

The Elusive Impact of Corporate Tax Incentives

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Abstract

Despite the large fiscal footprint of corporate tax incentives, limited causal evidence exists on their impact on economic outcomes. This paper helps fill this gap by exploiting the phasing out of a large income tax exemption scheme for export-oriented firms in Tunisia. Using data on the universe of registered Tunisian firms, the analysis shows that the reform caused a decline in the entry of new firms in the sector previously benefiting from the incentives. However,

the reduced entry did not translate into any effects on employment, revenue, or the wage bill, as the reform did not impact the activities of incumbent firms, which account for the bulk of economic activity in Tunisia. The findings are robust to addressing various threats to the empirical identification, and they confirm emerging evidence casting doubt on the importance of tax incentives to determine investments relative to other factors in an economy.

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The Elusive Impact of Corporate Tax Incentives

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1 Introduction

Tax incentives are a ubiquitous component of policies aiming to attract investment and boost exports. OECD (2022) estimates that in 2022, 87% of the 52 developing economies surveyed had at least one type of Corporate Income Tax (CIT) exemption, while 69% and 65% had at least one type of reduced CIT rate or tax allowance, respectively. These incentives are economically significant. According to data collected by Redonda et al. (2024), tax relief schemes to businesses amounted to 1.4% of global GDP and 7.8% of global tax revenues in 2021.

In spite of the large footprint of these incentives, there is limited evidence on their causal impact on economic outcomes. A key reason is that changes in taxation are often bundled within broader policy packages that provide a wide range of benefits for affected firms. Special Economic Zones are a case in point. These regimes often include preferential customs rules, flexibility in labor regulations, and a range of tax benefits such as exemption from import duties, VAT on local purchases and, often, exemption on CIT. As the precise mix of benefits being offered varies among countries and over time, any assessment of one specific intervention will necessarily bundle all of these benefits together.

In this paper, we make progress in addressing the paucity of causal evidence by leveraging the phasing out of a large CIT exemption for export-oriented firms in Tunisia, during a period in which all other benefits remained unchanged. Tunisia is a lower-middle income country that has extensively relied on special regimes, the most important of which is the so-called *offshore regime*. This entails radically different institutions and rules for firms that export the majority of their sales. Until 2013, these firms were subject to a zero CIT rate on their profits, whereas *onshore* firms (i.e. all other firms outside the regime) faced a 30 percent CIT rate. This was the largest tax exemption scheme in Tunisia in the past decades.¹

Our identification leverages a large, arguably unanticipated policy shock. After almost a decade-long process to reduce the tax disparities between the two regimes, the CIT

¹ According to our (upper-bound) estimates, it cost up to 6.8% of GDP in foregone tax revenues.

rate for offshores was raised to 10%, while the rate for onshore firms was reduced to 25%. Importantly, all other institutional features that benefited export-oriented firms remained unaffected.

We employ a differences-in-differences approach to assess the impact of the CIT rate increase on firms by comparing outcomes of interest for offshores versus onshore firms before and after the shock. The comparison is based on the universe of registered Tunisian firms, for which we collect administrative data from registries, social security, customs and tax records, to estimate the causal impact of the CIT reform on economic activity.

The key identifying assumption is that trends in the offshore and onshore sectors would have been similar absent the reform. We provide evidence in favor of that assumption, showing that onshore and offshore sectors often had very similar pre-reform trends, and also by documenting that our results are robust to a wide battery of aggregate and firm-level tests. These include robustness checks based on alternative samples which maximize the comparability of treated and untreated firms, as well as on a propensity-score matching estimator re-weighting firms on their observable characteristics. The results are also robust to controlling for possible shocks which could have differential impacts on offshore and onshore firms, including EU import demand, exchange rate and domestic demand.

The results at the extensive margin show that the number of firms in both the offshore and onshore sectors were growing significantly in the four years before the reform.² However, these trends diverged starkly in 2014, the first year of the reform. We estimate that relative to the counterfactual growth proxied by onshore firms, the number of offshore firms dropped by 20% four years after the reform. This effect is almost completely driven by a reduction in entry of new offshore firms after the change in policy, not by an increase of exit among incumbents.

The stark relative decrease in the number of offshore firms did not translate into a relative decrease in economic activity in the offshore sector. The differences-in-differences

²This growth in entrants was not associated with an equally robust growth in overall economic activity, which instead was sluggish in line with the macroeconomic performance of the Tunisian economy in those years.

estimates of the impact of CIT rate increase on employment, wage bill and gross revenue of the offshore sector are all null. If anything, we find small *increases* in aggregate economic activity among manufacturing firms in the offshore sector, but the estimates are imprecise.

To explain the apparently inconsistent findings of a large fall in the number of entrants and no changes in aggregate activity, we turn to more granular data. First, we find that entrant firms are typically very small and that economic activity in the offshore sector is highly concentrated in a few, large incumbents remaining largely active in the post-reform period. Second, the differences-in-differences analysis on a balanced firm-level panel shows that the CIT reform has no significant effects on the employment, wage bill and revenue of offshore incumbents.

Taken together, our results strongly reject the hypothesis that the increase in corporate income taxes led to a decrease in aggregate economic activity, or that they hampered the performance of firms subject to the CIT rate increase.

Like our paper, several other empirical contributions document a limited economic effect of CIT reform. [Buba and Wong \(2017\)](#) review the literature on SEZ and conclude that despite their ability to attract foreign investment and boost exports, their impacts on employment and spillovers to other local firms are unclear. Interviewing management from firms in SEZ across countries, [Frick and Rodríguez-Pose \(2023\)](#) document that factors such as infrastructure, labor costs and political stability are more important for investment than tax benefits. We add to this evidence by focusing on the specific role of corporate income taxes in developing economies – which is crucial given their typical fiscal needs – independently of other policy measures.

Beyond developing economies, survey evidence from small and medium enterprises (SMEs) often points to other barriers such as financial constraints and regulatory burden, as much more relevant to business decisions ([Ravšelj et al., 2019](#); [Wang, 2016](#)). [Gordon and Li \(2009\)](#) conclude that the most important tax provision to encourage risk-taking by corporations is beneficial treatment of losses (e.g. allowing it to be deducted from payroll taxes), rather than lowering tax rates. [Akcigit and Ates \(2023\)](#) use an estimated general

equilibrium model to perform policy simulations and do not find significant effects of increasing CIT. [Harju et al. \(2022\)](#) estimate null effects of a corporate tax cut in Finland on the average level of investment for affected firms. In a review of 42 studies, [Gechert and Heimberger \(2022\)](#) find that corporate tax cuts have very limited, if any, effect on growth.³ This result is also consistent with other studies analyzing the impact of tax competition for foreign direct investment (FDI) across countries. Using a panel of 40 economies in Latin America and the Caribbean, [Klemm and Van Parys \(2012\)](#) find that CIT incentives attract FDI, but do not boost gross private fixed capital formation or growth.

Yet, there does exist evidence that firms respond to changes in the tax rate (e.g. [Ohrn, 2019](#); [Ohrn et al., 2022](#); [Cummins et al., 1994](#)). [Ohrn \(2018\)](#) finds that a 1 p.p. decrease in effective tax rate in a program to encourage domestic manufacturing in the US, increased investment by more than 4%. [Zwick and Mahon \(2017\)](#) show that accelerated depreciation provisions in the US were effective in increasing eligible capital, particularly for small firms. [Bilicka \(2020\)](#) shows that the investment of Canadian firms responds strongly to a tax reform that changed cash flow availability. Our contribution is closely related to [Chen et al. \(2023\)](#), who study the impacts of a tax cut for domestic firms versus foreign-oriented firms in China. Their focus is on explaining how CIT cuts affect the structure of exports, documenting an increase in product concentration in response to a decrease in CIT rates.

Our paper contributes to partially reconcile these mixed findings by documenting a nuanced effect of a CIT reform: significant aggregate effects do not necessarily imply significant economic effects. In this sense, our paper is closely related to [Gordon and Li \(2009\)](#), who study how the tax system affects the decision of individuals to start businesses. They conclude that changes in corporate tax rates might affect the decision of entrepreneurs to incorporate – akin the decline in entry documented in this paper – but that does not mean that new economic activity is being generated, just that income is being shifted from unincorporated activities to incorporated ones. That is a similar

³Correcting for publication bias, the authors cannot reject the hypothesis that these tax cuts have zero effect on economic growth.

result to [Damgaard et al. \(2024\)](#), who separate *phantom FDI*, investments into empty corporate shells with no link to the local real economy, and *real FDI*. They find a positive impact of lower CIT rates on total FDI across countries, but zero impact on *real FDI*.

The rest of the paper is organized as follows. The next section provides the institutional context including the background of the tax reform; sections 3 and 4 describe the data and the empirical methodology, respectively; section 5 presents the results at the sectoral- and firm-levels; and section 6 concludes and discusses the policy relevance of the findings.

2 Institutional Context and Policy Background

Tunisia has long maintained a preferential regime aimed to attract and facilitate the activities of exporting firms, which are defined as those that export at least 70% of their output. This regime comprised generous tax and fiscal benefits since its creation in 1972, including duty-free imports and income tax exemptions. Additional benefits include "streamlined customs procedures, corresponding to significant costs savings" and the possibility of holding bank accounts in foreign currency, which protects against currency risks ([Nucifora and Rijkers, 2014](#)).⁴

While the establishment of the offshore regime was associated with growth in export oriented investment, it also came at a high fiscal cost. A study by the [IFC and ECOPA \(2012\)](#) estimates that the offshore income tax exemption accounted for two-thirds of the total fiscal and financial incentives granted by Tunisia in 2009. Using administrative firm-level data (described below), we estimate that the fiscal cost of this offshore exemption was worth 2.4 billion Tunisian dinars in 2013, equivalent to 6.8% of GDP or 14.7% of overall tax revenues.⁵ While this is an upper-bound estimate, it illustrates the significant order of magnitude of the offshore tax holiday scheme.⁶

⁴The benefits of the offshore regime are such that [Nucifora and Rijkers \(2014\)](#) notes that "domestic companies that start to export tend to divide themselves into two distinct entities: one dedicated to the onshore market and the other under the fully exporting offshore regime."

⁵Approximately USD PPP 3.5 billion, using the GDP PPP conversion rate of 0.67 in 2013.

⁶This is estimated from the firm-level data described below multiplying each offshore firm's reported accounting profit by the general corporate tax rate. This is obviously an upper bound estimation as it takes into account neither the tax exemptions/incentives that reduce the effective rate, nor the possible

2.1 The corporate tax reform

The desire of harmonizing the tax treatment between the two regimes paved the way for the 2014 corporate tax reform, which is the focus of our study. This was the first and arguably most important step in the process of convergence of tax rates between the offshore and onshore sectors. Up to that moment, offshore firms were fully exempt from paying income tax on their profits, while onshore firms paid a standard rate of 30%. This full exemption had been applied since the establishment of the offshore regime in 1972 (Law 72-38). The law established this exemption for the first 10 years of the offshore firm, after which it would face a reduced rate of 10% for a further 10 years before paying the full general rate.

However, the full exemption was eventually renewed upon its expiration by successive laws so that it remained in force for the subsequent decades. At the end of 2006 the authorities decided to eliminate this tax exemption altogether by applying a reduced tax rate of 10% on new offshore firms' profits starting in 2008 (Law 2006-80). Once again subsequent budget laws postponed the application of this new regime, thus leaving the full exemption in place until 2013, when the law 2006-80 was finally applied (see [Figure 1](#) for a summary of the timeline). The continuous postponements over four decades created an environment where firms would consider this exemption valid indefinitely. Discontinuing this tradition of postponements in 2013 with the subsequent enforcement of the phase-out in 2014 arguably came as a surprise for firms, which helps the identification of its effects.

The 2006-80 law maintained a 10-year grace period from the date of incorporation for all existing firms as of the end of 2013. That means, for instance, that a firm incorporated in 2004 would immediately face the new CIT rate in 2014, while one incorporated in 2008 would only face the new rate starting in 2018; those incorporated in 2013 would face zero rate until 2023. We discuss below in more details how we deal with that lagged implementation in our empirical exercises, including by isolating the effects for firms liable to pay corporate taxes upon the enactment of the reform. However we note here that in a fundamental sense this implementation does not mean that some firms were only

effect of the tax rate increase on declared profits.

"treated" after 2014. Forward-looking firms make entry, investment and hiring decisions, for example, with the goal of maximizing firm value, taking into account the entire flow of future after-tax profits, not only the present period. In that sense, we can consider this staggered adoption as treating all firms but with somewhat different intensities.

At the same time in 2014, the general corporate tax rate was lowered from 30% to 25%. Thus, half of the onshore-offshore rate differential was eliminated in 2014. This convergence process continued in 2019 when the tax rate for offshore firms was further increased to 13.5% and was finalized in 2021 when both the onshore and offshore tax rates were set to 15%. We do not include this further convergence period in the analysis for two reasons. First, it was arguably not as unexpected as the 2014 reform, which came on the heel of many years of deferral. Second, these additional reforms coincided with the Covid period, which would make the identification of impacts particularly challenging. It is also worth noting that onshore firms in a number of sectors faced a higher rate (35%) than the general rate throughout the period. These sectors, including for instance credit, insurance, oil refining, car dealership and hyper-markets, comprise a relatively small share of firms, which we exclude from the subsequent analysis.

According to data from Tunisia's Ministry of Finance, the tax reform was associated with a reduction in corporate income tax revenues for the fiscal year 2014 (and collected in 2015). Overall tax revenues from non oil companies dropped by 28% to TD 1.6 billion dinars mainly driven by the rate reduction for onshores, which still represented the bulk of CIT collection.⁷ Revenues from offshore represented around 4.4% of total CIT revenues, a share which eventually increased to 9.4% by 2018.

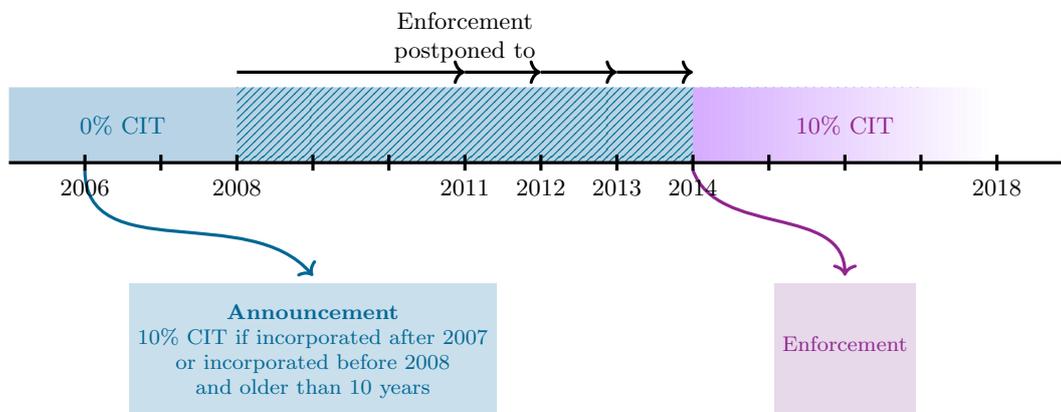
Importantly for our analysis, the aggregate data also suggest that the reform was not accompanied by other tax relief measures that limited the increased tax burden for offshores in the face of the rate increase. In fact the effective tax rate imposed on offshores (calculated as paid tax/taxable profit) hovered even slightly above the actual 10% rate in the period 2014-18 (11.8%-13.8%).⁸ That is due to the fact that offshores can sell up

⁷This dominance of the onshore sector is due to two main reasons. First, during the period of analysis they are responsible for around three-quarters of total revenues. Second, as noted below, in 2014 only 20% of offshores were actually liable to pay taxes because of their age.

⁸This rate is computed by dividing the tax paid by offshore firms by their overall profits, both data

to 30% of their production in the domestic market, and the related profits are taxed at the general rate.

Figure 1: Timeline of reform.



Note: This timeline depicts the subsequent budget law postponements of the enforcement of the Corporate Income Tax (CIT) reform for Offshore firms, thus leaving the full exemption in place until 2013, when the law 2006-80 was finally applied.

3 Data and Descriptive Statistics

The main source of data we use are administrative records on Tunisian registered firms, the Répertoire National des Entreprises (RNE). This data spans the universe of all private and public sector firms and includes information such as firms' 4-digit economic activity sector, location, age and whether owners are foreign.⁹ In joint collaboration with the Tunisian Statistics Institute (INS), the RNE microdata has been merged with tax returns to include yearly measures of firms' declared turnover, profits, and revenue from exports; social security data on total employment and wage bill; and customs data on total value of exports and imports.¹⁰

We clean the data in a number of ways. In Figure A1 in the Appendix, we provide the key steps we take to arrive at our analysis sample. We start with a full panel of almost 16 million observations and almost 1.5 million firms between 1995 and 2021. First, we focus

from the Ministry of Finance.

⁹Details of the RNE can be found [here](#) (in French). See for example [Rijkers et al. \(2017\)](#), [Rijkers et al. \(2014\)](#), and [Baghdadi et al. \(2019\)](#) for other studies using the RNE.

¹⁰For data privacy reasons, not all information from these sources could be provided for this study. Notably, we do not have access to information on paid taxes nor on details about exports, such as product-level amounts.

on the 2009 - 2018 period, since further corporate income tax reforms were introduced after 2018. We also drop firms that are not liable for income tax regimes; state-owned firms; and "Individual Enterprises" (*Personnes Physiques*), which should not be liable for the Corporate Income tax. These restrictions reduce our sample to approximately 198,000 firms. Finally, we also drop what we define as "never active" firms – these are firms that are observed at some point throughout the period in the RNE dataset but never register any activity (i.e. positive revenue in tax data, employment in social security, exports or imports in customs).

The sample we obtain, which is the main one we use for the following analyses, is comprised of approximately 96,000 onshore firms and 22,660 offshore firms. In [Table 1](#), we provide descriptive statistics for this sample – in column (1) for the entire panel, and in columns (2) - (6) for selected years. We also document the characteristics of the offshore and onshore sectors in 2013, the year prior to the reform. Approximately 20% of firms in our sample are registered in the offshore regime and 10% of total firms are foreign owned. In terms of sectors, one-third of firms are in manufacturing and one-third in wholesale or retail; the remaining firms are mostly in the services sector (25%).

This is a period of significant expansion in the number of firms in the registry (and our sample), with close to 6 - 7% of firms each year being "entrants", defined as firms we do not observe previously in the panel. The average age of firms is 10 years, but the median is 7 years.

Before providing descriptives for the outcomes of firms in each year, we note that often we observe firms in a given year in the RNE data but information on outcomes can be missing. For that reason, we first document the share of non-missing observations before providing statistics on average values of outcomes of interest.¹¹ Approximately half of the firms declare employment and wage information in each year - for those, the average number of employees is between 15 - 19 and the average wage bill is approximately 200,000 dinars. The average total revenue is in the range 1.5 - 1.8 million dinars in the

¹¹When we consider aggregate outcomes at the sectoral level in the next section, we treat these missing observations as zeros. In our firm level regressions, we restrict our analysis to a balanced sample of firms for which we observe non-missing outcomes in every period.

period, while average profits are always below 30,000 dinars.

Each year, approximately 20% of firms report non-missing revenue from exports in their tax declarations, and those firms have average export revenue of 500,000 dinars. When we consider export value from customs data, the share of firms with non-missing values is much smaller at less than 10%, and the average export values are much larger at 3 million - 4 million dinars. The reason for that large discrepancy is in large part because customs data only includes the export of goods, while tax data also includes revenue from the export of services – an important component of the offshore sector in particular, as we document below. When we compare total aggregates of both export measures in our sample (see [Table A3](#)), they are often within 10-15% of each other. We also observe that total exports are extremely concentrated in a small number of firms, mostly manufacturers, and for those the yearly values declared from both sources are often very similar. We return to these discrepancies when we estimate the impacts of the reform below, since using customs data as an outcome will exclude exports from a large share of firms.

Table 1: Descriptives

	Panel	2012	Onshore 2013	Offshore 2013	2014	2016
Firm Characteristics:						
Offshore	0.19 (0.40)	0.20 (0.40)	0.00 (0.00)	1.00 (0.00)	0.21 (0.40)	0.19 (0.39)
Foreign	0.09 (0.29)	0.10 (0.30)	0.01 (0.12)	0.43 (0.50)	0.10 (0.30)	0.09 (0.29)
Age (years)	9.83 (9.81)	9.34 (9.31)	10.12 (9.82)	6.83 (5.71)	9.56 (9.16)	10.09 (11.23)
Non-missing Manufacturing	0.31 (0.46)	0.32 (0.47)	0.29 (0.45)	0.41 (0.49)	0.31 (0.46)	0.30 (0.46)
Non-missing Sales	0.35 (0.48)	0.34 (0.47)	0.40 (0.49)	0.14 (0.34)	0.35 (0.48)	0.36 (0.48)
Non-missing Services	0.27 (0.44)	0.26 (0.44)	0.22 (0.42)	0.44 (0.50)	0.27 (0.44)	0.27 (0.44)
Entry	0.06 (0.24)	0.07 (0.25)	0.06 (0.24)	0.07 (0.26)	0.06 (0.23)	0.05 (0.21)
Exit	0.02 (0.12)	0.01 (0.11)	0.01 (0.11)	0.02 (0.14)	0.01 (0.12)	0.02 (0.12)
Social Security Records Outcomes:						
Non-missing Employment	0.51 (0.50)	0.55 (0.50)	0.55 (0.50)	0.41 (0.49)	0.49 (0.50)	0.46 (0.50)
Number of employees	17.96 (108.61)	19.03 (113.31)	13.24 (71.81)	40.68 (208.27)	16.79 (104.52)	14.89 (102.84)
Non-missing Wagebill	0.51 (0.50)	0.55 (0.50)	0.54 (0.50)	0.41 (0.49)	0.48 (0.50)	0.45 (0.50)
Wagebill, M dinars	0.21 (1.52)	0.19 (1.31)	0.18 (1.35)	0.38 (1.75)	0.22 (1.59)	0.24 (1.73)
Tax Record Outcomes:						
Revenue Before Tax, M dinars	1.74 (15.87)	1.66 (14.94)	1.62 (14.76)	1.94 (15.59)	1.65 (14.51)	1.75 (16.02)
Profits, M dinars	0.03 (3.85)	0.03 (3.14)	0.02 (3.41)	0.03 (12.00)	0.01 (3.48)	0.00 (2.88)
Non-missing Exports from tax authorities	0.18 (0.39)	0.23 (0.42)	0.11 (0.32)	0.58 (0.49)	0.19 (0.39)	0.14 (0.35)
Exports from Tax authorities, M dinars	0.51 (8.59)	0.52 (8.97)	0.14 (2.64)	1.92 (15.55)	0.47 (7.06)	0.48 (8.10)
Customs Records Outcomes:						
Non-missing Exports Customs	0.08 (0.27)	0.09 (0.29)	0.05 (0.22)	0.23 (0.42)	0.08 (0.27)	0.06 (0.24)
Exports Customs, M dinars	4.03 (26.12)	3.24 (21.78)	1.67 (11.36)	5.29 (28.66)	3.87 (23.96)	4.52 (30.01)
Imports Customs, M dinars	2.09 (12.78)	1.75 (10.25)	1.50 (8.17)	3.08 (15.75)	2.01 (11.16)	2.22 (14.06)
Observations	769241	66040	58198	14983	80725	94219

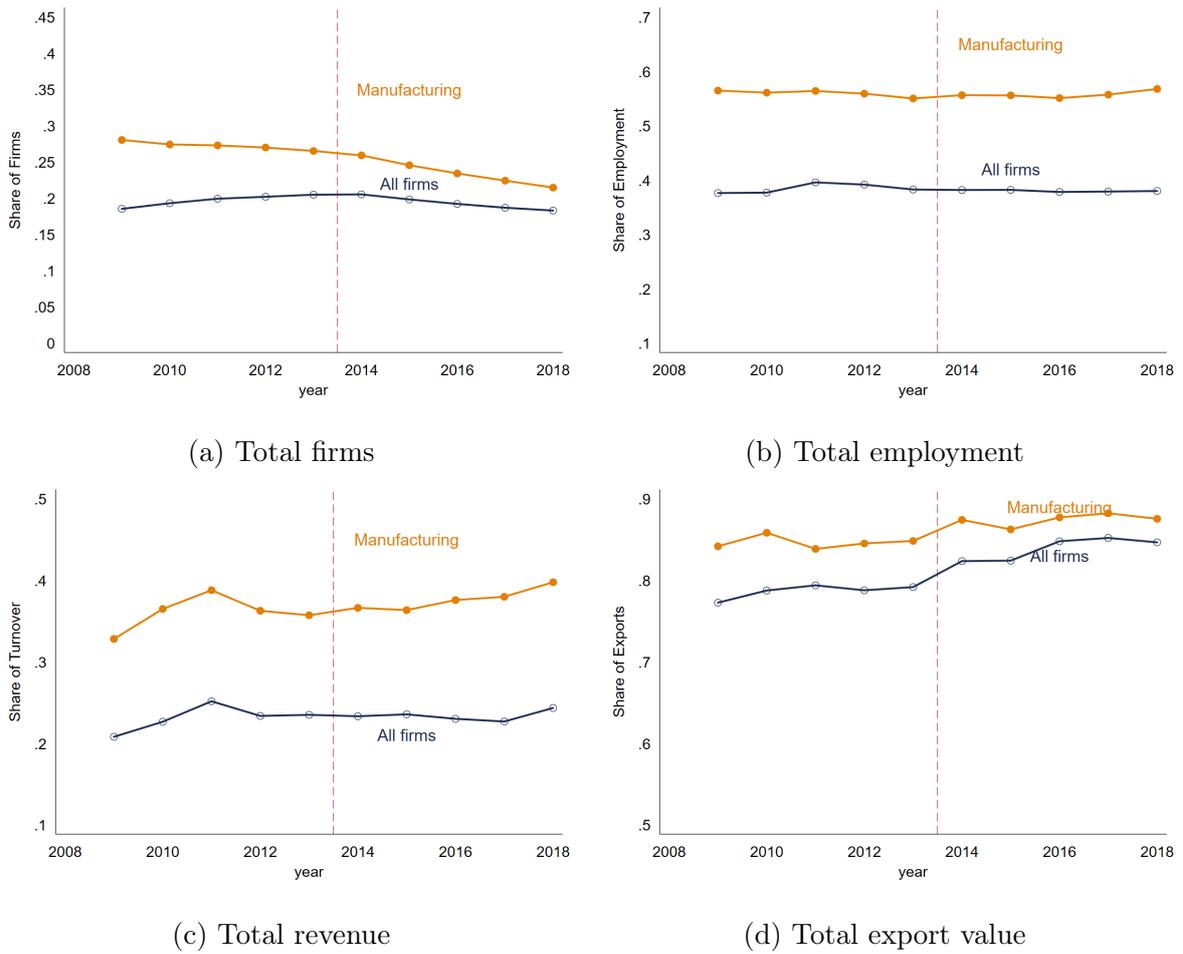
Note: Table 1 provides a detailed descriptive analysis of various firm characteristics along with key outcome measures for the cleaned panel as well as in 2012, 2014, and 2016. The table is segmented in 2013 by firm Offshore status, comparing offshore and onshore firms in the year before the tax reform. This table documents the evolution of firm attributes and performance indicators (Social Security Records Outcomes, Tax Record Outcomes, and Customs Records Outcomes) over time.

We also document differences between onshore and offshore firms. Table 1 shows that in 2013, the year before the reform, 43% of offshore firms are foreign-owned vs 1% of onshore, and offshores are younger - less than 7 years on average versus almost 10 years for onshores. In terms of sectors, offshores are much more likely to be in manufacturing (41% versus 29% for onshore) and services (45% versus 22%), while onshore firms are more likely to be in retail and wholesale.

Conditional on reporting social security data, offshores are much larger both in average number of employees (43 versus 13 for onshores) and wagebill (380,000 dinars versus 180,000 dinars for Onshores). They are also much more likely to report export revenue in their tax returns (60% versus 12% for onshore) and report average export revenue an order of magnitude larger. Similarly, they are also more likely to have export values in customs data and also larger values on average.

Despite representing a relatively small share of total firms, a disproportionate amount of economic activity in Tunisia is concentrated in offshore firms, particularly for the manufacturing sector. In [Figure 2](#), we document the importance of the offshore sector across the period, both for the entire sector and specifically for manufacturing. In panel (a), we show that offshore firms were approximately 20% of all firms in the period, but represented a larger share (25-30%) of all manufacturing firms - although that share declined constantly over the period. Since we already documented that Offshore firms are on average larger than onshore ones, it is not surprising that they represent a larger share of employment (40%) and revenue (20 - 25%) - for manufacturing, they are substantially more important, representing close to 60% of total employment and 35-40% of aggregate revenue. Close to 80 - 90% of all exported value is accounted for by the offshore sector, which is consistent with exporting firms concentrating in the offshore regime given the substantial benefits that they derive.

Figure 2: Participation of offshore sector



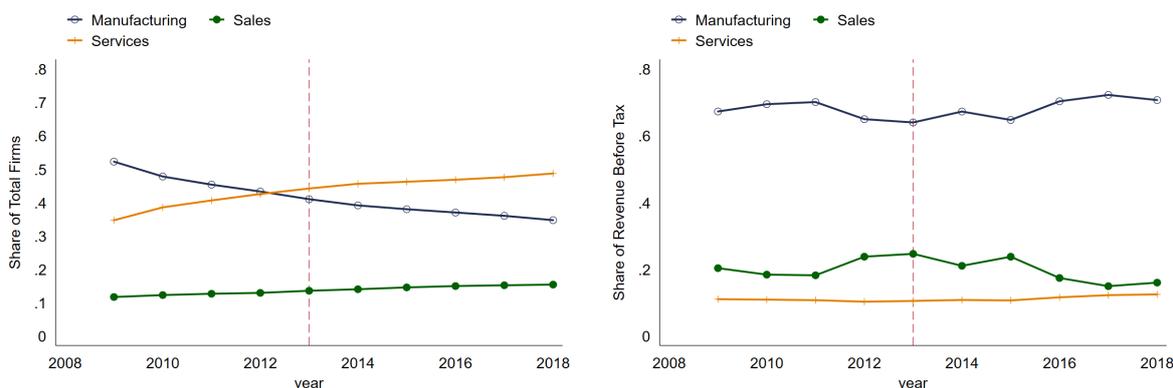
Note: These figures display the participation of offshore firms in several economic aggregates over time, separately for the entire economy (in blue) and for the manufacturing sector only (in orange). Panel (a) refers to the share of total firms; panel (b) to share of total employment; panel (c) to share of turnover and panel (d) to share of export value.

An additional notable feature of the offshore sector is the increase in the number of firms in the service sector relative to firms in manufacturing. In [Figure 3a](#), we document that manufacturing accounted for more than 50% of total offshore firms in 2009 and those in services less than 40%. After that the share of services steadily increased and by 2018 over 50% of total offshore firms were in the services sector. Despite this meaningful change in the sectoral composition of offshore firms, the manufacturing sector maintained a dominant participation both in terms of total turnover (70% - [Figure 3b](#)) and employment (80% - [Figure 3c](#)).¹² The dominance of manufacturing in revenues and employment and of

¹²Because of this dominance and of the importance of the offshore sector in overall manufacturing, we perform the analysis below both on all sectors and on manufacturing only.

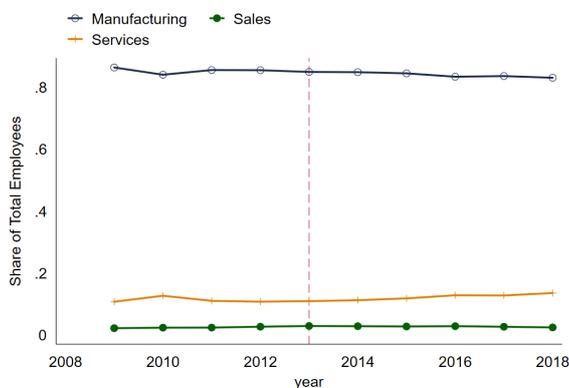
services in the number of firms imply that the average offshore firm size in manufacturing is much larger than in services. In the former, activity is concentrated in a few large firms; in the latter, offshore entrants are often very small, so despite their large numbers they contribute little to aggregate economic activity. These will be important features to explain our findings when we evaluate the effect of the 2014 offshore reform in the next section.

Figure 3: Composition of offshore firms - by sector



(a) Number of firms

(b) Total Revenue



(c) Total Employment

Note: These figures display the composition of offshore firms by economic sectors. In panel (a) we present how firms are distributed across manufacturing, services and sales sectors, whereas in panel (b) we present participation of total revenue and panel (c) of total employment. The vertical dashed line marks 2013, the year before the CIT reform that increased income tax rates for offshore firms.

4 Empirical Strategy

To evaluate the causal effect of the 2014 tax reform on the performance of the offshore sector, we use a differences-in-differences strategy – we compare outcomes of interest in the

offshore sector, before and after the reform, with outcomes of the onshore sector. While firms in the onshore and offshore sectors are systematically different as we documented above, our key identifying assumption is that, in the absence of the reforms, the sectors would have followed similar trajectories after 2014. As a result, the outcome of the onshore sector is a valid proxy for the counterfactual outcome of offshores. We argue that this is a plausible assumption given the context described in [section 2](#), which suggests that the reform may have come as an unexpected shock, hence minimizing possible anticipation effects. We further corroborate this assumption by showing below the absence of clear differential pre-trends in most outcomes of interest.

We perform these exercises using data at two different levels. First, we aggregate our firm-level data at the 2-digit economic sector, by offshore status level, and compare outcomes in the offshore versus onshore sectors.¹³ This analysis speaks to the aggregate effects of the reform and include both possible causal effects on existing firms as well as composition effects from the entry and exit of firms in each sector. We then turn, in a second analysis, to a firm-level analysis of the tax reform. In that section, we restrict our attention to a balanced panel of firms that are active every year in the period 2009-2018.

4.1 Sectoral analysis

In our main specification for the aggregate analysis, we estimate the following equation:

$$Y_{soy} = \theta_o + \gamma_{sy} + \sum_{j=-4}^4 \beta_j \mathbb{1}[y \geq 2014, o = 1]_{oy} + \varepsilon_{soy} \quad (1)$$

where Y_{soy} is an outcome of interest Y for economic sector s , with offshore status $o \in \{0, 1\}$ in year y ; θ_o are offshore status fixed-effects, and γ_{sy} allows for industry-by-year shocks. Standard-errors are clustered at the industry level. Our coefficients of interest are β_j , which estimate the differential outcomes between offshore and onshore sectors by year.

We also summarize our results using a static, pre-post differences-in-differences equa-

¹³The 2-digit sector aggregation allows us to maximize the number of observations as around 12% of the firms do not report either the third or fourth digit of activity.

tion, in which we estimate differential results for offshore versus onshore, before and after the reform:

$$Y_{sop} = \gamma_s + \theta_o + \delta \mathbb{1}[p = 1, o = 1]_{op} + \varepsilon_{sop} \quad (2)$$

4.2 Intensive margins

We complement the sectoral analysis with one at the firm-level, which exploits the differential responses of existing firms to the reform on the basis of their status.

As in the previous part of the analysis, we exploit a discrete absorbing treatment using a model similar to (1), but adjusted as to account for firm-level variation:

$$Y_{foy} = \theta_f + \gamma_{sy} + \sum_{j=-4}^4 \delta_j \mathbb{1}[y \geq 2014, o = 1]_{oy} + \varepsilon_{foy} \quad (3)$$

where Y_{foy} is an outcome of interest Y for firm f , with offshore status $o \in \{0, 1\}$ in year y ; θ_f are firm fixed-effects, and γ_{sy} allows for industry-by-year shocks. Standard-errors are clustered at the firm level. Our coefficients of interest are δ_j , which estimate the differential outcomes between offshore and onshore firms by within sector-years.

In [Table A1](#) we present descriptive statistics for firms in 2013, before the reform, for the full sample (column 1); for the balanced sample (column 2); for all offshore firms (column 3) and for offshore firms in the balanced sample (column 4). The main takeaway is that firms in the balanced sample are larger, in terms of employment, revenue, export values, etc. This is expected as the balanced sample is composed of firms which have been active in every year of the period while the full sample includes also new entrants and exiters during the period, which tend to be smaller. The sectoral composition is also different for offshore, which are more likely to be in manufacturing in the balanced sample.

5 The Effects of the 2014 Offshore Tax Reform

This section presents the estimated effect of the CIT reform at industry- and firm-level.

5.1 Aggregate responses of the offshore sector

We begin this section by evaluating the *aggregate effects* of the 2014 increase in corporate income tax rate for offshore firms in Tunisia. To ensure economy-wide representativeness of the results, we weigh observations by the its sector's share of the outcome variable at the beginning of the period, 2009, which we then drop prior to estimation.

5.1.1 Number of firms in offshore versus onshore sectors

Our first finding is that before the 2014 reform the number of firms in both the onshore and offshore sectors were increasing rapidly. In [Figure A3a](#), we show that the number of onshore firms increased from approximately 40,000 in 2009 to almost 60,000 by 2013, while the number of offshores increased from about 10,000 to 15,000. As can be seen in [Figure 4a](#), where we normalize the number of firms to unit in 2013, these were similar growth rates in the years previous to the reform.

Nonetheless, after the reform these trends clearly diverge – the number of onshore firms remain on the same growth trajectory, whereas the growth of offshore firms becomes much more muted. By 2018 the number of offshores is only 20% larger than in 2013 while the number of onshores is 40% larger. We formalize these results using our differences-in-differences strategy in [Figure 5a](#), where we plot the coefficients from equation (1) both for the full sample and also for firms in the manufacturing sector only. Consistent with what we see in the normalized data above, the number of offshore firms was increasing at a faster pace relative to onshore before the reforms, reflected in the negative coefficients before 2013, and that trend radically reverses precisely after the reform – the point coefficient on differential (log of) firm numbers increases in absolute value to approximately -0.2 by 2018.¹⁴ For the manufacturing sector, we do not see any differential pre-trends, but also observe a similar decrease in number of firms post-reform.

These results are fully driven by a very significant drop in the number of new entrants

¹⁴These results consider all firms in our analysis sample, regardless of whether they seem "active", meaning reporting employment, revenue or export, in any given period. We show that this divergence is even starker if we restrict our sample to active firms in [Figure A2](#) – the number of active firms in the offshore sector actually declines in absolute term by close to 10% post-reform, while the onshore sector continues to grow.

in the offshore sector post-reform, and not by an increase in firms exiting the market. We document this fact in [Figure 4](#), where panels (b) shows normalized entry numbers and panels (c) show the same figures for firms' exit. The number of entrants in the offshore sector is mostly stable before the reform and falls significantly after – by 2015-2017 the number of yearly entrants is close to half that in 2013. Again we formalize these results plotting the DiD coefficients for log entrants in [Figure 5b](#) and for exiters in [Figure 5c](#). We find that entry falls by more than 50 log-points post reform for offshores compared to onshores, and the result is similar for the full sample and also for the manufacturing sector only (where entrant rates falls by even more if anything).

The effect on exit is not as clear-cut. The estimated coefficients become negative three years after the reform—especially for manufacturing firms. However, the magnitude of the impact is somewhat smaller in absolute value and only marginally significant.

5.1.2 Economic activity in offshore versus onshore sectors

The previous section shows that the 2014 CIT reform caused a decrease in the number of offshore firms (compared to the counterfactual proxied by the trajectory of onshore ones). A separate and arguably more relevant policy question is whether this decrease translated also into a drop in aggregate economic outcomes, such as employment, wage bill or revenue. As previously discussed, a relative fall in the number of firms in the offshore sector does not automatically translate into less activity in that sector, since the latter will depend on the size of new entrants, on possible changes in the outcomes of firms that remain in activity and on how the economic outcomes are distributed across sectors.

We start by documenting no meaningful changes in aggregate employment or total wage bill in the offshore sector when compared to the onshore. We show outcomes for the number of employees in [Figure 4d](#) and for the total wage bill in [Figure 4e](#). We see nothing close to the same divergence in number of firms between the two sectors—the growth rate of number of employees in the offshore sector seems slightly lower than onshore, whereas its wage bill seems slightly larger, but both are small in magnitudes; outcomes in the two

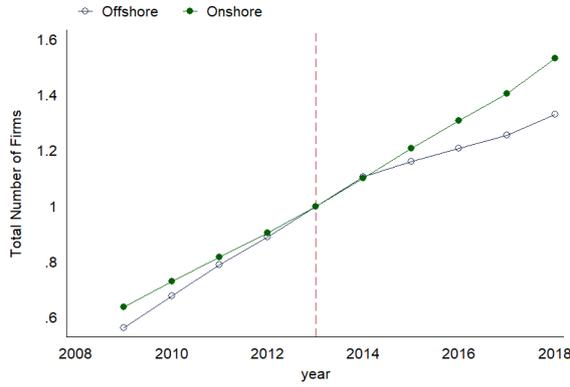
sectors track each other closely both before and after the 2013 reform.¹⁵ These results are confirmed in our DID estimates, in [Figure 5d](#) and [Figure 5e](#), where most of our coefficients post-reform are indistinguishable from zero. The exception is in the manufacturing sector, for which the growth of the wage bill seems higher for the offshore sector in the post-reform period, but we cannot rule out a continuation of somewhat differential pre-trends. Overall, we find no clear evidence that the tax reform decreased labor market outcomes in the offshore sector, and particularly not for manufacturing firms.

Even for aggregate revenues we do not find any negative effects of the reform for the offshore sector. We again observe that revenues in both sectors are very different in levels ([Figure A3f](#)), but present similar trends before the reform and continue to trend similarly post-reform ([Figure 4f](#)). In our estimates using DID strategy, presented in [Figure 5f](#), we do not observe any significant pre-trends either for the entire sample or the manufacturing sector. For manufacturers, which represent approximately 60-70% of total revenues in the period, we have point-estimates that are positive post-reform but are only marginally significant. For the entire sample, some of our coefficients, particularly after 2016, are negative and large in size, but estimates are very noisy and never indistinguishable from zero. Once again, the evidence suggests that, despite having significantly changed the number of firms in the offshore sector relative to the onshore, economic aggregates were mostly unchanged by the reform.¹⁶

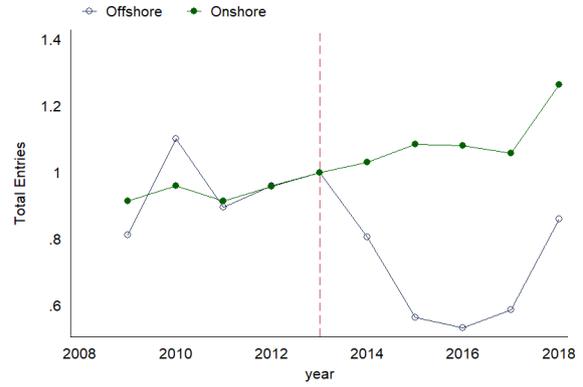
¹⁵It is also worth noting that the growth rates in both variables prior to the reform were lower than for the total number of firms discussed above. Aggregate revenues grew at an average annual rate of 8% for onshore and 12% for offshore firms. Similarly employment growth was only 0.9% and 1.6% for onshores and offshores respectively. Those outcomes - as well as aggregate revenues - are more closely related to the sluggish growth rate of the economy throughout the period than the number of firms.

¹⁶To assess whether our results are sensitive to small deviations from the assumption of parallel trends, in [section 6](#) we apply the methodology of [Rambachan and Roth \(2023\)](#) to our estimates. Overall, we document that we would need relatively large deviations for our significant results on impacts on number and entry of offshore firms to be insignificant.

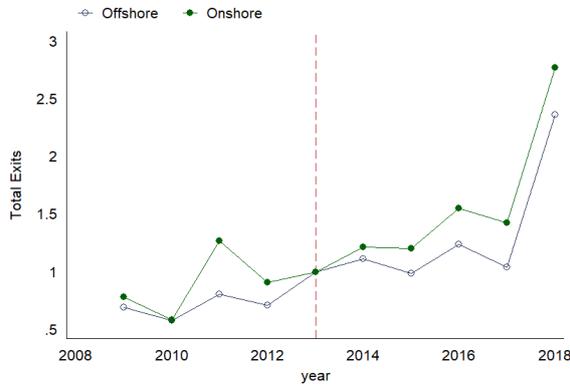
Figure 4: Aggregate quantities (normalized) - Offshore versus Onshore



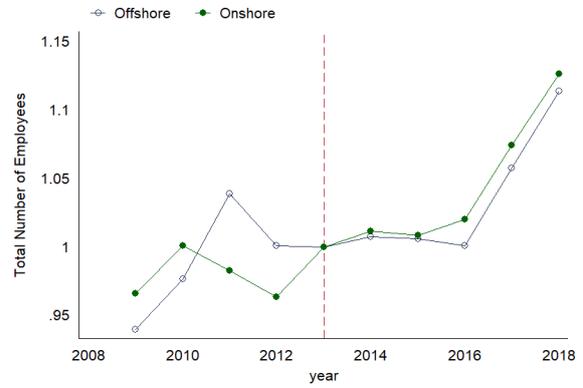
(a) Total firms normalized



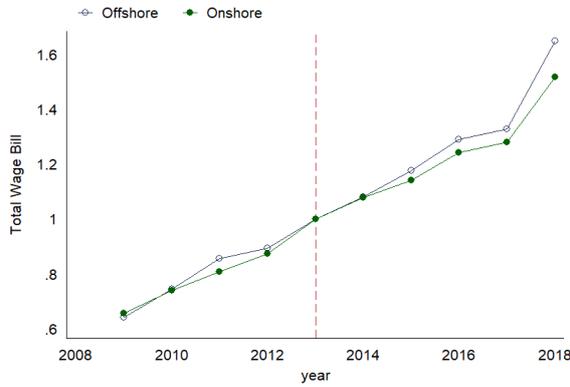
(b) Normalized numbers of entrants



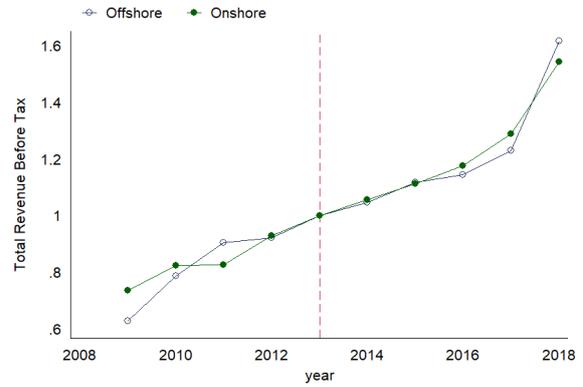
(c) Normalized numbers of exiters



(d) Number of employees - normalized



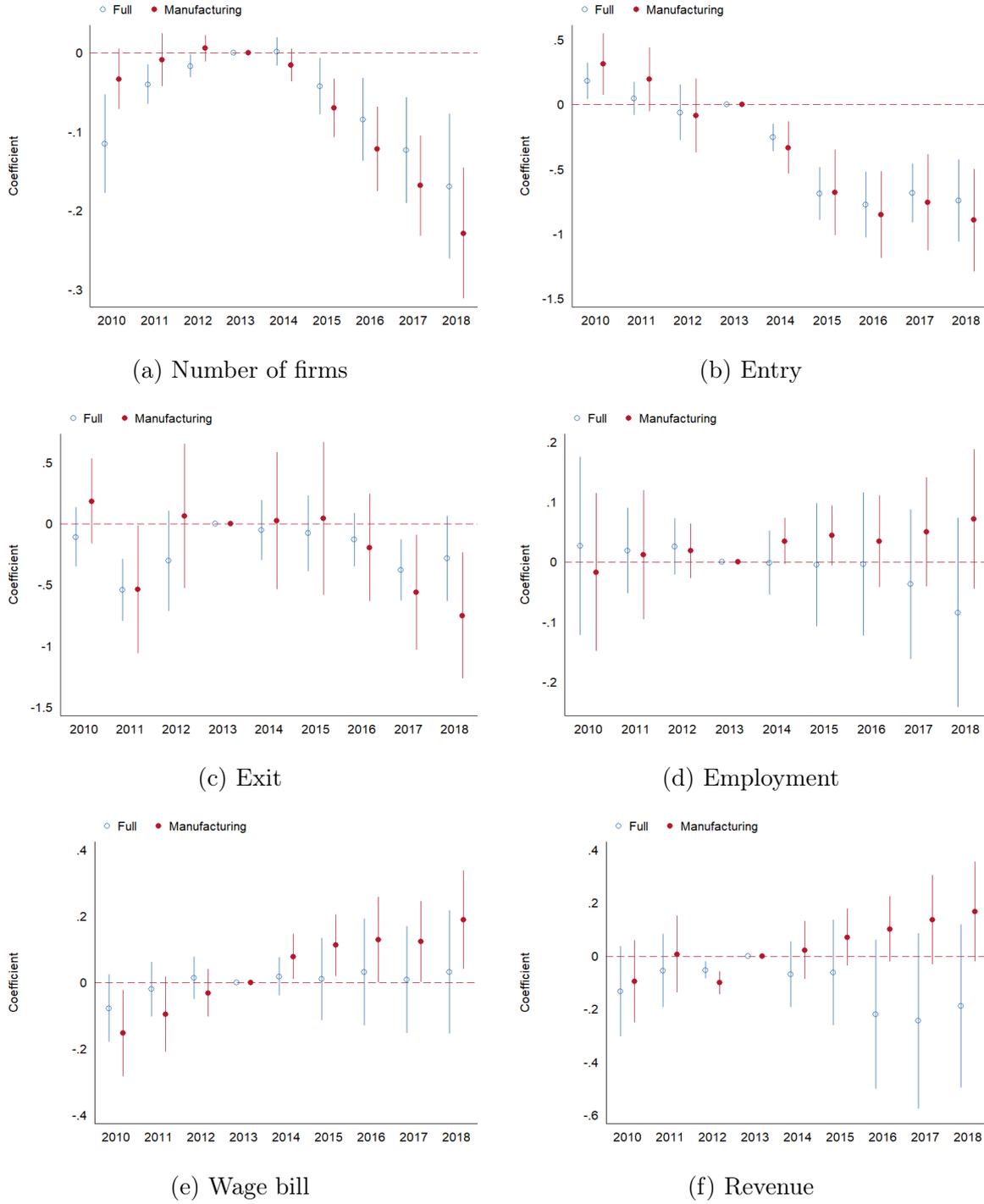
(e) Total wage bill - normalized



(f) Revenue - normalized

Note: These figures present the 2009-2018 evolution of the total number of firms (a); number of entrants (b); number of exiters (c); number of employees (d); total wage bill (e), and total revenue (f) for offshore and onshore firms separately. All variables are normalised to one in the pre-reform year in 2013.

Figure 5: DID estimates: aggregate outcomes (Full sample & Manufacturing)



Note: Industry-level DID obtained from estimating equation (1) on the log of total number of firms (a); the log of the total number of entrants (b); the log of the total number of exiters (c); the log of the total number of employees (d); the log of the total wage bill (e), and the log of the total revenue (f) in separate regressions using the entire sample and only manufacturing firms.

We summarize our findings in [Table 2](#), where we present the coefficients of interest from estimating equation (2) for the entire sample in the first panel, and restricting our

sample to manufacturers in the second one. Since these tables report average changes after the reform, coefficients are often smaller in magnitude when effects are dynamic: column (1) for example shows a decrease of 4% in the number of offshore firms (and not significant) and 11% for manufacturing offshore firms, but we observe in the data that effects are dynamic, with substantial increases in coefficients over time. We also observe in the pooled data the large decrease in entry in the offshore sector and effects that are small in magnitude and noisier for exit. For employees, wage bill and revenue, we estimate effects that are indistinguishable from zero—with the exception of a marginally significant increase in wage bill for the offshore sector post-reform. Overall, these results are consistent with dynamic effects and strongly reject meaningful decreases in economic activity of offshores after the reform, despite a substantial (relative) decrease in the number of offshore firms. This decrease may provide some caveat on extrapolating our results to the long-term horizon, as the reduced entry could in principle lead to a relatively smaller offshore sector over a period of time. While our data and the ensuing policy changes do not allow to test explicitly for the long-term effects, the uptick of the main economic aggregates in the final two years of the period is not consistent with detrimental long-term effects.

Table 2: DID Results - static

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(N firms)	Ln(N entries)	Ln(N exits)	Ln(N employess)	Ln(Wagebill)	Ln(Revenue)
<i>Full Sample</i>						
Offshore \times Post	-0.041 (0.03)	-0.669*** (0.10)	0.053 (0.11)	-0.044 (0.06)	0.041 (0.08)	-0.096 (0.11)
Observations	1,094	1,094	1,094	1,076	1,076	1,094
N sectors	61	61	61	60	60	61
R-squared	0.91	0.93	0.90	0.76	0.74	0.85
<i>Manufacturing Sample</i>						
Offshore \times Post	-0.112** (0.03)	-0.808*** (0.11)	-0.214 (0.13)	0.044 (0.06)	0.196* (0.08)	0.147 (0.08)
Observations	504	504	504	486	486	504
N sectors	28	28	28	27	27	28
R-squared	0.83	0.86	0.82	0.79	0.73	0.75

Note: this table illustrates the results of estimating equation (2) with OLS, for the full sample and manufacturing industries only. The dependent variables are the log of: number of firms, entries, exits, employees, wage bill, and revenue. The specification includes 2-digit industry-year fixed effects. Standard errors are clustered at the industry level.

5.1.3 Robustness results for industry-level effects

We present a battery of tests based on alternative specifications of the industry-level DID. First, [Figure A4](#) presents unweighted results, which appear consistent with the baseline analysis.

Second, we consider an alternative specification of our outcomes. In [Figure A5](#), we show results on the cumulative effects of the reform using the same empirical specification as [Garrett et al. \(2020\)](#), where we define outcomes as relative changes with respect to 2013 (pre-reform) levels and weight observations by the 2013 participation of each sector in total aggregate outcomes. Since this specification shows cumulative, and not period-by-period, differences between offshore and onshore, the small positive effects on the offshore sector are more pronounced, particularly for the manufacturing sector. They do reinforce the message, nonetheless, that we strongly reject a decrease in economic activity in the

offshore sector after corporate income tax rates increased.

Third, we perform various checks to address the concern that, given their export orientation, offshore firms might be affected by external shocks differently to onshore firms, thus undermining the identification. First, we interact the log of deflated value of EU imports – the major trading partner of Tunisian firms – with the offshore dummy.¹⁷ [Figure A6](#) shows that our conclusions are robust to this alternative specification. Next, we exploit equation (2) to include interaction terms between the offshore dummy and both i) the Tunisian dinar-Euro exchange rate and ii) Tunisia’s domestic final consumption over GDP ratio.¹⁸ We expect that exchange rate shocks could affect disproportionately offshore firms via export markets, while final consumption would mainly affect the demand for onshore firms, which are predominantly domestic-oriented. [Table A2](#) presents the results which show that accounting for possible differential shocks does not alter the core of our results.¹⁹ The only meaningful changes are the reduction in the negative effect of the reform on entry and the number of firms, particularly in manufacturing, and the positive effect of the reform on the wage bill in manufacturing, which becomes not significant.

The final test aims to ascertain whether the reduced entry is driven by foreign owned firms. To the extent that FDI are more footloose than domestic investors, including that they are also more likely to be registered as *phantom FDI* ([Damgaard et al., 2024](#)), the reform may affect mainly this type of investors. To test this hypothesis, we replicate the analyses excluding foreign owned firms. The results in [Figure A7](#) show that the pattern of entry and exit is similar if we only consider domestic onshore and offshore companies. The results are also similar for employment, wage bill and revenues, which continue to be unaffected by the reform even when excluding foreign firms.

¹⁷Since this specification requires that EU imports from sectors are non-zero, it restricts our sample size – most industries in the service sector drop out of this analysis.

¹⁸ Since the exchange rate and final consumption vary by year, we cannot use these interaction terms in (1), where the independent variable of interest varies at the same level.

¹⁹ Collinearity between the independent variable and the additional controls reduces the size of the sample.

5.2 Offshore firm-level responses

A possible explanation for the tax reform’s significant negative effects on entry along with the zero effects on economic activity is that the intensive margin accounts for the bulk of the impact on economic activity. To test for this explanation, we move to the analysis at the firm level. As previously discussed, we focus on the balanced panel of incumbent firms that were active throughout the 2009 - 2018 period. This panel comprises the bulk of aggregate economic activity, lending credibility to the hypothesis that this is the key margin of impact. It accounts for between 76% and 97% of overall annual onshore revenues during the period and between 58% and 89% for offshores. Similarly for the overall wage bill, incumbent firms account for 80%-96% for onshores and 66%-84% for offshores.

Our first set of results relates to employment in firms in the offshore sector, measured using social security data. In [Figure 6](#), we present results from estimating equation (3) for a set of outcomes of interest related to employment. In panel (a) we use the log number of employees as the outcome of interest. Since, as documented in [section 3](#), a large share of firms have very few employees, we also present results using other measures of employment level categories - panel (b) uses a dummy for 2 or more employees; panel (c) for 5 or more; and panel (d) for 10 or more.

Throughout our results, we first note that we observe a strong convergence between firms in the offshore and onshore sectors in 2009 - 2010. We attribute that convergence to the rebound of the Great Financial Crisis (GFC) – offshore firms in Tunisia are heavily exposed to the European market and were strongly affected by the economic impacts of the GFC in 2007-2008. So our coefficients for 2009 and 2010 are likely documenting the recovery of those firms in relative terms to the onshore sector. In 2011 and 2012, the two groups of firms show no differential trends. Nor do they show any differential behavior after the reform in 2013 – for most of our employment measures, the coefficients on the offshore sector are small in magnitude and not statistically different from zero. The only exception is the outcome measured as an indicator function for firms with 10 or more employees – but even in that case, the point estimates are positive and suggest

an increase in the share of large firms in the offshore sector. These facts hold both for the entire sample and also when we restrict the analysis for firms in the manufacturing industry.

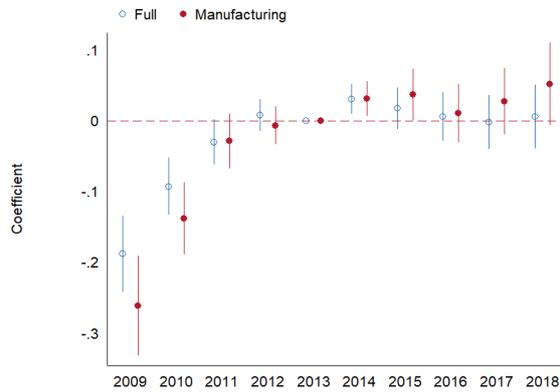
We then proceed to evaluate outcomes available from firms' tax records in [Figure 7](#). In panel (a), we document no meaningful differential behavior in the log wage bill for offshore and onshore firms after the reform (again, highlighting the strong convergence of the offshore sector in 2009-2010 but similar trends in 2011-2012). For the full sample we estimate precise zeroes, whereas for the manufacturing sector we have point estimates that are approximately +5% but not always significant. Results for log revenue are similar, showing zero effects in the early years after the reform and larger increases in offshore revenue later in the panel (particularly for the manufacturing sector).

The one outcome for which we find large, negative effects of the reform on the offshore sector are declared profits, presented in panel (c) of [Figure 7](#). We estimate no differential trends in the onshore and offshore sector before the reform, but a large decrease in profits in the two years afterwards: both for the entire sample and manufacturing industry, we see a .4 log-points decrease in profits in 2014 and a 1 - 1.5 log point decrease in 2015. In later years, nonetheless, we see a rapid convergence of profits, such that by 2018 profits are actually estimated to be larger in the offshore sector. Given the consistency of the remaining evidence that the reform did not affect real economic outcomes such as revenue and employment, we consider it unlikely that the large effects we estimate are real decreases in economic profit of offshore firms. This is also consistent with the effects of the tax reform on imports, which appear to be non significant both at the industry- (panel (a) in appendix [Figure A8](#)) and at firm-level (panel (b) in appendix [Figure A8](#)).²⁰. More likely, this is a reporting response from offshore firms: once profits go from being taxed at a zero rate to a 10% rate, firms respond by decreasing their reported profits.²¹

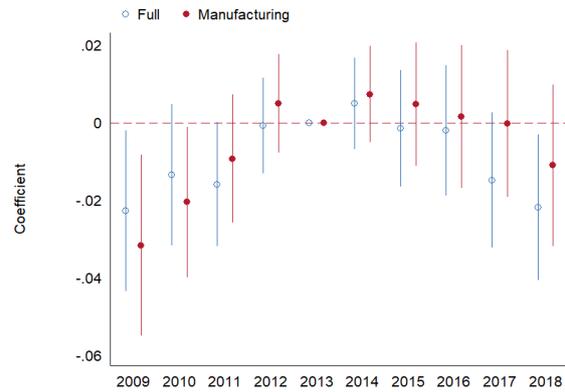
²⁰The effect on imports appears to be positive even three years after the reform.

²¹We should note that, since we see little to no revenue response, the response in profits is likely driven by an increase in reported costs. It has been extensively documented that costs are much more elastic than revenues when firms respond to changes in tax rates ([Bachas and Soto, 2021](#); [Lobel et al., 2024](#)). We also note that the profit variable we use is not the taxable base of corporate income taxes – it is instead a “top line” economic profit measure, after which firms will apply deductions and other adjustments to arrive at taxable income, which we do not observe.

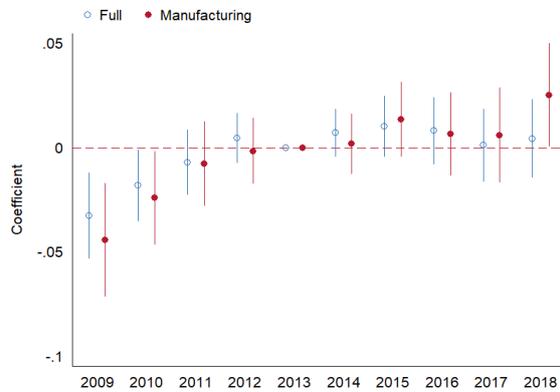
Figure 6: Employment outcomes on the balanced sample - Offshore versus Onshore



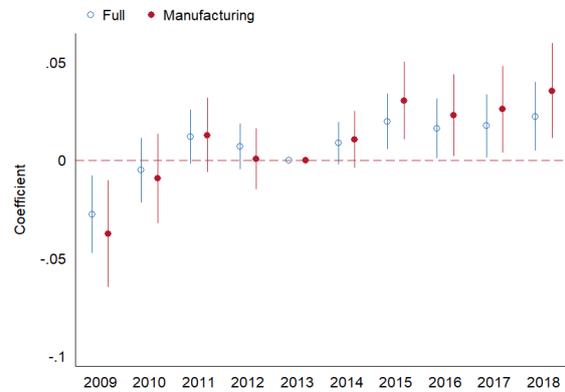
(a) Ln(Employees)



(b) Firm has more than 2 employees



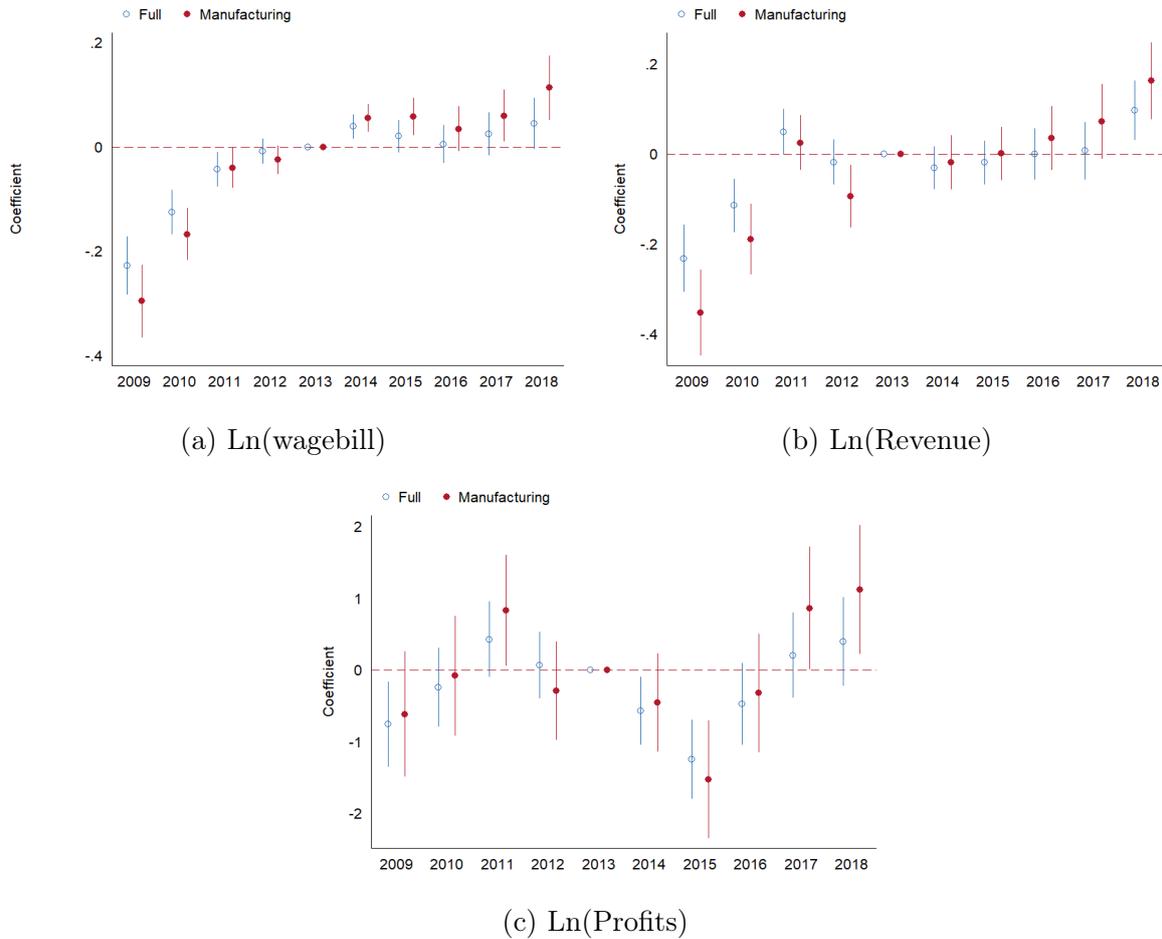
(c) Firm has more than 5 employees



(d) Firm has more than 10 employees

Note: Firm-level DID obtained from estimating equation (3) on the log of the employees in panel (a) a dummy for 2 or more employees in panel (b) a dummy for 5 or more in panel (c) and a dummy for 10 or more in panel (d), in separate regressions using the entire sample and only manufacturing firms. We observe in 2009-2010 a convergence between the two regimes which we attribute to the GFC since offshore firms are exposed to international markets. Once again, the evidence suggests that incumbents employment was mostly unchanged by the reform.

Figure 7: Other outcomes on the balanced sample - Offshore versus Onshore



Note: Firm-level DID obtained from estimating equation (3) on the log of the wage bill in panel (a) the log of revenue before tax in panel (b) and the log of declared profits in panel (c), in separate regressions using the entire sample and only manufacturing firms. We observe no meaningful differential behavior in both the log of wage bill and log of revenue after the reform. The only economic outcome for which we find a large and negative short-term impact is profits. This is more likely a reporting response from Offshore firms decreasing their reported profits since revenues are the same.

5.2.1 Robustness results for firm-level effects

We present a series of alternative specifications for the firm-level DID exercise, which overall are consistent with the finding of no negative effect of the reform on economic activity in those firms. First, given that we document that firms in the onshore and offshore sectors are very different in outcome levels, we estimate the equation re-weighting observations by the inverse of the propensity score (PS) of firms being offshore. We provide more details in appendix [section 6](#), but note here that the common support is quite limited, so for this exercise our sample is restricted to a much smaller set of firms.

We present results in [Figure A9](#) and [Figure A10](#), which are remarkably similar to our baseline results and suggest, if anything, small increases in employment and revenue in the offshore sector.

We also restrict the sample in two other ways to make onshore and offshore firms more similar in terms of fixed characteristics. First, we exclude foreign-owned firms from the sample, since very few onshore are foreign-owned versus more than one-third of offshores. Second, in a separate exercise we restrict our onshore sample to firms that ever export, to limit our comparison of offshore behavior to onshores that are also engaged in foreign trade. We present the results for the first exercise in [Figure A11](#) - [Figure A12](#), and the result for the second exercise in [Figure A13](#) - [Figure A14](#). Results are again very similar to our baseline estimate, suggesting no negative effects of the reform on the offshore sector, regardless of the precise comparison group we use as a proxy for the counterfactual behavior of offshore firms.

Another robustness exercise we consider relates to the staggered nature of the reform. As discussed in the context section, the increase in corporate income tax rates for the offshore sector did not happen instantly. As we document in [Figure A15](#), only approximately one in five offshore firms immediately faced the increased 10% income tax rates, because they were at least 10 years-old by 2014. The remaining 80% offshore firms gradually entered the new regime over the next decade – by 2018, at the end of our panel, close to half of offshore firms were already paying larger income taxes on their profits. To perform a stringent exercise on defining treatment offshore, we exclude all offshore firms not treated in 2014, that is, 80% of our offshore sample, and consider as treated only those firms facing higher rates throughout the period. We note that this restricts our offshore sample in a particular way: we only keep older firms, that also happen to be much larger. Furthermore, as we discuss previously, we believe this to be an extremely narrow definition of "treatment": even firms that were very young and expected to be treated only after 2018, the end of our panel, should be affected by the reform – while they might not be paying income taxes in the present, the fact that the policy established that they would be paying taxes in the near future should affect long term decisions such

as hiring, investment and growth.

We present results in [Figure A16](#) and [Figure A17](#). For this sample, we often observe differential trends before the reform: when comparing the sub-sample of immediately treated firms and onshores, it seems that onshores were catching-up in terms of employment, under several of our outcomes. Furthermore, point estimates for the DID coefficients post-reforms are often negative (although not always statistically different from zero). However, it is hard to distinguish these negative point estimates from the overall trend, already observed pre-reform, that onshores were converging towards the large offshores considered here. The results for revenue, wage bill and profits are more similar to our baseline estimates – we do not see any systematic pre-trends and results are mostly zero (with small negative effects in early years for offshores), while for profits we observe the same strong dip in 2014 and 2015, followed by a recovery in the later years of the sample.

Finally, we address the concern that the firm-level results are confounded by local shocks, such as changes in local labor market competition following the reduction in offshore entry documented in the industry-level analysis. To that end, we run the event studies including region-year effects. We experiment with two geographical units, “gouvernorat”—roughly a province, and the more granular “delegation”, identifiable as a municipality. [Figure A18](#) and [Figure A19](#) present the results for the full sample. Results are still unchanged for manufacturing firms only. A significant but small negative coefficient is observed for employment above two employees in panel (b). However, this effect takes place in 2017, three years after the reform. Thus, we conclude that the inclusion of region-year effects does not alter our conclusions.

6 Conclusion

Given the large fiscal costs involved, tax benefits for the corporate sector are often scrutinized for potential benefits. In this paper, we provide evidence on the economic impacts of phasing out a sizable corporate tax incentives to the *offshore sector* in Tunisia – a large

set of export-oriented firms benefiting from several preferential policies. We estimate that this policy could have cost up to 6% of GDP in foregone tax revenues.

Despite observing a substantial decline in the number of firms in that sector, driven by decreased entry, we do not find meaningful economic effects in terms of employment or revenue. That is true in aggregate terms, but also when we restrict our analysis to a balanced panel of firms that are active throughout the analysis period. As these incumbent firms account for the bulk of economic activity in Tunisia, the null effect of the reform on this sample helps reconcile the negative impact on entry with the zero impact on economic activity.

Our setting provides an important opportunity to evaluate how one specific component of the preferential policies in export-oriented regimes – namely, reduced CIT rates – affects economic activity. In that sense, our findings should not be interpreted as speaking to the overall impacts of the *existence* of export-oriented regimes. Instead, we evaluate how increase CIT rates on firms in these regimes affect entry and economic activity decisions, holding constant a range of other existing benefits. In the specific case of *offshore* firms in Tunisia, our results suggest that the previous CIT exemption did not boost employment or revenue. The results are in line with survey evidence among global investors that show that incentives are second order factors in deciding the location of investments relative to leading country characteristics, such as political and economic stability, a transparent regulatory framework, availability of skills, infrastructure quality and a large local market (World Bank, 2017; UNIDO, 2011).

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Appendix Tables and Figures

Figure A1: Data flow.

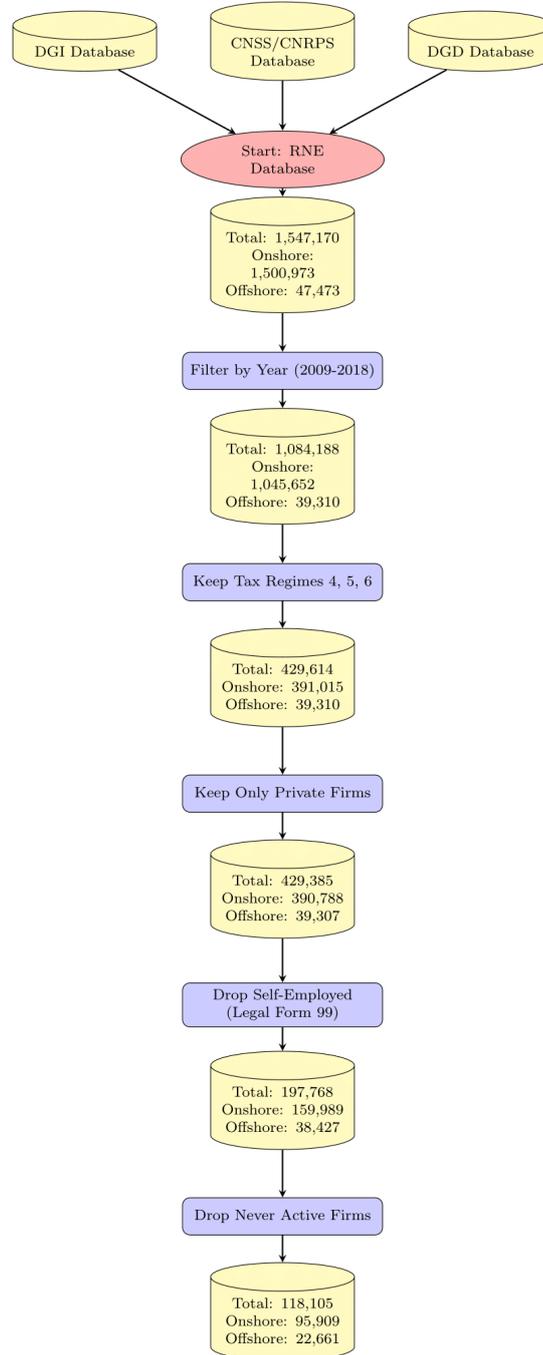
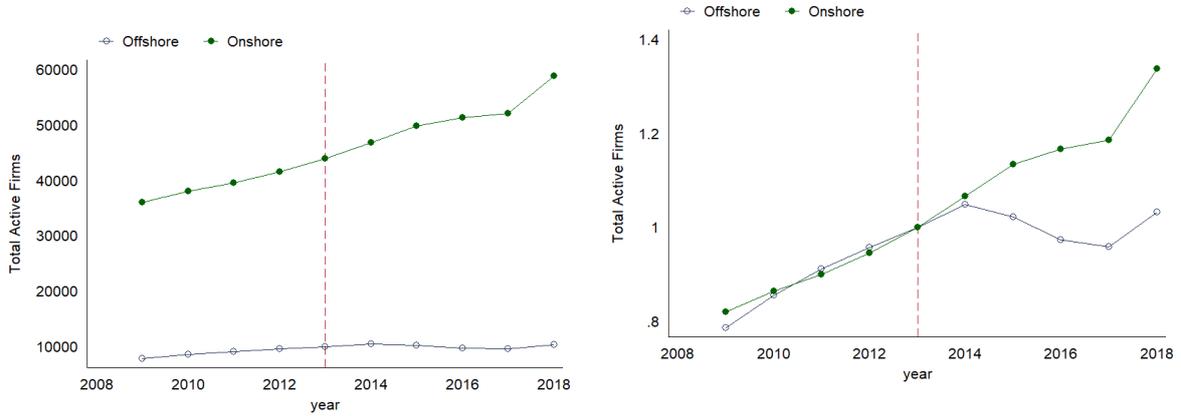


Figure A2: Number of active firms - Offshore versus Onshore



Note: This graph presents the evolution of the total number of active offshore and onshore firms from 2009 to 2018.

Note: This graph presents the evolution of the total number of active offshore and onshore firms from 2009 to 2018, normalized to 2013 levels.

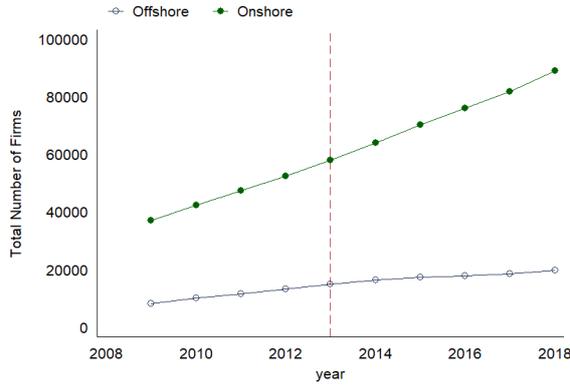
(a) Number of active firms

(b) Number of active firms - Normalized

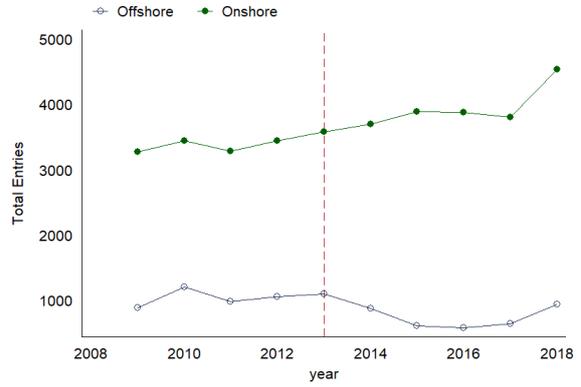
Table A1: Descriptives

	Full sample	Balanced sample	All offshore	Balanced offshore
Firm Characteristics:				
Offshore dummy	0.20 (0.40)	0.12 (0.33)	1.00 (0.00)	1.00 (0.00)
foreign	0.10 (0.30)	0.06 (0.23)	0.44 (0.50)	0.38 (0.49)
firm age	9.44 (9.23)	15.63 (10.90)	6.82 (5.68)	11.12 (6.96)
d_manufacturing	0.32 (0.47)	0.34 (0.47)	0.41 (0.49)	0.61 (0.49)
d_sales	0.35 (0.48)	0.36 (0.48)	0.14 (0.34)	0.10 (0.31)
d_services	0.27 (0.44)	0.22 (0.41)	0.44 (0.50)	0.27 (0.45)
Entry dummy	0.06 (0.25)	0.00 (0.01)	0.07 (0.26)	0.00 (0.00)
Exit dummy	0.01 (0.12)	0.00 (0.01)	0.02 (0.14)	0.00 (0.00)
Social Security Records Outcomes:				
d_employment	0.52 (0.50)	0.89 (0.31)	0.41 (0.49)	0.88 (0.32)
Number of employees	17.78 (108.27)	33.63 (163.00)	40.82 (209.23)	95.70 (370.83)
d_wagebill	0.51 (0.50)	0.89 (0.32)	0.41 (0.49)	0.88 (0.33)
Wagebill (Million Dinars)	0.21 (1.43)	0.34 (1.97)	0.38 (1.73)	0.72 (2.66)
Tax Record Outcomes:				
Revenue (Million Dinars)	1.68 (14.99)	3.64 (22.72)	1.95 (15.72)	5.18 (21.92)
d_loss	0.34 (0.48)	0.27 (0.45)	0.27 (0.45)	0.21 (0.40)
Profits (Million Dinars)	0.03 (6.25)	0.05 (10.35)	0.03 (12.11)	-0.24 (25.71)
d_revenue_export	0.21 (0.41)	0.29 (0.45)	0.58 (0.49)	0.93 (0.26)
DGI export value (Million Dinars)	0.49 (7.43)	0.88 (8.67)	1.94 (15.68)	5.15 (21.89)
Customs Records Outcomes:				
d_exportvalue	0.09 (0.28)	0.14 (0.35)	0.23 (0.42)	0.50 (0.50)
Customs export value (Million Dinars)	3.65 (22.69)	5.45 (22.85)	5.35 (28.92)	9.28 (30.10)
Customs import value (Million Dinars)	1.94 (10.86)	3.21 (13.16)	3.11 (15.89)	5.15 (17.62)
Observations	72379	20500	14762	2521

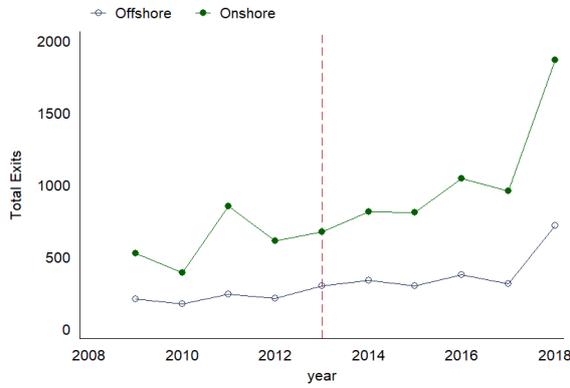
Figure A3: Aggregate quantities (levels) - Offshore versus Onshore



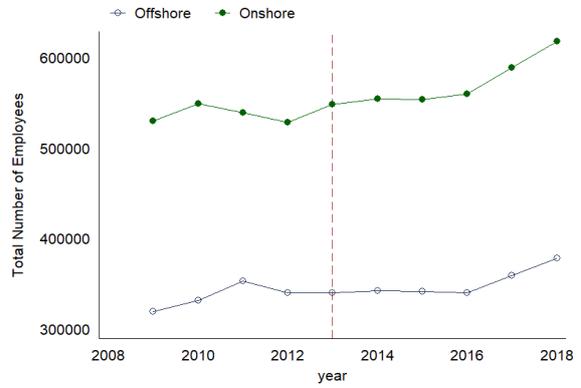
(a) Total firms



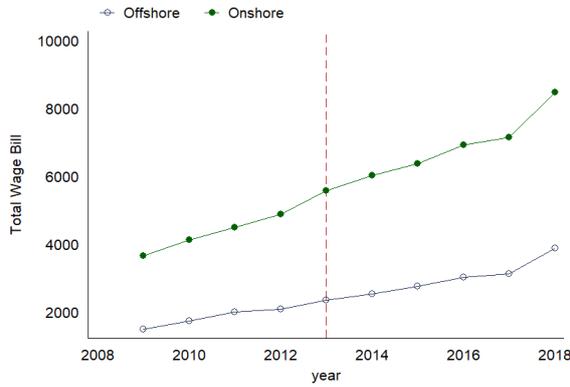
(b) Numbers of entrants



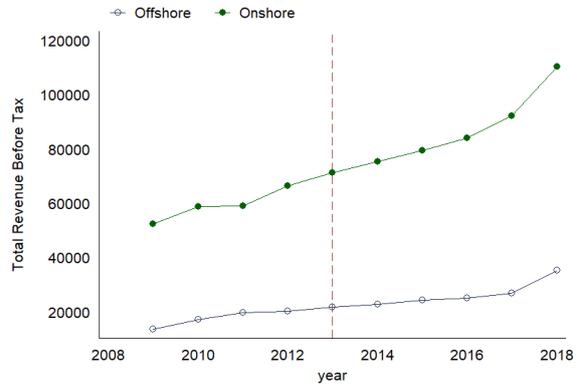
(c) Numbers of exiters



(d) Number of employees - levels



(e) Total wage bill - levels

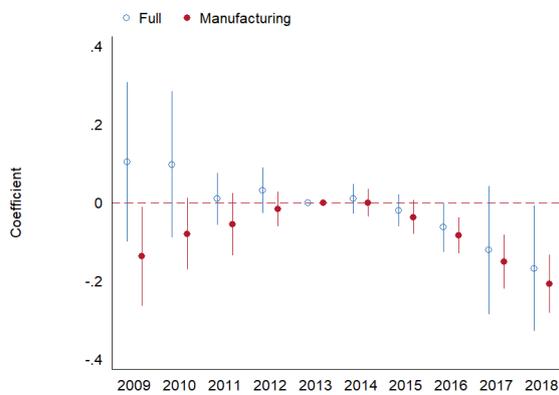


(f) Revenue - levels

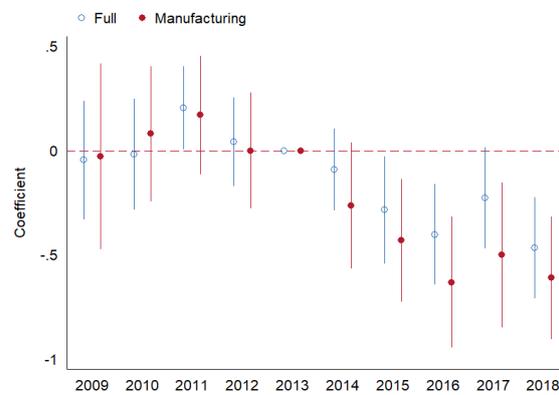
Note: These figures present the 2009-2018 evolution of the total number of firms (a); number of entrants (b); number of exiters (c); number of employees (d); total wage bill (e), and total revenue (f) for offshore and onshore firms separately.

Unweighted industry results

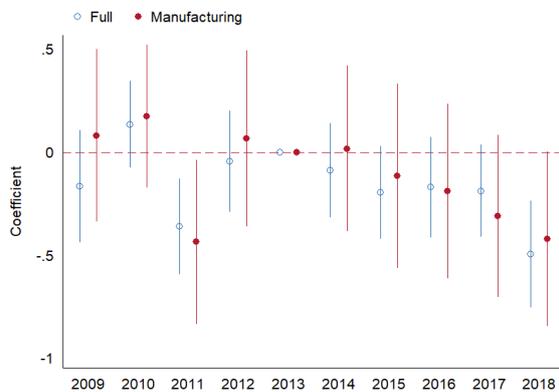
Figure A4: DID industry-level results – unweighted



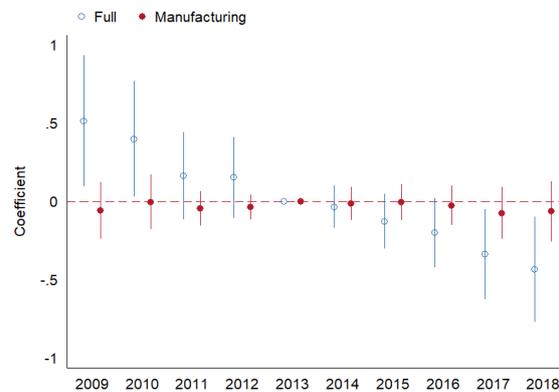
(a) Number of firms



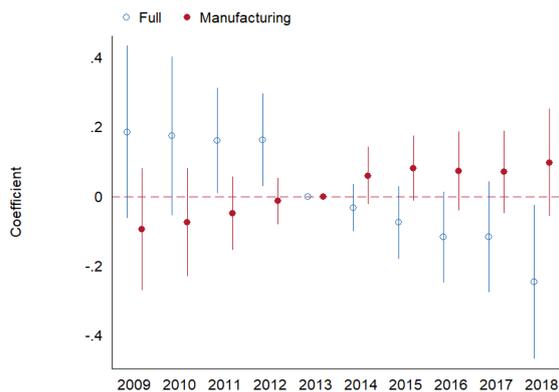
(b) Entry



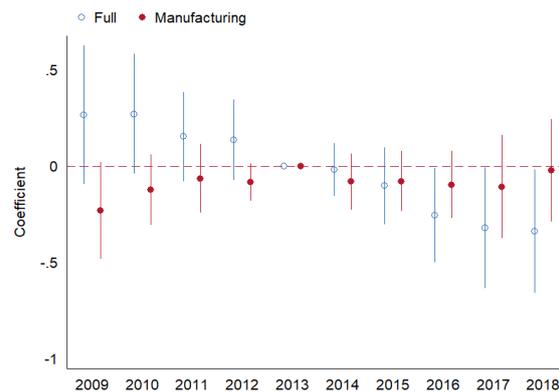
(c) Exit



(d) Employment



(e) Wage bill

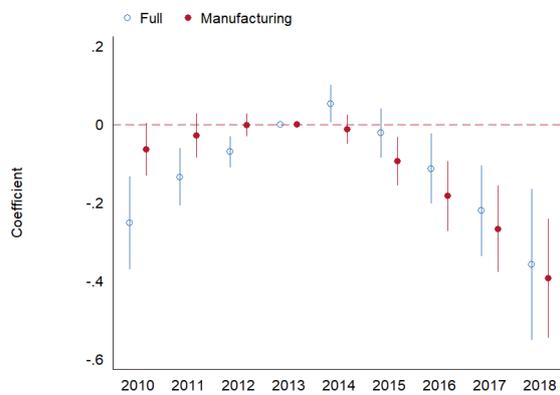


(f) Revenue

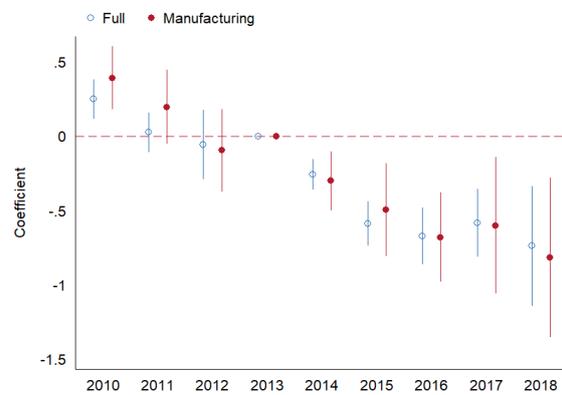
Note: Industry-level 2009 unweighted DID, obtained from estimating equation (1) on the log of total number of firms (a); the log of the total number of entrants (b); the log of the total number of exiters (c); the log of the total number of employees (d); the log of the total wage bill (e), and the log of the total revenue (f) in separate regressions using the entire sample and only manufacturing firms.

Cumulative industry-level results

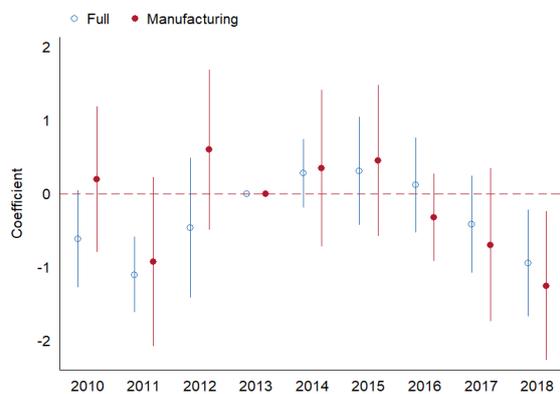
Figure A5: DID industry-level results – cumulative effects.



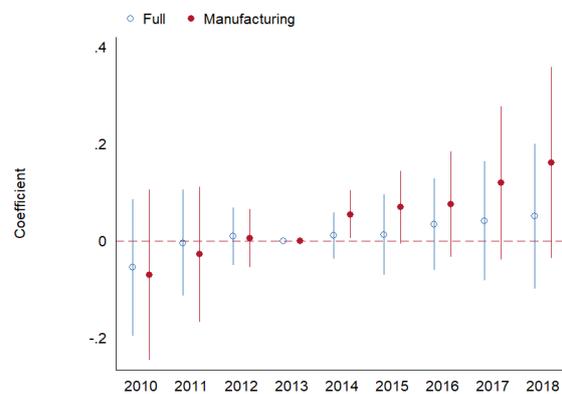
(a) Number of firms



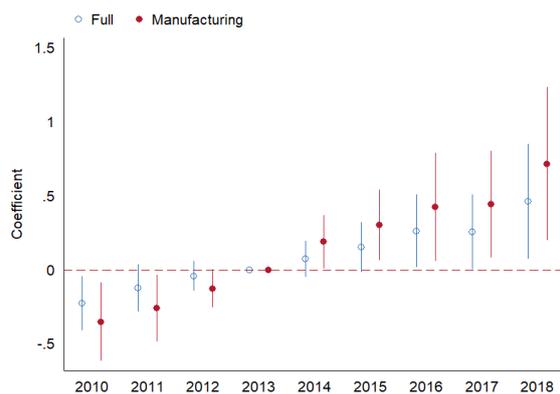
(b) Entry



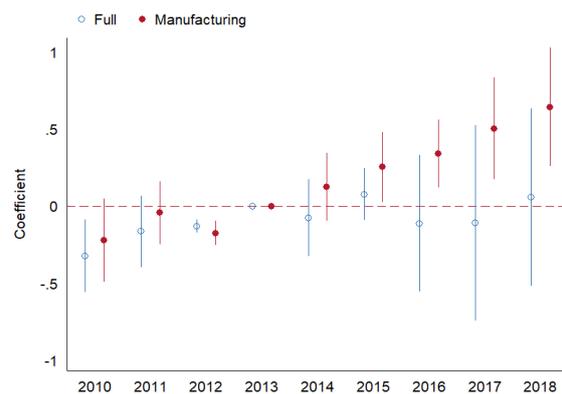
(c) Exit



(d) Employment



(e) Wage bill

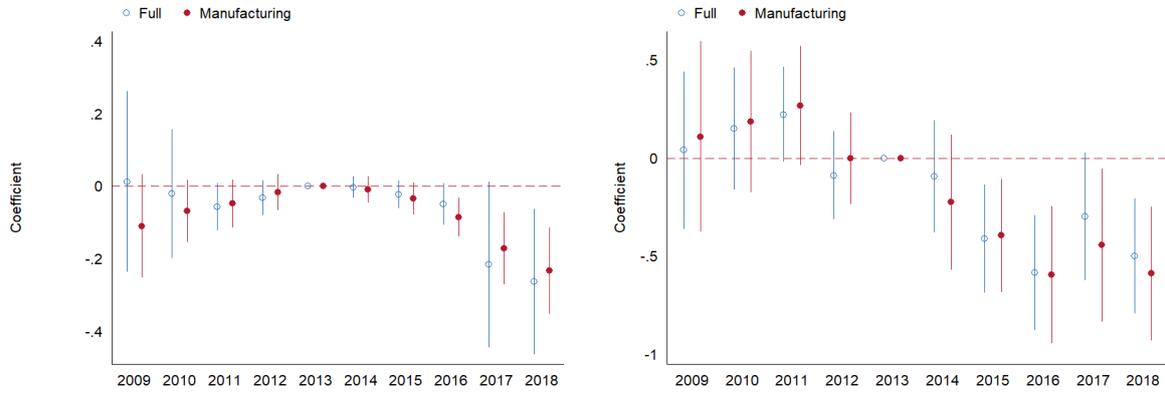


(f) Revenue

Note: Industry-level 2009 weighted DID, obtained from estimating equation (1) on the log of total number of firms (a); the log of the total number of entrants (b); the log of the total number of exiters (c); the log of the total number of employees (d); the log of the total wage bill (e), and the log of the total revenue (f) in separate regressions using the entire sample and only manufacturing firms. The outcome variables are defined as in [Garrett et al. \(2020\)](#) to reflect growth from the pre-reform period 2013.

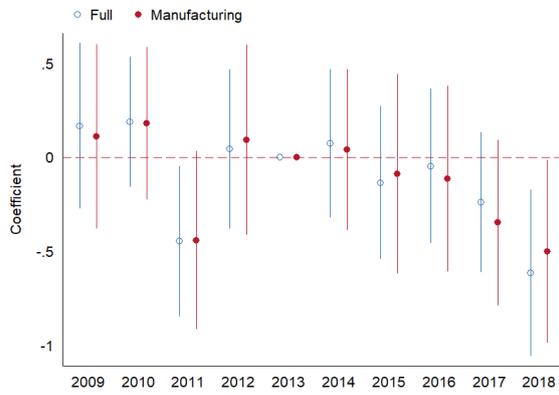
Including EU imports \times offshore dummy in industry-level results

Figure A6: DID industry-level results – including EU imports \times offshore dummy.

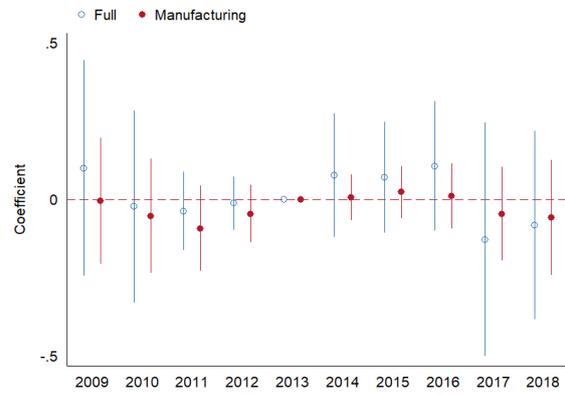


(a) Number of firms

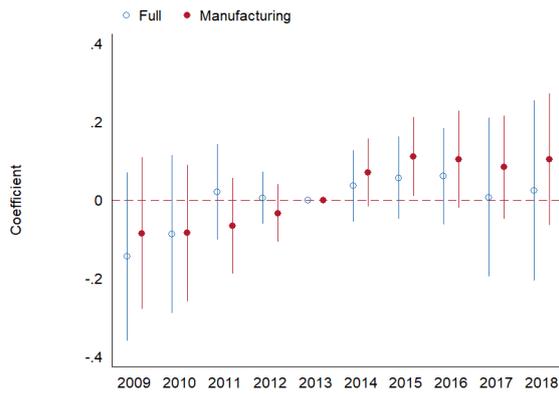
(b) Entry



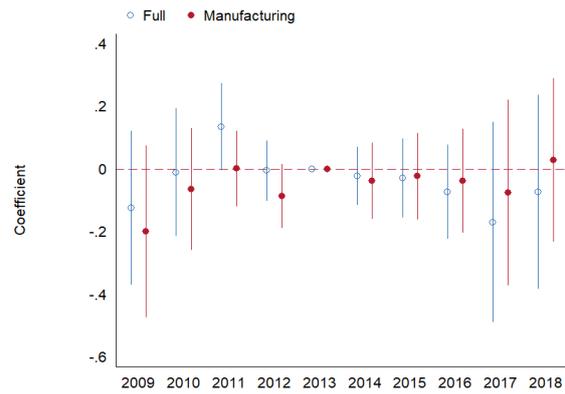
(c) Exit



(d) Employment



(e) Wage bill



(f) Revenue

Note: Industry-level event study on the log of total revenue using FE, and highlighting differences between the aggregate and manufacturing sectors and including EU imports \times offshore dummy.

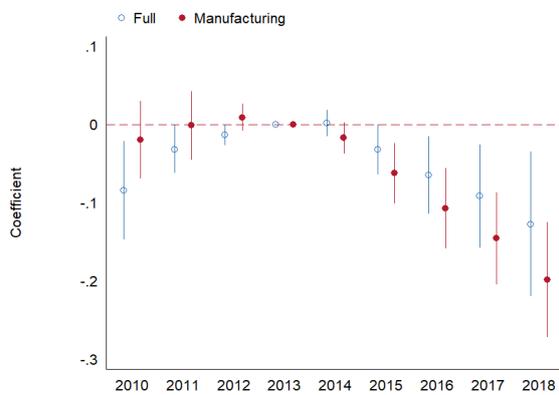
Table A2: DID Results - static: additional controls

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(N firms)	Ln(N entries)	Ln(N exits)	Ln(N employees)	Ln(Wagebill)	Ln(Revenue)
<i>Full Sample</i>						
Offshore \times Post	-0.037*	-0.295**	0.216*	0.002	-0.018	-0.088
	(0.02)	(0.10)	(0.08)	(0.06)	(0.05)	(0.07)
Offshore \times Consumption/GDP	1.789**	-7.145***	-1.469	0.037	1.331	1.322
	(0.53)	(1.52)	(1.86)	(1.22)	(0.95)	(1.63)
Offshore \times Xrate	-0.172***	-0.062	-0.177	-0.091	-0.009	-0.137
	(0.04)	(0.13)	(0.22)	(0.06)	(0.05)	(0.10)
Observations	1,094	1,094	1,094	1,076	1,076	1,094
N sectors	61	61	61	60	60	61
R-squared	0.91	0.93	0.90	0.76	0.74	0.85
<i>Manufacturing Sample</i>						
Offshore \times Post	-0.036**	-0.319*	0.322*	0.015	0.057	0.026
	(0.01)	(0.13)	(0.15)	(0.02)	(0.04)	(0.04)
Offshore \times Consumption/GDP	0.487	-8.285***	-3.118	0.310	2.279*	1.478
	(0.29)	(2.22)	(3.48)	(1.08)	(1.05)	(1.20)
Offshore \times Xrate	-0.190***	-0.179	-0.743*	0.027	0.058	0.097
	(0.02)	(0.18)	(0.32)	(0.04)	(0.04)	(0.07)
Observations	504	504	504	486	486	504
N sectors	28	28	28	27	27	28
R-squared	0.83	0.87	0.82	0.79	0.73	0.75

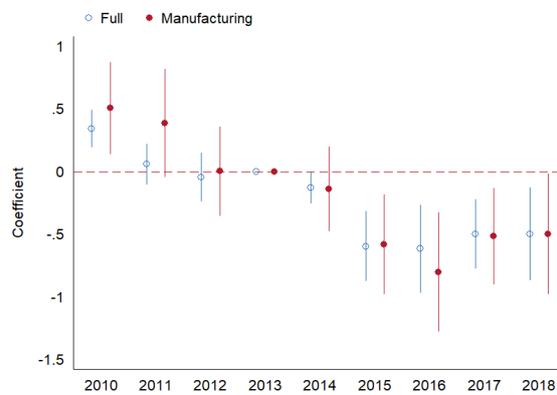
Note: this table illustrates the results of estimating equation (2) with OLS, for the full sample and manufacturing industries only. The dependent variables are the log of: number of firms, entries, exits, employees, wage bill, and revenue. The specification includes interaction terms between a dummy flagging offshore aggregate outcomes and: i) the Tunisian dinar-Euro exchange rate, and ii) final consumption-GDP ratio. All specifications include 2-digit industry-year fixed effects. Standard errors are clustered at the industry level.

Only domestic firms

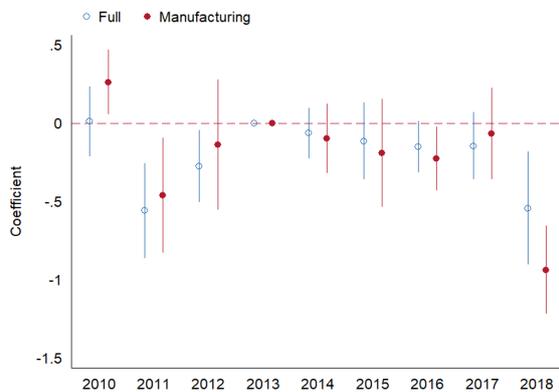
Figure A7: DID results - only domestic firms



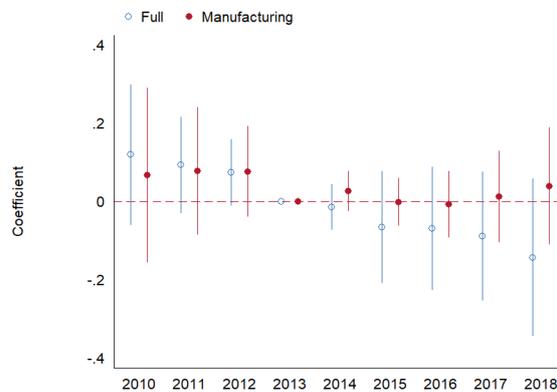
(a) Number of firms



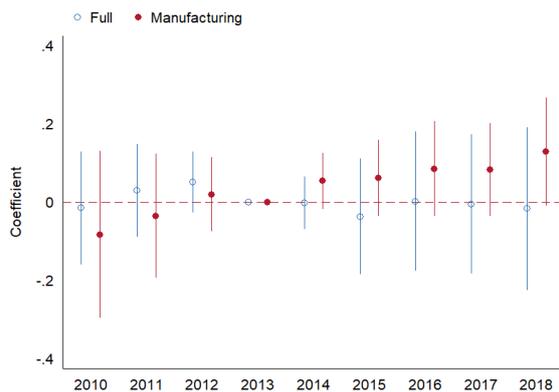
(b) Entry



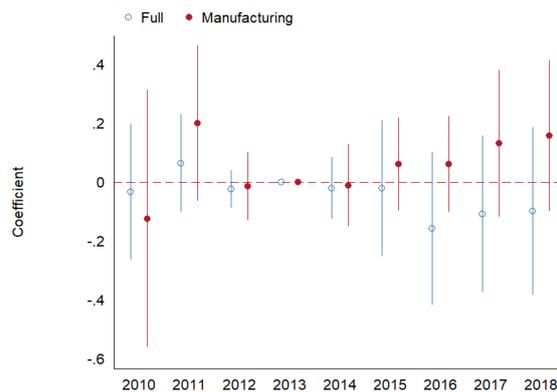
(c) Exit



(d) Employment



(e) Wage bill

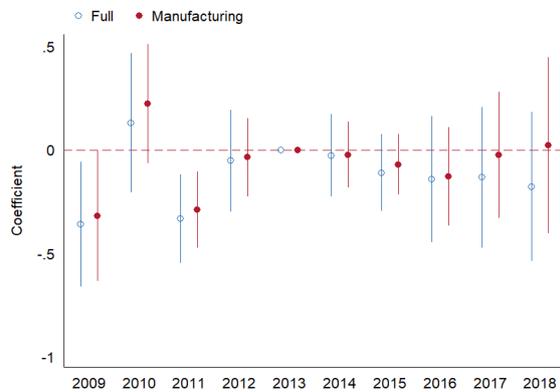


(f) Revenue

Note: Industry-level event study for domestic firms only on the log of total revenue using FE, and highlighting differences between the aggregate and manufacturing sectors.

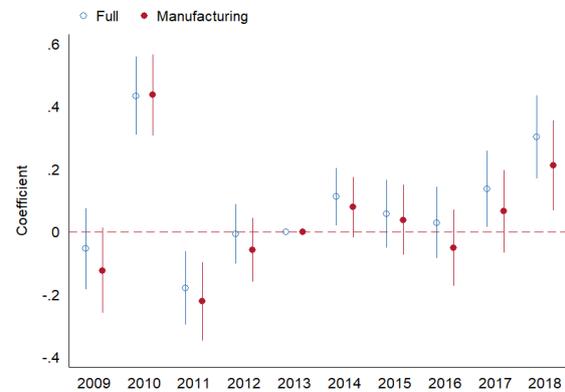
Impact of the reform on imports – industry and firm-level

Figure A8: DID estimates: value of imports (Full sample & Manufacturing): industry-level.



Note: Industry-level event study on the log of import value using FE, and highlighting differences between the aggregate and manufacturing sectors.

(a) Industry-level

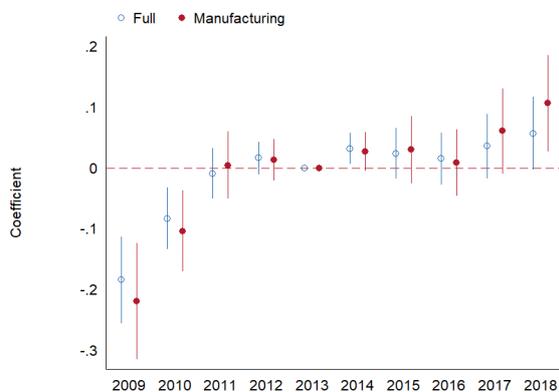


Note: Firm-level event study on the log value of imports using firm FE, highlighting differences between the aggregate and manufacturing sectors.

(b) Firm-level

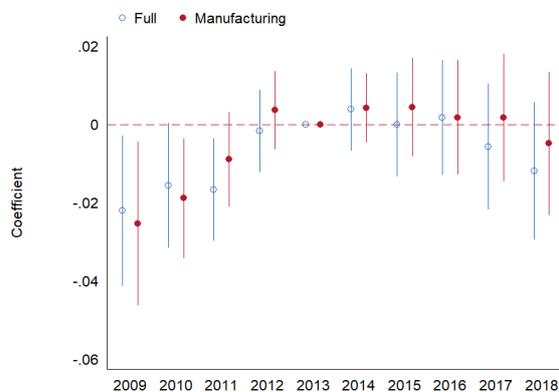
Using weights firm results

Figure A9: Employment outcomes Weighted



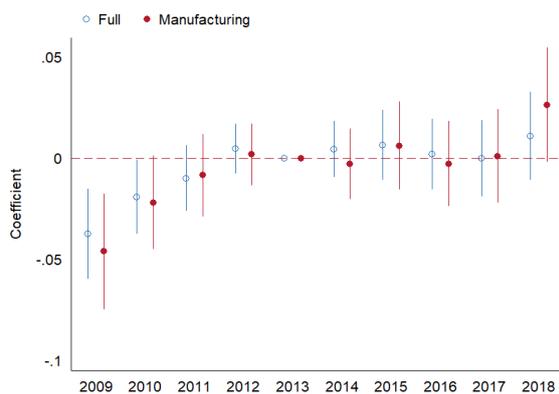
Note: Firm-level event study on the log of number of employees using FE, 2009 employment weights and highlighting differences between the aggregate and manufacturing sectors.

(a) $\ln(\text{Employees})$



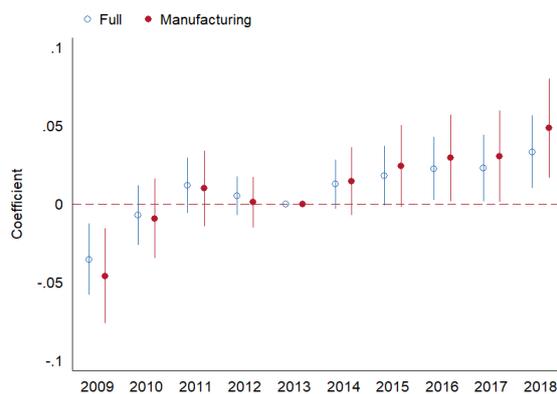
Note: Firm-level event study on firms with 2 or more employees using FE, 2009 employment weights and highlighting differences between the aggregate and manufacturing sectors.

(b) Firm has more than 2 employees



Note: Firm-level event study on firms with 5 or more employees using FE, 2009 employment weights and highlighting differences between the aggregate and manufacturing sectors.

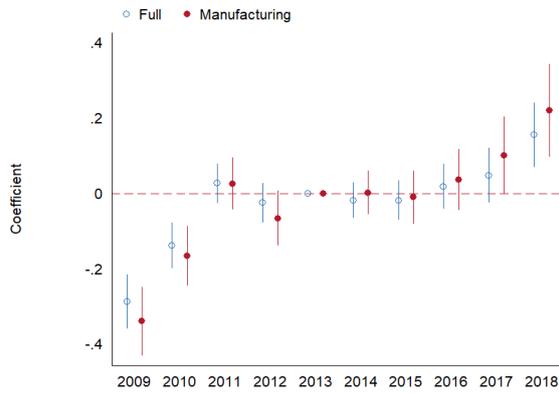
(c) Firm has more than 5 employees



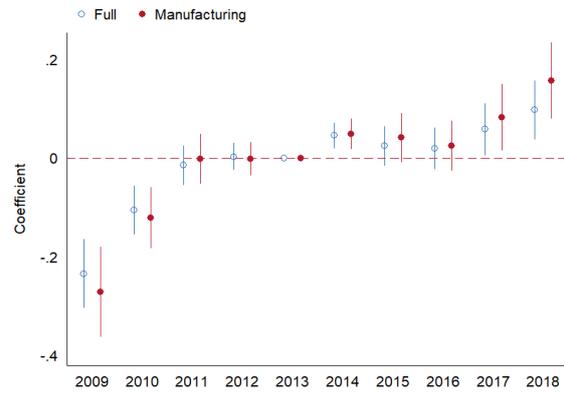
Note: Firm-level event study on firms with 10 or more employees using FE, 2009 employment weights and highlighting differences between the aggregate and manufacturing sectors.

(d) Firm has more than 10 employees

Figure A10: Output, Wage bill and Profits Weighted



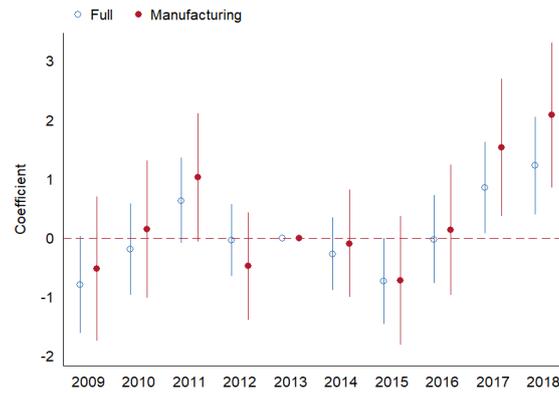
Note: Firm-level event study on the log of revenue before tax using FE, 2009 employment weights and highlighting differences between the aggregate and manufacturing sectors.



Note: Firm-level event study on the log of wage bill using FE, 2009 employment weights and highlighting differences between the aggregate and manufacturing sectors.

(a) Ln(Revenue)

(b) Ln(wagebill)

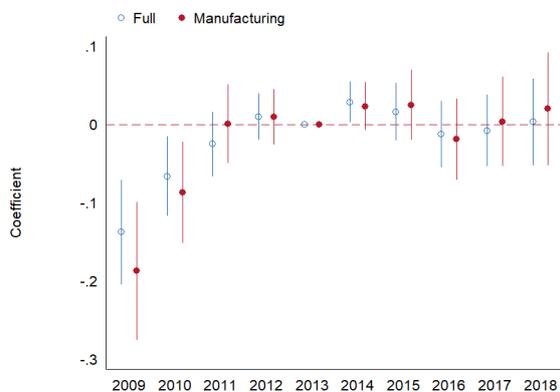


Note: Firm-level event study on the log of winsorized profits using FE, 2009 employment weights and highlighting differences between the aggregate and manufacturing sectors.

(c) Ln(Profits)

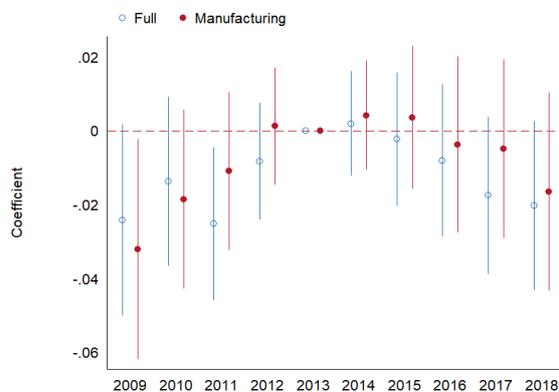
Excluding foreign-owned firms

Figure A11: Employment outcomes excluding foreign-owned firms



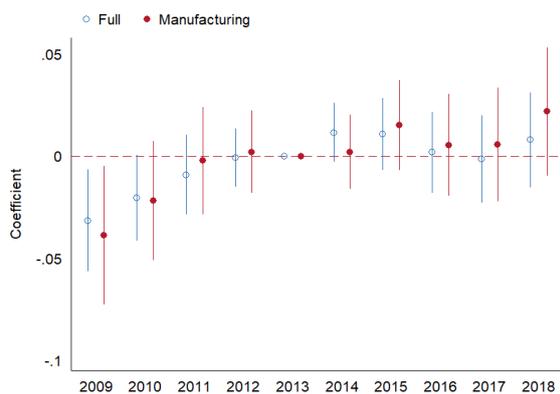
Note: Firm-level event study on the log of employees using FE, excluding foreign-owned firms and highlighting differences between the aggregate and manufacturing sectors.

(a) $\ln(\text{Employees})$



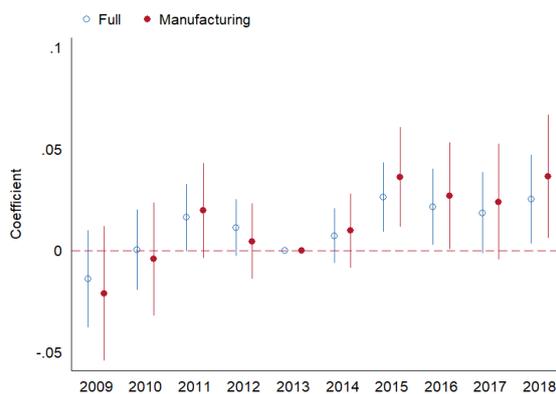
Note: Firm-level event study on firms with 2 or more employees using FE, excluding foreign-owned firms and highlighting differences between the aggregate and manufacturing sectors.

(b) Firm has more than 2 employees



Note: Firm-level event study on firms with 5 or more employees using FE, excluding foreign-owned firms and highlighting differences between the aggregate and manufacturing sectors.

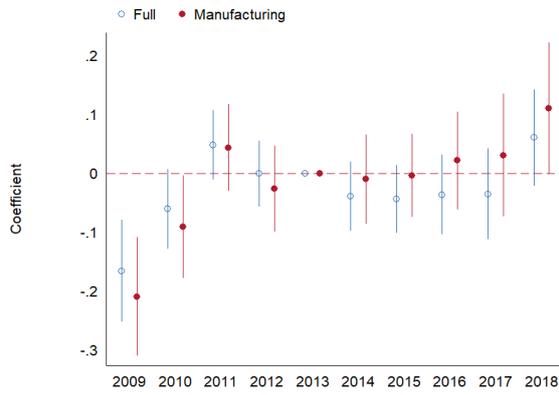
(c) Firm has more than 5 employees



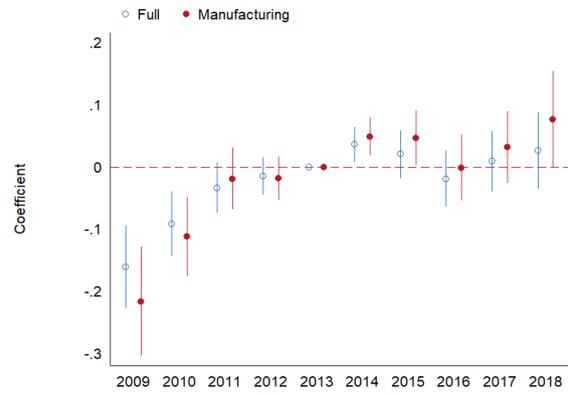
Note: Firm-level event study on firms with 10 or more employees using FE, excluding foreign-owned firms and highlighting differences between the aggregate and manufacturing sectors.

(d) Firm has more than 10 employees

Figure A12: Output, Wage bill and Profits excluding foreign-owned firms



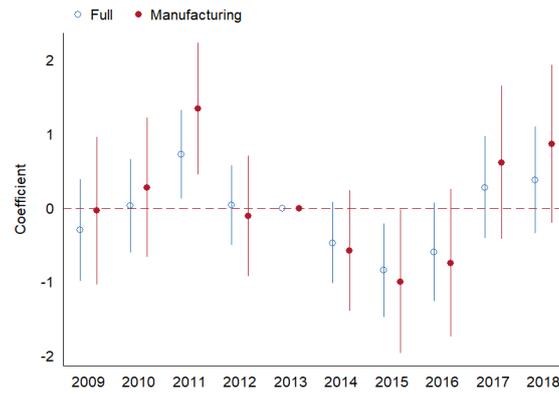
Note: Firm-level event study on the log of revenue before tax using FE, excluding foreign-owned firms and highlighting differences between the aggregate and manufacturing sectors.



Note: Firm-level event study on the log of wage bill using FE, excluding foreign-owned firms and highlighting differences between the aggregate and manufacturing sectors.

(a) Ln(Revenue)

(b) Ln(wagebill)

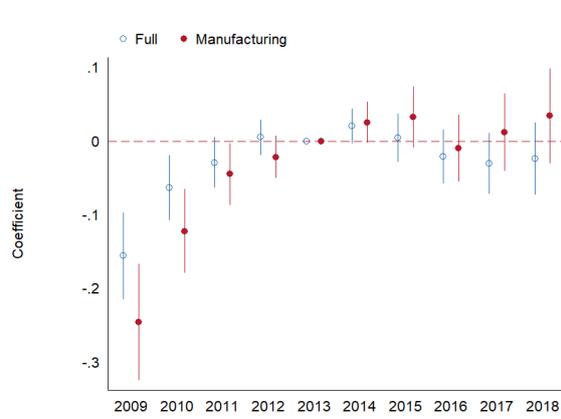


Note: Firm-level event study on the log of winsorized profits using FE, excluding foreign-owned firms and highlighting differences between the aggregate and manufacturing sectors.

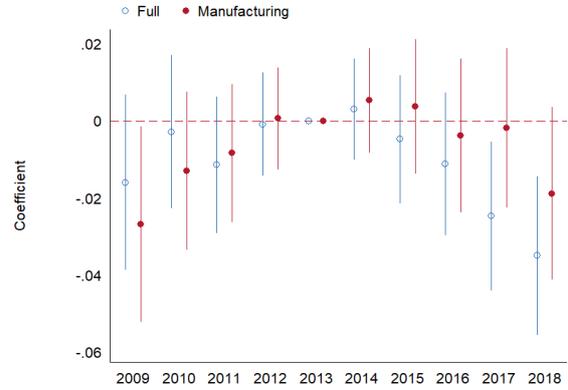
(c) Ln(Profits)

Excluding Onshore firms that never export

Figure A13: Employment outcomes excluding Onshore firms that never export

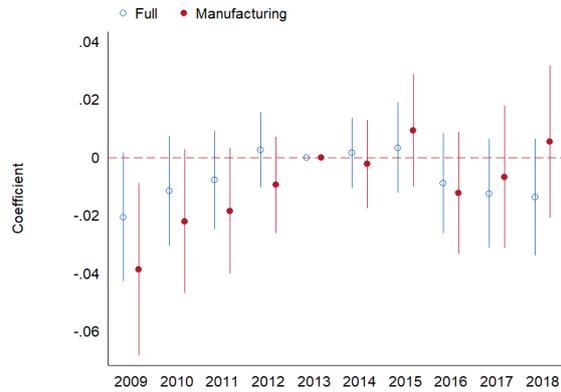


Note: Firm-level event study on the log of employees using FE, excluding onshore firms that never export, and highlighting differences between the aggregate and manufacturing sectors.



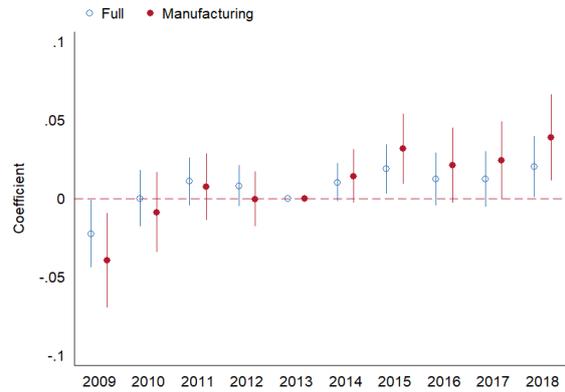
Note: Firm-level event study on firms with 2 or more employees using FE, excluding onshore firms that never export, and highlighting differences between the aggregate and manufacturing sectors.

(a) $\ln(\text{Employees})$



Note: Firm-level event study on firms with 5 or more employees using FE, excluding onshore firms that never export, and highlighting differences between the aggregate and manufacturing sectors.

(b) Firm has more than 2 employees

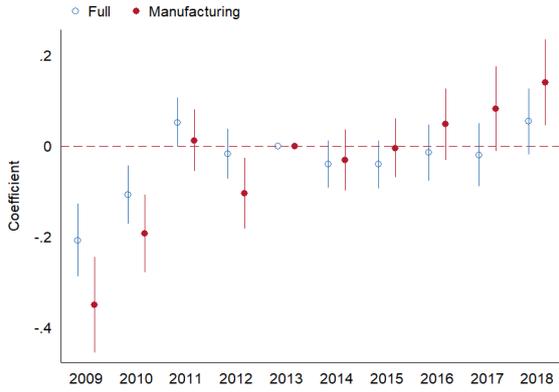


Note: Firm-level event study on firms with 10 or more employees using FE, excluding onshore firms that never export, and highlighting differences between the aggregate and manufacturing sectors.

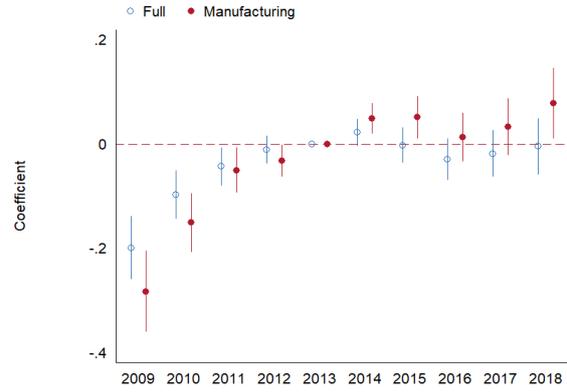
(c) Firm has more than 5 employees

(d) Firm has more than 10 employees

Figure A14: Output, Wage bill and Profits excluding Onshore firms that never export



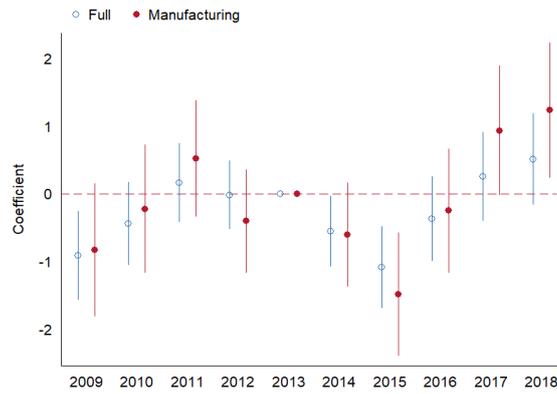
Note: Firm-level event study on the log of revenue before tax using FE, excluding onshore firms that never export, and highlighting differences between the aggregate and manufacturing sectors.



Note: Firm-level event study on the log of wage bill using FE, excluding onshore firms that never export, and highlighting differences between the aggregate and manufacturing sectors.

(a) Ln(Revenue)

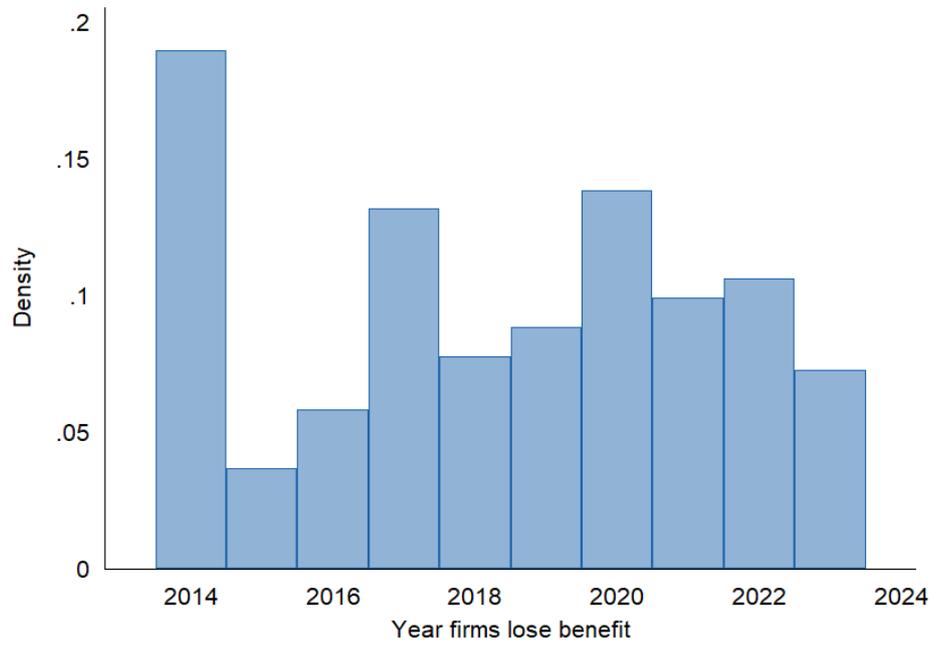
(b) Ln(wagebill)



Note: Firm-level event study on the log of winsorized profits using FE, excluding onshore firms that never export, and highlighting differences between the aggregate and manufacturing sectors.

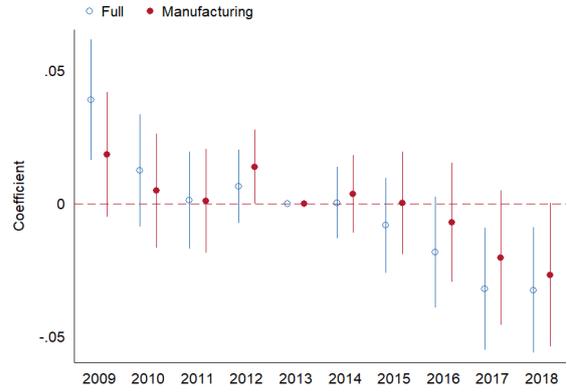
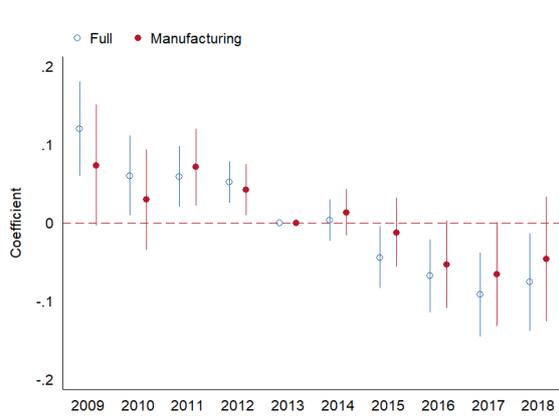
(c) Ln(Profits)

Figure A15: Histogram of predicted year to enter new Offshore rules



Note: This histogram displays the predicted years in which firms are expected to lose benefits due to the implementation of the new offshore CIT rate.

Figure A16: Employment outcomes excluding offshores that are treated after 2014

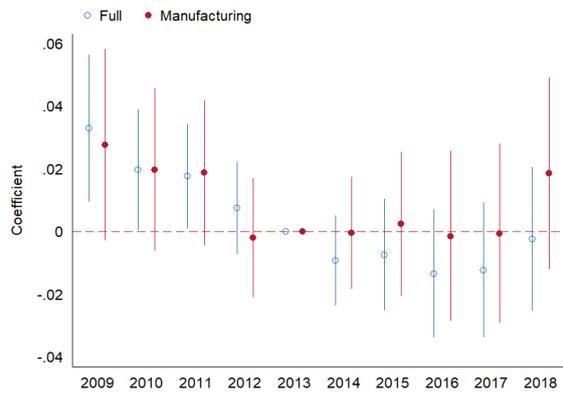
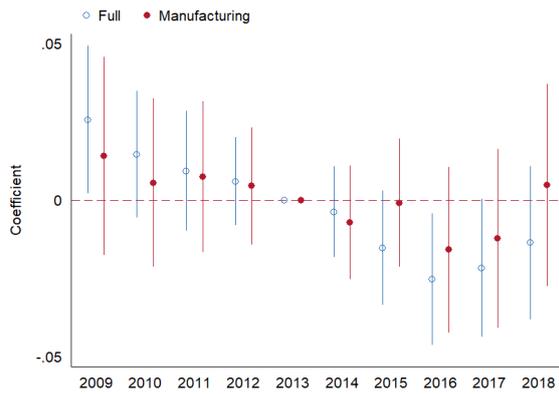


Note: Firm-level event study on the log of employees using FE, excluding offshore firms treated after 2014, and highlighting differences between the aggregate and manufacturing sectors.

Note: Firm-level event study on firms with 2 or more employees using FE, excluding offshore firms treated after 2014, and highlighting differences between the aggregate and manufacturing sectors.

(a) $\ln(\text{Employees})$

(b) Firm has more than 2 employees



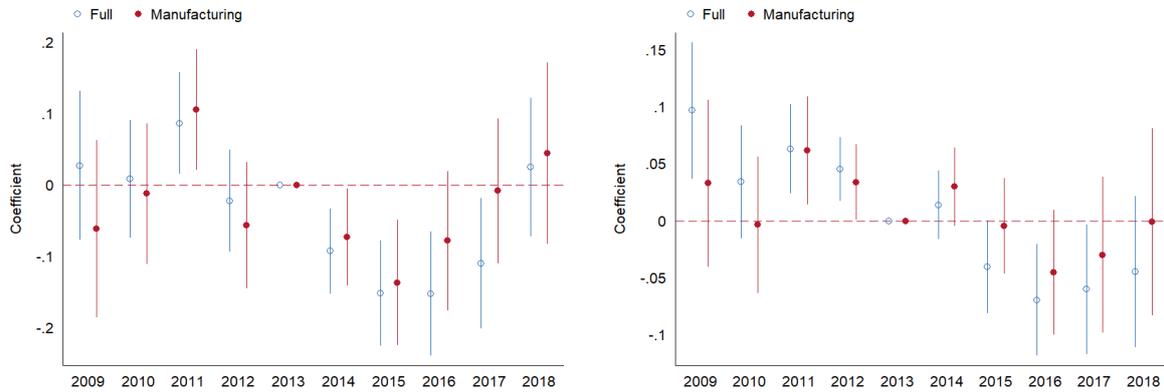
Note: Firm-level event study on firms with 5 or more employees using FE, excluding offshore firms treated after 2014, and highlighting differences between the aggregate and manufacturing sectors.

Note: Firm-level event study on firms with 10 or more employees using FE, excluding offshore firms treated after 2014, and highlighting differences between the aggregate and manufacturing sectors.

(c) Firm has more than 5 employees

(d) Firm has more than 10 employees

Figure A17: Output, Wage bill and Profits excluding Offshores that are treated after 2014

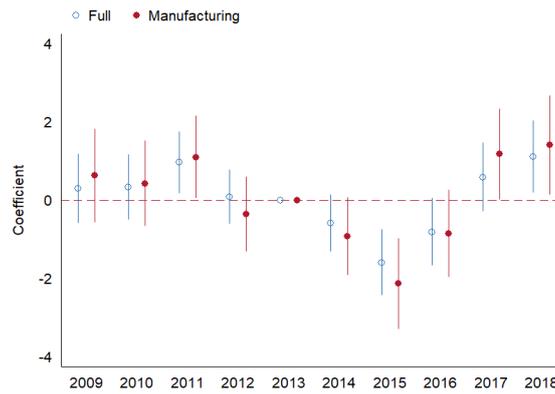


Note: Firm-level event study on the log of revenue before tax using FE, excluding offshore firms treated after 2014, and highlighting differences between the aggregate and manufacturing sectors.

Note: Firm-level event study on the log of wage bill using FE, excluding offshore firms treated after 2014, and highlighting differences between the aggregate and manufacturing sectors.

(a) Ln(Revenue)

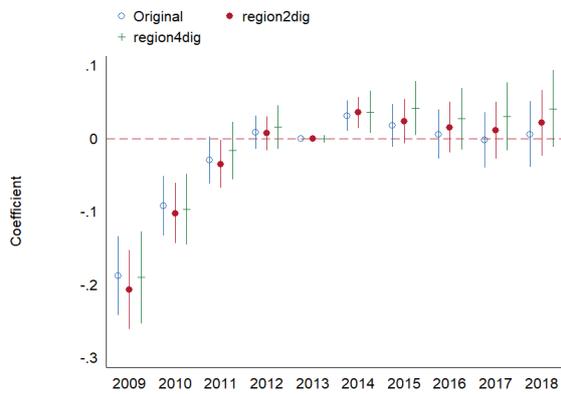
(b) Ln(wagebill)



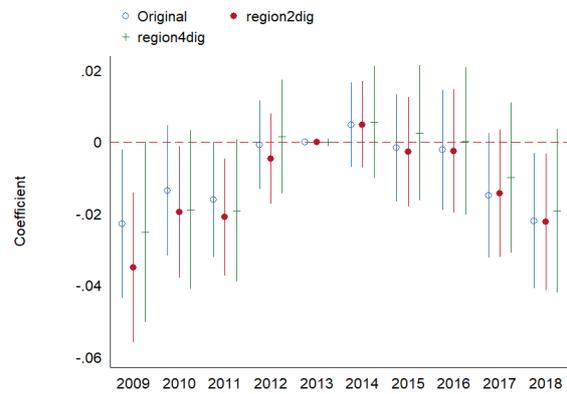
Note: Firm-level event study on the log of winsorized profits using FE, excluding offshore firms that are treated after 2014, and highlighting differences between the aggregate and manufacturing sectors.

(c) Ln(Profits)

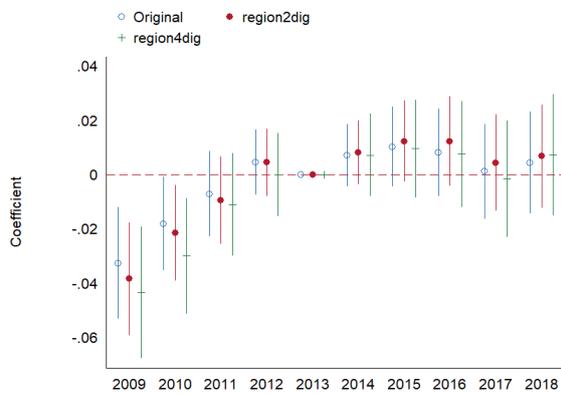
Figure A18: Employment outcomes on the balanced sample - Offshore versus Onshore - including region-year fixed effects.



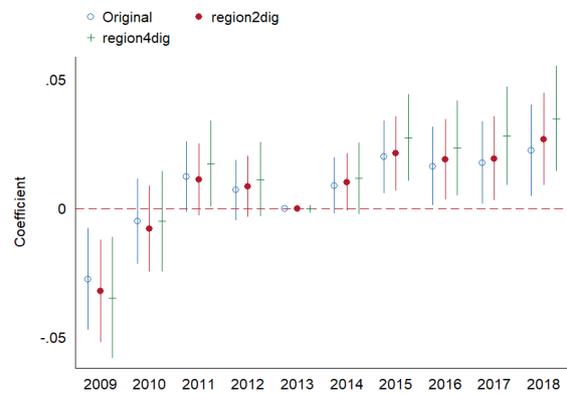
(a) Ln(Employees)



(b) Firm has more than 2 employees



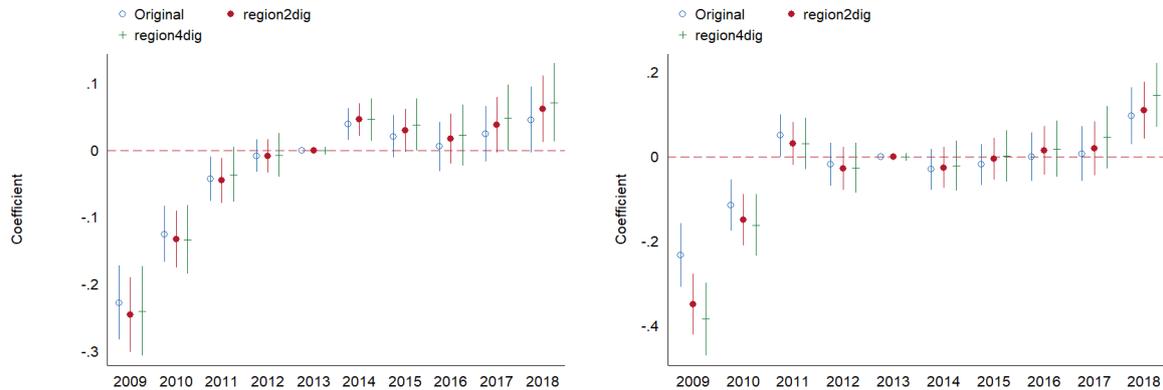
(c) Firm has more than 5 employees



(d) Firm has more than 10 employees

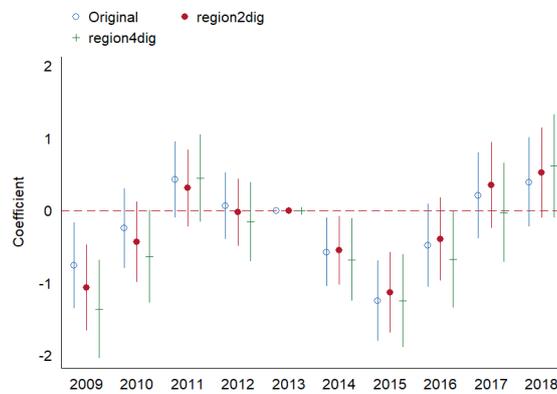
Note: Firm-level DID obtained from estimating equation (3) on the log of the employees in panel (a) a dummy for 2 or more employees in panel (b) a dummy for 5 or more in panel (c) and a dummy for 10 or more in panel (d), in separate regressions using the entire sample and only manufacturing firms. The figure includes estimates obtained by including region-year fixed effects. These are either 4-digit (Delegation) or 2-digits (Gouvernorat).

Figure A19: Other outcomes on the balanced sample - Offshore versus Onshore - including region-year fixed effects.



(a) Ln(wagebill)

(b) Ln(Revenue)



(c) Ln(Profits)

Note: Firm-level DID obtained from estimating equation (3) on the log of the wage bill in panel (a) the log of revenue before tax in panel (b) and the log of declared profits in panel (c), in separate regressions using the entire sample and only manufacturing firms. We observe no meaningful differential behavior in both the log of wage bill and log of revenue after the reform. The only economic outcome for which we find a large and negative short-term impact is profits. This is more likely a reporting response from Offshore firms decreasing their reported profits since revenues are the same.

Table A3: Aggregates

Year	N firms	N offshore	Employees	Wagebill	Export (Customs)	Import (Customs)	Revenue	Profits	Export (tax)
2009	49,802	9,276	850,354	5,187	16,737	19,079	66,499	2,261	19,444
2010	55,125	10,784	881,937	5,894	19,430	16,466	76,365	2,849	23,887
2011	60,506	11,876	893,159	6,534	17,345	22,177	79,092	1,361	27,357
2012	65,863	13,125	869,823	7,004	19,697	23,476	86,874	1,758	27,121
2013	71,958	14,473	889,536	7,948	23,263	26,729	93,518	1,412	27,824
2014	77,721	15,293	898,168	8,588	24,341	28,751	98,687	790	27,942
2015	82,796	15,595	896,196	9,168	25,405	28,401	104,329	573	29,465
2016	87,750	16,067	900,680	9,997	26,604	32,126	109,502	213	29,850
2017	91,791	16,387	949,708	10,298	31,688	37,898	119,381	1,945	31,661
2018	97,740	17,278	997,587	12,388	38,124	44,544	146,087	1,759	41,618

Propensity Score Matching approach

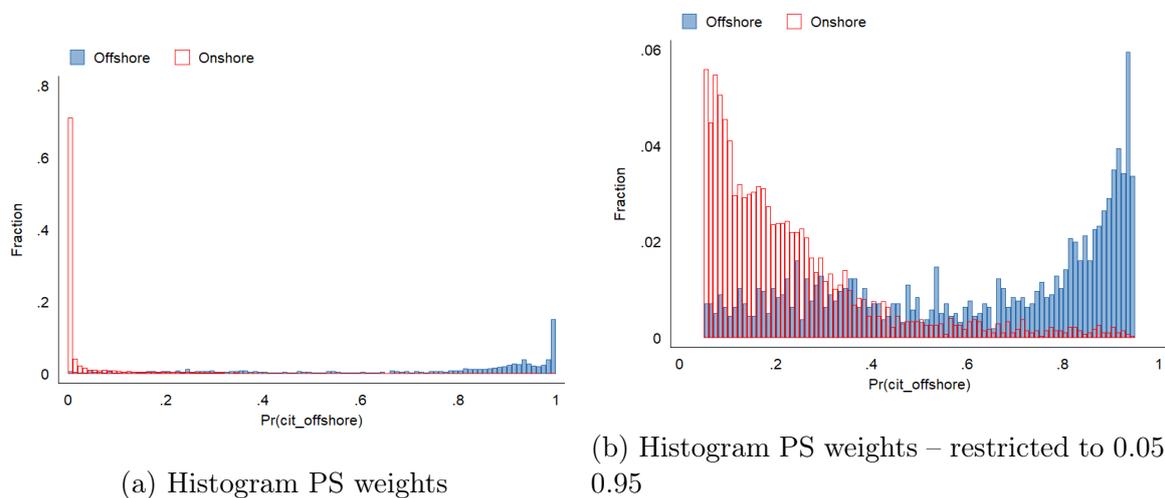
In this section we briefly describe the use of propensity score matching in our estimates. We start with the same balanced panel of firms that are active in every period of our dataset, and estimate the probability that firms belong to the offshore sector using a probit model and using as explanatory variables firm age, whether owners are foreign, 2-digit industry dummies, regional dummies, dummies for decile of revenue and employment, and whether they export. We then use the same observable to predict the probability that firms belong to the offshore regime - the propensity score weights.

Figure A20 presents the histogram of these weights for onshore (blue) and offshore (red) firms. In panel (a), we present the entire distribution of propensity weights, showing that the vast majority of observations fall in the extremes of the distribution: we predict that most observations in the onshore group have a very small probability of benefitting from offshore status, based on their observables, and similarly that most offshore firms have a very high likelihood to benefit from it. Another way of stating this finding is that offshore and onshore firms are very different in observable traits, so these characteristics are very predictive of offshore status. In panel (b), we show that once we drop firms with extreme PS weights (below percentile 5 and above percentile 95), we see some degree of overlap in these probabilities, but not in a large degree.

We use this definition of propensity weights at the (0.05, 0.95) interval as our common

support, and only use observations with values in this range, which significantly decreases our sample. We then compute the inverse of propensity score weights²² and run our differences-in-differences analysis using these as regression weights.

Figure A20: Propensity Score Weights



Note: Firm-level event study on the log of export revenue (from Tax authorities) using FE, and highlighting differences between the aggregate and manufacturing sectors.

Robustness: [Rambachan and Roth \(2023\)](#) test on parallel trends

In this section we summarize a series of robustness exercises to our main results, using the "honest differences-in-differences" approach from [Rambachan and Roth \(2023\)](#). The core idea of the methodology is to consider how sensitive are results to "partial" violations of the parallel trends assumption.

We start by describing in some detail the results for the main set of results where we do document impacts of the reform, namely on the number of offshore firms, before summarizing results for other outcomes where we estimate null results.

In [Figure A21](#), we first replicate our main results on the impact of the tax reform on the number of firms in the offshore versus onshore sectors in panel (a) - as documented previously, we estimate the reform led to a decrease of up to 15-25% in the number of offshore firms by 2018, with slightly larger estimates for the manufacturing sector when

²²The weight for offshore firms is $w_{off} = \frac{1}{\hat{p}}$ and the weight for onshore firms is $w_{on} = \frac{1}{(1-\hat{p})}$, where \hat{p} are the estimated propensity weights.

compared to the full sample. Nonetheless, we do note somewhat differential pre-trends, particularly in the full sample, where offshore firms were growing faster than onshore firms in the pre-reform period.

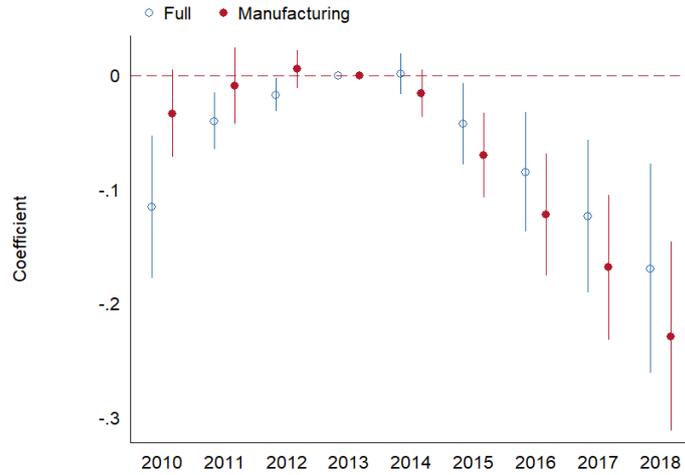
We then apply the [Rambachan and Roth \(2023\)](#) approach to evaluate how sensitive our estimates are to violations of the parallel trends approach. We first presents results for the manufacturing sample in panels (b) and (c). In panel (b), we present the original estimate and 95% CI in red for the **average treatment effect in the post-period**, while showing sensitivity of our CI to different assumptions about the size of deviation from parallel trends (the parameter $Mbar$). We show results for deviations that range from 20% to 100% of the largest deviation observed in the pre-period. The results show that our CI do not include zero for any deviations up to 80% of the largest pre-treatment deviation - at 100%, the CI now includes zero. When we instead focus on the **last period effect**, our point-estimates are larger in magnitude (consistent with dynamic effects we observe) and upper-bound of our CI is precisely zero when we consider a deviation of 100%.

One relevant note is that the approach in [Rambachan and Roth \(2023\)](#) considers the largest *absolute* variation in the pre-period (which in this case is approximately 0.04 in the first pre-period of 2010). But note that in this setting the pre-trends suggest that, if there are any deviation from pre-trends, they might suggest a catch-up in the number of offshore firms, and not a divergence. Nonetheless, it is possible that, despite what we observe in the pre-trends, some other shock different from the reform we studied generated differential trends for the two groups - and this is precisely the sensitivity evaluated in this method. So what the results suggest is that, as long as parallel trends violation was smaller than approximately 4% per year (100% of the largest pre-treatment violation), our results still suggest a significant impact of the reform.

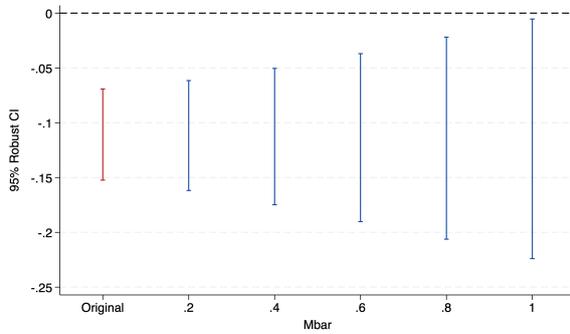
In panels (d) and (e), we provide the analogous sensitive test for the full sample of firms, including all economic sectors. Here we note that the sensitivity CI are much larger, and considering deviations from parallel trends larger than 20% of the reference deviation yields CI that encompass zero effect. That effect is mostly driven by the fact that, in

the period 2010, we estimate a large coefficient for offshore firms, of approximately 10%. Therefore, deviations of 40% are equivalent to 4%, or the reference deviation for the manufacturing sector. If we consider that deviations from parallel trends should not be substantially different in the full sample when compared to the manufacturing one, and that the 2010 coefficient is an outlier, then our results are similarly robust in the full sample, up to deviations of approximately 4% per year in the number of firms.

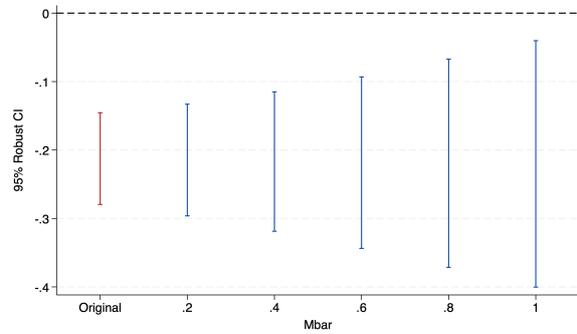
Figure A21: Honest DID - Industry-level impacts on Log(number of firms)



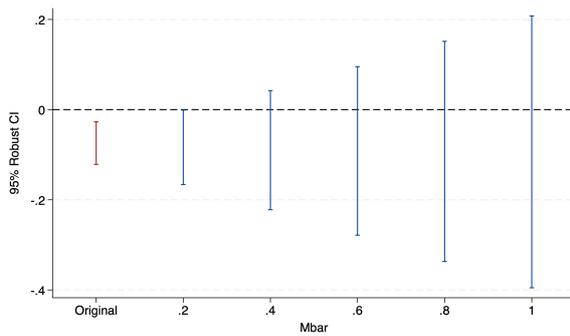
(a) Original dynamic estimates (Fig 5a)



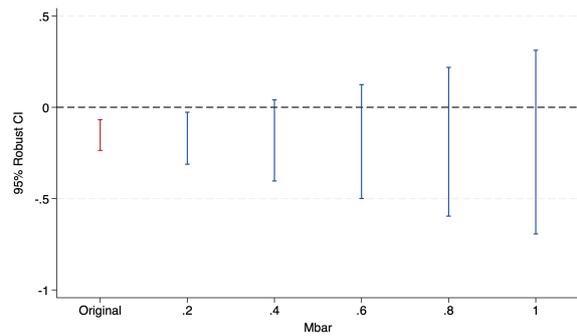
(b) Manufacturing - average post-period



(c) Manufacturing - last post-period



(d) Full sample - average post-period



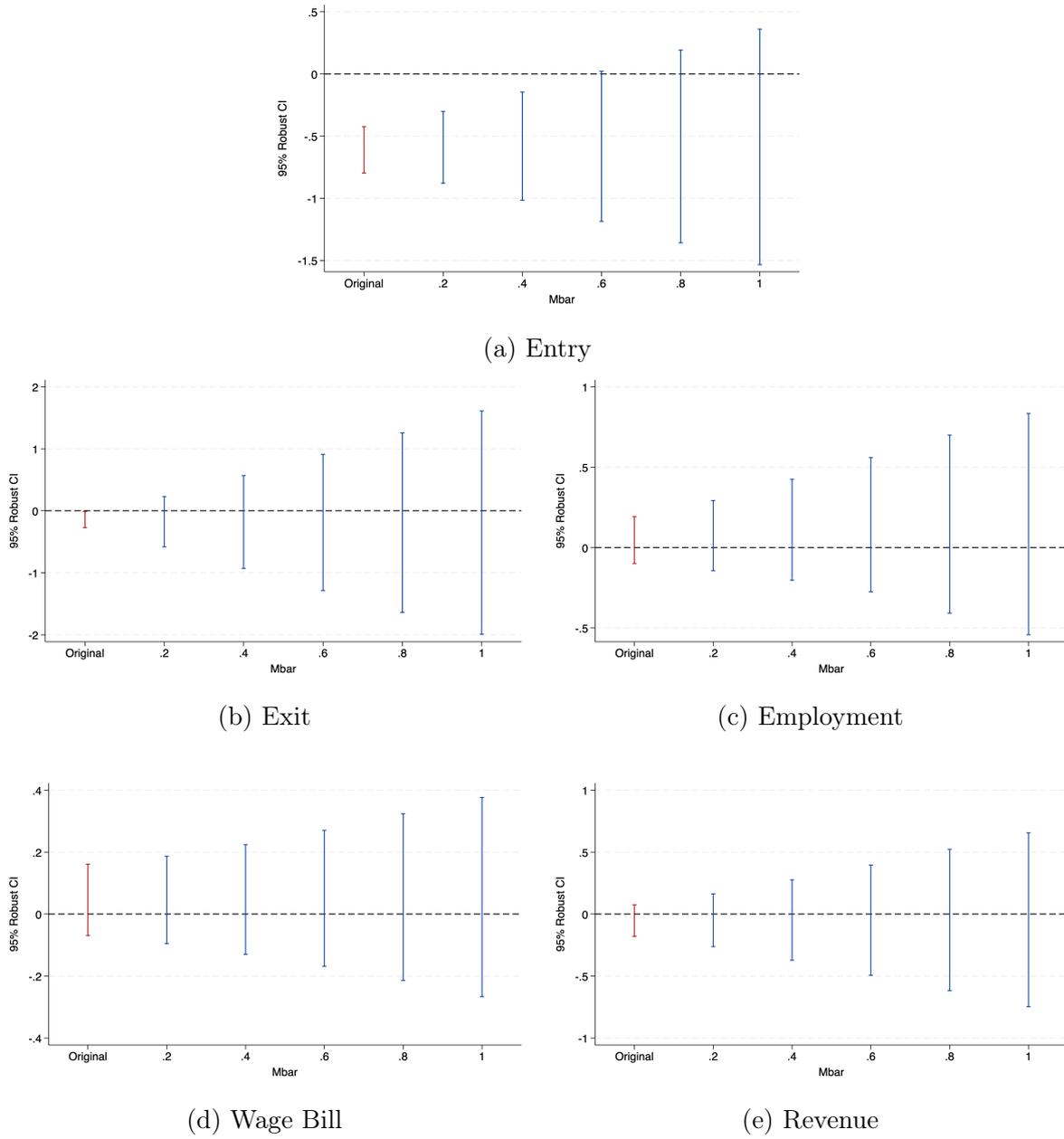
(e) Full sample - last post-period

Note: Panel (a) reproduces Figure 5(a) in the main text, while remaining panels report results from the sensitivity tests in [Rambachan and Roth \(2023\)](#) for the described outcomes in the industry-level analysis. $Mbar$ refers to multiples of the largest deviation from parallel trends in the pre-period (i.e. $Mbar = 0.8$ considers a deviation equals to 80% of the largest pre-period deviation).

Below we report similar results for the other main outcomes of interest - entry, exit,

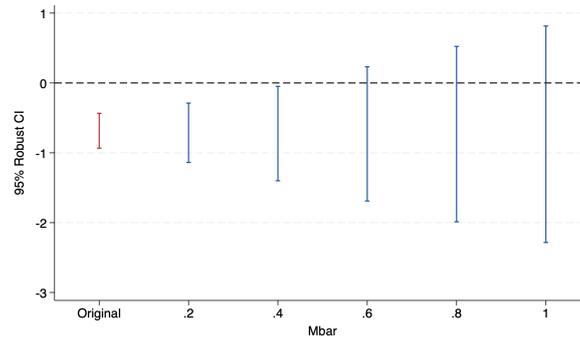
employment, wage bill and gross revenue. We first show results for the entire sample in [Figure A22](#) and then for manufacturing firms only in [Figure A23](#). In both cases, the only robust result to deviations from parallel trends is the decrease in firm entry for offshore firms after the reform: in both cases, deviations in parallel trends up to 40-50% of the largest pre-period deviation are still consistent with the significant results we estimate. For all other outcomes, in both samples, any small deviations yield insignificant results. As seen in [Table 2](#), all estimates for average post-treatment effects are insignificant for the full sample, and any deviations would make CI even larger. For manufacturing, we estimate a marginally significant positive impact for offshore firms, but here we show that it is not robust to deviations from parallel trends: a 20% deviation would already yield CI that include null effects. These results are again consistent with our main findings of null effects across a range of economically relevant outcomes for offshore firms.

Figure A22: Honest DID - Industry-level impacts on full sample

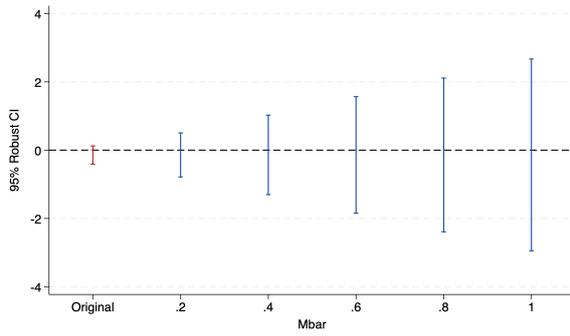


Note: These figures report results from the sensitivity tests in [Rambachan and Roth \(2023\)](#) for the described outcomes in the industry-level analysis. Estimates are for the average post-treatment effect. $Mbar$ refers to multiples of the largest deviation from parallel trends in the pre-period (i.e. $Mbar = 0.8$ considers a deviation equals to 80% of the largest pre-period deviation).

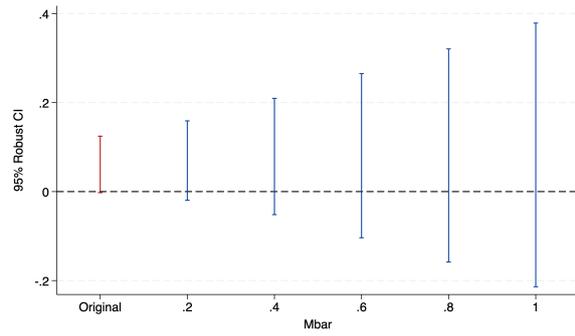
Figure A23: Honest DID - Industry-level impacts on manufacturing sample



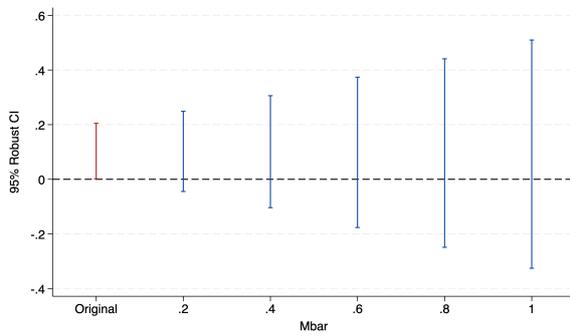
(a) Entry



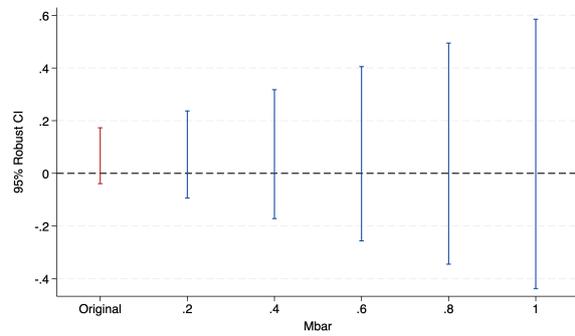
(b) Exit



(c) Employment



(d) Wage Bill



(e) Revenue

Note: These figures report results from the sensitivity tests in [Rambachan and Roth \(2023\)](#) for the described outcomes in the industry-level analysis. Estimates are for the average post-treatment effect. The sample is restricted to firms in the manufacturing sector. $Mbar$ refers to multiples of the largest deviation from parallel trends in the pre-period (i.e. $Mbar = 0.8$ considers a deviation equals to 80% of the largest pre-period deviation).