Online Appendix for "Repatriation Taxes" (Not For Publication)

This not-for-publication appendix contains additional analysis of our framework.

Contents

OA1 Transition Probabilities for Experiments

This appendix describes the firm's expectations of future policy from the period of receiving news through the resolution of the news.

OA1.1 Baseline

In the baseline simulations, the firm unexpectedly receives a tax news shock that notifies them that there will be a one-period repatriation tax rate reduction 4 quarters in the future. Figure A1 shows the transition graph for the general case when the time from the news to the tax holiday is J quarters. After the tax holiday, the repatriation tax rate returns to its original steady-state rate indefinitely.
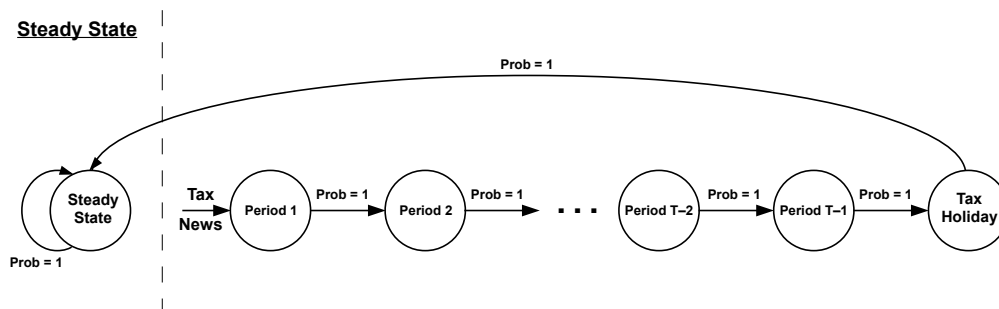

Figure A1: *Transition Graph for Baseline Simulation: Tax Holiday Occurring J Periods From the Arrival of the News*

OA1.2 Uncertainty: When a Tax Holiday May Occur

Figure A2 shows the transition graph for the case when firms receive news of a one-period temporary repatriation tax reduction that will occur at an unknown time between the arrival of the news and J periods from the arrival of the news. This corresponds to the simulations in Section 4.5.1 in the main text. If the tax holiday has not occurred in a given period, the firm places an equal likelihood that the tax holiday will occur in any given future period. For example, if $J = 8$, then in the first period of the news firms will place a $P_1 = 1/8$ probability that it will occur in the next period, and if it doesn't occur in the next period then in period 2 they place a $P_2 = 1/7$ probability of it occurring in the following period, and so on. Once the tax holiday occurs, the repatriation tax rate returns to its original steady-state rate indefinitely.
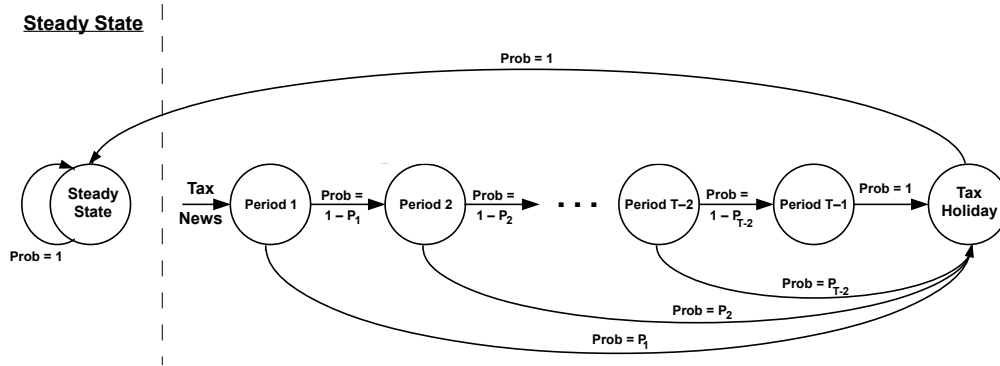
Figure A2: *Transition Graph With Uncertainty of When a Tax Holiday May Occur Between the Arrival of the News and J Periods Afterwards*

OA1.3 Uncertainty: If a Tax Holiday May Occur

Figure A3 shows the transition graph for the case when firms receive news of a one-period temporary repatriation tax reduction that may or may not occur J periods in the future. This corresponds to the simulations in Section 4.5.2 in the main text. The firm unexpectedly receives a tax news shock that notifies them there *may* be a temporary repatriation tax rate reduction J quarters in the future. At time $J - 1$, the firm knows that the tax news will be resolved with a probability of the tax holiday occurring as $P(Occur)$ and probability $1 - P(Occur)$ that it will not occur. If the tax holiday does occur, the firm will receive a one-period repatriation tax reduction before the repatriation tax rate returns to the original steady-state rate indefinitely. If it does not occur, the repatriation tax rate returns to its original steady-state rate indefinitely.

Figure A3: *Transition Graph With Uncertain Tax Holiday Occurring J Periods From Arrival of the News*

OA1.4 Uncertainty in If and When a Tax Holiday May Occur

Section 4.6 in the main text reports the shadow tax on repatriated earnings at the period the firm receives news of a possible repatriation tax holiday. Figure A4 shows the general case of the transition graph used in calculating these shadow taxes. The firm receives news of a temporary repatriation tax reduction that may or may not occur between the arrival of the news and J periods from the arrival of the news. If the tax holiday has not occurred in a given period, the firm places an equal likelihood that the tax holiday may occur in any given future period. They additionally place a probability that the holiday will occur at all $(P(Occur) = P_{J-1})$. For example, if $J = 4$ and firms place a 50 percent probability a tax holiday will occur, then in the first period of the news firms place a $\frac{1}{4} \times 0.5$ probability it will occur in the next period and in each remaining period. At time $J - 1$, firms know that the tax news will be resolved with a probability of the tax holiday occurring as P_{J-1} and probability $1 - P_{J-1}$ that it will not occur. If the tax holiday does occur, the firm receives a one-period repatriation tax reduction before the repatriation tax rate returns to its original steady-state rate indefinitely. If it does not occur, the repatriation tax rate returns to its original steady-state rate indefinitely.
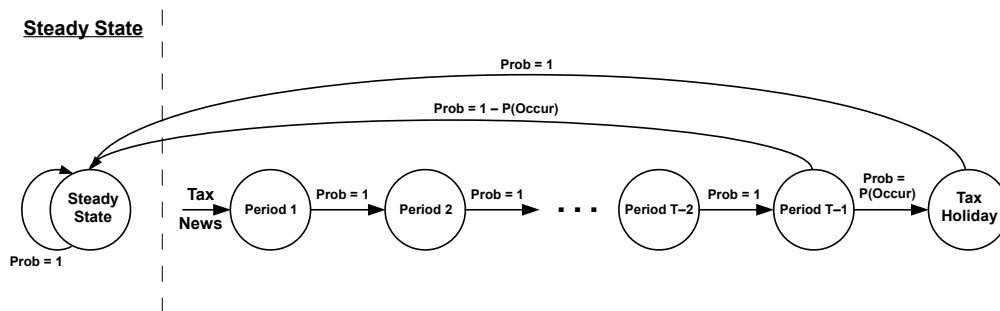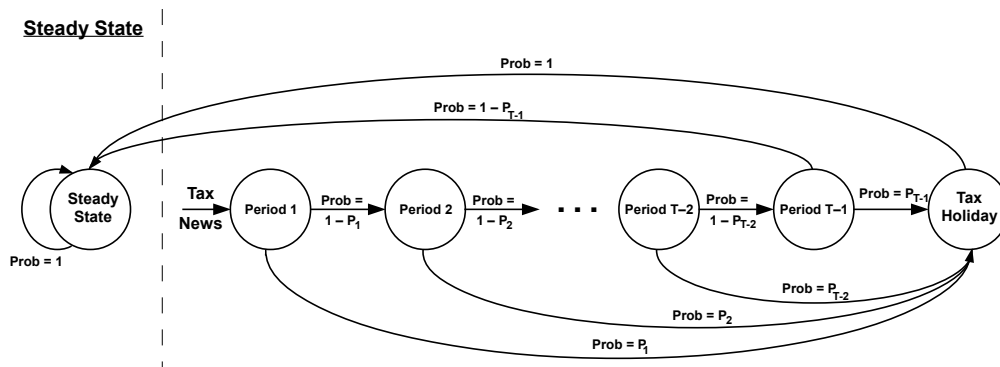

Figure A4: *Transition Graph With Uncertainty if and When a Tax Holiday May Occur Between Arrival of the News and J Periods Afterward*

OA2 Model Comparison with Foley, Hartzell, Titman, and Twite (2007)

This appendix describes how we compare the relationship between foreign liquid asset holdings and repatriation tax rates from the model with the empirical results from Foley, Hartzell, Titman, and Twite (2007) (hereon FHTT) in Section 3.2.1 in the main text. FHTT use confidential firm-level BEA data on foreign subsidiaries of U.S. multinationals in 4 benchmark surveys from 1982-1999 to estimate the relationship between liquid asset holdings and repatriation tax rates. We focus on the specification in Table 5, column 3 as this provides the closest mapping with our model. Specifically, it is the only specification that considers i) only foreign liquid asset holdings, which we have in our model; ii) repatriation tax rates calculated in the exact way we calibrate it in our model, and iii) weights on repatriation tax rates (all are weighted in FHTT) by the foreign employment share, the only weight where we have a 1-to-1 correspondence in our model.

Their dependent variable $ln\left(\frac{Cash}{Net\ Assets}\right)$ is the natural log of foreign liquid assets ("cash") divided by net assets, total assets-cash. The primary explanatory variable is the *employment-weighted-effective repatriation tax rate* which is calculated in the same way as in our calibration (see Section 3.1 in the main text) but then weighted by the share of employees in foreign subsidiaries to total employees by the firm. They regress $ln\left(\frac{Cash}{Net\ Assets}\right)$ on *employment-weighted-effective repatriation tax rate* and controls. The control variables are *Domestic Income/Assets, Foreign Income/Assets, Log of Assets, Book/Market Value, Debt/Debt+Market Value, St. Dev. Income/Assets, Dividend Dummy, R&D/Assets,* and *Capital Expenditures/Assets.*

To compare our model results to FHTT, we simulate 200,000 firms at the stochastic steady state for $\tau = \{0.05, 0.1, ...0.35\}$. We then calculate $ln\left(\frac{Cash}{Net\ Assets}\right)$, *employment-weighted-effective repatriation tax rate*, and the control variables for each firm observation. We do not have a model counterpart for the last three control variables in the list above so they are not included. We regress $ln\left(\frac{Cash}{Net\ Assets}\right)$ on *employment-weighted-effective repatriation tax rate* and the control variables in our model generated data as in FHTT. The range of *employment-weighted-effective repatriation tax rate* spans from 0.007 to 0.155 in our model generated data. We then find the means of all the control variables in intervals of 0.02 of *employment-weighted-effective repatriation tax rate*, $0.01 \pm 0.01, 0.03 \pm 0.01, ..., 0.15 \pm 0.01$. Using these conditional means, we generate the predicted

values of $ln\left(\frac{Cash}{Net\ Assets}\right)$ at *employment-weighted-effective repatriation tax rate*$= 0.01, 0.03, ..., 0.15$, based on the regression estimates. These predicted values are plotted in Figure 2 in the main text. The predictions are centered at 0 by subtracting the average predicted value from each predicted value. The reference line is also centered at 0 and its slope is the coefficient on *employment-weighted-effective repatriation tax rate* from FHTT.

OA3 Additional Evidence of News: Permanently Reinvested Earnings and the AJCA

In this appendix we present additional evidence of firms' responses to anticipation of the AJCA. Prior to 2018, firms could avoid paying U.S. taxes on foreign income by declaring these assets as Permanently Reinvested Earnings (PRE); these are earnings that are claimed to be indefinitely held by foreign affiliates.[1] To illustrate the accumulation of PRE leading up to the AJCA, we hand collect the disclosed PRE from firms' 10-K filings with the SEC for those that received tax breaks on over $500 million under the AJCA. We choose $500 million dollars as the cutoff for repatriated earnings in order to correlate firms' PRE leading up to the AJCA. Under the AJCA firms could receive tax breaks on repatriated earnings of the larger of $500 million or the dollar amount of PRE. That is, the amount of a firms PRE could be independent to the amount of tax breaks received if the repatriated money was less that $500 million. We then link our PRE data with foreign earnings data from the annual Compustat Industrial Database. We require firms in our sample to have a minimum of 5 PRE observations leading up to the AJCA. Our sample contains 58 firms which, as a group, represents 57% of the estimated $312 billion repatriated under the act.

PRE is a stock measure of all earnings held permanently abroad that are not subject to U.S. taxes. To measure a firm's annual accumulation of PRE to show how it changed in the time leading up to the AJCA, we define $\Delta PRE\ share_{i,t}$ as the dollar change in PRE for a firm i in time t divided by its net foreign income (pre-tax foreign income minus foreign income taxes). This gives the implied share of net foreign income designated as PRE that year. We restrict $\Delta PRE\ share$ to be between 0 and 1. If $\Delta PRE\ share > 1$, we set it equal to 1 (i.e. all of a firm's foreign income

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[1]There were no deferred tax liability on PRE as firms declared these assets would not return to the U.S., although under the AJCA these assets were permitted to be repatriated with the reduced tax rate.

is assigned as PRE). If $\Delta PRE\ share < 0$ we let $\Delta PRE\ share = 0$ (i.e. none of a firm's income is assigned as PRE). Additionally, if net foreign income is negative and $\Delta PRE\ share < 0$, we set $\Delta PRE\ share = 0$.

We then measure how firms' accumulation of PRE changed before and after 2003. We pick 2003 as this is the year in which the precursor bills leading up to the AJCA were first introduced. We do this by comparing a firm's $\Delta PRE\ share$ by its average $\Delta PRE\ share$ from 1996-2002. This is given by

$$\Delta \widetilde{PRE\ share}_{i,t} = \left(\Delta PRE\ share_{i,t} \Big/ \overline{\Delta PRE\ share}_{i,1996-2002} \right) - 1$$

where $\overline{\Delta PRE\ share}_{i,1996-2002}$ is the firm's average $\Delta PRE\ share$ from 1996-2002. $\Delta \widetilde{PRE\ share}_{i,t}$ gives the percentage point deviation of a firm's accumulation of PRE as a share of foreign income relative to its 1996-2002 average accumulation of PRE as a share of foreign income.
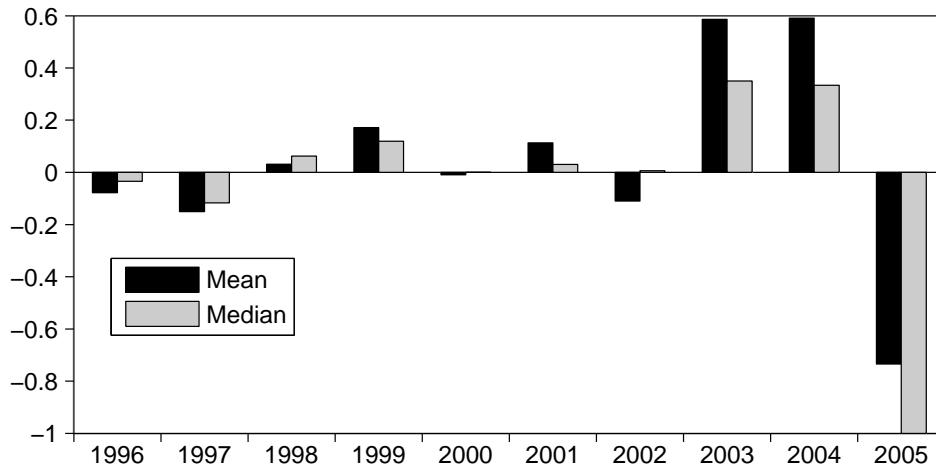

Figure A5: $\Delta \widetilde{PRE\ share}$ 1996–2005

Notes: The figure shows the percentage point deviation of the share of foreign income retained abroad and untaxed by the US (PRE) relative to the average share from the period 1996–2002. $\Delta \widetilde{PRE\ share}$ is defined as $(\Delta PRE\ share)/(\overline{\Delta PRE\ share})_{1996-2002} - 1$ where $\Delta PRE\ share$ is the implied share of after tax foreign income designated as PRE and $\overline{\Delta PRE\ share}$ is the average $\Delta PRE\ share$ from 1996-2002.

Figure A5 plots the across-firm mean and median percentage point deviation of $\Delta PRE\ share$ from its 1996-2002 average $\Delta PRE\ share$, $\Delta \widetilde{PRE\ share}$. This gives a measure of how firms' accumulation of PRE changed before versus after 2003, the year the precursor bills leading up to the AJCA were first introduced. Prior to 2003, $\Delta \widetilde{PRE\ share}$ was relatively stable. From 2002-2003

and 2003-2004, this measure of changes in foreign asset holdings by U.S. firms increases sharply relative to its long-run average. In 2004-2005, $\Delta \widetilde{PRE\ share}$ substantially declined as firms ran down their holdings of PRE by repatriating a large share of these assets during the tax holiday. We note that the sharp increase in the accumulation of PRE in 2002-2003 occurred before the AJCA was officially introduced and enacted. This is once again suggestive that firms anticipated the tax holiday and acted on this anticipation by changing the amount of assets held overseas leading up to the AJCA.

OA4   AJCA Literature and Model Comparison

In the early 2000's policymakers were concerned that U.S. tax laws were disincentivizing U.S. based multinationals from repatriating foreign income back to the U.S. They felt that if they could convince firms to repatriate more foreign income it would lead to greater investment and job creation in the U.S., thereby spurring further economic growth. Thus, in October 2004 they passed the AJCA which reduced the maximum repatriation tax rate on qualified funds from 35 to 5.25 percent on 85 percent of repatriated earnings in a one-year window. Further, under the AJCA guidelines, firms were required to use any funds that received tax breaks from the act on U.S. employment, investment, research and development, and other uses related to job creation and retention.

There is a large empirical literature that aims to tease out the effects of the AJCA tax holiday on a number of firm-level and fiscal policy variables. Table A1 summarizes the comparison between our model findings and this empirical literature. The table shows our model is remarkably consistent with the results documented in the empirical literature.

Table A1: AJCA Literature and Model Predictions

Study	Period	Study Findings	Our Model Predictions
Transfers: Joint Committee on Taxation (2004)	At/After	Predicted transfers rise during the AJCA and fall afterward	Transfers rise during the tax holiday and fall afterward.
U.S. Tax Revenue: Joint Committee on Taxation (2004)	At/After	An estimate of the budget impacts of the AJCA predicted rise in tax revenue at the AJCA and fall thereafter for a net loss in tax revenue.	Tax revenue rises during the tax holiday and falls afterward for a net loss of U.S. tax revenue.
Employment and Investment (Financially Unconstrained): Faulkender and Petersen (2012), Dharmapala, Foley, and Forbes (2011)	At/After	No significant change.	Negligible total response.
Employment and Investment (Financially Constrained): Faulkender and Petersen (2012)	At/After	Increase in investment and no change to employment.	Increase in both variables (see Section 4.4 in main text).
Shareholder Payouts: Blouin and Krull (2009), Dharmapala, Foley, and Forbes (2011), Clemons and Kinney (2008)	At/After	Increase in shareholder payouts (dividends and share repurchases). Dharmapala, Foley, and Forbes (2011) estimate a $1 increase in repatriation during the AJCA correspond to a $0.60 to $0.92 increase in shareholder payouts.	Increase in dividend payments approximately equaling the tax saving from holiday.
Debt Reduction: Faulkender and Petersen (2012), Dharmapala, Foley, and Forbes (2011), Graham, Hanlon, Shevlin et al. (2010)	At/After	Graham, Hanlon, Shevlin et al. (2010) finds firms with foreign sourced earnings reported paying down domestic debt as one of the most common uses of repatriated earnings using survey data from tax executives from these firms. The other papers find no impact of the AJCA on debt reduction.	Firms repay debt but the debt reduction is short lasting.
Firm Value: Oler, Shevlin, and Wilson (2007)	News	Stock value increased proportionately to the expected tax savings from the holiday. Increases occurred beginning in 2003 when the passage of the AJCA seemed likely, but the AJCA was not enacted until October 2004.	Increase in firm value V at the time of the news of the tax holiday.

Notes: This table summarizes the impacts from the AJCA of 2004 from the literature and compares it with our model findings. The second column reports the sub-periods of the analysis in the empirical literature in which the empirical studies focus on: the News Period and At/After the enactment of the AJCA.

OA5   Sensitivity Analysis

OA5.1   Shareholder Preferences

In this section, we perform sensitivity analysis on the coefficient of relative risk aversion σ in our utility function. In our baseline simulation, we use log utility ($\sigma = 1$). Here we also show the case when shareholders have risk neutral preferences ($\sigma = 0$).
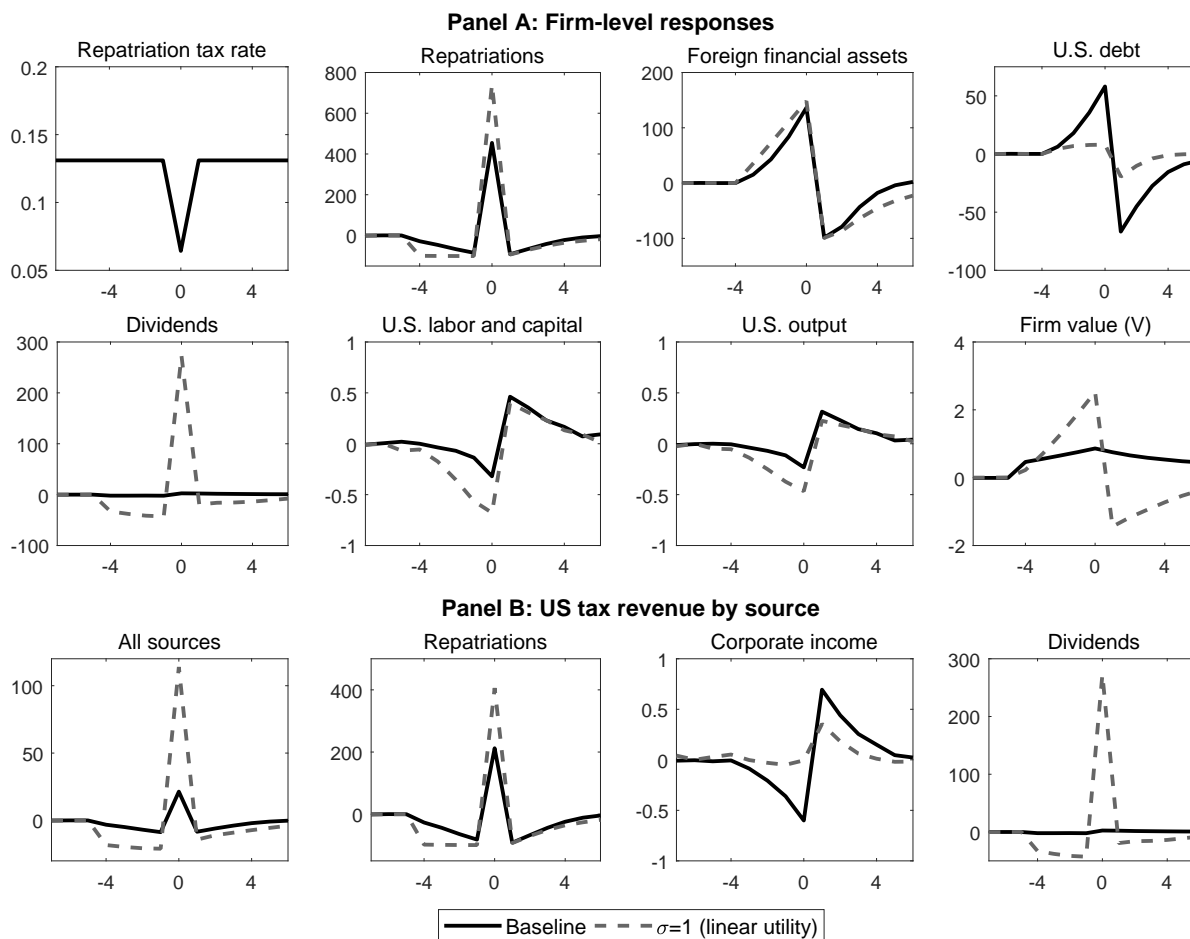

Figure A6: *Responses to Temporary Reduction in Repatriation Taxes Where News of Reduction is Received 4 Quarters in Advance*

Notes: Except for the repatriation tax rate, units are in percent deviation from initial steady state. The figure plots the baseline ($\sigma = 1$) and with risk neutral preferences ($\sigma = 0$).

Figure A6 shows the responses to news and the implementation of a tax holiday. The top panel gives the firm-level responses and the bottom gives the responses for the U.S. government tax revenue. The units are percentage deviations from the original stochastic steady state with the

exception of the repatriation tax rate graph which shows the actual time-path for the repatriation tax rate. The tax holiday is implemented at period 0 and the firm receives news of it 4 quarters in advance (period -4). The repatriation tax rate reduction is the same as in the baseline.

When we consider the case with linear utility, the results differ quite substantially. Without curvature in the utility of dividends, the firm does not have a motive to smooth out dividend payments. Thus, there are wide swings in many variables at the announcement of the news. For example, the firm cut off repatriations almost completely during the news period. The large swings in foreign transfers, dividend payments, and U.S. tax revenue are at odds with the variation of these variables for multinational firms in the data. In particular, with linear utility firms do not have an incentive to smooth dividends over time. We thus, incorporate curvature in out utility function.

OA5.2   Normal Distribution of ϵ_R

In our baseline calibration, the steady state repatriation tax rate $\tau_R = \tau + \epsilon_R$ where ϵ_R is normally distributed in the interval $[-0.032, 0.032]$. Here we instead consider having ϵ_R as distributed normally. Our method for estimating the parameters of ϵ_R is for a firm i and observation j, we first calculate the percentage deviation of the repatriation tax rate $\tau_{i,j}^R$ for each firm from that firm's mean repatriation tax rate, $\mu_{\tau_{i,j}^R}$

$$\% deviation_{i,j} = \frac{\tau_{i,j}^R - \mu_{\tau_{i,j}^R}}{\mu_{\tau_{i,j}^R}}.$$

In our model, the repatriation tax rate for each firm is given by $\tau_R = \tau + \epsilon_R$ where $\tau = 0.131$ is the mean repatriation tax rate estimated from the data. We then scale each $\% deviation_{i,j}$ observation to be consistent with a mean tax rate of $\tau = 0.131$ by multiplying $\% deviation_{i,j}$ by 0.131. This gives us our $\epsilon_{R_{i,j}}$ values for each observation consistent with the model.

The next step is to consider the theoretical bounds on ϵ_R which must be truncated – at the upper and lower tails – when estimated in the data. Consistent with the AJCA, in our main experiment we lower the average repatriation tax rate $\tau = 0.131$ to $\tau = 0.0643$. Theoretically, the

effective repatriation tax rate must always be greater or equal to zero,

$$\tau_R = 0.0643 + \epsilon_R \geq 0$$

which means $\epsilon_R \geq -0.0643$. This is because if ϵ_R was too low the firm could actually receive a direct repatriation tax subsidy from the U.S. government by holding assets abroad.

In regards to the upper theoretical bounds of ϵ_R, under the previous U.S. tax code the highest corporate income tax rate was 35 percent. Given that the firm pays a 17.1 percent tax rate to the foreign government per our estimation, the maximum repatriation tax rate a firm in the model could theoretically pay is 0.35-0.171=0.179. This gives and upper bound on ϵ_R as

$$\tau_R = 0.131 + \epsilon_R \leq 0.179$$
$$\longrightarrow \epsilon_R \leq 0.048.$$

It seems unusual to impose an unevenly truncated normal distribution, so we symmetrically truncated the data by dropping observations greater than 0.048 and less than -0.048. From that, we then estimated the standard deviation of the observations by firm. The average standard deviation is 0.024. Given this, we model ϵ_R as drawn from a normal distribution with mean 0, standard deviation 0.024, and bounded in the interval $[-0.048, 0.048]$.

Figure A7 shows the results from our main experiment mimicking the AJCA when ϵ_R is normally distributed against our baseline model when ϵ_R is uniformly distributed. The results are virtually unchanged. The role of ϵ_R – in the range we consider – does not seem to be an important driver of our dynamic results. Moreover, given the estimated distribution of ϵ_R when it is normally distributed is not meaningfully different – in our model – from the uniform distribution (i.e. only 13% of the draws from the normal distribution lie outside of the [-0.032,0.032] interval – the interval we use in the model).
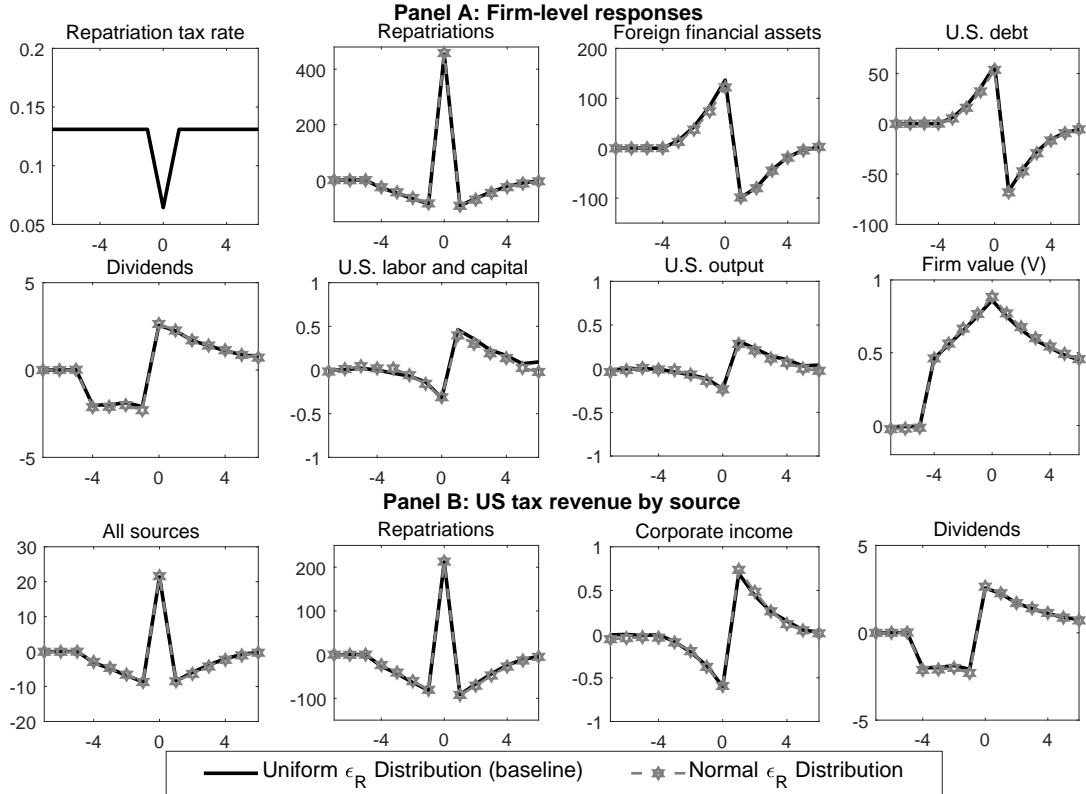
Figure A7: *Responses to an Announced Temporary Reduction in Repatriation Taxes when ϵ_R is uniformly and normally distributed.*

Notes: Units are in percentage point deviation from the steady state. The solid line is the baseline (uniformly distributed ϵ_R) and the gray, starred line is the response when ϵ_R is normally distributed.

OA5.3 Foreign Borrowing

Here we relax the restriction that foreign operations cannot access external credit markets and allow them to borrow as they can domestically. The firm therefore faces a worldwide interest rate on borrowing – i.e. the interest rate on debt is the same across both jurisdictions. Figure A8 shows the model results from the baseline exercise (no foreign borrowing) and with foreign borrowing. The top panel gives the firm-level responses and the bottom gives the responses for the U.S. government tax revenue. The units are percentage deviations from the original stochastic steady state, with the exception of the repatriation tax rate graph, which shows the actual time-path for the repatriation tax rate. The tax holiday is implemented at period 0 and the firm receives news of it 4 quarters in advance (period -4). The repatriation tax rate reduction is the same as in the baseline.

When there is foreign borrowing, increases in foreign financial asset holdings rise much more

sharply than in the baseline during the news period. However, we note that although the percentage change is larger, the steady state level of foreign asset holdings is smaller than in the baseline. In fact, a large part of the transferred assets during the tax holiday when there is foreign borrowing comes from assets used to finance production abroad. Immediately after the transfer, foreign operations overcome this shortcoming with a rapid increase in foreign debt.
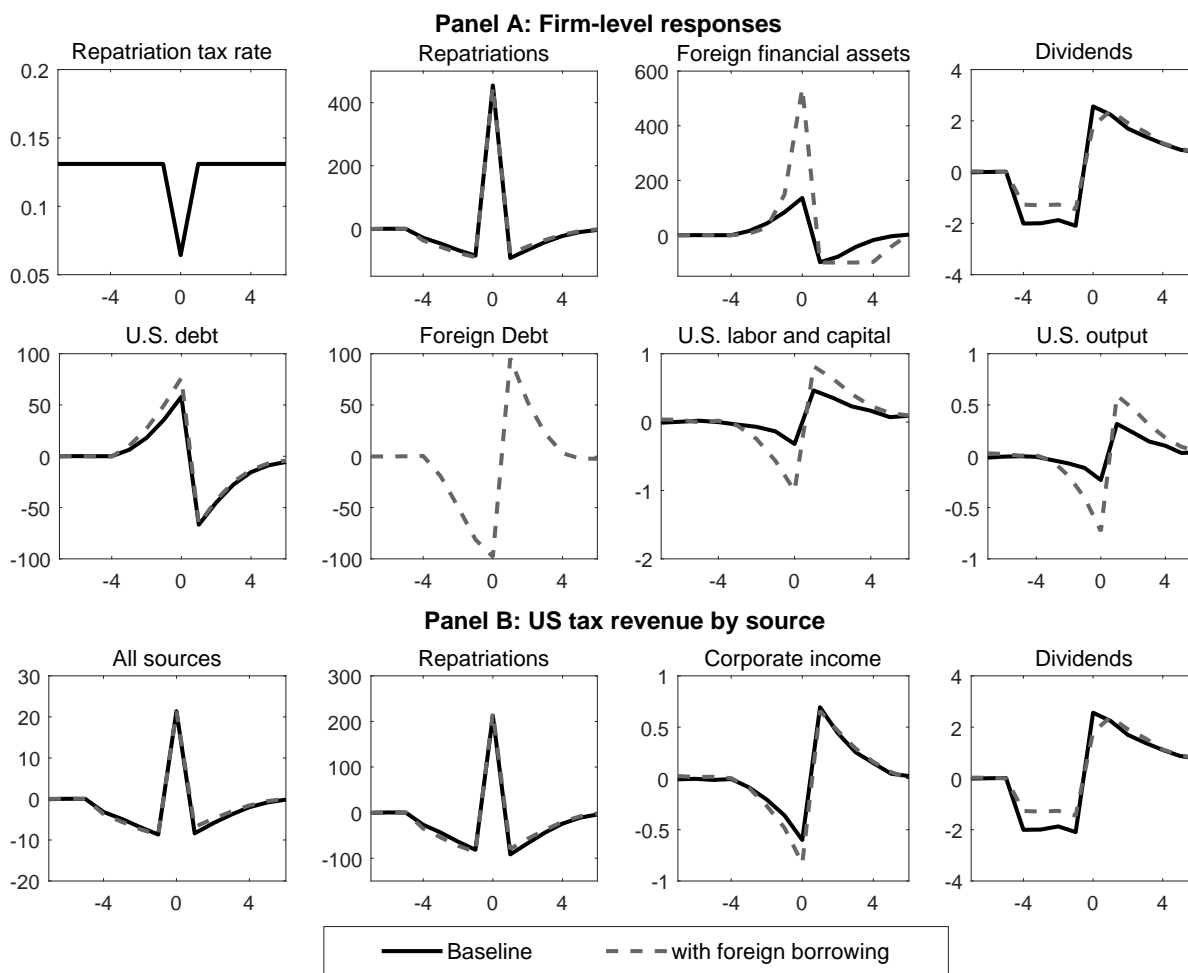
Panel A: Firm-level responses

Panel B: US tax revenue by source

Figure A8: *Responses to Temporary Reduction in Repatriation Taxes Where News of Reduction is Received 4 Quarters in Advance when Firms can Borrow both in the U.S. and Abroad.*

OA5.4 Permanent Repatriation Tax Cut

Here we consider the case when the repatriation tax changes is implemented as a permanent reduction. Figure A9 shows the transition graph for the case of a permanent reduction in repatriation tax rates. The firm unexpectedly receives a tax news shock that notifies them there will be a permanent tax policy change J quarters in the future. Once the tax reform is implemented, the

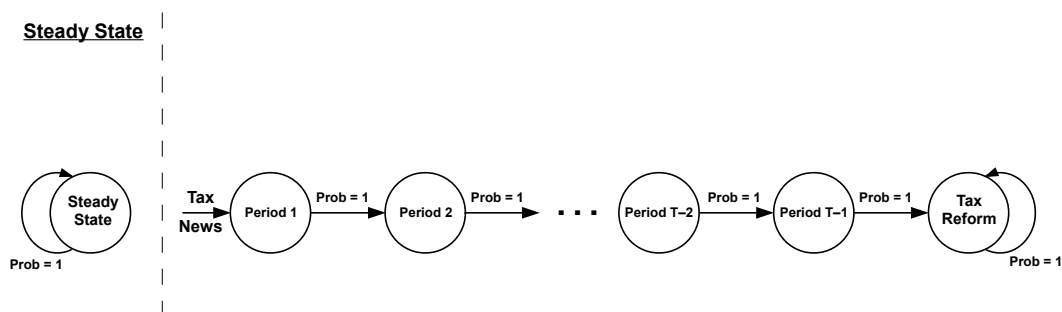tax rate remains at this new level indefinitely.

Figure A9: *Transition Graph Where a Permanent Change in Tax Policy Occurs J Periods From Arrival of the News*

Figure A10 shows the responses to a permanent repatriation tax reduction announced 4 periods in advance plotted alongside the baseline results for comparison. The size of the repatriation tax reduction is the same as in the baseline.
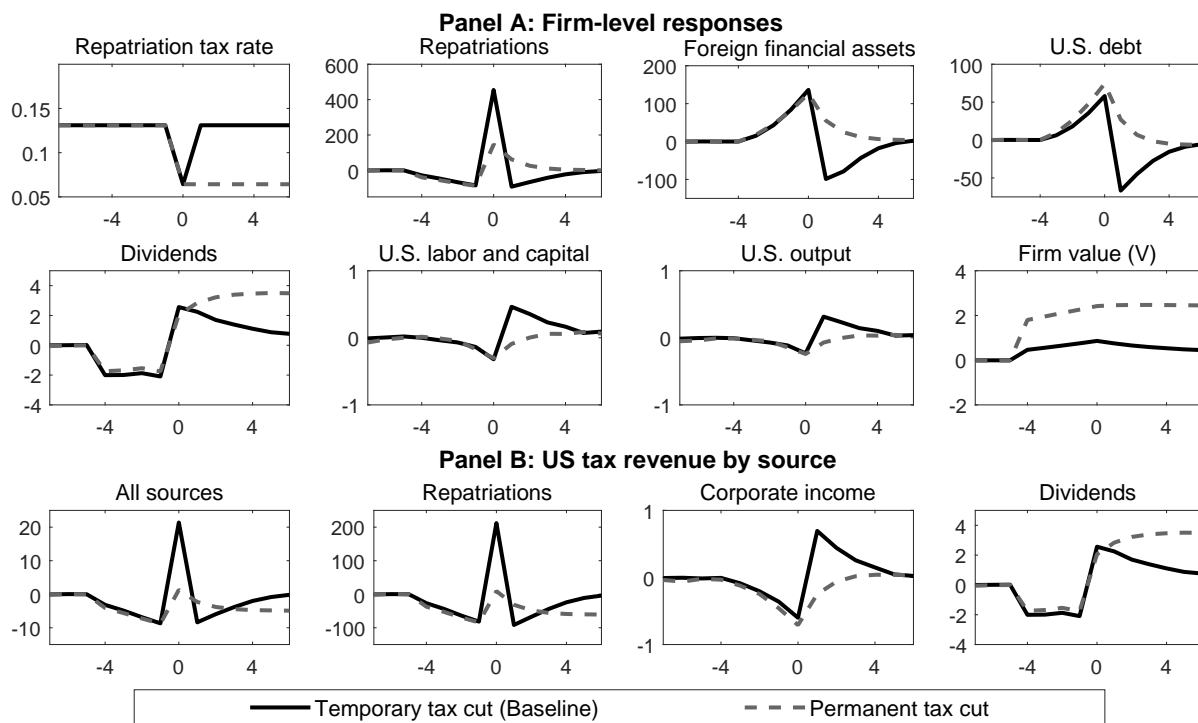

Figure A10: *Responses to a permanent reduction in the repatriation tax rate were news of reduction is received 4 Quarters in Advance. Units are in percent deviation from initial steady state.*

In the news period, firms reduce transfers at approximately the same rate as the baseline. At the policy change, the firm repatriates the assets accumulated during the news period, but the total

amount repatriated in this period is less than the baseline. When the tax change is temporary, firms have incentive to shift foreign income that would otherwise be transferred in future periods to exploit the one-time tax saving on these assets. When the change is permanent, firms have no such motive since these repatriated assets will indefinitely face a lower tax rate. This is why repatriations at the time of the policy change is less responsive for a permanent than a temporary tax reduction.

After the permanent repatriation tax reduction, U.S. output and capital and labor use is permanently higher in the steady state, albeit is very small (approximately 1/20 of 1 percent). Additionally, the permanent tax rate reduction leads to a perpetual loss to U.S. tax revenues: a lower tax rate yields lower tax revenues. In sum, gains to U.S. output and factor input use is small and U.S. tax revenue losses are large from this permanent repatriation tax reduction. In comparison, Arena and Kutner (2015) study the empirical impacts of permanent repatriation tax reductions from the 2009 reforms in Japan and the United Kingdom. They do not find evidence of increases in domestic investment. Again, in our model domestic capital use increases by 1/20 of 1 percent.

OA5.5   Discussion On General Equilibrium

For the case of a permanent reduction in repatriation tax rates, we believe our framework is informative to understand the dynamics around a local period from the time of the news period to after the policy change. In the long run, however, there may general equilibrium effects from a permanent repatriation tax change that we do not capture as firms and households adjust to a new tax environment.[2]

Our model, for one, does not capture the additional production – and the subsequent effects – that could emerge from efficiency gains following a reduction in distortionary taxes. From a tax revenue perspective, this would imply that when the repatriation tax rates are lower, the taxable base may be larger. If the efficiency gains are large enough, it could be that tax revenue does not decrease much during the announcement and after the holiday. At the firm level, the substitution effect from the reduction in taxes on repatriations – or its announcements – may remain unchanged: taxes in the present became relatively higher. The income effect, however, would be heighten as the value of the firm increases. The latter would dampen the reduction in dividend payments in

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[2]See, for example, Spencer (2017) for a general equilibrium model of permanent repatriation tax rate changes.

the news period. Depending on the level of dividends, it could be that the marginal increases are devoted to production during the time of the announcement which could imply that, even if firms are financially constrained, labor and capital does not contract.

Second–as mentioned in the main text in more detail – as firms adjust their demand for inputs in response to the policy change, input prices would respond accordingly. Most likely, these price adjustments in factor inputs would also serve to dampen the responses to labor/capital and output in comparison to the relatively small responses in our baseline model. As the asset flows into the U.S. in response to the tax reduction, this would make consumers wealthier – from an influx of dividends and/or higher factor payments – and result in an increase in demand for goods and services from the firms.

In both cases – efficiency gains and price changes – the income effect would be larger and there would be no substitution effect of tax rates (i.e. in the case of an announcement, future repatriation tax rates became cheaper). These would arguably dampen the responses we find at the firm level. The response of labor would hence depend on the extent to which wealth effects are assumed in the household's preferences. What is clear, however, is that the aggregate and welfare effects of repatriation taxes would necessitate a general equilibrium to be properly quantitatively evaluated in the case of permanent changes in repatriation taxes. Our framework, nevertheless, highlights important mechanisms at the firm level that are consistent with the empirical literature and that such a framework should capture.

OA6   Tax Cut and Jobs Act of 2017

Here, we use our framework to analyze the periods leading up to, and implementation of, the most recent tax reforms: the Tax Cut and Jobs Act of 2017 (henceforth the TCJA17 to clearly distinguish the acronym from the AJCA). The TCJA17 includes comprehensive tax reforms that include, but are not exclusive to, changes in the taxation of foreign activity of U.S. multinationals. Our analysis strictly focuses on the aspects that impact the taxation of multinationals.

Calls for changes in the taxation of U.S. based multinationals were continuously proposed by both Democrats and Republicans in the years leading up to the TCJA17. This included President Obama's White House Budgets for 2015, 2016, and 2017, and *The Blueprint* – a leading Republican

tax reform plan introduced in the House of Representatives in 2016. Expectations of a heightened possibility of tax reform took hold after the elections of 2016 which aligned Republican majorities in both houses of congress and in the presidency. President Trump's administration unveiled their outline for tax reform in April 2017 where Treasury Secretary Mnuchin stated that they would move as fast as they can on passage and implementation. The TCJA17 was brought to congress later that year was signed into law on December 2017 and went into effect at the beginning of 2018.

The act reduced U.S. corporate income tax from a top marginal tax rate of 35% to a flat tax of 21%. Second, the TCJA17 moved the U.S. to a territorial tax system – a 100 percent tax exemption on all income generated abroad by U.S. multinationals, i.e. an elimination of repatriation taxes. Finally, it implemented a one-time "deemed repatriation tax" bridging the former international tax regime to a new one. This is a one-time retroactive tax on the sum of foreign income held abroad that was untaxed by the U.S. government at the time of the implementation date. Following this one-time tax, these assets were able to be repatriated with no additional U.S. tax costs.

Within our model, we can implement the changes of the TCJA17. Letting the date of implementation be time $t = J$, U.S. corporate income taxes in the model are given by

$$\tau_{US} = 0.302 \quad if \quad t < J \tag{OA6.1}$$

$$\tau_{US} = 0.21 \quad if \quad t \geq J. \tag{OA6.2}$$

The model repatriation tax rate is similarly given as

$$\tau = 0.131 \quad if \quad t < J \tag{OA6.3}$$

$$\tau = 0.0 \quad if \quad t \geq J. \tag{OA6.4}$$

Under the TCJA17, the deemed repatriation tax applies to all foreign assets yet to be taxed by the U.S. government and accumulated since the enactment of the *Tax Reform Act of 1986*. In the model, the transition tax is applied to all foreign assets, A_F, at the period of the tax reform minus the initial transfer from the U.S. parent to set up the foreign operation. Assuming the foreign operation was established at time $t = 0$ and the tax reform is initiated at time $t = J$, then the

assets facing the transition tax is

$$A_{F,J} - T_0 = \sum_{t=0}^{J} \pi_{F,t}(1 - \tau_F) - \sum_{t=1}^{J} T_t$$

where T_0 is the initial transfer from the firm's U.S. operations and π_F are the sum of pre-tax foreign income from operations and interest on bank assets. In the model, we assume the seed money from the U.S., T_0, is small relative to the total assets at time J. Thus, tax revenues from the transition tax τ_{TT} is $\tau_{TT}A_{F,T}$. The TCJA levies the deemed repatriation tax rate of 15.5% on cash and cash equivalents (liquid assets) and 8% on remaining assets. Given the fungibility of internal funds, in our model the differential taxation on liquid vs. non-liquid assets is problematic as firms can immediately change the composition of asset holdings – particularly if the tax change is anticipated. For this reason, we impose the transition tax to be $\tau_{TT} = 0.104$ which is calculated by weighting the two tax rates by the relative shares of liquid and non-liquid assets to total foreign assets in the model steady state.

In this exercise, the firm knows with certainty that the TCJA17 will occur 4 periods in advance of its implementation. This corresponds with a news period over the 2017 calendar year with implementation in 2018Q1. The solid lines in Figure A11 present the responses to news of and implementation of the provisions in the TCJA17. We additionally include a simulation with all of the tax changes in the TCJA17 *except* the deemed repatriation tax (dashed line) to highlight the role deemed repatriation taxes play on the dynamics. We note that although from the Figure it is clear the dynamics differ, both simulations eventually converge to the same steady state.

During the news period, firms that face the deemed repatriation tax withhold fewer repatriations and accumulate less foreign financial assets as this tax reduces the incentives for firms to accumulate assets abroad. From a policy perspective, if lawmakers wanted to draft a tax policy change that mitigates the incentives for firms to accumulate foreign assets in expectation of tax reform, including a deemed repatriation tax is a better option in this dimension than just purely permanently changing the tax rates. The size of the deemed repatriation tax, however, still results in tax gains for the firm.

In the short run, the TCJA17 leads to short run losses in labor/capital and output before and in the periods after the policy change. The deemed repatriation tax drives this result because this tax

removes a portion of the firm's stock of assets and, since the cost of debt is a function of its assets, higher borrowing cost reduce the firm's ability to finance production with debt. However, if the timeline were extended we would see that in the final steady state labor/capital are just 1/2 percent larger than before the policy change. At the time of the policy change, U.S. tax revenues spike from the one-time deemed repatriation tax. All of the tax revenue losses after the enactment period come solely from reductions in repatriation tax receipts. In the short run, the deemed repatriation tax results in sizable tax revenues for the U.S. government.
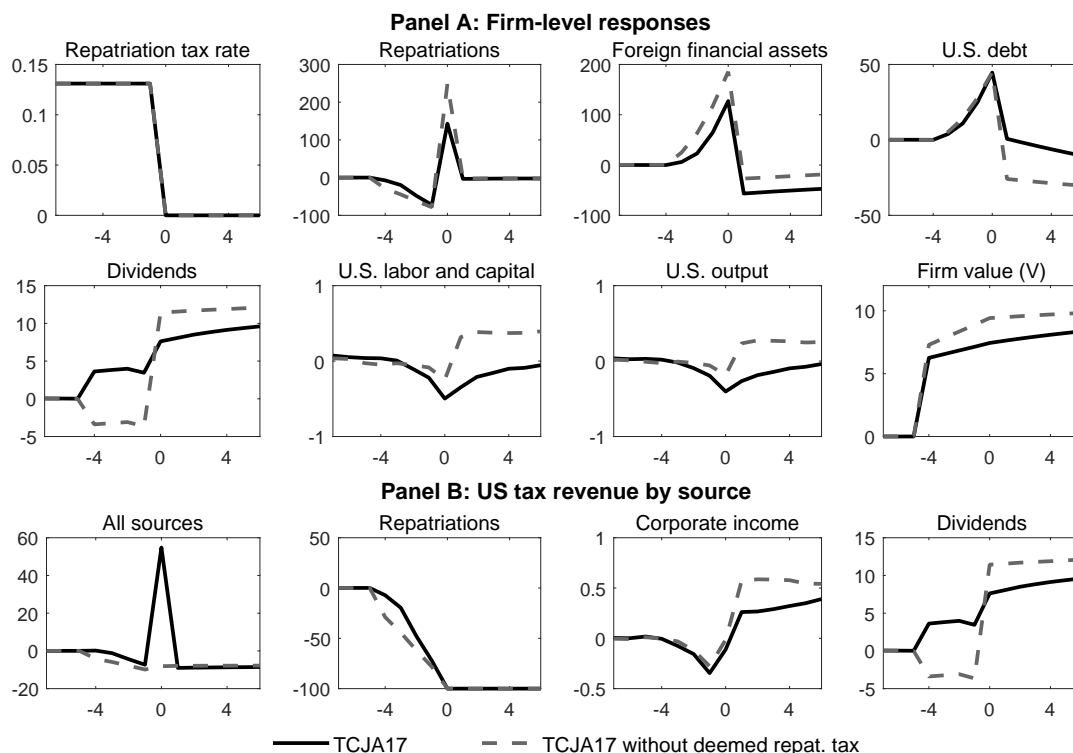
Panel A: Firm-level responses

Panel B: US tax revenue by source

Figure A11: *Response to News and Implementation of the* Tax Cut and Jobs Act of 2017

Notes: Firms receive news of the TCJA17 4 quarters in advance. The policy change includes a deemed repatriation tax of 10.4 percent at the time of the policy change only, and permanent reductions of U.S. corporate income tax rate to 21% and a removal of repatriation taxes ($\tau_R = 0$). The solid line has all of the policy changes and the dashed line has all of the policy changes *except* the deemed repatriation tax.

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