

The Costs of Corporate Tax Complexity
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Online Appendix

Online Appendix for “The Costs of Corporate Tax Complexity”

A. 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 the 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.

B. 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 Appendix Table A1. 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 Appendix Table A1. 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. Appendix Figure A1 plots means of $\log(\text{claimed refunds})$ by vigintiles of $\log(\text{simulated refunds})$. A univariate regression of $\log(\text{claimed refunds})$ on $\log(\text{simulated refunds})$ yields a coefficient of 0.9636 and an R^2 of 0.9336. These results imply that we simulate the eligible carryback refunds with a high degree of accuracy.

B1. 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. LARGE FIRMS AND TAX CODE INTERACTIONS

Because large firms are more sophisticated in developing their own tax planning strategies, they may be less subject to agency problems between the firm and hired experts. However, large firms are more likely to face other costs arising from the complexity of the tax code and how it is administered. In this section, we consider two potential factors. First, interactions between the carryback and other tax code provisions may alter the cost-benefit calculation in favor of the carryforward, either by reducing the value of the carryback or by increasing the cost of filing a claim. Second, if a prior tax return is currently under audit, a taxpayer may choose to forgo the carryback to avoid interfering with the audit. Even if these considerations only apply to a small share of firms, these costs may prove critical for designing policy that uses the code to promote social priorities because the largest firms account for the majority of dollars at stake.

INTERACTIONS WITH OTHER TAX CODE PROVISIONS. — We separately analyze two sets of tax code provisions that generate additional complexity through interactions with carrybacks: (1) the corporate alternative minimum tax (AMT) and (2) a basket of tax credits and offset provisions. Both the AMT and tax credits contribute significantly to estimated costs of tax return filing and estimated time to prepare a corporate tax return, making them likely to contribute to the complexity of a large corporation’s tax return. These provisions apply after the firm computes taxable income but before the firm computes total tax, thus interacting with loss offsets after economic costs have been taken into account. Claiming a carryback requires a firm to recompute its AMT liability and eligibility for tax credits claimed in the past, thus increasing the cost of claiming and possibly reducing the size of a refund.

Figure A2A documents carryback claiming behavior by firm size, while separating firms that have never paid the AMT from firms that have paid the AMT at some time (see Appendix Table A5 for analogous regressions). The statistic above the bars reports the share of observations in that size bin that have paid the AMT at some time. Two facts emerge. First, the AMT is not relevant for most firms in the economy. Less than ten percent of firms in the bottom five deciles ever pay AMT. For these firms, interactions with the AMT are unlikely to

explain low refund take-up. In contrast, more than half the firms in the top decile pay some corporate AMT, with this figure reaching 77 percent for the top two percent of firms. Second, in terms of carryback take-up, we see that AMT payers are considerably less likely to claim a refund, and this gap in claiming rates is widest for firms at the top of the firm size distribution. For the top two percent of firms, the gap is approximately 20 percentage points, which suggests that AMT interactions may be a pivotal determinant of refund take-up among large firms.³³

Figure A2B plots the share of refunds unclaimed for firms that have never claimed other tax credits and for firms that have claimed other tax credits at some time. The statistic above the bars reports the share of observations in that size bin that have never claimed other tax credits. We consider all credits claimed on Form 1120, Schedule J, Line 5, including the foreign tax credit and all credits from the general business credit claimed on Form 3800. In 2016, the general business credit included 37 different credits, the majority of which are claimed via distinct forms and apply to highly specialized activities (e.g., the Mine Rescue Team Training credit or the Distilled Spirits credit). Appendix D lists these credits and provides short descriptions.

As for the AMT, only in the top few deciles of the firm size distribution do we see a significant share of firms claiming other tax credits. Less than ten percent of firms in the bottom five deciles ever claim these other credits. Thus, interactions with other provisions are unlikely to explain low take-up for these firms. In contrast, two-thirds of firms in the top two percent claim other credits. Among firms who do claim other credits, we see consistently *higher* rates of carryback claims. The effects are smaller than for the AMT but remain notable.

This finding contrasts with the pattern for AMT payers, who showed lower rates of carryback claiming. We interpret these results as suggesting some complementarity in claiming complicated credits and claiming the carryback refund. One policy implication of this finding is that the incidence of carryback expansions may fall on firms that have invested in more sophisticated tax planning operations. It is unclear whether policymakers intend to target these firms when pursuing fiscal stimulus through these provisions.

³³One potential explanation for this fact is that net operating losses can only be used to offset ninety percent of AMT income, which can reduce the value of a refund. Unfortunately, our data do not permit us to decompose post-adjustment tax liabilities into regular and AMT liability. We thank Andrew Lyon for this suggestion.

ANECDOTAL EVIDENCE OF CORPORATE TAX COMPLEXITY. — As a final piece of evidence that complements our administrative data, we turn to public company filings to ask how firms talk about their burden as taxpayers when communicating with shareholders. Using only data from Compustat, we identify a set of firms that are likely to have had carryback opportunities during the 2009 recession. These firms report large financial losses in 2009 and large cumulative profits over the prior five years.³⁴ We hand collect quotes from annual filings that describe their tax positions with respect to net operating losses.

To protect taxpayer confidentiality, we cannot link these statements to our administrative data set. By way of comparison, within our administrative data the claim rate for public firms is 43% versus 37% for non-public firms. The claim rate for the largest non-public firms (i.e., those in the top 2% ranked by mean sales) is slightly higher at 45%. Thus, despite differences in disclosure regime and ownership structure, the considerations relevant for the claiming behavior of public firms appear similar to those for the largest private firms.

The first quote comes from Rite-Aid’s 10-K filing:

The federal income tax returns are closed to examination by the Internal Revenue Service (IRS) through fiscal 2005. However, **any net operating losses that were generated in these prior closed years may be subject to examination by the IRS upon utilization**...Additionally the IRS completed the examination of the consolidated U.S. income tax return for Brooks Eckerd for the fiscal years 2004 and 2005. A revenue agent report (RAR) was received in the fourth quarter of fiscal 2010. **The company is appealing these audit results**...State income tax returns are generally subject to examination for a period of three to five years after filing of the respective return. However, as a result of reporting IRS audit adjustments, the Company has **statutes open in some states from fiscal 2003**. (emphasis added)

This example highlights three key points. First, federal tax returns for the largest companies are audited every year and often remain open to examination and negotiation for many years. Here, Rite-Aid reports in 2009 having tax returns open back to 2006 for federal purposes and to 2003 for state tax purposes. Second,

³⁴The sample selection begins with all Compustat filings for the years 2004–2009 for firms incorporated in the U.S. We then restrict to firms with income before extraordinary items (Compustat item IB) less than \$-100M in 2009 and total taxes paid (Compustat item TXT) in 2004, 2005, and 2006 exceeding \$100M.

the concluding position of these audits is often contested. Companies frequently appeal audit results in order to claim disallowed deductions or propose alternative interpretations of the code. Third, if the use of a net operating loss either for carryforward or carryback triggers an adjustment on a closed return, the IRS may reopen that return to evaluate the net operating loss claim. Relative to carryforwards, carryback claims are more likely to interfere with ongoing audits, since they entail amendments to past returns. Such interference may considerably amplify the cost of claiming a carryback for large firms.

The second quote comes from Marriott's 10-K filing:

We filed a refund claim relating to 2000 and 2001. The IRS disallowed the claims, and in July 2009, we protested the disallowance. This issue is pending in the IRS Appeals Division.

This example illustrates that a carryback claim can take years to be resolved. Conversations with former tax accountants suggest such cases are rare but possible. Presumably the cost of legal and accounting services needed to protest disallowed claims would prevent a firm from pursuing small refunds. The example also highlights the uncertainty that taxpayers and accountants may face when filing for a refund.

The third quote comes from Chesapeake's 10-K filing:

At December 31, 2009, Chesapeake had federal income tax net operating loss (NOL) carryforwards and carrybacks of approximately \$889 million and \$681 million, respectively. Additionally, we had \$3 million of alternative minimum tax (AMT) NOL carryforwards available as a deduction against future AMT income and \$333 million of AMT NOL carrybacks to be used against prior year AMT income. The NOL carryforwards expire from 2019 through 2029. **The value of these carryforwards depends on the ability of Chesapeake to generate taxable income.** (emphasis added)

This example shows the added complexity created by the corporate AMT, which requires firms to keep separate accounts for regular tax and AMT, including accounting for accumulated stocks of carryforwards and potential carrybacks. The filing does not report whether Chesapeake in fact claimed the carrybacks. The quote also shows that firms recognize that carryforwards can expire unclaimed and advise investors to account for this possibility in valuing deferred tax assets.

The last quote comes from Applied Materials's 10-K filing:

During fiscal 2010, Applied received a U.S. federal income tax refund of approximately **\$130 million for the carryback of Applied's net operating loss from fiscal 2009 to fiscal 2005**. (emphasis added)

Indeed, some firms did benefit from the extended carryback window and claimed substantial refunds. During the most severe disruption in financial markets since the Great Depression, this program provided Applied Materials with a large liquidity infusion. The example thus highlights the potential for this stimulus program to support the economy in times of economic weakness and points to why reforms that enable more eligible firms to benefit may be desirable.

The anecdotes presented in this section provide context for the literature that has shown carryback incentives can explain reporting and operating behavior for public companies. Maydew (1997) finds that the Tax Reform Act of 1986 induced firms to shift income intertemporally to generate larger carryback refunds. Erickson, Heitzman and Zhang (2013) expand this idea to document refund-motivated income shifting in a sample of companies between 1981 and 2010. While these studies observe heterogeneous patterns across firms due to potential refund size and the presence of financial constraints, differences in tax compliance costs may also affect income shifting.

D. BACKGROUND ON CORPORATE TAX CREDITS (TAX YEAR 2016)

- 1) **Foreign Tax Credit:** An FTC is given to U.S. corporations that pay income, war profits, or excess profits taxes to foreign countries or U.S. possessions. Excess foreign tax credits can either be carried back 1 year or carried forward 10 years to offset taxes in the same category (Form 1118, Line 5a).
- 2) **Qualified Electric Vehicle Credit:** This tax credit can be used to reduce taxable income for vehicles that are “propelled to a significant extent by an electric motor that draws electricity from a battery that can be recharged from an external source of electricity.” There was a maximum of \$2,500 in recent years per vehicle, and the credit could be used for vehicles used for both business and personal use (Form 8834, Line 5b).
- 3) **American Samoa Economic Development Credit:** The American Samoa credit can be used to reduce taxable income for qualified production that takes place in American Samoa (Form 5735, Line 5b).
- 4) **Investment Tax Credit:** The Investment Tax Credit is a credit that can be used for qualifying advanced coal projects, qualifying gasification projects, qualifying advanced energy projects (solar, wind, geothermal), rehabilitating older buildings, or the use of qualifying “energy property” such as fuel cells or wind turbines (Form 3468, line 5c).
- 5) **Credit for Increasing Research Activities:** The research credit is for research that is undertaken for discovering information that is “technological in nature, and its application must be intended for use in developing a new or improved business component of the taxpayer.” The research must relate to a new or improved function, performance, reliability, or quality (Form 6765, line 5c).
- 6) **Low-Income Housing Credit:** The LIHC is a tax credit for new or rehabilitated affordable, residential rental buildings. A certain percentage of the units in each building are “reserved” for renters with incomes below a certain threshold with the rent capped for those units (Form 8586, line 5c).
- 7) **Disabled Access Credit:** Taken by certain small businesses for reasonable expenses that they incur for the purpose of providing access to persons with disabilities. These expenses include removing barriers that prevent a business from being accessible to persons with disabilities, providing interpreters and readers, or purchasing or modifying equipment (Form 8826, line 5c).
- 8) **Renewable Electricity, Refined Coal, and Indian Coal Production Credit:** This tax credit is for renewable energy products including wind

facilities, biomass facilities, geothermal energy facilities, solar energy facilities, landfill gas or trash facilities, and small irrigation power facilities. The credit can also be used for refined coal production or coal produced from coal reserves owned by an Indian tribe or held in trust by the U.S. for the benefit of an Indian tribe (Form 8835, line 5c).

- 9) **Indian Employment Credit:** This credit is meant to give businesses an incentive to hire individuals who live on or near Indian reservations. The tax credit is for employees who are enrolled members of an Indian tribe or the spouse of an enrolled member, who make less the \$45,000, who perform most of their services within an Indian reservation and have their home near or on that reservation (Form 8845, line 5c).
- 10) **Orphan Drug Credit:** This credit is for 50 percent of qualified clinical testing expenses paid or incurred during the tax year for rare diseases or conditions (those that affect less than 200,000 people in the U.S.) or for diseases or conditions “for which there is no reasonable expectation of recovering the cost of developing and making available a drug in the United States for the disease from sales of the drug in the United States” (Form 8820, line 5c).
- 11) **New Markets Tax Credit:** The NMTC allows corporations to receive a credit (39 percent over 7 years) against income taxes for making equity investments in community development entities (CDEs) that are expected to result in the creation of jobs and material improvement in the lives of residents of low-income communities where at least 20 percent of individuals live below the poverty line or the median family income does not exceed 80 percent of the median family income (Form 8874, line 5c).
- 12) **Small Employer Pension Plan Startup Costs Credit:** For small employers (those with fewer than 100 employees), this credit is for 50 percent of qualified startup costs (up to \$500) incurred in establishing and administering an eligible employer pension plan (Form 8881, line 5c).
- 13) **Credit for Employer-Provided Child Care Facilities and Services:** This credit is for 25 percent of qualified childcare facility expenditures plus 10 percent of qualified resource and referral expenditures up to \$150,000. These expenditures include acquiring, constructing, rehabilitating, or expanding property that will be used as part of a childcare facility, operating a childcare facility, or expenses as part of a contract with a facility to provide childcare services to employees of the taxpayer (Form 8882, line 5c).
- 14) **Biodiesel and Renewable Diesel Fuels Credit:** The biodiesel credit is \$1.00 for each gallon of biodiesel or renewable diesel that is either used by the taxpayer in the production of a biodiesel mixture, used as fuel, or sold by the taxpayer and placed in a fuel tank. A credit of 10 cents can be taken

by small agri-biodiesel producers for each gallon of agri-biodiesel produced (Form 8864, line 5c).

- 15) **Low Sulfur Diesel Fuel Production Credit:** The credit is generally 5 cents for every gallon of low sulfur diesel fuel produced by a small business refiner (Form 8896, line 5c).
- 16) **Distilled Spirits Credit:** For wholesalers, the Distilled Spirits credit is a credit of 8 cents per case of bottled distilled spirits (Form 8906, line 5c).
- 17) **Nonconventional Source Fuel Credit:** The Nonconventional Source Fuel Credit is a credit of \$3 per barrel-of-oil equivalent for coke or coke gas that was produced and sold. The fuel could not have been produced in a facility that produces coke or coke gas from petroleum-based products (line 5c, currently just a carryforward).
- 18) **Energy Efficient Home Credit:** The Energy Efficient Home Credit is for contractors who construct an energy efficient home. The credit is \$2,000 for homes that meet a 50 percent energy efficient standard and \$1,000 for homes that meet a 30 percent energy efficient standard (Form 8908, line 5c).
- 19) **Energy Efficient Appliance Credit:** The Energy Efficient Appliance Credit is for producers of energy efficient appliances, including dishwashers, clothes washers, and refrigerators. There was a limit of \$25 million dollars or 4 percent of average gross receipts per taxpayer (line 5c, currently just a carryforward).
- 20) **Alternative Motor Vehicle Credit:** The Alternative Motor Vehicle Credit is a credit for four-wheeled vehicles that are powered by fuel cells (Form 8910, line 5c).
- 21) **Alternative Fuel Vehicle Refueling Property Credit:** This credit is for property that is used to store or dispense an alternative fuel into the fuel tank of a motor vehicle or recharge an electric car. The credit is for 30 percent of the cost up to \$30,000 per location for each business (Form 8911, line 5c).
- 22) **Mine Rescue Team Training Credit:** For businesses that employ miners in underground mines, this credit is for 20 percent of the cost of training program costs paid to train qualifying full-time employees (up to \$50,000 per employee) (Form 8923, line 5c).
- 23) **Agricultural Chemicals Security Credit:** This credit is for manufacturers or sellers of agricultural products for costs paid to protect specific agricultural chemicals including fertilizers and pesticides. The credit is for 30 percent of the costs up to \$100,000 per facility and \$2,000,000 per taxpayer (carryforward, line 5c).

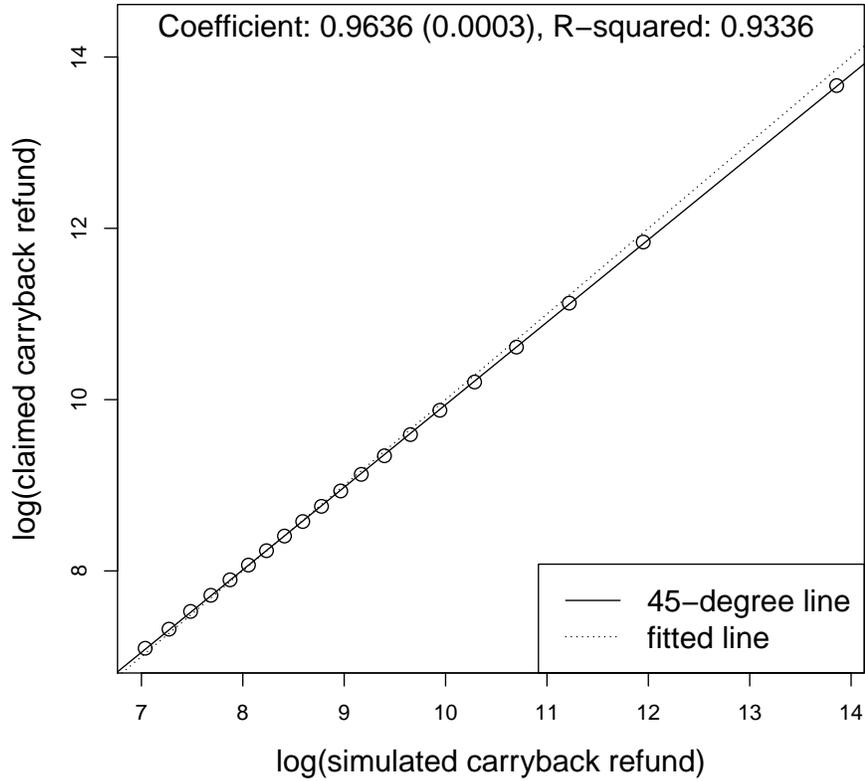
- 24) **Credit for Employer Differential Wage Payments:** This credit is for differential wage payments (all or a portion of the wages the employee would have received from the employer if the employee were working for the employer) made by employers to employees who are performing active duty service in the U.S. armed forces. Before 2015, this credit only applied to qualified small businesses. The credit is for 20 percent of up to \$20,000 of payments paid to each employee (Form 8932, line 5c).
- 25) **Carbon Dioxide Sequestration Credit:** This credit is for carbon dioxide that is captured and either disposed of or used in an enhanced oil or natural gas recovery project (Form 8933, line 5c).
- 26) **Qualified Plug-In Electric Drive Motor Vehicle Credit:** For new four-wheeled vehicles that are propelled to a significant extent by an electric motor that draws electricity from a battery, or two-wheeled vehicles that go at least 45 miles per hour and are propelled to a significant extent by an electric motor (Form 8936, line 5c).
- 27) **Qualified Plug-In Electric Vehicle Credit:** For any electric vehicle passive activity credit from prior years (Line 5c, currently just a carryforward).
- 28) **New Hire Retention Credit:** The New Hire Retention Credit was for businesses that hired an employee between February 2010 and January 2011 if the employee worked for at least 52 weeks and did not have their wages decrease significantly during the second 26 weeks. The credit was for 6.2 percent of the employees' wages, but could not be larger than \$1,000 (Line 5c, currently just a carryforward).
- 29) **General Credits from an Electing Large Partnership:** This is a partner's share of General Credits from a large partnership, excluding the Low-Income Housing Credit, the Rehabilitation Credit from Rental Real Estate, and the Foreign Tax Credit (Schedule K-1 (Form 1065-B), line 5c).
- 30) **Credit to Holders of Tax Credit Bonds:** This is a tax credit that holders of certain bonds receive in addition to or instead of receiving regular interest payments. These bonds include clean renewable energy bonds, energy conservation bonds, zone academy bonds, school construction bonds, and Build America bonds. Holders have to hold the bond on particular allowance dates in order to claim the credit (Form 8912, line 5e).
- 31) **Enhanced Oil Recovery Credit:** This credit is for 15 percent of the costs of any project that is expected to result in more than an insignificant increase in the amount of oil that will be recovered, or any amount paid to construct an Alaska natural gas plant (Form 8830, line 5c). Carryforwards from credits related to the Trans-Alaska pipeline liability fund; employers affected by Hurricane Katrina, Rita, or Wilma; the Hurricane Katrina

housing credit; affected Midwestern disaster area employers; the employer tax credit; contributions to selected community development corporations; welfare-to-work; and the New York Liberty Zone; as well as for some credits paid in the mid-2000s are included on the same line.

- 32) **Work Opportunity Credit:** The Work Opportunity Credit is a credit for the wages paid to targeted group employees, including long-term family assistance recipients, TANF recipients, veterans, ex-felons, SNAP recipients, SSI recipients, long-term unemployment recipients, summer youth employees, designated community residents, and vocational rehabilitation referrals. The maximum amount the credit can cover per employee is based on the type of targeted group employee and the number of hours worked (Form 5884, line 5c).
- 33) **Biofuel Producer Credit:** This is a tax credit for second generation biofuel (a liquid fuel that is derived from feedstocks) that is sold by the producer for use in the buyer's trade or business or to a buyer who sells the biofuel at retail. The credit is for \$1.01 per gallon sold (Form 6478, line 5c).
- 34) **Credit for Employer Social Security and Medicare Taxes Paid on Certain Employee Tips:** This credit is for food and beverage establishments that pay social security and medicare taxes on employee tips. The credit only includes taxes paid on tips above the federal minimum wage of \$5.15 per hour that was in effect at the beginning of 2007 (Form 8846, line 5c).
- 35) **Qualified Railroad Track Maintenance Credit:** The RTMC can be claimed by select taxpayers for expenditures for maintaining, repairing, and improving a railroad structure (Form 8900, line 5c).
- 36) **Small Employer Health Insurance Premiums Credit:** This credit is for eligible small employers for premiums paid for certain health insurance coverage provided to employees enrolled in a health plan offered through the Small Business Health Options Program. In recent years, the credit is only available for a period of 2 consecutive tax years (Form 8941, line 5c).
- 37) **Credit for Prior Year Minimum Tax—Corporations:** This is a credit for minimum tax paid in the year prior, or minimum tax carryforwards from previous years. This can be used to offset current-year income above the minimum tax (Form 8827, line 5d).
- 38) **Credit for Federal Tax Paid on Fuels:** This is a refundable tax credit for certain uses of fuels, including farm use, export, off-highway business use, use in a commercial fishing boat, use in local buses, use by nonprofit education organizations, use by states or local governments, and for use by military aircraft (Form 4136, line 19b).

E. APPENDIX FIGURES AND TABLES

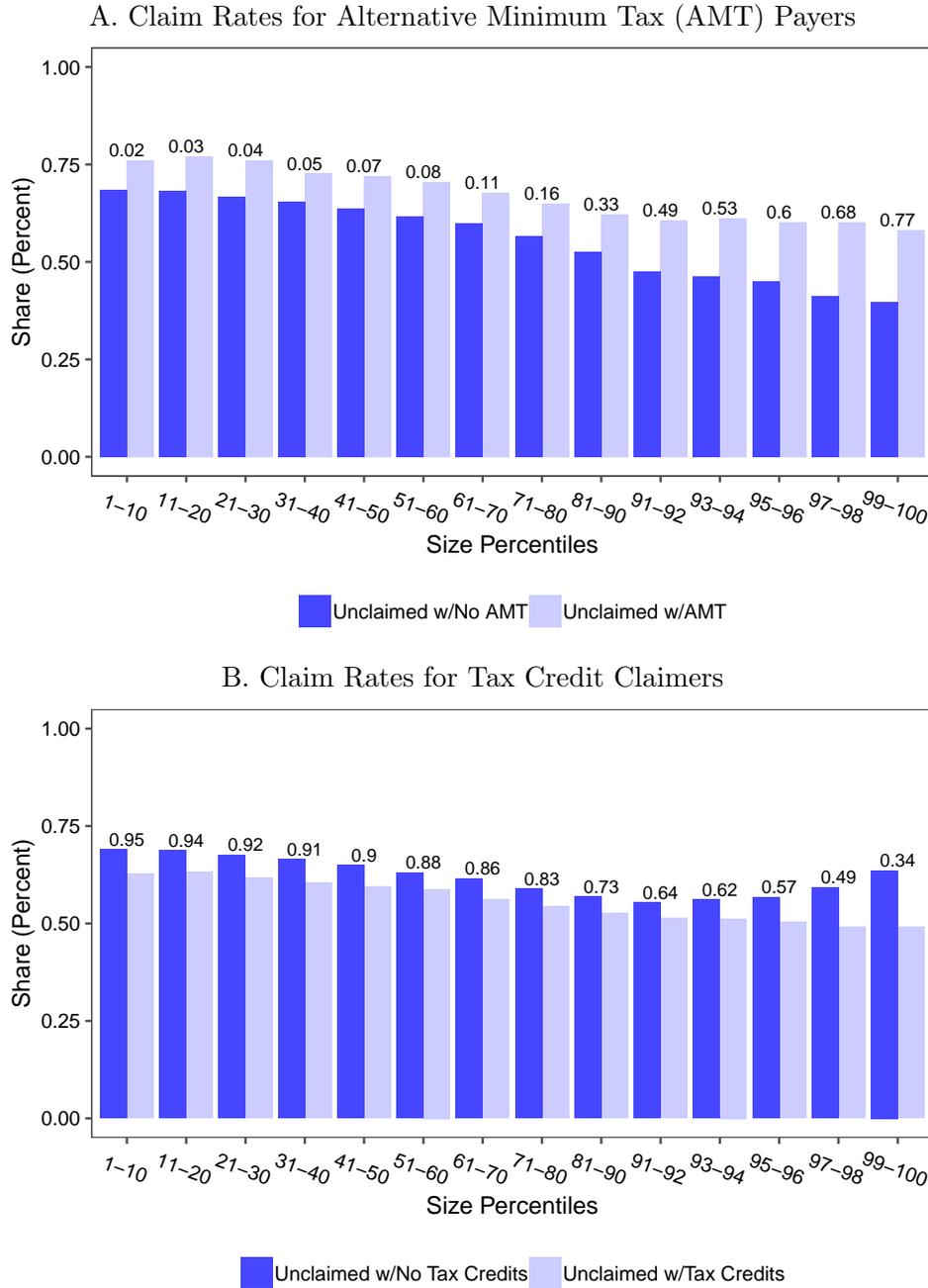
Figure A1. : Claimed carryback refunds vs. simulated carryback refunds



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.

Source: Author's calculations

Figure A2. : Unclaimed Refunds and Tax Return Complexity (Population, 1998-2011)



Notes: This figure documents carryback claiming behavior by firm size and alternative measures of tax return complexity. Panel A plots the share of refunds unclaimed for firms that have never paid the alternative minimum tax (AMT) and for firms that have paid the AMT at some time. The statistic above the bars reports the share of observations in that size bin that have paid the AMT at some time. Panel B plots the share of refunds unclaimed for firms that have never claimed other tax credits and for firms that have claimed other tax credits at some time. The statistic above the bars reports the share of observations in that size bin that have never claimed other tax credits. The sample includes firms that have the option to claim a carryback refund between 1998 and 2011. We exclude firms with mean revenue and mean payroll less than \$100,000. Size bins 1 through 9 demarcate the first nine deciles of the main analysis sample firm size distribution in mean sales. Size bins 10 through 14 divide the tenth decile into 2-percent bins.

Source: Author's calculations

Table A1—: Legislative Background on Tax Loss Carrybacks and Carryforwards, 1998-2011

Ending fiscal period ^a	Carryback	Carryforward	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.

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

Source: Bulletins and revenue procedures released by the Internal Revenue Service

Table A2—: Claim Rates for Stimulus Refunds

	LHS Variable is I(Claimed Refund)					
	(1)	(2)	(3)	(4)	(5)	(6)
Bigger Refund	0.0576 (0.0012)	0.0370 (0.0012)	0.0298 (0.0012)			
>20% Bigger				0.0324 (0.0013)	0.0131 (0.0013)	0.0070 (0.0013)
$\log(\widehat{\text{Refund}})$		0.0791 (0.0005)	0.1089 (0.0004)		0.0800 (0.0003)	0.1099 (0.0004)
Year FE	No	Yes	Yes	No	Yes	Yes
Firm controls	No	No	Yes	No	No	Yes
Observations	1,244,729	1,244,729	1,244,729	1,244,729	1,244,729	1,244,729

Notes: This table reports coefficients from regressions of carryback take-up on refund characteristics associated with stimulus policies. The variable Bigger Refund is an indicator for whether a simulated refund is larger because of expansions in the carryback window either during the 2001-2002 or 2008-2009 periods. The variable > 20% Bigger is an indicator further restricted to those refunds where the stimulus policy causes the refund to be at least 20% larger than it would have been in normal times. Firm controls include $\log(\widehat{\text{eligible refund}})$, $\log(\widehat{\text{revenue}})$, $\log(\widehat{\text{assets}})$, and $\log(\widehat{\text{EBITDA}})$, and an indicator for negative EBITDA. Standard errors are clustered at the firm level.

Source: Author's calculations

Table A3—: Percent of Firms below Alternative Thresholds for NPV_f/NPV_b

Discount rate	Threshold for NPV_f/NPV_b			
	100%	90%	80%	70%
3%	75	42	32	28
5%	77	50	36	30
7%	79	57	41	33
9%	81	61	46	36

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. The columns consider different maximum thresholds and the rows consider different discount rates 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. Our baseline result in the main text is highlighted in bold.

Source: Author's calculations

Table A4—: Tabulation of External Preparer Characteristics by Size Group (Population, 1998-2011)

Percentile	Preparer Characteristics			Refund Facts					Refund Client Characteristics		
	Preparer <i>N</i>	Client <i>N</i>	Clients/Year	Eligible?	Claim?	Always?	Never?	Refund	Sales	Payroll	EBITDA
1-20	4.72	41.6	8.30	0.179	0.310	0.063	0.394	369K	47M	9.1M	2.5M
21-40	6.56	129	19.6	0.052	0.354	0.056	0.279	103K	14M	2.9M	552K
41-60	8.34	262	31.3	0.033	0.373	0.042	0.223	56.2K	8.1M	1.9M	241K
61-80	10.6	508	47.4	0.021	0.371	0.032	0.202	41.8K	7.0M	1.7M	186K
81-100	14.4	1536	98.1	0.012	0.329	0.016	0.220	31.3K	4.9M	1.2M	149K
Overall	8.92	495	40.9	0.059	0.347	0.042	0.264	121K	16M	3.4M	719K

Notes: This table presents statistics for external preparer characteristics with preparers grouped and ordered by the average number of clients they have per year. The underlying data are the 88,267 preparers with observations in the main analysis sample who also have at least three firm-year observations in the main analysis sample. Except where otherwise noted, the reported statistics are means. Preparer *N* and Client *N* are the number of carryback-eligible observations and the number of prepared returns (including eligible and ineligible observations) for each preparer during years with at least one carryback-eligible client. Clients/Year is the average number of prepared returns per year. Eligible? is the share of preparer's clients who are eligible for a refund in the years with at least one carryback-eligible client. Claim? is an indicator for whether the refund was claimed. Always? is an indicator for whether a preparer's clients always claims a refund when eligible. Never? is an indicator for whether a preparer's clients never claim a refund when eligible. Refund is the average simulated eligible refund among carryback-eligible clients. Sales, Payroll, and EBITDA are client characteristics in the year of the loss event for the preparer's refund-eligible clients. All dollar values are normalized to 2013 price levels.

Source: Author's calculations

Table A5—: Unclaimed Refunds and Tax Return Complexity (Population, 1998-2011)

	LHS Variable is I(Claimed Refund)					
	(1) All Firms	(2) All Firms	(3) Top 2%	(4) Top 2%	(5) All Firms	(6) Top 2%
I(AMT)	-0.0683 (0.0016)	-0.1606 (0.0016)	-0.2006 (0.0085)	-0.1301 (0.0082)	-0.1696 (0.0019)	-0.1571 (0.0125)
I(Credit)	0.1399 (0.0017)	0.0781 (0.0017)	0.1872 (0.0072)	0.1173 (0.0070)	0.0671 (0.0021)	0.0792 (0.0143)
I(AMT) * I(Credit)					0.0296 (0.0034)	0.0501 (0.0161)
Year FE	No	Yes	No	Yes	Yes	Yes
Firm controls	No	Yes	No	Yes	Yes	Yes
Number of observations	1,244,729	1,244,729	24,852	24,852	1,244,729	24,852

Notes: This table reports coefficients from regressions of carryback take-up on alternative measures of tax return complexity. Complexity measures are defined as in Figure A2. Firm controls are defined as in Table 4.

Source: Author's calculations