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Future Versus Today's Improvements: The Trade-off of Place-Based Policies

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Future versus Today's Improvements: the Trade-off of Place-based Policies*

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Abstract

This paper provides causal evidence on the impact of subsidy re-allocation between high technology sectors and low-skill sectors on local labor markets. We exploit a policy targeting under-performing employment areas, France's *Aides à Finalité Régionale*, which relaxes rules governing the allocation of firm subsidies while keeping their level constant. In response, policy makers re-allocate subsidies away from research and development to mainly low-skilled manufacturing and service sectors. It triggers a persistent improvement of employment, mainly through increased low-skilled manufacturing employment and at the expense of R&D related occupations. In the long term, though, labor income and productivity decrease. Finally, at the individual level, workers employed in manufacturing at the time of the treatment benefit on average of 2% higher hourly wage even 10 years after the policy was lifted.

Keywords: subsidy allocation, place-based policies, manufacturing, R&D, employment and wages, underperforming areas

JEL: H25, J21, J31

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1 Introduction

In developed economies, the structural decline of manufacturing sectors left formerly flourishing regions in distress. To resist this trend, governments implemented place-based policies aiming to foster investments and revitalise local economies. More recently, current climate and geopolitical challenges have also triggered a significant increase in firm subsidies across advanced economies to foster new industries (Criscuolo et al., 2023). The resurgence of discussions about the sustainability of public debts might, though, limit the capacity of governments to find resources to finance these investments. Re-allocating subsidies away from prevalent sectors could prove necessary.

In this paper we attempt to answer the following questions. What is the employment effect of re-allocating subsidies? Is there a trade-off between subsidising prevalent and new promising sectors? Who would eventually benefit and loose from this re-allocation?

We exploit arguably exogenous rule changes for French subsidies and find that in depressed labor markets a re-allocation of firm subsidies from research and development to low-skilled intensive sectors triggers a strong and persistent employment response, benefiting low-skilled workers the most, especially in manufacturing. This positive dynamic comes at the costs of lower workers' income and labor productivity.

To arrive at these conclusions, we consider structurally disadvantaged areas that are naturally the target of subsidies. Policy makers face (at least) two quite different strategies. Local leaders might naturally be inclined to lean against structural trends, subsidizing sectors with limited long-term growth prospects but high overlap between the current occupation structure and the skills available locally. Alternatively, an authority with a broader geographic mandate might take a more long-term view and instead require subsidies in new sectors, investing to foster a change in the sector composition of the local labor market towards more promising activities. The latter strategy might be helpful in the longer run and alleviate the need for subsidies in the future, but can come at the cost of a more immediate degradation of local labor market conditions and significant loss of physical and human capital, especially if such capital is at least partially sector-specific.[1]

One can view the European Commission rules for subsidies as taking the second view. While subsidies to research and development (R&D) benefit from exemptions, most

[1]See, e.g., Kambourov and Manovskii (2009); Couch and Placzek (2010); Gathmann and Schönberg (2010).

other subsidies face substantive restrictions to guarantee fair competition. Only in specially designated disadvantaged areas, *Aides à Finalité Régionale* (AFR) zones, policy makers benefit from a much looser rules. There, firms can receive subsidies up to a share of their investments irrespective of their sector of activity, which are available in the rest of the country mainly for research and development (R&D) expenditures.

Furthermore, in contrast to other EU countries which allocated large budgets to make use of these exemptions to achieve regional development goals, the French government dedicated only a negligible amount of funding to specifically subsidize firms in AFR zones.[2] This offers the chance to study a setting where subsidy amounts are not affected by whether regions have AFR status or not, but where this status allows local policy makers to re-allocate subsidies to struggling but maybe less future-oriented industries.

To study exogenous variation in status, we exploit a change in the geographical coverage of the legal frameworks governing firm subsidies. An employment area can change AFR status because local economic condition changes or because the rule governing the zoning changes. While the former are endogenous, the latter changes depends on EU rules which arguably are largely exogenous to the exact local conditions. In 2000 the European Commission decided to reduce the share of the population included in AFR zones from 40% to 34%, a reduction of about 18% of the coverage. This change was mainly motivate by the coming 2004 enlargement of the European Union to less developed countries in Eastern Europe and affected all members of the EU similarly. This 2000 change was therefore mainly exogenous to local economic conditions.

To further control for the remaining endogenous part, i.e., the economic development of French local areas, we build a synthetic instrumental variable which solely relies on changes in the zoning rule in the spirit of Criscuolo et al. (2019). According to the regulations set by the European Commission, the French government set the zoning rule based on a few indicators and an homogeneous geographical level. Even though the exact rules are not public, we recover the used indicators from exchanges between the European Commission and the French government and estimate the rule from the actual zoning. A notable characteristic of the AFR zoning is that it is defined at the employment area level, the most relevant level to study local labour market dynamics.

To study this policy change our analysis relies on match employer-employee data for the quasi-universe of firms in France for the period 1997 to 2018. We can, thus, estimate

[2]See Criscuolo et al. (2019) for the United Kingdom and Siegloch et al. (2021) for Germany, who study the large increases in subsidy amounts that these countries allocate to areas who are given exempt status.

the effect of the policy both during its implementation between 2001 – 2006 as well as up to a decade later. This long-term perspective allows us to distinguish transitory and persistent effects. It is necessary to evaluate these policies given that they are usually implemented to fulfill long-term goals.

In terms of results, we first document that the total amount of subsidies received by firms indeed remains unaffected by changes to the legal framework governing them. Policy makers make, though, use of higher discretion in two ways: they increase the share of large subsidies beyond the cap that is anyhow exempt, and they re-allocate subsidies away from research centers to low-skill-intensive sectors. Other firm characteristics seem to play a relatively minor role, including the size of the firms who receive subsidies.[3] The re-allocation to low skilled-intensive sectors is in line with previous work showing that local policy makers favor low-skilled employment over long-term growth [e.g., recently D'Amico (2021)].

Our second result concerns the main interest of this paper: this re-allocation triggers a positive and persistent employment response, both in terms of hours worked and number of employees. In aggregate across the local labor market this does not lead to negative effects on total value added in the local area, and even boosts exports. In this aggregate sense we do not find detrimental effects on local growth even up to a decade beyond the intervention. If such a trade-off with long-term growth is actually present, the "long-term" must be defined over an even longer time frame.

While these effects are positive for the local area, per individual worker they come at the cost of some deteriorating conditions. While the hourly wage remains unaffected, the number of annual hours worked per worker decreases, reducing workers' annual labor income. Furthermore, labor productivity decreases in the longer term.

The shift in subsidies is associated with a shift of work towards lower skills. In particular, it mainly increases low-skilled work in manufacturing and services, while employment in R&D related occupations drops significantly. These results are based on repeated cross-sections of workers, which includes those that might move into the area or change occupations. Additionally, we utilize a panel of incumbent workers in 1999 to estimate the policy effect at the individual level. We find that labor market outcomes of incumbent workers overall do not improve in treated areas compared to those in non-treated areas. Zooming into different sectors, we find that only workers who were

[3]The insignificant role of firm size for subsidy receipts is part of the policy design, as we discuss in more detail in the main body.

initially employed in the manufacturing sectors experience improvements of their labor market prospects, mainly through persistently higher hourly wages (about 2%).

Our results contribute to an extensive literature that identifies the causal effect of place-based policies, see Kline and Moretti (2014) for a survey. A recent literature provides causal evidence that firms' receipt of subsidies can increase employment significantly, especially in manufacturing.[4] Nevertheless, significant uncertainty about heterogeneous effects remains (Juhász et al., 2024). We provide evidence about this heterogeneity and show that the choice of which sector to support matters for local labor markets, even in the long-term.

Several papers study a similar policy in other European countries: Criscuolo et al. (2019) in the United-Kingdom and Siegloch et al. (2021) in Eastern Germany. In both cases, areas eligible to more lenient subsidy rules also benefit from a large increase in the amount of subsidies available, and these studies attribute their effects to this increase in funding. We find that solely the change in the legal framework governing firm subsidies triggers a large employment response due to the re-allocation of subsidies away from R&D.[5] Future studies could thus benefit from disentangling the *level* effect or larger amounts of local subsidies from the *re-allocation* effect of targeting a given amount differently when studying regional development policies. A further specificity of the AFR is that the zoninig is defined at the employment area level, which is probably the most relevant level to study the employment effect of place-based policies. It also mitigates concerns of spatial spillovers which are often found in studies of place-based policies with cross-sectional treatment heterogeneity.

Our paper relates also closely to the literature on the political economy of subsidy allocation. D'Amico (2021) shows that local policy maker have a preference to allocate subsidies to more low-skilled oriented sectors and away from R&D. At the firm level, Cingano et al. (2023) provide causal evidence that giving more discretionary power to local policy makers generates a larger employment response but at a higher cost. We find indeed that when firm subsidies are governed by less restrictive rules, policy makers re-allocate them to low-skill intensive sectors. In our case though, this re-allocation is beneficial for local employment, even in the long term.

[4] see among many recent contributions: Choi and Levchenko (2021); Kim et al. (2021); Lane (2022) and Hirvonen et al. (2022)

[5] This goes in line with Bronzini and Iachini (2014) which shows that R&D subsidies are broadly ineffective unless given to particular firms: in their setting to small firms. We do not find that rule changes in France trigger re-allocations by firm size, but by sector.

In the next section we describe the institutional context, and in Section 3 and 4 we introduce the data and empirical strategy. In Section 5, we provide evidence for the constant level of subsidies and its re-allocation across sectors. Section 6 discusses the effects on the local economy and in Section 7, we describe the effects on incumbent workers. Section 8 concludes.

2 Institutional framework

In this paper, we exploit spatial and temporal variation in the rules that govern the allocation of subsidies to firms in France. Under the premise that subsidies can distort competition and trade, the European Union strictly restricts their allocation. But more lenient firm subsidies are allowed in specifically defined economically disadvantaged areas. Our empirical approach relies on regulations that define those economically disadvantaged areas, named *Aides à Finalité Régionale (AFR)* zones, in France. Generally, the goal of assigning different regions as AFR zones is to equalize living standards across regions by stimulating the local economy. But in contrast to other EU countries which allocated large budgets to make use of these rules and exemptions, see e.g. Criscuolo et al. (2019) for the United Kingdom and Siegloch et al. (2021) for Germany, the French government dedicated only a negligible amount of funding to specifically subsidize firms in AFR zones: the respective policy, *Prime d'Aménagement des Territoires* was granted during in 1997 a budget of 38 millions out of which only 24 millions were allocated to 228 project. It represent less than 1% of the total amount of subsidies allocated to firms the same year.[6] The institutional setting in France provides an excellent setting for our research questions because the federal and regional governments did not channel any additional money into those regions.

In AFR zones, existing funds are allowed to be allocated in a more lenient way: in non-AFR zones in France, the *de minimis rule* sets the maximum amount of subsidies a firm can receive over a three year period to be €100k.[7] Exemptions to the de minimis rule exist for state aid in support of investments in some sectors, mainly Research and Development, and in support of regional development objectives. In comparison, in AFR zones, policy makers benefit from a much more permissive legal framework. Firms may receive subsidies higher than the threshold of the de minimis rule but restricted to

[6] See Appendix 6 *Aménagement Du Territoire et Environnement* to the *Projet de loi de Finance 1999*.
[7] The limit was €100k prior to 2008 and increased to €200k thereafter.

a share of their total investments or costs of new jobs. While becomes more permissive for all firms, larger firms have tighter share restrictions even in AFR zones to avoid preferential treatment of just the largest firms.[8] This setting grants policy makers in AFR zones a much greater freedom in their allocation of subsidies, which might affect which firms and sectors get subsidised and to which extent. We show in this paper that the heterogeneity in the legal framework governing firm subsidies as well as the negligible additional amounts devoted to AFR zones provides credible variation in the allocation of subsidies across sectors at a relatively constant budget. The institutional setting creates an ideal opportunity to tackle our research question as, in particular, it affects the differential incentive to subsidise R&D-focused sectors in comparison to other sectors (primarily manufacturing).

The assignment of AFR zones is determined within the EU state aid legislation and typically declared for the 6-year horizon of the European Union. Comparable to the setting in Criscuolo et al. (2019) for the UK, we exploit a significant change in the geographical coverage of the legal framework in 2000. An employment area can change AFR status because local economic condition change or because the rule governing the zoning changes. While the former changes are endogenous, the latter changes depends on EU rules that are viewed as largely exogenous to the exact local conditions and hence, are the key identifying variation in our paper. We thereby follow the argumentation of Criscuolo et al. (2019) that the European Commission sets the rules for the entirety of the European Union which mitigates concerns of policy endogeneity.[9] In particular, the following procedure takes place. First, the European Unions sets common rules as well as population quotas, i.e., determining the size of the population which is allowed to live in AFR zones. Based on this, France proposes a zoning rule based on local indicators which is then approved by the European Commission. Variation originates from, first, the share of French population living in AFR zones and, second, changes in the zoning rule over time due to different local indicators being used and different weights assigned to those indicators.

Figure 1 depicts the AFR zones in France for 1995 – 2000 (left panel) and 2000 – 2006

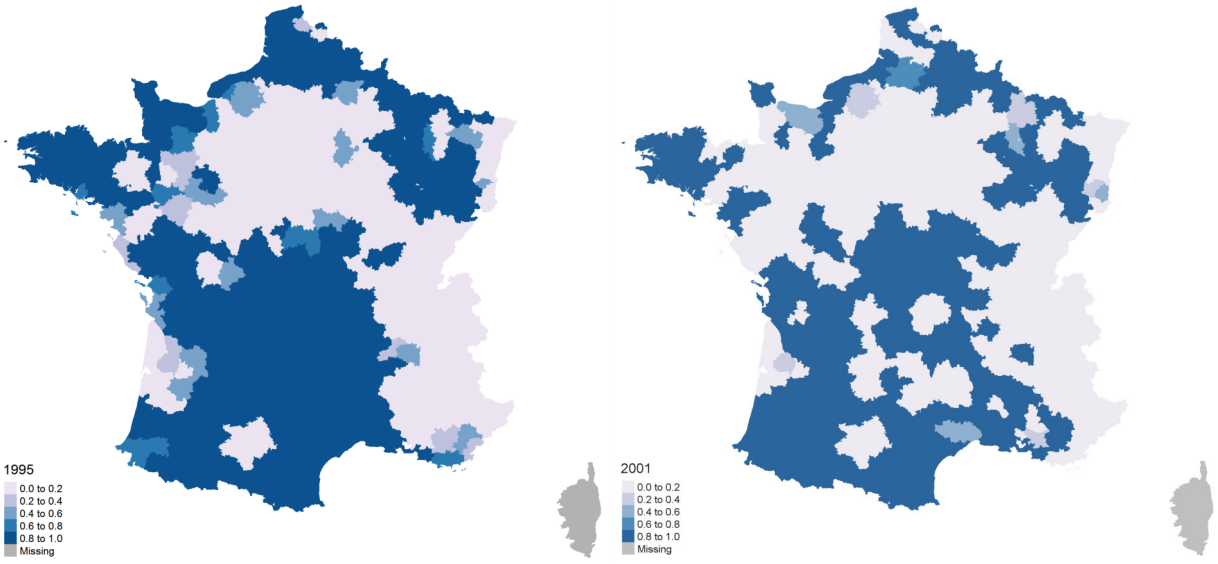
[8]The subsidy threshold is decreasing in firm size and ranges from 30% for small firms to 20% for larger ones during the period 2000–2006. Details can be found in the *Official Journal of the European Union C74/19 10.03.1998*.

[9]The EU rules for state aid for 2000 – 2007 and the assignment of AFR zones are explained in the *Official Journal of the European Union C74/19 10.03.1998*. The resulting AFR assignment is given for 1995 – 2000 in the *République Française Journal Officiel – Lois et décrets, 12.02.1995, 127e année, No 37.* and for 2000 – 2006 in the *République Française Journal Officiel – Lois et décrets, 13.04.2001, 133e année, No 88.*

(right panel). The most dynamic regions of France are in neither of the AFR zoning: the Paris region, the Rhone valley, Toulouse and Bordeaux. In the rest of the country, we observe some considerable change between the two periods with a generally more sparse coverage after 2000. In few employment areas, French authorities negotiated with the European Commission to only treat some municipalities instead of the whole employment area. In such cases, we compute the treatment intensity as the employment share of treated municipalities in the employment area.

Local authorities in France benefit for several levers to subsidise firms. They can exempt firms from local taxes, mainly the *taxe professionnelle*, a tax on labor costs and physical capital, or provide non-pecuniary benefits, e.g. advantageous rent or purchasing price of real-estate. They have though little capacity to increase their income given that a large share of their budget consists of transfers from the central government.

Figure 1: AFR zoning before and after 2000



Notes: Map of the *Aide à Finalité Régionale* at the employment area level. Few employment areas are only partially included in the AFR zoning. The gradient of blue corresponds to the employment share of municipalities treated in the employment area; with employment taken in 1997.

3 Data

Our empirical investigation make use of two main datasets. First, we use firm-level balance sheet data for all private sector firms in France (FARE/FICUS), provided by the

Institut national de la statistique et des études économiques (INSEE) and the *Direction générale des Finances publiques*, which includes also information about subsidies received. Second, we use cross-sections of job-level social declarations of all private sector employees (DADS), provided by the INSEE, which in particular includes occupation, wage payments, hours worked and socio-economic characteristics of workers. [10]

We combine them into a panel of firms covering the period 1997-2018. Our analysis aims to understand dynamics at the level of a local labor market, given that we only have access to balance-sheet information at the firm level, we focus our analysis on single-establishment firms when looking at financial data. We further exclude firms reporting zero hours worked or zero value added. Finally, we exclude from the analysis employment areas in *Ile de France*, the Paris region, which are *per se* excluded from the AFR zones irrespective of their economic indicators; and regions with special fiscal status: Corsica and oversea regions. The latter restriction applies also to the analysis we do at the employment area level.

Finally, we also build a panel of the universe of workers with detailed information about their jobs and socio-economic characteristics relying on the new methodology to identify workers across years implemented in Babet et al. (2022).

Table 1 shows summary statistics in 2000 for all employment areas in France as well as the share which has ever become an AFR zone between 1997 and 2018. Three quarters of employment areas have been, at least partially, an AFR zone at some point over the period. The zoning covers on average smaller labor markets, with smaller establishments, lower mean wages and low value-added per hour, and a lower share of skilled workers. Large metropolitan areas, at the notable exception of Marseille, never falls in AFR zones. The presence of most head quarters in large metropolitan areas probably explain the higher amount subsidies per worker outside AFR zones.

[10] The data sources which we use in our analysis are: Insee (2012a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p, 2014c,a,b, 2015, 2016b,a, 2017), Insee and Ministère Des Finances (2013, 2014r,q,h,g,f,e,d,c,b,a,p,o,n,m,l,k,j,i, 2015, 2016, 2017, 2018)

Table 1: Employment areas in 2000 by AFR status

	France	AFR zones
# of employment areas (EA)	314	244
# of employees (in 1,000)	13,023	8,865
Average establishment size (in employees)	12.5	11.8
Mean wage	10.25	9.49
Mean of VA/hours	37.97	35.04
Share of high skilled workers	12.45	8.27
Subsidies		
Total subsidies (in mn Euro)	24,606	10,975
Subsidy per worker (in Euro)	1889	890

Notes: FARE/FICUS & DADS 2000. The set of *AFR zones* comprise all employment areas which are at least partially an AFR zone during the period 1997 – 2018. High skilled workers corresponds to the 1-digit PCS occupation 3, e.g. CEOs, managers and engineers.

4 Empirical Methodology

We estimate a standard event study model:

$$y_{c,t} = \sum_{k \neq 1999} \beta^k 1_{k=t} D_c + f_c + f_{t,r(c)} + \epsilon_{c,t} \tag{1}$$

where $y_{c,t}$ is an economic statistic in year t of employment area c. $D_{c,t} \equiv AFR_{c,2001} - AFR_{c,1997}$ is the treatment change. We include employment area fixed effects f_c and regional-year fixed effects $f_{t,r(c)}$ to control respectively for individual heterogeneity and common regional shocks. The French territory consists of 22 regions and 348 employment areas.[11] The change in zoning was announced at the end of 2000 and formally implemented in 2001, so we decided to take 1999 as a base year.

The rules from the European Commission stipulate that employment areas should be entirely included in the treatment. French authorities negotiated though a few exceptions to the rule. In such cases, we define the treatment as the employment share of

[11]The French statistical office (INSEE) groups municipalities into employment areas to create entities maximizing the share of people leaving in the area they also work. Employment areas are specifically designed to the study of local labor markets. They do not have any legal existence. Municipalities and regions are administrative and political entities.

treated municipalities in the employment area c, with employment shares taken in 1997, i.e., before the change in treatment.

In 2000 the European Commission decided to reduce the share of the population included in AFR zones from 40% to 34%, a reduction of about 18% of the coverage. This change was mainly motivated by the upcoming enlargement of the European Union in 2004 which included less developed countries in Eastern Europe. It affected all existing members of the EU similarly. This 2000-change of the national aid regulations was therefore mainly exogenous to domestic conditions. Nevertheless, local economic development also plays a role; worst-performing areas are more likely to be treated, which would tend to underestimate the benefits from the treatment. To control for this endogenous component, we build a synthetic instrumental variable which solely relies on changes in the zoning rule, in the spirit of Criscuolo et al. (2019).

We decompose the change of AFR treatment into an endogenous part, the economic development of local labor markets, and an exogenous part, changes in the treatment rule itself:

$$\begin{aligned} AFR_{c,01} - AFR_{c,97} &= \beta_{01} X_{c,01} - \beta_{97} X_{c,97} \\ &= (\beta_{01} - \beta_{97}) X_{c,97} + \beta_{97}(X_{c,01} - X_{c,97}) + (\beta_{01} - \beta_{97})(X_{c,01} - X_{c,97}) \end{aligned} \tag{2}$$

with $X_{c,t}$ as the value of economic indicators used in the AFR treatment rule in the employment area c at time t and the β-coefficients reflect the weights in the rule given to each indicator.

The actual zoning rule is not published, but the indicators used are made public in the letters exchanged between the European Commission and the French government.[12] This allows us to estimate the weights from the actual treatments and policy indicators. The estimates used to construct the policy rule instrument are presented in columns 1 and 2 of Table 2. On top of the share of population treated, we also find significant discrepancies between the AFR zoning rules between 1995 and 2001.

$$z_c \equiv (\hat{\beta}_{01} - \hat{\beta}_{97}) X_{c,1997} \tag{3}$$

We obtain *synthetic instrumental variables* with $\hat{\beta}_{01}$ and $\hat{\beta}_{97}$ the estimated weights of socio-

[12] See letter: *Aide d'Etat n N45/2000-France Carte des aides à finalité régionale pour la période 2000-2006* SG(2000) D/ 102303

Table 2: Estimated weights of the AFR zoning rules

	AFR zoning	
Year	**1995**	**2001**
Share of population treated	40%	34%
Population trend	5.9**	9.0**
Income per capita (in 1,000)	2.1 x 10^5	0.1 x 10^{3}*
Share of poor municipalities	0.30**	0.47**
Share of struggling manufacturing sectors	0.63*	0.45
Share of manufacturing employment	-0.17	-0.58*
Employment rate	0.04	-3.4*
(Intercept)	0.55*	0.78**
Observations	314	314
R^2	0.33	0.31

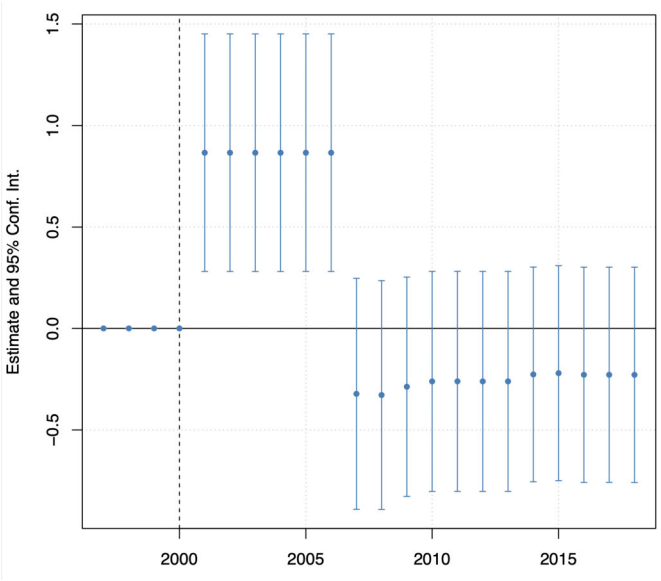
Notes: this table shows β from the regression: $AFR_{c,t} = X_{c,t}\beta_t + f_{r(c)} + \varepsilon_{c,t}$ with $AFR_{c,t}$ the actual treatment in employment area c at time t, $X_{c,t}$ a set of socio-economic indicators used in the zoning rule, $f_{r(c)}$ regional fixed-effects and β_t the weights of the treatment rule. Struggling manufacturing sectors defined by the French authorities and comprise: textile-clothing-leather, automobile assembly, shipyard, mining and defense industry. Income per capita defined as total labor income per inhabitan, share of poor municipalities defined as the share of employment in municipalities with income per capita below the national median. Significance levels: ***: 0.001, **: 0.01, *: 0.05.

economic indicators in the zoning rule for respectively year 1997 and 2001. Our main empirical model follows equation 4 in which z_c is normalised by its standard deviation.

$$y_{c,t} = \sum_{k \neq 1999} \beta^k 1_{k=t} z_c + f_c + f_{t,r(c)} + \epsilon_{c,t} \tag{4}$$

We test the relevance of our instrument by regressing it on the actual AFR treatment change. The synthetic instrument correlates significantly with the AFR treatment change in 2001 but with no later treatment (Figure 2).

Figure 2: AFR treatment



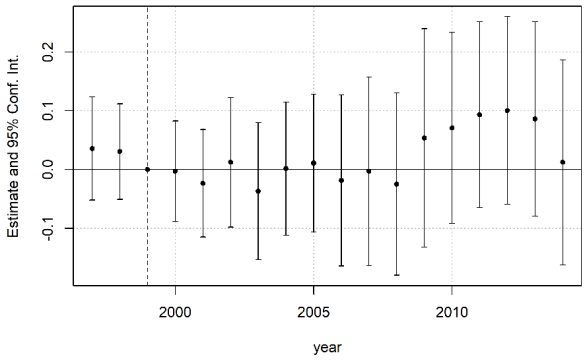
Note: This graphs shows the β_t of equation (4), with β_{2000} normalized to zero (horizontal dashed line). Horizontal bars correspond to the 95 confidence intervals around the point estimates. Standard errors are clustered at the employment area level. The dependent variable is the change in the actual AFR treatment compared to 1997, at the employment area level: $AFR_t - AFR_{1997}$.

5 Subsidy level and its re-allocation across sectors

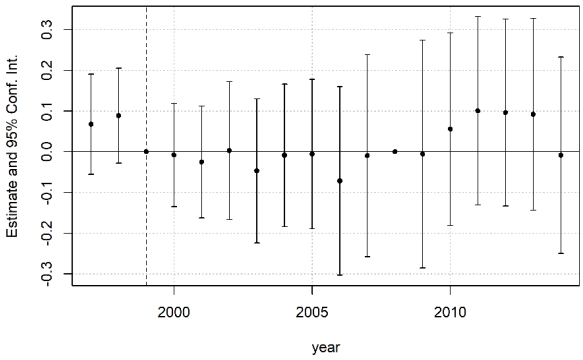
In this section, we analyse the subsidy allocation outcomes at the employment area level after changes in the legal framework which govern firm subsidies. We first verify that the aggregate amount of firm subsidies remains unaffected in response to the (instrumented) treatment of becoming an AFR zone. Second, we analyse the re-allocation of subsidies across sectors.

Figure 3 reports regression results at the employment area level based on the dynamic event-study model in equation (4). Panel 3a reports the dynamic response of the total amount of subsidies to the instrumented AFR treatment. It remains broadly constant and statistically insignificant during the treatment period, running through 2001 to 2006. The maximum absolute value of the point estimate falls below 4% and relatively equally spread between positive and negative values. We observe a small but insignificant increase after 2007. Firms report two types of subsidies in their balance sheets: investment subsidies and production subsidies. We do not find a change in the composition of subsidies either, e.g., investment subsidies remain constant and follows a very similar pattern to aggregate subsidies (Panel 3b).

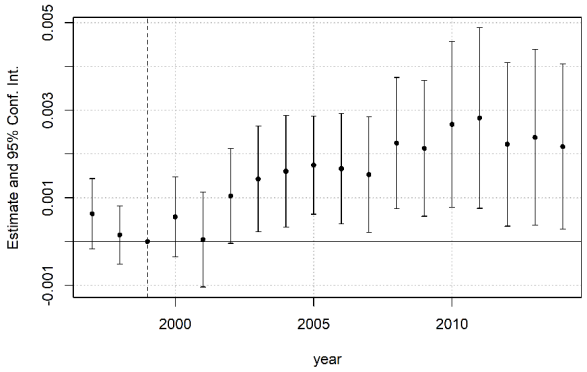
Figure 3: Subsidies



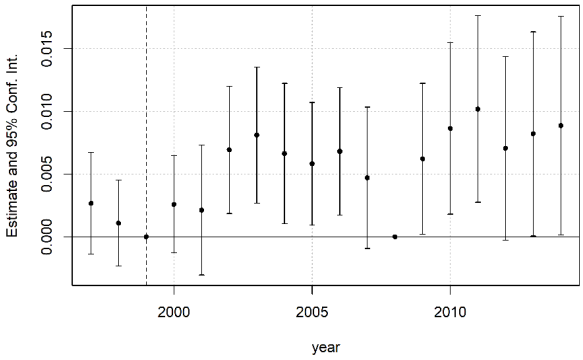
(a) Total amount of subsidies



(b) Total amount of investment subsidies



(c) Share of firms receiving large subsidies



(d) Share of large subsidies

Note: this graphs shows the β_t of equation (1), with β_{1999} normalized to zero (horizontal dashed line). Horizontal bars correspond to the 95 confidence intervals around the point estimates. Standard errors are clustered at the employment area level. Due to lacking information about investment subsidies in 2008, its coefficient is set to zero. Sample restricted to single establishment firms.

The European Commission requires an ex-ante approval of any subsidy to firms above the de minimis threshold which amounts to €100k over a rolling three-year window, i.e., around €30k per firm and year. Since such subsidies are exempt anyhow, we should see effects on subsidies that exceed this level. The share of subsidies above €30k increases both in terms of the number of firms (Panel 3c) and of subsidised firms (Panel 3d). Policy makers appear to make use of the possibility to subsidise firms beyond the de minimis threshold. The effect subsists beyond the treatment horizon, possibly because the de minimis threshold increased to €200k in 2007. To summarise, policy makers did not benefit from a larger budget but used the more permissive legal framework to grant

larger subsidies to local firms.

To consider the re-allocation of subsidies across sectors, we estimate a slightly modified version of equation (4) at the firm level which allows us to estimate heterogeneous treatment effects across sectors. A large share of firms do not receive subsidies. We, therefore, compute the symmetric growth rate. This transformation also reduces the impact of outliers. Hence, we estimate the following regression:

$$\frac{y_{i,t} - y_{i,1999}}{0.5(y_{i,t} + y_{i,1999})} = \sum_s \beta_s D_{c(i)} 1_{s(i)} + \delta H_i D_{c(i)} + f_{t,r(i)} + \epsilon_{i,t} \tag{5}$$

where $y_{i,t}$ is an economic statistic in year t of firm i, H_i are firm-specific characteristics taken in the pre-treatment period, $D_{c,t}$ is the instrumented treatment change, $1_{s(i)}$ is an indicator for sector s, and $f_{t,r(i)}$ are region-year fixed effects.[13] To be able to interpret the regression coefficient as aggregate effects, we weight observations by the amount of subsidies received by each firm in the pre-treatment period.

Table 3 reports establishment-level regression results about the re-allocation. In column 1, we report our main regression weighted by subsidy level in 1997. It allows a direct interpretation of the coefficient as an aggregate effect. Firms in the R&D-sector loose the most from this policy by a large margin, with a decrease of about 26% of their subsidies. Manufacturing and low skill services are the main beneficiaries. A possible caveat of using subsidy weights is that many firms do not receive subsidies in a given year. Hence, the regression captures the *intensive* margin of the re-allocation, meaning the re-allocation between firms already receiving subsidies in the pre-treatment period. In column 2, we instead use pre-treatment employment levels as weights. We find quantitatively consistent results.

[13] We test specifically the heterogeneity by firm size because smaller firms have been found to benefit more from public capital; see e.g. Chodorow-Reich (2014); Siemer (2019); Criscuolo et al. (2019). A re-allocation between larger and smaller firms concomitant to the sector re-allocation would make it difficult to estimate the sole effects from the latter one.

Table 3: Subsidy re-allocation across sectors

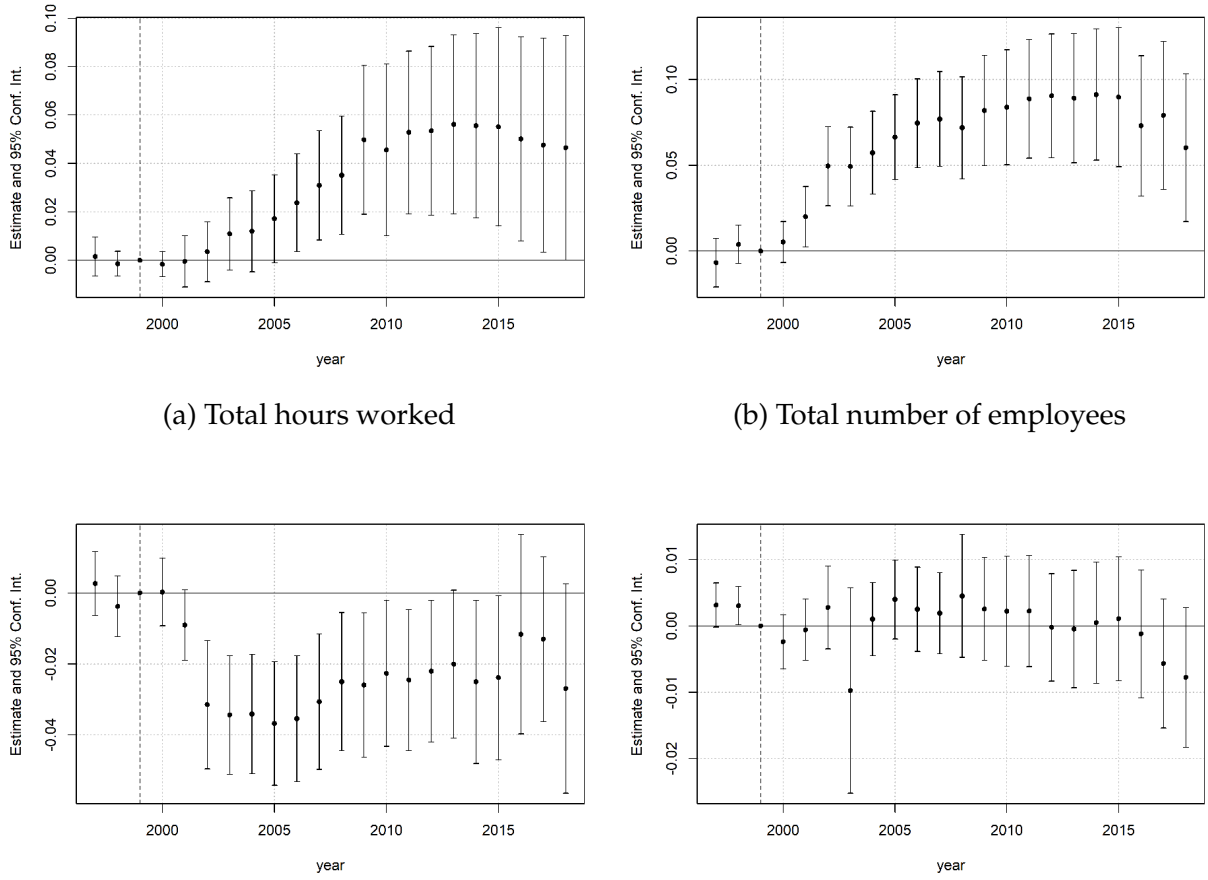
High skill services	0.0382	0.0736	0.0740
	(0.0497)	(0.0380)	(0.0502)
Low skill services, construction and transport	0.0641	0.0095	0.0856*
	(0.0339)	(0.0210)	(0.0366)
Manufacturing	0.0514	0.0445	0.0858*
	(0.0267)	(0.0227)	(0.0374)
Public services	-0.0111	-0.0591	0.0103
	(0.0463)	(0.0500)	(0.0468)
R&D	-0.2690*	-0.2967*	-0.2630*
	(0.1239)	(0.1161)	(0.1324)
Others	0.0625	0.0259	0.0640
	(0.0370)	(0.0286)	(0.0385)
Employment in 1999			-0.0110
			(0.0082)
Region-year	Yes	Yes	Yes
Weights	Subsidy	Employment	Subsidy
Observations	1,024,468	1,269,123	946,815
R^2	0.08639	0.00539	0.08464
Within R^2	0.00195	0.00059	0.00214

Note: This table shows the β_i of equation (5). Standard errors are clustered at the employment area level. We define sectors based on the 2-digit NAF industry classification of the Insee (for details see *https://www.insee.fr/en/information/2107765*): 01 – 14: *agriculture and mining* ; 15 - 37: *manufacturing*, 40, 41, and 75 – 92: *public services* ; 45 – 64: *Low-skill services, construction, and transport* ; 65 – 72, and 74: High-skilled services ; 73: *R&D* ; remaining: *others*. Significance levels: ***: 0.001, **: 0.01, *: 0.05.

6 Aggregate effects on the local economy

In this section we estimate the effect of this subsidy re-allocation on local labour markets. Figure 4 reports regressions on the main labor market statistics at the employment area.

Figure 4: Aggregate employment response



(a) Total hours worked

(b) Total number of employees

(c) Hours worked per worker

(d) Gross labor income per hour worked

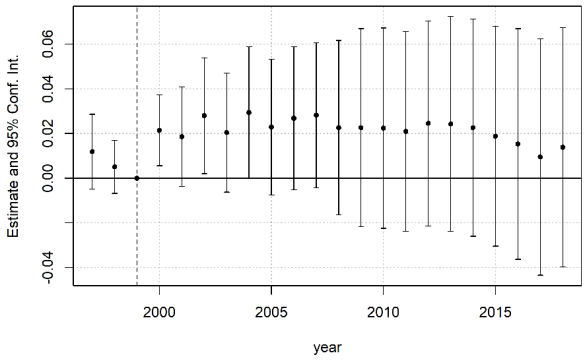
Note: This graphs shows the β_t of equation (4), with β_{1999} normalized to zero (horizontal dashed line). The sample comprises all firms, i.e, single and multiple-establishment firms. Horizontal bars correspond to the 95% confidence intervals around the point estimates. Standard errors are clustered at the employment area level.

Panel 4a and 4b show a large and persistent positive effect on local employment. Both the total number of hours worked and number of employees improve gradually during the treatment period and increase respectively of 5.5% and 9% at their maximum in 2013. This discrepancy between hours and employees means that the average number of hours per worker decreases and a corresponding worsening of workers' average yearly

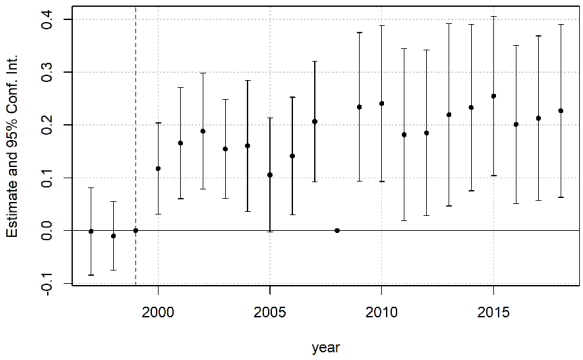
salary. Gross income per hours remains unaffected. Hence, the new dynamism of local labour markets emerges together with caveats.

The improvement of labor market indicators also coincides with a short-term improvement in value added (Figure 5a) and an increase in exports (Figure 5b). But the discrepancy in the persistence and magnitude of the effects on employment and value added fosters a long-term drop in labor productivity (see Figures 5c and 5d).

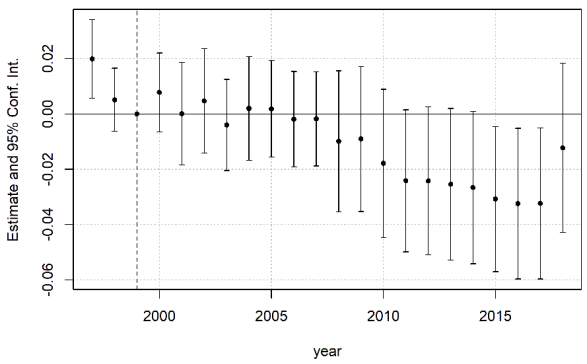
Figure 5: Aggregate economic response



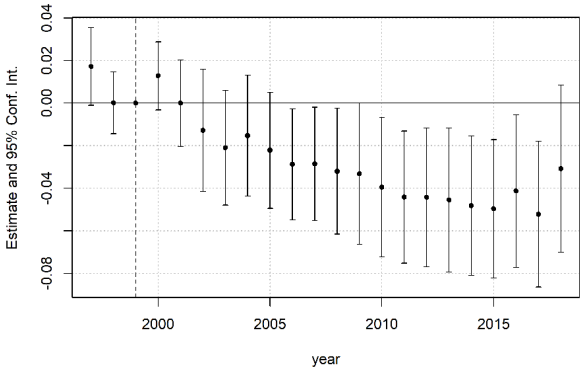
(a) Value added (log)



(b) Exports (log)



(c) Value added per hour worked (log)



(d) Value added per worker (log)

Note: this graphs shows the β_t of equation (4), with β_{1999} normalized to zero (horizontal dashed line). The sample comprises all firms, i.e, single and multiple-establishment firms. Horizontal bars correspond to the 95% confidence intervals around the point estimates. Standard errors are clustered at the employment area level. Labor productivity is approximated by value added per hours worked. Sample restricted to single establishment firms.

6.1 Which occupation gains and looses?

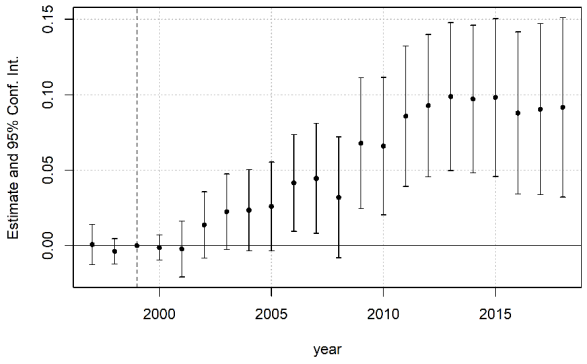
The changed allocation of resources due to AFR assignment is accompanied by a large increase in hours worked, with little effect on the hourly wage (Figure 4a). We saw in Table 3 that subsidies get re-allocated from R&D to manufacturing and low-skilled services.

To see the distributional consequences of this re-allocation, we now focus on workers in different occupations. We isolate three large occupational classes: Mid-skilled, low-skilled service and low-skilled manufacturing occupations, which correspond to 1-digit groups 4, 5 and 6, respectively, in the French professional and occupational categorization system PCS ("professions et catégories socioprofessionnelles"). We include also Research and Engineers (PCS 38 for Engineers and PCS 34 for Scientific Occupations) to capture the potential losses due to R&D reductions.

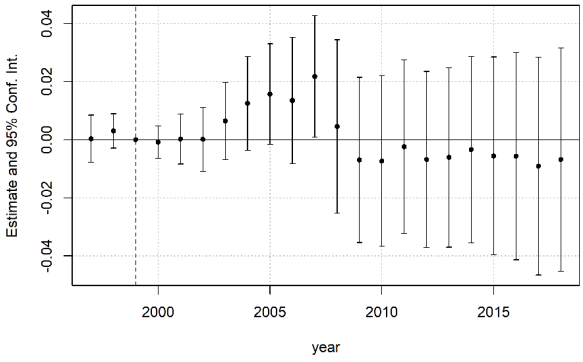
Figure 6 shows very heterogeneous dynamics across occupations. In the short-term low-skilled occupations benefit across sectors at the expense of medium and high-skilled occupations. For low-skilled manufacturing occupations, though, these gains persist beyond the duration of the 2001-2006 treatment assignment. To the extent that subsidies in manufacturing build or maintain industrial capacity it might not be surprising that these effects persist. But effects do not persist in all sectors: hours worked in low-skilled services occupations initially increase as well, but that effect dies out immediately after the duration of the treatment assignment. Mid-skilled professions see some decline during the treatment assignment, but this negative impact also reverses. This is not the case for researchers and engineers, who see a persistent decline in hours in the treatment areas even after the actual positive impact in terms of AFR assignment is removed, indicating again some capacity that is lost more permanently in this domain.

These effects are to some extent mirrored in wages as depicted in Figure 7. Low-skilled manufacturing occupations see long-run improvements in wages and research and engineering sees long-run declines. The effects on low-skilled manufacturing might be taken with a grain of salt given some indication of pre-trends, though the long-run effects clearly dominate the initial pre-trend decline. There is a similar long-run positive wage effects in low-skilled services despite the fact that it is not reflected in long-run employment. One might speculate that this is due to persistent labor demand for low-skilled manufacturing and associated wage-spillovers. There is no evidence of negative wage effects for mid-skilled occupations, though.

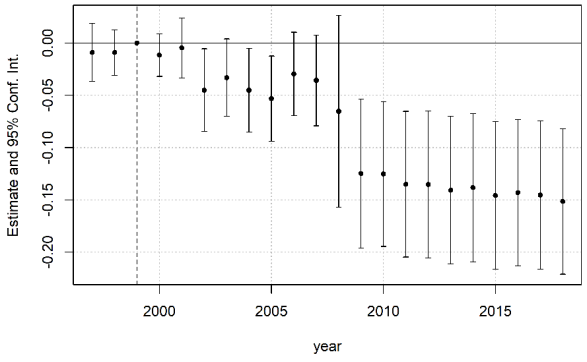
Figure 6: Total hours worked by occupation



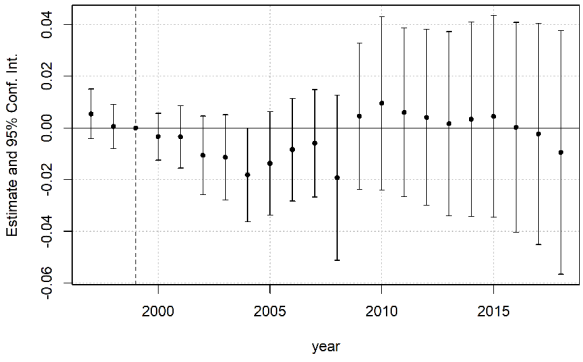
(a) Low-skilled manufacturing



(b) Low-skilled service



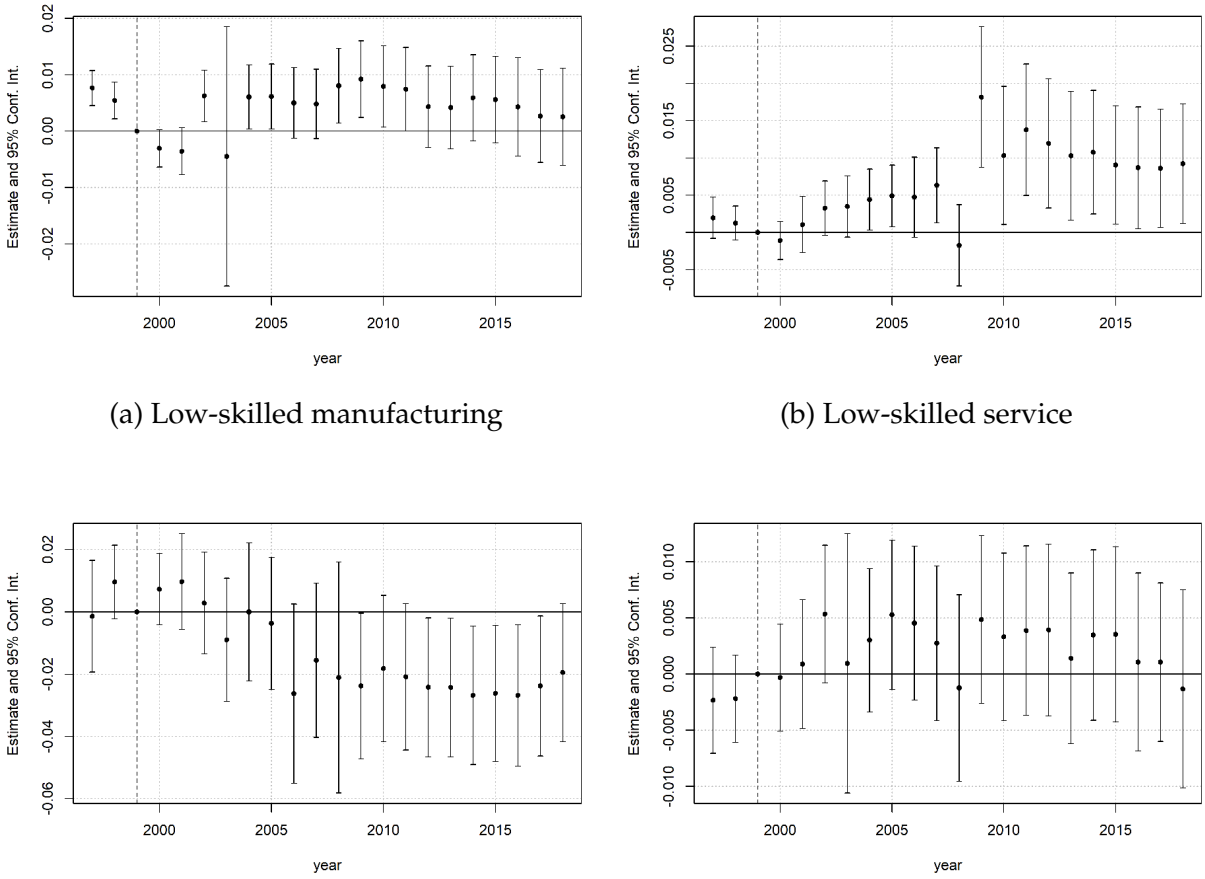
(c) Researchers and engineers



(d) Mid-skilled

Note: R&D related occupations include engineers (2-digit PCS 38) and scientific occupations (2-digit PCS 34). Mid-skilled, low-skilled service and low-skilled manufacturing occupations correspond respectively to the 1-digit PCS 4, 5 and 6. This graphs shows the β_t of equation (4), with β_{1999} normalized to zero (horizontal dashed line). The sample comprises all firms, i.e, single and multiple-establishment firms. Horizontal bars correspond to the 95% confidence intervals around the point estimates. Standard errors are clustered at the employment area level.

Figure 7: Average hourly wage by occupation



(a) Low-skilled manufacturing

(b) Low-skilled service

(c) R&D related occupations

(d) Mid-skilled

Note: total average hourly wage computed as the average individual hourly wage weighted by individual hours worked. R&D related occupations include engineers (2-digit PCS 38) and scientific occupations (2-digit PCS 34). Mid-skilled, low-skilled service and low-skilled manufacturing occupations correspond respectively to the 1-digit PCS 4, 5 and 6. This graphs shows the β_t of equation (4), with β_{1999} normalized to zero (horizontal dashed line). The sample comprises all firms, i.e, single and multiple-establishment firms. Horizontal bars correspond to the 95% confidence intervals around the point estimates. Standard errors are clustered at the employment area level.

7 Workers' trajectories

A substantial advantage of our data is that it allows us to follow individual workers over time. We rely on recent work by Babet et al. (2022) to create a panel of workers. We focus on those who were present in the labor market in 1999. We are interested if workers in treated regions face different future labor market outcomes compared to those in non-treated regions; or put differently, what happens to workers working in treated employment areas in 1999?

We view the main difference to the analysis at the employment area as follows: the previous analysis captures workers that move into the region and excludes those that move out of the region. Moreover, when a worker changes from a high-skilled to a low-skilled occupation, she might face an earnings loss even though the wage in the occupation into which she switches might have gone up. Looking at incumbent workers before the policy change avoids these issues, but at the cost of loosing some regional information precisely because it neglects workers who enter the region and still incorporates those who leave the region.

To make the exposition comparable to the structure in the earlier analysis at the employment area level, we first lay out the average effects on the incumbent workers. Then, in a second step, we investigate heterogeneous effects across sectors, i.e., we assign to each incumbent worker the sector in which she worked in 1999 and run the regressions on the respective subsets.

7.1 Average effects on incumbent workers

In this subsection, we consider all workers who worked in the respective employment areas in 1999 and follow them over the rest of their working life. This setting allows us to run a two-way fixed-effects regression including worker fixed effects. Table 4 reports results for the time period 1997 – 2018 in which we interact the instrumented AFR treatment with a post-treatment dummy for years after 2000 (instead of the yearly interaction). Our results are suggestive although not (or only marginally) significant that hours and days worked per years as well as gross labor income decrease. In addition, the average length of each employment spell decreases. It appears that individually incumbent workers loose on average, though, the latter estimates are small in comparison to aggregate effects. No clear dynamic transpire either from Figure 8. The labor market

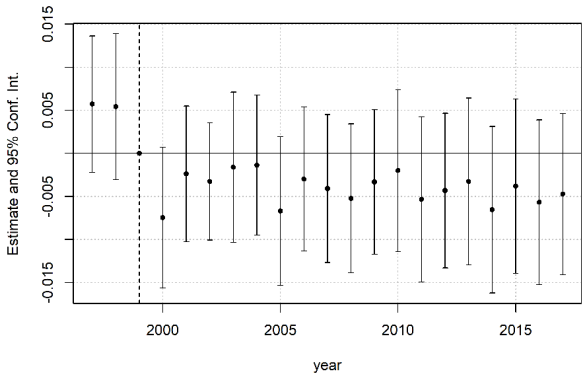
improvement on aggregate does not translate into better employment conditions at the individual level.

Table 4: Employment outcomes

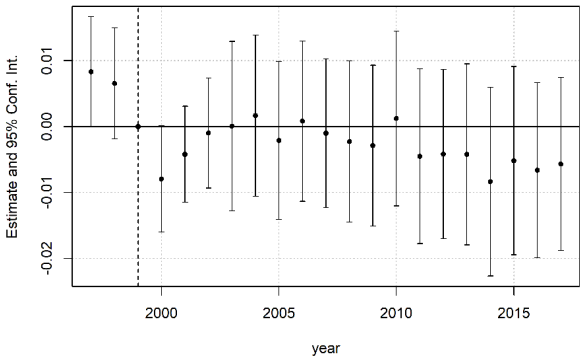
	Hours worked	Days worked	Unemployment spell	Employment spell	Gross income
Post-treatment	-0.0074	-0.0079*	0.6699	-0.8012*	-0.0082
	(0.0048)	(0.0047)	(0.5397)	(0.4181)	(0.0052)
Worker FE	Yes	Yes	Yes	Yes	Yes
Region-year FE	Yes	Yes	Yes	Yes	Yes
Observations	58,545,890	59,056,768	59,057,303	59,057,303	59,057,330
R^2	0.78634	0.71117	0.64933	0.62001	0.84762

Note: This table shows results for a two-way fixed-effects regression at the worker level with a pre-/post-treatment dummy, i.e., it estimates regression (4) at the worker level with a simple pre-/post-dummy instead of treatment-year interactions. Standard errors are clustered at the employment-area level. *Low-skilled* comprises low-skilled services, construction and transport. The outcome variables are defined as total hours worked per year, total gross labor income per year, total number of days worked per year, the average unemployment spell is the number of days not worked per year divided by the number of jobs reported, and the average employment spell is defined as the number of days worked per year divided by the number of jobs reported. Significant levels: ***: 0.01, **: 0.05, *: 0.1. This table is based on a 50% random sample of the panel for computational reasons.

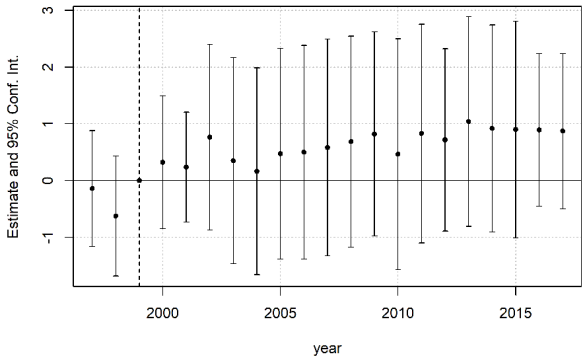
Figure 8: Workers' outcomes conditional on employment in the region in 1999



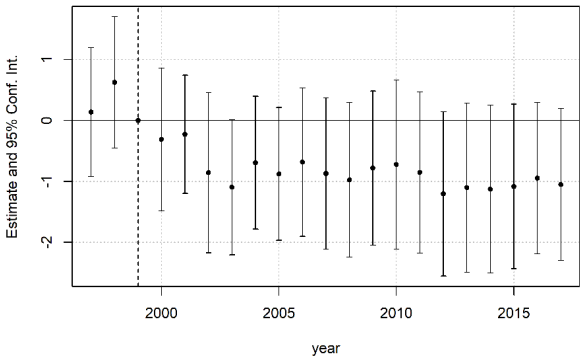
(a) Hours worked



(b) Gross labor income



(c) Average unemployment spell



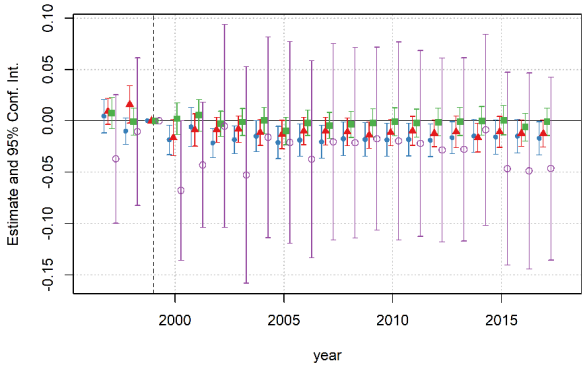
(d) Average employment spell

Note: this graph shows the β of a version of equation (4) with workers as the unit of observation; only the treatment z_c remains at the employment area level. Standard errors are clustered at the employment-area level. *Low-skilled* comprises low-skilled services, construction and transport. The outcome variables are defined as total hours worked per year, total gross labor income per year, total number of days worked per year, the average unemployment spell is the number of days not worked per year divided by the number of jobs reported, and the average employment spell is defined as the number of days worked per year divided by the number of jobs reported.

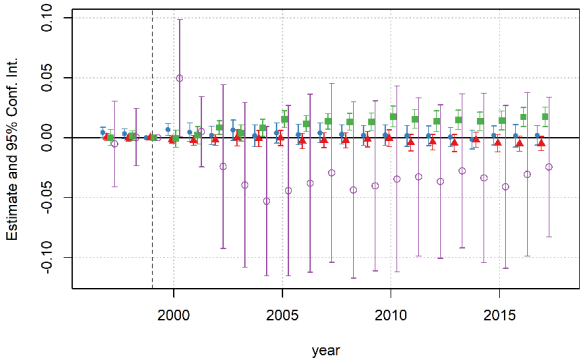
7.2 Which worker gains and which looses?

We now split our sample of workers according to their sector of activity in 1999, and follow these workers over time. Figure 9 depicts the effects.

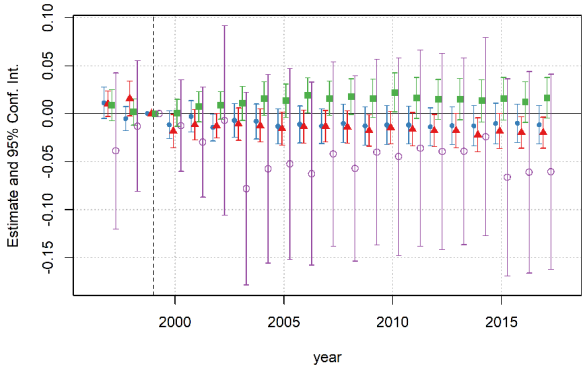
Figure 9: Workers' outcomes conditional on their sector in 1999

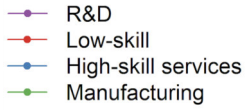


(a) Hours worked



(b) Hourly wage





(c) Gross labor income

Note: this graph shows the β of a version of equation (4) with workers as the unit of observation and split in 4 sub-samples by sector of employment in 1999. Standard errors are clustered at the employment-area level. We define sectors based on the 2-digit NAF industry classification of the Insee (for details see *https://www.insee.fr/en/information/2107765*): 15 - 37: *manufacturing*, 40, 41; 45 – 64: *Low-skill services, construction, and transport* ; 65 – 72, and 74: *High-skilled services* ; 73: *R&D*.

None of the worker categories improve their yearly hours of work as the result of the treatment (see Panel 9a). For workers from the manufacturing sectors, hours remain stable after 2000 relative to their peers in controlled areas. Everyone else looses relative to their peers in controlled areas, even workers from low-skilled services, transport, or

construction sectors. Point estimates are most sizable for workers in the R&D sector, though due the few number of workers the effects are less precisely estimated.

Individually, workers in manufacturing benefit from a significant rise in wage both compared peers in other sectors as well as in controlled areas. Hourly wages rise around 1% – 2% above those of their peers in controlled areas (see Panel 9b), and leads to similar improvements in gross labor income (Panel 9c). This effect is persistent, in line with the hourly wage response that we found in Figure 7.

We do not find any wage effects for those working in low-skilled services, construction, or transport. This discrepancy with aggregate results dcould come from composition effects; new workers enter with higher wages. The opposite effect seems to occur for R&D workers with individual hourly wage decreasing less in the aggregate. Finally, R&D professionals have an increased rate of occupational change (see Appendix-Table 5).

8 Conclusion

This paper is interested in the question how the allocation of subsidies affects the local workforce. To analyse this, it specifically considers a context in which the rules for subsidy allocations change, without a connection to the level of subsidies that are being dispersed.

This is the case for place-based subsidies in France, which are generally limited by EU rules which place a cap on subsidies except in the domain of research and development. These caps are lifted in special "AFR" zones, where policy makers have much more leeway in providing subsidies. We exploit rule changes for such special zones at the European level, and use this component as a source of quasi-exogenous variation.

Although our instrument significantly impacts AFR zoning primarily during its designated period (from 2000 to 2007), the effects on local labor markets are long-lasting. Aggregate measures such as hours worked and total employment increase relative to control areas. However, this positive dynamic is accompanied by a deterioration in employment conditions, indicated by lower average labor income. Low-skilled workers benefit the most and persistently, especially for those who work in manufacturing. This not only accrues to those who enter manufacturing, but the effect translates to incumbent workers who were employed in manufacturing prior to treatment, as they expe-

rience an average 2% increase in hourly wages relative to their peers in untreated areas even ten years after the policy ended. On the other hand, R&D-related occupations such as researchers and engineers face a steep and persistent decline in employment and wages. Total value added at the area level is not much affected and point estimates indicate even a positive impact, which is also confirmed in increased total exports, though labor productivity (either per hour or per worker) decreases persistently as work shifts towards lower-skilled sectors.

The effects on hours worked and overall employment in the local labor markets are generally positive, yet we cannot rule out that decreasing R&D subsidies may have negative externalities and detrimental effects from an aggregate perspective. But from the local area perspective, our results suggest that subsidies might not be optimally spent in regions with already underperforming labor markets as long as they are not yet classified as AFR zones. Their labor market does not seem to benefit as much from the focus on R&D as it does from a focus on low-skilled labor in manufacturing. Evidently, our analysis focuses on the worst-performing employment areas, which we deem worthwhile due to the large policy focus on such areas. Further research is needed to understand impacts of subsidies in more flourishing labor markets.

Finally, the coverage of AFR zones has significantly decreased over the past decades. Since 1999, the share of the French population in AFR zones fell from 43% to between 15% and 22% since 2007. This reduction means fewer employment areas benefited from a policy that strongly supported low-skilled workers, possibly accelerating deindustrialization and worsening labor market outcomes for low-skilled workers in already struggling areas.

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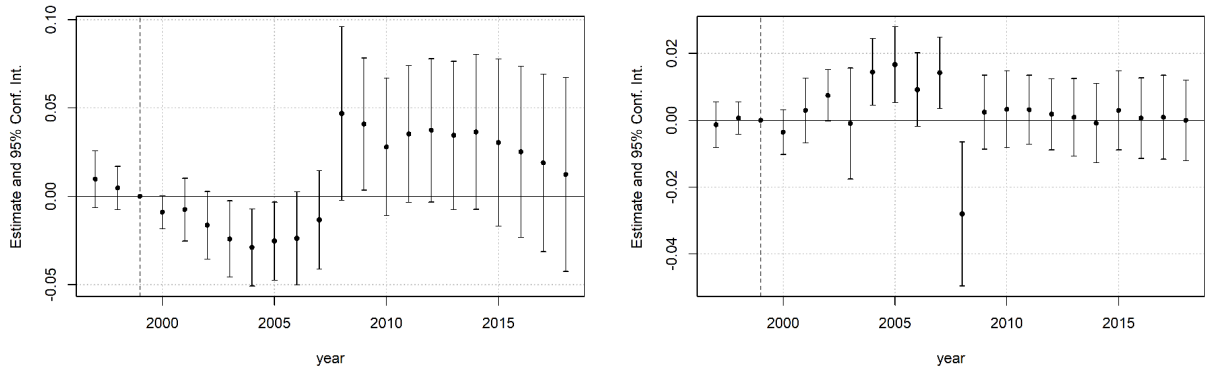
A Additional results

Figure 10: High-skilled occupations



(a) Total hours worked

(b) Average hourly wage

Note: total average hourly wage computed as the average individual hourly wage weighted by individual hours worked. High-skilled occupations correspond to the 1-digit PCS 3. This graphs shows the β_t of equation (4), with β_{1999} normalized to zero (horizontal dashed line). The sample comprises all firms, i.e, single and multiple-establishment firms. Horizontal bars correspond to the 95% confidence intervals around the point estimates. Standard errors are clustered at the employment area level.

Table 5: Workers changing occupations

	High-skill services	Low-skilled	Manufacturing	R&D
Post-treatment effect	0.0031	0.0005	-6.15×10^{-5}	0.0646*
	(0.0037)	(0.0021)	(0.0043)	(0.0366)
Worker fixed-effects	Yes	Yes	Yes	Yes
EA-year fixed-effects	Yes	Yes	Yes	Yes
Observations	8,451,035	18,411,297	13,046,280	225,871
R^2	0.58200	0.59197	0.55849	0.57104

Note: This table shows results for a two-way fixed-effects regression at the worker level with a pre-/post-treatment dummy, i.e., it estimates regression (4) at the worker level with a simple pre-/post-dummy instead of treatment-year interactions. Standard errors are clustered at the employment-area level. *Low-skilled* comprises low-skilled services, construction and transport. We define sectors based on the 2-digit NAF industry classification of the Insee (for details see *https://www.insee.fr/en/information/2107765*): 01 – 14: *agriculture and mining* ; 15 - 37: *manufacturing*, 40, 41, and 75 – 92: *public services* ; 45 – 64: *Low-skill services, construction, and transport* ; 65 – 72, and 74: High-skilled services ; 73: *R&D* ; remaining: *others*. Significant levels: ***: 0.01, **: 0.05, *: 0.1.