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Do Experts Help Firms Optimize?*

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Abstract

We study the role of paid preparers in the take-up of a tax refund for corporate losses, a provision of the U.S. tax code that made $357 billion available to eligible firms between 1998 and 2011. Drawing a sample of 1.2 million observations from the population of corporate tax returns, we present three findings. First, only 37 percent of eligible firms claim their refund. Second, a cost-benefit analysis of the tax loss choice cannot explain the low take-up rate. Third, firms with sophisticated preparers, such as licensed accountants, are more likely to claim the refund. Moving from the 10th to 90th percentile in a predicted preparer effect based on observables would increase take-up by 9.4 percentage points. To show that firm selection cannot explain the observed preparer effect, we validate this result with a research design based on preparer deaths and relocations. Our results reject the standard view that firms optimize perfectly with respect to taxes.

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Recent research has emphasized that imperfect information mutes behavioral responses to tax policy (Chetty, Looney and Kroft 2009; Finkelstein 2009). This friction is a first order concern for policymakers because tax incentives cannot stimulate the economy if those affected do not know about them. Absent from theoretical treatments of this issue is the fact that most taxpayers hire third party preparers to help them with their tax returns. Just as managerial features may influence corporate decisions (Bertrand and Schoar 2003; Dyreng, Hanlon and Maydew 2010), how firms respond to tax policy could depend on the external experts they hire. This paper studies the role of paid preparers in their clients' decision to claim a tax refund for losses. We find that hired experts play a central role in the transmission of this fiscal policy.

The tax treatment of corporate losses is a permanent feature of the U.S. tax code that affects most firms.[1] Under this provision, a firm reporting a loss can choose between a carryback and a carryforward. A firm electing a carryback applies its loss against past taxable income and then receives a refund from the IRS. A firm electing a carryforward reserves its loss to deduct against taxable income in the future. In most cases, the carryback option is more valuable both because of discounting and because the firm risks losing its stock of carryforward deductions if it fails.[2] Prior research has estimated the impact of these rules on marginal tax rates (Auerbach and Poterba 1987; Altshuler and Auerbach 1990; Graham 1996), typically under the assumption that all firms elect the carryback when available.

Carryback refunds serve as an important automatic fiscal stabilizer: more firms report losses during recessions and as result aggregate eligible refunds increase (Altshuler et al. 2009). In addition, policymakers often expand carryback generosity in bad times with the goal of injecting cash into the economy to promote business activity. Between 1998 and 2011, the carryback provision made $357 billion in refunds available, of which $124 billion was available during the 2008-2009 recession.[3] Thus whether firms claim eligible refunds is a question of policy and macroeconomic relevance.

[1] Between 1998 and 2011, 37 percent of firm-year observations reported a tax loss and 80 percent of firms reported a tax loss at least once.

[2] An exiting firm could still use its carryforward deduction if acquired by another firm. But the value of carryforwards from acquisition is limited by IRS rules that restrict the use of losses after a change in ownership.

[3] This figure includes eligible refunds for all C corporations. We restrict our analysis to this corporate form because the treatment of losses takes place at the entity level. Losses for pass-through business entities, such as S corporations and partnerships, are reported on the returns of their owners. As of 2008, C corporations accounted for 63 percent of all business receipts in the United States (Internal Revenue Service 2014).

We explore the take-up of corporate tax refunds using a new dataset drawn from the population of U.S. corporate tax returns filed between 1998 and 2011. Our data consists of more than 1.2 million firm-year observations that were eligible for tax refunds. In addition to coverage, the dataset improves on past samples by enabling us to measure eligible and actual refunds and to link firms to the experts they hire to help them file their returns. The median firm in our sample is small, with revenues of $1.5 million and payroll of less than $500 thousand. These firms are more likely both to face financial frictions that would make immediate refunds valuable[4] and to rely on external experts to make tax decisions that are unrelated to their core business.

We present three empirical findings. First, take-up is surprisingly low. Only 37 percent of eligible firms claim their refund. This finding holds even when we restrict our attention to potential refunds that are large relative to a firm's operating cash flows. Although larger firms are more likely to claim a refund, the take-up rate only reaches fifty percent at the 90th percentile of firm size in our data. Just half of the potential aggregate refund amount was claimed and distributed to eligible firms. Thus the low take-up rate substantially limits the impact of this policy as fiscal stimulus.

Second, we find that a simple cost-benefit analysis of the carryback-carryforward trade-off cannot explain the low take-up rate. Because the loss provision presents firms with a simple binary choice and our dataset allows us to compute the ex post value of each option, our setting provides a unique opportunity to learn whether firms optimize with respect to the tax code. Most firms that fail to claim do not benefit from waiting and many non-claimers forgo more than thirty percent of the refund's value. This finding is based on firms for whom we can precisely compute the ex post net present value of the carryback and carryforward options using each firm's realized path of taxable income over time. In our calculations, we assume discount rates ranging from three to nine percent. If firms face financial frictions that generate higher discount rates, the net present value difference in favor of the carryback over the carryforward would be even greater.

These findings suggest that either informational frictions or transaction costs prevent firms

[4]Zwick and Mahon (2014) find that firms only respond to investment tax incentives when they have an immediate impact on cash flows, suggesting that firms face financial frictions.

from claiming their refunds. We consider these alternatives while exploring the connection between tax preparers and client claiming behavior. By reducing informational frictions and the cost of electing the carryback, preparers could play an important role in determining client take-up. We evaluate this hypothesis by testing whether preparer characteristics can account for the variation in corporate claiming behavior. The exercise is similar to the approach used to explore whether managerial "style" affects corporate decisions (Bertrand and Schoar 2003; Kaplan, Klebanov and Sorensen 2012) and whether teachers affect student test scores (Jackson and Bruegmann 2009). In addition to providing insight into the take-up puzzle, this test also speaks to whether hired experts help firms optimize.[5]

Our third finding is that firms with sophisticated preparers, such as those licensed as certified public accountants (CPAs), are more likely to claim the refund. We begin with a specification that includes firm fixed effects, so that the coefficients on preparer characteristics are identified from firms that switch preparers while holding constant time-invariant client unobservables. Relative to preparers without a professional license, the clients of CPAs are 6.8 percentage points more likely to claim. This effect is large in comparison to a baseline take-up rate of 37 percent. In addition to professional licenses, other proxies for preparer sophistication—age, salary, client size, and client base size—also coincide with higher take-up.

The research design relies on the identifying assumption that changes in preparers are uncorrelated with unobservable changes in client determinants of take-up. Our estimates will be biased if hiring a more sophisticated manager leads to hiring a more sophisticated preparer and more sophisticated managers are more likely to claim refunds. We address this threat in three ways. First, we confirm that our results are robust to a variety of client control sets. Second, we confirm the absence of differential trends in claiming rates prior to a preparer switch. Third, we validate our estimates in a sample of switching events in which the prior preparer either dies or moves personal residence. Here it is more plausible that around the event client unobservables do not change. We find similar estimates as in our original design, indicating that selection does not confound our results.

Taken together, these facts reject the null that tax preparers do not influence the trans-

[5] A growing literature documents the impact of managers on firm performance. Key contributions include Bertrand and Schoar (2003), Bloom and Van Reenen (2007), Kaplan, Klebanov and Sorensen (2012), and Bloom et al. (2013).

mission of this policy. We attempt to quantify the relative impact of preparers using a simple variance decomposition. Our estimate comes from the within-firm covariance structure for observations that do and do not share the same preparer at different points in time. This decomposition relies on a strong assumption of independence between the unobserved preparer effect and the unobserved firm error term. Based on this approach, we find that the variance of the preparer effect equals 9 percent of the total variation in take-up. As a benchmark for this magnitude, the prediction from firm observables accounts for 9 percent of the variation in take-up. If selection into preparers does not affect take-up, preparers matter as much as firm observables for predicting claiming behavior.

Our paper sits at the intersection of several strands in the economics, finance, and accounting literatures. The literature on optimization frictions and behavioral responses to tax policy mostly focuses on individual taxes and settings where imperfect information or search costs affect responses to tax incentives.[6] The literature on public program take-up surveyed by Moffit (2003) and Currie (2006) has traditionally focused on social welfare programs targeted at low-income and vulnerable populations. Many studies in this area argue that these programs have low participation rates because of filing requirements and poor information.[7] We show that similar considerations apply to firms and demonstrate that their claiming decisions depend on the third party experts they hire to help them. Our results reject the standard view that firms optimize perfectly with respect to taxes.

The paper extends past research about the tax treatment of corporate losses.[8] These studies focus on how loss rules affect marginal incentives to invest and borrow. While they emphasize that marginal tax rates do not equal statutory tax rates once firms take into account the ability to offset gains in one year with losses in another, these papers typically assume that firms always claim the carryback when available. Our results raise questions about whether many firms take dynamic corporate tax incentives into account.

[6]Key empirical studies include Chetty, Looney and Kroft (2009), Finkelstein (2009), Chetty, Friedman and Saez (2013), and Goldin and Homonoff (2013). These papers have found evidence that individuals under-respond to taxes in the context of sales taxes, highway tolls, and the individual income tax.

[7]Daponte and Taylor (1999), Currie and Grogger (2001), Bitler, Currie and Scholz (2003), Heckman and Smith (2004), and Aizer (2007) make this point in the context of food stamps, job training programs, and public health insurance.

[8]Key papers include Auerbach and Poterba (1987), Altshuler and Auerbach (1990), Graham (1996), and Graham and Mills (2008).

The paper also relates to a growing literature on the role of human capital in firm decision making. These studies have documented that firm investment, leverage, and effective tax rates depends on managerial style.[9] In recent work, Klassen, Lisowsky and Mescall (2012) find a cross-sectional relationship between the aggressiveness of corporate tax positions and whether a firm's financial auditor prepares the tax return. We introduce a novel research design using quasi-experimental preparer switches based on deaths and relocations to show that, in addition to internal managers, external consultants can significantly affect how firms make decisions.

The paper proceeds as follows. Section 1 introduces the tax code's loss rules, describes the corporate tax data and sample selection process, and documents refund take-up among eligible firms. Section 2 performs a cost-benefit assessment of the tax loss choice and shows that the low take-up puzzle survives this analysis. Motivated by these findings, Section 3 describes the corporate market for tax preparation services and explores the relationship between paid preparers and their clients' claiming patterns. Section 4 discusses policy implications and future research directions.

1 Corporate Losses and Tax Refunds

1.1 The Tax Code's Loss Rules

Consider a firm that reports a tax loss. The corporate tax code allows the firm to apply losses in one year to offset profits in other years and thus reduce its average tax burden. In general, the firm can choose either to carry the loss back against past taxable income or to carry the loss forward into the future. In tax code terminology, the option is between a *carryback* and a *carryforward*.

The tax loss choice has economic consequences for the firm because the two options differ in the timing of the tax benefit. Under the carryback, firms immediately receive a refund for the taxes they paid in the past. Under the carryforward, firms defer the tax benefit to future periods when they deduct their loss against future taxable income. The carryback is typically

[9] Bertrand and Schoar (2003) study the role of managers in corporate decision making. Bloom and Van Reenen (2007) and Kaplan, Klebanov and Sorensen (2012) document strong correlations between management practices and firm performance measures. Dyreng, Hanlon and Maydew (2010) and Armstrong, Blouin and Larcker (2012) show that managers influence corporate effective tax rates.

more valuable because the firm gets cash now, but the carryforward can be better if the firm expects to pay a higher marginal tax rate in the future.

A statutory window limits the application of loss deductions to past and future tax years. Table 1 summarizes the statutory window for carrybacks and carryforwards in the U.S. tax code over the 1998-2011 period. The carryback window was typically two years during this time, except when Congress twice lengthened it to five years in response to recessions. These policy changes enhanced the automatic stabilizer feature of the carryback provision, which generates more refunds in bad times when corporate losses are common. The carryforward window was twenty years throughout this same period.

The size of the refund generated by the carryback election depends on how much the firm has paid in past taxes. When a firm claims the carryback, it must fully apply the loss to all eligible past income. Loss firms are not eligible for a carryback refund when they do not have any past income within the statutory window. In cases where the current loss exceeds eligible past taxable income, a carryback election generates both a tax refund for past taxes paid and a carryforward deduction equal to the losses in excess of past income.

To claim a carryback, the firm must file a special form to document how it computed its carryback refund. The form details how the loss deduction is applied to past tax returns to generate a tax refund.[10] Upon approving the firm's claim, the tax authority sends a refund check equal to the amount of overpaid taxes in past years after taking into account the loss deduction. To claim a carryforward, the firm must keep a record of its carryforward stock from past losses and then take a net operating loss deduction on its future tax return. All loss deductions against past and future taxable income are computed in nominal terms.

1.2 Business Tax Data

We use administrative IRS databases to document the impact of preparers on the claiming of the carryback refund. Theses databases collect information for all corporations that file a tax return in the United States, approximately 5.9 million per year between 1998 and 2011.

[10] A firm claims the carryback by filing either Form 1139 or Form 1120X. To remain eligible for the carryback, the firm must file within three years of the due date (plus extensions) of the tax return where it reports the loss. Alternatively, the firm can elect to irrevocably forgo the carryback and fully carry forward the loss when it files its income tax return. This election is made by checking a box on its income tax return.

We rely on two main files: a tax return file that records line items from corporate income tax returns and a transactions file that records debits and credits to individual tax liability accounts. We measure corporate characteristics—including revenue, assets, payroll, industry codes, and tax losses—from the tax return file and claimed refunds from the transactions file.

We limit our study to C corporations because they are taxed at the firm level and retain the decision over whether to claim the tax refund for losses. We exclude firms with mean revenue and mean payroll measures less than $100,000 because they may not represent operating firms (Knittel et al. 2011). To focus on firms with a meaningful carryback option, our sample only includes firm-year observations that are eligible for a carryback refund of at least $1,000.

Table 2 reports summary statistics for our sample, which consists of 1.24 million firm-year observations and 612 thousand individual firms. The median firm is small, with $1.5 million in revenue, $489 thousand in assets, and $469 thousand in payroll. The eligible carryback refunds are also moderate in size, with a median of approximately $5.7 thousand. Among eligible firms, the ratio of refund to revenue is 0.4 percent. For these firms the median ratio of EBITDA to revenue is 4.6 percent. Thus the median refund is modest but not negligible relative to a firm's earnings.

Table 2 also includes variables for the preparer and the tax firm matched to each corporate tax return. Most corporations hire small tax firms. The median corporation hires a tax firm with $0.8 million in revenue and 98 corporate clients. Table 3 reports summary statistics for a subset of firms that switch preparers between 1998 and 2011. All observations in this subsample match to a preparer. This subsample only includes two observations per firm: the last observation before switching preparers and the first observation after switching preparers. It consists of 124,862 firm-year observations and 62,431 individual firms. Similar to the overall sample, the median firm is small with $1.9 million in revenue. The table also includes the preparer characteristics used to test whether client claiming behavior depends on which preparer is employed.

The IRS does not explicitly record each firm's eligible carryback refund, so we simulate this amount. Our algorithm first imputes each firm's past taxable income from its historical tax liability. We next use the policy rules to determine the eligible carryback window. Starting with the earliest eligible year, we deduct the current tax loss against imputed past taxable

income.[11] We continue with these deductions until either the current loss or past taxable income is exhausted. We then recompute the historical tax liability based on the post-deduction taxable income. The difference between the pre-deduction and post-deduction tax liability provides our estimate for the eligible carryback refund.

We verify our algorithm for the eligible refunds using firms that claim the carryback. Although the IRS database does not track eligible refunds, it does record claimed refunds. For those firms that make the carryback election, we can directly compare our simulation to the claimed amount. Our results indicate that we impute the eligible refunds with a high degree of accuracy. Regressing log(claimed amount) on log(eligible amount) yields a coefficient of 0.96 and an R^2 of 0.93. Appendix A describes in more detail how we construct and validate our eligible refund measure.

1.3 Low Take-up of Tax Refunds for Losses

Eligibility for the carryback refund is common. Figure 1 reports the annual share of loss firms from the population of C corporations. It also reports the share of firms eligible for a carryback refund of at least $1,000. Over the 1998-2011 period, 37 percent of firm-year observations report tax losses and 80 percent of firms report a loss at least once. Among tax loss firms, 28 percent are eligible for a carryback refund. Firms frequently face the choice between whether to apply their tax loss deduction as a carryback or a carryforward.

In addition, the aggregate magnitude of the carryback refunds is macroeconomically relevant. Figure 2 reports the annual amount of eligible and claimed refunds for the population of C corporations. Over the 1998-2011 period, C corporations claimed $187 billion. Carryback refunds play an even larger role as countercyclical policy, totaling $68 billion in 2008 and 2009. As a benchmark, payments for unemployment insurance equaled $209 billion during these years (US Department of Labor 2014).

Claimed refund amounts, however, significantly understate the potential size of the policy. Only 37 percent of eligible firms claimed their refund. In aggregate, eligible refunds are nearly

[11] Tax losses are defined from the front page of the income tax return for C corporations. We use the statutory definition of tax losses for ordinary income. It equals net income (Line 28) + special deductions (Line 29b). This definition excludes capital income losses. It also excludes losses obtained from mergers and acquisitions, which are reported with the stock of losses from prior periods (Schedule K, Line 12).

twice as large as claimed refunds. During the 1998-2011 period, C corporations were eligible for $357 billion in carryback refunds. In 2008 and 2009 alone, they were eligible for $124 billion. Thus low take-up substantially undermines the potential effect of the carryback refund as fiscal stimulus.

2 Evidence on Tax Loss Choices

In this section, we implement a cost-benefit analysis on the set of eligible firms to compare the net present value of the carryback and carryforward options. This setting provides a rare opportunity to evaluate whether firms make the value-maximizing choice. Despite the low take-up rate, 79 percent of firms value the carryback more than the carryforward. We discuss alternative reasons for the low take-up rates.

2.1 A Cost-Benefit Analysis of Tax Loss Choices

Loss firms deciding between the carryback and the carryforward elections need to consider whether it would be more valuable to use the loss as a deduction against past taxable income or against future taxable income. The carryback's value depends on the tax rates that the firm paid in the past. In contrast, the carryforward's value depends on the tax rates that it will pay in the future, the length of time that it will take the firm to return to a profitable state, and the firm's discount rate. These considerations also arise when the corporate loss exceeds eligible past taxable income because the carryback election generates a carryforward deduction equal to the loss in excess of eligible past income.

Computing the value of the carryback and carryforward elections involves a net present value calculation because either option can generate carryforward deductions to be applied against future taxable income. The key difference between their formulas is that the carryback election deducts the loss against past taxable income and the carryforward election does not. Carryback deductions against past taxable income are not discounted because they generate an immediate tax refund.

We formalize the net present value formulas for the carryback and carryforward elections under the assumption that the firm has perfect foresight over the timing of future taxable

income,

$$\begin{aligned} NPV^b &= \sum_{t=T_{\min}}^{-1} \tau_t D_t^b + \sum_{t=1}^{T_{\max}} \frac{\tau_t D_t^b}{(1+r)^t} \\ NPV^f &= \sum_{t=1}^{T_{\max}} \frac{\tau_t D_t^f}{(1+r)^t} \end{aligned} \tag{1}$$

where τ_t is the tax rate in time t, D_t^b is the deduction taken in time t under the carryback election, D_t^f is the deduction taken in time t under the carryforward election, and r is the firm's discount rate for future tax savings. Time is indexed relative to the loss at time $t = 0$. Deductions applied to past taxable income are not discounted because the refund is immediate. In either case, the nominal sum of the deductions cannot exceed the loss reported at time $t = 0$. The nominal sum of the deductions can be less than the current loss in cases where the firm does not have sufficient past and future taxable income to offset the loss.

Table 4 uses a numerical example to clarify the differences between the carryback and carryforward elections. For a firm with a loss of \$100, we compute how deductions under the carryback and carryforward elections would be applied to the firm's taxable income. Under the carryback election, the firm first deducts its loss against taxable income in period $t = -2$. It deducts its remaining loss against taxable income in period $t = -1$. Assuming a tax rate of 35 percent, the net present value of the carryback election equals $\$100 \times \tau = \$35$. Under the carryforward election, the firm deducts all of its loss against taxable income in period $t = 2$. Assuming a tax rate of 35 percent and a discount rate of 7 percent, the net present value of the carryforward election equals $\frac{100 \times \tau}{(1+r)^2} = \$30.57$. In this example, the carryback election has a higher net present value because the tax rate is constant over time and the firm discounts future tax savings.

2.2 Empirical Evaluation of Cost-Benefit Formulas

We empirically evaluate the net present value formulas in Equation 1 for firms with losses between 1998 and 2002. We restrict our sample to this period because we want to use a future 10-year period of realized taxable income to value each firm's carryforwards. We assume that all firms in this period do not have any carryforwards from prior tax years. We make this assumption because the administrative tax data does not begin to collect this information until

2003. We find similar results when we replicate our analysis on firms with losses in 2003 where we do not need make assumptions about their pre-existing stock of carryforwards. We also limit our sample to firms with eligible refunds of at least $1,000 to exclude firms that do not have a meaningful carryback option.

We simulate the claiming of future carryforward deductions over a 10-year period based on their realized taxable income. We perform this simulation under both the carryback and carryforward elections. We assume that firms will claim their future carryforward deductions as soon as possible and, in cases of surviving firms that have unused losses after 10 years, that all unused losses are claimed in the 11th year. We then compute the net present values of the carryback and carryforward elections assuming a discount rate of 7 percent.

We calculate the net present value difference between the carryback and carryforward elections, $NPV^b - NPV^f$, and plot its histogram in Figure 3. For 79 percent of the sample, the carryback election has a larger net present value than the carryforward election. This difference is greater than $844 for half the sample. Based on this simple net present value comparison, the majority of firms value the carryback more than the carryforward election.

This finding is robust to our assumption of a 7 percent discount rate. In Table 5, we show the sensitivity of our results to the assumed discount rate. For a given threshold and discount rate, the table reports the share of firms where the ratio of NPV^f to NPV^b is less than the threshold. Each column assumes a different threshold and each row assumes a different discount rate. Varying the discount rate between 3 and 9 percent, the share of firms where the net present value of the carryback election is greater than the carryforward election ranges between 75 and 81 percent.

Figure 4 compares the net present value difference between the carryback and the carryforward options to an estimate of the labor cost for submitting a carryback application. It provides a benchmark for evaluating the magnitude of the net present value difference. Anecdotal conversations with preparers that serve firms in the size range of our sample suggest that filing for the carryback involves one to two hours of additional work. We impute the hourly wage by dividing each individual preparer's annual labor income by 2,000.[12] Figure 4 plots the imputed hourly wage of preparers at the 25th, 50th, and 75th percentiles by the net present

[12]We define labor income as the sum of W-2 earnings and self-employment income.

value difference between the carryback and the carryforward options.

We find that the imputed hourly wage remains relatively constant regardless of the net present value difference. The imputed wage equals approximately $20, $45, and $80 at the 25th, 50th, and 75th percentiles. Even allowing for a markup for overhead expenses and profit, the net present value differences between the carryback and the carryforward options are large relative to these estimates of the labor costs.[13]

Figure 5 provides an alternative benchmark for whether firms should make the carryback or the carryforward election. It compares the observed growth rates in corporate taxable income to hypothetical growth rates at which the net present value of the carryback and carryforward options equal each other. The observed growth rates are based on each firm's observed taxable income trajectory between the year of the net operating loss and the tenth year after the loss. We compute the break-even growth rates from a linear forecast over a ten-year period following the loss year. The initial value for the linear forecast also equals the firm's net operating loss.

We present this comparison as a histogram of the ratio between the observed growth rate and the break-even growth rate. The observed and break-even growth rates equal each other when the ratio equals one. The ratio is less than one in cases where the observed growth rate is less than the break-even growth rate. The ratio can be negative because some firms experience negative growth rates in taxable income following their loss.

We find that the observed growth rate is less than the break-even rate in most cases. The mean ratio of observed to break-even growth rates equals 0.26. The observed growth rate is less than the break-even growth rate for 94 percent of observations. This result differs from a comparison of the net present value of the carryback and the carryforward options because, in this exercise, we assume a linear growth rate in taxable income (which smooths the volatility). This comparison implies that few firms experience growth rates in taxable income that would make electing the carryforward more valuable than the carryback option.

[13] In cases where a team of preparers file a tax return for a client, the head of the team will typically sign the client's return. Because our sample consists predominantly of small corporations that hire small tax firms, we suspect that most client returns are prepared by individuals.

2.3 Alternative Explanations for Low Take-Up

The results from our cost-benefit exercise make the low take-up rate of the carryback refund puzzling. Based on a net present value comparison alone, most firms should claim the carryback. We next consider alternative rationales for why a minority of eligible firms would claim the carryback.

First, small firms may not know how to file for the carryback refund, or even that this option is available to them. Claiming it involves submitting an additional form and recomputing the firm's income tax for each prior tax year affected by the carryback. Small firms without professional expertise regarding the tax code may find the filing requirements to claim the carryback refund too complicated.

Second, a firm's preparer may charge additional fees for claiming the carryback refund. While the preparer may know how to claim it, filing for the carryback still involves additional effort on their part. In this industry, it is common for preparers to bill their clients by the hour or by the tax form. The additional fees for claiming the refund may be sufficient to deter clients.

Third, firms may be concerned that filing for a carryback refund will put them at risk for an IRS audit. When a firm applies for the carryback, an IRS employee must review their recomputed tax liability for prior years. This carries the risk that the IRS will spot something that will prompt an audit. Even if the actual risk is small, the perceived risk may be sufficient to deter filing for the carryback claim.

Each of these alternative explanations creates opportunities for preparers to determine whether their client claims the carryback refund. Firms hire preparers to inform them about the tax code, file tax returns on their behalf, and warn them about the audit risk of different tax reporting choices. Preparers may differ in whether they encourage their clients to claim the tax refund based on their own beliefs about its merits for their clients, its filings costs, and its audit risks.

3 Do Tax Preparers Help Firms Optimize?

In this section, we provide evidence that client take-up of the carryback refund depends on preparers. We begin with background information about the corporate market for tax preparation services. We then show that preparer characteristics predict whether firms claim the carryback refund using a research design based on firms that switch preparers. We also causally validate our results by focusing on a subset of switching events where the prior preparer either dies or moves personal residence. In these cases, it is more plausible that changes in client unobservables do not confound our estimates. We conclude with an analysis of variance exercise that finds that, if selection into preparers does not affect take-up, an unobserved preparer effect accounts for as much of the variation in claiming behavior as firm observables.

3.1 Corporate Market for Tax Preparation Services

A large private market provides tax preparation services to firms. In 2012, 96 percent of corporations hired an external preparer to file their income taxes. The market comprised 188 thousand individual preparers who file tax returns for corporations. Although federal regulations do not mandate any licensing requirements for preparers, 89 percent of firms hired a preparer with a professional license[14] (predominantly certified public accountants). The remaining 10 percent of firms hired preparers without any professional credentials.

The tax preparation market includes a wide variety of tax firms. They range from sole proprietorships with a single employee to national brands with thousands of locations. These firms also vary in their degree of specialization. Some focus on tax preparation (e.g., H&R Block, Inc.) whereas others offer a broad portfolio of professional services for businesses (e.g., BDO USA, LLP). At most tax firms, employees use tax preparation software to manage client returns (Internal Revenue Service 2009).

[14]Either a certified public accountant, attorney, enrolled agent, or state licensed preparer. Enrolled agents are licensed by the Internal Revenue Service. They must pass an examination and fulfill 72 hours of continuing education every three years.

3.2 Claiming Decisions and Preparer Characteristics

Baseline Specification. We use firms that switch preparers to show that preparer characteristics predict claiming behavior. Our analysis uses a sample of firms that were eligible for carryback refunds of at least $1,000 between 1998 and 2011. We restrict the sample to firms that were eligible in multiple years and that switched preparers. Because we want to identify our result from variation due to changing preparers, we only include the last observation before switching preparers and the first observation after switching preparers for each firm in the sample. These observations are often not consecutive because firms are not eligible for the carryback refund in each tax year. If a firm changes preparers multiple times, we only include observations associated with the last switching event.

We estimate equation 2 in a panel regression given by

$$\text{I(carryback take-up)}_{ijt} = Z_{\mathbf{J}(i,t)}\gamma + X_{it}\beta + \alpha_i + \delta_t + \epsilon_{it} \tag{2}$$

where the subscripts represent client i with preparer j in tax year t, $Z_{\mathbf{J}(i,t)}$ are preparer characteristics, X_{it} are client characteristics, α_i is the client fixed effect, and δ_t is the tax year fixed effect. Preparer observables include indicators for professional credentials, log(labor income), I(self-employment), age, log(mean client revenue), and log(total client revenue). Client observables include log(revenue) and log(assets). [15]

Our estimates of equation 2 rely on the following identifying assumption:

> **Assumption 1 [Switchers Design]**: The error term ϵ_{it} must satisfy the strict exogeneity condition $\mathrm{E}[\epsilon_{it}|Z_{\mathbf{J}(i,t)}, X_{it}, \alpha_i, \delta_t] = 0$.

This condition implies that client unobservables in the error term must be uncorrelated with preparer characteristics, client observables, a client fixed effect, and a tax year fixed effect. Because the switchers design uses within-firm variation, this assumption will hold if unobservable determinants of carryback take-up remain unchanged before and after switching preparers.

[15] We include separate indicators for certified public accountants, attorneys, and preparers with another professional license. The last category includes enrolled agents and state licensed preparers. The omitted category are preparers without any professional credential. The self-employment indicator equals one if the preparer derives at least half of their labor income from self-employment.

We report estimates from the switchers design in Table 6. The regressions are univariate with respect to preparer characteristics. All regressions include a firm fixed effect, a tax year fixed effect, and firm controls. They also include dummies for missing values of the preparer characteristics and the client controls. We block bootstrap the standard errors by firm and report them in parentheses. With the exception of the category for "other professional license," all preparer covariates are statistically significant at the one percent level.

We find that proxies for preparer sophistication predict claiming of the carryback refund. Preparers that are certified public accountants, that are attorneys, that are better paid, that do not work for themselves, that are older, and that have bigger client bases are more likely to claim the carryback refund for their clients. Our results indicate that preparers matter for client claiming behavior.

The professional certification categories and the client base measures have the coefficients with the largest magnitudes. Relative to preparers without a professional license, certified public accountants are 6.8 percentage points more likely to claim the carryback refund for their clients. Similarly, attorneys are 4.7 percentage points more likely to claim. The results also imply that a one standard deviation increase in log(mean client revenue) would increase take-up by 2.7 percentage points. Likewise, a one standard deviation increase in log(total client revenue) would increase take-up by 2.3 percentage points. These effects are substantial relative to a baseline take-up rate of 37 percent in the population.

We test the sensitivity of our results to varying the set of controls and to including all preparer characteristics in a multivariate regression. Table 7 reports these estimates. All regressions include a firm fixed effect. Columns (2) and (5) add a tax year fixed effect. Columns (3) and (6) add firm controls. All regressions also include dummies for missing values of the preparer characteristics and the client controls. The first three columns limit the preparer characteristics to the professional license categories. The last three columns include all preparer characteristics. We block bootstrap the standard errors by firm and report them in parentheses.

The point estimates are not sensitive to the specification tests in Table 7. The magnitudes slightly decrease with the expansion of the set of controls. The coefficients have a similar response to including all preparer characteristics in a multivariate regression. But in only a few cases do the specification tests generate statistically distinguishable point estimates from

the previous results. All coefficients retain the same sign as before.

Balanced Event Study Specification. A common validation for an event study design plots trends before and after the event in a balanced panel. This placebo test evaluates whether there appears to be an effect in periods when there is no treatment. If present, it would suggest a failure of the strict exogeneity assumption that requires unobservables to be uncorrelated with the treatment. To implement this test, we focus on a subsample of events where we have four observations per firm: two observations before changing preparers and two observations after changing preparers.

Within each firm, we order the observations by tax year and define them relative to the first observation after the firm changes preparers. We call this order event time e, where $e \in \{-2, -1, 0, 1\}$ and each firm has four observations. We restrict ourselves to a balanced panel because changes in the sample over time can introduce the appearance of trends.

We construct a measure of the treatment effect associated with each event from our estimates of equation 2:

$$\Delta\widehat{\mu}_{\mathbf{J}(i,0)} = Z_{\mathbf{J}(i,0)}\widehat{\gamma} - Z_{\mathbf{J}(i,-1)}\widehat{\gamma} \tag{3}$$

We obtain the estimated coefficients $\widehat{\gamma}$ from Column (6) of Table 7. We then estimate a variant of our original panel regression where we allow the coefficient θ_e on the treatment effect $\Delta\widehat{\mu}_{\mathbf{J}(i,0)}$ to vary with event time:

$$\text{I(carryback take-up)}_{ijt} = \Delta\widehat{\mu}_{\mathbf{J}(i,0)}\theta_e + X_{it}\beta + \alpha_i + \delta_t + \zeta_e + \nu_{it} \tag{4}$$

The regression equation above also includes client characteristics X_{it}, a client fixed effect α_i, a tax year fixed effect δ_t, and an event time fixed effect ζ_e.

Estimating equation 4 tests for pre-trends and post-trends that are correlated with the treatment effect $\Delta\widehat{\mu}_{\mathbf{J}(i,0)}$. Because we omit a dummy for the event time $e = -2$ to avoid collinearity, the coefficients θ_e are estimated relative to the coefficient at event time $e = -2$. By construction, $\theta_{-2} = 0$. We expect to find that $\theta_{-1} = 0$ because the clients have not yet changed preparers. We expect to find that $\theta_0 = 1$ because the client has changed preparers and take-up should reflect the change in the predicted preparer effect. This relationship should be one-for-

one because the predicted preparer effect reflects the relationship between client take-up and preparer characteristics. And, we also expect to find $\theta_1 = 1$ because most clients are still with the same preparer at event time $e = 1$.

There is also a mechanical component to some of our results for equation 4 because we estimate the treatment effect $\Delta\widehat{\mu}_{J(i,0)}$ from the switchers design. The difference $\theta_0 - \theta_{-1}$ should equal one by construction because the switchers design uses observations from event time $e = -1$ and $e = 0$. The estimated difference may not equal one exactly because the balanced event study panel uses a subset of the firms in the switchers design. However, the estimates for the coefficients θ_{-1} and θ_1 are still informative about pre-trends and post-trends because the switchers design excludes observations from event time $e = -2$ and event time $e = 1$.

We plot our estimates of the coefficients θ_e in Figure 6. The regression includes dummies for missing values of the preparer characteristics and the client controls. We block bootstrap the standard errors by firm.[16] As stated earlier, the coefficient θ_{-2} equals zero by construction because we omit a dummy for event time $e = -2$ from the regression.

We cannot reject the null of zero for the coefficient θ_{-1}, but we can reject it for the coefficients θ_0 and θ_1. We find a point estimate close to zero for θ_{-1} and point estimates close to one for θ_0 and θ_1. Our results confirm the absence of both pre-trends and post-trends that are correlated with the treatment effect.

Preparer Deaths and Relocations. Our estimates of equation 2 rely on the identifying assumption that unobservable determinants of client take-up remain unchanged before and after switching preparers. But clients may change preparers in response to a change in their firm. For example, a client may hire a new preparer when it hires a new manager. The change in client unobservables that cause the firm to switch preparers could also affect its claiming behavior. Here, we focus on a subsample of events where the prior preparer either dies or relocates to a new zip code at least 75 miles away. In these cases, we find it more plausible that client unobservables remain unchanged around the switching event.

We identify deaths and relocations by linking preparers to a social security file and to their individual income tax returns. We compute the distance between personal residence addresses

[16] We bootstrap with 1,000 replications.

based on the centroids of their reported zip codes. We then identify firms that change preparers contemporaneously with either the death or relocation of the prior preparer.

We estimate equation 2 for this subset of events and report the results in Table 8. We estimate regressions separately for each preparer characteristic, and we also include the predicted preparer effect based on Column (6) of Table 7 as an additional covariate. All regressions include a client fixed effect, a tax year fixed effect, and firm controls. They also include dummies for missing values of the preparer characteristics and the client controls.

The estimates are broadly similar to our earlier results. With the exception of the covariates I(other professional license) and I(self-employment), we find coefficients close to our earlier point estimates. We have less statistical power to detect effects, but we still find strongly significant results for I(certified public accountant), log(mean client revenue), and log(total client revenue). And, we estimate a strongly significant coefficient of 0.9372 on the predicted preparer effect. This last result implies that the switchers design estimates an unbiased preparer effect. Together, our estimates indicate that changes in client unobservables do not confound the original results from the switchers design.

We focus on deaths and relocations because we believe it is more likely that client unobservables remain unchanged before and after the switching event. But selection could still arise in this subsample from the hiring of new preparers. Our results could be confounded if the same client unobservables that determine preparer hiring also determine take-up of the carryback refund.

We address this additional concern with a two-stage least squares estimate with the deaths and relocations subsample. Intuitively, we instrument for the change in the preparer effect with the prior preparer characteristic because we think that the change in client unobservables is unrelated to the prior preparer. To clarify the interpretation of our identifying assumption, we express our estimates for this design in a first-differences version of equation 2.[17] We index our notation by event time e.[18]

$$\Delta \text{I(carryback take-up)}_{ije} = \Delta Z_{\mathbf{J}(i,e)}\gamma + \Delta X_{ie}\beta + \Delta \delta_{\mathbf{T}(i,e)} + \Delta \epsilon_{ie} \tag{5}$$

[17] The estimates from a fixed effects specification and a first-differences specification are numerically equivalent when the panel has two observations per firm.

[18] The function $\mathbf{T}(i,e)$ maps firm i at event time e to tax year t.

The difference in the equation above is between the first observation after the switching event and the last observation before the event. These observations are not always consecutive because firms are not eligible for the carryback refund in every year. We use the following instrument for the change in the preparer characteristic $\Delta Z_{\mathbf{J}(i,e)}$.

$$\Delta \widetilde{Z}_{\mathbf{J}(i,e)} = \bar{Z} - Z_{\mathbf{J}(i,e-1)} \tag{6}$$

Our instrument $\Delta \widetilde{Z}_{\mathbf{J}(i,e)}$ equals the difference between the sample mean $\bar{Z}$ and the preparer characteristic $Z_{\mathbf{J}(i,e-1)}$ from the pre-event period.

The two-stage least squares estimates identify the causal treatment effect of preparer covariates under the following assumption.

> **Assumption 2 [Deaths and Relocations Instrument]**: The instrument $\Delta \widetilde{Z}_{\mathbf{J}(i,e)}$ must satisfy the exclusion restriction $\mathrm{E}[\Delta \epsilon_{ie} | \Delta \widetilde{Z}_{\mathbf{J}(i,e)}, \Delta X_{ie}, \Delta \delta_{\mathbf{T}(i,e)}] = 0$.

The condition above implies that the change in client unobservables is uncorrelated with the characteristics of the prior preparer (as represented by the instrument $\Delta \widetilde{Z}_{\mathbf{J}(i,e)}$), the change in client observables, and the tax year fixed effects. We find it plausible that our setting satisfies this assumption because we do not believe that changes in client unobservables determine preparer deaths and relocations.

We report results from the instrument design for the predicted preparer effect.[19] We do not include results for the individual preparer covariates because we lack the statistical power to estimate informative coefficients for them. Our subsample only includes 9,824 observations, 8 percent of the sample with all switching events. We have more statistical power with the predicted preparer effect because it combines the individual covariates into one summary statistic.

Table 9 reports our two-stage least squares estimates. Each column represents a different regression. All regressions include a client fixed effect. Column (2) adds a tax year fixed effect. Column (3) adds firm controls. We include dummies for missing values of the client controls. The standard errors are block bootstrapped by firm and reported in parentheses.

[19] We obtain the estimated coefficients $\widehat{\gamma}$ from Column (6) of Table 7.

We expect to find a coefficient of one on the predicted preparer effect. As stated earlier, the predicted preparer effects captures the estimated relationship between the preparer covariates and carryback take-up. Our estimates will not mechanically equal one, however, because they are based on a different research design.

We find point estimates of 1.1780, 0.9950, and 0.7532 in columns (1), (2), and (3). The confidence intervals are relatively large, but in all specifications we can reject the null of a zero coefficient at a 5 percent level. Our estimates are not statistically distinguishable from a coefficient of one. These results validate the predicted preparer effect estimated under the switchers design.

3.3 How Much Do Preparers Matter for Aggregate Take-up?

We have shown that claiming behavior depends on observable preparer characteristics, but these results most likely understate the impact of preparers on take-up. Preparer unobservables could have large impacts on client claiming decisions. For example, preparers could differ in their familiarity with the tax loss rules or in their beliefs about the audit risk associated with carryback refunds. For either example, we do not have direct measures of the unobserved heterogeneity. In this section, we estimate the variance of an unobserved preparer effect and benchmark our results against the variance of predicted take-up from client observables.

We use an analysis of variance approach to find the standard deviation of the unobserved preparer effect. We isolate the preparer variance from the within-firm covariances for pairs of observations that do and do not share the same preparer. In the former case, the covariance partly reflects the preparer variance. In the latter it does not. The difference between these two covariances provides an estimate of the preparer variance.

We use the sample of C corporations eligible for a carryback refund of at least $1,000 between 1998 and 2011. We define take-up as a function of firm characteristics and a preparer fixed effect in equation 7.

$$\text{I(carryback take-up)}_{ijt} = W_{it}\pi + \mu_{\text{J}(i,t)} + \eta_{it} \tag{7}$$

In the equation above, firm characteristics W_{it} include deciles in the eligible carryback refund,

deciles in revenue, deciles in assets, deciles in payroll, state-year fixed effects, and industry-year fixed effects. We then compute residual take-up with respect to firm observables.

$$T_{ijt} = \text{I(carryback take-up)}_{ijt} - W_{it}\pi = \mu_{\mathbf{J}(i,t)} + \eta_{it} \tag{8}$$

We construct the residuals by estimating equation 7.

We next estimate the within-firm covariance structure of the residual T_{ijt}. We make the following assumptions of independence and stationarity to arrive at our estimate for the preparer variance.

> **Assumption 3 [Independence]**: The unobserved preparer effect $\mu_{\mathbf{J}(i,t)}$ and the error term η_{it} are independent.

> **Assumption 4 [Stationarity]**: The covariance between any two error terms, $\text{Cov}(\epsilon_{it}, \epsilon_{is})$, equals $\sigma^2_{\epsilon,|t-s|}$.

We use these assumptions to isolate the preparer variance from the within-firm covariance structure by differentiating between pairs of observations that do and do not share the same preparer.

$$\begin{aligned} \sigma^{j=k}_{|t-s|} &= \text{Cov}\left(T_{ijt}, T_{iks}\right) = \sigma^2_{\mu} + \sigma^2_{\epsilon,|t-s|} \\ \sigma^{j\neq k}_{|t-s|} &= \text{Cov}\left(T_{ijt}, T_{iks}\right) = \sigma^2_{\epsilon,|t-s|} \end{aligned} \tag{9}$$

We find the preparer variance by taking the difference between the two equations above.

We make a strong assumption with the independence condition. It may not hold because sophisticated clients likely hire sophisticated preparers. But if the firm error term and the preparer effect are positively correlated as we suspect, our estimate for the preparer variance provides an upper bound for the true variance. In this sense, our estimate is useful as a metric for the potential magnitude of the unobserved preparer effect.

Figure 7 plots our estimates of the within-firm covariances separately for observations that do and do not share the same preparer. Figure 8 plots our estimate for the standard deviation of the preparer effect. We also report the point estimates and standard errors in Table 10. We block bootstrap the standard errors by firm.[20]

[20] We bootstrap with 1,000 replications.

We find drift in both series of covariance estimates in Figure 7. The covariances decline as the lapsed time between observations increases. This pattern could arise if client unobservables, such as management practices, slowly change over time. Our estimates for the preparer variance comes from the difference between the two series in Figure 7. Despite their overall decline, the difference remains relatively stable over time.

The standard deviation of the preparer effect in Figure 8 equals the square root of the difference between the within-firm covariances. The point estimates in the series range between 0.1303 and 0.1659. Most are statistically indistinguishable. Their weighted average equals 0.1472.[21] This magnitude is larger than any of our estimated effects of the individual preparer covariates. We benchmark our result by comparing it to the predicted effect from firm observables $W_{it}\widehat{\pi}$. Both the unobserved preparer effect and the prediction from firm observables yield variance estimates of 9 percent of the variance in take-up of the carryback refunds.

Alternatively, we can also interpret our result by calculating the implied change in take-up if a client moved from the 10th percentile to the 90th percentile in preparer effects. Assuming that the preparer effects follow a normal distribution, take-up would increase by 38 percentage points. This change would be larger than the baseline take-up rate of 37 percent in the population. These estimates imply that preparers play a substantial role in determining whether their clients claim the carryback refund.

4 Conclusion

Our study highlights the mediating role that preparers play between the tax code and taxpayers by showing that preparers influence tax claiming decisions. We use firms that change preparers to demonstrate that preparer characteristics predict take-up of a corporate tax refund for losses. We validate our results by focusing on a subsample of events where the prior preparer either dies or relocates to a new zip code at least 75 miles away. In these cases, we find it more plausible that client unobservables remain unchanged before and after the switching event. We also estimate the variance of an unobserved preparer term and find that it potentially

[21] The weights equal the number of pairs of observations at each time interval, as defined by the length of time between observations.

explains as much of the variation in take-up as a prediction from firm observables.

The results suggest that investing in better take-up of tax benefits could be as important as changing the tax code itself. Fiscal stimulus measures often rely on the introduction of new and temporary tax benefits. For example, the American Reinvestment and Recovery Act of 2009 distributed 36 percent of its stimulus dollars through 55 different tax benefits (The Recovery Accountability and Transparency Board 2014). Future research should consider whether targeting preparers with informational materials or training programs can improve the take-up of tax benefits.

References

Aizer, Anna. 2007. "Public Health Insurance, Program Take-up, and Child Health." *Review of Economics and Statistics*, 89(3): 400–415.

Altshuler, Rosanne, Alan Auerbach, Michael Cooper, and Matthew Knittel. 2009. "Understanding U.S. Corporate Tax Losses." *Tax Policy and the Economy*, 23: 73–122.

Altshuler, Rosanne, and Alan J. Auerbach. 1990. "The Significance of Tax Law Asymmetries: An Empirical Investigation." *Quarterly Journal of Economics*, 105(1): 61–86.

Armstrong, Chris, Jennifer L. Blouin, and David F. Larcker. 2012. "The Incentives for Tax Planning." *Journal of Accounting and Economics*, 53(1-2): 391–411.

Auerbach, Alan J., and James M. Poterba. 1987. "Tax-Loss Carryforwards and Corporate Tax Incentives." In *The Effects of Taxation on Capital Accumulation*. Vol. I, 305–342.

Bertrand, Marianne, and Antoinette Schoar. 2003. "Managing with Style: The Effect of Managers on Firm Policies." *Quarterly Journal of Economics*, 118(4): 1169–1208.

Bitler, Marianne P., Janet Currie, and John Karl Scholz. 2003. "WIC Eligibility and Participation." *Journal of Human Resources*, 38: 1139–1179.

Bloom, Nicholas, and John Van Reenen. 2007. "Measuring and Explaining Management Practices Across Firms and Countries." *Quarterly Journal of Economics*, 122(4): 1351–1408.

Bloom, Nicholas, Benn Eifert, Aprajit Mahajan, David McKenzie, and John Roberts. 2013. "Does Management Matter? Evidence from India." *Quarterly Journal of Economics*, 128(1): 1–51.

Chetty, Raj, Adam Looney, and Kory Kroft. 2009. "Salience and Taxation: Theory and Evidence." *American Economic Review*, 99(4): 1145–1177.

Chetty, Raj, John Friedman, and Emmanuel Saez. 2013. "Using Differences in Knowledge Across Neighborhoods to Uncover the Impacts of the EITC on Earnings." *American Economic Review*, 103(7): 2683–2721.

Currie, Janet. 2006. "The Take Up of Social Benefits." In *Public Policy and the Income Distribution*. , ed. Alan J. Auerbach, David Card and John M. Quigley. New York, NY:Russell Sage Foundation Publications.

Currie, Janet, and Jeffrey Grogger. 2001. "Explaining Recent Declines in Food Stamp Program Participation." *Brookings-Wharton Papers on Urban Affairs*, 203–244.

Daponte, Beth Osborne, Sanders Seth, and Lowell Taylor. 1999. "Why Do Low-Income Households not Use Food Stamps? Evidence from an Experiment." *Journal of Human Resources*, 34(3): 612–628.

Dyreng, Scott D., Michelle Hanlon, and Edward L. Maydew. 2010. "The Effects of Executives on Corporate Tax Avoidance." *The Accounting Review*, 85(4): 1163–1189.

Finkelstein, Amy. 2009. "EZ-Tax: Tax Salience and Tax Rates." *Quarterly Journal of Economics*, 124(3): 969–1010.

Goldin, Jacob, and Tatiana Homonoff. 2013. "Smoke Gets in Your Eyes: Cigarette Tax Salience and Regressivity." *American Economic Journal: Economic Policy*, 5(1): 302–336.

Graham, John R. 1996. "Debt and the marginal tax rate." *Journal of Financial Economics*, 41(1): 41–73.

Graham, John R., and Lillian F. Mills. 2008. "Using tax return data to simulate corporate marginal tax rates." *Journal of Accounting & Economics*, 46(2-3): 366–388.

Heckman, James J., and Jeffrey A. Smith. 2004. "The Determinants of Participation in a Social Program: Evidence from a Prototypical Job Training Prorgam." *Journal of Labor Economics*, 22(2): 243–298.

Internal Revenue Service. 2009. "Return Preparer Review." Publication 4832 (Rev. 12-2009) Catalog Number 54419P.

Internal Revenue Service. 2014. "SOI Tax Stats: Integrated Business Data."

Jackson, C. Kirabo, and Elias Bruegmann. 2009. "Teaching Students and Teaching Each Other: The Importance of Peer Learning for Teachers." *American Economic Journal: Applied Economics*, 1(4): 85–108.

Kaplan, Steven N., Mark M. Klebanov, and Morten Sorensen. 2012. "Which CEO Characteristics Matter?" *Journal of Finance*, 67(3): 973–1007.

Klassen, Kenneth, Petro Lisowsky, and Devan Mescall. 2012. "Corporate tax compliance: The role of internal and external preparers." *Working paper*.

Knittel, Matthew, Susan Nelson, Jason Debacker, John Kitchen, James Pearce, and Richard Prisinzano. 2011. "Methodology to Identify Small Businesses and Their Owners." *OTA Working Paper*, , (August).

Moffit, Robert A., ed. 2003. *Means-Tested Transfer Programs in the United States*. University of Chicago Press.

The Recovery Accountability and Transparency Board. 2014. "Overview of Funding."

US Department of Labor, Employment & Training Administration. 2014. "Unemployment Insurance Data."

Zwick, Eric, and James Mahon. 2014. "Do Financial Frictions Amplify Fiscal Policy? Evidence from Business Investment Stimulus." *Working paper*.

A Simulation of Tax Refunds for the Carryback Election

The IRS does not automatically compute the eligible carryback refund each time a corporation files an income tax return that reports a net operating loss. Instead, the IRS requires firms to provide documentation that details the computation of their refund when they file for it. To determine whether firms are eligible for carryback refunds, we simulate eligible refunds based on each firm's reported loss, their history of taxes paid in prior tax years, and the policy rules detailed in Table 1. We validate the accuracy of our simulated refunds by comparing them to claimed refunds.

Specifically, we identify each corporate tax return that reports a net operating loss. For each firm, we pull their tax liability history and incorporate any post-filing adjustments to their past tax returns. We then infer each firm's past taxable income using their past tax liabilities. This assumption ignores adjustments to tax liability from Schedule J of Form 1120, such as the application of tax credits and the alternative minimum tax. We next apply the reported loss against our simulation of past taxable income according to the policy rules in Table 1. We start by deducting the loss against the earliest eligible tax year and progress in calendar order, until we have exhausted either the loss or all eligible taxable income. We then re-compute the firm's tax liability based on their new taxable income in each past tax year. Finally, we calculate the carryback refund by taking the difference in the firm's tax liability before and after applying the carryback deduction.

We check the credibility of our simulation of eligible carryback refunds by comparing them to the observed refunds received by firms that claim the carryback. Figure A.1 plots means of log(claimed refunds) by vigintiles of log(simulated refunds). A univariate regression of log(claimed refunds) on log(simulated refunds) yields a coefficient of 0.9636 and a R-squared of 0.9336. These results imply that we simulate the eligible carryback refunds with a high degree of accuracy.

B Simulation of Carryforward Deductions

We compute the net present values of the carryback and carryforward elections by simulating future carryforward deductions. For each firm, we use the observed taxable income in future tax periods. We first compute the amount of tax loss available for carryforward deductions. For firms that elect the carryback, this amount equals the remaining amount of deductions that could not be applied to past taxable income. For firms that elect the carryforward, this amount equals the full loss reported at time $t = 0$.

We then simulate the claiming of the carryforward deduction against future taxable income. We assume that firms deduct the carryforwards as soon as possible. Our simulation can also account for firms that have an existing stock of carryforwards prior to time $t = 0$. In these cases, we first deduct from the stock of pre-existing carryforwards before we deduct the carryforwards generated by the tax loss at time $t = 0$. This treatment increases the delayed realization of the tax benefits from the carryforwards.

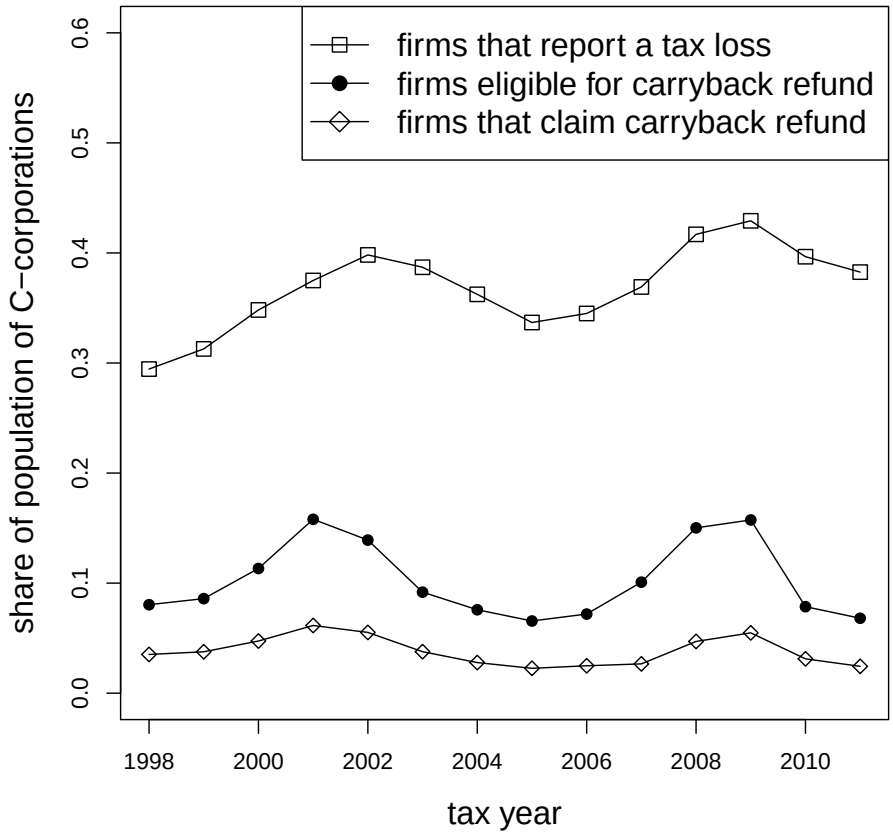
C Variable Definitions from the Business Tax Data

We pull line items from the income tax return, Form 1120, to describe characteristics of the tax loss firms in our sample. Here, we explain how we construct the variables reported in Table 2. All dollar amounts are normalized to 2013 price levels. Revenue equals total income (line 11) plus cost of goods sold (line 2). Assets is reported in box D on the front page of Form 1120. Payroll is the sum of W-2 and 1099-MISC wage statements. Firms issue these statements to employees and contractors respectively. EBITDA is defined as total income (line 11) minus total deductions (line 27) plus compensation of officers (line 12) plus interest (line 19) plus charitable contributions (line 19) plus depreciation (line 20) plus depletion (line 21) plus domestic production activities deduction (line 25).

We identify the paid preparer that assisted a corporation with filing their tax return from Form 1120. On the bottom of the front page of the tax form, preparers hired to file an income tax return must self-identify themselves and their employing firm. This field does not include internal employees that prepare their employer's income tax return.

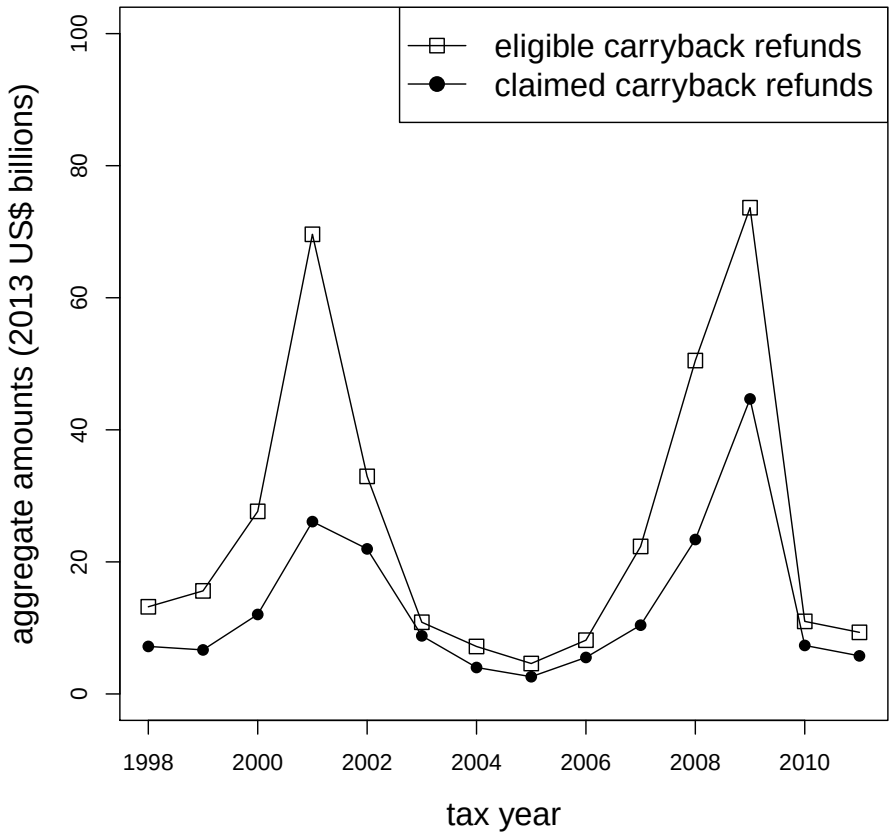
We construct measures of preparers using the identifiers reported on Form 1120. We match these identifiers to their individual income tax returns. We obtain our age variable from a social security file that records the date of birth. We also compute average client characteristics and the number of clients from the population of C and S corporations by preparer and tax year. Similarly, we match tax firm identifiers to income tax returns for sole-proprietorships, partnerships, and corporations to construct our measures for tax firms.

Figure 1: Frequency of tax losses and carryback refunds



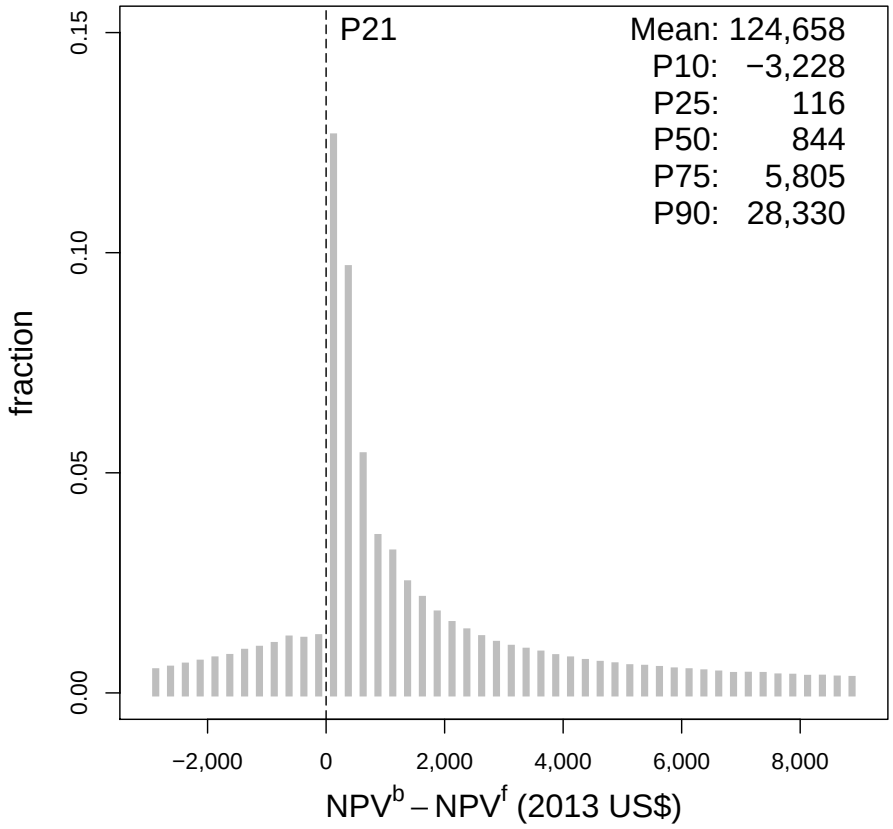
Notes: This figure plots the share of C corporations that report a tax loss, that are eligible for a carryback refund, and that claim the carryback refund. It is based on the population of corporate tax returns for C corporations. We limit eligibility to firms that have the option to claim a carryback refund of at least $1,000. We exclude firms with mean revenue and mean payroll less than $100,000 because they may not represent real operating entities.

Figure 2: Aggregate magnitudes of carryback refunds



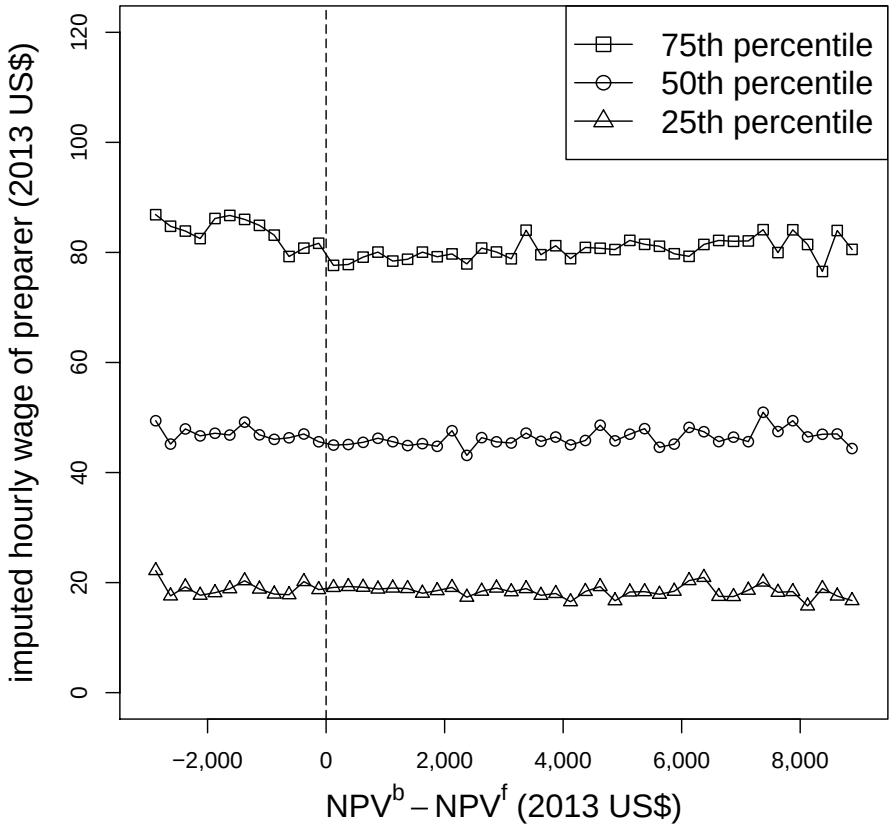
Notes: This figure plots the aggregate dollar amounts of eligible and claimed carryback refunds for C corporations. All dollar amounts are indexed to 2013 price levels.

Figure 3: Histogram of NPV difference between carryback and carryforward



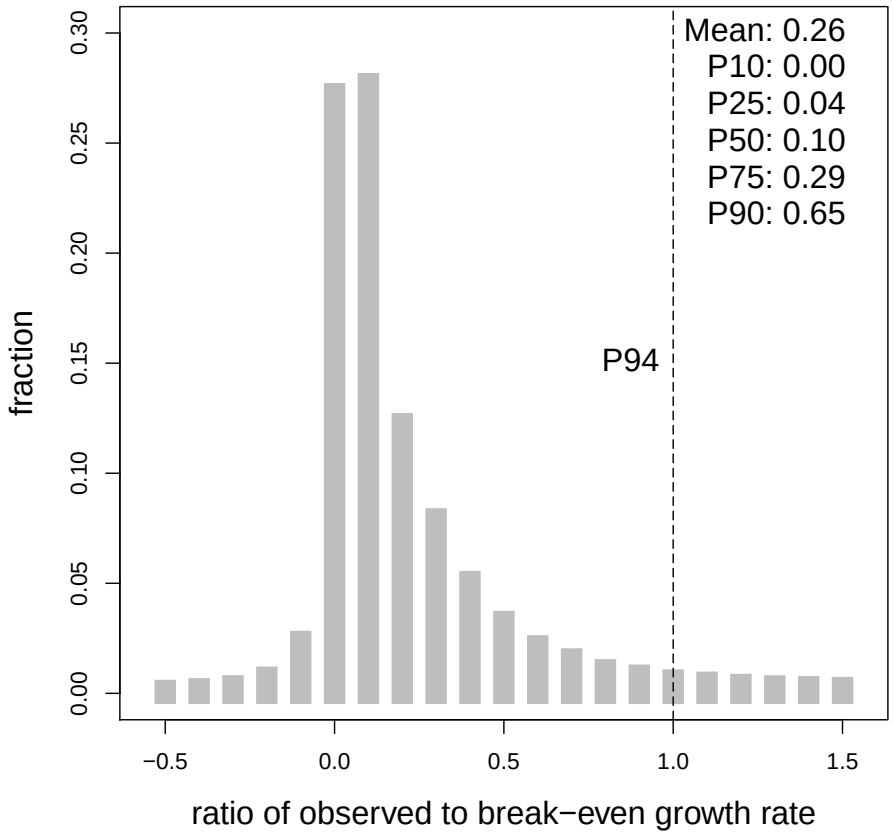
Notes: This figure plots a histogram of the net present value difference between the carryback and carryforward elections. The sample includes firms with tax losses between 1998 and 2002 that were eligible for a carryback refund of at least $1,000. We calculate the net present value based on each firm's realized taxable income over a 10-year period. We use their realized taxable income to simulate the claiming of future carryforward deductions and to compute the net present value of future tax benefits. Please see Section 2.2 for further details.

Figure 4: Imputed preparer wage by NPV difference between carryback and carryforward



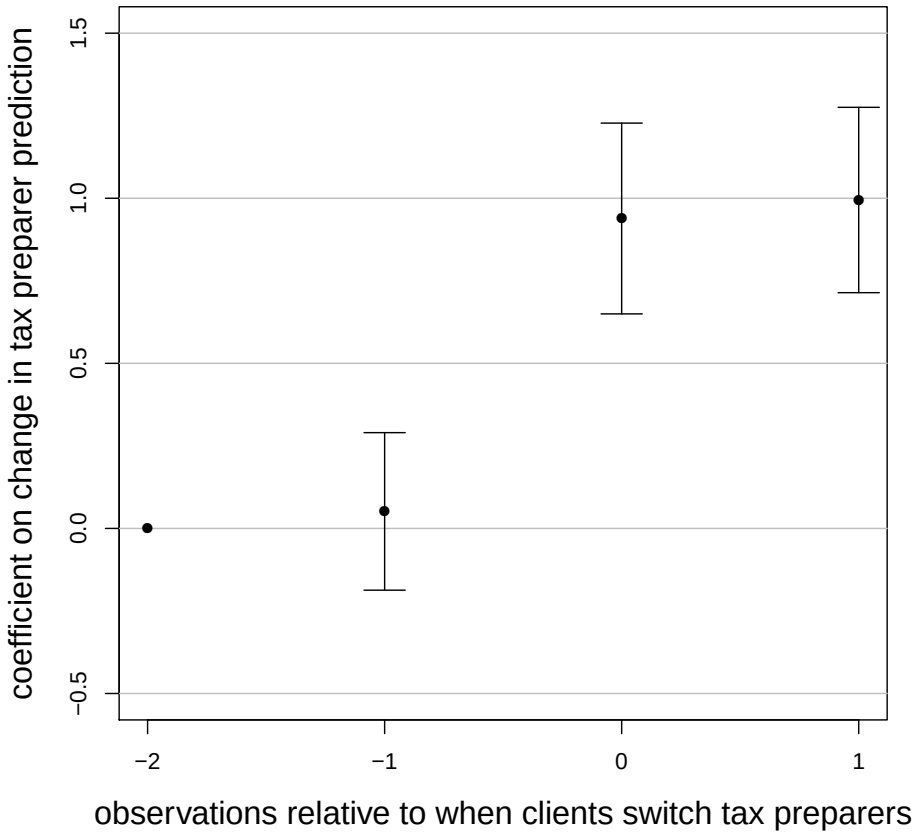
Notes: This figure plots the 25th, 50th, and 75th percentiles in imputed preparer wages by the net present value difference between the carryback and the carryforward options. The sample includes firms with tax losses between 1998 and 2002 that were eligible for a carryback refund of at least $1,000. Wages are imputed by dividing preparer labor income by 2000. This computation assumes that preparers bill 40 hours per week over 50 weeks in one calendar year. Labor income equals the sum of W-2 earnings and self-employment income. Dollar amounts are normalized to 2013 price levels.

Figure 5: Histogram of the ratio between observed and break-even income growth rates



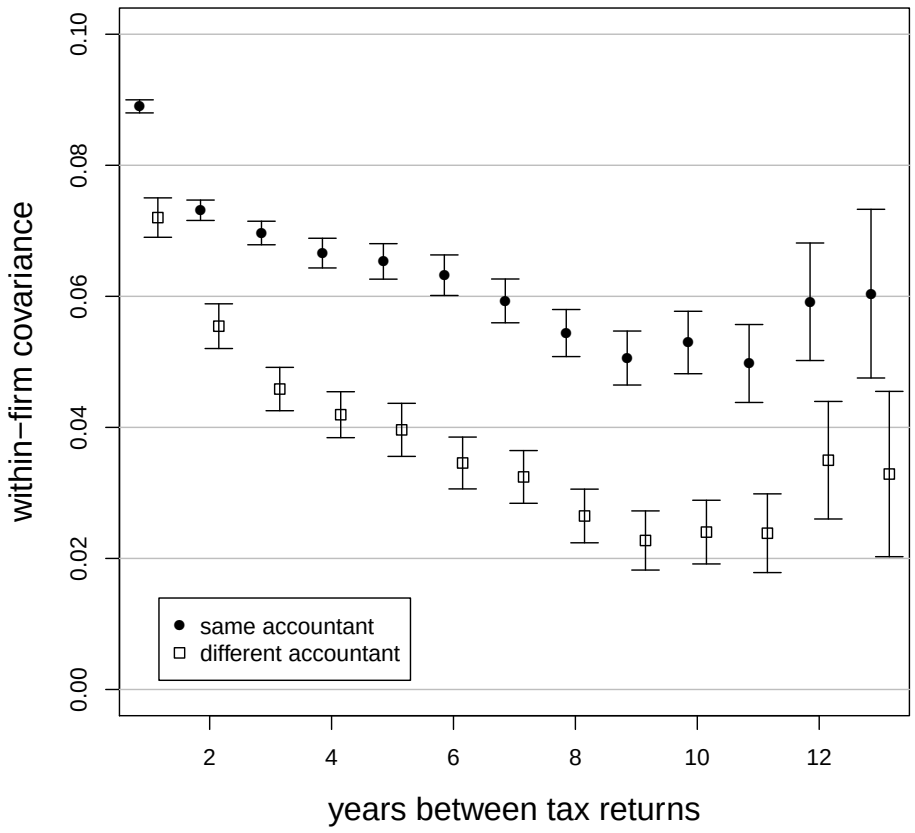
Notes: This figure plots a histogram of the ratio between the observed and break-even growth rates in corporate taxable income. The sample is based on firms with tax losses between 1998 and 2002 that were eligible for a carryback refund of at least $1,000. It also excludes firms for whom the value of the carryforward is dominated by the carryback (i.e., the value of the carryback is greater than the carryforward regardless of the firm's future growth rate). The break-even growth rate refers to the rate at which taxable income must grow for the carryforward and carryback options to equal in value. This computation assumes a linear growth rate that starts with each firm's reported loss. The observed growth rate is based on each firm's observed taxable income in the ten year window following its reported loss. The dotted line at 1.0 indicates the point at which the observed growth rate equals the break-even growth rate. The ratio between these rates can take negative values because some firms experience negative growth rates following their loss.

Figure 6: Panel regression estimates of carryback take-up on predicted preparer effect



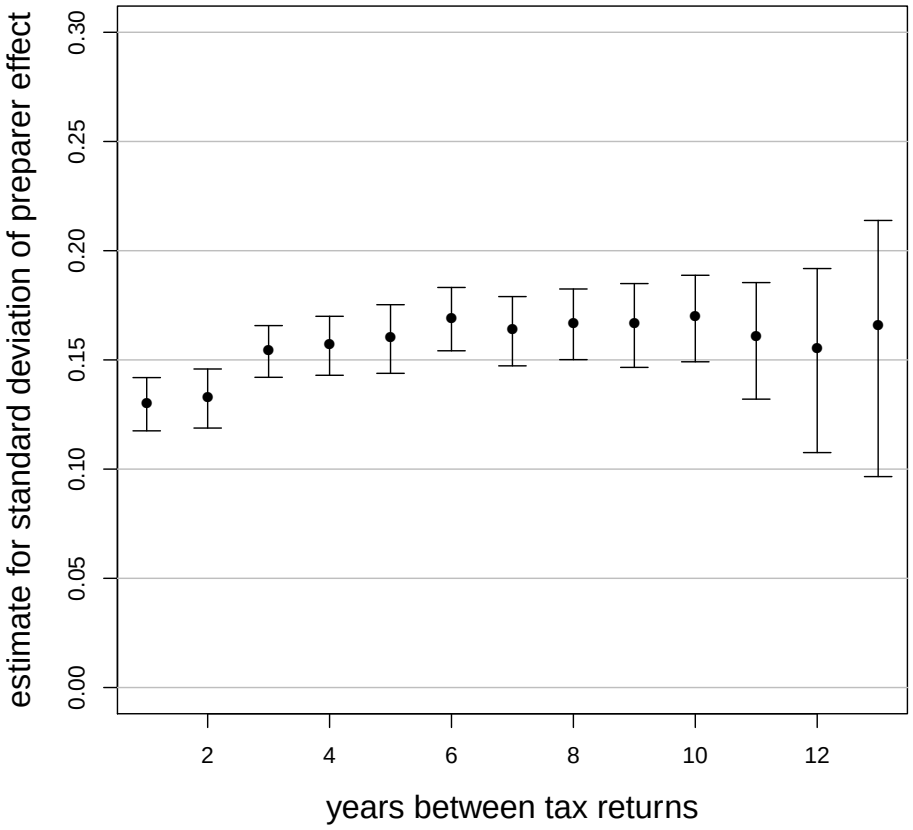
Notes: This figure plots the coefficients from a regression of carryback take-up on interactions between event time and the change in the predicted preparer effect at event time $e = 0$. Standard errors are block bootstrapped by firm with 1,000 replications. We construct the predicted preparer effects using the estimated coefficients from Column (6) of Table 7. The change in the predicted preparer effect at event time $e = 0$ equals $\Delta\widehat{\mu}_{\mathbf{J}(i,0)} = Z_{\mathbf{J}(i,0)}\widehat{\gamma} - Z_{\mathbf{J}(i,-1)}\widehat{\gamma}$. The regression includes a firm fixed effect, a tax year fixed effect, firm controls, and an event time fixed effect. Firm controls include log(eligible refund), log(revenue), log(assets), and log(EBITDA). The regression also includes dummies for missing values in firm controls. The regression omits a dummy for event time $e = -2$ to avoid collinearity. The plotted coefficients are estimated relative to event time $e = -2$. The coefficient at event time $e = -2$ equals zero by construction. Please see Section 3.2 for further details.

Figure 7: Estimates of within-firm covariances of residual carryback take-up



Notes: This figure reports the within-firm covariances of residual carryback take-up. Standard errors are block bootstrapped with 1,000 replications. The estimates are based on the residual $T_{ijt} = \text{I(carryback take-up)} - W_{it}\pi$ where W_{it} are client observables. The coefficients π are estimated from a regression of take-up on client observables and a preparer fixed effect. Client observables include deciles in the eligible carryback refund, deciles in revenue, deciles in assets, deciles in payroll, state-year fixed effects, and industry-year fixed effects. We estimate covariances for pairs of observations from the same firm. We differentiate between pairs by the length of time between observations and by whether the observations share the same preparer. Please see Section 3.3 for further details.

Figure 8: Estimates for standard deviation of preparer effects



Notes: This figure plots estimates of the standard deviation of the preparer effect. Standard errors are block bootstrapped with 1,000 replications. We estimate the variance of the preparer effect by taking the difference of the within-firm covariances for pairs of observations that do and do not share the same preparer. (Please see Figure 7.) We then take the square root of the difference to estimate the standard deviation. Please see Section 3.3 for further details.

Table 1: Legislative background on tax loss carrybacks and carryforwards, 1998-2011

Ending fiscal period (year-month)[a]	Carryback period	Carryforward period	Enacting legislation
1998-12 to 2000-12	2 years	20 years	TRA 1997 (permanent)[c]
2001-01 to 2002-12	5 years	20 years	JCWAA 2002 (temporary)[d]
2003-01 to 2007-12	2 years	20 years	TRA 1997 (permanent)
2008-01 to 2010-11	5 years	20 years	ARRA 2009 (temporary)[b,e]
			WHBAA 2009 (temporary)[b,f]
2010-12 to 2012-11	2 years	20 years	TRA 1997 (permanent)

Notes: This table summarizes the statutory window for eligible carrybacks and carryforwards between 1998 and 2011. The policy rules apply to corporate tax returns with ending fiscal periods that fall within the range detailed in the first column of the table. The last column lists the legislation that enacted the policy changes. In this period, the carryback window was twice expanded temporarily as part of fiscal stimulus legislation. The information for this table was pulled from bulletins and revenue procedures released by the Internal Revenue Service.

a. Corporations file income taxes for the fiscal year instead of the calendar year
b. ARRA 2009 and WHBAA 2009 limited deductions against the fifth fiscal year preceding a firm's current tax loss to 50 percent of taxable income
c. TRA: Taxpayer Relief Act of 1997
d. JCWAA: Job Creation and Worker Assistance Act of 2002
e. ARRA: American Recovery and Reinvestment Act of 2009
f. WHBAA: Worker, Homeowner, and Business Assistance Act of 2009

Table 2: Summary statistics of C corporations eligible for carryback refunds, 1998-2011

Covariates	Mean	P10	P50	P90
Firm variables				
revenue ($1M)	42.189	0.307	1.485	12.442
assets ($1M)	91.631	0.048	0.489	6.394
payroll ($1M)	5.336	0.103	0.469	3.356
EBITDA ($1M)	2.020	-0.118	0.079	0.603
EBITDA / revenue	-0.101	-0.092	0.046	0.296
Refund variables				
take-up of carryback refund	0.3742			
eligible refund ($1K)	286.490	1.463	5.696	70.670
eligible refund / revenue	0.0415	0.0008	0.0042	0.0281
Preparer variables				
indicator for matching tax return	0.7107			
labor income ($1K)	127.824	5.080	99.450	269.583
mean client revenue ($1M)	9.676	0.463	1.339	7.323
number of corporate clients	51.55	8.00	37.99	103.26
Tax firm variables				
indicator for matching tax return	0.7673			
revenue ($1M)	132.119	0.136	0.785	10.741
indicator for sole proprietor	0.1637			
mean client revenue ($1M)	7.738	0.538	1.577	7.031
number of corporate clients	498.35	21.51	98.49	539.88

Notes: Number of observations: 1,244,729. Number of firms: 612,070. This table reports summary statistics for all C corporations with tax losses between 1998-2011 that were eligible for a carryback refund of at least $1,000. The sample is derived from the U.S. population of corporate tax returns. All dollar values are normalized to 2013 price levels. We do not report standard deviations because the variables are highly skewed due to the firm size distribution. The firm variables are based on the corporate tax return. EBITDA refers to earnings before interest, taxes, depreciation, and amortization. See Appendix C for details about how we construct these measures from the individual line items on the corporate income tax return. We directly observe take-up of the carryback refund, but we impute the eligible refund based on the policy rules and each firm's historical tax liability. The preparer and tax firm variables are based on their matching tax returns. Their statistics exclude observations that do not have a matching tax return. Labor income equals the sum of W-2 wages and self-employment income. Mean client revenue refers to the corporate clients of each preparer and each tax firm. Percentiles are computed as percentile means.

Table 3: Summary statistics of C corporations that change preparers, 1998-2011

Covariates	Mean	Standard deviation	P10	P50	P90
Firm variables					
revenue ($1M)	24.877		0.338	1.873	23.370
assets ($1M)	38.817		0.063	0.650	15.285
payroll ($1M)	5.027		0.103	0.572	5.801
EBITDA ($1M)	0.525		-0.228	0.075	0.796
EBITDA / revenue	-0.149		-0.109	0.037	0.264
Refund variables					
take-up of carryback refund	0.3572				
eligible refund ($1K)	233.866		1.566	7.045	125.411
eligible refund / revenue	0.0506		0.0007	0.0042	0.0298
Preparer variables					
I(certified public accountant)	0.8314				
I(attorney)	0.0214				
I(other professional license)	0.0556				
log(labor income)	11.36	1.17	9.98	11.57	12.51
I(self-employment)	0.1794				
age	49.89	11.17	35.52	50.00	63.48
log(mean client revenue)	14.59	1.50	13.06	14.27	16.62
log(total client revenue)	17.86	1.82	15.50	17.94	20.11

Notes: Number of observations: 124,862. Number of firms: 62,431. This table reports summary statistics for the sample of C-corporations that were eligible for carryback refunds of at least $1,000, that switched preparers between 1998 and 2011, and that reported preparer identifiers which match to a tax return. All dollar values are normalized to 2013 price levels. We do not report standard deviations for the firm and refund variables because they are highly skewed due to the firm size distribution. The firm variables are based on the corporate tax return. EBITDA refers to earnings before interest, taxes, depreciation, and amortization. See Appendix C for details about how we construct these measures from the individual line items on the corporate income tax return. We directly observe take-up of the carryback refund, but we impute the eligible refund based on the policy rules and each firm's historical tax liability. The preparer variables are based on their matching tax returns. Labor income equals the sum of W-2 wages and self-employment income. The self-employment indicator reflects preparers that derive at least half of their labor income from self-employment. Mean and total client revenue refer to the corporate clients of the individual preparers. Percentiles are computed as percentile means.

Table 4: Example of loss deduction under carryback and carryforward elections

	Event time relative to loss year					
	-2	-1	0	1	2	3
Taxable income before loss deduction	50	100	-100	0	100	100
Panel A: carryback election						
Loss deduction	-50	-50	+100	0	0	0
Taxable income after loss deduction	0	50	0	0	100	100
NPV of carryback election	$100\,\tau = \$35$					
Panel B: carryforward election						
Loss deduction	0	0	+100	0	-100	0
Taxable income after loss deduction	50	100	0	0	0	100
NPV of carryback election	$\frac{100\,\tau}{(1+r)^2} = \$30.57$					

Notes: This table illustrates the application of carryback and carryforward deductions for a firm that reports a tax loss of \$100 at time $t = 0$. Panel A assumes that the firm makes the carryback election and Panel B assumes that the firm makes the carryforward election. The illustration also assumes that the firm pays a tax rate of $\tau = 0.35$ and has a discount rate of $r = 0.07$. Under the carryback election in Panel A, the hypothetical firm applies its loss deduction against its past taxable income. It starts with the earliest eligible tax year ($t = -2$) and then proceeds to the next tax year ($t = -1$). Under the carryforward election in Panel B, the hypothetical firm applies its loss deduction against its future taxable income. In this example, we assume that the firm claims the loss deduction as early as possible ($t = 2$). Even though this hypothetical firm always pays the same tax rate, the net present value of these two elections differ because they realize the tax benefits at different times. The carryback election realizes the tax benefits immediately at time $t = 0$ as a tax refund. In contrast, the carryforward election defers the tax benefits until time $t = 2$ when it claims its loss deduction. In this example, the carryback election has a higher net present value than the carryforward election because it realizes its tax benefit earlier.

Table 5: Share of firms below alternative thresholds for NPV_f/NPV_b

Firm	Maximum value for NPV_f/NPV_b			
discount rate	1	0.9	0.8	0.7
3%	0.7499	0.4163	0.3246	0.2828
5%	0.7719	0.4955	0.3634	0.3001
7%	0.7911	0.5727	0.4109	0.3261
9%	0.8087	0.6127	0.4644	0.3574

Notes: This table compares the net present value of the carryforward and carryback elections for firms with tax losses between 1998 and 2002. It shows the sensitivity of our results to the assumed firm discount rate. The table reports the share of firms for whom the ratio of the carryforward net present value to the carryback net present value is below a maximum threshold. Each column assumes a different maximum threshold and each row assumes a different firm discount rate for the net present value calculation. The sample only includes firms that were eligible for a carryback refund of at least \$1,000. NPV_f indicates the net present value for the carryforward election. NPV_b indicates the net present value of the carryback election. Please see Section 2.2 for further details.

Table 6: Panel regression of carryback take-up on individual preparer characteristics
Sample: All events where a client changed its tax preparer

Covariates	(1)	(2)	(3)	(4)	(5)	(6)
I(certified public accountant)	0.0681***					
	(0.0055)					
I(attorney)	0.0474***					
	(0.0124)					
I(other professional license)	0.0099					
	(0.0080)					
log(labor income)		0.0074***				
		(0.0014)				
I(self-employment)			-0.0205***			
			(0.0045)			
age				0.0003		
				(0.0002)		
log(mean client revenue)					0.0179***	
					(0.0017)	
log(total client revenue)						0.0125***
						(0.0011)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	124,862	124,862	124,862	124,862	124,862	124,862

Notes: This table reports coefficients from a regression of carryback take-up on preparer characteristics. The standard errors are block bootstrapped with 250 replications and are reported in parentheses. All regressions include a firm fixed effect, a tax year fixed effect, and firm controls. Firm controls include log(eligible refund), log(revenue), log(assets), and log(EBITDA). The sample only includes the last observation before a client changes its preparer and the first observation after a client changes its preparer. The "other professional license" category represents enrolled agents and state licensed preparers. Preparers that do not have a professional license are the omitted certification category. Please see Section 3.2 for further details.

Table 7: Panel regression of carryback take-up on multiple preparer characteristics
Sample: All events where a client changed its tax preparer

Covariates	(1)	(2)	(3)	(4)	(5)	(6)
I(certified public accountant)	0.0718***	0.0725***	0.0681***	0.0605***	0.0611***	0.0590***
	(0.0059)	(0.0065)	(0.0058)	(0.0061)	(0.0063)	(0.0062)
I(attorney)	0.0510***	0.0496***	0.0474***	0.0404***	0.0385***	0.0387***
	(0.0141)	(0.0130)	(0.0129)	(0.0140)	(0.0139)	(0.0130)
I(other professional license)	0.0049	0.0044	0.0099	0.0043	0.0043	0.0092
	(0.0089)	(0.0086)	(0.0081)	(0.0089)	(0.0087)	(0.0087)
log(labor income)				0.0049***	0.0047***	0.0042***
				(0.0016)	(0.0016)	(0.0015)
I(self-employment)				-0.0142***	-0.0140***	-0.0158***
				(0.0049)	(0.0047)	(0.0046)
age				0.0006***	0.0007***	0.0006***
				(0.0002)	(0.0001)	(0.0001)
log(mean client revenue)				0.0122***	0.0136***	0.0091***
				(0.0024)	(0.0026)	(0.0024)
log(total client revenue)				0.0066***	0.0063***	0.0057***
				(0.0015)	(0.0017)	(0.0016)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	No	Yes	Yes
Firm controls	No	No	Yes	No	No	Yes
Number of observations	124,862	124,862	124,862	124,862	124,862	124,862

Notes: This table reports coefficients from a regression of carryback take-up on preparer characteristics. The standard errors are block bootstrapped with 250 replications and are reported in parentheses. All regressions include a firm fixed effect. Columns (2) and (5) add a tax year fixed effect. Columns (3) and (6) add firm controls, which include log(eligible refund), log(revenue), log(assets), and log(EBITDA). The sample only includes the last observation before a client changes its preparer and the first observation after a client changes its preparer. The "other professional license" category represents enrolled agents and state licensed preparers. Preparers that do not have a professional license are the omitted certification category. Please see Section 3.2 for further details.

Table 8: Panel regression of carryback take-up on individual preparer characteristics
Sample: Events contemporaneous with preparer deaths and relocations

Covariates	(1)	(2)	(3)	(4)	(5)	(6)	(7)
I(certified public accountant)	0.0857***						
	(0.0219)						
I(attorney)	0.0728						
	(0.0526)						
I(other professional license)	0.0551*						
	(0.0319)						
log(labor income)		0.0073					
		(0.0050)					
I(self-employment)			0.0095				
			(0.0151)				
age				0.0007			
				(0.0005)			
log(mean client revenue)					0.0162**		
					(0.0068)		
log(total client revenue)						0.0144***	
						(0.0041)	
predicted preparer effect							0.9372***
							(0.1880)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	9,824	9,824	9,824	9,824	9,824	9,824	9,824

Notes: This table reports coefficients from a regression of carryback take-up on preparer characteristics. The standard errors are block bootstrapped with 1,000 replications and are reported in parentheses. The sample is limited to switching events contemporaneous with either the death or relocation of the prior preparer. It also only includes the last observation before a client changes its preparer and the first observation after a client changes its preparer. Relocations are defined based on moving personal residences to a new zip code at least 75 miles away. The "other professional license" category represents enrolled agents and state licensed preparers. Preparers that do not have a professional license are the omitted certification category. The predicted preparer effect is constructed using the estimated coefficients from Column (6) of Table 7. Please see Section 3.2 for further details.

Table 9: Two-stage least squares estimates of carryback take-up on predicted preparer effect
Sample: Events contemporaneous with preparer deaths and relocations

Covariates	(1)	(2)	(3)
predicted preparer effect	1.1780***	0.9950***	0.7532**
	(0.3839)	(0.3774)	(0.3728)
Firm FE	Yes	Yes	Yes
Year FE	No	Yes	Yes
Firm controls	No	No	Yes
Number of observations	9,824	9,824	9,824

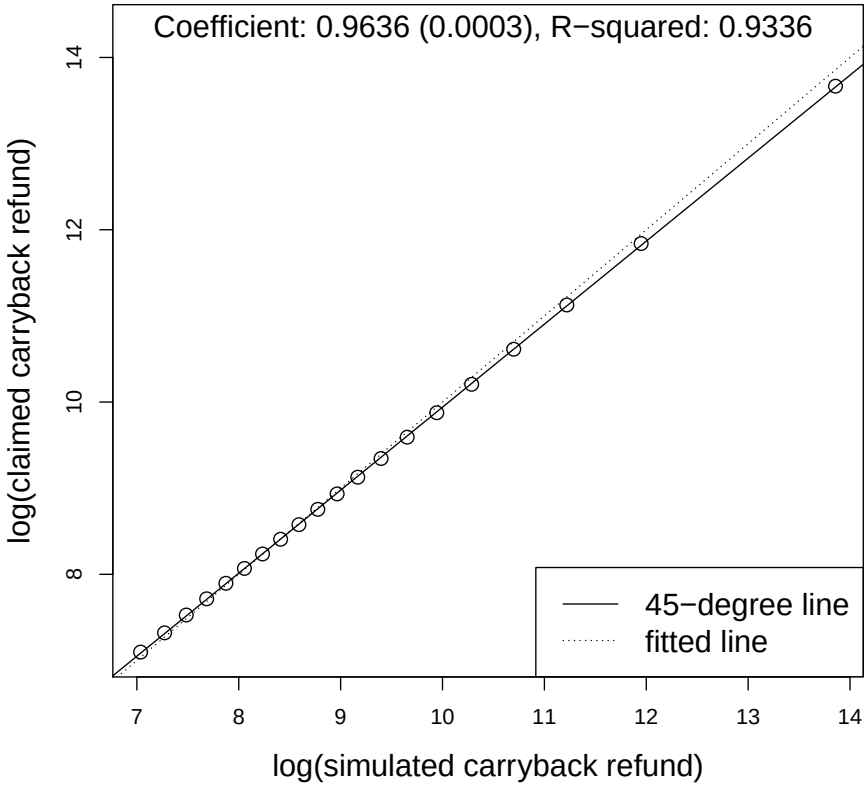
Notes: This table reports coefficients from a two-stage least squares regression of carryback take-up on preparer characteristics. The standard errors are block bootstrapped with 1,000 replications and are reported in parentheses. The predicted preparer effect is constructed using the estimated coefficients from Column (6) of Table 7. The instrument equals the preparer covariate in the pre-event period and the sample mean for the preparer covariate in the post-event period. All regressions include a firm fixed effect. Column (2) adds a tax year fixed effect. Column (3) adds firm controls, which include log(eligible refund), log(revenue), log(assets), and log(EBITDA). The sample is limited to switching events contemporaneous with either the death or relocation of the prior preparer. It also only includes the last observation before a client changes its preparer and the first observation after a client changes its preparer. Relocations are defined based on moving personal residences to a new zip code at least 75 miles away. Please see Section 3.2 for further details.

Table 10: Estimates of within-firm covariances

Years between tax returns	Same preparer		Different preparers		Estimate of preparer variance		Estimate of preparer std. dev.
1	0.0890	(0.0005)	0.0720	(0.0015)	0.0170	(0.0016)	0.1303
2	0.0731	(0.0008)	0.0554	(0.0017)	0.0177	(0.0018)	0.1330
3	0.0697	(0.0009)	0.0459	(0.0017)	0.0238	(0.0019)	0.1543
4	0.0666	(0.0012)	0.0419	(0.0018)	0.0247	(0.0022)	0.1570
5	0.0653	(0.0014)	0.0396	(0.0021)	0.0257	(0.0026)	0.1603
6	0.0632	(0.0016)	0.0346	(0.0020)	0.0287	(0.0025)	0.1693
7	0.0593	(0.0017)	0.0324	(0.0021)	0.0269	(0.0026)	0.1639
8	0.0544	(0.0018)	0.0265	(0.0021)	0.0279	(0.0027)	0.1671
9	0.0506	(0.0021)	0.0227	(0.0023)	0.0278	(0.0032)	0.1669
10	0.0530	(0.0024)	0.0240	(0.0025)	0.0289	(0.0034)	0.1701
11	0.0498	(0.0030)	0.0238	(0.0031)	0.0259	(0.0043)	0.1609
12	0.0592	(0.0046)	0.0350	(0.0046)	0.0242	(0.0064)	0.1555
13	0.0604	(0.0066)	0.0329	(0.0064)	0.0275	(0.0093)	0.1659
weighted average					0.0217		0.1472

Notes: This table reports the estimates from an analysis of variance of carryback take-up. Standard errors are block bootstrapped with 1,000 replications and are reported in parentheses. The estimates are based on the residual $T_{ijt} = \text{I(carryback take-up)} - W_{it}\pi$ where W_{it} are client observables. The coefficients π are estimated from a regression of take-up on client observables and a preparer fixed effect. Client observables include deciles in the eligible carryback refund, deciles in revenue, deciles in assets, deciles in payroll, state-year fixed effects, and industry-year fixed effects. We estimate covariances for pairs of observations from the same firm. We differentiate between pairs by the length of time between observations and by whether the observations share the same preparer. We estimate the preparer variance as the difference between covariances for observations that do and do not share the same preparer. We estimate the preparer standard deviation as the square root of the preparer variance. We compute the weighted average based on the number of pairs per covariance estimate. Please see Section 3.3 for further details.

Figure A.1: Claimed carryback refunds vs. simulated carryback refunds



Notes: This figure compares claimed carryback refunds to simulated carryback refunds. The sample includes all firms that (i) report a net operating loss, (ii) have simulated eligible refunds of at least $1,000, and (iii) claim (and receive) a carryback refund. The figure plots mean log(claimed carryback refund) by vigintiles in log(simulated carryback refund). It also reports the slope coefficient and the R-squared from a regression of log(claimed carryback refund) on log(simulated carryback refund). The simulation of eligible carryback refunds are based on each firm's tax loss, historical tax liability, and the policy rules for carryback refunds. Please see Appendix A for further details.

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