. areas not yet treated). On the other hand, the individual-level analysis focuses on the long-run outcomes of treated cohorts. The number of cohorts considered is constrained but the delay between the date of treatment and the year when the outcome is observed is not.

In this section, I focus on the long-run effects of the policy on education and labor market outcomes at the individual level. I study whether the construction of new colleges increased the access to university for cohorts directly exposed to the policy (i.e. born in treated areas and young enough to study in the new colleges). I then consider the impact on labor market outcomes such as the probability to be employed and the probability to have a skilled occupation. To do so, I leverage the staggered implementation of the policy and the differential exposure of cohorts, using an event study design. In particular, I exploit the fact that the policy might have had a direct effect on "young" cohorts in treated cities but not on slightly older cohorts which had decided to go or not to university *before* the beginning of the policy.[51] The progressive construction of new colleges provides variations in treatment status for people belonging to the same cohort but born in different cities. I define "young" cohorts as individuals aged around 18 or less: most French students complete high-school education at age 17, 18 or 19 and enroll right after in university. Thus, we should expect a positive impact on education for people younger than 20 at the beginning of the policy and no impact on older individuals. I use the area of birth of the individuals to recover an "exogeneous" measure of exposure to the policy. Contrary to the place of residence, the place of birth cannot be affected by the construction of colleges that took place many years later. The following model compares individuals belonging to "young" versus slightly "older" cohorts born in early versus later treated areas:

$$Y_{i,a,c,t} = \alpha_a + \delta_c + \mu_t + \sum_{\substack{j=15 \\ j\neq 23}}^{29} \gamma_j .1\{j = \text{yr. of treatment - yr. of birth}\} + X_{i,t}\beta + \epsilon_{i,a,c,t} \qquad (3)$$

where $Y_{i,a,c,t}$ is the outcome variable of individual i, born in area a, belonging to cohort c, observed at time t. Again, α_a accounts for the characteristics of area a that affect all cohorts of birth similarly. δ_c accounts for the shocks common to all individuals belonging to cohort

[51] See also Duflo (2001) and Currie & Moretti (2003) for similar identification strategies.

c. The parameters of interest are the γ_j. They provide the impact of the new colleges on people aged j when their area of birth received the first new college. $X_{i,t}$ includes demographic characteristics such as gender, age, age-squared and a linear time trend by area of birth. As for the city analysis, the identifying assumption is that, in the absence of the policy, education and labor market outcomes of cohorts would have evolved similarly in early and later treated areas. I measure outcome variables in the 2015 Census. It allows me to study the effects of the policy up to 25 years after the beginning of the policy.

5 The effects of new colleges on local economic activity

In this Section, I study the impact of new colleges on firms, employment, wages, and local economic activity at the city-level. I start by providing evidence on their effects on the level of education of the local workforce. I then consider the impact of new colleges on firm entry, firm exit and firm growth, and discuss the mechanisms at play. Third, I estimate the aggregate impact on local economic activity, including employment and wages. Finally, I study the heterogeneity of the effects based on city characteristics and provide evidence on the robustness of the results.

5.1 Local level of education

I start by investigating the impact of the construction of higher education establishments on the level of education of the local workforce. I wonder whether cities were able to retain new graduates educated in new colleges. Figure 9 plots the results of an event study design, corresponding to equation 1, at the urban area level. Cities experienced a steady increase in the share of college graduates starting two years after the construction of new capacities.[52] The effect increases over time reflecting the accumulation of several generations of university graduates. After six years, the policy increased the share of college graduates by 2 percentage points which represents a 15% increase in the level of education of the local workforce. The two-year delay observed before the effect kicks in is consistent with the time needed to educate the new students. Indeed, most of the new colleges offer two-year diplomas (e.g. DEUG or DUT). Looking at the pre-treatment period, we observe that the placebo coefficients are small and not significant. The level of education was evolving similarly in early and later treated areas before the policy. This confirms that the parallel trend assumption holds on the pre-treatment period.

The policy increased the local level of education of the workforce. Treated cities were able to

[52] Year 0 corresponds to the first year new colleges are active (i.e. start educating students).

retain part of the new graduates who stayed and worked where they got educated. We can then wonder whether this newly educated workforce fostered economic activity. I start by studying the impact on the entry of new businesses and on the characteristics of new entrepreneurs.

5.2 New colleges and firm entry

Firm creation. Young firms strongly contribute to employment growth, GDP and innovation (Haltiwanger et al. 2013, Adelino et al. 2017). They matter both for national growth and for the local development of cities and counties. In particular, areas with high startups rate tend to experience more employment and wage growth in the long-run due to the persistence in entry at the local level (Walsh 2020). In this section, I study whether the construction of new colleges resulted in an increase in business formation.

As a first step, I consider the effects of the policy on the yearly number of establishments created, including both firms created *ex-nihilo* (i.e. new registrations) and the opening of new establishments by existing firms. Figure 10 plots the results of an event study of the effect of the policy on (a) the log number of establishments created and (b) the entry rate of establishments. The policy had a sizeable impact on new establishments with a significant increase of around 13% after six years. The effect on business formation follows a similar pattern as for the level of education of the workforce: the coefficients are small and not significant before the policy and during the first two years. Then, they become positive and significant and feature a linear positive growth over time. Using the entry rate provides comparable results. I estimate an increase of around one percentage point after six years consistent with the 13% rise found in panel (a). The observed delay between the policy and the increase in entry is expected if either new college graduates create new firms or if the creation of establishments is triggered by the increased number of skilled workers in treated areas.[53] Finally, early and later treated areas experienced similar trends before the policy. All the pre-treatment coefficients are quantitatively small and not statistically significant at conventional levels. Again, it confirms that the timing of the policy was not driven by local trends in firm entry. In particular, new colleges were not created in either booming or declining areas in the first place.

Second, I decompose the total number of creations into the registration of new companies and the opening of new establishments by existing firms. Figure 11 plots the corresponding estimates. Most of the increase in entry is driven by new firms. Panel (a) and (b) show a persistent

[53] Using survey data on entrepreneurs, I study their demographic characteristics and discuss the mechanisms in Section 5.3. I find that new firms are not created by new graduates but rather by older more experienced entrepreneurs.

increase in firm creation: about 22% after six years (respectively 1.8 percentage points for the entry rate). On the other hand, the increase in new establishments created by existing firms is much smaller and only temporary. As a result, the long run increase in business formation is driven mostly by the creation of firms *ex-nihilo*.[54] For the rest of the Section, I focus on newly created firms.

Finally, I consider the effects of the policy at the industry level to understand what type of firms are created. Table 8 displays the results of an event study separately for each industry. The coefficients are averaged over all treatment periods using the procedure described in (Callaway & Sant'Anna 2021). As a complement, Figure 12 plots the coefficients year by year for four aggregated industries (manufacturing, retail, construction and services). The increase in firm creation took place in most industries including manufacturing, agrifood, retail, transportation, hotels and restaurants and household services. The increase in non-tradable industries such as the retail or households services suggests that local demand for goods and services may have increased following the construction of new colleges, triggering additional entry. In particular, firm creation could be driven by the consumption of new students, university staff and new graduates. Interestingly, the immediate increase in firm entry in the retail observed in Figure 12 seems consistent with this mechanism. On the other hand, entry in traded industries such as the manufacturing is unlikely to be driven by local consumption. It is likely to result from the supply of educated workers to potential entrepreneurs. Considering the timing in the manufacturing, I find a small and non significant effect during the first two years before observing a sizeable increase in entry. The pattern follows the evolution of the level of education of the workforce and is consistent with the time needed to educate the new students. I discuss in more details these two mechanisms in Section 5.3.

Elasticity of firm creation to local education. Previous results were estimating the impact of new colleges on firm entry and on the local level of education separately. However, the impact on firm creation depends on the capacity of cities to retain new graduates. To account for this factor, I turn to the semi-elasticity between the share of college graduates and firm entry. I use the construction of new colleges as a local shifter for the level of education of the workforce. The empirical strategy is described in more details in Appendix Section D. This quantification exercise allows to re-scale the effect on entry by the effect on education. However, it assumes that the effect on new firms is entirely due to improved education. This hypothesis might not hold

[54] Appendix Figure A.3 compares the effect of the policy on firm creation separately for new companies and sole-proprietorships. I find that the effect on companies is four times bigger than for sole-proprietorship. The effect is hence unlikely to be driven by "subsistence entrepreneurs", i.e. small businesses unlikely to grow or create new jobs (Schoar 2010).

if, for example, part of the new firms are created to respond to an increase in local demand. To mitigate this issue, I exclude firms in non-tradable industries and focus on firms created in the manufacturing sector. Firms in these industries are typically producing goods for the national or international markets. Entry is hence unlikely to be affected by local demand shocks. Table 9 displays the results. Column (1) shows the result of the ordinary least squares (OLS) regression of the IHS transformation of firm creation on the share of workers with a university diploma, controlling for area and year fixed effects. The OLS coefficient suggests a positive and statistically significant impact of education on firm creation, with a semi-elasticity of 2.1%. However, this estimate may not reflect the causal impact of education on firm creation because of several potential biases (e.g. measurement error in education or reverse causality). Column (2) provides the results of the first stage regression and column (3) shows the reduced-form impact of new colleges on firm creation. As shown earlier, the new colleges strongly increased the level of education of the local workforce and firm entry. The high first stage F statistics of 107.1 indicates that the instrument is a strong. Finally, column (4) reproduces the 2SLS estimator of the impact of education on firm creation. I find that an increase of 1 ppt. in the share of workers with a university diploma increases firm creation by approximately 6.2%. The coefficient is significant at the 1% level. This finding implies an elasticity of about 0.85. Increasing the share of workers with a university diploma by 1% raises firm creation by 0.85% in the manufacturing sector.

Quality of new firms. The policy resulted in more companies created. However, the quantitative increase in start-ups could be due to the creation of lower quality firms with little impact on economic activity. I investigate the effects of the policy on the quality of the firms created using initial employment as a first proxy. This measure allows me to study the effects of new colleges on the initial quality of firms, independently from their impact on firms' growth. The drawback is that new firms typically start small and that firm size is only partially correlated with firms' productivity. As a complement, I also consider the effects of the policy on the survival, the size and the wage of new firms observed some years after creation. Figure 13 plots the coefficients of an event study of the average employment at creation (a) in level and (b) in log. The two measures provide consistent results: the size of the new firms did not decrease following the construction of new colleges. If anything, the coefficients are slightly positive but mostly not statistically significant. This result suggests that the average quality of the new firms did not decrease as one would expect if the effect on entry was driven by the creation of marginal, less productive, firms.

The policy had a large impact on firm creation with no evidence of a decrease in their initial

quality. We may then wonder whether the construction of new colleges had an impact on the survival, the growth, and the composition of the workforce of these new firms. To do so, I match the registry of firms with linked employer-employee data observed seven years after the date of creation.[55] Table 10 displays the corresponding results. Column (1) reports the effects on the probability of survival and column (2) on the average employment of the new firms at age seven. The coefficients are both small and not significant, suggesting no effect on survival and average size. However, because the entry of new firms was initially much higher, this implies an increase in the number of firms surviving and in the number of jobs created by new firms by about 22%. Turning to the composition of the workforce, columns (3)-(6) show that treated firms did not employ a higher share of young workers but became more intensive in skilled labor. The share of high-skilled white-collar workers increased by 3.8 percentage points, which corresponds to a 24% increase. Decomposing the effect by age, I find that firms created after the policy employed a higher share of young high-skilled workers (+2.14 ppts.) and, to a lesser extent, a higher share of older high-skilled workers (+1.69 ppts.). Finally, the average wage in new firms increased by 2.9% following the policy. This is consistent with the upskilling of the workforce and with an increase in the quality of new firms.

Potential displacement effects. While the number of new firms strongly increased in treated cities, this rise could be driven by displacement effects. Potential entrepreneurs may decide to create new firms in treated areas instead of untreated ones because of the policy. This could result in no effect on the aggregate number of firms created and only entail spatial reallocations. Testing for national displacement effects would require a "super" control group for France, unaffected by both direct and indirect effects of the new colleges. In an attempt to test for potential displacement effects, I reproduce the previous analysis at the province level (*département*), a more aggregated geographic level.[56] If substitutions are taking place between cities within provinces, the effect of the policy on firm creation should become small. Figure 14 plots the corresponding results. Because provinces typically include several cities, there is less variation in the timing of the policy than at the urban area level. I hence focus on the short-run effects. I find a positive and significant impact on firm creation at the province level. After four years, I estimate an increase of approximately 15%. This suggests that the previous results were not driven by local displacement effects and that the policy actually increased the number of

[55] This gap corresponds to the smallest number of years between the first year of the Sirene registry (1987) and the starting date of the comprehensive LEED (1994). As a result, firms created between 1987 and 2001 are observed in the LEED over the period 1994-2008.

[56] There are 94 provinces in continental France. They were created during the French Revolution and have approximately the same surface area.

firms created.

We may then wonder whether provinces are a relevant level of analysis for displacement effects. Using survey data on French entrepreneurs (SINE), I observe that most entrepreneurs are indeed "local" entrepreneurs. In 1998, 82% of the entrepreneurs created their company in the province where they lived and 57% in the municipality or in a municipality close to where they lived. As a result, the province level is likely to capture the potential local displacement effects that may result from the policy.

5.3 Mechanisms

The policy strongly fostered the entry of new firms both in tradable and non-tradable industries. This rise can be driven by four non-exclusive mechanisms discussed in this section: (i) the availability of skilled workers, needed for the production process, to potential entrepreneurs, (ii) the creation of new firms by new graduates, (iii) an increase in local consumption due to students, new graduates and university staff, (iv) the direct effect of new colleges through research and partnerships with firms.

First, potential entrepreneurs may decide to start new firms because the policy increased the level of human capital available locally. Start-ups typically experience an "up or out dynamics": they either grow rapidly or exit (Decker et al. 2014). The availability of skilled workers may fuel the growth of these new firms. Indeed, educated workers can use more advanced technologies and are better at implementing new ideas, which might be especially valuable for innovative young firms (Bartel & Lichtenberg 1987, Skinner & Staiger 2005, Doms & Lewis 2006, Lin 2011, Acemoglu et al. 2022). The increase in firm creation in tradable industries (i.e. industries that don't rely on local demand) suggests that the supply of high-skilled workers is an important driver of firm entry. In addition, new firms employ more young high-skilled workers after the policy consistently with this mechanism. To provide direct evidence, I leverage the heterogeneous demand for skilled labor between industries. If the supply of educated workers is causing an increase in firm creation, the effect should be higher in industries that are intensive in skilled labor. Using a triple-difference analysis, I study the evolution of firm entry in high and low-skilled industries in treated versus untreated areas. Table 11 displays the estimated parameter of the triple interaction from equation 2. I use two proxies to define skilled industries: the share of college educated workers (columns (1) and (2)) and the share of high-skilled white-collars (columns (3) and (4)). Results are similar with both measures. The increase in firm creation is higher in industries that are intensive in skilled labor. This result is consistent with the increase

in the share of high-skilled workers in new firms found in the previous section. It also suggests that treated cities were experiencing a human capital shortage that was preventing the entry of new firms.

Second, the policy might increase the pool of potential entrepreneurs by increasing the level of education of the local population. Indeed, entrepreneurs tend to be on average more educated than the rest of the population and various papers provide empirical evidence that entrepreneurs' level of education is strongly correlated with business success (see Praag et al. (2008) for a literature review). Following Lazear (2004), entrepreneurs must be "Jack of all trades". They must be able to perform various tasks such as management, recruitment, marketing, and accounting. The education provided at universities and colleges might contribute to the acquisition of the balanced skill-mix necessary to start a business. Using the *SINE* survey of entrepreneurs, I test whether the entry of new firms is driven by new graduates becoming entrepreneurs. The survey asks entrepreneurs about their occupation before starting a new firm, including whether they were former students or not. Table 12 displays the results of a difference-in-differences model of the impact of policy on entrepreneurs' characteristics. The regression focuses on areas treated between 1994 and 2003.[57] Column (1) reports the impact of the policy on the probability of being a student before creating a new firm. Columns (2) to (4) display the impact on the age of entrepreneurs. Columns (5) to (7) focus on their level of education. I find that the policy decreased the share of former students creating new firms by 4.3 percentage points and the share of entrepreneurs aged 25 or less by 4.7 ppts. This result suggests that the large increase in firm creation is not driven by new graduates creating new firms. Indeed, as in the US, French entrepreneurs tend to be much older than new graduates (Azoulay et al. (2020)).[58] Table 13 displays the share of entrepreneurs by age group for treated and untreated areas over time. Overall, less than 6% of entrepreneurs are younger than 25 years old in 1994 while around 50% are older than 40 years old. This suggests that, at least in the short run, the increase in firm creation is unlikely to be driven by new graduates creating new firms. Since the policy changed local economic conditions, individuals creating firms after the policy might be different, even if these people are not new graduates. Starting with education, I find a sizeable but not significant impact of the policy. The coefficient on college education is large and positive while the coefficient for high school is negative and of similar magnitude. This suggests that more educated individuals took advantage of the supply of skilled workers and decided to create new firms. This is consistent with new firms being created in more skilled industries. However, both coefficients are

[57] The first survey of entrepreneurs was run in 1994 which prevents the study of areas treated earlier.

[58] In contract, Bernstein et al. (2022) find that local *demand shocks* in Brazil resulted in firm creation in non-tradable industries driven by young skilled entrepreneurs.

very imprecisely estimated and hence not statistically significant. Table 14 provides the results occupation by occupation. In addition to not being former students, new entrepreneurs are also less likely to be outside of the labor force before creating their firm. On the contrary, they tend to be more often company managers (column (1)) and hence to have already some experience in running a firm. The results also suggest that they were more likely to have started a business before (column (8)) but the coefficient is very imprecisely estimated.

Third, the policy can promote firm creation by stimulating local consumption. I exclude firms and workers in the construction industry and in the public sector to avoid capturing a mechanical impact resulting from the actual construction of new colleges. However, local demand can increase if the policy attracts students from other cities and hence increase local population, or if firms directly supply goods and services to the new colleges. Section 5.2 shows that the policy indeed increased firm creation in industries such as the retail sector, hotels and restaurants and household services. Yet, province-level analysis indicates that the policy had little effect on local population and on the share of youth.[59] Table B.3 display the results in columns (1) and (2). As a result, the construction of new colleges did not resulted in a large inflow of population. This is consistent with the objectives of the policy to build small establishments to educate the local population. To complement these results, I exploit the survey of entrepreneurs which provides information on the main clients of newly created firms. Table 15 reports the results of a difference-in-differences specification of the impact of the policy on the probability to have as main clients individuals, firms or administrations (columns (1) to (3)) and to have mainly local, regional, national or international clients (columns (4) to (7)). None of the results are significant at usual levels, suggesting that the policy did not tilted the composition of new firms towards local demand. If anything, the coefficients for local and regional clients are negative while the coefficient for the national market is positive but very imprecisely estimated. In addition, the coefficient relative to the share of firms working mainly for administrations is small and not significant again suggesting a limited role for the direct demand from new colleges.

Finally, new higher education establishments may affect firms through research. In particular, the development of new patents can lead to the creation of spin-out companies and hence foster firm creation. While this mechanism has been shown to matter in previous studies (see Hausman (2021), Babina et al. (2022) for example), it is less likely to explain the results in this context. First, previous papers were mostly focusing on full universities and research centers while most of the establishments constructed during the policy were teaching colleges. Second, the production of research papers and new patents usually takes many years while the increase

[59] I use the labor force surveys to study the effects of the policy on local population. While the national sample is large, it is too small to be used at a more disaggregated level than the province.

in firm creation started very quickly: only two years after the beginning of the policy. Finally, while spin-out companies may be important for local and national growth, their number is usually small, especially compared to the massive number of firms created. As a result, it could only explain a very limited fraction of the increase in entry observed after the policy.

The supply of educated workers available to potential firms plays an important role in explaining the increase in firm creation. While increased local demand might also matter, in particular in retail and services, the small effect on local population indicates that the results are not driven by a large inflow of students and professors. Finally, the effects are unlikely due to new graduates becoming entrepreneurs nor to research.

5.4 Incumbent firms and aggregate effects on local economic activity

The policy durably increased firm creation in treated areas. I then consider the effects of new colleges on incumbent firms and the overall impact on local economic activity. I start with the total number of active firms in urban areas. Figure 15 plots the results for the log number of firms. The coefficients are small and not significant at common levels suggesting no impact on the total stock of firms. Since the number of firms created and the number of young firms surviving both increased following the construction of new colleges, the result suggests that the policy was also followed by more exits of incumbent firms, keeping the total number of active firms constant. Figure 16 displays the results for the log number of exits per year. As expected, we observe that the number of firms exiting the market increased after the policy. Hence, the increase in firm creation led to a crowding-out effect of older firms with little increase in the total number of firms.

To provide a comprehensive assessment of the effects of the policy on firms, I also consider its effects on surviving incumbent firms. To do so, I focus on a balanced panel of firms active in 1989 (i.e. one year before the beginning of the policy). Table 16 display the results including various measures of firms' activity. The results are unambiguous: incumbent firms experienced lower growth following the policy. I find a negative effect of about 2% on sales and value-added and an even bigger effect on profits (about 5.6%). As a result, employment decreased by 0.8%, indicating a less than full adjustment to the drop in economic activity. In addition, incumbent firms also paid slightly lower wages (-0.8%) suggesting a second margin of adjustment. Finally, both measures indicate a decrease in productivity following the policy.

The positive effect on new firms and the negative one on incumbents suggest an ambiguous

impact of the policy on local economic activity. To estimate the overall effect, I aggregate the firm level data at the urban area level. I consider an unbalanced sample of firms, composed of mono-establishments, in order to account for entry, exit and firm growth. Table 17 displays the results. Overall, the positive impact slightly dominates the negative one. I find an increase in sales and value-added following the policy. The policy hence resulted in more creative destruction with positive effects on local economic activity. However, I find no significant impact on employment and average wage in the medium-run, indicating little gains for the local workforce. Finally, I estimate a positive effect on labor productivity and a non significant increase in TFP following the policy.

5.5 Local labor markets

The firm-level analysis suggests a positive effect on local economic activity but little impact on employment and wages. In this section, I investigate further the firm-level results using linked employer-employee data. These data are available at the establishment level which allows me to estimate the effects on all firms, not only mono-establishment ones. They also allow me to study the heterogeneity of the effect for different age groups (typically "young" versus "older" workers) and different levels of skills ("university graduates" versus "unskilled" workers). I assess the effects by skill type using the occupation code provided in the French LEED.[60] I divide the workforce into four categories of jobs: blue-collars, low-skilled white-collars (i.e. clerks), intermediate white-collars (i.e. technicians and supervisors) and high-skilled white-collars (i.e. engineers and managers). Figures 17 and 18 provide the results for young and older workers respectively. Starting with young workers, employment strongly increased for the two most skilled occupations following the policy. The number of intermediate white-collars increased by 15% after six years and the number of high-skilled white-collars by 20%. The policy had little impact on employment for less skilled occupations such as clerks or blue-collars. On the other hand, employment decreased globally for older workers. The decrease is slightly smaller for the most skilled occupation and particularly striking for blue-collars and clerks (respectively -14% and -12% after six years). These results suggest either some substitution effects between young and older workers or some displacement effects due to the entry of new firms and the exit of older firms. Indeed, young firms tend to employ more young workers (Ouimet & Zarutskie 2014). As a result young workers benefited more from the entry of new firms and were relatively less affected by exits.

[60]The level of education of the workers is only available for a small sample while occupations are provided for all workers. In addition, the French occupations are ranked hierarchically and hence provide a good proxy for education.

Overall, the increase in employment for young workers and the decrease for older workers almost offset each other with little employment effects at the city level (see Figure 19).

I then consider the effects of the policy on the mobility of workers. The LEED allow me to track individuals changing jobs over time and to identify the city where they work. I consider both the inflows of workers (i.e. employees who are currently working in the area but were working in another one during the previous period) and the outflows of workers (i.e. employees currently working in the area but working in another one in the next period) expressed as a share of current employment. As for employment, I study inflows and outflows by age groups and skills. Figure 20 plots the results for the two groups. Following the policy, treated areas experienced a large inflow of young workers without any effect on the outflow. The coefficients are initially small but growing over time. After 6 years, areas which received new higher education capacities experienced an additional annual inflow of young workers equivalent to 1% of the workforce. On the other hand, the effect is pretty small for older workers. If anything, the inflows of older workers might have slightly decreased and the outflows slightly increased following the policy. I then decompose the flows by age and by skill categories. I consider low-skilled jobs (blue-collar and clerks) and high-skilled jobs (intermediate and skilled white-collars). Figure 21 displays the results for young workers. The increased inflow is mainly driven by the mobility of low-skilled workers towards treated areas. The outflow of low-skilled workers also slightly increases. For skilled young workers, the flows are much smaller. The increase in inflow is comparable to the increase in outflow with little effect overall on the number of young high-skilled workers. These results show that treated areas attracted more young low-skilled workers after the policy. One possible interpretation is that these workers came to compensate the "missing generation" of young low-skilled workers that resulted from more high-school graduates going to university due to the policy. Considering the flows of older workers, Figure 22) shows that the temporary increase in outflows is mainly driven by older high-skilled workers moving to other areas. This suggests that the previous results slightly overestimated the negative impact on employment for older workers since part of them found new jobs in other cities.

I now consider the effects of new colleges on wages by age and skill groups. Figure 23 displays the results for young workers and Figure 24 for older workers. For the young workers, the wage of low-skill employees slightly decreases while the wage of young high-skilled workers slightly increases after the policy. The two effects are small and mostly not statistically significant. Focusing on older workers, the effect is again small for both high and low-skill workers. Older low-skill workers experienced a small temporary decrease in wages but the effect is negligible

after 6 years. Second, I study the effects of the rise in the level of education of the workforce on the college premium, defined as the gap in daily wage between university graduates and workers with less than a high-school diploma. I find a small, non significant, decrease in the premium following the policy (see Figure 25). Finally, Figure 26 shows the results for two measures of residualized wages: panel (a) accounts for gender and age fixed effects while panel (b) also includes education. Both measures of wages provide similar results: the policy had no impact on wages in the medium-run after controlling for demographic characteristics. This entails that cities with better educated workers did not experience positive spillover effects in the medium-run.

5.6 Heterogeneity analysis

The construction of higher education establishments resulted in sizeable effects on local economic activity. In this section, I study whether the policy produced stronger effects in some type of cities rather than others (e.g. less vs. more dense areas). I consider various sources of heterogeneity including population size and density, level of education of the population, economic dynamism, and industry structure. To do so, I interact the treatment variable with initial city characteristics observed in the 1990 census. I use the following variation of the baseline model:

$$\Delta Y_{at} = \delta_t + \gamma.\frac{\text{Capacities}_a}{\text{Workforce}_a} + \phi.\frac{\text{Capacities}_a}{\text{Workforce}_a} \text{ x City characteristics}_{a,1990}$$
$$+ \theta.\ \delta_t \text{ x City characteristics}_{a,1990} + \Delta\epsilon_{a,t}$$

where $\frac{\text{Capacities}_a}{\text{Workforce}_a}$ is the average number of university seats constructed between 1990 and 2002 divided by the city initial size of the workforce. This measure takes into account three elements: (i) areas can be treated multiple times and new establishments can have different sizes, (ii) new capacities can be built at the beginning or at the end of the policy, finally (iii) one additional seat might have different effects depending on the size of the city. The model is estimated in long difference between 1990 and 2002. Indeed, two-way fixed-effect models provide unbiased estimates in two periods settings even when treatment effects are heterogeneous.

Figure 27 plots the coefficient of interaction between the treatment variable and cities' initial characteristics (ϕ) when the outcome variable is the log of firm creation. The results indicate larger effects on firm entry in more "rural" cities, defined as cities with lower population density and a larger share of their activity related to agricultural industry. This suggests that the construction of higher education establishments in more remote cities, as opposed to concentrating them in the biggest ones, might have contributed to more firm creation. I then turn to the effects on employment. Figure 28 displays the results separately for young and older workers. Most

coefficients are small and not significant. Strikingly, the distance to Paris is the only dimension which has a significant impact for both young and older workers. The further away from Paris, the strongest the effects of the policy. This result is consistent with Paris attracting part of the new graduates from surrounding areas and hence resulting in smaller effects for neighboring cities. Focusing on the effect for young workers, I find that all remaining coefficients are not significant suggesting that the effect of the policy on youth employment is homogeneous along cities' characteristics. On the other hand, I find significant heterogeneity for the effect on older workers. Overall, results indicate that the negative effects are smaller in cities with better initial economic conditions (i.e. higher employment to population ratio, lower unemployment rate, higher firm entry rate) and a workforce initially more skilled (higher college share and more high-skilled white-collar workers). As expected, better economic conditions allow displaced workers to find new jobs more rapidly and better educated workers suffer less from the competition with new graduates.

5.7 Robustness analysis

I examine the robustness of the results to the exclusion of the biggest area of the sample (Paris), to an alternative specification controlling for areas' initial size, to other definitions of local labor markets (e.g. commuting zones or provinces) and to the inclusion of more treatment and control periods. The results are displayed in Appendix Section E. I summarize the main findings here.

First, the distribution of the size of French cities is extremely skewed to the right and fat tailed. Especially, the urban area of Paris, which almost corresponds to the Parisian region, had about 11 million inhabitants in 1990 (approximately 19.5% of the French population). To check that the results are not driven by Paris, I reproduce the main analysis excluding the French capital. The results are displayed in Appendix Figure E.1. Again, I find a large effect of new colleges on the local level of education and on firm entry (Panels (a) and (b)). The share of college graduates increased by 1.9% and firm creation by about 14% after six years. Considering employment, I find an increase in employment for the youth and a decrease for older workers. Both effects offset each other with no impact on total employment (Panels (c), (e) and (f)). Finally, I find no significant change in residualized wages (Panel (d)). The results are consistent with the main analysis. The coefficients are however slightly smaller when excluding Paris. This decrease might be due to the fact that Paris concentrates a large fraction of economic activity and received many higher education establishments during the policy.[61]

[61] While the municipality of Paris was not targeted by the policy, municipalities in the suburbs benefited from the construction of large establishments. In particular, four of the eight full universities were constructed around

Alternatively to excluding areas from the sample, one can control for initial city-size. I reproduce the analysis including the log population in 1990 as a control variable. The estimator of (Callaway & Sant'Anna 2021) allows to control for initial characteristics.[62] The parallel trend assumption must now hold conditional on the size of the area. The results are displayed in Appendix Figure E.2. The results are confirmed. Treated areas experienced a large increase in the local level of education and in firm creation with little medium-run effects on employment and wages.

The main analysis uses urban areas as a proxy for cities. I show that the results are robust to using alternative geographic levels of analysis. In particular, Appendix Figures E.3 and E.4 display the main results at the Commuting Zone (CZ) and at the Province levels (*département*), respectively. There are 279 CZ and 94 provinces in metropolitan France. Contrary to urban areas, they form a partition of the French territory and hence also include rural areas. They also allow to account for the heterogeneity of the Parisian area. Indeed, the region of Paris is composed of 25 CZ and 8 provinces. The results are similar when using CZ, Provinces and Urban areas. As a result, the main conclusions are not affected by changes in the geographic level of analysis.

Finally, I study whether the results observed in the short and medium run are consistent with the longer run effects. As mentioned in Section 4, the maximum length of analysis is constrained by variations in the timing of the policy. There is a trade-off between the number of treatment periods and the number of control areas (i.e. not yet treated). E.5 reproduces the analysis including effects up to nine years after (respectively before) the beginning of the policy. The results follow a similar pattern as in the short and medium run. There is a large and persistent increase in the share of college graduate, in firm creation and in youth employment. The negative effects on older workers seems to stabilize over time and even to slightly decrease in the long run. The effect on residualized wage stays very small and non significant over the whole period of analysis.

6 Long-run Impact at the Individual Level

We saw in the previous section that the construction of new colleges had a large impact on local labor markets. On the firms' side, the policy fostered the entry of new firms and increased the

Paris. The goal was to reduce congestion in Parisian universities and provide better access to higher education. These suburban municipalities are included in the urban area of Paris.

[62] In particular, they incorporate and extend the stable Inverse Probability Weighting method (Abadie 2005) to their framework. In particular, it allows to adjust the estimator to account for the fact that cities with different levels of population could potentially be treated at different periods.

exit of older firms. On the workers' side, high-skilled employment increased for young workers while employment decreased for older workers. As a result, the policy had little aggregate effect on employment in the medium-run. In this section, I turn to the impact of the policy at the individual level focusing on people born in treated areas. The objective is to study whether the policy benefited to cities' "natives" in terms of education and employment. In addition, using the 2015 Census allows me to study the long-run impact of the policy, 25 years after its implementation.

I leverage variations in the timing of the policy between areas and differences in exposure between cohorts born in the same city to estimate the causal impact of new colleges at the individual level. Using an event study design, I compare education and labor market outcomes of young and slightly older cohorts born in early versus later treated areas. The staggered implementation of the policy implies that individuals belonging to the same cohort but born in different cities will have different treatment status. Second, I exploit the fact that only young cohorts are likely to study in the new colleges and hence that slightly older cohorts can be used as a control group.

First, I consider the effects in terms of education: does the creation of local colleges improve access to higher education? Figure 29 displays the results for the probability to get a university diploma. The policy had a positive impact on cohorts directly exposed to the policy, with a higher effect on the youngest cohorts at the time of the policy. The effect is quantitatively large. The probability to get a university diploma is 4 percentage points higher for people aged 15 at the beginning of the policy compared to people aged 23. This result suggests that the creation of local establishments increased the access to higher education for people born in treated cities. On the other hand, the placebo tests (i.e. for individuals older than 23 at the time of the policy) are small and not significant which confirms the validity of the research design. I then turn to the impact on individuals' labor market outcomes.

Figure 30 plots the results for the probability to be employed in 2015. The pattern is very similar as for education: the policy increased the probability to be employed for the cohorts directly benefiting from the new capacities. The impact on employment strongly increases for the cohorts younger than 18 years old, following a similar pattern as for education. Finally, I consider the impact on job quality using occupation codes. I find that the policy significantly increased the probability to hold a high-skilled position (see Figure 31). In particular, the probability to be an intermediate white-collar raised by 4.5 ppts. for people aged 15 at the beginning of the policy. The estimates for high-skilled white-collars and company managers are also positive but largely insignificant.

To conclude, the construction of local colleges contributed to the large increase in the level of education of the population that took place in the 1990s and 2000s. While the employment effects of the policy were ambiguous at the city level, the individual analysis suggests a long-term increase in employment and in the quality of the jobs hold by cohorts that could directly benefit from the new capacities.

7 Conclusion

In this paper, I assess the impact of a massive college expansion policy on workers, firms and local labor markets in France. The policy consisted in the construction of hundreds of small new colleges and new departments over a decade. Using a staggered event study design, I leverage both variations over space and over time to estimate the causal impact of new colleges on cities' economic development and the long-run effects on cohorts directly exposed to the policy. Combining a rich set of administrative data on higher education establishments, workers and firms, I find that the policy resulted in a persistent increase in the level of education of the local workforce suggesting that areas were able to retain a share of the new graduates. In addition, I estimate that the construction of new colleges had a large positive impact on firm entry in both tradable and non-tradable industries, with no decrease in average quality. Firms created after the policy became more intensive in skilled labor and paid higher wages. These results indicate that the supply of skilled workers played an important role in explaining the rise in firm entry. Leveraging a survey of entrepreneurs, I show that the new firms were created by older, more experienced, entrepreneurs, not by new graduates. Turning to the impact on incumbent firms, I find that the policy had a negative effect on their growth and increased firm exit, suggesting some substitutions between young and older firms. Overall the positive effects dominate the negative ones. The policy increased creative destruction in treated areas. In addition, I find strong composition effect on employment. On the one hand, employment increased in high-skilled occupations for young workers. On the other hand, employment decreased for older workers in both high and low-skilled occupations. Overall, both effects compensated and the policy had no significant impact on cities' employment in the medium-run. Finally, I consider the effects of new colleges on surrounding areas. I find evidence of non-negative spillovers. In particular, I show that the increase in firm creation was not driven by local displacement effects, indicating an actual increase in firm entry.

I then consider the long run impact of the policy at the individual level. Using variations in cities' dates of treatment and individuals' dates of birth, I find that cohorts directly exposed to

the policy experienced a significant increase in their probability to get a university diploma. The construction of new colleges also resulted in better labor market outcomes. I estimate a sizeable increase in their probability to be employed and to hold a high-skilled occupation. As a result, the policy actually improved the labor market outcomes of young individuals born in treated cities.

References

Abadie, A. (2005), 'Semiparametric Difference-in-Differences Estimators', *The Review of Economic Studies* **72**(1), 1–19. 38, 107

Abowd, J. M., Kramarz, F. & Margolis, D. N. (1999), 'High wage workers and high wage firms', *Econometrica* **67**(2), 251–333. 17

Abramovsky, L., Harrison, R. & Simpson, H. (2007), 'University research and the location of business r&d', *The Economic Journal* **117**(519), 114–141. 5

Acemoglu, D., Akcigit, U. & Celik, M. A. (2022), 'Radical and incremental innovation: The roles of firms, managers, and innovators', *American Economic Journal: Macroeconomics* **14**(3), 199–249. 30

Acs, Z., Astebro, T., Audretsch, D. & Robinson, D. T. (2016), 'Public policy to promote entrepreneurship: a call to arms', *Small Business Economics* **47**(1), 35–51. 7

Adelino, M., Ma, S. & Robinson, D. (2017), 'Firm age, investment opportunities, and job creation', *The Journal of Finance* **72**(3), 999–1038. 26

Adelino, M., Schoar, A. & Severino, F. (2015), 'House prices, collateral, and self-employment', *Journal of Financial Economics* **117**(2), 288–306. 7

Aghion, P., Boustan, L., Hoxby, C. & Vandenbussche, J. (2009), 'The causal impact of education on economic growth: Evidence from u.s.'. 5

Andrews, M. J. (2019), Local effects of land grant colleges on agricultural innovation and output, Working Paper 26235, National Bureau of Economic Research. 5, 6

Azoulay, P., Graff Zivin, J. S., Li, D. & Sampat, B. N. (2018), 'Public R amp;D Investments and Private-sector Patenting: Evidence from NIH Funding Rules', *The Review of Economic Studies* **86**(1), 117–152. 5

Azoulay, P., Jones, B. F., Kim, J. D. & Miranda, J. (2020), 'Age and high-growth entrepreneurship', *American Economic Review Insights* **2**(1), 65–82. 31

Babina, T., He, A. X., Howell, S. T., Perlman, E. & Staudt, J. (2022), 'Cutting the Innovation Engine: How Federal Funding Shocks Affect University Patenting, Entrepreneurship, and Publications', *SSRN* . 4, 5, 32

Balsmeier, B., Fleming, L., Marx, M. & Shin, S. R. (2020), Skilled Human Capital and High-Growth Entrepreneurship: Evidence from Inventor Inflows, NBER Working Papers 27605, National Bureau of Economic Research, Inc. 7

Bartel, A. P. & Lichtenberg, F. (1987), 'The comparative advantage of educated workers in implementing new technology', *The Review of Economics and Statistics* **69**(1), 1–11. 30

Bergeaud, A., Guillouzouic, A., Henry, E. & Malgouyres, C. (2022), 'From public labs to private firms: Magnitude and channels of rd spillovers', *CEPR Discussion Paper No. 1882* . 5

Bergman, P., Chetty, R., DeLuca, S., Hendren, N., Katz, L. F. & Palmer, C. (2019), Creating moves to opportunity: Experimental evidence on barriers to neighborhood choice, Working Paper 26164, National Bureau of Economic Research. 2

Bernstein, S., Colonnelli, E., Malacrino, D. & McQuade, T. (2022), 'Who creates new firms when local opportunities arise?', *Journal of Financial Economics* **143**(1), 107–130. 31

Bertrand, M., Schoar, A. & Thesmar, D. (2007), 'Banking deregulation and industry structure: Evidence from the french banking reforms of 1985', *The Journal of Finance* **62**(2), 597–628. 7

Bilal, A. & Rossi-Hansberg, E. (2021), 'Location as an asset', *Econometrica* **89**(5), 2459–2495. 2

Black, S. E. & Strahan, P. E. (2002), 'Entrepreneurship and bank credit availability', *The Journal of Finance* **57**(6), 2807–2833. 7

Borusyak, K., Jaravel, X. & Spiess, J. (2021), Revisiting Event Study Designs: Robust and Efficient Estimation, Papers 2108.12419. 22

Breau, S., Pawel, B., Mark, F., Neil, L., Margarita, L. F., Clement, M., Filip, N., Moritz, S. & Gregory, V. (2022), Linking national and regional income inequalities, Working paper. 2

Callaway, B. & Sant'Anna, P. H. (2021), 'Difference-in-differences with multiple time periods', *Journal of Econometrics* **225**(2), 200–230. Themed Issue: Treatment Effect 1. 3, 22, 27, 38, 88, 90, 107

Card, D. (1993), Using geographic variation in college proximity to estimate the return to schooling, NBER Working Papers 4483, National Bureau of Economic Research, Inc. 6

Card, D. (2001), 'Estimating the return to schooling: Progress on some persistent econometric problems', *Econometrica* **69**(5), 1127–1160. 6

Carneiro, P., Liu, K. & Salvanes, K. G. (2018), The Supply of Skill and Endogenous Technical Change: Evidence From a College Expansion Reform, Discussion Paper Series in Economics 16/2018, Norwegian School of Economics, Department of Economics. 5

Cetorelli, N. & Strahan, P. E. (2006), 'Finance as a barrier to entry: Bank competition and industry structure in local u.s. markets', *The Journal of Finance* **61**(1), 437–461. 7

Chen, H., Gompers, P., Kovner, A. & Lerner, J. (2010), 'Buy local? the geography of venture capital', *Journal of Urban Economics* **67**(1), 90–102. Special Issue: Cities and Entrepreneurship. 7

Chetty, R. & Hendren, N. (2018*a*), 'The Impacts of Neighborhoods on Intergenerational Mobility I: Childhood Exposure Effects*', *The Quarterly Journal of Economics* **133**(3), 1107–1162. 2

Chetty, R. & Hendren, N. (2018*b*), 'The Impacts of Neighborhoods on Intergenerational Mobility II: County-Level Estimates*', *The Quarterly Journal of Economics* **133**(3), 1163–1228. 2

Chetty, R., Hendren, N. & Katz, L. F. (2016), 'The effects of exposure to better neighborhoods on children: New evidence from the moving to opportunity experiment', *American Economic Review* **106**(4), 855–902. 2

Chinitz, B. (1961), 'Contrasts in agglomeration: New york and pittsburgh', *The American Economic Review* **51**(2), 279–289. 7

Currie, J. & Moretti, E. (2003), 'Mother's Education and the Intergenerational Transmission of Human Capital: Evidence from College Openings', *The Quarterly Journal of Economics* **118**(4), 1495–1532. 24

DATAR (1998), Développement universitaire et développement territorial. l'impact du plan u 2000 : 1990-1995, Technical report. 3, 20, 87

de Chaisemartin, C. & D'Haultfœuille, X. (2020), 'Two-way fixed effects estimators with heterogeneous treatment effects', *American Economic Review* **110**(9), 2964–96. 3, 22, 96, 97, 102

Decker, R., Haltiwanger, J., Jarmin, R. & Miranda, J. (2014), 'The role of entrepreneurship in us job creation and economic dynamism', *Journal of Economic Perspectives* **28**(3), 3–24. 30

Dent, R. C., Karahan, F., Pugsley, B. & Şahin, A. (2016), 'The role of startups in structural transformation', *American Economic Review* **106**(5), 219–23. 4

DEPP & SIEP (2010), Repères et références statistiques, Technical report. 13, 98

DEPP & SIEP (2021), Repères et références statistiques, Technical report. 13

Diamond, R., McQuade, T. & Qian, F. (2019), 'The effects of rent control expansion on tenants, landlords, and inequality: Evidence from san francisco', *American Economic Review* **109**(9), 3365–94. 2

Djankov, S., La Porta, R., Lopez-de Silanes, F. & Shleifer, A. (2002), 'The regulation of entry', *The Quarterly Journal of Economics* **117**(1), 1–37. 7

Doms, M. & Lewis, E. (2006), Labor supply and personal computer adoption, Technical report. 30

Doms, M., Lewis, E. & Robb, A. (2010), 'Local labor force education, new business characteristics, and firm performance', *Journal of Urban Economics* **67**(1), 61–77. 7

Duflo, E. (2001), 'Schooling and labor market consequences of school construction in indonesia: Evidence from an unusual policy experiment', *American Economic Review* **91**(4), 795–813. 24

Fonseca, J. & Matray, A. (2022), The real effects of banking the poor: Evidence from brazil, Working Paper 30057, National Bureau of Economic Research. 7

Givord, P., Rathelot, R. & Sillard, P. (2013), 'Place-based tax exemptions and displacement effects: An evaluation of the zones franches urbaines program', *Regional Science and Urban Economics* **43**(1), 151–163. 6

Glaeser, E. L. & Kerr, W. (2009), 'Local industrial conditions and entrepreneurship: How much of the spatial distribution can we explain?', *Journal of Economics Management Strategy* **18**(3), 623–663. 7, 15

Glaeser, E. L. & Lu, M. (2018), Human-capital externalities in china, Working Paper 24925, National Bureau of Economic Research. 6

Glaeser, E. L., Pekkala Kerr, S. & Kerr, W. (2015), 'Entrepreneurship and urban growth: An empirical assessment with historical mines', *The Review of Economics and Statistics* **97**(2), 498–520. 7

Gompers, P. & Lerner, J. (2001), 'The venture capital revolution', *Journal of Economic Perspectives* **15**(2), 145–168. 7

Goodman-Bacon, A. (2021), 'Difference-in-differences with variation in treatment timing', *Journal of Econometrics* **225**(2), 254–277. Themed Issue: Treatment Effect 1. 22

Haltiwanger, J., Jarmin, R. & Miranda, J. (2013), 'Who creates jobs? small versus large versus young', *The Review of Economics and Statistics* **95**(2), 347–361. 7, 26

Hausman, N. (2021), 'University Innovation and Local Economic Growth', *The Review of Economics and Statistics* pp. 1–46. 4, 5, 32

Hombert, J., Schoar, A., Sraer, D. & Thesmar, D. (2020), 'Can unemployment insurance spur entrepreneurial activity? evidence from france', *The Journal of Finance* **75**(3), 1247–1285. 7

Howard, G., Weinstein, R. & Yuhao, Y. (2022), 'Do regional universities make their local economy more resilient'. 6

Hurst, E. & Pugsley, B. W. (2011), What do small businesses do?, Working Paper 17041, National Bureau of Economic Research. 15

Ji, Y., Teng, S. & Townsend, R. (2021), Dynamic Bank Expansion: Spatial Growth, Financial Access, and Inequality, NBER Working Papers 28582, National Bureau of Economic Research, Inc. 7

Kantor, S. & Whalley, A. (2014), 'Knowledge spillovers from research universities: Evidence from endowment value shocks', *The Review of Economics and Statistics* **96**(1), 171–188. 5

Kennan, J. & Walker, J. R. (2011), 'The effect of expected income on individual migration decisions', *Econometrica* **79**(1), 211–251. 2

Kerr, W. R., Lerner, J. & Schoar, A. (2014), 'The consequences of entrepreneurial finance: Evidence from angel financings', *The Review of Financial Studies* **27**(1), 20–55. 7

Klapper, L., Laeven, L. & Rajan, R. (2006), 'Entry regulation as a barrier to entrepreneurship', *Journal of Financial Economics* **82**(3), 591–629. 7

Kline, P. & Moretti, E. (2013), ' Local Economic Development, Agglomeration Economies, and the Big Push: 100 Years of Evidence from the Tennessee Valley Authority *', *The Quarterly Journal of Economics* **129**(1), 275–331. 2, 6

Kramarz, F., Nimier-David, E. & Delemotte, T. (2022), Inequality and Earnings Dynamics in France: National Policies and Local Consequences, Working Papers 2021-18, Center for Research in Economics and Statistics. 2

Landier, A. & Thesmar, D. (2009), 'Financial Contracting with Optimistic Entrepreneurs', *The Review of Financial Studies* **22**(1), 117–150. 16

Lazear, E. P. (2004), 'Balanced skills and entrepreneurship', *American Economic Review* **94**(2), 208–211. 31

Lerner, J. & Nanda, R. (2020), 'Venture capital's role in financing innovation: What we know and how much we still need to learn', *Journal of Economic Perspectives* **34**(3), 237–61. 7

Levinsohn, J. & Petrin, A. (2003), 'Estimating production functions using inputs to control for unobservables', *Review of Economic Studies* **70**(2), 317–341. 96, 97

Lin, J. (2011), 'Technological Adaptation, Cities, and New Work', *The Review of Economics and Statistics* **93**(2), 554–574. 30

Liu, S. (2015), 'Spillovers from universities: Evidence from the land-grant program', *Journal of Urban Economics* **87**, 25 – 41. 5, 6

Michelacci, C. & Silva, O. (2007), 'Why so many local entrepreneurs?', *The Review of Economics and Statistics* **89**(4), 615–633. 7

Moretti, E. (2004*a*), Chapter 51 - human capital externalities in cities, *in* J. V. Henderson & J.-F. Thisse, eds, 'Cities and Geography', Vol. 4 of *Handbook of Regional and Urban Economics*, Elsevier, pp. 2243–2291. 5, 6

Moretti, E. (2004*b*), 'Estimating the social return to higher education: evidence from longitudinal and repeated cross-sectional data', *Journal of Econometrics* **121**(1), 175–212. Higher education (Annals issue). 5

Moretti, E. (2004*c*), 'Workers' education, spillovers, and productivity: Evidence from plant-level production functions', *American Economic Review* **94**(3), 656–690. 5

Mountjoy, J. (2022), 'Community colleges and upward mobility', *American Economic Review* **112**(8), 2580–2630. 6

Neumark, D. & Simpson, H. (2015), Place-based policies, Vol. 5, Elsevier, chapter Chapter 18, pp. 1197–1287. 2

Ouimet, P. & Zarutskie, R. (2014), 'Who works for startups? the relation between firm age, employee age, and growth', *Journal of Financial Economics* **112**(3), 386–407. 34

Praag, M., van der Sluis, J. & Vijverberg, W. (2008), 'Education and entrepreneurship selection and performance: A review of the empirical literature', *Journal of Economic Surveys* **22**, 795–841. 31

Samila, S. & Sorenson, O. (2011), 'Venture capital, entrepreneurship, and economic growth', *The Review of Economics and Statistics* **93**(1), 338–349. 7

Schmalz, M. C., Sraer, D. A. & Thesmar, D. (2017), 'Housing collateral and entrepreneurship', *The Journal of Finance* **72**(1), 99–132. 7

Schmutz, B. & Sidibé, M. (2018), 'Frictional Labour Mobility', *The Review of Economic Studies* **86**(4), 1779–1826. 2

Schoar, A. (2010), 'The divide between subsistence and transformational entrepreneurship', *Innovation Policy and the Economy* **10**(1), 57–81. 15, 27

Skinner, J. & Staiger, D. (2005), Technology adoption from hybrid corn to beta blockers, NBER Working Papers 11251, National Bureau of Economic Research, Inc. 30

Stern, S., Porter, M. E. & Furman, J. L. (2000), The determinants of national innovative capacity, Working Paper 7876, National Bureau of Economic Research. 5

Sun, L. & Abraham, S. (2021), 'Estimating dynamic treatment effects in event studies with heterogeneous treatment effects', *Journal of Econometrics* **225**(2), 175–199. Themed Issue: Treatment Effect 1. 22

Tartari, V. & Stern, S. (2021), More than an ivory tower: The impact of research institutions on the quantity and quality of entrepreneurship, Working Paper 28846, National Bureau of Economic Research. 4

Toivanen, O. & Väänänen, L. (2016), 'Education and invention', *The Review of Economics and Statistics* **98**(2), 382–396. 5

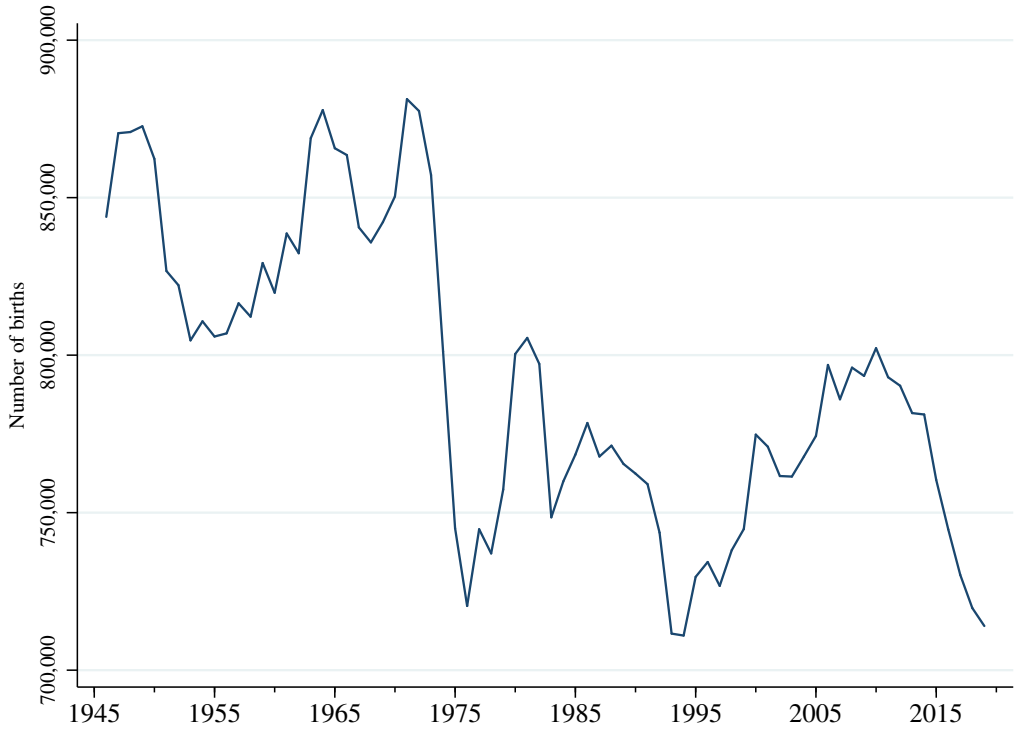
Uhlbach, W.-H., Tartari, V. & Kongsted, H. C. (2022), 'Beyond scientific excellence: International mobility and the entrepreneurial activities of academic scientists', *Research Policy* **51**(1), 104401. 7

Valero, A. & Van Reenen, J. (2019), 'The economic impact of universities: Evidence from across the globe', *Economics of Education Review* **68**, 53 – 67. 5

Walsh, C. (2020), 'Firm creation and local growth', *Working Paper* . 7, 26

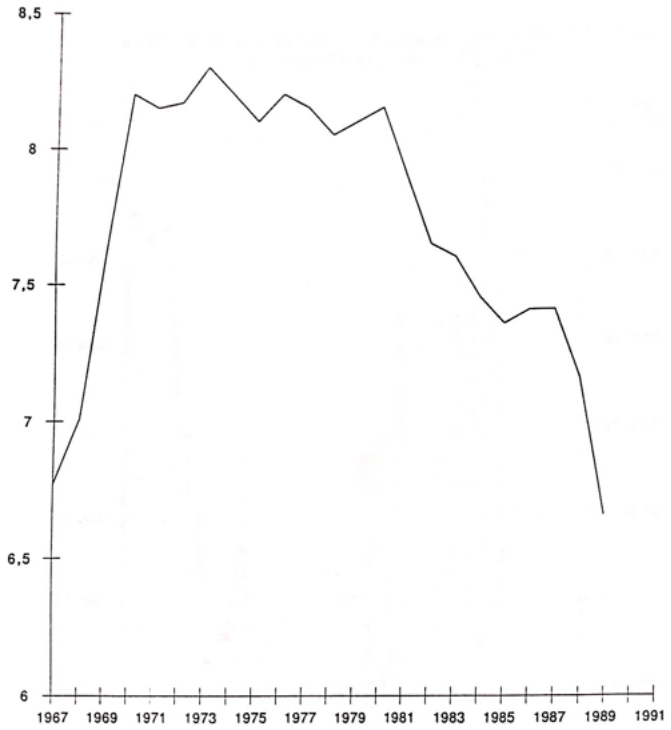
Zucker, L., Darby, M. & Brewer, M. B. (1998), 'Intellectual human capital and the birth of u.s. biotechnology enterprises', *American Economic Review* **88**(1), 290–306. 7

FIGURES



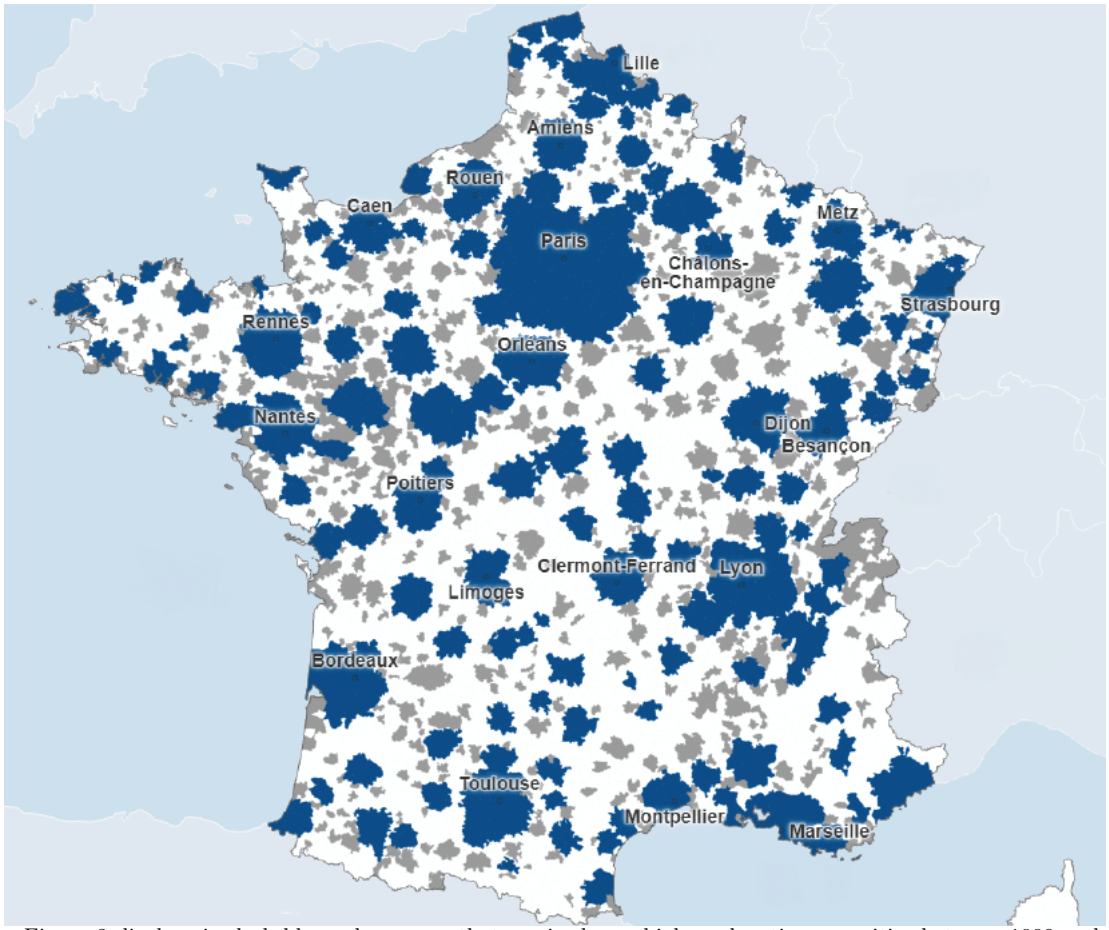
Notes: Figure 1 plots for each year the number of births in France between 1945 and 2020. Data: INSEE. Go back to main text

Figure 1: Evolution of the number of births in France



Notes: Figure 2 displays for each year the total surface area (in m^2) of all public higher education establishments in France divided by the number of enrolled students over the period 1967-1989. Data: figure reproduced from the national archives, Ministry of Education. Go back to main text

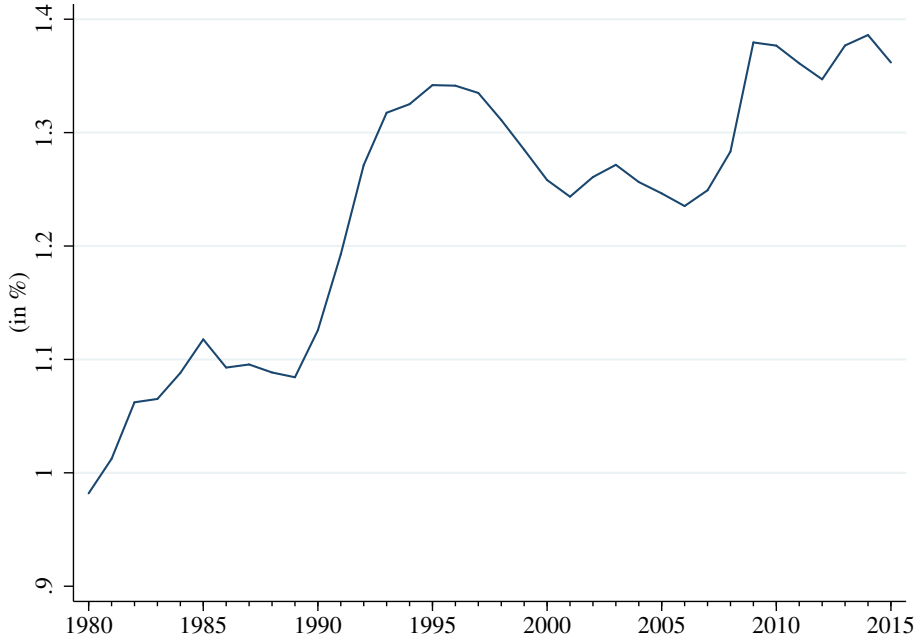
Figure 2: Higher education capacities per student



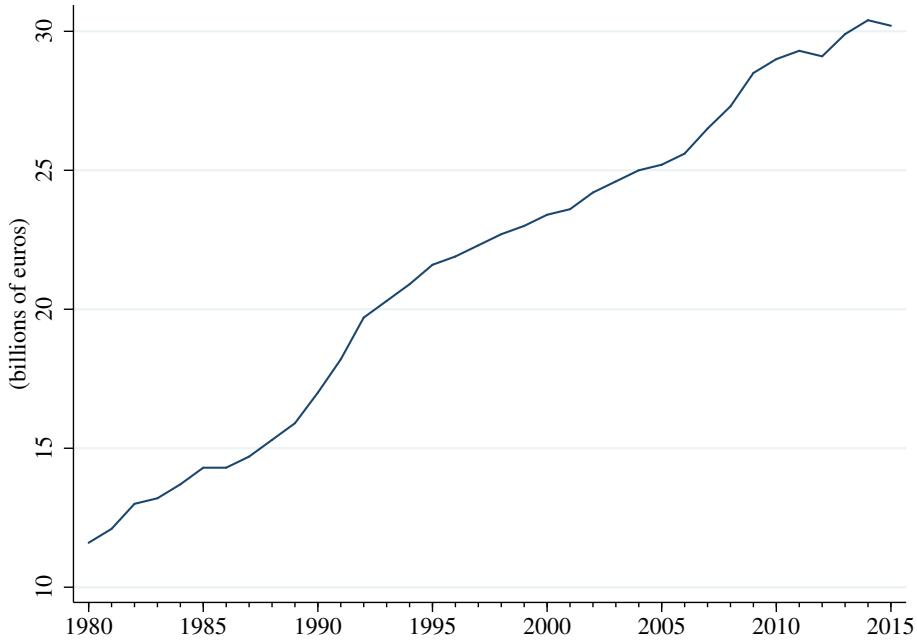
Notes: Figure 3 displays in dark blue urban areas that received new higher education capacities between 1990 and 2003. Territories in grey correspond to untreated urban areas. Territories in white correspond to municipalities located outside of urban areas. Data: Registry of higher education establishments (SISE). Go back to main text

Figure 3: Urban areas receiving new capacities (1990-2003)

(a) Spending as a share of GDP

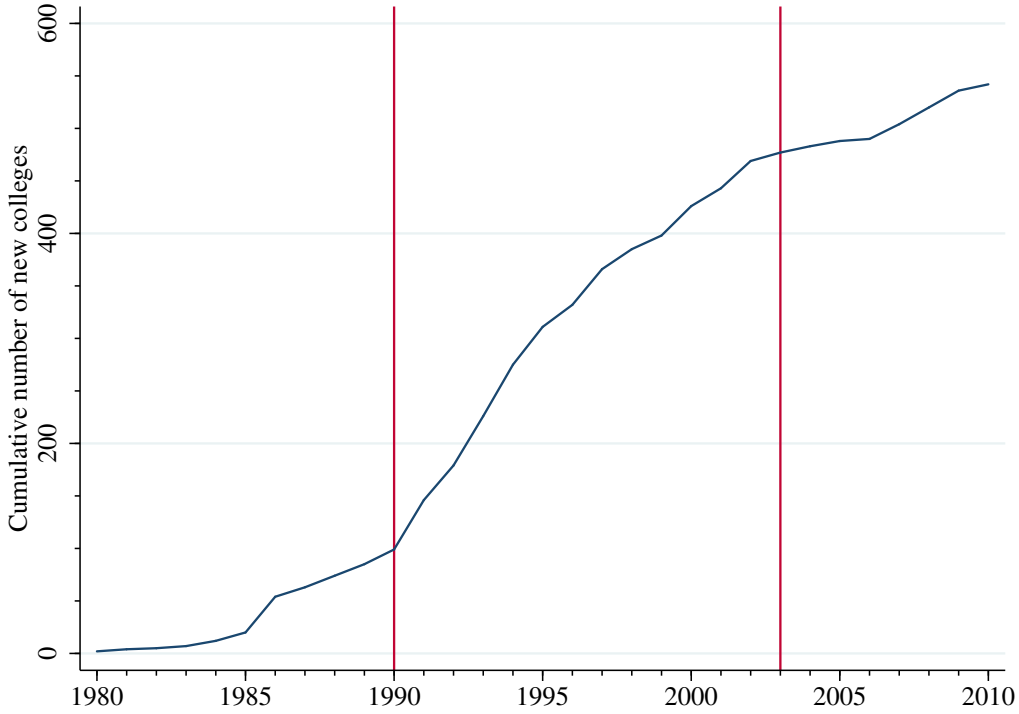


(b) Spending in billions



Notes: Figure 4 plots the evolution of the budget for higher education (a) as a share of GDP and (b) in billions of euros. Spendings are expressed in 2017 euros. Data: Ministry of Higher Education. Go back to main text

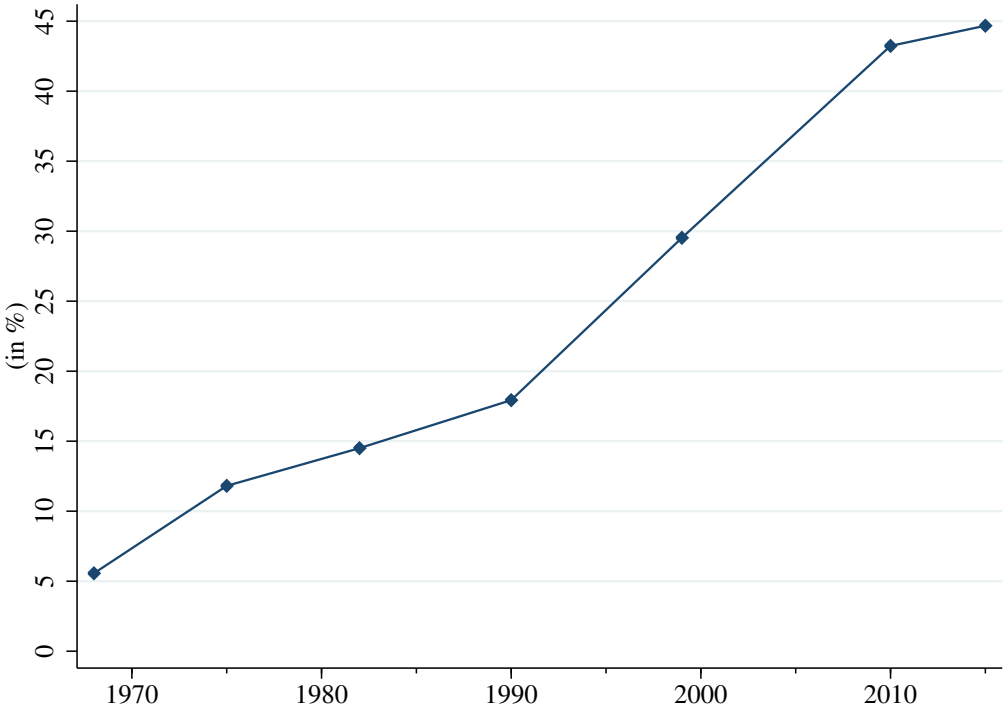
Figure 4: Budget of Higher Education



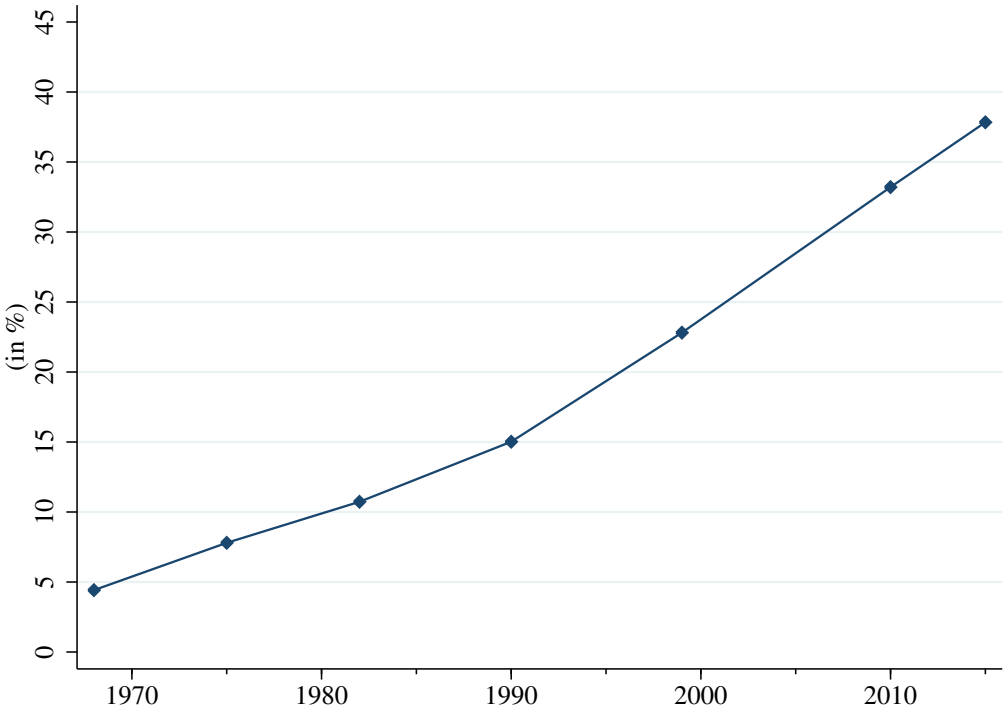
Notes: Figure 5 plots the cumulative number of new higher education establishments (excluding new departments) constructed between 1980 and 2010. The number of new establishments is normalized to 0 in 1980. The red lines correspond respectively to the beginning and to the end of the period of analysis. Data: Registry of higher education establishments (SISE). Go back to main text

Figure 5: Cumulative number of new colleges

(a) Share of college graduates (25-34 years old)

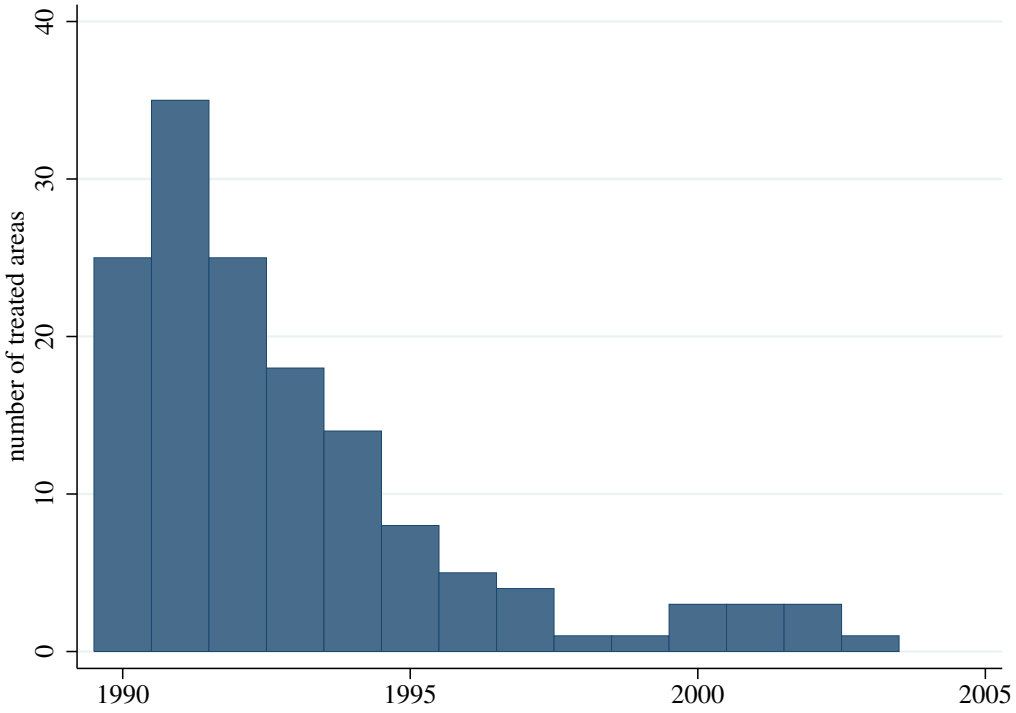


(b) Share of college graduates (25-55 years old)



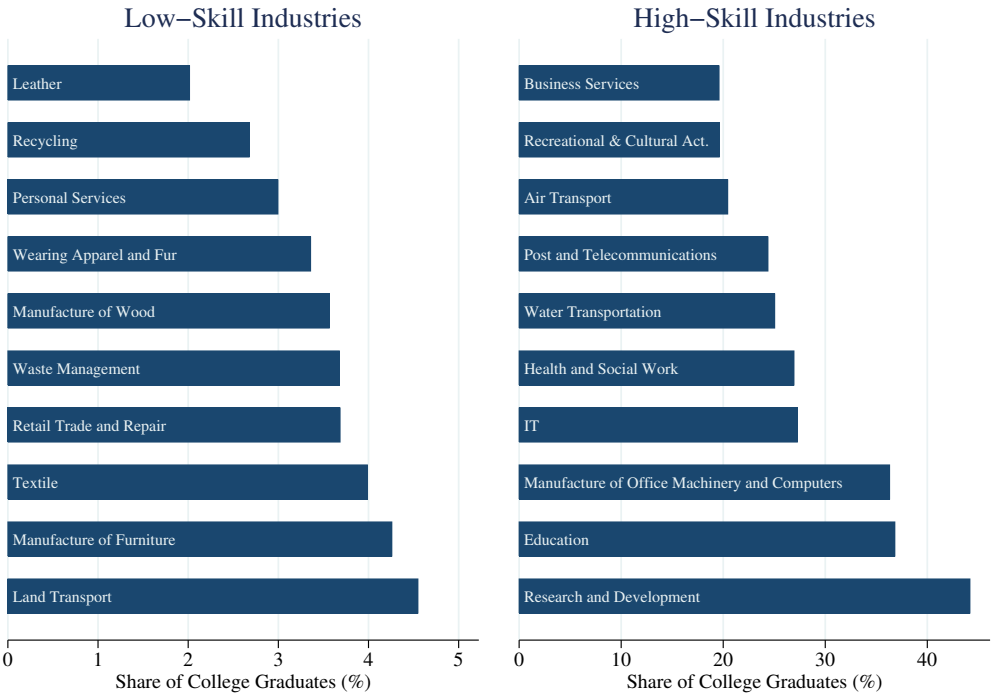
Notes: Figure 6 plots the share of the population with a university diploma for (a) people aged 25-34 years old and (b) people aged 25-55 years old. Data: Census (1968-2015). Go back to main text

Figure 6: Share of the population with a university diploma



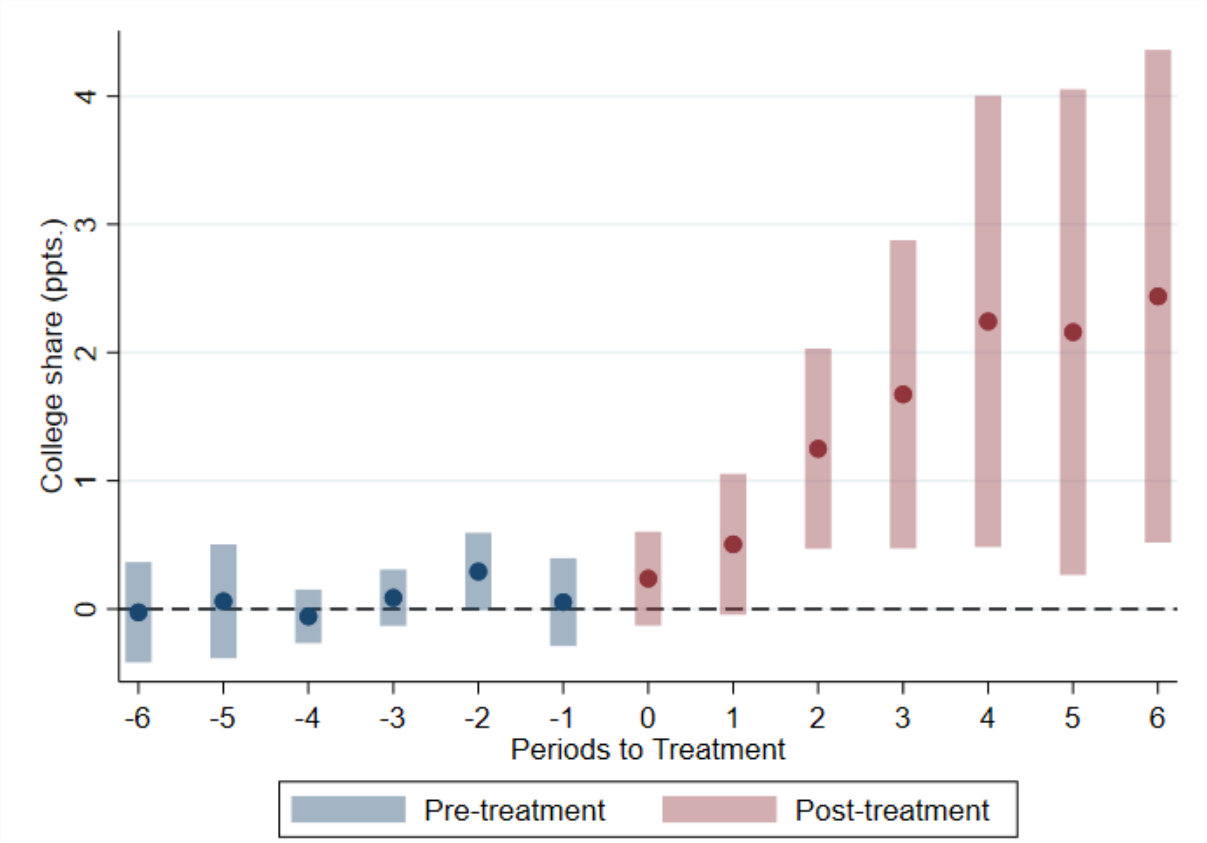
Notes: Figure 7 plots for each year the number of urban areas receiving higher education capacities for the first time during the policy. Data: registry of higher education establishments (SISE). Go back to main text

Figure 7: Number of treated areas per year



Notes: Figure 8 provides a list of the 10 most and least skilled 2-digit industries based on the share of workers with a university diploma. The share of high-skill workers is computed over the period 1985-1989, before the beginning of the policy. Data: employer-employee data merged with census data (Panel DADS and EDP). Go back to main text

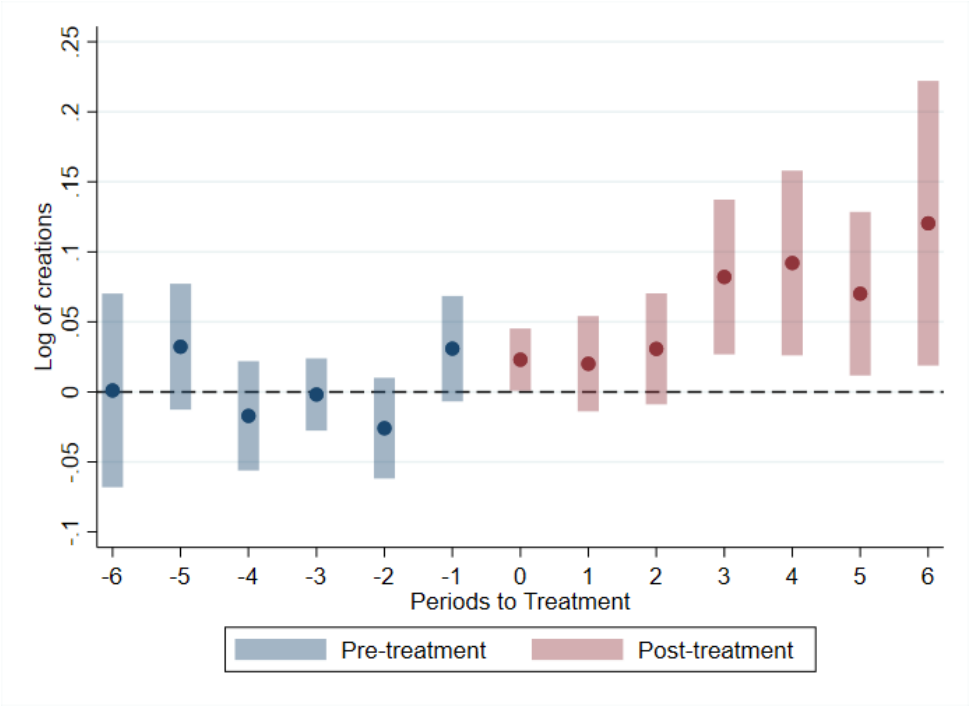
Figure 8: High and low-skill industries



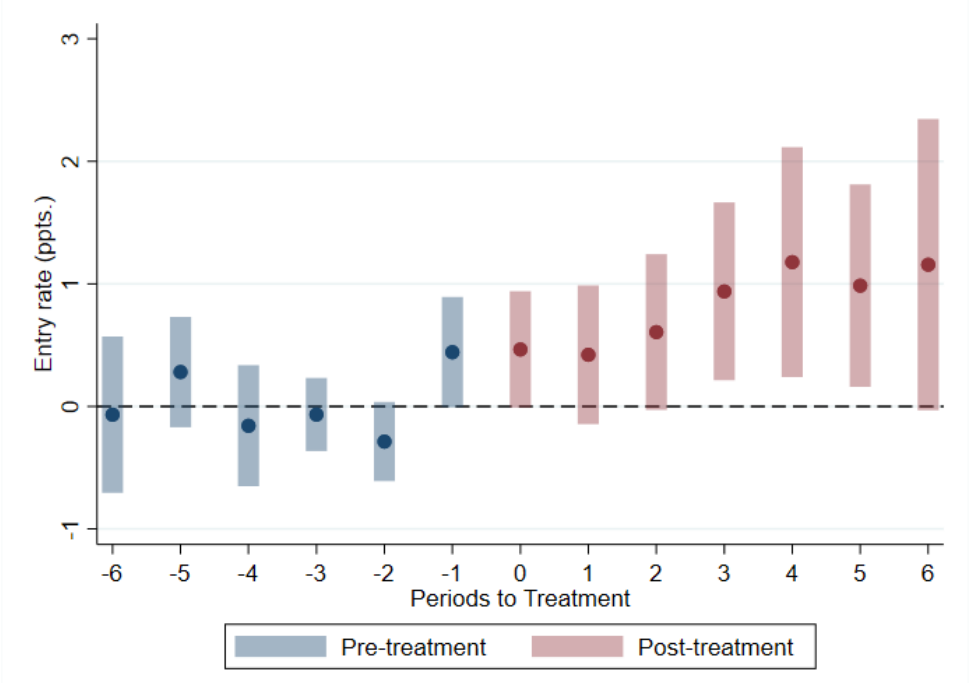
Notes: Figure 9 plots the results of an event study on the share of the workforce with a university diploma. The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. All estimates are weighted using the size of the workforce in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: employer-employee data merged with census data (Panel DADS and EDP). Go back to main text

Figure 9: Share of the workforce with a college diploma

(a) New Businesses (log)



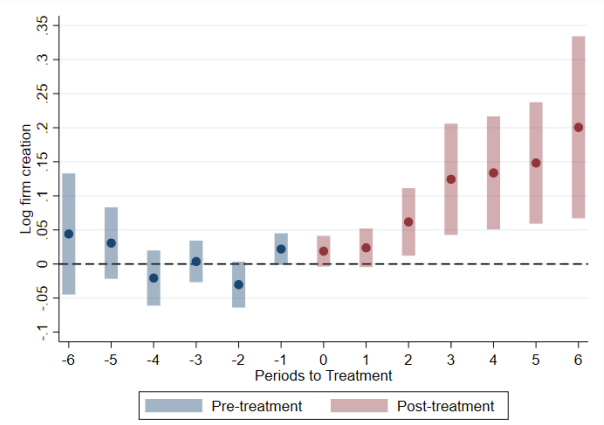
(b) Entry Rate of New Businesses (%)



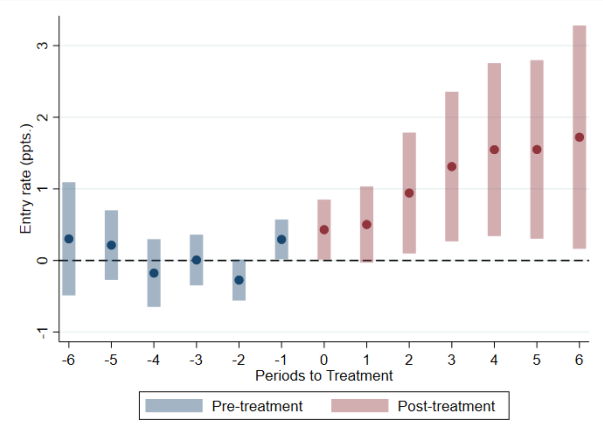
Notes: Figure 10 plots the results of an event study on the creation of new businesses, including both new firms and new establishments opened by existing firms. The outcome variables are: (a) the log of the number of new businesses and (b) the entry rate of new businesses (i.e. the number of new establishments and firms divided by the existing number of establishments and firms). The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. All estimates are weighted using the number of firms in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: administrative registry of firms (sirene registry). Go back to main text

Figure 10: Business formation

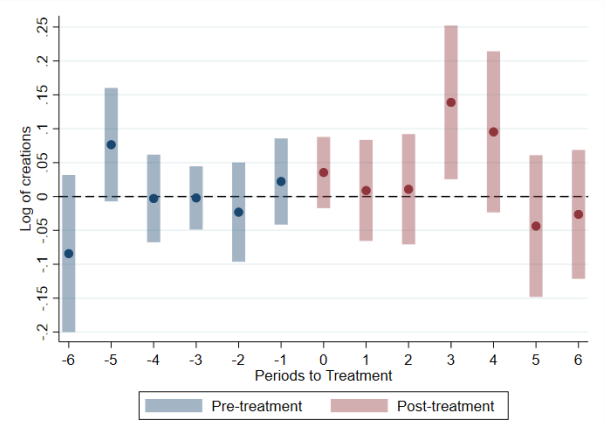
(a) Firm Creation (log)



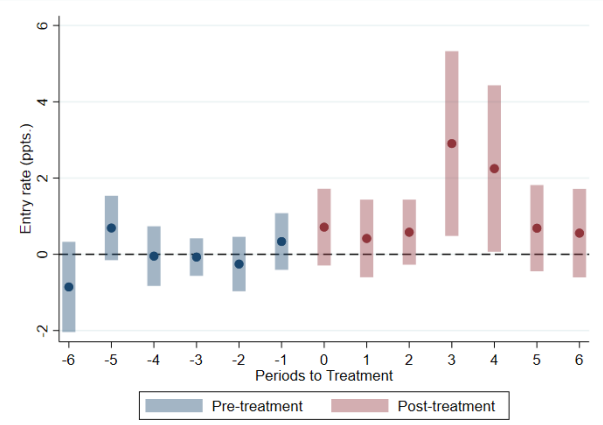
(b) Entry Rate of Firms (%)



(c) Openings of Establishments (log)



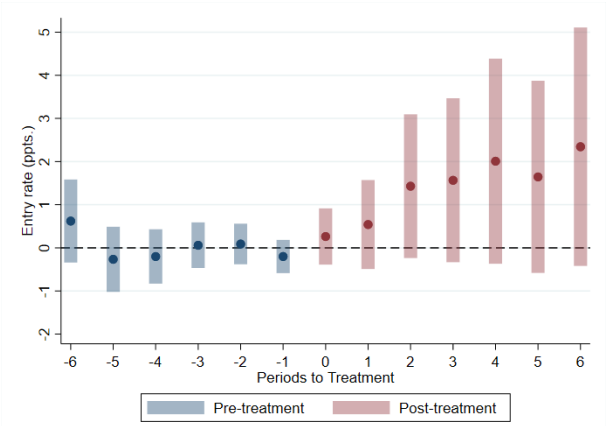
(d) Entry Rate of Establishments (%)



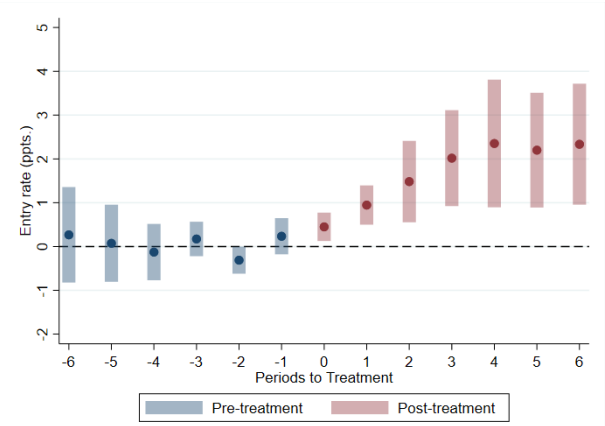
Notes: Figure 11 plots the results of an event study on the creation of new firms and new establishments separately. The outcome variables are: (a) the log of the number of new firms, (b) the entry rate of firms (i.e. the number of new firms divided by the existing number of firms), (c) the log of the number of establishments created by existing firms, and (d) the entry rate of new establishments. The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. All estimates are weighted using the number of firms in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: administrative registry of firms (sirene registry). Go back to main text

Figure 11: Creation of new firms and establishments

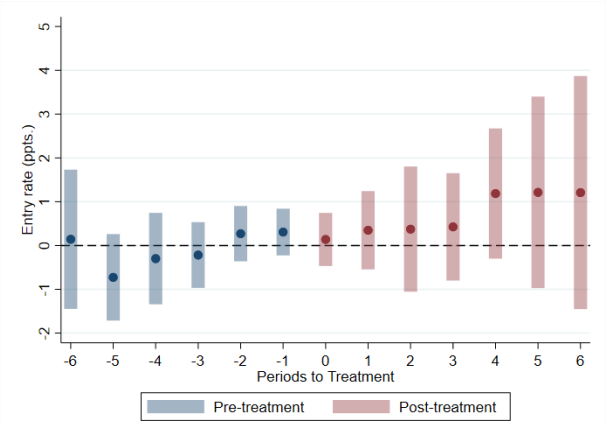
(a) Manufacturing (%)



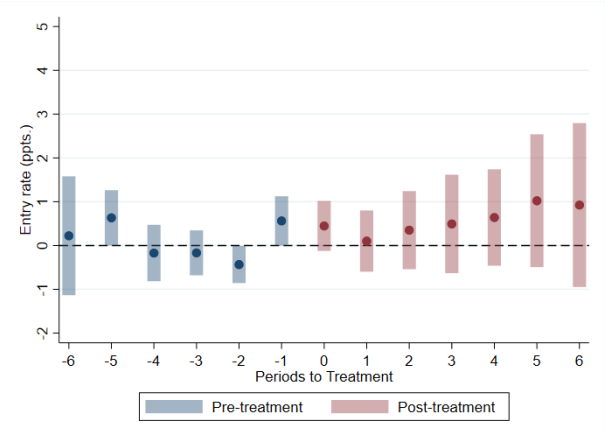
(b) Retail (%)



(c) Construction (%)



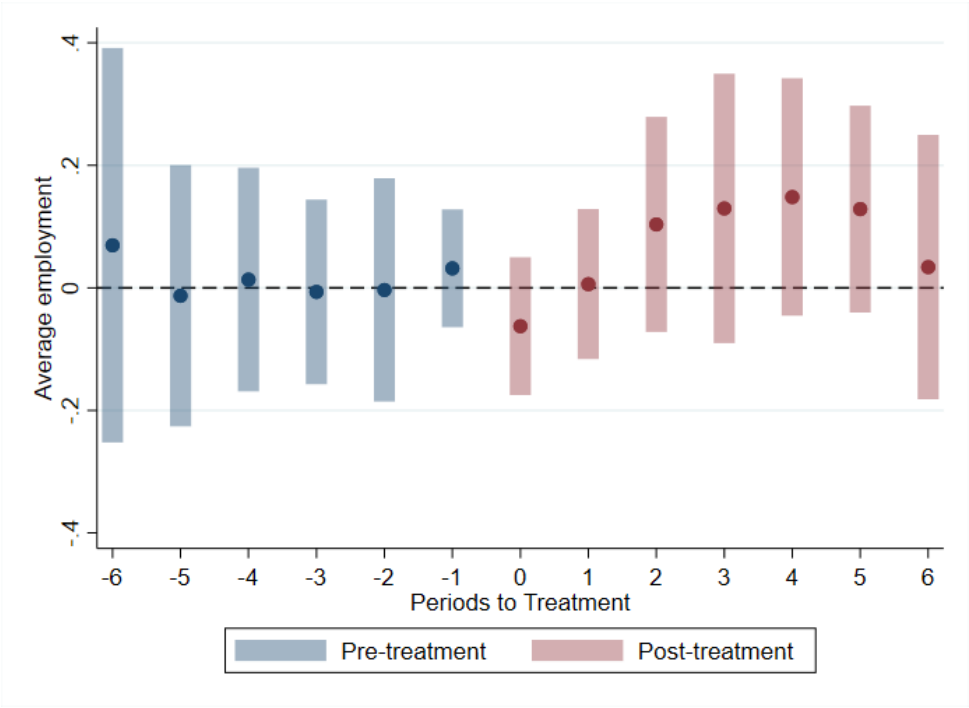
(d) Services (%)



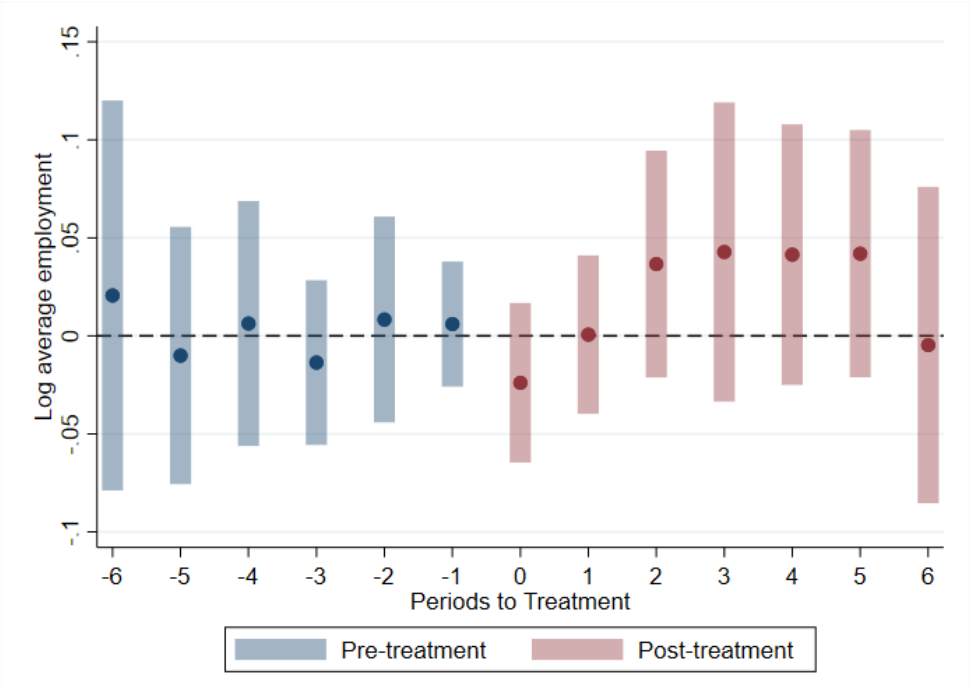
Notes: Figure 12 plots the results of an event study on the entry rate of new firms by industry. The outcome variables are the entry rates in: (a) the manufacturing industry, (b) the retail, (c) the construction, (d) the services. The service industry includes transportation, hotels and restaurants, business services, and household services. The event time is defined relative to the first year of treatment (i.e. the construction of the first new capacities). Each observation is a urban area x year. All estimates are weighted using the number of firms in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: administrative registry of firms (sirene registry). Go back to main text

Figure 12: Impact of the policy on the entry of firms by industry

(a) Average Employment



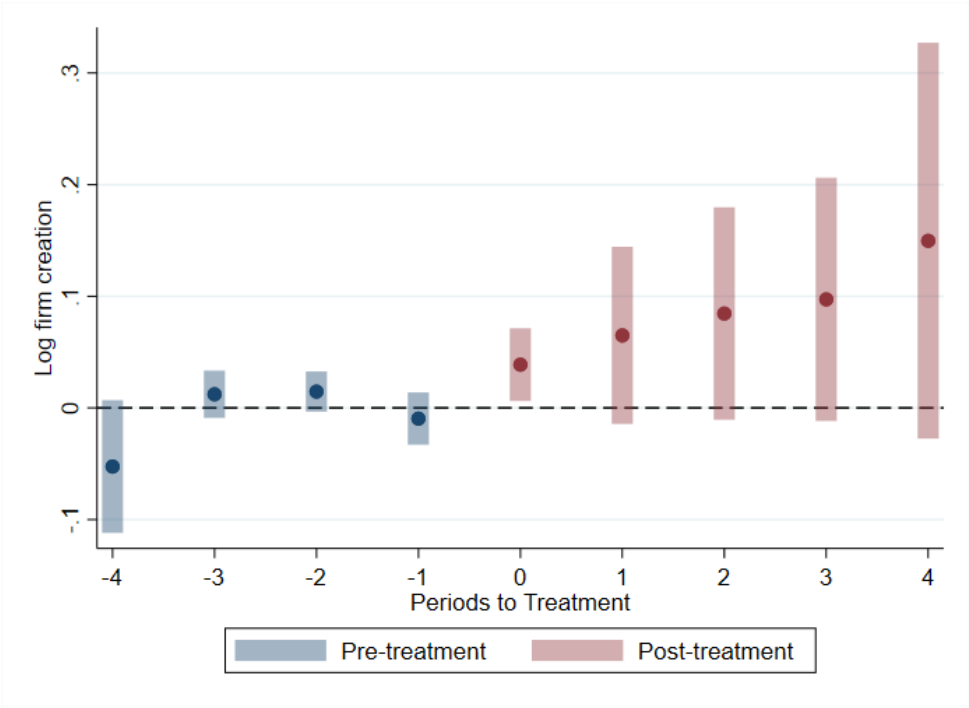
(b) Average Employment (log)



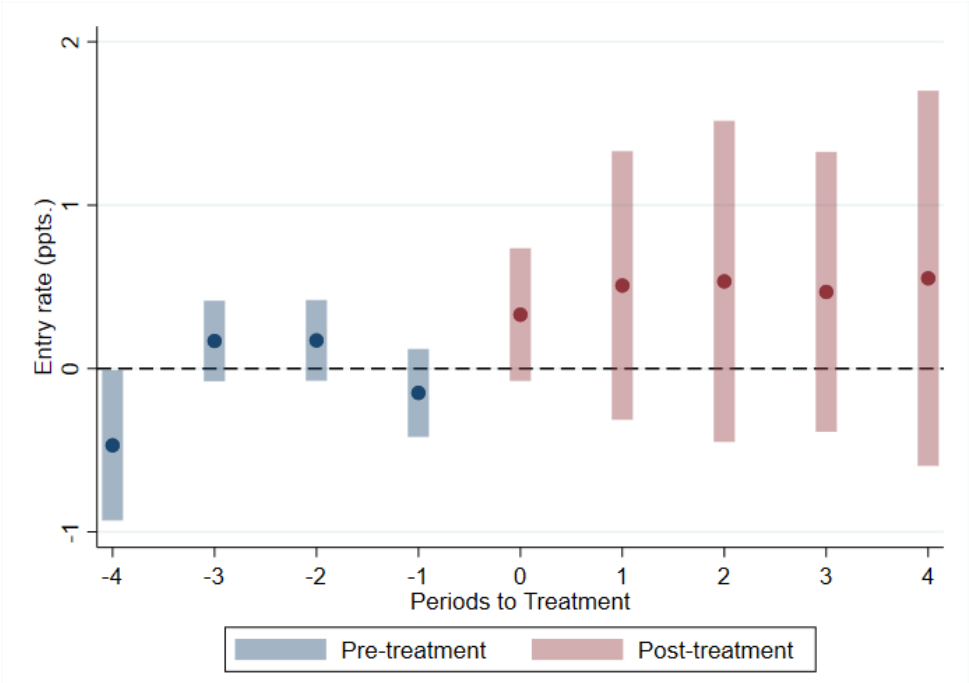
Notes: Figure 13 plots the results of an event study on the average size of new firms. The outcome variables are: (a) the average number of employees and (b) the log of the average number of employees in newly created firms. The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. All estimates are weighted using the number of firms in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: administrative registry of firms (sirene registry). Go back to main text

Figure 13: Impact of the policy on the initial size of new firms

(a) Firm Creation (log)

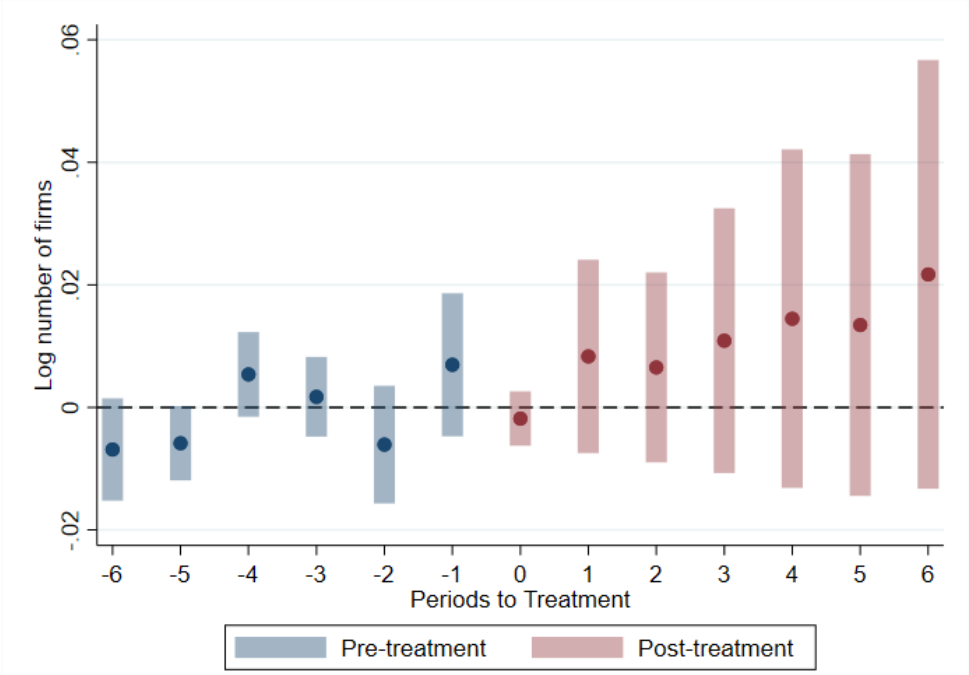


(b) Entry Rate (in %)



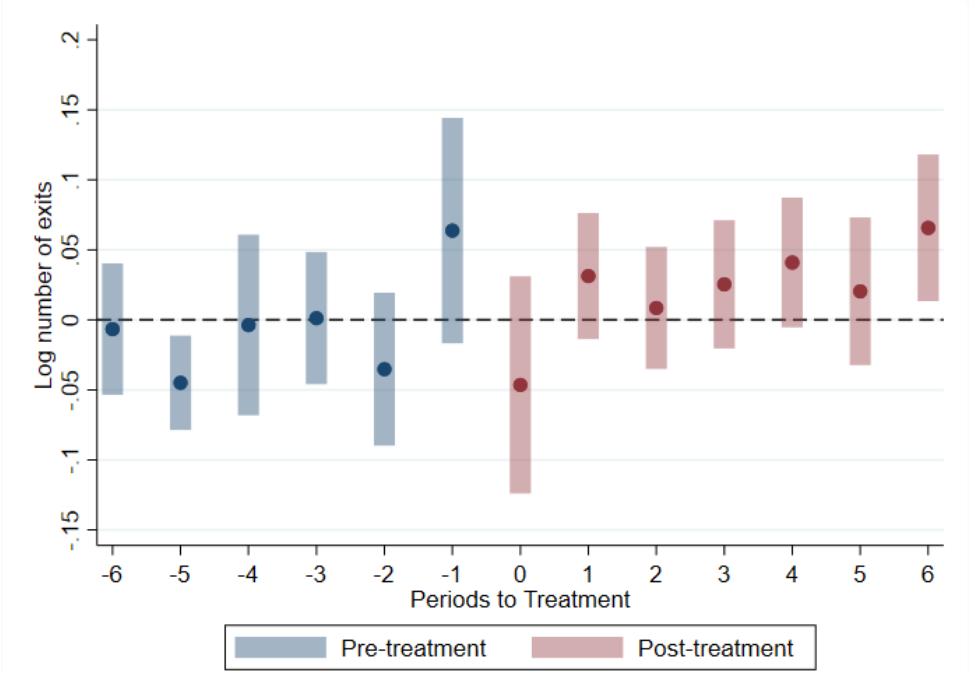
Notes: Figure 14 plots the results of an event study on the creation of firms. The outcome variables are: (a) the log of the number of new firms and (b) the entry rate of firms (i.e. the number of new firms divided by the existing number of firms). The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a province. All estimates are weighted using the number of firms in the province in 1990. Standard errors are clustered at the province level. The bars correspond to the 95% confidence intervals. Data: administrative registry of firms (sirene registry). Go back to main text

Figure 14: Firm creation at the province level



Notes: Figure 15 plots the results of an event study on the log of the total number of active firms. The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. All estimates are weighted using the size of the workforce in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: administrative registry of firms (sirene registry). Go back to main text

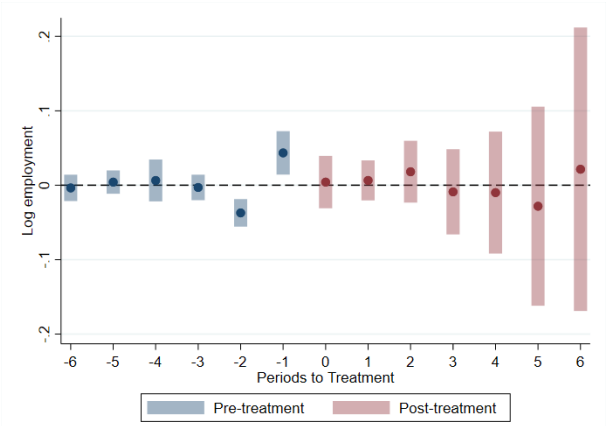
Figure 15: Total stock of firms (log)



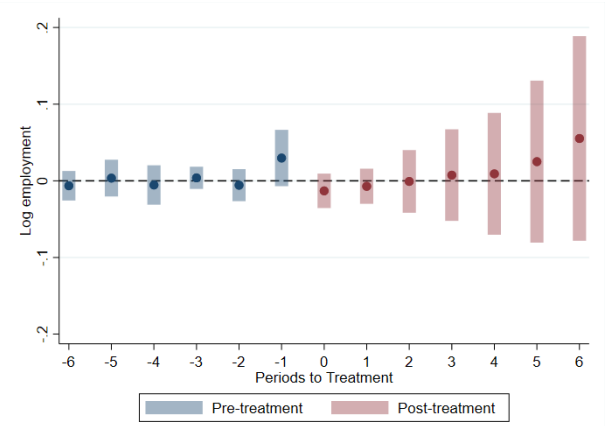
Notes: Figure 16 plots the results of an event study on the log of the number of firms exiting the market. The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. All estimates are weighted using the size of the workforce in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: administrative registry of firms (sirene registry). Go back to main text

Figure 16: Exit of firms (log)

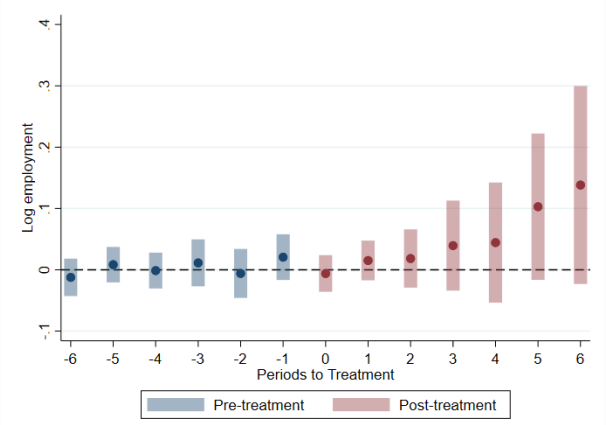
(a) Blue-collars (log)



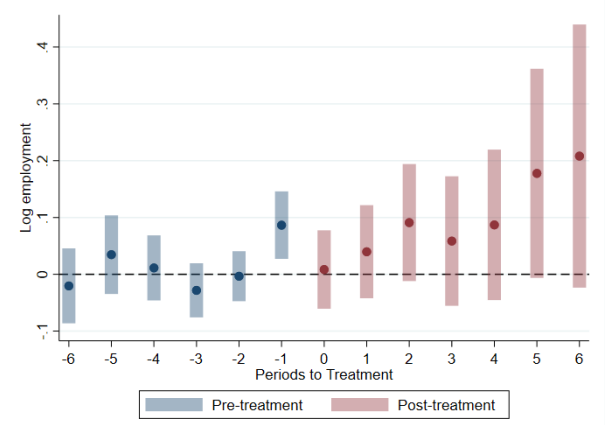
(b) Clerks (log)



(c) Intermediate white-collars (log)



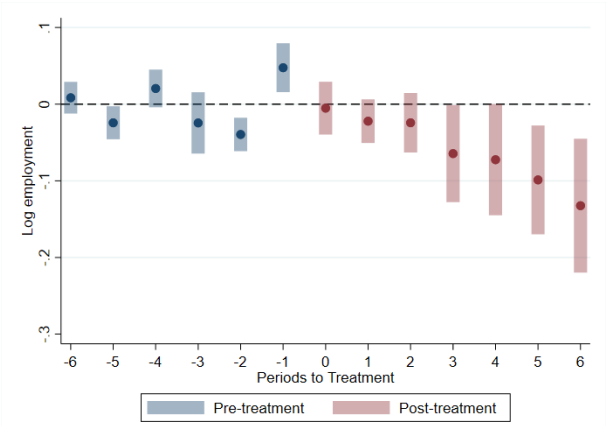
(d) Skilled white-collars (log)



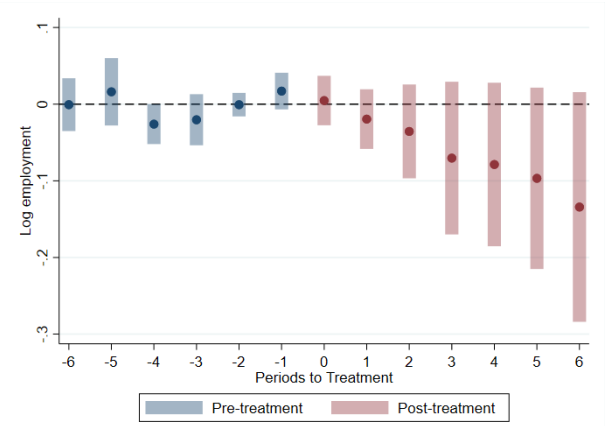
Notes: Figure 17 plots the results of an event study analysis on the log of employment by occupation for workers aged less than 35 years-old. Occupations include: (a) blue-collars (b) clerks, (c) intermediate white-collar (e.g. supervisors and technicians), (d) skilled white-collars (e.g. managers and engineers). The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. All estimates are weighted using the population in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: linked employer-employee data (Panel DADS). Go back to main text

Figure 17: Employment by occupation (young workers)

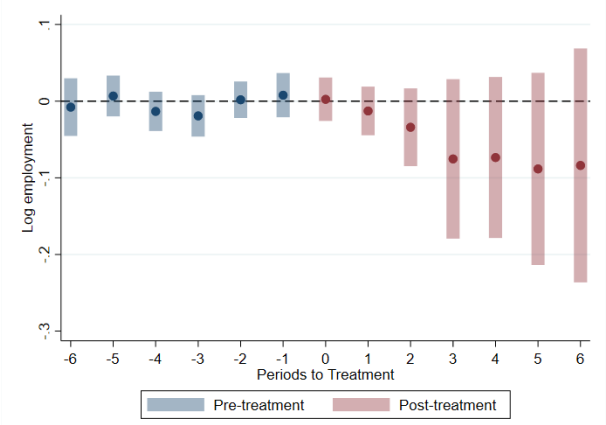
(a) Blue-collars (log)



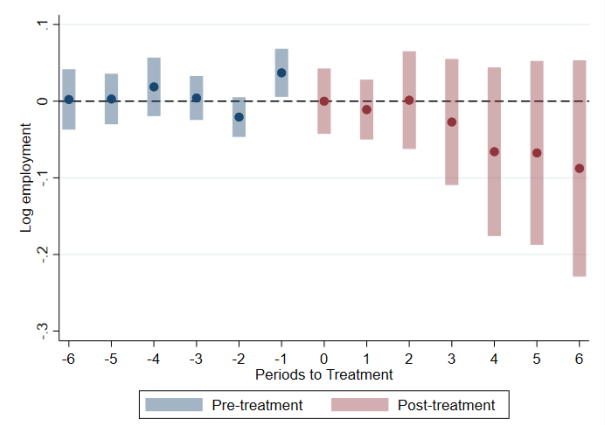
(b) Clerks (log)



(c) Intermediate white-collars (log)

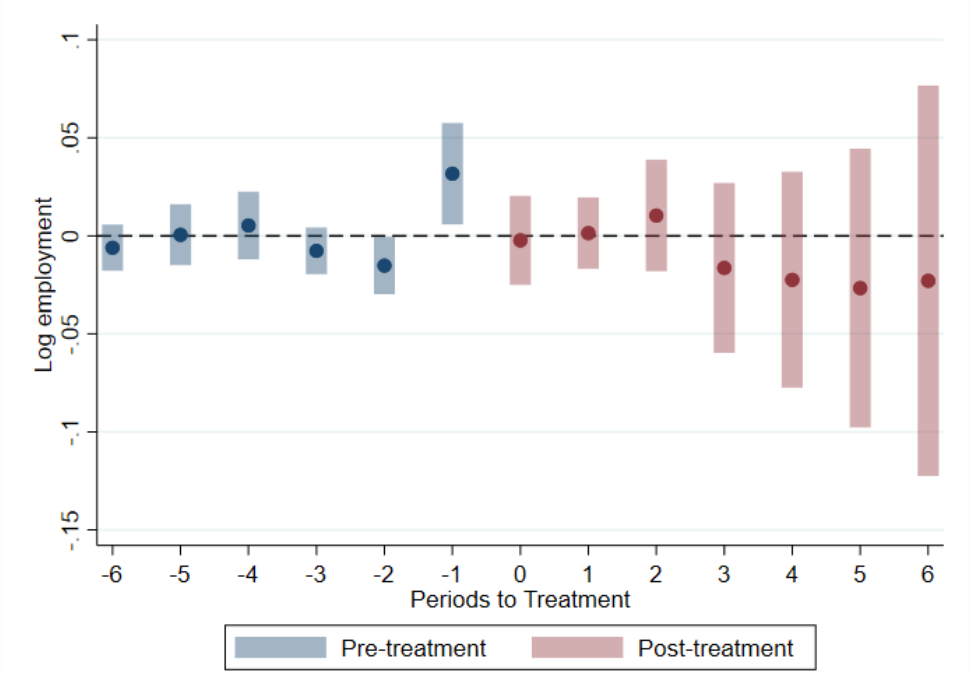


(d) Skilled white-collars (log)



Notes: Figure 18 plots the results of an event study analysis on the log of employment by occupation for workers older than 35 years-old. Occupations include: (a) blue-collars (b) clerks, (c) intermediate white-collar (e.g. supervisors and technicians), (d) skilled white-collars (e.g. managers and engineers). The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. All estimates are weighted using the population in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: linked employer-employee data (Panel DADS). Go back to main text

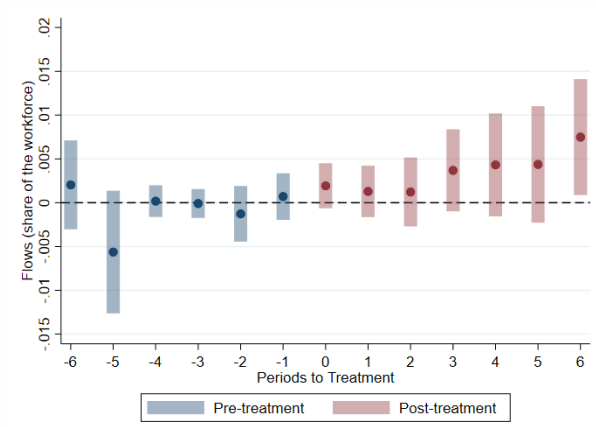
Figure 18: Employment by occupation (older workers)



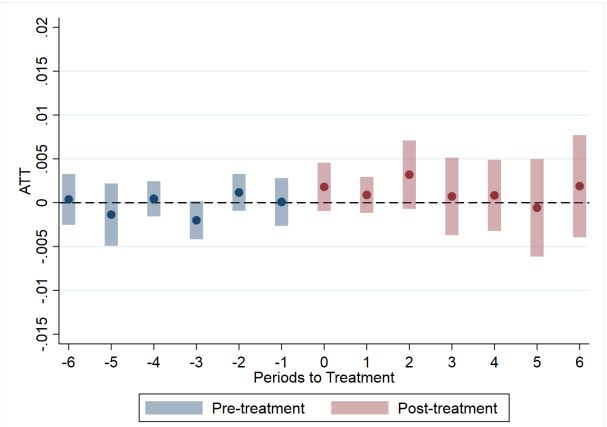
Notes: Figure 19 plots the results of an event study analysis on the log of employment for all workers. The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. All estimates are weighted using the population in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: linked employer-employee data (Panel DADS). Go back to main text

Figure 19: Employment (log)

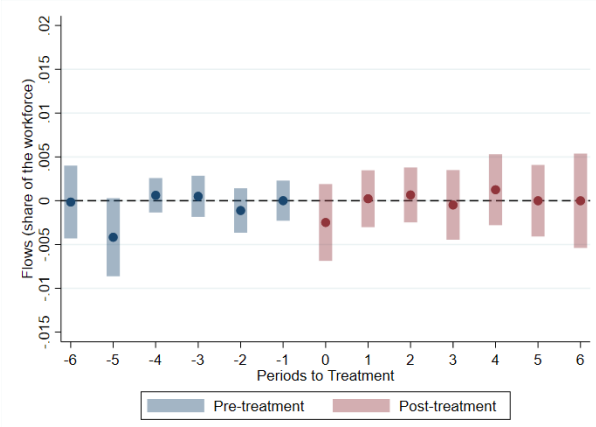
(a) Inflow of young workers



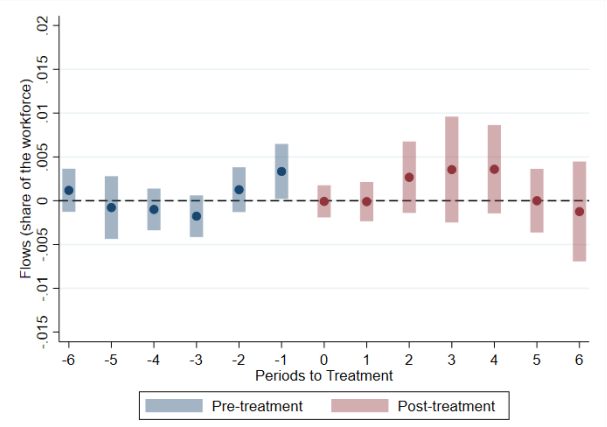
(b) Outflow of young workers



(c) Inflow of older workers



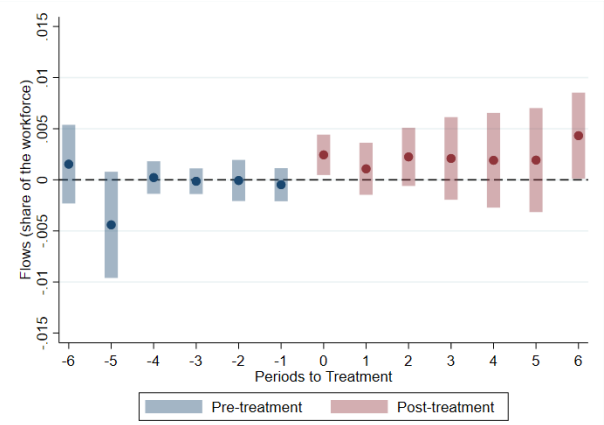
(d) Outflow of older workers



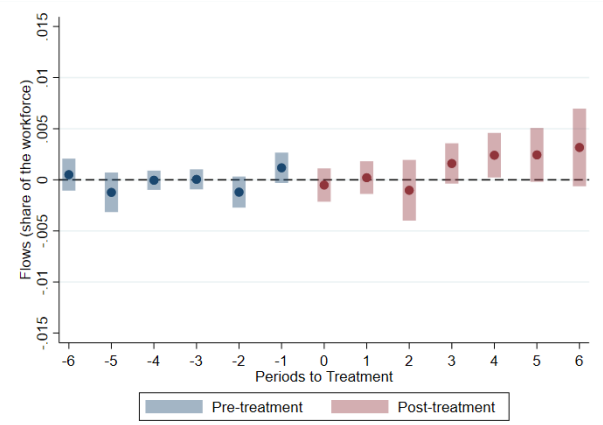
Notes: Figure 20 plots the results of an event study analysis on the mobility patterns of young and older workers. The inflow of workers is defined as the share of the workforce that is currently working in the area but was working in another area in the previous period. The outflow of workers corresponds to the share of the workforce that is currently working in the area but is going to work in another area in the next period. The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. All estimates are weighted using employment in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: linked employer-employee data (Panel DADS). Go back to main text

Figure 20: Migration patterns by age

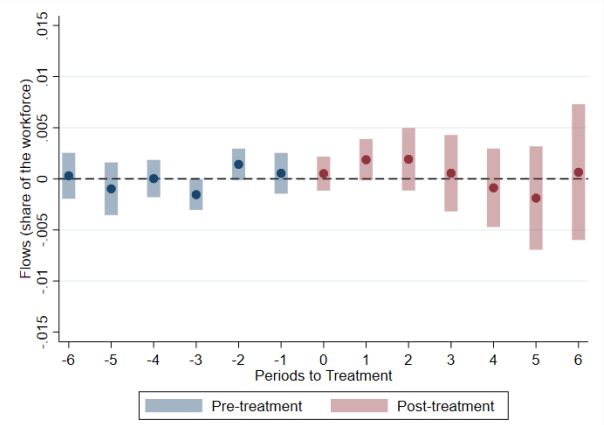
(a) Inflow of low-skill workers



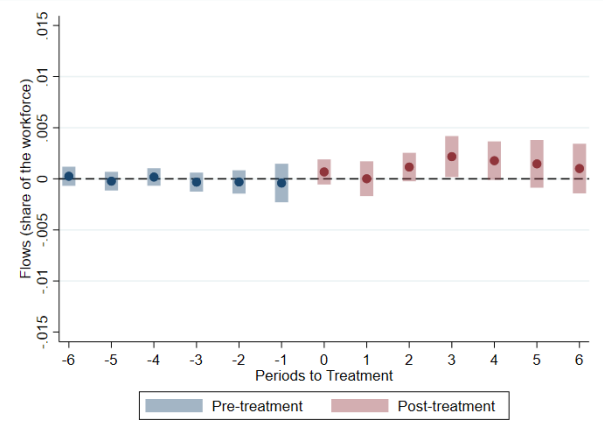
(b) Inflow of high-skill workers



(c) Outflow of low-skill workers



(d) Outflow of high-skill workers

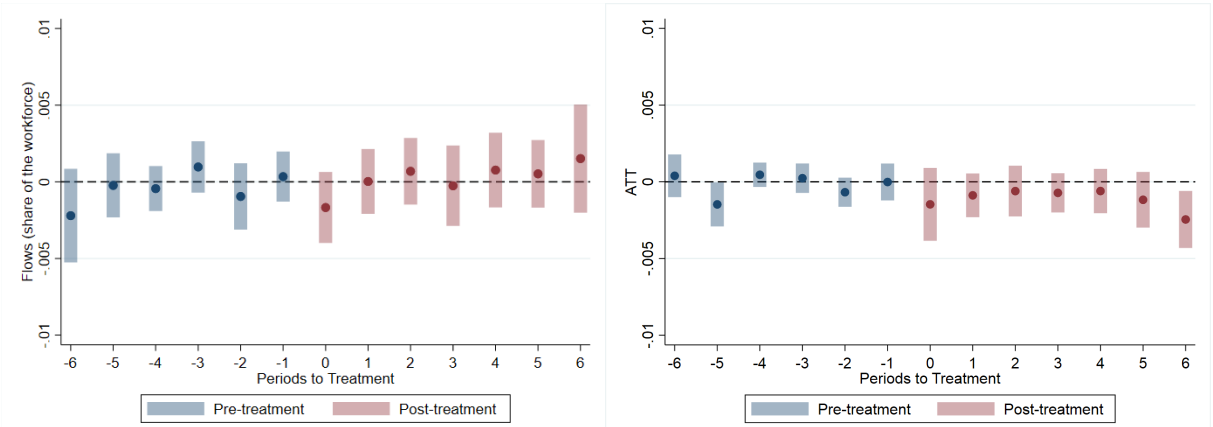


Notes: Figure 21 plots the results of an event study analysis on the mobility patterns of workers aged between 18 and 34 years old by skill group. The inflow of workers is defined as the share of the workforce that is currently working in the area but was working in another area in the previous period. The outflow of workers corresponds to the share of the workforce that is currently working in the area but is going to work in another area in the next period. Low-skill workers include employees with either blue-collar or clerk occupations. High-skill workers include employees with either intermediate or skilled white collar occupations. The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. All estimates are weighted using employment in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: linked employer-employee data (Panel DADS). Go back to main text

Figure 21: Migration patterns by skill (young workers)

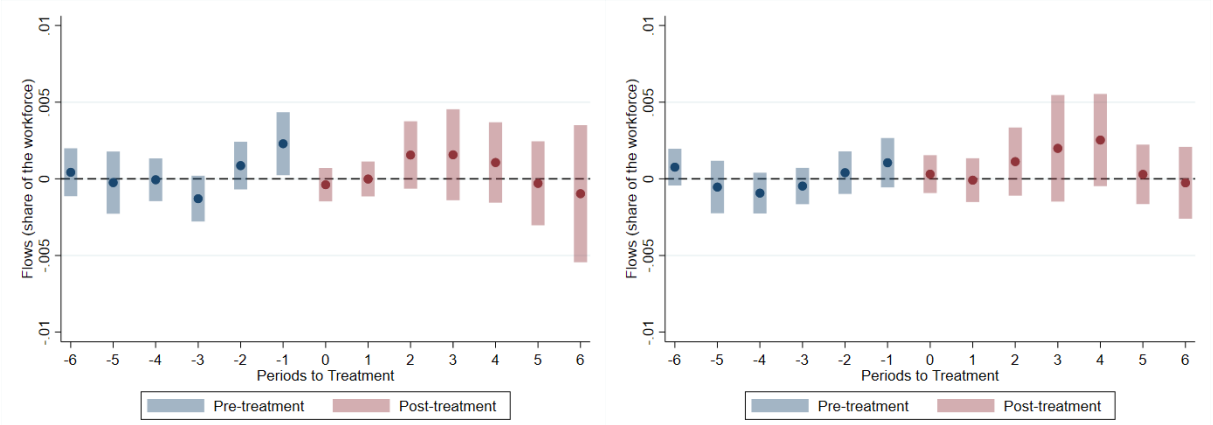
(a) Inflow of low-skill workers

(b) Inflow of high-skill workers



(c) Outflow of low-skill workers

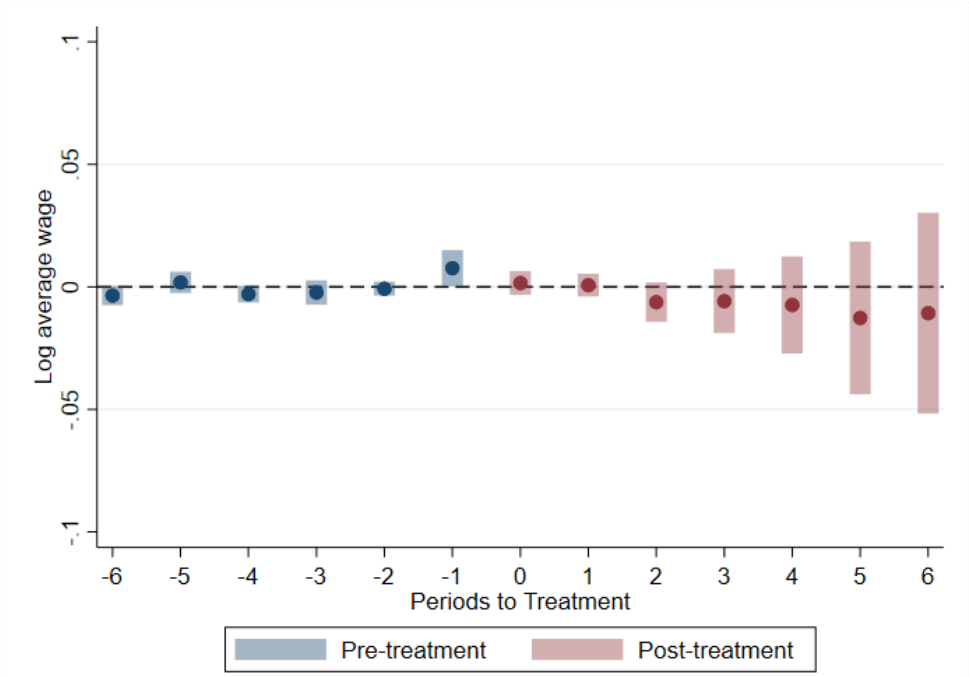
(d) Outflow of high-skill workers



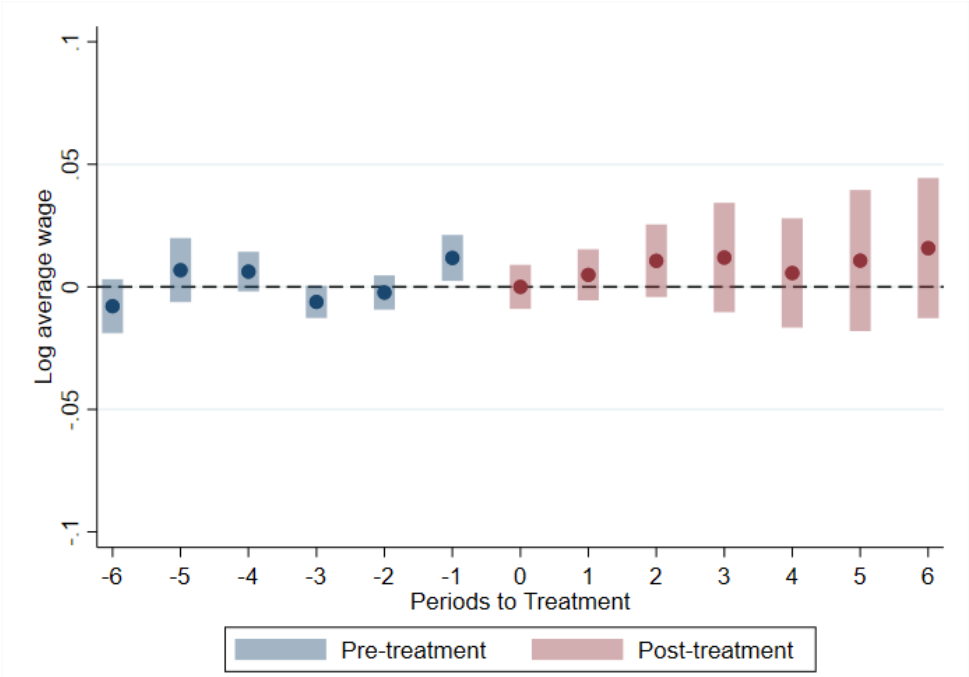
Notes: Figure 22 plots the results of an event study analysis on the mobility patterns of workers aged between 35 and 60 years old by skill group. The inflow of workers is defined as the share of the workforce that is currently working in the area but was working in another area in the previous period. The outflow of workers corresponds to the share of the workforce that is currently working in the area but is going to work in another area in the next period. Low-skill workers include employees with either blue-collar or clerk occupations. High-skill workers include employees with either intermediate or skilled white collar occupations. The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. All estimates are weighted using employment in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: linked employer-employee data (Panel DADS). Go back to main text

Figure 22: Migration patterns by skill (older workers)

(a) Wage of low-skill workers



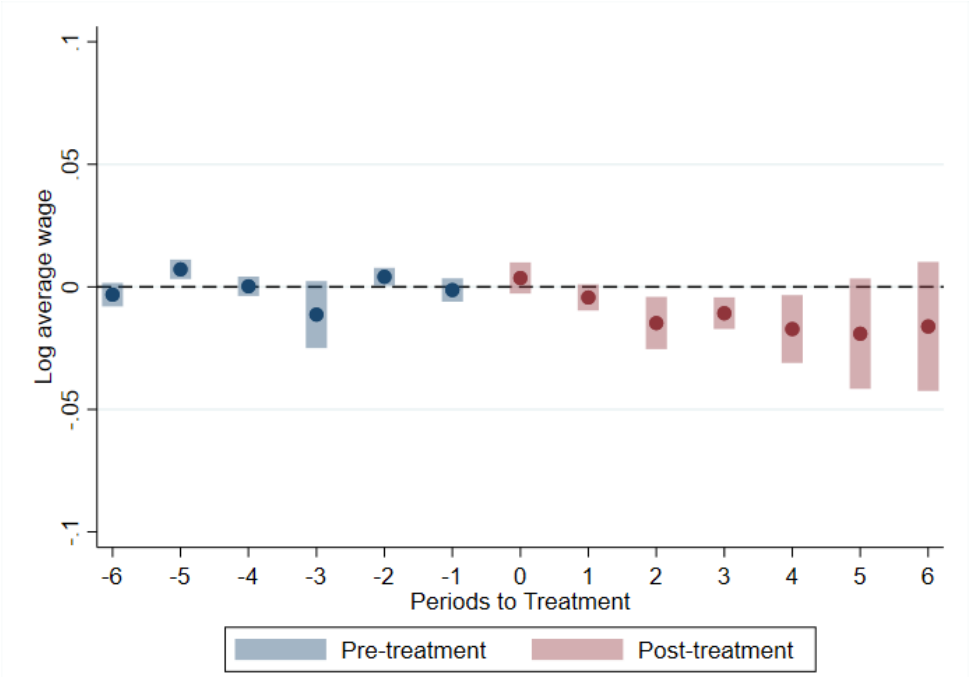
(b) Wage of high-skill workers



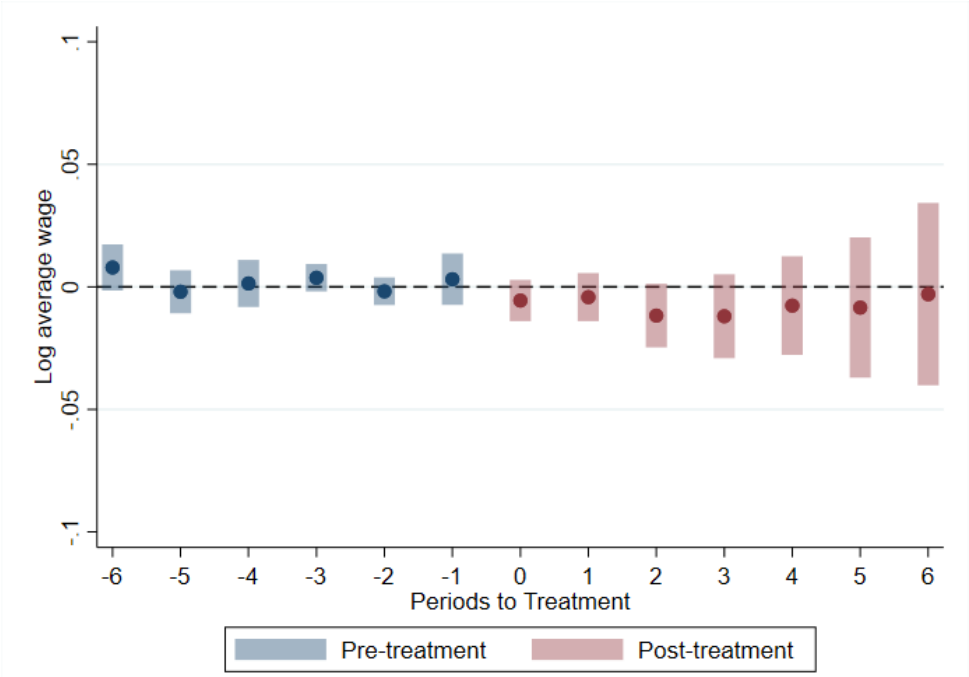
Notes: Figure 23 plots the results of an event study analysis on the log of daily wages for workers younger than 35 years old. The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. All estimates are weighted using the size of the workforce in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: linked employer-employee data (Panel DADS). Go back to main text

Figure 23: Wage of young workers (log)

(a) Wage of low-skill workers

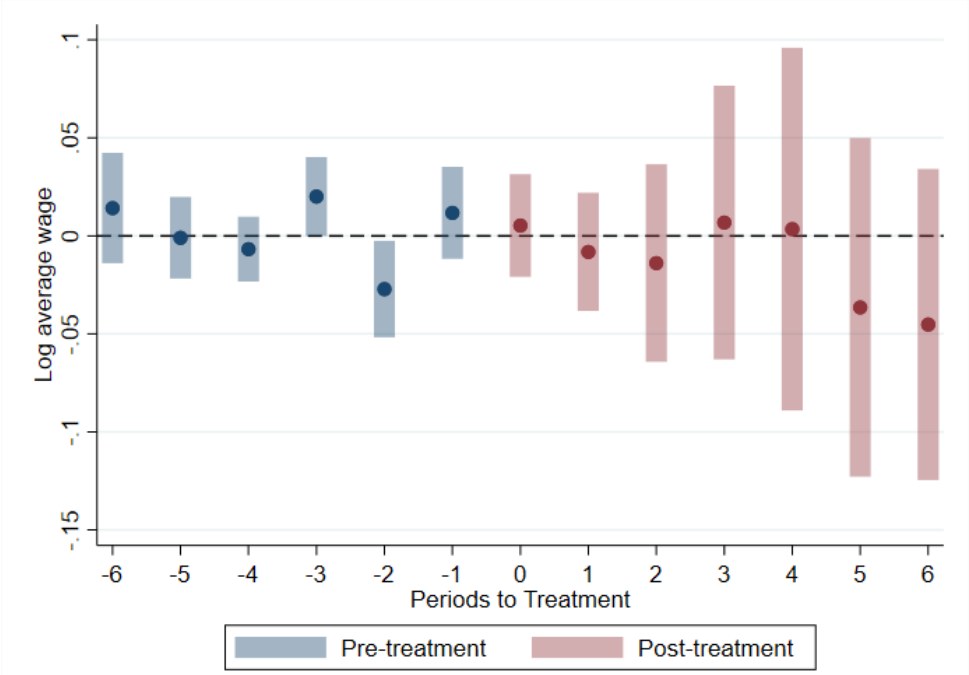


(b) Wage of high-skill workers



Notes: Figure 24 plots the results of an event study analysis on the log of daily wages for workers aged 35 years or more. The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. All estimates are weighted using the size of the workforce in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: linked employer-employee data (Panel DADS). Go back to main text

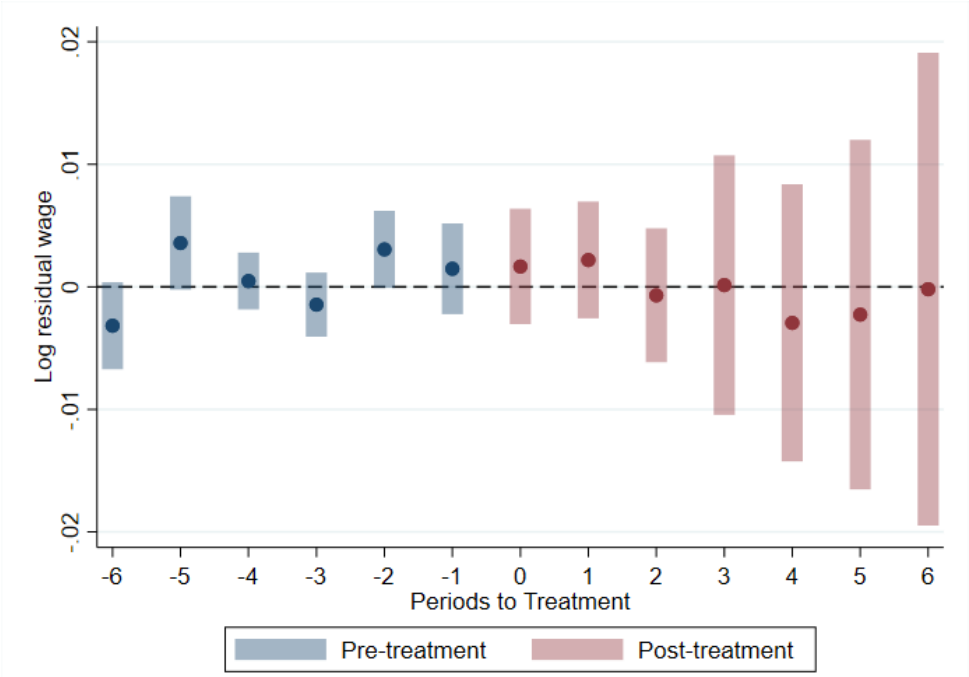
Figure 24: Wage of older workers (log)



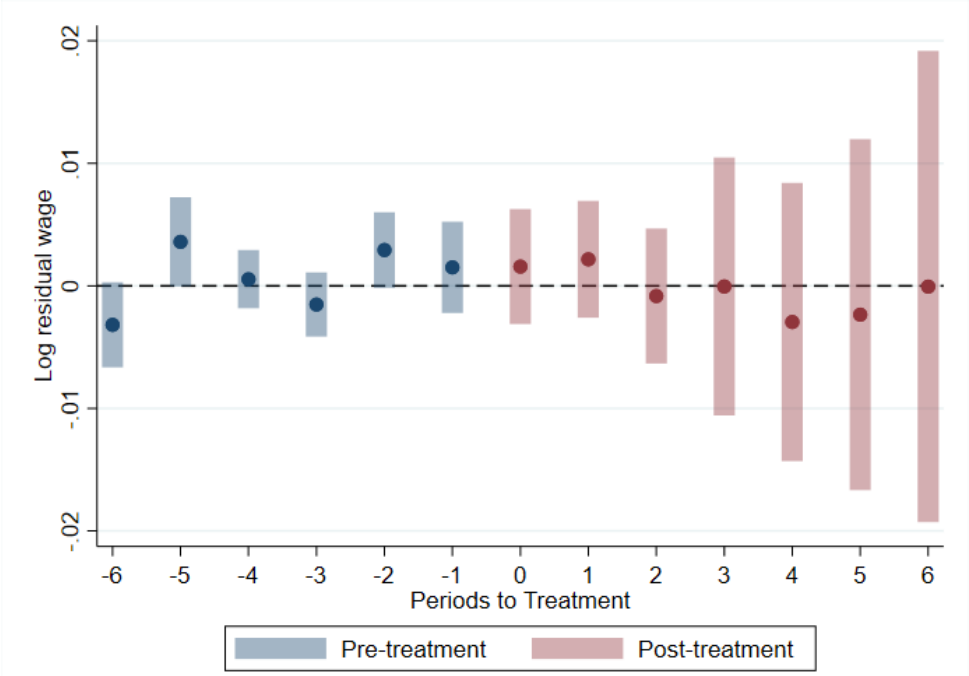
Notes: Figure 25 plots the results of an event study analysis on the difference in log wages between university graduates and workers with less than a high-school diploma. The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. All estimates are weighted using the size of the workforce in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: linked employer-employee data (Panel DADS). Go back to main text

Figure 25: College premium (log)

(a) Log residualized wage (gender & age)

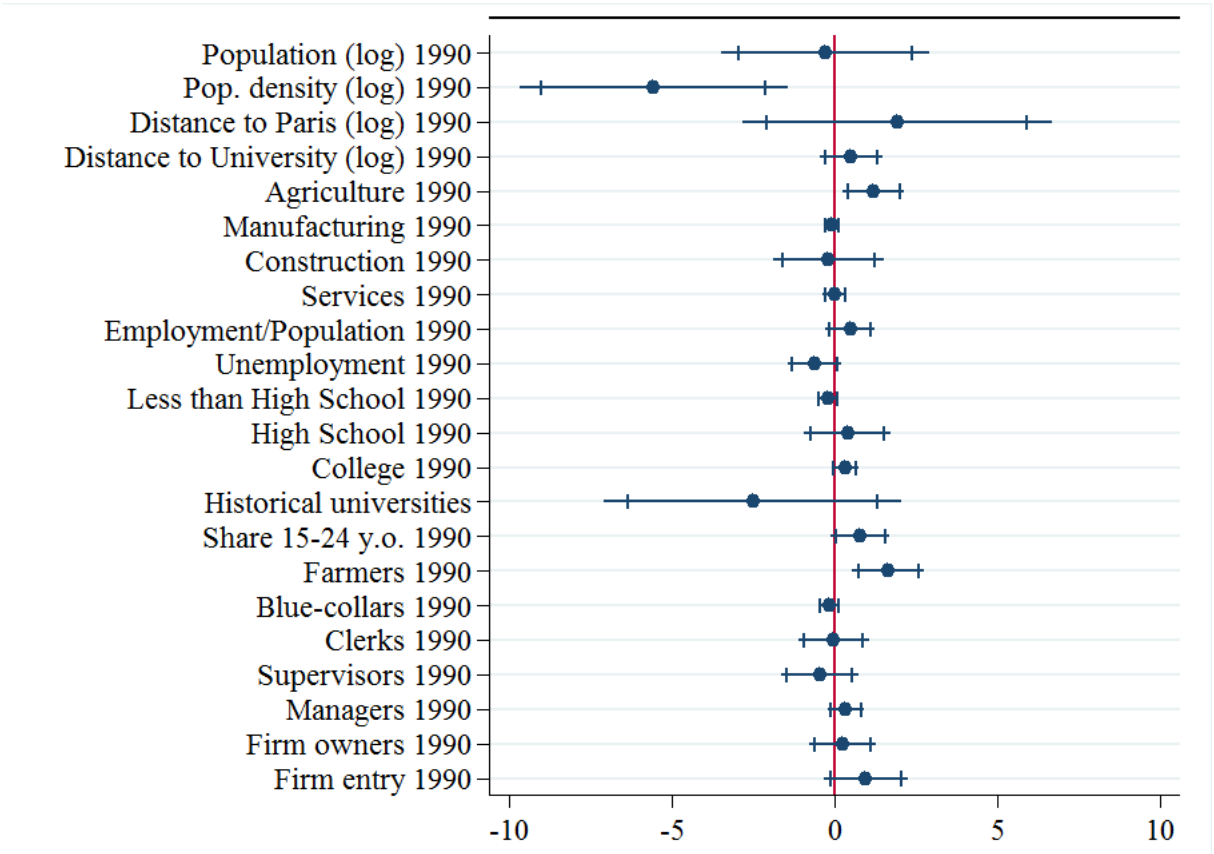


(b) Log residualized wage (gender, age & education)



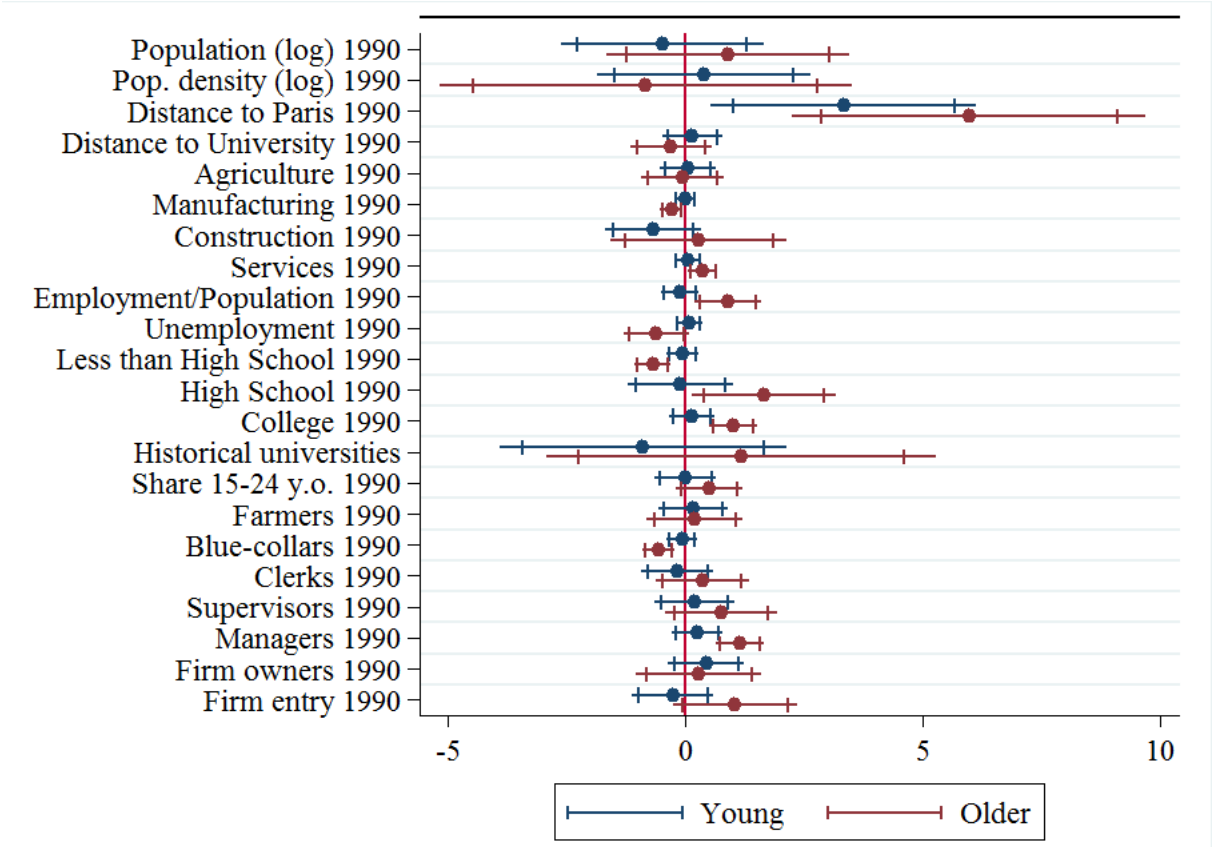
Notes: Figure 26 plots the results of an event study analysis on the log daily wage for all workers. Log wages are residualized using (a) gender and age dummies, and (b) gender, age and education dummies. Education includes four categories: no diploma, vocational diploma, high-school diploma and university diploma (two-years or more). The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. All estimates are weighted using the size of the workforce in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: linked employer-employee data (Panel DADS). Go back to main text

Figure 26: Wages (log)



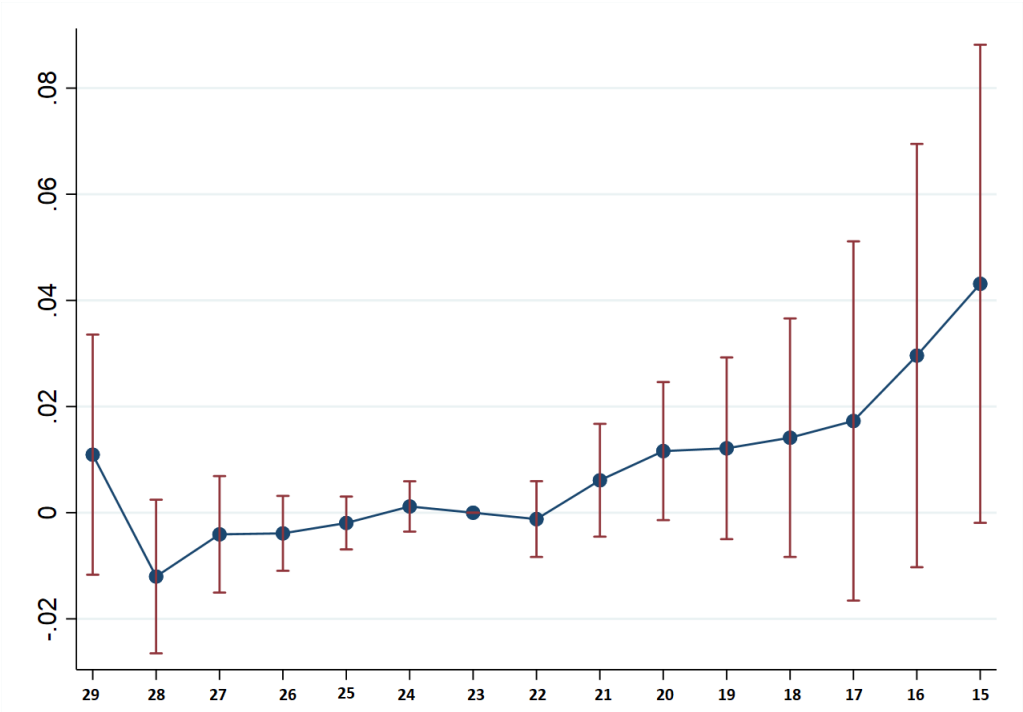
Notes: Figure 27 plots the coefficient of interaction between the treatment variable and cities' initial characteristics. Each coefficient corresponds to a separate regression. Observations are at the urban area level. All estimates are weighted using the number of firms in the area in 1990. Standard errors are robust to heteroskedasticity. The bars correspond to the 90% and 95% confidence intervals. Data: administrative registry of firms (sirene registry). Go back to main text

Figure 27: Heterogeneous effects on firm creation



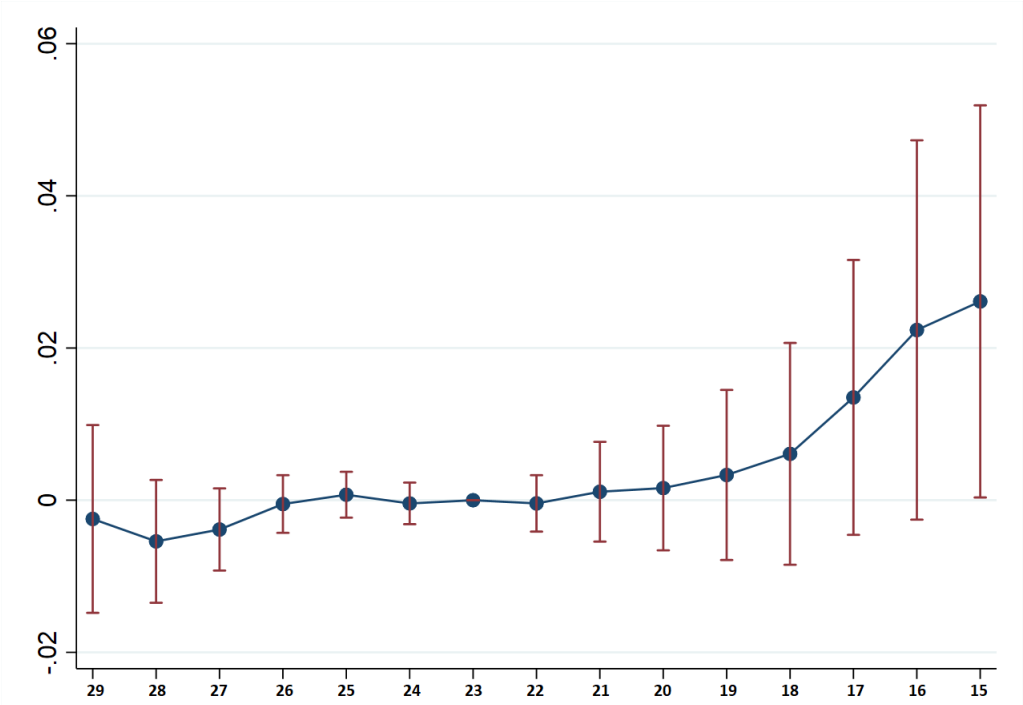
Notes: Figure 28 plots the coefficient of interaction between the treatment variable and cities' initial characteristics. Each coefficient corresponds to a separate regression. Young and older workers include people aged 18-34 years old and 35-60 year old respectively. Observations are at the urban area level. All estimates are weighted using the size of the workforce in the area in 1990. Standard errors are robust to heteroskedasticity. The bars correspond to the 90% and 95% confidence intervals. Data: linked employer-employee data (Panel DADS). Go back to main text

Figure 28: Heterogeneous effects on employment by age



Notes: Figure 29 plots the results of an event study analysis on the probability to hold a university diploma. The x-axis corresponds to the age of the individuals the year their area of birth received new higher education capacities for the first time during the policy. Observations are at the individual level. Standard errors are clustered at the area of birth level. The bars correspond to the 95% confidence intervals. Data: Census (2015). Go back to main text

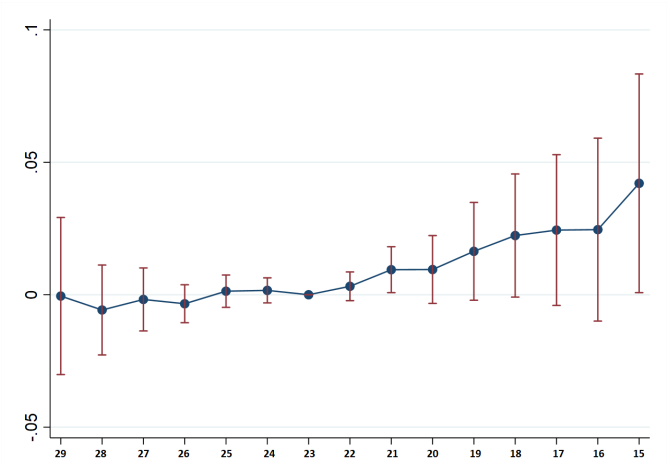
Figure 29: Probability to hold a university diploma



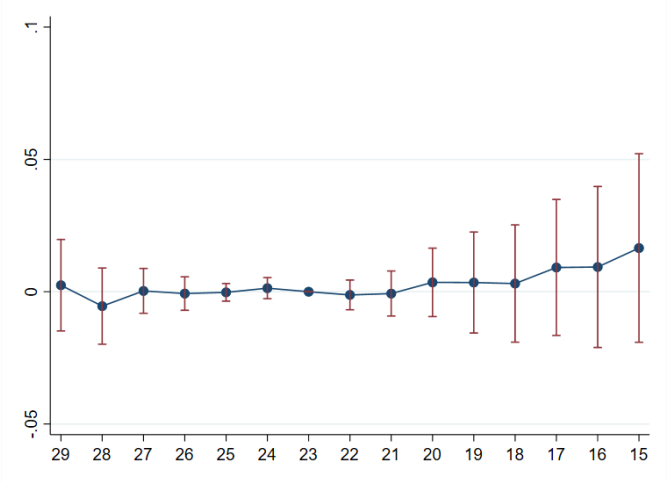
Notes: Figure 30 plots the results of an event study analysis on the probability to be employed. The sample is restricted to individuals in the workforce (either employed or unemployed). The x-axis corresponds to the age of the individuals the year their area of birth received new capacities for the first time during the policy. Observations are at the individual level. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: Census (2015).
Go back to main text

Figure 30: Probability to be employed

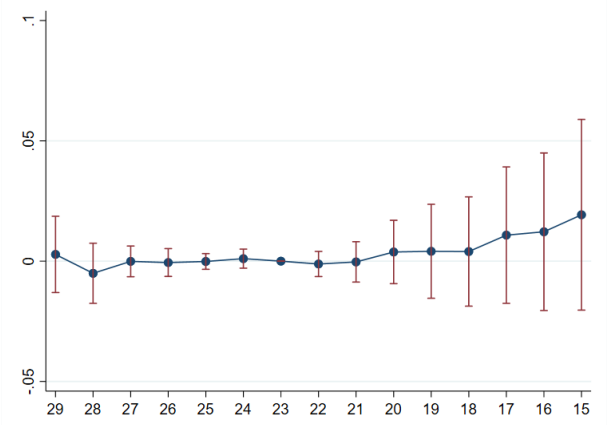
(a) Intermediate white-collar



(b) Skilled white-collar



(c) Company manager



Notes: Figure 31 plots the results of an event study analysis on the probability to hold a high-skilled occupation. Occupations include: (a) intermediate white-collar (e.g. supervisors and technicians), (b) skilled white-collars (e.g. managers and engineers), and (c) company managers (i.e. entrepreneurs). The x-axis corresponds to the age of the individuals the year when their area of birth received new capacities for the first time during the policy. Observations are at the individual level. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: Census (2015).
Go back to main text

Figure 31: Probability to hold a high-skill occupation

TABLES

Table 1: Higher education establishments created during the policy

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	1990-2003	Median size
Universities:																
Full universities	0	4	2	1	1	1	0	0	0	0	0	0	0	0	8	3500
Satellite Campuses	5	7	1	6	28	8	10	14	5	2	5	4	3	2	100	335
Departments	6	11	11	9	12	8	15	10	10	4	11	9	7	15	138	935
Engineering:																
Engineering Schools	5	10	2	5	3	3	2	2	2	1	3	3	4	1	46	475
Instituts Uni. Pro.	0	9	10	13	3	11	2	8	9	5	17	5	12	1	105	150
Technical colleges:																
2-y Technical Colleges	2	5	9	11	2	3	2	0	1	0	1	0	0	0	36	590
Satellite Campuses	1	6	7	11	13	8	3	3	0	4	1	4	2	0	63	250
Departments	10	24	50	58	40	25	39	29	11	7	11	13	17	7	341	155
Others	2	5	4	1	1	1	2	11	1	2	3	2	3	4	42	910

Notes: Table 1 displays for each year the number of higher education establishments created during the policy by type. Full universities correspond to the eight *Universités nouvelles*. Satellite campuses of universities are typically two to three-year colleges. They are similar to Community colleges. Engineering Schools and *Instituts Universitaires Professionnalisés* (IUP) offer respectively four and five-year engineering diplomas. Finally, technical colleges award two-year technical diplomas and typically train skilled technicians. Data: Registry of higher education establishments (SISE). Go back to main text

Table 2: Probability of receiving higher education capacities during the policy

	(1)	(2)	(3)	(4)
	Logit	Marginal effects	Probit	Marginal effects
Distance to Paris (log)	0.7428	0.0260	0.2938	0.0213
	(0.5356)	(0.0181)	(0.2253)	(0.0160)
Population (M)	0.0712***	0.0025***	0.0330***	0.0024***
	(0.0140)	(0.0003)	(0.0062)	(0.0003)
Population density	0.0028	0.0001	0.0013	0.0001
	(0.0021)	(0.0001)	(0.0009)	(0.0001)
Age 15-24 (%)	0.4565**	0.0160**	0.2053**	0.0149**
	(0.2100)	(0.0071)	(0.0980)	(0.0070)
Age 25-34 (%)	0.1774	0.0062	0.0505	0.0037
	(0.3033)	(0.0105)	(0.1356)	(0.0097)
Age 35-44 (%)	0.4146	0.0145	0.1891	0.0137
	(0.2935)	(0.0102)	(0.1226)	(0.0086)
Age 45-54 (%)	0.0187	0.0007	0.0136	0.0010
	(0.2541)	(0.0089)	(0.1177)	(0.0085)
Age 55-64 (%)	0.4838**	0.0169**	0.2453***	0.0178**
	(0.2070)	(0.0073)	(0.0915)	(0.0070)
Age 65+ (%)	0.1212	0.0042	0.0561	0.0041
	(0.1464)	(0.0051)	(0.0680)	(0.0049)
University diploma (%)	0.1041	0.0036	0.0045	0.0003
	(0.1537)	(0.0053)	(0.0735)	(0.0053)
High school (%)	0.3582*	0.0125*	0.1867**	0.0135**
	(0.1910)	(0.0065)	(0.0794)	(0.0058)
Vocational (%)	-0.0764	-0.0027	-0.0566	-0.0041
	(0.0897)	(0.0032)	(0.0397)	(0.0030)
Distance to full university (log)	0.7394	0.0259	0.3074	0.0223
	(0.5279)	(0.0182)	(0.2241)	(0.0160)
Historical university	1.5186**	0.0532**	0.7151**	0.0518**
	(0.7211)	(0.0230)	(0.3250)	(0.0221)
Unemployment rate (%)	0.0386	0.0014	0.0273	0.0020
	(0.0734)	(0.0026)	(0.0364)	(0.0027)
Blue-collars (%)	-0.3326*	-0.0116*	-0.1548**	-0.0112**
	(0.1796)	(0.0061)	(0.0744)	(0.0055)
Clerks (%)	-0.3518*	-0.0123*	-0.1492*	-0.0108*
	(0.2135)	(0.0072)	(0.0868)	(0.0062)
Intermediate white-collars (%)	-0.3467*	-0.0121*	-0.1480*	-0.0107*
	(0.1931)	(0.0065)	(0.0781)	(0.0056)
High-skilled white-collars (%)	-0.3481	-0.0122	-0.1378	-0.0100
	(0.2280)	(0.0077)	(0.0957)	(0.0067)
Company managers (%)	-0.5833***	-0.0204***	-0.3229***	-0.0234***
	(0.2005)	(0.0073)	(0.0912)	(0.0078)
Manufacturing (%)	0.1920	0.0067	0.0818	0.0059
	(0.1349)	(0.0046)	(0.0557)	(0.0040)
Construction (%)	-0.0008	-0.0000	0.0021	0.0002
	(0.1547)	(0.0054)	(0.0670)	(0.0049)
Tertiary (%)	0.2114	0.0074	0.0906	0.0066
	(0.1384)	(0.0047)	(0.0578)	(0.0042)
Civil servants (%)	0.0189	0.0007	0.0075	0.0005
	(0.0297)	(0.0010)	(0.0121)	(0.0009)
Average wage	-0.0021	-0.0001	-0.0010	-0.0001
	(0.0235)	(0.0008)	(0.0101)	(0.0007)
Firm entry rate (%)	0.0186	0.0007	-0.0003	-0.0000
	(0.0378)	(0.0013)	(0.0185)	(0.0013)
N	759	759	759	759

Notes: Table 2 provides the results of a logit model (column (1)) and a probit model (column (3)) of the probability to receive new capacities during the policy on initial areas' characteristics. The marginal effects are displayed in columns (2) and (4). The distance to Paris is expressed in kilometers, population in millions, and population density in inhabitants per square kilometer. The level of education of the population is divided into fours categories (i) university diploma (at least a two-year diploma), (ii) high school (baccalauréat), (iii) vocational (CAP-BEP) and (iv) no diploma. "Historical university" is an indicator variable for areas with a full university before the policy. Intermediate white-collar occupations typically correspond to technicians and supervisors while high-skilled white-collars occupations include engineers and managers. Data: Registry of higher education establishments (SISE), 1990 Census, linked employer-employee (DADS) and administrative registry of firms (Sirene register). Go back to main text
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Demographic characteristics of the French urban areas in 1990

	All areas	Treated	University Towns
Number of Urban Areas	759	146	104
Population			
Mean	63,049	291,833	347,616
Median	9,541	110,050	135,238
SD	421,672	973,445	1,087,715
Density	153.1	203.5	214.4
Age (%)			
0-14	20.38	20.47	20.40
15-24	15.50	15.72	15.79
25-34	15.47	15.70	15.78
35-44	15.16	15.33	15.38
45-54	10.33	10.40	10.45
55-64	10.04	9.81	9.74
65+	13.12	12.56	12.46
Education (%)			
College	12.26	13.28	13.70
High School	11.05	11.49	11.63
Vocational Technical School	21.14	21.03	21.07
No Diploma	55.55	54.20	53.60
Unemployment rate (%)	9.47	9.48	9.33
Industries (%)			
Agriculture	2.77	2.26	2.16
Manufacturing	22.96	21.80	21.54
Construction	6.97	6.90	6.89
Services	67.30	69.05	69.40
Occupations (%)			
Blue-collars	28.00	26.30	25.82
Clerks	26.88	27.23	27.25
Intermediate white-collars	23.16	23.81	23.96
High-skilled white-collars	14.27	15.39	15.74
Company managers	7.70	7.26	7.23
Firm Entry (%)	10.17	11.33	11.33

Notes: Table 3 provides descriptive statistics on the 759 French urban areas in 1990. Treated areas correspond to areas receiving some higher education capacities between 1990 and 2003. University towns correspond to urban areas which had at least one college before the beginning of the policy. Population density is the number of inhabitants per square kilometers. The level of education of the population is divided into fours categories (i) college (at least a two-year diploma), (ii) high-school (baccalauréat), (iii) vocational (CAP-BEP) and (iv) no diploma. Intermediate white-collar occupations typically correspond to technicians and supervisors while high-skilled occupations include engineers and managers. Data: Registry of higher education establishments (SISE), 1990 Census, and administrative registry of firms (Sirene register). Go back to main text

Table 4: Firm creation in France between 1987 and 2001

	All New Establishments	New Firms	New Establishments of Existing Firms
Mean:	90,050	67,134	22,917
Standard deviation	6,869	6,122	2,853
Initial # of jobs created	271,467	166,543	104,924
Average size at creation	3	2.5	4.6
Industries (in %)			
Agrifood	1.3	1.2	1.6
Manufacturing	10.6	10.7	10.3
Construction	9.8	11.2	5.4
Retail	33.7	31.5	40.3
Transport	4.2	3.8	5.5
Hotels and Restaurants	5.7	5.2	7
Real Estate and Firm Services	29.1	30.6	24.8
Other Services	5.5	5.7	5
Size (in %)			
1	49.9	53.5	39.3
2-5	41	39.9	44.4
6-10	4.9	3.6	8.6
11-20	2.9	2.4	4.7
More than 20	1.2	0.6	3

Notes: Table 4 provides descriptive statistics on the number of new firms and new establishments created in France between 1987 and 2001. Column one provides descriptive statistics on both new firms and new establishments created by existing firms. Columns two and three correspond respectively to firms created *ex-nihilo* and new locations opened by existing firms. All variables are computed as yearly averages over the period. The initial number of jobs created and the average size at creation are computed using the number of employees at the date of registration (including the entrepreneur). Data: administrative registry of firms (Sirene register). Go back to main text

Table 5: Year of treatment by urban area

Name	Year of Treatment	Name	Year of Treatment	Name	Year of Treatment
Agen	1993	Dunkerque	1992	Perpignan	1992
Albi	2002	Égletons	2002	Poitiers	1997
Alençon	1993	Épinal	1995	Pontivy	2001
Amiens	1991	Évreux	1992	Périgueux	1990
Angers	1991	Figeac	1994	Quimper	1995
Angoulême	1991	Foix	1997	Reims	1990
Annecy	1990	Fougères	1996	Rennes	1990
Arles	2000	Fréjus	1994	Roanne	1991
Arras	1991	Gap	1992	Rodez	1994
Auch	1990	Grenoble	1993	Rouen	1991
Aurillac	1992	Haguenau	1996	Saint-Avold	1994
Auxerre	1991	Issoudun	1991	Saint-Brieuc	1990
Avignon	1990	La Roche-sur-Yon	1990	Saint-Chély-d'Apcher	1994
Bayonne	1992	La Rochelle	1992	Saint-Dié-des-Vosges	1993
Beauvais	1992	Lannion	1992	Saint-Lô	1996
Belfort	1991	Laon	1993	Saint-Malo	1993
Besançon	2001	Laval	1993	Saint-Nazaire	1993
Blois	1991	Le Creusot	1991	Saint-Omer	1991
Bordeaux	1992	Le Havre	1991	Saint-Pol-de-Léon	1990
Boulogne-sur-Mer	1991	Le Mans	1993	Saint-Quentin	1994
Bourg-en-Bresse	1992	Le Puy-en-Velay	1994	Saint-Étienne	1991
Bourges	1991	Lille	1990	Salon-de-Provence	1993
Brest	1991	Limoges	1991	Sarrebruck – Forbach	2002
Brive-la-Gaillarde	1992	Lisieux	1993	Sarreguemines	1994
Béthune	1990	Longwy	1990	Soissons	1991
Béziers	1992	Lons-le-Saunier	2001	Strasbourg	1990
Caen	1993	Lorient	1990	Sète	1993
Cahors	1998	Lunéville	1996	Sélestat	2003
Calais	1992	Lyon	1991	Tarbes	1992
Cambrai	1995	Marseille - Aix-en-Provence	1992	Thionville	1995
Carcassonne	1993	Maubeuge	1992	Toulon	1991
Castres	1992	Mende	1994	Toulouse	1991
Chalon-sur-Saône	1992	Menton – Monaco	1997	Tours	1996
Chambéry	1990	Metz	1990	Troyes	1990
Charleville-Mézières	1995	Mont-de-Marsan	1991	Tulle	1995
Chartres	1991	Montauban	1994	Valence	1990
Cherbourg-en-Cotentin	1991	Montbéliard	1991	Valenciennes	1991
Cholet	1990	Montluçon	1993	Vannes	1991
Châlons-en-Champagne	1994	Montpellier	1992	Verdun	1995
Châteauroux	1992	Morlaix	2000	Vesoul	1992
Châtellerault	1992	Moulins	1994	Vichy	1995
Clermont-Ferrand	1991	Mulhouse	1992	Vienne	1993
Colmar	1991	Nancy	1990	Vire Normandie	1999
Compiègne	1997	Nantes	1991	Oyonnax	1994
Creil	1991	Narbonne	1993	Paris	1990
Dax	2000	Nevers	1991	Pau	1991
Digne-les-Bains	1992	Nice	1990		
Dijon	1990	Niort	1990		
Douai - Lens	1990	Nîmes	1991		
Draguignan	1994	Orléans	1993		

Notes: Table 5 displays the year of treatment for each urban area. The year of treatment is defined as the first year an area received new higher education capacities during the policy. Data: registry of higher education establishments (SISE). Go back to main text

Table 6: Correlations between treatment year and cities' initial characteristics

	First Year of Treatment	All Years of Treatment
Distance to Paris (km)	0.0019	0.0007
	(0.0030)	(0.0019)
Population (M)	-0.1332	0.1704
	(0.2924)	(0.2055)
Population density	-0.0003	0.0001
	(0.0021)	(0.0011)
Age 15-24 (%)	0.2668	0.3841
	(0.3652)	(0.2709)
Age 25-34 (%)	0.8315	0.2499
	(0.5721)	(0.3643)
Age 35-44 (%)	0.8667	0.0518
	(0.9570)	(0.5316)
Age 45-54 (%)	-0.8228	-0.2933
	(0.6766)	(0.4497)
Age 55-64 (%)	1.0693*	0.2554
	(0.6100)	(0.3981)
Age 65+ (%)	0.1238	0.2233
	(0.2563)	(0.1841)
Unemployment rate (%)	-0.5132*	0.1188
	(0.2773)	(0.1506)
Employment/population	-0.3518	0.2102
	(0.4905)	(0.2413)
University (%)	-0.0008	-0.0640
	(0.3694)	(0.2460)
High school (%)	-0.3871	-0.0391
	(0.3695)	(0.2597)
Vocational (%)	-0.0597	0.0086
	(0.1330)	(0.0919)
Manufacturing (%)	-0.0636	0.1394
	(0.5043)	(0.2890)
Construction (%)	-0.4685	0.0003
	(0.5402)	(0.2936)
Services (%)	-0.1250	0.0542
	(0.5511)	(0.3140)
Blue-collars (%)	0.0649	-0.1325
	(0.5082)	(0.3115)
Clerks (%)	0.1678	-0.0038
	(0.5404)	(0.3320)
Intermediate white-collars (%)	0.1498	0.0545
	(0.5481)	(0.3381)
High-skilled white-collars (%)	0.0909	-0.1072
	(0.5933)	(0.3619)
Company managers (%)	0.4604	0.1717
	(0.5739)	(0.3356)
Public employment (%)	0.0660	0.0412
	(0.0701)	(0.0472)
N	146	473
R^2	0.25	0.038

Notes: Table 6 provides the results of a linear regression of the year of treatment on cities' demographic characteristics observed in 1990. Column (1) focuses on the first year of treatment (i.e. the year during which additional capacities were built for the first time during the policy). Column (2) includes all the years of treatment (i.e. all the years during which the city received additional capacities). Population is expressed in millions of inhabitants. The level of education of the population is divided into fours categories (i) college (at least a two-year diploma), (ii) high-school (baccalauréat), (iii) vocational (CAP-BEP) and (iv) no diploma. Intermediate white-collar occupations typically correspond to technicians and supervisors while high-skilled occupations include engineers and managers. Data: census (1990). Go back to main text
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Expected vs. constructed capacities between 1991 and 1995

	1991	1992	1993	1994	1995	Total
m^2 planned	150,000	310,000	350,000	400,000	300,000	1,500,000
m^2 constructed	73,049	198,458	389,207	348,350	504,915	
Cumulative sum	73,049	271,507	660,714	1,009,064	1,513,979	1,513,979

Notes: Table 7 compares the number of m^2 of higher education establishments planned by the government in 1990 and effectively constructed over the period 1991 and 1995. Source DATAR (1998). Go back to main text

Table 8: Firm entry by industry

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Manufacturing	Agrifood	Retail	Construction	Transport	Hotels & Restaurants	Business Services	Household Services	All Industries
After x Treated	2.431**	2.153**	1.892***	1.107	2.837**	2.067*	1.365	4.254*	1.572**
	(1.100)	(0.974)	(0.645)	(0.988)	(1.375)	(1.255)	(0.920)	(2.427)	(0.694)
Controls:									
Year & Area FE	X	X	X	X	X	X	X	X	X
Mean	7.71	6.40	9.57	9.93	10.88	7.65	16.86	12.34	10.76
N	2044	2044	2044	2044	2044	2044	2044	2044	2044

Notes: Table 8 displays the results of an event study design on the entry rate of new firms by industry. The coefficients are averaged over all treatment periods using the procedure described in (Callaway & Sant'Anna 2021). The mean is computed over the pre-reform period. Each observation is a urban area x year. All estimates are weighted using the number of firms in the area x industry in 1990. Standard errors are clustered at the area level and are displayed into parentheses. Data: administrative registry of firms (Sirene register). Go back to main text

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

Table 9: Impact of education on log firm creation in the Manufacturing

	(1)	(2)	(3)	(4)
	OLS	First Stage	Reduced Form	2SLS
College share (%)	0.021***			0.062***
	(0.006)			(0.009)
Number of Colleges$_{t-2}$		0.026***	0.002***	
		(0.003)	(0.0002)	
Controls:				
Area & Year FE	X	X	X	X
N	2175	2175	2175	2175
Cragg-Donald Wald F Statistics				682
Kleibergen-Paap F Statistics				107.1

Notes: each observation corresponds to a urban area x year. The outcome variable of column (1), (3), and (4) is the inverse hyperbolic sine transformation of the number of firms created in the manufacturing. The outcome of column (2) is the share of college graduates. "Number of Colleges$_{t-2}$" corresponds to the number of colleges constructed in the area between 1989 and $t-2$. The regressions are weighted using the number of active firms in the manufacturing in 1990. Standard errors are clustered at the urban area level. Go back to main text

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

Table 10: Outcomes seven years after creation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Survival	Av. employment (log)	Age <35	High-skill workers	Young H-S	Older H-S	Average Wage (log)
After x Treated	-0.0120	-0.0151	0.0011	0.0383***	0.0214***	0.0169***	0.0289*
	(0.0119)	(0.0536)	(0.0158)	(0.0126)	(0.0073)	(0.0066)	(0.0163)
Controls:							
Area & Year FE	X	X	X	X	X	X	X
Mean	0.305	0.166	0.511	0.160	0.067	0.092	2.827
N	2482	2482	2482	2482	2482	2482	2482

Notes: Figure 10 displays the results of an event study on the growth of new firms. The coefficients are averaged over all treatment periods using the procedure described in (Callaway & Sant'Anna 2021). The outcome variables are: (1) the survival rate, (2) the log average size, (3) the share of the workforce younger than 35 years old, (4) the share of high-skill white collars workers (5) the share of high-skill white collars workers aged less than 35 (6) the share of high-skill white collars workers aged 35 or more, and (7) the log average wage. Employment is measured as full-time employment based on hours of work. High-skill workers include engineers and managers. Young workers are aged between 18 and 34 years old. Each observation is a urban area x year. All estimates are weighted using the number of firms in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: administrative registry of firms (sirene registry) and comprehensive employer-employee data (DADS). Go back to main text
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Effect of the policy on firm creation in high and low-skill industries

	Dependent variable: arsinh. transformation of firms created			
	Exposure: % of college grad.		Exposure: % of managers	
	(1)	(2)	(3)	(4)
After x Treated x Exposure	0.01501***		0.01592***	
	(0.00162)		(0.00159)	
After x New Colleges x Exposure		0.00007***		0.00006***
		(0.00001)		(0.00001)
Controls:				
Industry x Area FE	X	X	X	X
Area x Year FE	X	X	X	X
Industry x Year FE	X	X	X	X
N	64512	64512	64512	64512

Notes: Table 11 displays the results of a triple-difference analysis at the industry x urban area level. The outcome is the inverse hyperbolic sine transformation of the number of firms created. The exposure variable is the share of the workforce with a college diploma (columns (1) and (2)) or with a managerial position (columns (3) and (4)). The exposure is computed using employer-employee data over the period 1985-1989. The variable *Treated* is a dummy variable which takes the value one if the area received at least some new higher education capacities during the policy. *New Colleges* corresponds to the number of higher education establishments and department constructed during the policy. The analysis is run in long difference between 1988 and 2000. Firm creation is averaged over three years around 1988 and 2000 to reduce measurement error. All estimates are weighted using the number of active firms in the industry x area cell in 1990. Standard errors are clustered at the area level and are displayed into parentheses. Data: administrative registry of firms (sirene registry), linked employer-employee data merged with census data (Panel DADS and EDP). Go back to main text
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 12: Demographic characteristics of new entrepreneurs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Former student	Age≤ 25	Age≤ 35	Age≤ 45	<High school	High school	College
After x Treated	-0.0437**	-0.0472*	-0.0476	-0.0389	0.0130	-0.0862	0.0732
	(0.0212)	(0.0277)	(0.0668)	(0.0652)	(0.1160)	(0.0559)	(0.1284)
Controls:							
Area & Year FE	X	X	X	X	X	X	X
Mean (1994)	0.022	0.077	0.357	0.507	0.547	0.186	0.267
N	82	82	82	82	82	82	82

Notes: Table 12 displays the results of a difference in differences analysis on the demographic characteristics of new entrepreneurs. The outcome variables are (i) the probability to be a student before creating the firm, (ii-iv) the age of the entrepreneur, (v-vii) their level of education. Each observation is a urban area x year. All estimates are weighted using the number of firms in the area in 1990. Standard errors are robust to heteroskedasticity and are displayed into parentheses. Data: SINE survey of entrepreneurs (1994, 1998). Go back to main text

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

Table 13: Age distribution of entrepreneurs

Year	Treatment Group	16-24	25-29	30-39	40-49	50-59	60+
1994	Untreated	5.3	12.2	32.9	34.7	11.8	3.2
1994	Treated	5.6	13.6	34.8	33.0	10.4	2.5
1998	Untreated	6.0	13.5	34.2	30.9	13.1	2.3
1998	Treated	6.1	14.5	35.1	28.8	13.0	2.5
2002	Untreated	4.4	11.1	36.5	30.3	15.1	2.7
2002	Treated	4.9	11.4	36.0	29.5	14.8	3.4

Notes: Table 13 provides the distribution of the age of new entrepreneurs in France. Treated areas correspond to urban areas receiving some higher education capacities between 1990 and 2003. Data: SINE survey of entrepreneurs (1994,1998,2002).
Go back to main text

Table 14: Former occupation of new entrepreneurs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Head of a Company	Manager	Supervisor	Clerk	Blue-Collar	Student	Out LF	Serial-Entrepreneur
After x Treated	0.1424**	-0.0213	0.0503	-0.0371	-0.0136	-0.0437**	-0.0770**	0.1036
	(0.0628)	(0.1100)	(0.0659)	(0.1327)	(0.0420)	(0.0212)	(0.0326)	(0.0953)
Controls:								
Area & Year FE	X	X	X	X	X	X	X	X
Mean (1994)	0.295	0.209	0.131	0.231	0.059	0.022	0.053	0.408
N	82	82	82	82	82	82	82	82

Notes: Table 14 displays the results of a difference in differences analysis on the former occupation of new entrepreneurs. Head of companies include salaried CEOs, self employed and entrepreneurs. Serial entrepreneurs include individuals who already started a company in the past. Each observation is a urban area x year. All estimates are weighted using the number of firms in the area in 1990. Standard errors are robust to heteroskedasticity and are displayed into parentheses. Data: SINE survey of entrepreneurs (1994, 1998). Go back to main text
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 15: Main clients of new firms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Main Clients			Market			
	Individuals	Firms	Administrations	Local	Regional	National	International
After x Treated	-0.0907	0.0822	0.0085	-0.0737	-0.0505	0.1035	0.0207
	(0.0846)	(0.1216)	(0.0584)	(0.0908)	(0.1069)	(0.0783)	(0.0427)
Controls:							
Area & Year FE	X	X	X	X	X	X	X
Mean (1994)	0.436	0.503	0.061	0.341	0.393	0.193	0.073
N	82	82	82	82	82	82	82

Notes: Table 15 displays the results of a difference in differences analysis on the characteristics of the main clients of newly created firms averaged at the urban area level. The outcomes are (i-iii) the probability that new firms have as main clients individuals, firms or public administrations, and (iv-vii) the probability that they provide mostly a local, regional, national or international market. Each observation is a urban area x year. All estimates are weighted using the number of active firms in the area in 1990. Standard errors are clustered at the area level and are displayed into parentheses. Data: SINE survey of entrepreneurs (1994, 1998). Go back to main text

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

Table 16: Effect on incumbent firms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Sales	Value-added	Pretax Income	Employment	Average Wage	Investment Ratio	Labor Productivity	TFP
After x Treated	-.0202***	-.0214***	-.0458***	-.0083*	-.0080**	.0021	-.0072*	-.0083***
	(.0073)	(.0076)	(.0119)	(.005)	(.0113)	(.0048)	(.0038)	(.0060)
Controls:								
Area & Year FE	X	X	X	X	X	X	X	X
N	611,921	601,247	600,252	565,108	565,108	592,219	564,224	542,419

Notes: Table 16 displays the results of an event study on indicators of firms growth. The coefficients are averaged over all treatment periods using the procedure described in (de Chaisemartin & D'Haultfœuille 2020). The outcome variables are (i) log sales, (ii) log value-added, (iii) log profits before taxes, (iv) log employment, (v) log average wage, (vi) log investment over assets, (vii) log sales over employment, and (viii) total factor productivity. TFP is computed using the method of (Levinsohn & Petrin 2003). Each observation is a firm x year. Standard errors are clustered at the firm level. Data: Balance sheet data (1984-2001). Go back to main text
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

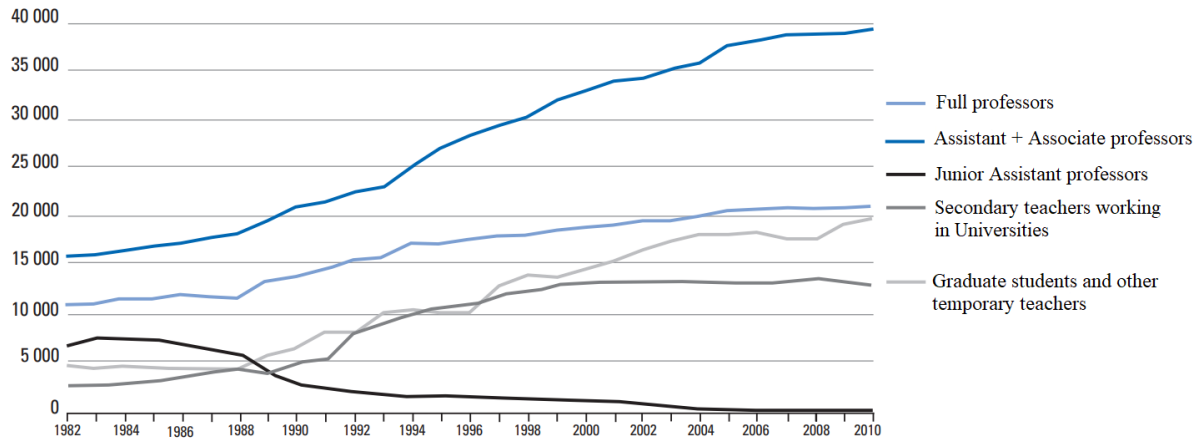
Table 17: Overall effect on firms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Sales	Value-added	Pretax Income	Employment	Average Wage	Investment Ratio	Labor Productivity	TFP
After x Treated	.0669*	.1025*	-.0069	.0161	-.0155	.0052	.0508*	.0713
	(.0385)	(.0574)	(.1104)	(.0340)	(.0113)	(.0284)	(.0271)	(.0569)
Controls:								
Area & Year FE	X	X	X	X	X	X	X	X
N	2482	2482	2482	2482	2482	2482	2482	2482

Notes: Table 17 displays the results of an event study on firm-level indicators of local economic activity. The coefficients are averaged over all treatment periods using the procedure described in (de Chaisemartin & D'Haultfœuille 2020). The outcome variables are (i) log sales, (ii) log value-added, (iii) log profits before taxes, (iv) log employment, (v) log average wage, (vi) log investment over assets, (vii) log sales over employment, and (viii) total factor productivity. TFP is computed using the method of (Levinsohn & Petrin 2003). The results summarize the effect of the policy taking into account firm entry, firm exit and firm growth. Firm level data are aggregated at the city level. Each observation is a urban area x year. All estimates are weighted using the number of firms in the area in 1990. Standard errors are clustered at the urban area level. Data: Balance sheet data (1984-2001). Go back to main text
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

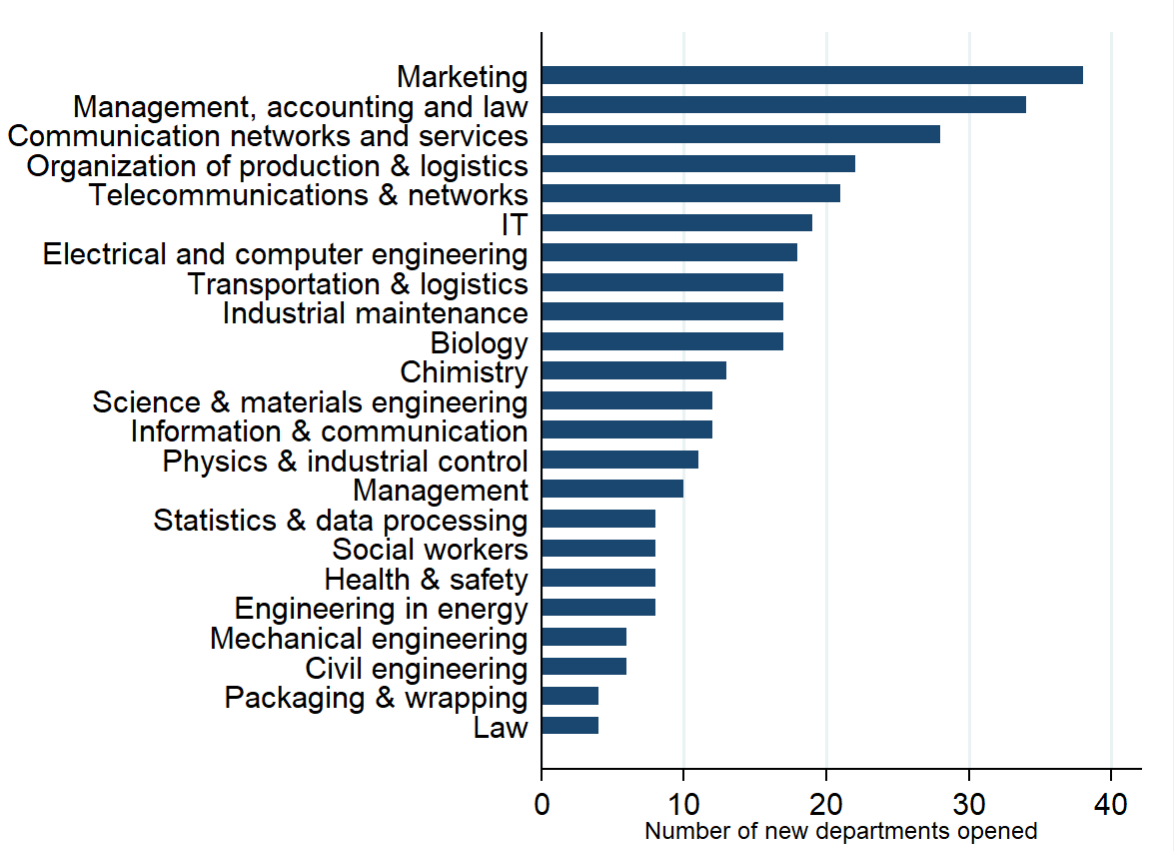
Appendices

A Appendix Figures



Notes: Figure A.1 plots the evolution of the number of faculty by status over time. Data: (DEPP & SIEP 2010). Go back to main text

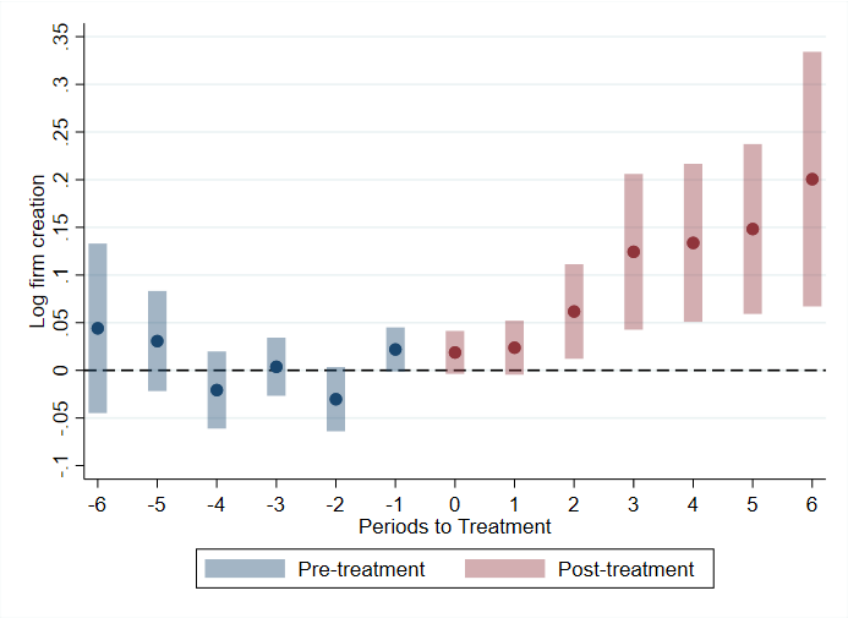
Figure A.1: Number of faculty (1982-2010)



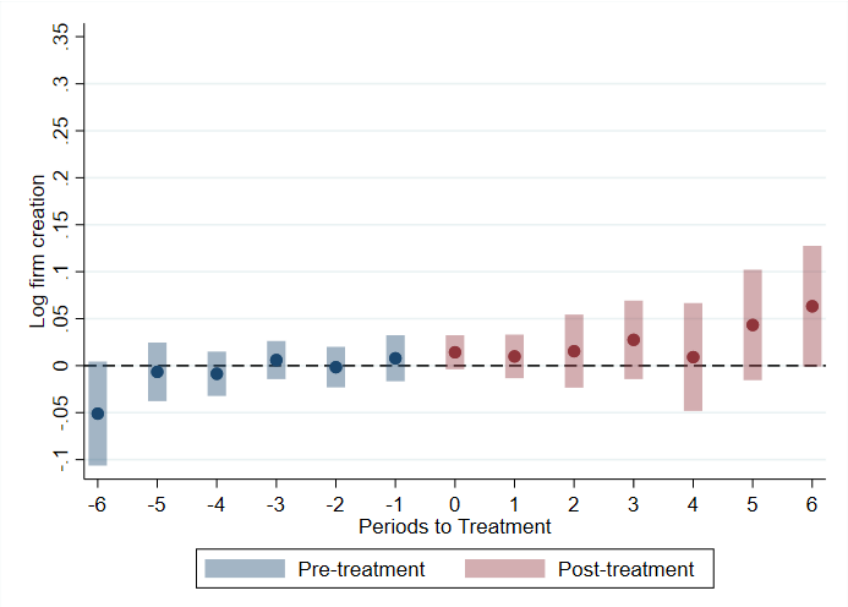
Notes: Figure A.2 plots the number of department opened in two-year technical colleges during the policy, by field of study. Data: official gazette of the French Republic ("Journal Officiel"). Go back to main text

Figure A.2: Fields opened in two-year colleges

(a) Companies (log)



(b) Sole-Proprietorships (log)



Notes: Figure A.3 plots the results of an event study on the creation of (a) new companies and (b) new sole-proprietorships. The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. All estimates are weighted using the number of firms in the area in 1990. Standard errors are clustered at the area level. The bars correspond to the 95% confidence intervals. Data: administrative registry of firms (sirene registry). Go back to main text

Figure A.3: Creation of Companies and Sole-Proprietorships

B Appendix Tables

Table B.1: Occupation & industry of new graduates, by diploma

	Head of company	Manager/ Engineer	Technician/ Supervisor	Clerk	Blue-Collar	Agriculture	Manufacturing	Construction	Retail Telecom.	Services	Public Sector
Universities:											
2-year	1.21	7.37	45.15	38.01	7.22	0.61	21.56	4.12	27.29	29.95	16.47
3-year	0.22	34.20	39.18	19.42	0.99	0.00	7.96	0.00	12.99	22.72	56.33
4-year	0.49	49.29	32.78	13.67	0.55	0.44	8.72	2.16	11.89	36.82	39.98
5-year	0.77	68.50	21.66	6.23	0.30	0.87	15.50	1.14	8.11	39.60	34.79
Ph.D	0.58	90.95	5.10	1.01	0.09	0.28	13.26	0.02	3.30	18.35	64.80
Engineering:											
Engineering schools	1.63	91.33	5.19	0.69	0.69	2.96	44.11	1.88	9.87	31.34	9.84
Instituts Uni. Pro.	0.95	44.61	32.01	14.10	0.71	0.00	22.90	4.03	16.55	44.34	12.18
Technical colleges	0.80	5.92	60.77	21.55	10.07	0.88	30.91	3.92	15.68	31.44	17.17
Business schools	1.22	44.95	44.11	7.51	0.36	0.54	19.52	1.26	27.97	46.71	3.99

Notes: Table B.1 provides job characteristics of individuals who graduated from higher education in 1994 and were working in 1997, by level of education. Columns (1)-(5) provide the share of workers by 1-digit occupation. Columns (6)-(11) display the share of workers by industry. Data: *Enquête de cheminement: sortants de l'éducation supérieure* (1994).
Go back to main text

Table B.2: Characteristics of new graduates, by diploma

	Unemployment rate	Permanent contract	Work in region of study	Wage (% of MW)	Father some Col.	Mother some Col.	Share of new graduates
Universities:							
2-year	10.89	65.69	71.77	116.78	14.19	10.13	26.37
3-year	15.35	68.29	74.11	126.03	22.12	17.48	17.69
4-year	12.01	68.27	67.67	146.03	28.34	23.74	14.31
5-year	11.28	75.48	59.98	180.48	37.24	31.74	14.09
Ph.D	10.65	74.36	64.39	216.40	43.10	30.26	3.12
Engineering:							
Engineering schools	7.09	86.95	40.30	203.93	48.81	39.29	7.25
Instituts Uni. Pro.	5.75	78.22	47.08	160.33	33.59	24.09	0.76
Technical colleges	11.08	65.32	64.05	120.10	19.96	16.49	9.81
Business schools	7.51	84.46	61.14	185.92	50.36	41.13	6.59

Notes: Table B.2 provides descriptive statistics for individuals who graduated in 1994, by diploma. Columns (1)-(4) provide: (1) the share of new graduates unemployed, (2) the share with a permanent contract (conditionally on being employed), (3) the share working in the region where they studied, and (4) their wage as a fraction of the national minimum wage. Employment characteristics are observed in 1997. Columns (5) and (6) display the share of new graduates whose father (respectively mother) has some college education. Finally, columns (7) reports the fraction of the total number of students graduating with a given diploma. Data: *Enquête de cheminement: sortants de l'éducation supérieure* (1994).
Go back to main text

Table B.3: Effects on population and local labor markets

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Population (log)	Population Aged 18-24 (%)	Students 18-24 (%)	University Graduates (%)	Unemployment Rate (%)	Unemployment Rate: 18-34 (%)	Unemployment Rate: 35-60 (%)
After x Treated	-.0182	.0037	2.685*	1.346***	.5015	.1448	.8604*
	(.0376)	(.5419)	(1.484)	(.4108)	(.4499)	(.7457)	(.4692)
Controls:							
Area & Year FE	X	X	X	X	X	X	X
N	1295	1295	1295	1295	1295	1295	1295

Notes: Table B.3 displays the results of an event study on demographic characteristics of the population at the Province level. The coefficients are averaged over all treatment periods using the procedure described in de Chaisemartin & D'Haultfœuille (2020). Outcomes include: (1) the log of population, (2) the share of the population aged between 18 and 24 years old, (3) the share of people aged between 18 and 24 going to university, (4) the share of the population with a university diploma, (5) the local unemployment rate, (6)-(7) the unemployment rate for people aged 18-34 and 35-60 respectively. Each observation is a province x year. All estimates are weighted using the size of the area in 1990. Standard errors are clustered at the area level. Data: Labor Force Surveys.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

C Data Appendix

C.1 Capacities of higher education establishments

The "Atlas Régional" provides for each city endowed with a public higher education establishments the number of students in universities and university offshoots, two-year technical colleges and engineering schools starting in 1991. The National Comity of Evaluation was created in 1984 with the objective of assessing the functioning of higher education establishments. I exploit a series of reports produced during the 1990's and 2000's on the "Universités Nouvelles" to recover their size. Missing data are then predicted using a poisson model including initial cities' characteristics, separately for each type of higher education establishment.

C.2 New graduates and the labor market

This section provides detailed descriptive statistics on new graduates' labor market outcomes by level of education. The statistics are computed using the "Enquête de Cheminement: sortants de l'éducation supérieure" (1994). This survey is run by the CEREQ on a representative sample of more than 10,500 students graduating from higher education in 1994. It collects information on their level of education, family background and labor market outcomes three years after graduation. The statistics are computed by level of education using sampling weights. The level of education is defined as the highest diploma observed in 1997. Appendix Table B.1 provides the occupation and industry in which new graduates work. Table B.2 provides information on their unemployment rate, probability to hold a permanent contract, probability to work in the region where they got their diploma, their wage, the level of education of their parents, and the fraction of each diploma among the new graduates.

First, Appendix Table B.1 shows that former students of two-year satellite campuses typically become skilled technicians, supervisors and clerks working in the manufacturing, retail, telecommunications and services. Appendix Table B.2 highlights that students with no more than two-year of higher education are extremely likely to work in the region where they were educated (74%). They earn on average 17% more than the minimum wage and they account for more than a fourth of the graduates.

Second, graduates from two-year technical colleges work mostly as skilled technicians and supervisors (60.77%). They are over-represented in the manufacturing industry and earn on average 120% of the minimum wage. They are slightly less likely than the other two-year college educated workers to work in the region where they got their diploma (64%). They account for almost 10% of the graduates.

Third, former students from engineering schools and IUP mostly become engineers and managers working in the manufacturing industry. They have the lowest unemployment rates and earn higher wages (respectively 204% and 160% of the minimum wage). They are also the most mobile students with a (high) retention rate ranging between 40 and 50%. Finally, students from IUP and engineering schools represent about 8% of the new graduates.

D Quantification exercise

The policy *Universities of the 21st century* offers a unique quasi-experimental design to estimate the impact of the level of education on business dynamism. We saw in Section 5.1 that the construction of new colleges resulted in a sizeable increase in the level of education of the local workforce. The policy can hence be used as localized supply shocks of educated workers. To estimate the semi-elasticity of firm creation with respect to education, I instrument the share of the workforce with a university diploma by the number of higher education establishments constructed during the policy. I implement the following two stage least squares model:

$$Y_{a,t} = \alpha_a + \delta_t + \gamma.\widehat{\text{College Share}}_{a,t} + \epsilon_{i,t} \tag{A}$$

$$\text{College Share}_{a,t} = \alpha_a + \delta_t + \mu.\text{New Colleges}_{a,t-k} + u_{i,t} \tag{B}$$

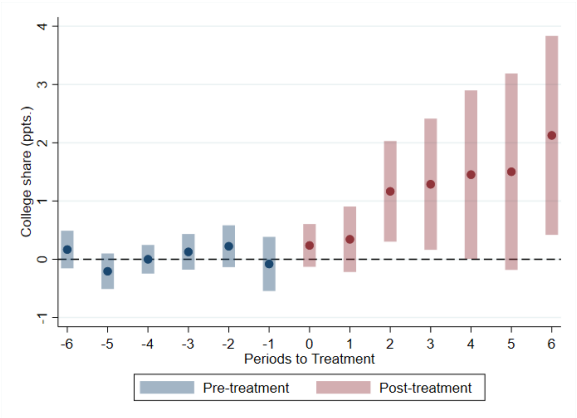
where equation B corresponds to the first stage regression while equation A is the second stage of the 2SLS regression. $Y_{a,t}$ is a measure of firm creation in area a during year t. α_a controls for time-invariant area characteristics. δ_t accounts for time-varying shocks that affect firm creation similarly in all areas. College Share$_{a,t}$ is the share of the workforce with a university diploma. New Colleges$_{a,t-k}$ is the cumulative number of colleges constructed between 1989 and $t-k$.[63] In the baseline specification, I use a lag of 2 years consistent with the time needed to educate the new students. Regressions are weighted by the number of firms in the areas in 1990. Standard errors are clustered at the area level.

Contrary to event study models, this framework allows to estimate the impact of education on firm creation even if new graduates are mobile, as long as the level of education increases more in treated areas. Indeed, the impact of the new colleges on firm creation is now scaled by their effect on the local level of education. However, this strategy relies on the assumption that the effect of new colleges on firm entry is driven solely by the increase in the level of education (see discussion in Section 5.2). Conditionally on that hypothesis, the γ coefficient provides the impact of increasing the share of the workforce with a university diploma by 1 percentage point on firm creation.

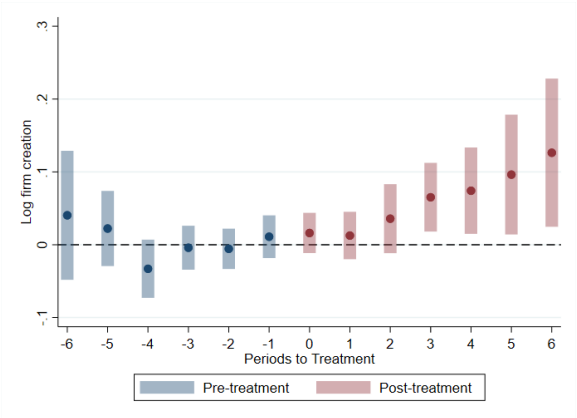
[63] Alternatively, I use a dummy variable which takes the value one if area a received at least a new college before $t-k$.

E Robustness analysis

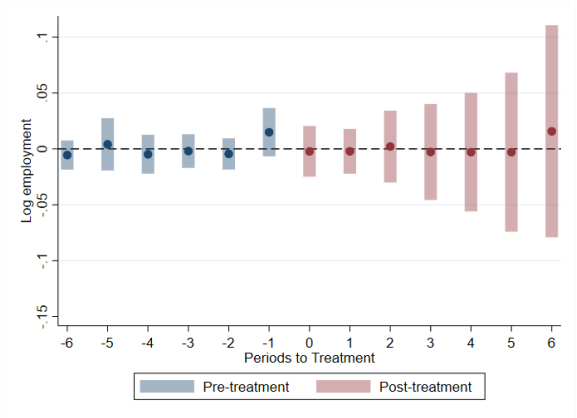
(a) Share of University Graduates



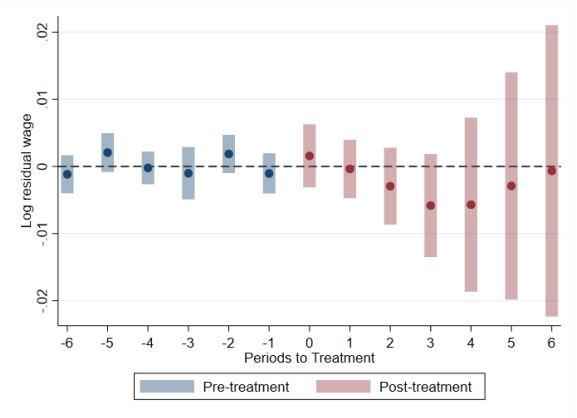
(b) Firm Creation (log)



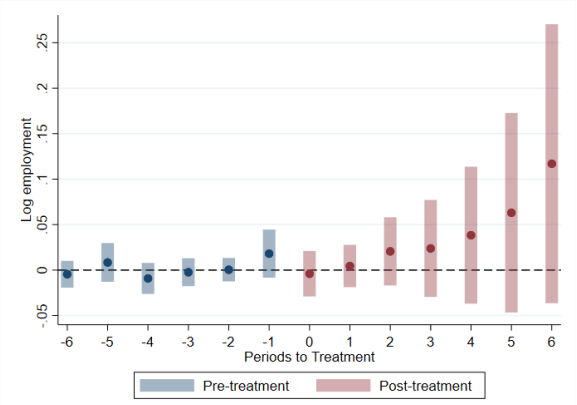
(c) Employment (log)



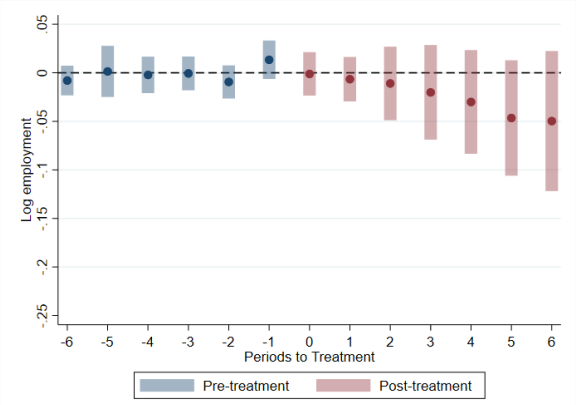
(d) Log Residualized Wage (gender, age education)



(e) Employment 18-34 (log)



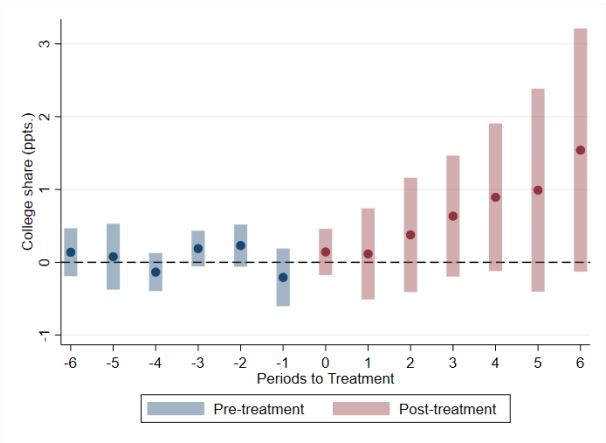
(f) Employment 35-60 (log)



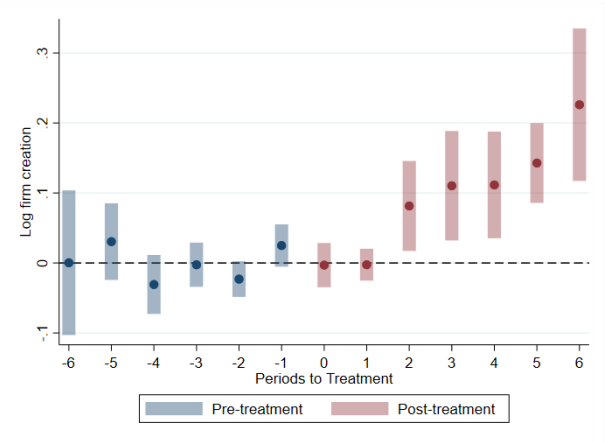
Notes: Figure E.1 plots the results of an event study analysis on (a) the share of college graduates, (b) the log of firm creation, (c) the log of employment, (d) the log of residualized wages for all workers, (e) the log of employment for workers aged 18-34 years old and (f) the log of employment for workers aged 35-60 years old. Log wages are residualized using gender, age and education dummies. Education includes four categories: no diploma, vocational diploma, high school diploma and university diploma (two-years or more). The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. Estimates of panel (a), (c), (d), (e), (f) are weighted using the size of the area in 1990. Estimates of panel (b) are weighted using the number of firms in the area in 1990. Standard errors are clustered at the urban area level. Data: linked employer-employee data matched with census data (Panel DADS and EDP) and administrative registry of firms (sirene registry) excluding the urban area of Paris. Go back to main text

Figure E.1: Analysis excluding the area of Paris

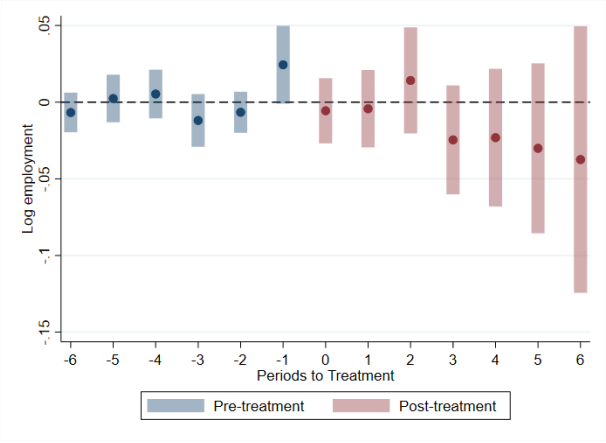
(a) Share of University Graduates



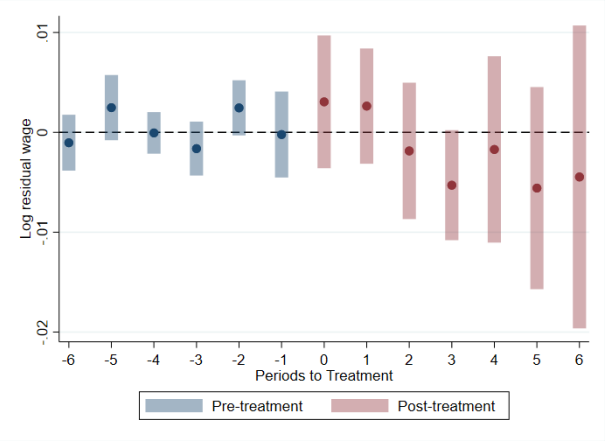
(b) Firm Creation (log)



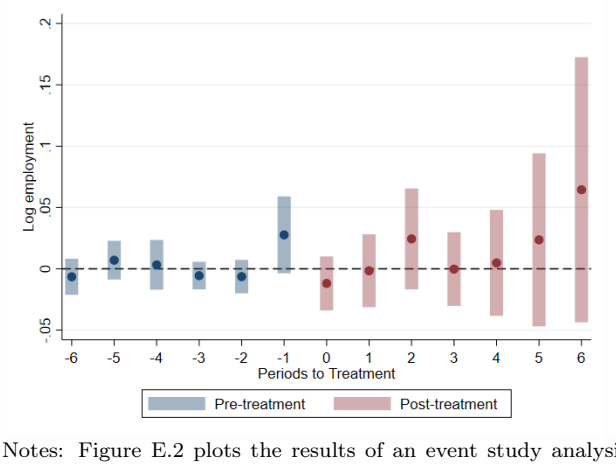
(c) Employment (log)



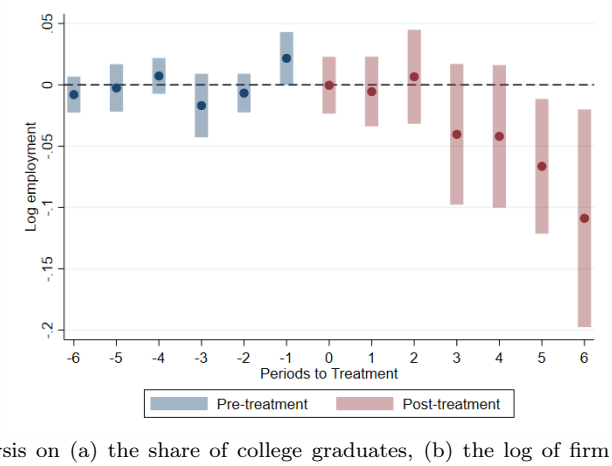
(d) Log Residualized Wage (gender, age education)



(e) Employment 18-34 (log)



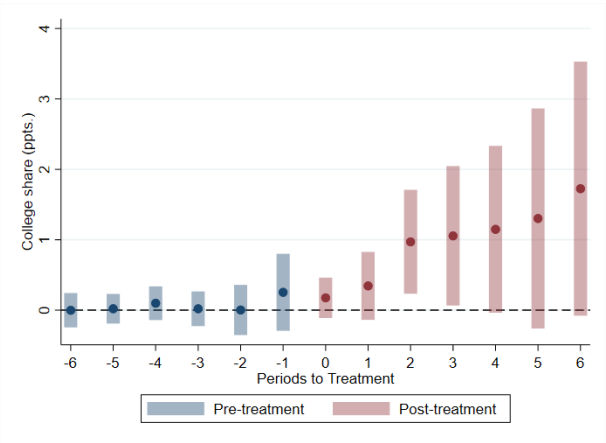
(f) Employment 35-60 (log)



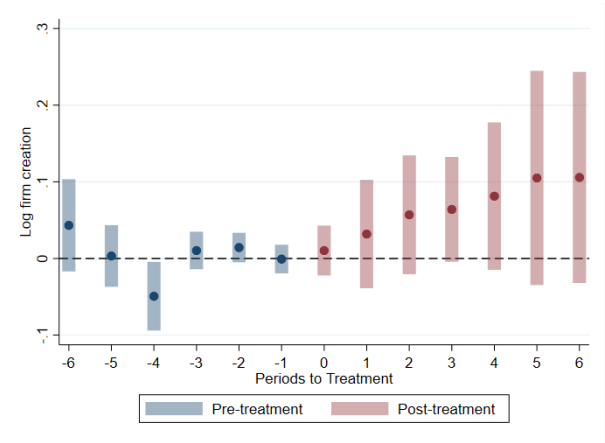
Notes: Figure E.2 plots the results of an event study analysis on (a) the share of college graduates, (b) the log of firm creation, (c) the log of employment, (d) the log of residualized wages for all workers, (e) the log of employment for workers aged 18-34 years old and (f) the log of employment for workers aged 35-60 years old. Log wages are residualized using gender, age and education dummies. Education includes four categories: no diploma, vocational diploma, high school diploma and university diploma (two-years or more). The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area. Estimates of panel (a), (c), (d), (e), (f) are weighted using the size of the area in 1990. Estimates of panel (b) are weighted using the number of firms in the area in 1990. Standard errors are clustered at the urban area level. Regressions include the log of the population in 1990 as control using stabilized IPW method (see Abadie (2005), Callaway & Sant'Anna (2021)). Data: linked employer-employee data matched with census data (Panel DADS and EDP) and administrative registry of firms (sirene registry). Go back to main text

Figure E.2: Analysis controlling for initial population

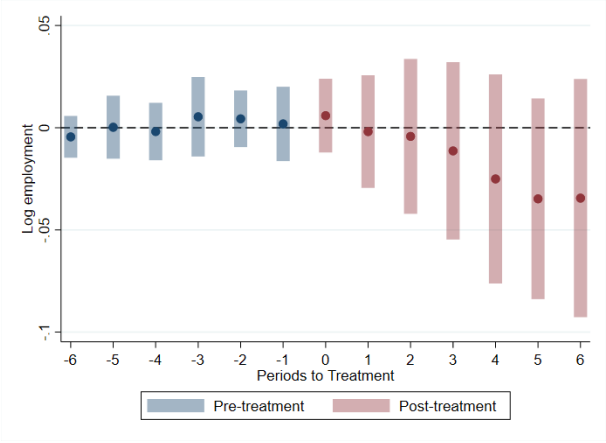
(a) Share of University Graduates



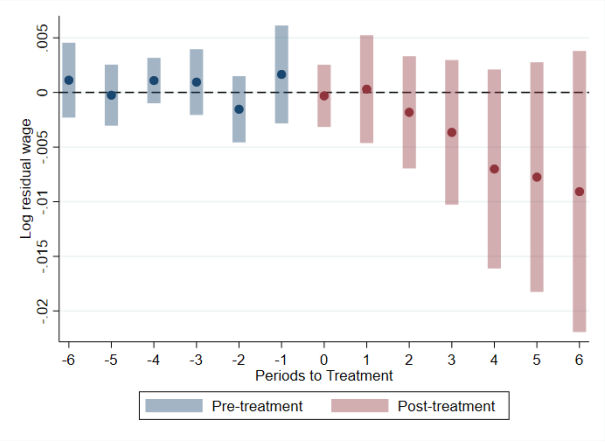
(b) Firm Creation (log)



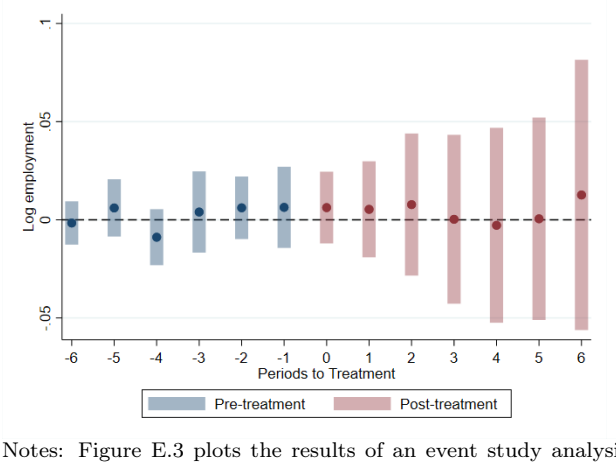
(c) Employment (log)



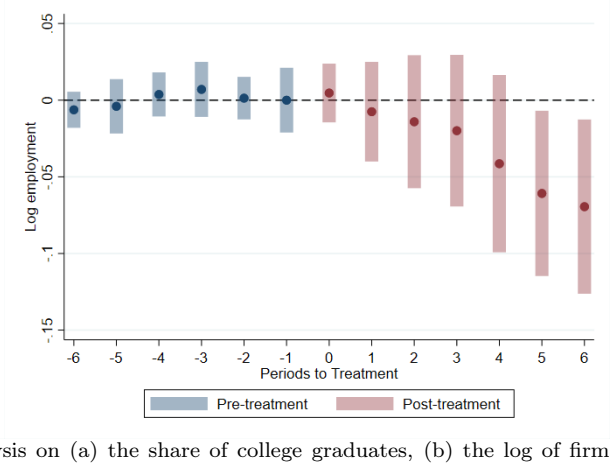
(d) Log Residualized Wage (gender, age education)



(e) Employment 18-34 (log)



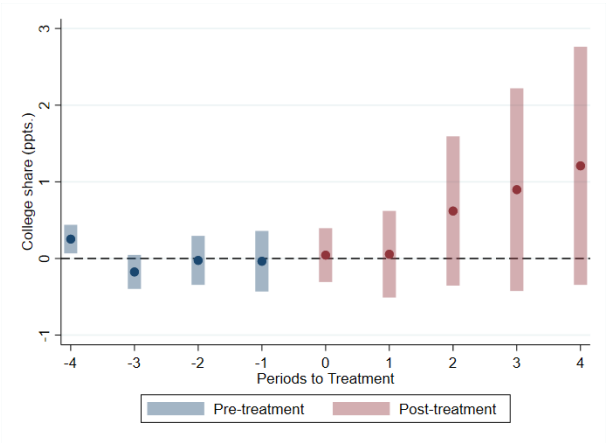
(f) Employment 35-60 (log)



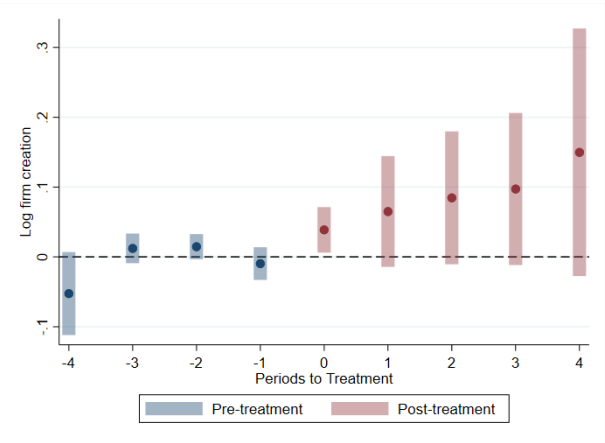
Notes: Figure E.3 plots the results of an event study analysis on (a) the share of college graduates, (b) the log of firm creation, (c) the log of employment, (d) the log of residualized wages for all workers, (e) the log of employment for workers aged 18-34 years old and (f) the log of employment for workers aged 35-60 years old. Log wages are residualized using gender, age and education dummies. Education includes four categories: no diploma, vocational diploma, high school diploma and university diploma (two-years or more). The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a province x year. Estimates of panel (a), (c), (d), (e), (f) are weighted using the size of the CZ in 1990. Estimates of panel (b) are weighted using the number of firms in the CZ in 1990. Standard errors are clustered at the CZ level. Data: linked employer-employee data matched with census data (Panel DADS and EDP) and administrative registry of firms (sirene registry). Go back to main text

Figure E.3: Analysis at the Commuting Zone level

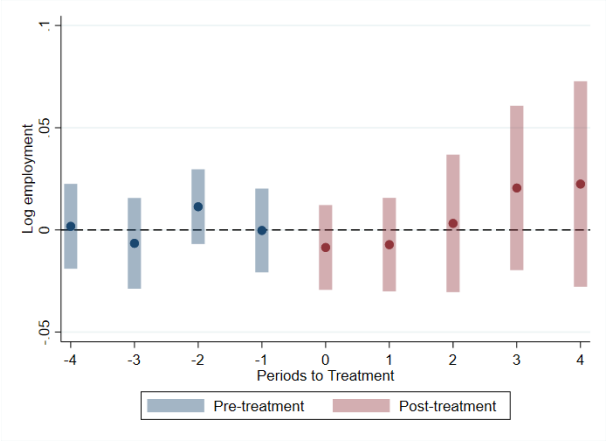
(a) Share of University Graduates



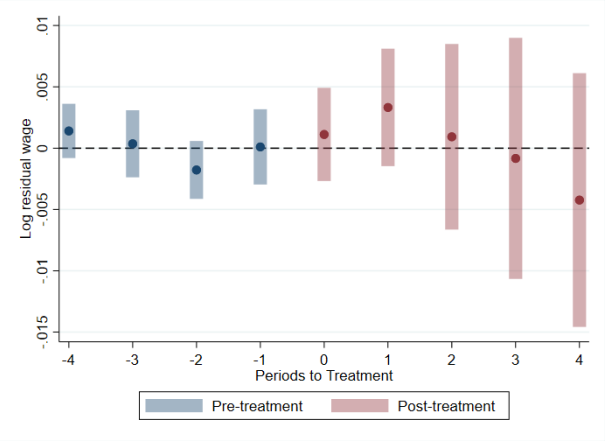
(b) Firm Creation (log)



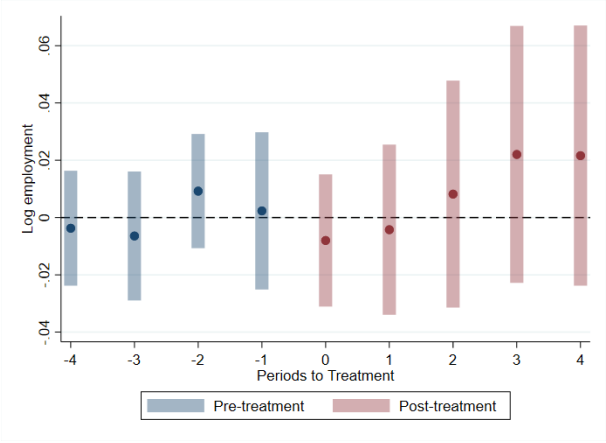
(c) Employment (log)



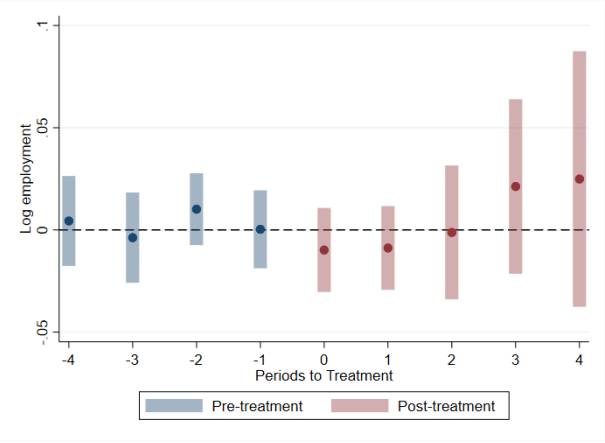
(d) Log Residualized Wage (gender, age education)



(e) Employment 18-34 (log)



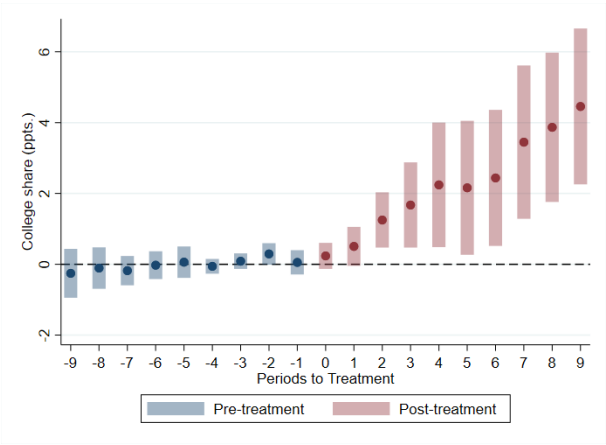
(f) Employment 35-60 (log)



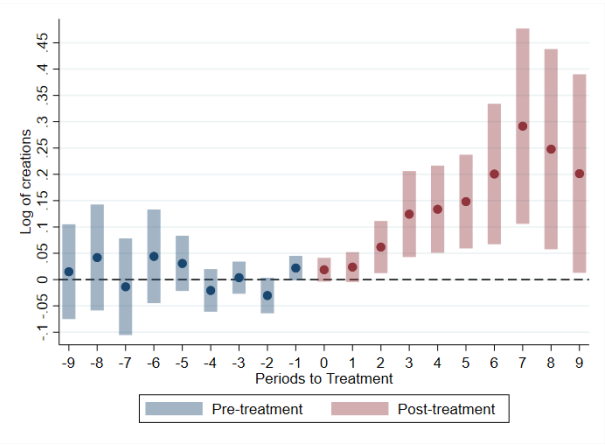
Notes: Figure E.4 plots the results of an event study analysis on (a) the share of college graduates, (b) the log of firm creation, (c) the log of employment, (d) the log of residualized wages for all workers, (e) the log of employment for workers aged 18-34 years old and (f) the log of employment for workers aged 35-60 years old. Log wages are residualized using gender, age and education dummies. Education includes four categories: no diploma, vocational diploma, high school diploma and university diploma (two-years or more). The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a province x year. Estimates of panel (a), (c), (d), (e), (f) are weighted using the size of the province in 1990. Estimates of panel (b) are weighted using the number of firms in the province in 1990. Standard errors are clustered at the province level. Data: linked employer-employee data matched with census data (Panel DADS and EDP) and administrative registry of firms (sirene registry). Go back to main text

Figure E.4: Analysis at the Province level

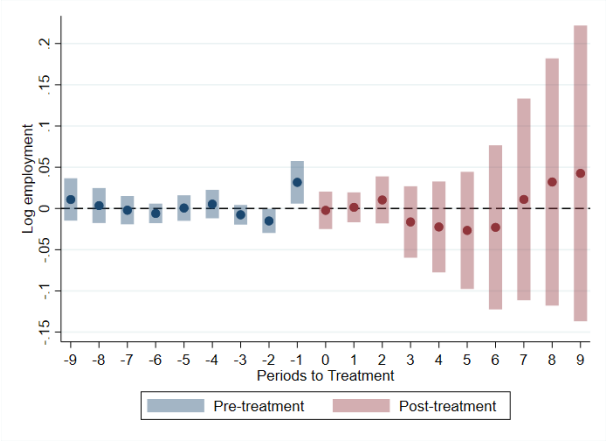
(a) Share of University Graduates



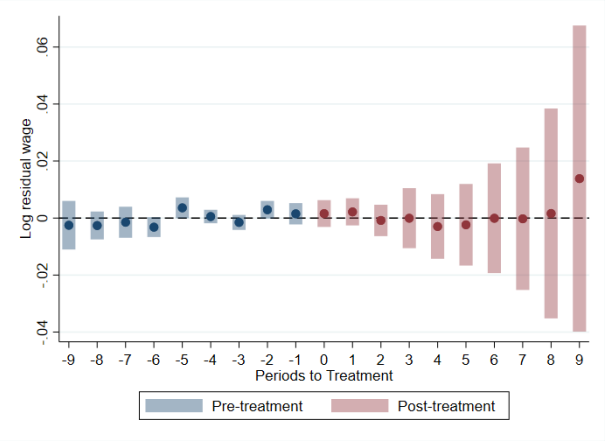
(b) Firm Creation (log)



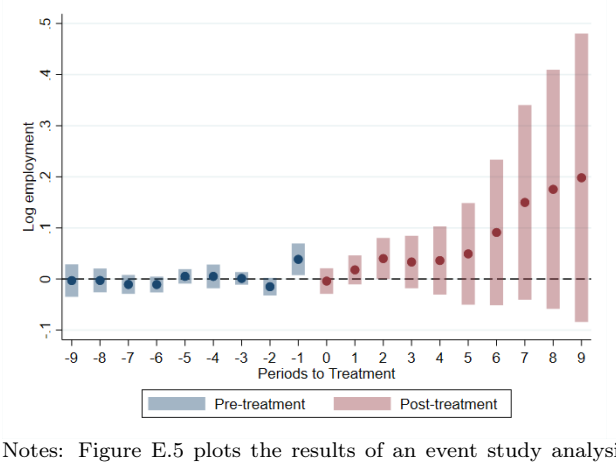
(c) Employment (log)



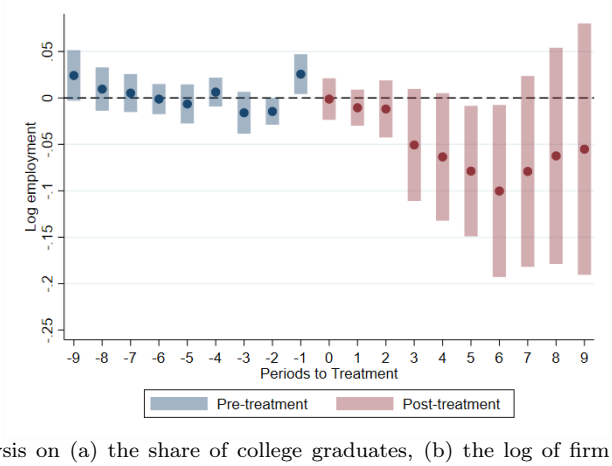
(d) Log Residualized Wage (gender, age education)



(e) Employment 18-34 (log)



(f) Employment 35-60 (log)



Notes: Figure E.5 plots the results of an event study analysis on (a) the share of college graduates, (b) the log of firm creation, (c) the log of employment, (d) the log of residualized wages for all workers, (e) the log of employment for workers aged 18-34 years old and (f) the log of employment for workers aged 35-60 years old. Log wages are residualized using gender, age and education dummies. Education includes four categories: no diploma, vocational diploma, high school diploma and university diploma (two-years or more). The event time is defined relative to the first year of treatment (i.e. the first increase in higher education capacities during the policy). Each observation is a urban area x year. Estimates of panel (a), (c), (d), (e), (f) are weighted using the size of the area in 1990. Estimates of panel (b) are weighted using the number of firms in the area in 1990. Standard errors are clustered at the urban area level. Data: linked employer-employee data matched with census data (Panel DADS and EDP) and administrative registry of firms (sirene registry). Go back to main text

Figure E.5: Long-run effects at the urban area level