

Who Benefits from Corporate Tax Cuts? Evidence from Banks and Credit Unions around the TCJA *

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Abstract

The TCJA of 2017 made large changes to the taxation of corporate and pass-through businesses in the U.S. Understanding the effects of these changes is complicated by the difficulty of finding control firms whose taxation was not altered by the Act. We study the effect of the TCJA on small and medium size banks using credit unions—which compete with these banks for deposits and in making loans—as a novel control group. Credit unions were not taxed both before and after the Act. Using a difference-in-difference framework, we find that an important fraction of the incidence of the tax cut goes to depositors. We find little evidence that employees or borrowers from banks receive a share of the tax cut in the form of higher wages or lower interest rates on loans or that banks increase their investment in fixed assets as a result of the Act.

Keywords:

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1 Introduction

The central provision of the 2017 Tax Cuts and Jobs Act (TCJA) cut the corporate tax rate from 35% to 21%. This rate cut is estimated to reduce federal revenue by more than \$1 trillion over the next decade (Congressional Budget Office, 2018).¹ Understanding who ultimately benefits from this provision is thus a critical policy question. There is, however, little scholarly consensus on who bears corporate taxes and in turn who will get the benefit of the rate cut.

As Auerbach (2018) recently observed, part of the reason for the divergence in estimates of who bears the corporate tax arises from the difficulty of identifying “credible natural experiments for corporate tax reforms or to control for the many developments occurring within countries at the same time as corporate tax changes.” Studies at the state or local level often provide cleaner identifying variation (e.g., Fuest et al. (2018) and Suárez Serrato and Zidar (2016)) than studies of national-level corporate tax changes, which use firms in other countries as a control. But capital flows much more easily across subnational borders than national ones. This higher capital elasticity will tend to reduce capital’s share of subnational corporate taxes, making it a potentially unreliable indicator for the incidence of national corporate and other capital taxes. As a result, it is important to study large national corporate tax changes like the TCJA directly, but it is also difficult to find good control firms, particularly because the Act reshaped both corporate and pass-through taxation of U.S. firms.

We contribute a partial solution to this problem by studying a novel natural experiment: looking at the effect the TCJA on banks using credit unions as controls. Credit unions were not taxed both before and after the Act. Banks and credit unions compete with each other to attract deposits, provide banking services, and make residential and consumer loans (DeYoung et al., 2019; DiSalvo & Johnston, 2017). Credit unions are thus often quite similar to small and medium size banks, aside from their tax status, making them a natural

¹Likewise, the Act cut taxes on owners of pass-through businesses, dropping the top rate (on qualifying income) from 39.6% to 29.6%, by adding §199A and also cutting the top marginal rate from 39.6% to 37%. The Act also reorganized the U.S. international taxation of businesses. These latter changes are unlikely to directly affect the small and medium size banks we study here.

control group.²

We gather quarterly data on the universe of U.S. credit unions and banks from 2013-2019. We then run difference in differences (“DD”) regressions around the TCJA. In the DD regressions, we find an economically and statistically significant uptick in the rates paid on deposits by banks after the TCJA. We estimate that the TCJA tax cut increased the price for-profit banks pay on deposits by about 0.8 basis points. When we measure the intensity of treatment by the decrease in each bank’s taxes compare to the pre-period, we find that a 100 dollar decrease in taxes generates a 74 dollar increase in returns to capital of which 22 dollars are deposit expenditures. By contrast, we see little evidence that the TCJA increased wages for employees, investments in fixed assets by banks, or lowered loan rates for borrowers from banks.

The apparent pass-through of the tax cut only to depositors is a bit difficult to interpret. Depositors have a dual role at banks: they are both lenders of capital to the bank and at the same time often customers of the bank’s payment services. Given that we see relatively little pass-through of the tax cut to other bank customers (i.e., borrowers), we tentatively suggest that the pass-through to borrowers is likely in their capacity as capital providers rather than an implicit cut in the price of payment services. In turn, this suggests that capital-both equity and debt providers-bear the corporate tax here (E. Fox, 2020; Harberger, 1962).

We thus contribute to the always active literature on corporate tax incidence and more specifically the emerging literature on the effect of the TCJA’s changes to the income taxation of businesses (e.g. Dowd et al. (2020), Gale and Haldeman (2021), and Hanlon et al. (2019)). We believe our identification strategy for isolating the causal impact of the Act on wages, investment, capital lenders, and customers is among the cleanest thus far put forward to analyze the incidence of the corporate rate cut. In addition, firms owned by suppliers (e.g., Land O’Lakes), customers (e.g., REI), or lacking owners altogether (e.g., Kaiser Permanente) compete with traditional enterprises owned by shareholders in a variety

²As the Independent Community Bankers Association puts it “The differences [between community banks and credit unions], are much less pronounced than their operational commonalities: credit unions and community banks provide similar financial products, compete for the same customers, and report to parallel federal regulatory agencies.” This should be taken with a grain of salt given the incentives of the organization making the statement, but academic work suggests in a lot of ways it is accurate.

of industries (Hansmann (2000)). Nevertheless, our paper is the first we are aware to use the different ways these firms are taxed (or sometimes not taxed) to help identify the incidence of changes to taxing shareholder-owned businesses. In other contexts, this strategy may be useful going forward.

A few caveats are worth discussing at the outset as well. Most specifically, small and medium size banks focus more on lending to businesses than credit unions, which traditionally have primarily made home and consumer loans. We believe this likely explains the noisiness of our estimates regarding interest rates on banks' overall loan portfolio and make us less confident we have isolated the effect of the Act on this margin. More generally, our method will not capture what might be loosely termed "quasi-general equilibrium" effects of the TCJA. That is, if the TCJA increased economic activity outside the banking sector, this might equally lift the activity of banks and credit unions, and therefore, in our difference in difference framework, we will not detect the effect. With that said, the smaller the (quasi-partial-equilibrium) effects we measure, the less likely it is that there would be important general equilibrium effects. In addition, if the nature of competition between credit unions and banks results in credit unions following bank pricing for loans and deposits, we may underestimate the effect of the Act as banks cut interest rates on loans in reaction to their lower cost of capital, and credit unions follow suit.

Finally, there need not be a single answer to the incidence of the TCJA rate cuts across firms or industries. We are looking at firms (small and medium size financial intermediaries) and markets (making home and small business loans and taking deposits) that are largely domestic. Depending on the model, this domestic nature may shift incidence of the tax toward capital compared to industries where production is more easily mobile. Our findings therefore may not be fully generalizable to other industries. To better understand several of these potential limitations, we implement a two-industry (banking and the rest of the economy), two-sector (corporate and non-corporate) model and demonstrate how generalizable our empirical findings might be under various assumptions.

The structure of the paper is as follows: Part II describes the institutional background, Part III describes the empirical approach and identification strategy, Part IV discusses the data, and Part V presents the results, Part VI calibrates a model, and Part VII briefly concludes.

2 Institutional Background

2.1 Credit Unions and Banks

Credit unions are financial cooperatives which are owned by their depositors, known as “members.” Membership in a given credit union is limited to those who share common bond(s). For many credit unions that common bond is employment at the same firm or a particular industry, or residing in the same city or neighborhood. Like banks, credit unions take deposits and make loans. Credit unions work somewhat differently than banks along a couple dimensions; for example, firm governance.³ In addition, credit unions are run to benefit their member/owners largely through their transactions with the firm-i.e. the credit union paying members higher deposit rates or offering them lower rates on loans.⁴ By contrast, in a simple model, banks are thought to maximize profits and return them pro-rata to shareholders, and do not adjust prices away from profit maximization in their dealings with shareholders.

While credit unions are often small institutions, in aggregate they make up a sizeable fraction of the U.S. banking sector. In the 4th quarter of 2019, there were 5,349 credit unions, with \$1.43 trillion of assets (2010 dollars), which represents 7.8% of all assets belonging to firms in the banking sector.⁵ Likewise-as shown below in our description of the data-many credit unions are similar in size to small and medium size banks. Credit

³As at banks, members govern the credit union by electing a board, which in turn chooses and supervises the full-time management. However, unlike in banks, voting at credit unions is usually on the basis of one member one-vote, rather than proportional to the capital contributed by the owner. This potentially exacerbates the collective action issues already problematic at shareholder owned firms with dispersed owners. As a result, credit union governance is often even more management driven than at banks (Goth et al., 2012).

⁴As a result, credit unions are sometimes referred to as non-profits, but this is not strictly true in the sense that credit unions can return profits to members in the form of dividends, known as “patronage dividends.” About one in ten credit unions pay a patronage dividend in a given year (DeYoung et al., 2019). In our analysis, we use variables which include such patronage dividends as payments to depositors.

⁵Defined here as all banks, thrifts, and credit unions. Unless otherwise noted, we use “banks” to mean banks and thrifts.

unions offer their members financial services that largely parallel those of banks: checking and savings accounts, certificate of deposits (CDs), home mortgage loans and auto-loans and other consumer credit. Likewise, banks and credit unions are regulated by parallel agencies to ensure safety and soundness: for credit unions, the National Credit Union Administration (NCUA) and for banks, the FDIC, OCC and Federal Reserve. In addition, deposits are federally insured at both credit unions (via the NCUA) and at banks (via the FDIC).

Despite credit unions using a somewhat different governance mechanism and approach, previous work has provided substantial evidence that small and mid-sized commercial banks are in direct competition with credit unions in a variety of products including consumer credit, savings products, and payment services (DeYoung et al., 2019; DiSalvo & Johnston, 2017; Feinberg, 2001; Hannan, 2003; Tokle & Tokle, 2000). One important difference, however, is that credit unions traditionally have made a much smaller percentage of their loans to businesses.⁶

This leads us to expect that, but for the tax changes discussed below, that the prices paid on deposits, and wages paid to employees will evolve in parallel at both sets of institutions. This is perhaps less true of the average interest rate on the overall loan portfolio of banks and credit unions, because of the different importance of business loans.

2.2 Taxation of Banks and Credit Unions and the 2017 TCJA

Federal and state chartered credit unions are exempt from all taxes, apart from property taxes (12 U.S.C. §1768). This exemption dates from 1937 (Tatom, 2005). The traditional justification for not taxing credit unions is that they are operated largely on a not-for-profit basis and help provide access to financial services to otherwise under-banked, low- and moderate-income individuals. Treasury considers this treatment of credit union a tax expenditure which costs the federal government \$2 billion per year, about the same size as the estimated cost to the fisc of carried interest. The non-taxation of credit unions was unaffected by the TCJA.⁷ It is unclear whether this tax treatment serves its purpose as

⁶In addition, credit unions have been less likely to securitize their residential loans than small and medium size banks (DiSalvo & Johnston, 2017).

⁷There were small changes in the TCJA that affected credit unions peripherally. Under the Act, tax-exempt organizations including credit unions are now required to pay a 21%

DeYoung et al. (2019) and DiSalvo and Johnston (2017) cast some doubt on whether in fact credit union customers are more likely to be lower or moderate-income, finding if anything they are higher income in many product categories than customers of small and medium size banks.

By contrast, banks are taxed under the corporate tax (known in tax argot as C-corporations) or pass-throughs as the case may be, with about 2/3rds being C-corps. Prior to the TCJA of 2017, large banks appear to have faced higher “effective” tax rates than large firms in many industries (Z. Fox & Vanderpool, 2017).⁸ That is likely to be true of small and medium size banks as well given that their business is overwhelmingly domestic.

The TCJA was enacted in December of 2017 and cut the statutory corporate tax rate from 35% to 21% starting in 2018.⁹ In our sample, just comparing the mean of the total income tax rate¹⁰ before and after the TCJA, the rate of (income tax)/(pre-tax profit) falls from 29% in 2014-2017 to about 20% in 2018-2019 at the median firm. So the rate falls by about 1/3 compared to the pre-period. The TCJA also radically transformed the U.S. international tax system. This, however, did not have much direct effect on our small and medium size banks given their domestic orientation. The Act also placed new limits on the ability of businesses to deduct net interest payments under §163(j), but this again is unlikely to affect banks directly as they are almost always net recipients of interest payments. However, this limitation could impact the willingness of businesses to take on new debt financing from banks or credit unions. Because of banks’ greater propensity to lend to excise tax on the five highest paid employees’ compensation that individually exceed \$1 million annually.

⁸As Auerbach (2018) points out these simple calculations of effective rates from profits and income taxes reported on financial statements usually ended up higher or lower based on the level of retained earnings “indefinitely” reinvested abroad by foreign subsidiaries.

⁹The TCJA’s rate cut was pro-rated for firms with fiscal years running across January 1, 2018. So if a firm’s fiscal year runs from November 1, 2017 to October 31, 2018, its tax rate would be roughly $\frac{2}{12} * 35\% + \frac{10}{12} * 21\% = 23.33\%$. One can think of the average rate on income earned in calendar year 2018 income as 21% if the firm earns its profits relatively evenly throughout the year. On the margin, however, the relevant rate for additional income generated by decisions influenced by the TCJA would be the blended rate, here of 23.33%.

¹⁰Our data does not break out federal income tax compared to state and local or foreign income taxes, though the latter seems likely to be very small.

businesses the 163(j) limitation may have a greater effect on demand for their loans. With that said, many borrowers from small and medium size banks would be exempt from the 163(j) limit because their gross receipts fell below the threshold established in §163(j)(3).¹¹ In addition, the Act placed new limits on the deductibility of home mortgage interest, which again may affect demand for home loans from both banks and credit unions.¹²

2.3 Regulatory Changes to Credit Unions During Pre-Period and After Post-Period

There were a few regulatory changes to credit unions during the pre-period of our study and after the post-period. All allowed credit unions to function more like banks. In particular, in 2015 and 2016, the NCUA promulgated final rules loosening the meaning of the common bond requirement both for credit unions whose bond was based on employment or other association, and for ones based on geography.¹³ The primary effect of these rules would seem to make it easier to find new credit unions (e.g., (NCUA, 2016b)), but given our balanced panel requirements these new credit unions will not show up in our sample.¹⁴ Also in 2016, the NCUA enacted a final rule loosening existing restrictions on credit union's ability to make business loans beginning January 1, 2017 (NCUA, 2016a). Finally, after the post-period, in January 2020, the NCUA promulgated a new rule easing restrictions on credit unions acquiring their capital from non-members.

¹¹See IRS, FAQs Regarding the Aggregation Rules Under Section 448(c)(2) that Apply to the Section 163(j) Small Business Exemption (last accessed December 2022).

¹²Again this should have an equal effect on banks and credit unions given the similarity of their home loan applicants (see DiSalvo and Johnston (2017)). The Act limited deduction of mortgage interest to the first \$750,000 of a loan rather than \$1 million §163(h)(3)(F)(i)(II). In addition by doubling the standard deduction, it substantially reduced the portion of borrowers who will find it advantageous to deduct home mortgage interest.

¹³The 2016 rule was challenged by a banker's association as violating the Administrative Procedure Act. In 2018, in Am. Bankers Ass'n v. NCUA, 306 F.Supp.3d 44, the district court vacated a large portion of the rule. In 2019, the ruling was appealed to the D.C. Circuit, which rejected most of the district court's decision, letting most of the original rule stand. 934 F.3d 649 (2019).

¹⁴To a lesser extent the rules might allow existing credit unions, particularly those whose common bond is geographic, to sign up new customers.

3 Empirical Approach and Identification Strategy

Economic theory and empirical investigations have variously suggested that along with corporate equity holders, other economic participants may also bear corporate tax incidence: other providers of capital (e.g., Harberger (1962)), labor (e.g., Fuest et al. (2018)), and customers (Baker et al. (2020)). Our estimation strategy is to compare how the prices paid to depositors, wages paid to employees, interest charged to borrowers, and investment in fixed structures varies across banks and credit unions before and after the TCJA.

The basic identifying assumption is that—absent tax changes—in each of these outcomes, the behavior of banks would have evolved in parallel to that of credit unions. This assumption can be evaluated by examining the trends of the two groups before the TCJA. But as with every DD design, we cannot in fact test the accuracy of the assumption during the treatment period. The threats to identification are those that usually come along with any DD: economic or policy changes in the post-period, unrelated to the TCJA, that drive different outcomes in banks and credit unions.

4 Data

An advantage of using financial institutions in our analysis is that although we study mostly non-publicly traded firms, their data is publicly available, audited, and regularly reported to supervisory institutions. Commercial banks report information quarterly to the Federal Financial Institution Examination Council (FFIEC) and this information is published in the Reports on Condition and Income (Call Reports). An analogous process occurs for credit unions. Credit unions report detailed financial information in their Call Reports which is then published by the National Credit Union Association (NCUA). Quarterly data is reported under standard accounting principles in calendar year-to-date format. We combine these sources to construct a quarterly panel.

From the accounting information, we construct categories that theory predicts may (or may not) differentially respond to changes in the corporate tax. In the banking sector, these categories include each firm’s pre-tax profit and return on assets. We additionally construct netput prices, quantity, and total inlay or outlay for loans, labor, and deposits. Finally, we construct measures of the value of premises, book equity, noninterest income received, and

risk-weighted assets. For ease of comparison, we adjust all quantities to constant 2010 dollars.

4.1 Sample

For our identification strategy to be valid, we need to compare similar credit unions and commercial banks. Not all commercial banks in our sample can be compared against credit unions. We therefore restrict our sample to firms with significant overlap in terms of asset size and drop firms that have missing data or have an extreme value for return on assets (top one or bottom percent).¹⁵ As noted above, credit unions tend to be smaller firms than small and medium size banks. In order to compare credit unions to similarly situated private banks, we keep firms with average assets greater than the 10th percentile of commercial banks (\$50 million). We impose a similar restriction on the largest firms by restricting our sample to firms with average assets less than the 95th percentile of credit unions (\$815 million). We also impose a balanced panel and restrict our sample to banks that report in every quarter. To ensure we are picking up changes from the TCJA and not changes driven by differences between particular credit unions or banks, we follow the existing literature (e.g. DeYoung et al. (2019)) by removing banks (or credit unions) that do not have any comparable institutions in the sample; we implement this by keeping only banks the FDIC has coded as “community banks.”

After these restrictions, about 20% of the for-profit banks are organized as S corporations in our sample, which we drop because we are unable to observe the intensity of the TCJA tax cut received by pass-throughs. To focus on the impact of the TCJA we restrict our sample to run from 2014 through the end of 2019 in order to avoid the period following the Great Recession but before the tumultuous financial situation caused by the COVID-19 pandemic. Table 1 shows summary statistics:

5 Results

The TCJA provided a substantial tax cut to for-profit banks in our sample. Before the fourth quarter of 2017, the median for-profit bank in our sample had an effective total income tax rate of about 29%. After the TCJA, they paid out 20% of their pre-tax net income as

¹⁵Winsorizing at those thresholds produces nearly identical results.

Table 1: Summary Statistics

	Banks		Credit Unions	
	mean	sd	mean	sd
Age (Years)	88.8	41.1	66.7	13.7
Taxes	228222	430327	0	0
ln(Assets)	19.2	0.8	19.0	0.8
ln(Investments)	17.88	0.84	17.32	1.05
ln(Deposits)	19.02	0.80	18.86	0.82
ln(Premises)	14.91	1.21	15.00	1.36
Deposit Share Check and Save	0.3084	0.1575	0.5774	0.1540
Deposit Share CDs	0.3299	0.1478	0.1703	0.0923
Deposit Share Money Market	0.1623	0.1244	0.1663	0.1181
Price of Deposits	0.0014	0.0008	0.0012	0.0008
Price of Labor	16380	4772	14933	3877
Price of Loans	0.0128	0.0023	0.0124	0.0023
Firm x Quarter Obs.	48312		37392	

Notes: The netput interest rates for deposits and loans and wages per employee are quarterly so the annual rate is approximately 4x that shown in the table.^a

^aThe similarity of the price paid on deposits between credit unions and banks is perhaps surprising given that in most savings products, the average interest rate advertised by credit unions is higher than at banks (NCUA 2021). The source of this apparent anomaly is that a greater share of bank deposits are CDs which pay higher interest which leads to the overall deposit rate being similar despite credit unions paying a higher rate in any given product type.

taxes. The median quarterly net income of the for-profit banks in our selected sample from 2018-2019 was \$574,556 (the mean was \$909,654).

We estimate the following event study for each variable, y , of interest using Equation 1:

$$y_{it} = \sum_r [\beta_r \mathbb{1}\{(t - 2018Q1 = r) * \text{Taxed Bank}\} + \eta_i + \gamma_t + \phi * t * \mathbb{1}\{\text{Taxed Bank}\}] + \epsilon_{it} \quad (1)$$

In this standard event study specification, the indicator function β_r traces out the event study, illustrating differences in the evolution of various outcome variables over the sample between treated and control firms. In our preferred specification, we use variation within a firm (controlling for firm fixed effects: η_i) after netting out state-quarter variation (state by quarter fixed effects: γ_t) and different trend growth ($\phi * t * \mathbb{1}\{\text{Taxed Bank}\}$). Our estimated beta coefficients trace out the treatment effect over time relative to 2017Q4, the period before the TCJA which is set to 0.¹⁶ As there is only one “event” (tax-cut) in our analysis, we also present Conley and Taber (2011) style p-values.

5.1 Event studies

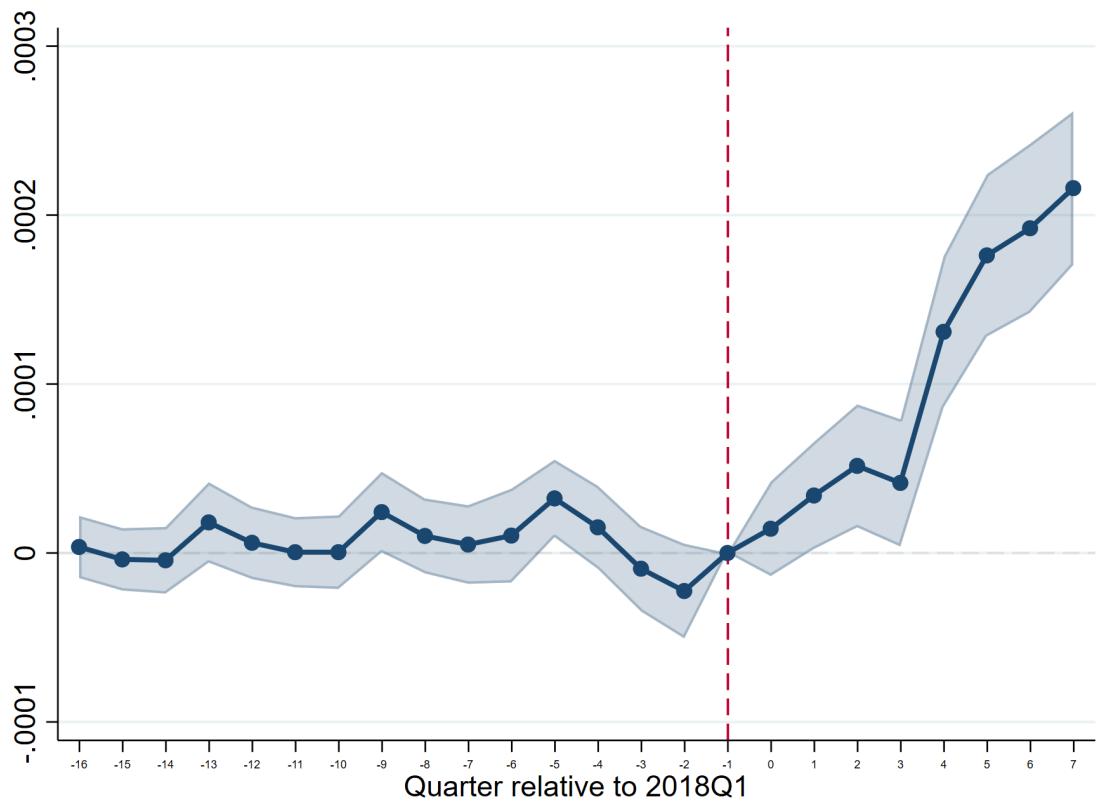
5.1.1 Depositors

Depositors. One group of particular interest in our setting is depositors. Absent distortions or other differing factors at credit unions and banks, depositors at for-profit banks and depositors at credit unions should receive similar returns on their deposits. However, relative to credit unions, previous research has found that depositors at for-profit banks seem to receive lower rates. As noted above, in this context, depositors are acting both as lenders of capital and purchasers of financial/payment services (checking accounts, ATM network, etc.). Our event study suggests that prior to the TCJA, the price paid on deposits was evolving in similar ways regardless of whether a firm was a credit union or a for-profit bank and the parallel trends assumption is satisfied (with or without the time trend included in the primary specification). After the TCJA, the price banks were paying on deposits increased relative to the price credit union were paying. This effect increase from about

¹⁶We smooth each event outcome variable to adjust for consistent quarterly patterns that differ slightly between for profit banks and credit unions. We do so by partialling out quarter dummies.

.5 basis point per quarter in 2018 to 2 basis points in 2019. Given the low prevailing rates paid on deposits in the sample period, this represents a large relative increase. These results are robust to controlling for the share of deposits in various categories (e.g. CD's, regular savings, checking interest) and interactions of these deposit shares with changes in the federal funds rate. The robustness of the result suggests that it is not caused by changes in the composition of bank deposits or changes in the federal funds rates around the TCJA. We have also repeated our analysis around a past increase in federal funds rates from 2004 to 2006 and observe a null result, increasing our confidence that the pattern in Figure 1 is not caused by changes in the federal funds rate during our study period.

Figure 1: Quarterly Price of Deposits Event Study



Notes: This figure displays the event study coefficient (β) on for-profit banks. The black dashed lines display the 95% confidence interval with standard errors clustered at the firm level. The red dashed line is through 2017Q4 ($t=-1$) the period prior to full TCJA exposure and is the omitted event study coefficient.

5.1.2 Employees

Next, we perform a similar exercise for labor. If workers bear some of the corporate tax, we might expect wages per worker (or total wages paid to all workers) to increase after the TCJA in for-profit banks relative to their credit union peers. We find little evidence that labor received a significant portion of the tax cut in our setting. The event study indicates that the change average quarterly spending per full time employee was similar in for-profit banks and credit unions after the TCJA than in 2017Q4. The 95% confidence interval typically rules out raises greater than \$400 per quarter. Equivalent event studies on the total wage bill as opposed to wages per employee look very similar.¹⁷

5.1.3 Loans

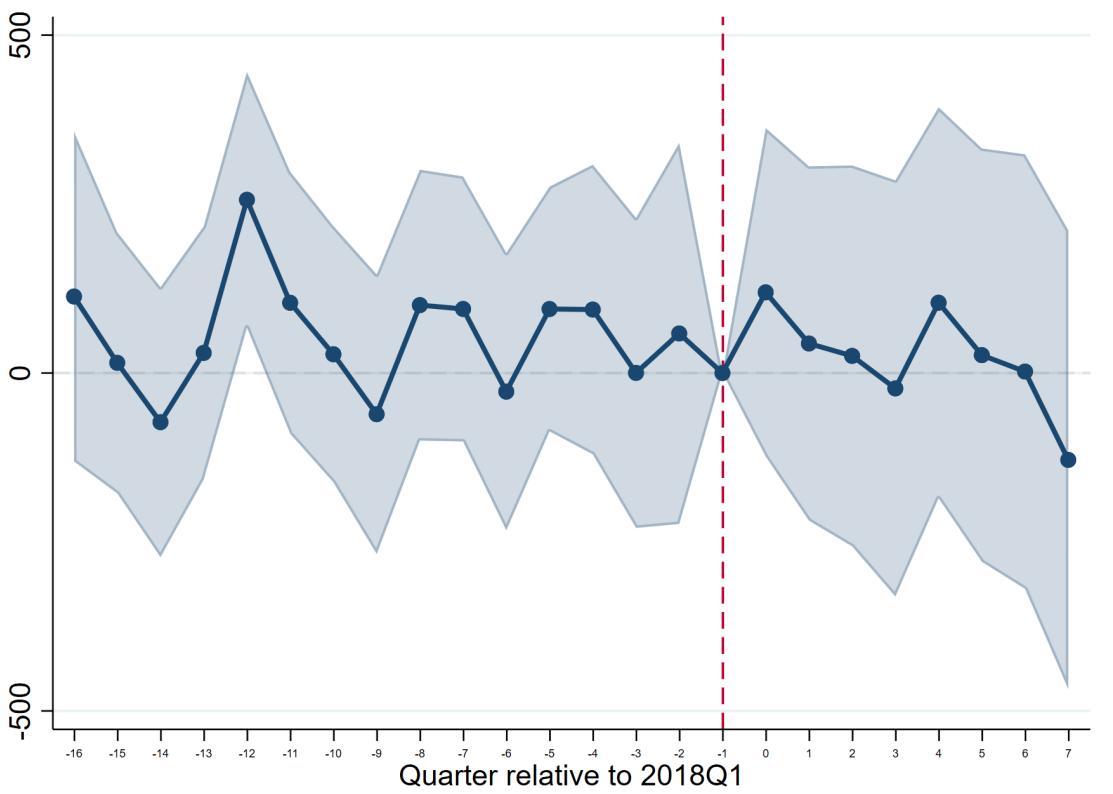
One other netput that might respond to the corporate tax rates is the price of loans offered to customers, for the reasons outlined in Baker et al. (2020) if firms are not perfectly competitive. The estimates from loans are quite noisy, but do run counter to what theory predicts. The coefficients are generally positive starting in 2018, which implies that, if anything, the tax cut resulted in higher loan prices. Theory suggests an opposite signed treatment. This evidence suggests that little to none of the subsidy is passed through to customers in the form of more efficient investment or cheaper access to capital through loans. But we have less confidence in this estimate both because of the differences in business loans for credit unions and the absence of parallel trends without controlling for a linear time trend. Equivalent event studies for interest income from loans (i.e. price x quantity) are flatter, suggesting that if anything banks relatively decreased their quantity of lending in the wake of the Act.

5.1.4 Physical investment

The tax cut in theory lowers the cost of capital for firms, enabling them to expand investments in equipment and structures (and other long-lived assets of which making long-term loans

¹⁷As noted in the introduction, the difference in difference model will fail to pick up an increase in wage per worker at banks caused by the Act if credit unions follow suit in order to avoid losing employees. Still, we would expect to see a change in the total wage bill at banks compared to credit unions if workers were benefiting substantially from the Act.

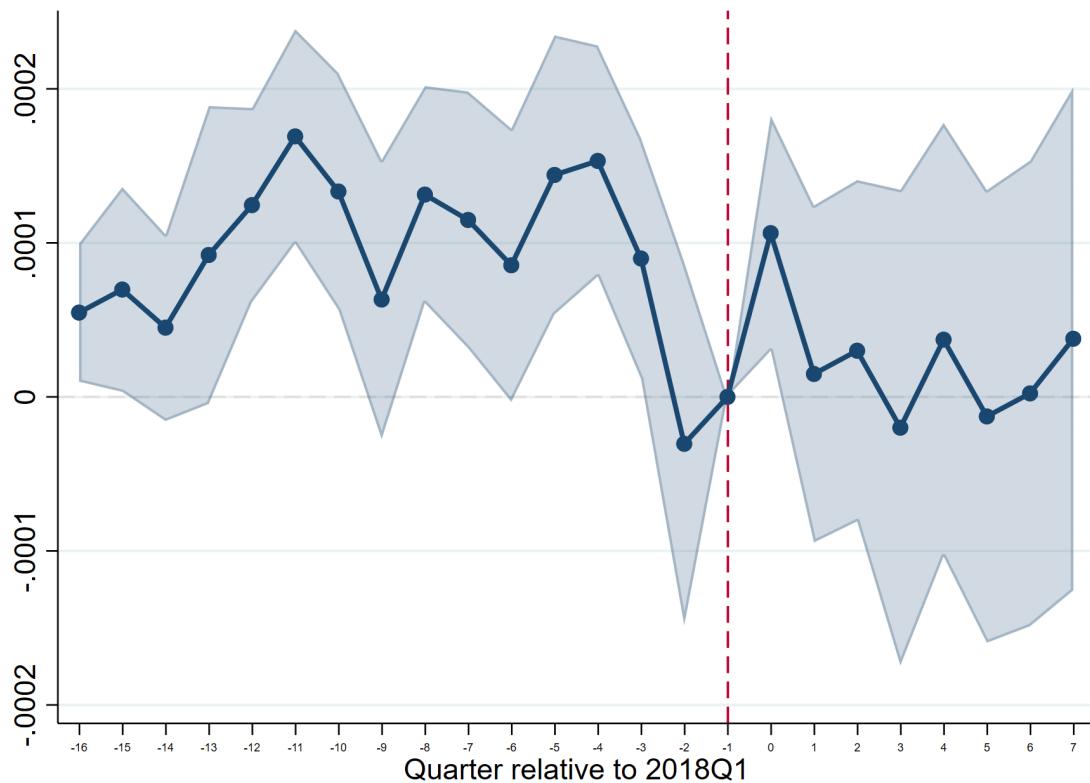
Figure 2: Quarterly Price of Labor Event Study



Notes: This figure displays the event study coefficient (β) on for-profit banks. The black dashed lines display the 95% confidence interval with standard errors clustered at the firm level. The red dashed line is through 2017Q4 ($t=-1$) the period prior to full TCJA exposure and is the omitted event study coefficient.

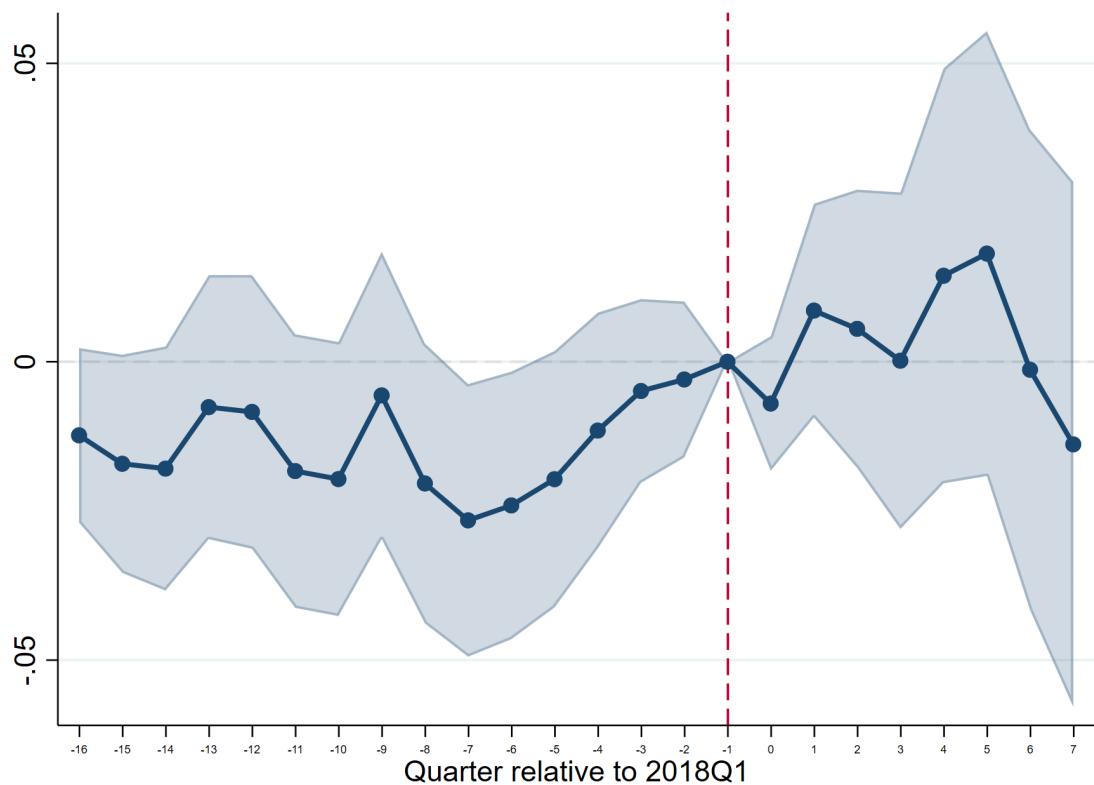
might be one). To examine this potential margin of response, we look at the change in the log of the value of premises. However, there is little evidence that the tax cut increased for-profit banks' relative premises. Most of the point estimates are modestly positive. Nevertheless, there does not appear to be a trend break around the TCJA.

Figure 3: Quarterly Price of Loans Event Study



Notes: This figure displays the event study coefficient (β) on for-profit banks. The black dashed lines display the 95% confidence interval with standard errors clustered at the firm level. The red dashed line is through 2017Q4 ($t=-1$) the period prior to full TCJA exposure and is the omitted event study coefficient.

Figure 4: Log Premises Event Study



Notes: This figure displays the event study coefficient (β) on for-profit banks. The black dashed lines display the 95% confidence interval with standard errors clustered at the firm level. The red dashed line is through 2017Q4 (t=-1) the period prior to full TCJA exposure and is the omitted event study coefficient.

5.2 Aggregated Treatment Effects

It is also helpful to translate these results into an aggregated treatment effect without the full saturation of year coefficients. We run the analogous difference in differences regression to estimate the total TCJA effect using Equation (2):

$$y_{it} = \beta * post * \mathbb{1}\{\text{Taxed Bank}\} + \eta_i + \gamma_t + \phi * t * \mathbb{1}\{\text{Taxed Bank}\} + \epsilon_{it} \quad (2)$$

In this specification, *post* takes a value of 1 starting in 2018 quarter 1. Our coefficient of interest is β , which will estimate the total impact of the TCJA on for-profit taxed banks from 2018 through 2019. The results for prices are shown in Table 2.

Our estimates are similar to DeYoung et al. (2019) who estimate that the non-taxation of credit union as a subsidy is primarily passed on to depositors. We estimate that the TCJA tax cut increased the price for-profit banks pay on deposits by about .8 basis points per quarter or 3.2 basis points per year. Lowering the tax burden on banks appears to benefit depositors. For the reasons discussed above, we are cautious about interpreting the coefficient on loan rates other than as ruling out important pass through of the tax cut to customers on this margin if the identifying assumption holds.

Table 2: TCJA Impact on Prices

	Quarterly price of:		
	Deposits (bps)	Labor	Loans (bps)
TCJA x for-profit	0.00826*** (0.00117)	-118.5* (66.22)	-0.00452 (0.00422)
(Conley & Taber, 2011) p-value	.007	.093	.058
For-profit ave.	0.113	16108.3	1.267

Notes: Robust standard errors in parentheses, clustered at the firm level. All regressions include firm and quarter by state fixed effects. Deposit price regression controls for the interaction of pre-treatment CD and money-market shares of deposits and the federal funds rate. The loan regression controls for the interaction of pre-treatment business, real estate, commercial real estate and consumer loans as a share of total loans with the federal funds rate.

We likewise use Equation (2) to generate a similar set of estimates for overall expenses, rather than just prices, to better translate where each dollar of the tax cut ends up. These estimates will take into account both quantity and price changes. In Table 3, we run Equation (2) using total spending or income for a given category in a quarter in place of the price. "Capital" is defined at payments to depositors and other lenders of capital, dividends, and changes in book value of equity.

Table 3: TCJA Impact on netputs

	Quarterly flow of:					
	Taxes	Capital	Deposit	Labor	Loan	Premise
TCJA	-180084.1*** (8646.2)	131367.3* (70294.2)	40221.5*** (7588.4)	7517.4 (8125.4)	-2956.2 (28235.2)	21880.1 (15745.5)
CT p-value	0.00	0.01	0.00	0.45	0.89	0.72

Notes: Robust standard errors in parentheses, clustered at the firm level. All regressions include firm and quarter by state fixed effects.

Finally, we use an instrumented difference-in-differences design (see Duflo (2001)), where we instrument the change in tax bill with the indicator for TCJA treatment. A different way to think about this is we measure the intensity of treatment by the difference of taxes within a bank pre and post-TCJA. The results of this analysis are shown in Table 4:

This analysis suggests that a 100 dollar decrease in taxes is associated with a 74 dollar increase in returns to capital inclusive of about a 22 increase in deposit expenditures. The impact of taxes on labor expenditure and loan income cannot be statistically be distinguished from 0. The estimate for both labor and loans rule out the possibility that significant portions of the tax cut are passed through to labor in the form of wages or customers in the form of lower loan rates, assuming the identifying assumptions hold.

Notably, we see pass through of the tax cut to depositors but not other customers (i.e., borrowers from banks). As a result, we tentatively conclude that the pass-through of the tax cut to depositors is likely in their capacity as capital providers to the bank, rather than as customers of payment services. That in turn suggests that capital providers (either equity or lenders) got the benefit of the corporate tax cut embodied in the 2017 Act at least in banks,

Table 4: TCJA - Scaled (IV) DiD

	Quarterly flow of:				
	Capital	Deposit	Labor	Loan	Premise
Taxes	-0.738*	-0.223***	-0.0417	0.0151	-0.121
	(0.395)	(0.0410)	(0.0452)	(0.144)	(0.0875)

Notes: Robust standard errors in parentheses, clustered at the firm level. All regressions include firm and quarter by state fixed effects.

and—depending on one’s views of the caveats noted in the introduction—quite possibly in other areas as well.

6 Model

There are two main questions a model can help with interpreting our empirical findings: 1) when might our difference-in-differences analysis fail to estimate the object(s) of interest and how generalizable are estimates from one sector (here banking) to the broader economy. This section proceeds to implement and describe an established model to help answer these questions.

Our setting can be well represented in the Differentiated Production Model developed in (Gravelle & Kotlikoff, 1993). This model has two industries, 1 and 2, which in our setting can be thought of as the financial-banking industry and the rest of the economy. In each industry there is a corporate and a noncorporate good. Our evidence is concentrated on one industry, with corporate production (for-profit banks) and non-corporate production (credit unions). This model is useful in understanding how our results might generalize.

The four goods are denoted C_1 , N_1 , C_2 , and N_2 where C_1 , and N_1 , (C_2 , and N_2) are the corporate and noncorporate goods in the two industries (indicated by the subscripts). While C_1 and N_1 , are not identical goods, they are closer substitutes than C_1 and C_2 . In our setting that simply assumes that consumers are more like to switch between credit union and community banks, than say, buying safes or putting the money into durable goods.

The model builds off of several primitives, most notably a utility function of the form:

$$U = [a(d_1 C_1^{(1-1/\eta)} + (1-d_1) N_1^{(1-1/\eta)})^{(1-1/\phi)/(1-1/\eta)} + (1-a)(d_2 C_2^{(1-1/\eta)} + (1-d_2) N_2^{(1-1/\eta)})^{(1-1/\phi)/(1-1/\eta)}]^{-1/(1-1/\phi)} \quad (1)$$

Here, a , d_1 , and d_2 are share parameters (which the model will solve for), η refers to the within-industry elasticity of substitution and ϕ the between industry elasticity (which we will choose). The model also relies on a standard economy wide budget constraint ($P_{C_1}C_1 + P_{N_1}N_1 + P_{C_2}C_2 + P_{N_2}N_2 = I$, where I is national income, and P 's indicate prices) and CES production functions for each good ($Q_j = H_i[(1-b_i)L_j^{-\rho_i} + b_i K_j^{-\rho_i}]^{-1/\rho_i}$ for $i = 1, 2; j = C_i, N_i$).

With these equations in place and the calibration of several parameters we can generate several useful comparative statics to help contextualize our difference-in-difference estimates. To generate useful comparative statics from this model we need the following values: $t_1 = .08$, $t_2 = .19$, $t = .35$, where t is the corporate tax rate and t_i is the average corporate tax rate in each industry; M_i , the capital income share in each industry (we use .6 and .2 respectively following Gravelle and Kotlikoff (1993)); a national income number (we use 296); and choices about the relevant elasticities (ρ_i, η, ϕ). For additional details on how this model is solved see Gravelle and Kotlikoff (1993). Solving this model allows us to understand how our DiD estimates (movements between capital and labor in industry 1) might translate to burdens in broader (domestic) economy.

Under our baseline calibration with pre-TCJA corporate tax rates, the initial allocation of capital and labor (as a share of their total) is as follows: $K_{N_1} = 31.3\%$, $K_{C_1} = 6.2\%$, $K_{N_2} = 35.3\%$, $K_{C_2} = 27.2\%$; $L_{N_1} = 9.5\%$, $L_{C_1} = 0.9\%$, $L_{N_2} = 64.6\%$, $L_{C_2} = 24.9\%$ (the price of N_1 is .78, and N_2 is .92 where the price of each corporate good is set to 1).

Adjusting the corporate tax rate to $t = .2$ and scaling t_1, t_2 similarly, generates the following allocations: $K_{N_1} = 29.2\%$, $K_{C_1} = 6.9\%$, $K_{N_2} = 32.8\%$, $K_{C_2} = 31\%$; $L_{N_1} = 9.1\%$, $L_{C_1} = 1.1\%$, $L_{N_2} = 61.0\%$, $L_{C_2} = 28.8\%$ (the price of N_1 is .88, and N_2 is .96).

As one would expect, lowering the corporate tax rate moves resources into the corporate sector of each industry. The gap between capital in the corporate and non-corporate sector in industry 1 declines by 2.8 percentage points (25.1-22.3) and in the second industry by 6.3 percentage points (8.1-1.8). This suggests that the quantity responses we see between

the taxed and non-taxed banking sectors may not fully generalize to the broader economy, but can be informative if we are willing to take a stand on several relevant parameters.

7 Conclusion

We analyze the effect of the TCJA on small and medium size banks using credit unions as controls. Using a difference in difference framework, we find consistent evidence that banks raised the (relative) amount they paid to capital holders (inclusive of depositors) after the Act.

This increase represents roughly three-quarters of the total tax savings enjoyed by banks. By contrast, we see little, if any, evidence of pass through of the tax cut to employees or customers who borrow from these banks or increase in investment in physical assets.

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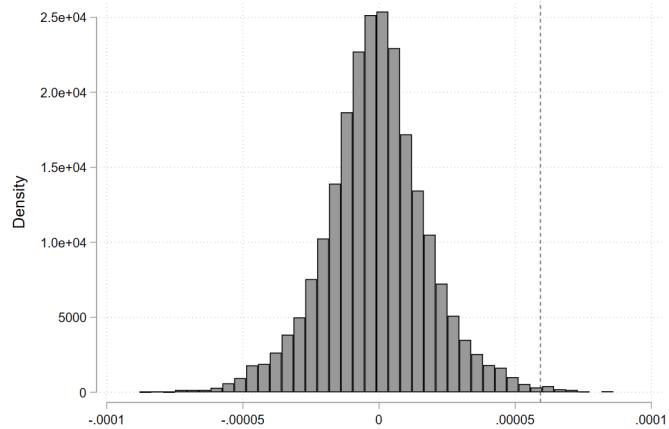
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8 Appendix

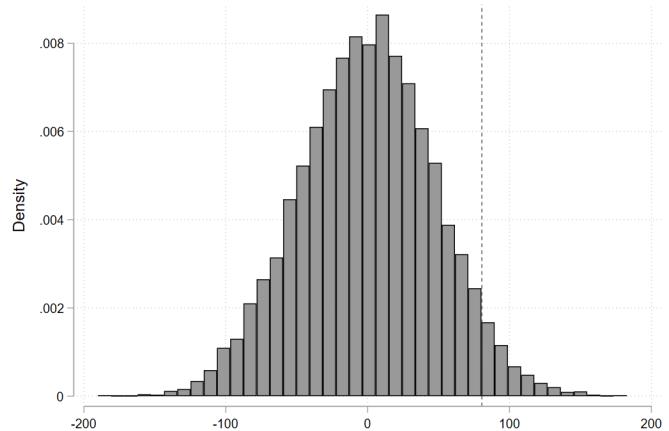
8.1 Randomization inference

One way of viewing the TCJA is as a study design with only one event, which can create standard errors that are too small even when clustered at the state level. One way to correct for this potential issue is to conduct placebo tests in the spirit of Conley and Taber (2011). In each of the placebo tests below, we randomly choose a treatment year between 2007 and 2017. We then randomly assign 57% of the sample “treatment” status after that date (57% of observations in our base sample are treated). As in the primary specification, we study 3 years before and 2 years after the placebo treatment. We rerun the placebo estimates 10,000 times in order to create a distribution of coefficients under a null where the treatment effect is by construction 0, and thus tells us the likelihood of observing under coefficients as large as under the null. Histograms of these distributions are displayed below, and p-values are listed in the table in the main text.

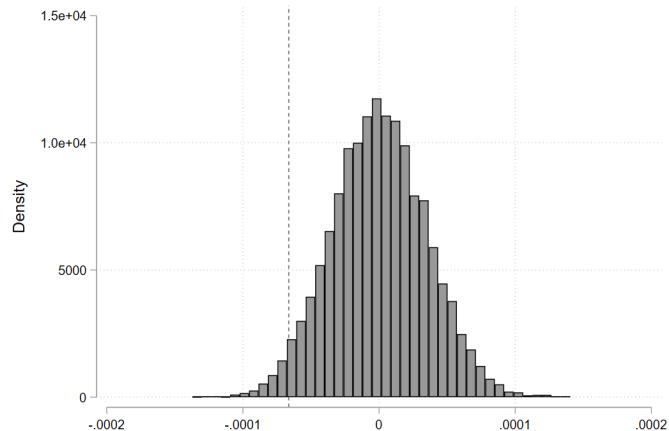
Figure 5: (Conley & Taber, 2011) inference



A: Deposit price



B: Labor price



C: Loan price

Figure 6: Quarterly flows randomization inference:

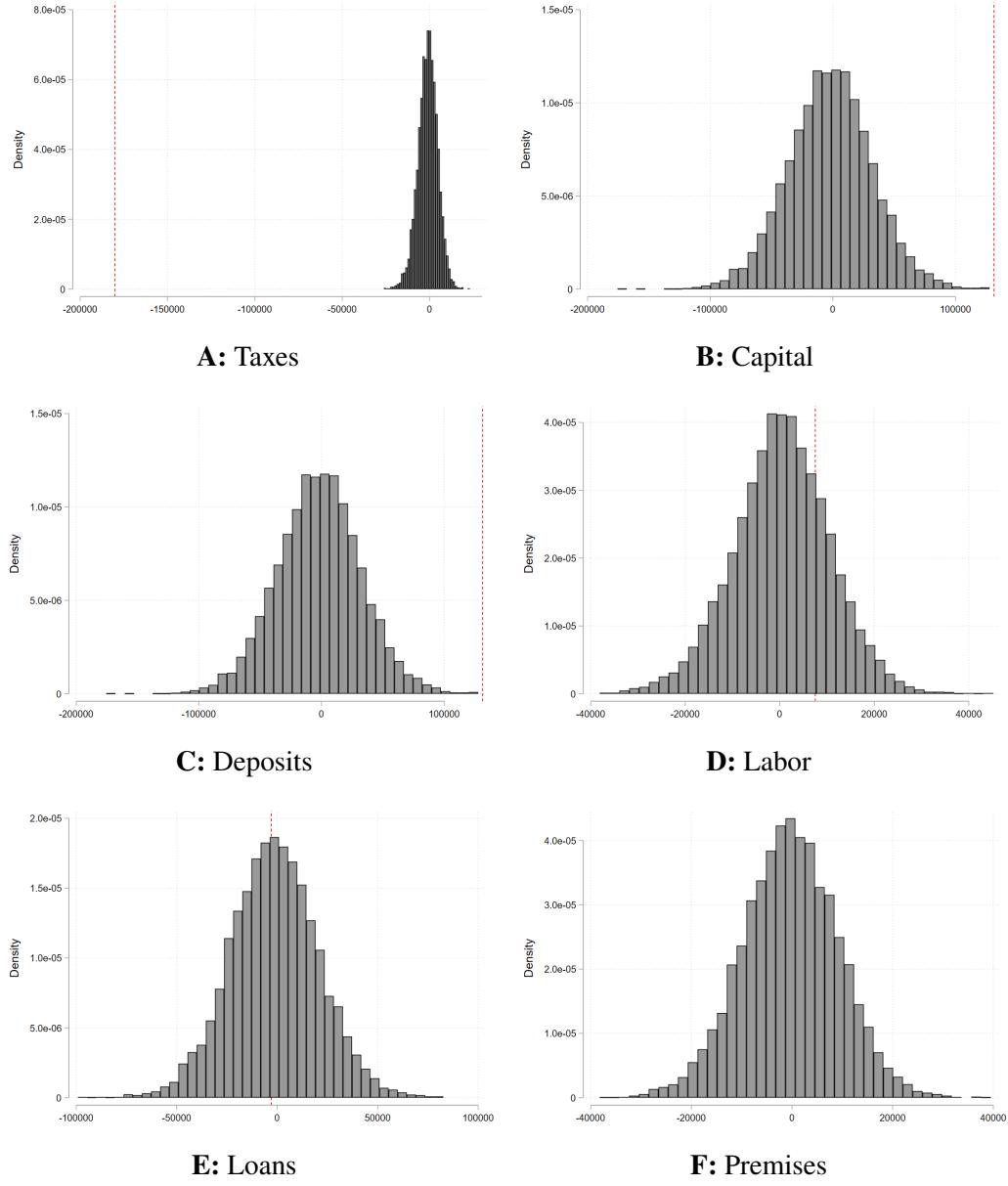


Table 5: Unweighted, unrestricted summary statistics

	Banks		Credit Unions	
	mean	sd	mean	sd
Age	90	40	64	14
Taxes	302432	843171	0	0
ln(Assets)	19.1	1.1	17.6	1.7
ln(Investments)	17.8	1.1	16.1	1.8
ln(Deposits)	18.9	1.1	17.4	1.7
ln(Premises)	14.7	1.6	12.9	3.0
Deposit Share Check and Save	0.30	0.16	0.18	0.67
Deposit Share CDs	0.33	0.15	0.15	0.12
Deposit Share Money Market	0.16	0.13	0.11	0.13
Price of Deposits	0.0013	0.0008	0.0011	0.0010
Price of Labor	16421	4995	13287	4463
Price of Loans	0.0129	0.0024	0.0138	0.0040
Firm x Quarter Obs.	59158		103128	

8.2 Event study robustness to specification choices

There are several choices that we made in the empirical work. We explored several different specifications and control groups. While there are some differences across these choices, the results are qualitatively robust to whatever choices we make. In panels A and B we change the event study specification but keep the comparison between credit unions and traditional private banks. In panel A, we show the same sample as our core specification, but do not include any trend controls; we also show a version without trends, but with weights. The weighting scheme we use is entropy balancing. (Hainmueller, 2012) This approach reweights the samples (from the unrestricted universe of credit unions and traditional for-profit banks) in order to upweight the most comparable credit unions to private banks. In particular, we reweight on age, the log of assets, labor expense, investments, deposits, and share of CD deposits in the pre-treatment period (and apply these weights to the full sample). Panel B shows the core regression from the text of the paper (trends), as well as a version with both trend controls and weighting. Summary statistics for the unweighted, unrestricted sample as well as the reweighted sample are displayed below.

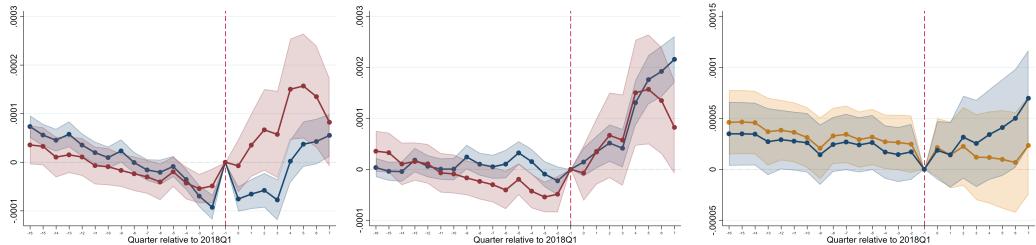
Panels C-E alter the relevant comparison group. In panel D the figure shows the coef-

Table 6: Weighted summary statistics

	Banks		Credit Unions	
	mean	sd	mean	sd
Age	49	36	64	14
Taxes	399625	1538584	0	0
ln(Assets)	18.5	1.5	17.6	1.7
ln(Investments)	17.3	1.4	16.1	1.8
ln(Deposits)	18.3	1.5	17.4	1.7
ln(Premises)	14.0	2.0	12.9	3.0
Deposit Share Check and Save	0.40	0.18	0.67	0.20
Deposit Share CDs	0.20	0.12	0.15	0.12
Deposit Share Money Market	0.21	0.18	0.11	0.13
Price of Deposits	0.0009	0.0007	0.0011	0.0010
Price of Labor	16777	65667	13287	4463
Price of Loans	0.0137	0.0037	0.0138	0.0040

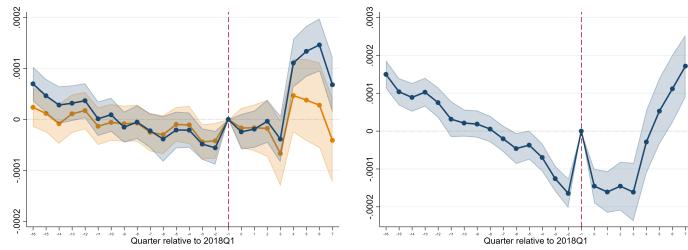
fecient on private banks, with the counterfactual group is S-Corps. Here the TCJA lowered the tax burden on both are traditional private banks as well as the S-Corps, but (likely) to a lesser extent for S-Corps. Due to the relatively unclear first-stage, it is unsurprising that this comparison shows

Figure 7: Deposit price



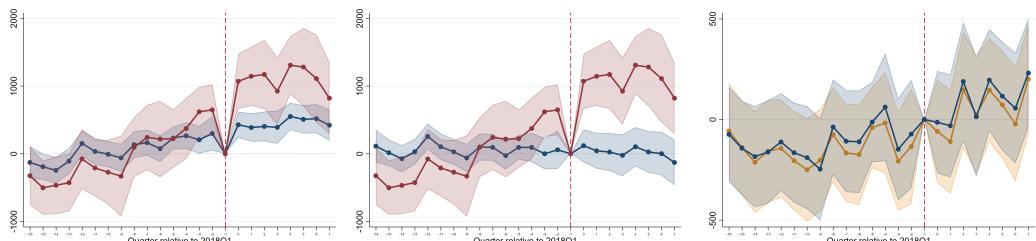
A: No weighting, no trends **B:** trends (blue) and trends + weights (red)

C: Bank v Scorp comparison, weighting (orange) and nothing (blue)



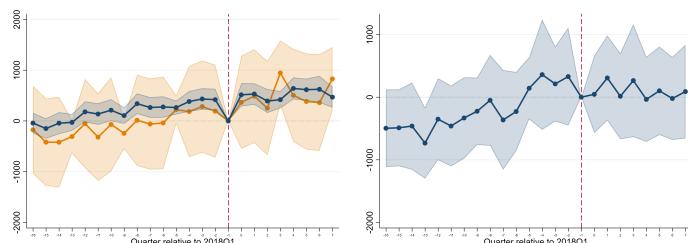
D: CU v Scorp comparison, **E:** CU v non-stock comparison, trends (blue) and trends + son, trends (blue) weights (orange)

Figure 8: Labor price



A: No weighting, no trends **B:** trends (blue) and trends + weights (red)

C: Bank v Scorp comparison, weighting (orange) and nothing (blue)



D: CU v Scorp comparison, **E:** CU v non-stock comparison, trends (blue) and trends + son, trends (blue) weights (orange)

Figure 9: Loan price

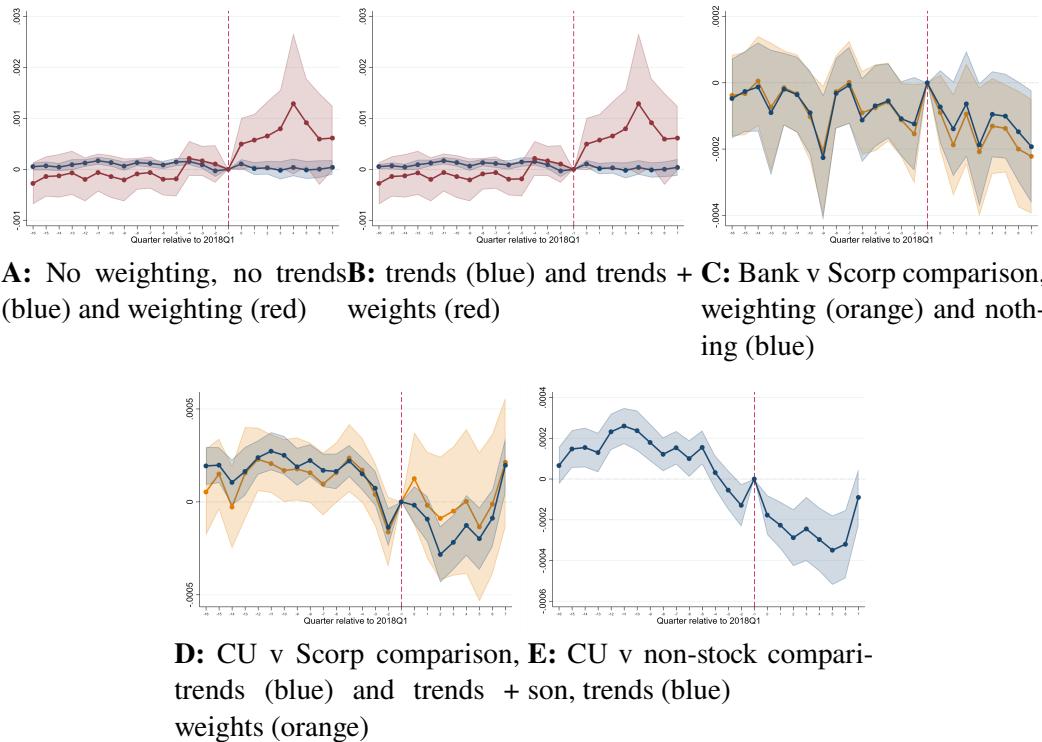


Figure 10: Investment price

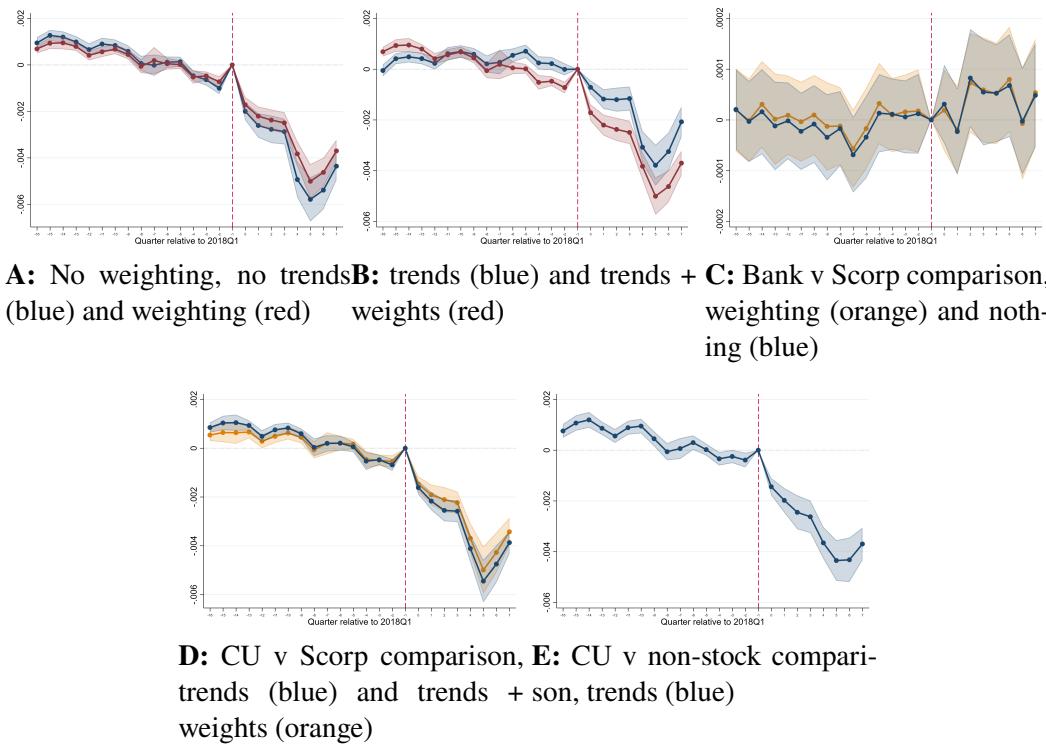


Figure 11: Capital payments

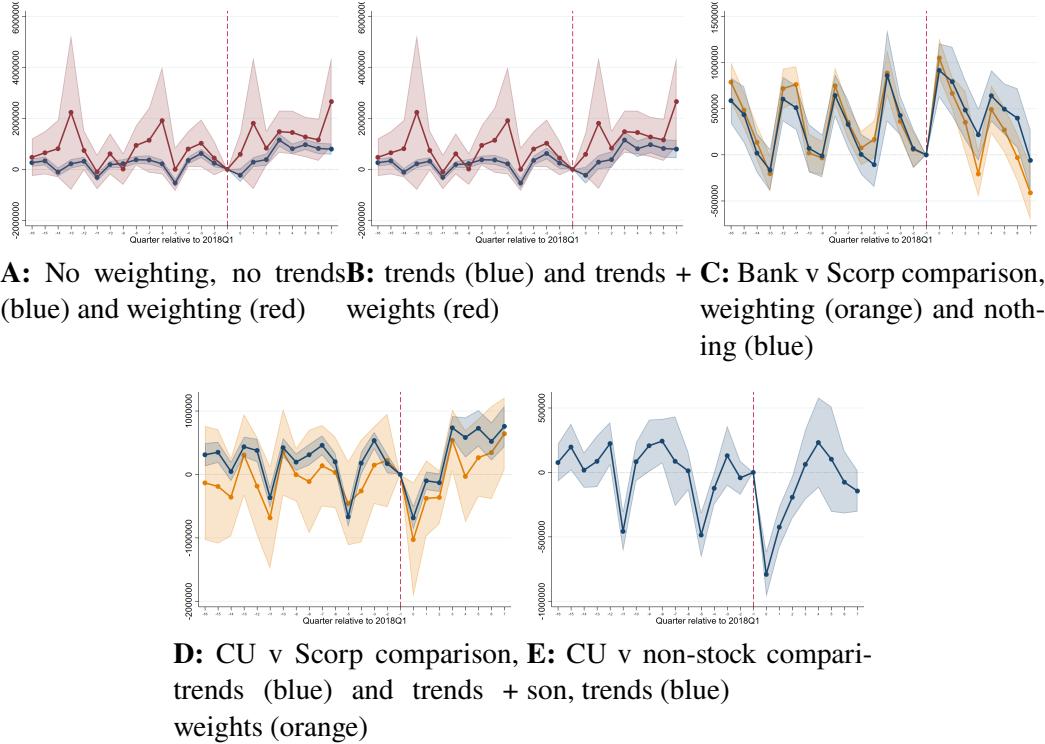


Figure 12: Log deposit expense

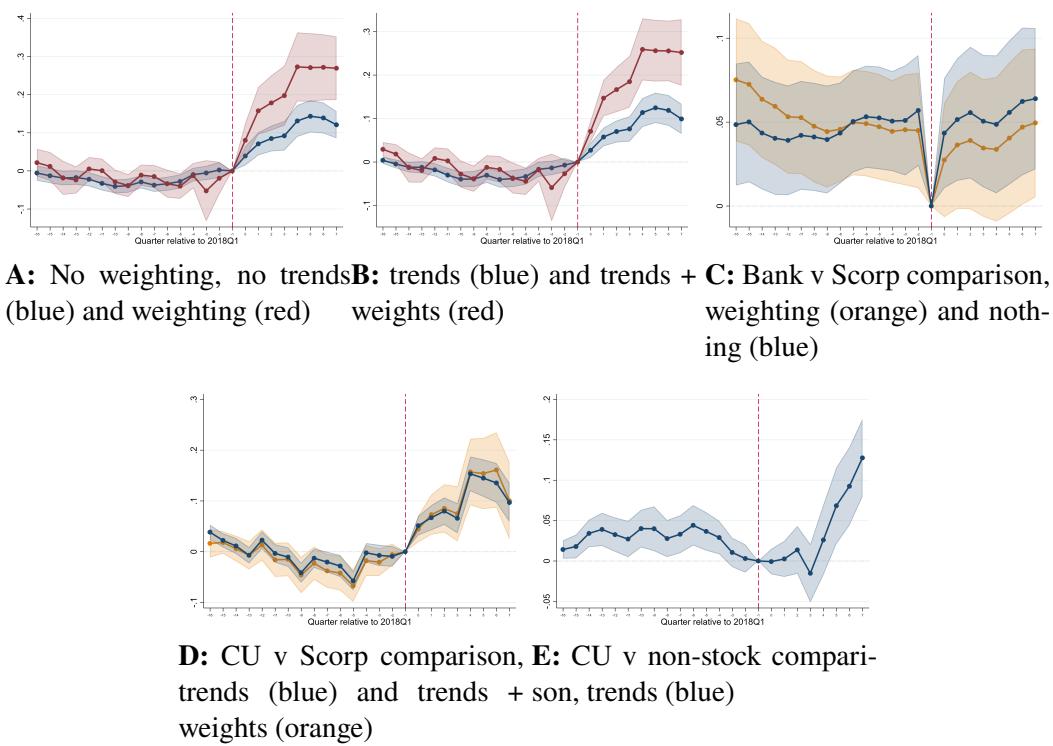
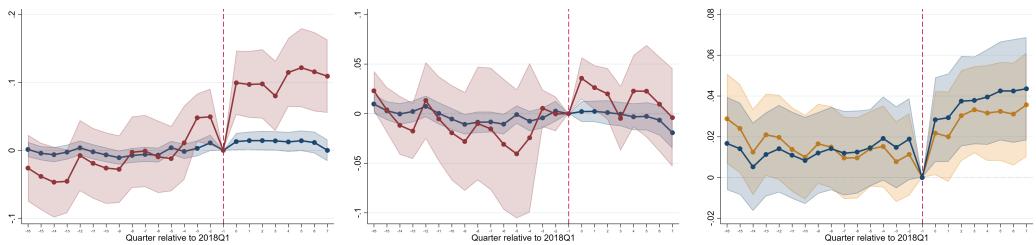
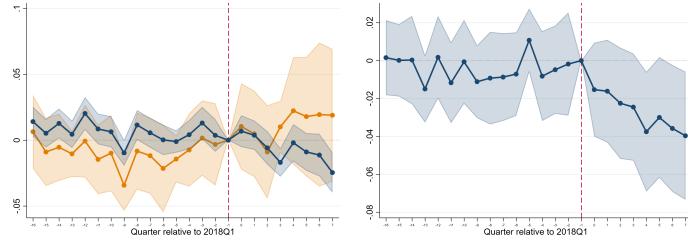


Figure 13: Log of labor expense



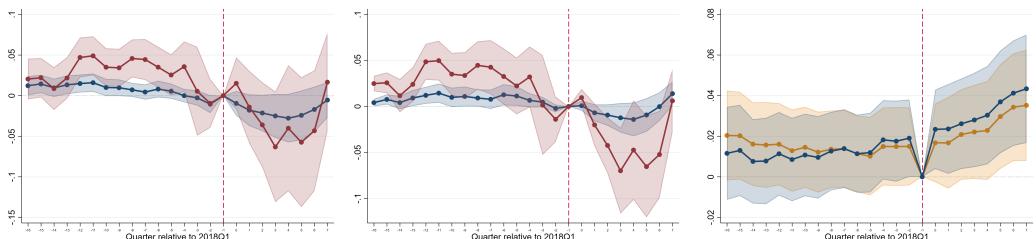
A: No weighting, no trends **B:** trends (blue) and trends + weights (red)

C: Bank v Scorp comparison, weighting (orange) and nothing (blue)



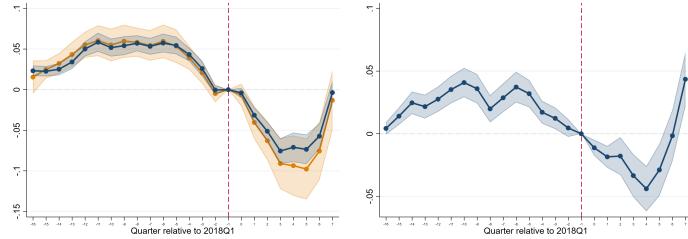
D: CU v Scorp comparison, **E:** CU v non-stock comparison, trends (blue) and trends + son, trends (blue)
weights (orange)

Figure 14: Log of loan expense



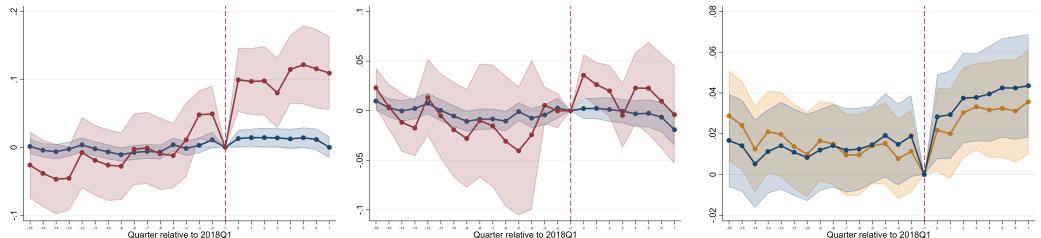
A: No weighting, no trends **B:** trends (blue) and trends + weights (red)

C: Bank v Scorp comparison, weighting (orange) and nothing (blue)

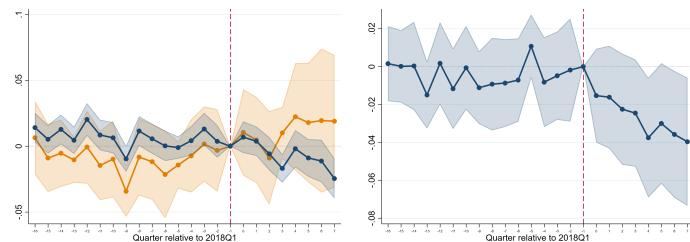


D: CU v Scorp comparison, **E:** CU v non-stock comparison, trends (blue) and trends + son, trends (blue)
weights (orange)

Figure 15: Log of investment expense

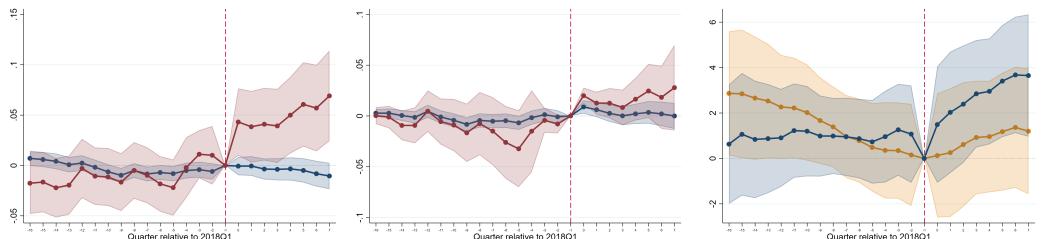


A: No weighting, no trends **B:** trends (blue) and trends + weights (red) **C:** Bank v Scorp comparison, weighting (orange) and nothing (blue)

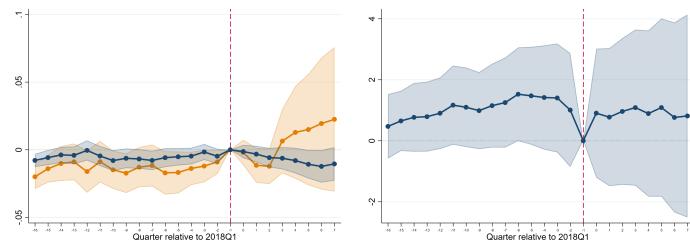


D: CU v Scorp comparison, **E:** CU v non-stock comparison, trends (blue) and trends + son, trends (blue) weights (orange)

Figure 16: Log of labor quantity



A: No weighting, no trends **B:** trends (blue) and trends + weights (red) **C:** Bank v Scorp comparison, weighting (orange) and nothing (blue)



D: CU v Scorp comparison, **E:** CU v non-stock comparison, trends (blue) and trends + son, trends (blue) weights (orange)

Figure 17: Log of loan quantity

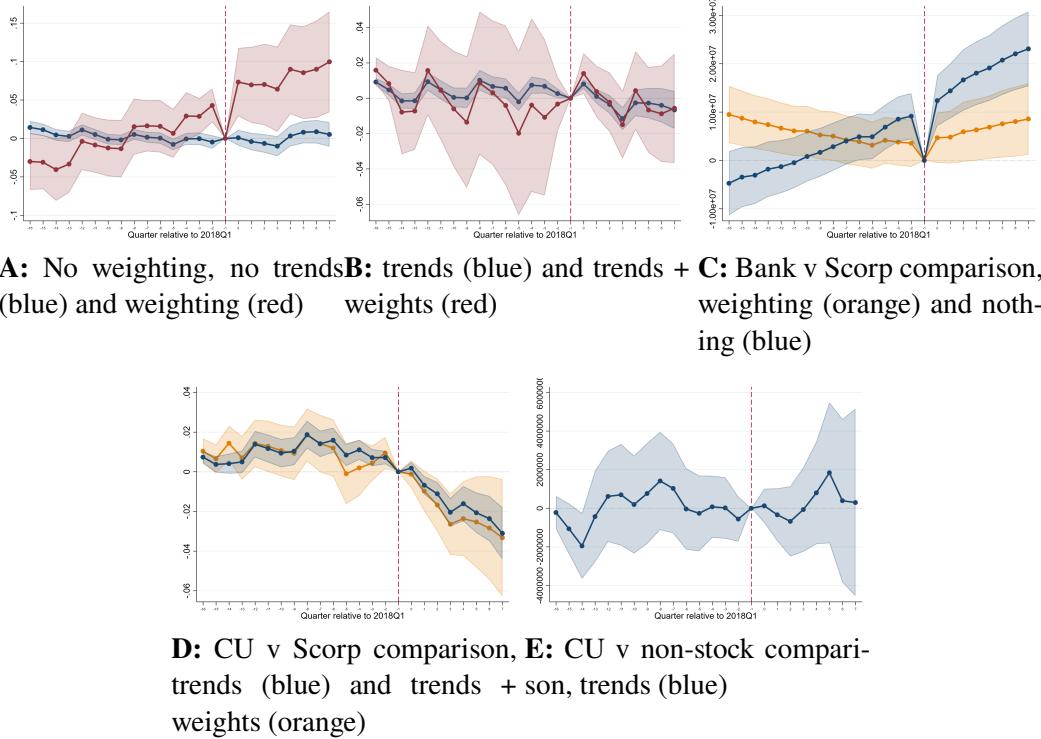


Figure 18: Log of investment quantity

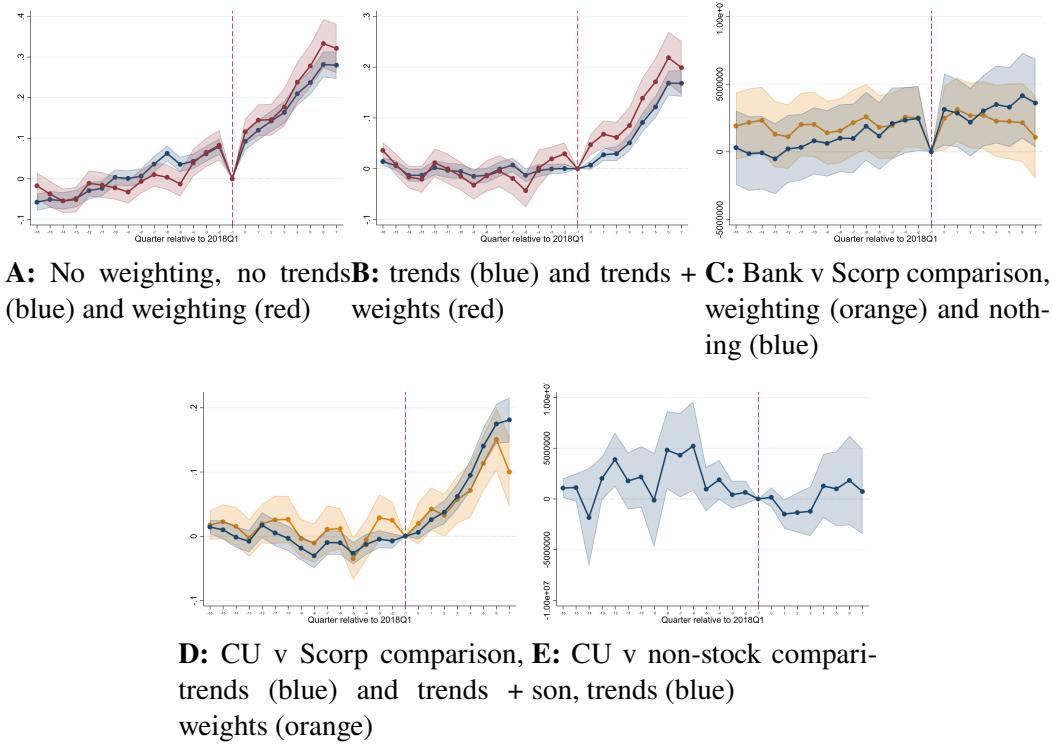
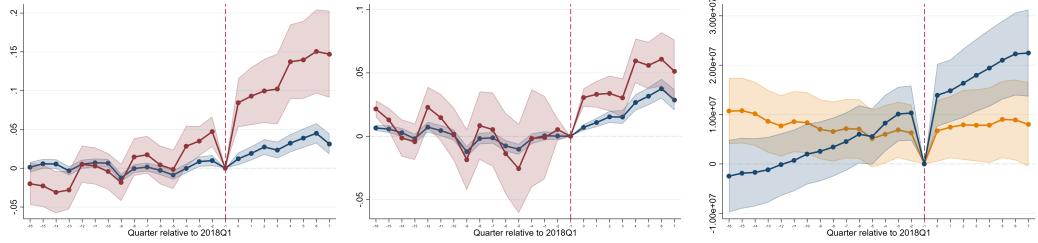
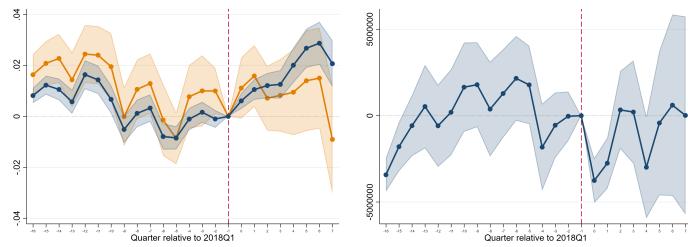


Figure 19: Log of deposits quantity

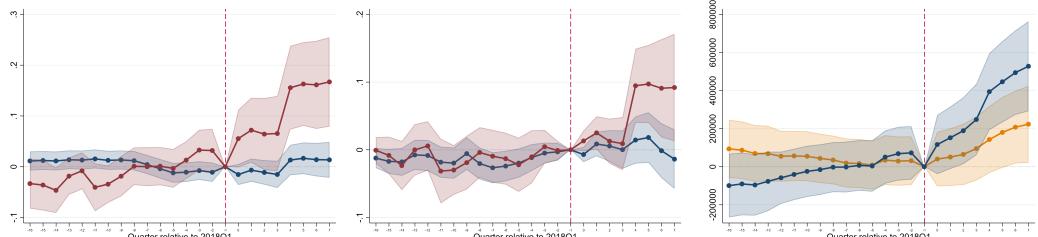


A: No weighting, no trends **B:** trends (blue) and trends + weights (red) **C:** Bank v Scorp comparison, weighting (orange) and nothing (blue)

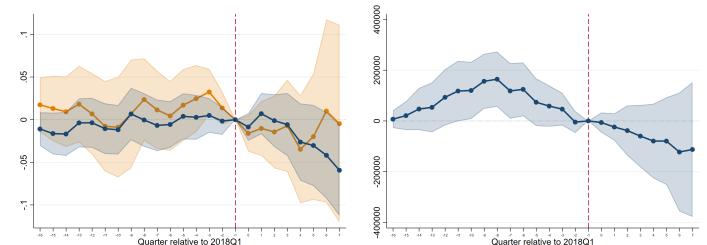


D: CU v Scorp comparison, **E:** CU v non-stock comparison, trends (blue) and trends + son, trends (blue)
weights (orange)

Figure 20: Log of premises quantity



A: No weighting, no trends **B:** trends (blue) and trends + weights (red) **C:** Bank v Scorp comparison, weighting (orange) and nothing (blue)



D: CU v Scorp comparison, **E:** CU v non-stock comparison, trends (blue) and trends + son, trends (blue)
weights (orange)

Figure 21: Log of equity quantity

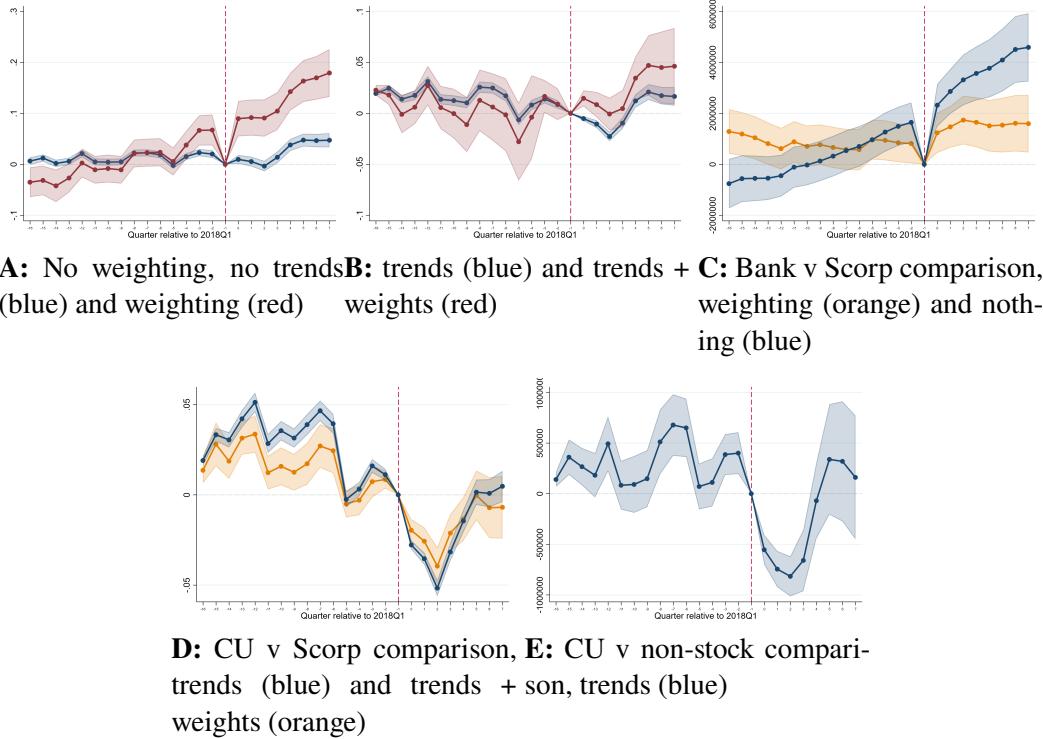


Figure 22: Log of non-interest income quantity

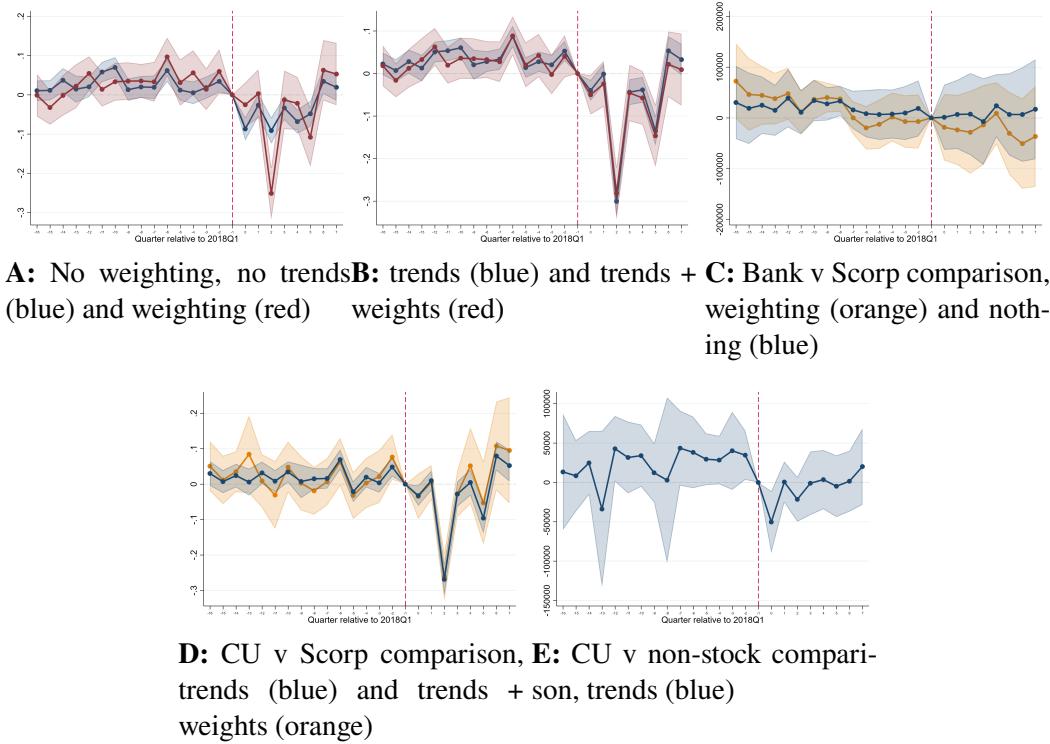
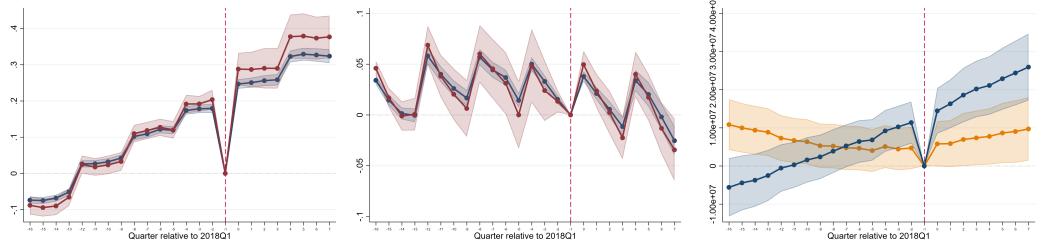
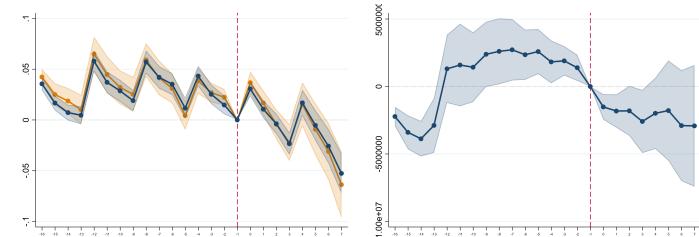


Figure 23: Log of risk-weighted assets quantity



A: No weighting, no trends **B:** trends (blue) and trends + weighting (red)

C: Bank v Scorp comparison, weights (red)
weighting (orange) and nothing (blue)



D: CU v Scorp comparison, weights (blue) and trends (orange)
E: CU v non-stock comparison, trends (blue)

