Taxes and Product Market Outcomes: Asymmetric Effects of Tax Cuts on Winners v. Losers

Michelle Hanlon
MIT Sloan School of Management
mhanlon@mit.edu

Nemit Shroff
MIT Sloan School of Management
shroff@mit.edu

Rachel Yoon
MIT Sloan School of Management
rsyoon@mit.edu

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ABSTRACT

This paper examines whether the differential effect of taxes on profitable versus loss-making firms affects their product prices and market share. Using data that allow for direct pricing and product tests - airline route and pricing data - we find evidence consistent with differential consequences of tax rate cuts for profitable versus loss firms. Specifically, after a tax rate cut, profitable airlines lower prices and enter markets where their dominant competitors include a financially constrained tax-loss airline. In addition, the data reveal that tax-loss airlines lose market share and exit routes after the tax rate cut. Our results are economically meaningful, we find that airlines in a tax-loss position lose 3.3 percentage points in market share following a significant cut in corporate tax rates in routes where loss-making airlines collectively have higher market share. The evidence is consistent with tax rule changes affecting product markets and product market competition, and the effects vary based on tax status of the competitors.

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1. Introduction

The tax code in the United States (U.S.), like that in many other countries, treats corporate losses differently than corporate profits. Tax treatment is asymmetric: firms with positive taxable income are typically liable to pay a percentage of their taxable income in tax, while firms with zero or negative taxable income do not receive a tax refund (unless it is a refund of prior taxes paid, discussed further below). Considering the fact that a large number of firms in the U.S. report negative taxable income, in other words they are loss corporations (Edgerton 2010; IRS 2017), understanding whether and why taxation has a differential effect on the behavior of profitable and loss-making firms is important (Hanlon and Heitzman, 2010). Indeed, several studies examine the effect of asymmetry in the tax code on firm behavior. For example, prior research examines the impact of the tax loss asymmetry on capital structure decisions (Mackie-Mason 1990; Graham 2000), the cost of capital and investment incentives (Devereux, Keen, and Schiantarelli 1994; Edgerton 2010; Zwick and Mahon 2017), mergers and acquisitions (M&A) (Auerbach and Reishus 1988), and risk-taking (Ljungqvist, Zhang, and Zuo 2017; Langenmayr and Lester 2018). In our paper, we examine the effect of tax loss asymmetry on product market outcomes and competition.

We hypothesize that tax cuts heighten a profitable firm's incentive and ability to lower prices and overall industry profits, which then drives competitors to exit the market – a strategy named "predation" by Fudenberg and Tirole (1986) and Bolton and Scharfstein (1990). Specifically, prior research finds that cash-rich firms can force economically efficient but financially constrained rivals out of business by lowering industry profits and reducing their rivals' cash flows (Chevalier 1995a, b; Zingales 1998; Barrot 2016; Bernard 2016). Since tax cuts increase the after-tax cash flows of firms with positive taxable income but not those of loss firms, profitable firms can use their cash tax savings to cut prices and gain market share from their loss-making rivals, especially those that are financially constrained and unable to lower prices in response to the actions of their profit-making competitors.

Identifying the effect of tax changes on firm decision-making and product market outcomes is challenging because tax policy changes typically occur in response to (or in anticipation of) changing economic conditions, at times making it difficult to distinguish tax effects from business cycle effects. In addition, there is a lack of detailed price and product market data available for a broad cross-section of firms over periods when tax changes have been implemented. To address the above challenges, we examine how U.S. domestic airlines responded to the Tax Reform Act of 1986 (TRA), which at a high level cut the top corporate income tax rate from 46% to 34% (we describe the details more below). A primary benefit of the airline setting is that it provides detailed route-level price and quantity data dating back to the early 1980s, when one of the largest U.S. tax cuts was enacted. Further, in the airline setting, each route can be considered a separate product market with different sets of competing firms, some with tax-loss positions and others without (Azar, Schmalz, and Tecu 2018). The granular data on price and quantity in each market (i.e., route) allows us to devise a research design that examines how an airline responds to the TRA by exploiting cross-sectional variation in the characteristics of markets that the airline operates in while filtering out the effect of confounding factors associated with the passage of the TRA. As such the TRA and the airline setting allow us to compare how firms offering an identical service – air transport between two cities in the same period – but with different tax positions change their price and market share in response to the TRA.[1]

[1] The 2017 Tax Cuts and Jobs Act (TCJA) could serve as another shock to corporate tax rates that we could in principle exploit to test our research question. However, none of the publicly listed airlines were in a loss position around the passage of the TCJA, making the setting unviable to test our research question.

We predict that profitable airlines respond to the passage of the TRA by reducing ticket prices relative to loss-making airlines, particularly in routes where loss-making airlines have greater market share (and thus profitable airlines have more to gain by lowering price). We then predict that the wedge in the ticket prices of flights operated by airlines with positive vs. negative taxable income leads to an increase in the market share of profitable airlines at the expense of loss airlines. We employ a research design that can be illustrated with the following example. Suppose that United Airlines and Jet Blue operate flights from Boston (BOS) to San Francisco (SFO), and United Airlines and American Airlines operate flights from BOS to Los Angeles (LAX). Further assume that American and United Airlines report positive taxable income while Jet Blue is in a tax loss position. We examine whether United Airlines charges its customers a lower price relative to Jet Blue (a tax loss firm) for BOS-SFO flights following the passage of the TRA, while charging its customers a similar price as American Airlines (a profitable firm) for BOS-LAX flights.[2] We use a difference-in-differences design that includes airline × route and airline × year-quarter fixed effects. Including airline × route fixed effects helps us identify the effect of the TRA on changes in ticket prices or market share, holding the airline and route constant. And including airline × year-quarter fixed effects enables us to exploit cross-sectional variation in the pricing policies of an airline across the routes in which it operates in the same period.

We estimate that the passage of the TRA increases the wedge in the ticket prices of profit vs. loss airlines by 4.2% in routes where loss-making airlines have higher aggregate market share.[3]

[2] We assume that firms incorporate information about the financial position of their competitors into their decision-making. Our analyses use lagged financial statement numbers as independent variables to be consistent with this assumption. Further, several prior studies find that firms incorporate information disclosed in their peers' financial statements when making decisions (see Roychowdhury, Shroff and Verdi (2019) for a review of the evidence in a general context and Bernard (2016) for evidence in the context of predation).

[3] We identify tax-loss firm-years as those that have negative pre-tax income *and* a positive NOL carryforward. Prior research (e.g., Auerbach and Poterba 1987; Hanlon 2003) note that the differences between tax and accounting data result in an under-representation of tax losses. Mills, Newberry, and Novack (2003) use confidential tax return data

Further, we find that airlines in a tax-loss position lose 3.3 percentage points market share following the TRA in routes where loss-making airlines collectively have higher market share. We estimate that the TRA led to a 9.6 percentage point decline in the marginal tax rate (MTR) for the profitable airlines in our sample, implying that each percentage point decline in MTR is associated with a 0.44% increase in the price difference charged by profit- and loss-making airlines for flights operated in the same route in the same period. Similarly, each percentage point decline in the MTR leads to a 0.34 percentage point increase in the market share of profitable airlines. Graphical inspection of parallel trends shows smooth pre-treatment trends in both price and market share for profit- and loss-making airlines, and clear changes in the relative trends in these variables following the TRA. These results are consistent with our hypothesis that tax cuts incentivize profit-making firms to lower prices and gain market share at the expense of their loss-making rivals.

To dig deeper, we investigate whether, post-TRA, profitable airlines are more likely to cut ticket prices in routes in which one of their loss-making rivals is financially constrained. Theory suggests financially constrained firms have greater exposure to predation risk than financially unconstrained firms because the former have fewer resources to survive a price war (Bolton and Scharfstein 1990). We predict that the price wedge between profit- and loss-making airlines will widen in routes that have at least one financially constrained loss-making incumbent, and profit-making airlines will gain market share in these routes.

Consistent with our prediction, we find that the price wedge for flights operated by profit- and loss-making airlines increases by 4.9% following the TRA in route-years in which one of the

and find that screening NOLs using a combination of pretax income and NOL carryforwards significantly reduces measurement error for identifying firm-years with tax loss positions. Notwithstanding, insofar as the measurement error in our classification of firms' tax position does not change post-TRA, our inferences should be largely unaffected.

loss-making incumbent airlines is financially constrained.[4] In contrast, we find no significant change in the price wedge for flights operated by profit- and loss-making airlines when none of the loss-making airlines operating in a route are financially constrained. We also find that profitable airlines gain market share at the expense of loss-making airlines only in route-years in which one of the loss-making incumbent airlines is financially constrained. These results are consistent with the idea that the tax savings from the TRA incentivize profitable airlines to cut prices and prey on their financially constrained loss-making rivals that do not benefit from the TRA and do not have the financial resources to survive a prolonged price war.

Next, we examine changes in *entry* and *exit* patterns of profit- and loss-making airlines in different routes following the TRA.[5] Controlling for route and year-quarter fixed effects, we find that the passage of the TRA is followed by a significant increase in the number of airline entries in routes where loss-making airlines (in aggregate) have greater market share. The increase in entry is entirely driven by profit-making airlines that expect to realize tax savings from the TRA rather than loss-making airlines that do not expect such tax savings. We also find that the passage of the TRA is followed by a significant increase in the number of airline exits in routes where loss-making airlines have greater aggregate market share, but in contrast to the evidence on airline entry, the increase in airline exits is entirely driven by loss-making airlines. These results suggest that, following a tax cut, profitable airlines enter new markets, especially those dominated by loss-making airlines, while loss-making airlines exit these same markets.

[4] Following Zwick and Mahon (2017), we classify an airline as financially constrained in a year if it has not paid a dividend in any of the prior three year and its ratio of cash-to-assets is in the bottom two terciles of the airlines in our sample. Note that the newer text-based measures of financing constraints (e.g., Hoberg and Maksimovic 2015 and Buehlmaier and Whited 2018) are unavailable during our sample period. Further, we recognize that Farre-Mensa and Ljungqvist (2016) provide evidence that existing proxies for financing constraints are not successful at partitioning companies into constrained and unconstrained groups, and acknowledge the limitations of our proxy.

[5] Note that while the analyses of airline ticket prices and market share are conducted at the airline-route-year-quarter level, the analyses of airline entry/exit into routes are conducted at the route-year-quarter level.

Since financially constrained airlines are more susceptible to predation risk, post-TRA, profitable airlines are more likely to enter routes in which an incumbent airline is not only loss-making but also financially constrained. Consistent with our prediction, we find that the increase in entry rates is almost four times greater in routes where at least one of the incumbent loss-making airlines is financially constrained. We also exploit the fact that profitable airlines that are financially constrained prior to the TRA are more likely to benefit from the cash tax savings provided by the TRA. Thus, we predict and find that the increased entry into new routes is entirely driven by the financially constrained profitable airlines while there is no change in the entry rates of financially unconstrained airlines. This result suggests that the TRA relaxes the financing constrained profitable airlines, who then use the tax savings to prey on their loss-making rivals.

In terms of exits, we find that the TRA is followed by an increased rate at which financially constrained airlines that are in a tax-loss position exit markets dominated by loss-making airlines. In contrast, we find no evidence that financially unconstrained airlines, whether they are profit- or loss-making, exhibit an increased propensity to exit markets dominated by loss-making airlines, following the TRA. Overall, our results support the argument that the asymmetric effect of tax cuts on profit- and loss-making firms leads profitable firms to gain market share from their loss-making rivals by preying on them. Further, the benefit of the tax cut is greater for financially constrained profitable firms while the cost of the tax cut is borne by financially constrained loss-making rivals.

Thus far our analyses rely on the airline industry as a laboratory to test the asymmetric effect of taxes on firm behavior and corporate outcomes. A potential concern with this approach is that the evidence from the airline industry might not generalize to the broader economy. Further, although our research design controls for concurrent non-tax factors that affect airline behavior, we recognize that endogeneity might still be a concern. Thus, we move to an entirely different setting to validate our inferences. We use a differences-in-differences design that exploits 62 changes in corporate income tax rates across U.S. states over the period 1996 to 2013 to examine their effect on the market share changes of profit- and loss-making firms (not just airlines) headquartered in these states (we do not have price data in this setting). Our research design compares the change in market share before vs. after a state tax change for firms that differ in terms of their tax position but are headquartered in the same state and operate in the same product market in the same period.

Controlling for firm, year × state, and year × industry fixed effects, we find that a one percentage point decrease in income tax rates leads to a 1.1 to 1.5 percentage point reduction in the market share of loss firms relative to profitable firms. The statistical significance and economic magnitudes of our results are similar when we control for several firm-level time-varying variables such as size, leverage, growth, and define product markets based on different industry groupings, including the Hoberg and Phillips (2010, 2016) 100- and 500-industry classifications. We find that market share changes occur upon implementation of the tax rate change, and we find no evidence of trends prior to treatment. Further, we find that the asymmetric effect of tax changes on the market share of loss- vs. profit-making firms is significantly greater for financially constrained firms. The collective evidence from two orthogonal settings shows that tax cuts lead to a decrease in the market share of tax-loss firms, especially those that are financially constrained. We conduct several robustness tests to mitigate concerns that our results are spurious or sensitive to research design choices.

This paper contributes to the literature on the economic consequences of tax asymmetries (see Hanlon and Heitzman (2010) and Graham (2013) for reviews of the literature). A large and growing number of U.S. corporations report tax losses (Cooper and Knittel 2010), and several prior studies find that loss firms respond differently to changes in tax policy than profitable firms. For example, Edgerton (2010) and Zwick and Mahon (2017) find that tax policy changes have weaker effects on the investment decisions of loss firms and conclude that firms respond to the tax incentives to invest only when the policy generates immediate cash flows for them. We build on this literature by examining, for the first time, the asymmetric treatment of profits and losses in the tax code on product market outcomes. Our findings speak to the importance of considering the differential effect of taxes on profitable and loss-making firms when designing policies and evaluating the ex-post response to tax policy changes.

Our paper also contributes to the literature on the effect of taxes on competitive outcomes. Recent studies find that tax policy, at times, has different effects on product market competitors, which then leads to differences in operating performance and market share. For example, many online retailers did not collect sales tax from the majority of their customers while brick-and-mortar retailers were required to do so. Recent studies find that this practice provided online retailers a competitive advantage at times over traditional retailers (Anderson et al. 2010; Hoopes, Thornock, and Williams 2016; Baugh, Ben-David, and Park 2018). In a more closely related paper to ours, Donohoe, Jang, and Lisowsky (2021) find that the American Jobs Creation Act of 2004 (AJCA) helped U.S. multinational firms (MNCs) gain a competitive edge over their domestic rivals by lowering the tax rate on earnings repatriated from foreign subsidiaries. Donohoe et al. (2021) find that domestic firms experience a decline in performance when their multinational rivals repatriate earnings into the U.S., and suggest that the AJCA may have helped MNCs prey on their domestic rivals. However, Donohoe et al. (2021) caveat that their evidence is indirect since they do not observe prices. Our paper contributes to the literature by showing the differential effects of tax rate cuts on profit vs. loss firms, using granular data on prices in the airline setting.

2. Background and hypotheses

2.1 The Tax Reform Act of 1986

The Tax Reform Act of 1986 was introduced and passed in the House of Representatives in December 1985. It passed the Senate in June 1986 and was signed into law in October 1986 by President Regan. The TRA changed a wide array of aspects of the U.S. Tax Code that can be broadly classified as those affecting 1) individual taxpayers, 2) corporate taxpayers, 3) specific industries or types of income (e.g., taxation of the natural resource, finance, and insurance industries, foreign source income, etc.) and 4) tax shelters (Auerbach and Slemrod 1987).[6] For this paper, the relevant changes were those to the corporate tax law. The TRA lowered the maximum corporate statutory tax rate from 46% to 34%, but simultaneously broadened the tax base by eliminating or restricting some deductions.[7] In addition, the Alternative Minimum Tax was enacted to ensure that companies with 'excessive' deductions would likely still have to pay some tax. Although the TRA was expected to raise revenue from the corporate sector for the U.S. government, ex-post analysis of corporate tax revenues suggests that this did not occur. Poterba (1992) analyzes why corporate tax revenues did not increase and concludes that the main reason is that corporate profitability went down in the following years, driven in part by an increase in corporate interest payments. The TRA resulted in the highest marginal corporate tax rate exceeding the highest personal income tax rate, and thus increased firms' incentive to lever up.

Given the offsetting provisions of the TRA, it is ex ante unclear whether and to what extent airlines experienced a decrease in their tax burden post-TRA. It is plausible that the reduction in

[6] To our knowledge, the TRA did not include any provisions specific to the airline industry.

[7] The tax rate reduction was implemented in a staggered manner. The first stage of the new tax rates was effective for taxable years beginning on or after July 1, 1987. Thus, for calendar year corporations, for years before 1987, the corporate statutory tax rate was 46%; for 1987, the tax rate was 40%; and from 1988 forward (until changed again in the early 1990s), it was 34%. For non-calendar-year-end corporations, a blended rate was applied.

airlines' tax burden from the reduced tax rate was partially offset by the elimination of some deductions (e.g., the repeal of the investment tax credit, modifications to the accelerated depreciation schedule). Since the analyses in this paper assume that the TRA lowered the tax burden for profitable airlines, we examine the change in the marginal tax rates (MTR) (computed using the approach developed by Shevlin (1987, 1990) and Graham (1996)) for the airlines in our sample following the TRA.[8] We find that the average profitable (loss-making) airline in our sample experienced a 9.6 (2.8) percentage point decline in their MTR. This result validates a primary assumption underlying our use of the TRA as our research setting. In addition, it is worth noting that the tax rate reduction reduces the value of unused investment tax credits as well as the future benefit of a firm's NOL carryforwards. Firms in a tax-loss position are more likely to have both unused investment tax credits and NOL carryforwards since they, by definition, did not have positive taxable income to utilize these deductions. Thus, the TRA provides a significant benefit to profitable firms relative to loss firms both directly (by reducing the highest statutory tax rate) and indirectly (by lowering the value of past credits and accumulated deductions for loss firms).[9]

2.2 Corporate tax loss treatment and growth in the number of tax-loss firms

Tax codes generally treat profits and losses asymmetrically. While profits create an immediate tax obligation for firms, losses often do not generate immediate tax relief. In the U.S., the tax law provides that firms with losses can carry them to other years to mitigate the effect of having to report and asset tax in one-year increments. Taxpayers that report a net operating loss (NOL) can carry that loss to offset taxable income in other years; either to a prior year and then a

[8] An alternative proxy for the tax burden of a company is the cash effective tax rate, which captures the cash tax payments in a year relative to a company's pre-tax earnings. However, the data required to compute the cash ETR is unavailable prior to 1988 since companies were not required to prepare the cash flow statement back then.

[9] See Maydew (1997) for an examination of loss firms utilizing their NOLs before the rate decline (i.e., using their NOLs when the NOL is more valuable).

future year, or just to future years depending on the laws in place at the time. For our sample period surrounding the TRA86, the carryback period for net operating losses was 3 years and the carryforward period was 15 years. If a firm paid taxes in the prior three years, then it could carry the NOL back and receive a refund for taxes paid.[10] If the firm is unable or unwilling to carry its current losses back, it then carries the NOL forward to be used as a deduction against future taxable income. In each of the next fifteen years that a firm's taxable income is positive, it may deduct the losses until either income or losses are exhausted. The disadvantage of carrying losses forward is that they are carried with zero nominal interest and may expire unused. Several studies find that tax asymmetry leads to significant declines in the inflation-adjusted value of tax losses (Mintz 1988; Auerbach and Poterba 1987; Cooper and Knittel 2010). Further, Edgerton (2010) finds that most losses are not used quickly to offset profits through carrybacks or carryforwards, but tend to be carried forward several years and often expire unused.

The consequences of treating profits and losses asymmetrically are amplified when there is a cut in the statutory tax rate. Firms with positive taxable income see their tax liabilities go down and experience immediate savings in their taxes paid. In contrast, firms with losses do not experience any tax savings (since their current tax liability is zero) and also see the value of their NOL carryforwards decline.

[10] The NOL rules were initially put in place in the Revenue Act of 1918 to provide relief for losses from World War 1. The loss carryback and carry over periods have changed often with carrybacks ranging from no years to five years and for some businesses or time periods up to 10 years. For example, in Taxpayer Relief Act of 1997 the rules changed to a 2 year carryback and a 20 year carryover period. Most recently, the 2017 Tax Cuts and Jobs Act (TCJA) removed the option for firms to carry back losses – thus firms could not carryback losses to a prior year at all, but could carryforward NOLs indefinitely. Then, in response to the global COVID-19 pandemic, the 2020 Coronavirus Aid, Relief and Economic Security (CARES) Act temporarily reversed some TCJA provisions, one of them being the limitation on loss carrybacks. The CARES Act temporarily allows firms to carryback losses for up to five years. During recessions or other economic downturns the government often temporarily (and/or for certain taxpayers) adjusts the NOL rules, for example the American Recovery and Reinvestment Act of 2009 in response to the financial crisis, The Job Creation and Worker Assistance Act of 2002 for relief from the 2001 recession, and the Gulf Opportunity Zone Act of 2005 for those affected by hurricanes Katrina, Rita, or Wilma, and many others. In addition, some types of losses are granted longer carryback periods, for example in some time periods farm losses, losses from the decommissioning of nuclear power plants, losses from product liability claims, etc.

Our question is given greater importance by the number of firms that are in a tax loss position and the magnitude of losses. Edgerton (2010) reports that U.S. corporations that lost money reported $418 billion in losses in their tax returns while profitable corporations reported $676 billion in profits (in 2002). Cooper and Knittel (2010) use Internal Revenue Service (IRS) administrative data and report that 45% to 52% of U.S. corporations reported NOLs valued at over $2.9 trillion from 1993-2004. Heitzman and Lester (2021) report that in their sample of (large) firms, 90% have some type of tax loss (federal, state, or foreign). As such, understanding the differential effect of taxes on profit- and loss-making firms is important considering the sheer number of firms that report losses.

2.3 Hypotheses

A long literature beginning with Telser (1966), Fudenberg and Tirole (1986) and Tirole (1988) provides analytical evidence that "deep-pocketed" or cash-rich firms can force economically efficient but financially constrained rivals out of business by lowering industry profits and reducing their rivals' cash flows. This literature shows that predation can occur for two reasons. In one class of models, predation is viewed as an attempt to convince rivals that it would be unprofitable for them to remain in the industry, thus leading to their exit (Telser 1966; Tirole 1988). Another class of models suggests that predation occurs even if the rival/prey knows that it is profitable and economically efficient (Bolton and Scharfstein 1990). Specifically, in the latter class of models, predation induces financially constrained firms to exit because their investors cannot distinguish between whether the firms' deterioration in performance is because of operational inefficiencies relative to rivals or because rivals artificially lower industry profits (via predatory pricing/advertising; see Shroff (2016) for a discussion).

Prior research finds that firms consider the ex-ante risk of predation when making decisions, and their decisions affect product market outcomes ex post. For example, Haushalter et al. (2007), Fresard (2010) and Hoberg et al. (2014) find that firms facing predatory threats have lower leverage, greater cash holdings, and are more likely to engage in hedging activities to mitigate underinvestment in the event of predation. Bernard (2016) finds that financially constrained firms avoid financial disclosure to mitigate predation risk. Other studies focus on the effect of corporate financing decisions on product market outcomes, assuming predation occurs in equilibrium. For example, Chevalier (1995a, b), Phillips (1995), Zingales (1998), Campello (2003), and Barrot (2016) among others find that firms with high leverage, low cash holdings and limited access to short-term liquidity tend to (i) lose market share to their rivals, (ii) lower product quality to preserve cash flows, and/or (iii) exit the market in situations when predation is likely to have occurred.[11] More recently, Donohoe, Jang, and Lisowsky (2021) find that the 2004 tax holiday that decreased the cost of repatriating foreign earnings helped U.S. MNCs prey on their domestic rivals.

We argue that tax cuts provide profitable firms a competitive advantage over loss-making firms because of the asymmetric treatment of losses vs. profits. Specifically, tax cuts provide profitable firms immediate cash tax savings, which they can use to lower prices, invest in capacity and market share growth, hire new employees and give their current employees raises, and increase investor payouts. In contrast, firms in a tax loss position do not receive any cash tax savings from the tax cut and also see the value of their NOL carryforwards decline, putting them at a

[11] Prior studies are careful not to attribute their findings as definitive evidence of predation. The primary reason to be cautious when making claims of predation is that firms compete on many dimensions and financially stronger firms might have other comparative advantages over their financially constrained rivals. If financing constraints are associated with, or cause, low productivity (Hopenhayn 2014), it is not clear whether financing constraints lead "economically efficient" firms to exit the market or just the less productive firms to exit the market.

disadvantage relative to profitable firms. As a result, in markets where profitable firms compete with loss-making firms, a tax cut can create incentives for profitable firms to use their tax savings to lower prices and gain market share from their loss-making rivals that do not derive the same benefits from the tax cut.

Further, the incentive for a profitable firm to use its tax savings to lower prices is stronger when its loss-making rivals are financially constrained and will not be able to sustain a price decrease. Bolton and Scharfstein (1990) analytically show that predation occurs primarily when a firm's competitors are financially constrained. The intuition is as follows: the cost of engaging in a predation strategy where a firm lowers price to push its rivals to exit the market is directly related to the duration for which the firm has to keep prices low. Financially unconstrained firms have higher cash flows and thus are in a better position to sustain a prolonged price war, making it costly for other firms to prey on them. In contrast, financially constrained firms are less likely to survive a price war for very long, making them more vulnerable to predation by their deep-pocketed rivals. The above discussion leads to our first hypothesis:

H1a: Tax rate cuts lead to an increase in the wedge in the price charged by profit- and loss-making firms for the same product/service, especially when loss firms are financially constrained.

H1b: Tax rate cuts lead to a shift in market share from loss-making to profit-making firms, especially when loss firms are financially constrained.

To the extent tax cuts give a competitive edge to profitable firms relative to loss-making firms, profitable firms can grow their market share not only by lowering price (as suggested above) but also by entering new markets, especially those with a greater proportion of loss-making incumbents. Further, tax cuts incentivize profitable firms to enter markets in which the incumbent firms are both loss-making (and thus do not benefit from the tax cut) as well as financially constrained and thus unable to sustain a price war. Finally, the entry of profitable firms that are competitively better positioned after a tax cut is likely to push loss-making firms, especially those that are financially constrained, to exit the market. This discussion leads to our next hypothesis:

H2a: Tax rate cuts incentivize profitable firms to enter new markets dominated by loss-making firms, especially those in which an incumbent loss firm is financially constrained.

H2b: Tax rate cuts lead to an increase in the exit rate of loss-firms, especially those that are financially constrained.

3. Data

We obtain data on airfares and passenger shares for each route using the U.S. Department of Transportation's Origin and Destination Survey DB1A database. The DB1A database covers 10% of domestic airline tickets and contains information about the origin, destination, passengers transported, average price, passenger itinerary (e.g., whether the flight is direct or connecting), etc. We use Severin Borenstein's summarized dataset, which aggregates information at the route-airline-quarter level. Further, Borenstein maintains separate datasets for direct and connecting flights, requiring us to combine them (see Goolsbee and Syverson (2008) for details on these data).

We begin our sample selection by identifying all route-airline-year-quarter level observations that have at least 20 passengers for connecting flights and 40 passengers for direct flights each quarter from the first quarter of 1981 to the fourth quarter of 1992, which gives us 1,002,678 initial observations.[12] We define each route as an origin-destination airport pair without regard to flight direction (Goolsbee and Syverson 2008; Azar et al. 2018). Dropping flights operated by multiple airlines, flights for which we are unable to identify the origin or destination airport, and aggregating observations at the airline-route-year-quarter level by merging the dataset for connecting and direct flights reduces our sample to 847,141 observations. We obtain financial statement information for the airlines in our sample from Compustat. Matching the DB1A data

[12] Our sample period begins in 1981 because the data are unreliable in earlier periods. We end our sample in 1992, which is six years after the passage of the TRA of 1986.

with Compustat results in the loss of 39,671 observations. Our regressions include controls for population and per capita incomes for the endpoints for each route and we obtain the data to compute these variables from the Bureau of Economic Analysis (BEA). We lose 49 observations that are missing BEA data, leaving us with 807,421 observations. Since our interest lies in understanding the asymmetric impact of tax rate cuts on profitable and loss-making carriers, we require route-year-quarters to have at least two airlines operating in the route, with at least one profitable airline and at least one loss-making airline, leaving us with 375,298 observations.[13] Finally, restricting our sample to the period from 1982 Q1 to 1992 Q4 leaves us with a final sample of 364,812 observations. Table 1 presents the sample selection procedure.

4. Research design and descriptive statistics

We estimate the following difference-in-differences regression to test our prediction:

$$y_{i,t} = \beta_1\, AGG\ MKT\ SHARE\ LOSS\ AIRLINES_{r,t-1} + \beta_2\, AGG\ MKT\ SHARE\ LOSS\ AIRLINES_{r,t-1} \times LOSS\ AIRLINE_{i,t-1} + \beta_3\, AGG\ MKT\ SHARE\ LOSS\ AIRLINES_{r,t-1} \times POST86 + \beta_4\, AGG\ MKT\ SHARE\ LOSS\ AIRLINES_{r,t-1} \times LOSS\ AIRLINE_{i,t-1} \times POST86 + \alpha_i \times \alpha_r + \alpha_i \times \alpha_t + \alpha_t \times LN(DISTANCE) + \gamma' X + \varepsilon_{i,t} \quad (1)$$

where *i*, *r*, and *t* index airlines, routes, and year-quarters, respectively; $y_{i,t}$ is either the natural logarithm of average fare charged by an airline in a route-year-quarter (*LN(PRICE)*) or the market share of an airline in a route-year-quarter, where market share is measured as the number of passengers flying by airline 'i' in route 'r' and period 't' scaled by the total number of passengers flying that route in the same period (*MARKET SHARE*). Following Azar et al. (2018), exclude tickets with multiple ticketing airlines from the analysis. In addition, we use weighted least squares when the dependent variable is *LN(PRICE)*, with weights based on the average number of

[13] We relax this assumption when we examine airline entry and exit patterns.

passengers traveling with an airline in a route over the entire sample period (Goolsbee and Syverson 2008; Azar et al. 2018).

LOSS AIRLINE is an indicator that equals one for airline-year-quarters in a tax loss position. Following Mills, Newberry, and Novack (2003), we classify an airline-year-quarter as being in a tax loss position if it reports negative pre-tax income in a fiscal year and also has an NOL carryforward. *AGG MKT SHARE LOSS AIRLINES* is market share of all airlines that are in tax-loss positions in a given route and year-quarter.

POST86 is an indicator variable that equals one for calendar years 1986 and onwards. The TRA passed the House of Representatives in December 1985, the Senate in June 1986, and was signed into law by President Regan in October 1986. Most of the provisions of the TRA were effective in January 1, 1987; a few were retroactive to January 1, 1986, and some were phased in over the next few years (Wakefield 1987). The new statutory tax rate took effect for taxable years beginning on or after July 1, 1987. The law provided transitional rules for the tax year that included July 1, 1987, where the tax rate for the transitional year was equal to a weighted average of the new rate and the old rate.

For the purpose of testing our prediction, our interest lies in the period when uncertainty about the enactment of the TRA and the reduction in the statutory tax rate had passed, which we believe to have occurred after the TRA passed the House. We expect that any treatment effect of the TRA on the behavior of profit- and loss-making airlines would occur soon after expectations were set that the bill would become law rather than following its effective date. Prior research finds that firms respond to known changes in tax rates prior to their effective dates to take maximum advantage of the tax rules (Scholes, Wilson, and Wolfson 1992). When it became known that the TRA would become law and lower tax rates, it is optimal for firms to shift expenses to the pre-TRA period and shift income to the post-TRA period. Since investments in market share (lowering price, increasing advertising, entering new routes, etc.) reduce a firm's taxable income and thus its tax burden, it is optimal for firms to incur such investment expenditures in the pre-TRA period and reap their benefits in the post-TRA period (see Scholes et al. (2014) for a detailed discussion of optimal tax planning around tax policy changes). Thus, we expect that profitable firms would respond to the TRA by lowering prices and increasing investments in market share soon after uncertainty about the passage of the TRA was resolved, which is believed to have occurred in December 1985.

Finally, equation 1 includes controls for route interacted with year-quarter fixed effects, airline interacted with year-quarter fixed effects, and several other variables following Azar et al. (2018). Specifically, we include the log of distance interacted with year-quarter fixed effects to control for the price effect of changes in fuel prices that differentially affect routes of varying length in ways that could be correlated with the TRA. We also include 1) the number of airlines operating in a route, 2) the log of the arithmetic average of the population in the two endpoints of a route, 3) the log of the arithmetic average of per-capita income in the two endpoints of a route, 4) the share of passengers in the route that travel using connecting flights, and 5) the share of passengers for the airline in the route that travel using connecting flights. We cluster standard errors at the route and year-quarter level.

A few important features of our research design are as follows. First, by including airline × year-quarter indicators, our regressions look for predictable differences in the pricing policies an airline adopts in the same period across the routes in which it operates, based on the airline's tax status and the aggregate market share of the tax-loss airlines operating in the route. These fixed effects control for all time-varying and time-invariant factors that affect an airline's pricing policies common to all the routes it operates in. Since the TRA changed several aspects of the tax code, it is conceivable that the TRA affected aggregate demand for air travel by individuals and firms. Our fixed effects control for TRA induced changes in aggregate demand for air travel for each airline.

Second, by including airline by route indicator variables, our regressions control for all time-invariant factors that affect each airline's pricing policies in a specific route. For example, an airline's pricing policy in a route is likely influenced by its market power relative to that of its competitors due to frequent flyer programs, location of hubs, etc. Similarly, each airline could have different operating cost for each route it serves based on the structure of its entire network, and such cost differences could then affect its pricing decisions. The inclusion of airline × route indicators controls for such determinants of ticket prices, while allowing us to estimate the effect of the TRA on changes in ticket prices for each airline-route pair.

Third, our research design exploits cross-sectional route-level variation in the aggregate market share of loss firms. In routes where loss-making airlines have greater market share, profitable airlines have more room to grow by capturing the market share of loss-firms. Thus, predation risk for loss-firms is likely greater in routes where loss-firms have greater aggregate market share. A benefit of this design is that helps further mitigate concerns that confounding demand or supply shocks bias our inferences.

Finally, we note that tax cuts could lead to differential pricing policies for profit vs. loss firms if tax incidences fall on consumers (i.e., consumers bear a portion of the corporate tax burden). Recent research finds that, in some settings, firms pass on a portion of the benefits (costs) of tax cuts (increases) to their customers in the form of lower (higher) prices (e.g., Baker, Teng Sun, and Yannelis 2020; Kang, Li, and Lin 2021). As such, it is plausible that profitable airlines respond to the tax rate cut in the TRA by lowering ticket prices while loss firms would not respond in the same manner since they do not experience any cash tax savings. While such a mechanism could be at work, it predicts uniform price decreases by profitable airlines across all the routes they operate in. By focusing on within-airline variation in pricing policies across the routes it operates in (with our use of airline × year-quarter fixed effects and variation in the aggregate market share of loss firms), our research design can separately identify the effect of the TRA on prices and market share through the predation channel.[14]

Table 2 reports descriptive statistics for our sample at the airline-route-year-quarter level. The average fare per passenger across all routes is $164, which amounts to $355 in 2020 dollars. The average airline has 27% market share in each route that it operates in while the aggregate market share of loss airlines in the average route is 31%. Approximately one-third of route-year-quarters are operated by loss-airlines, consistent with evidence in other studies showing that loss-firms make up a significant part of the economy. The average number of passengers flying per airline-route-year-quarter is 3,186 and the average number of airlines operating in a route-year-quarter is 4.6. On average, around four-fifths of an airline's passengers use connecting flights and around two-thirds of passengers in a given route use connecting flights. These statistics are consistent with those reported in Azar et al. (2018). For each route in our sample, we follow Azar et al. (2018) and use data from the Bureau of Economic Analysis to calculate the arithmetic mean of population and income per capita across the metro areas at the endpoints. The average population is 3.1 million and the average income is approximately $18,500 (which is $39,600 in 2020 dollars).

5. Main results

5.1. Effect of TRA on prices and market share

Table 3, Panel A presents the results from estimating equation 1. Our coefficient of interest is that for *AGG MKT SHARE LOSS AIRLINES* × *LOSS AIRLINE* × *POST86*. When the dependent

[14] Our research setting precludes us from testing the tax incidence channel because we lack variation on when consumers would be more or less likely to bear the tax burden. Observing changes in the average ticket prices charged by profitable vs. loss-making airlines post-TRA could be explained by both, the predation and tax incidence channels.

variable is *LN(PRICE)*, this variable captures the percent change in airfares, pre- vs. post- TRA, for a tax-loss airline relative to that for a profitable airline, in routes where loss-airlines have higher aggregate market share. Similarly, when *MARKET SHARE* is the dependent variable, the coefficient for *AGG MKT SHARE LOSS AIRLINES* × *LOSS AIRLINE* × *POST86* captures the change in a loss-making airline's market share, pre- vs. post- TRA, relative to the change in a profit-making airline's market share in the same route and period, in routes where loss-airlines have higher aggregate market share. Columns 1 and 2 report results when the dependent variable is *LN(PRICE)*, where column 1 excludes control variables and column 2 includes time varying route-level and airline-route level control variables. We find that the coefficient for *AGG MKT SHARE LOSS AIRLINES* × *LOSS AIRLINE* × *POST86* is 0.046 (t-stat.=5.24) in column 1 and 0.042 (t-stat.=4.98) in column 2. These coefficients imply that after the passage of the TRA becomes certain, tax-loss airlines on average charge their customers 4.2 to 4.6 percent higher airfares than profit-making airlines for flights operating in the same route and year-quarter.

Columns 3 and 4 present the regressions results when the dependent variable is *MARKET SHARE*. The coefficient for *AGG MKT SHARE LOSS AIRLINES* × *LOSS AIRLINE* × *POST86* in column 3 (which excludes control variables) is -0.037 (t-stat.=-5.32) and in column 4 is -0.033 (t-stat.=-5.70). These coefficients imply that, after the TRA, loss-making airlines lose approximately 3.3 to 3.7 percentage point market share to their profit-making rivals in markets previously dominated by loss-making airlines. We estimate that the TRA lowered the marginal tax rate (MTR) for profitable airlines by 9.6 percentage points, where the MTR is an estimate of the taxes payable on an incremental dollar of earnings, calculated using the Shevlin (1987, 1990) and Graham (1996) approach. Thus, the results in Table 3, Panel A suggest that a one percentage point decline in the MTR for profitable airlines leads to 0.44% increase in the wedge in the ticket prices of loss- and profit-making airlines, and a 0.34 percentage point decrease in the market share of loss-making airlines.

To address reverse causality concerns, in Table 3, Panel B, we estimate regressions where we replace the *POST86* indicator variable with ten calendar year indicator variables representing each year in our sample period (1985 serves as the base year and is excluded from the regression). Columns 1 and 2 show that the ticket price difference that profitable and loss-making airlines charge their customers begins to increase in 1986 (albeit insignificantly in 1986) and then stays between 2.0 to 4.1 percent different through the post-TRA period. The years prior to 1986 serve as placebo tests and show that the parallel trends assumption is not observably violated in our data. Similarly, columns 3 and 4 show that loss airlines lose market share to profitable airlines from 1986 and onwards but not in the years before the TRA. Figure 1 is a graphical presentation of the results in columns 2 and 4 in Table 3, Panel B. Overall, these results support our main hypothesis that tax cuts allow profitable firms to use their tax savings to lower prices and gain market share from loss firms that (typically) do not receive immediate benefits from tax cuts.

Next, we examine whether profitable airlines are more likely to lower prices and prey on their loss-making rivals in markets where their rivals are financially constrained. Financially constrained firms that are typically pressed for cash are more susceptible to predation risk because they do not have the liquidity to sustain a price war. Specifically, when competitors lower prices, firms face the choice of either lowering their price as well to retain market share or leaving their price unchanged at the risk of losing market share. To the extent financially constrained firms are unable to bear additional strain on their cash flows by lowering price in response to a price cut by a competitor, they face a greater risk of predation. Thus, we predict that the TRA incentivizes profitable airlines to engage in a predation strategy and lower ticket prices primarily in routes in which at least one of their loss-making rivals is financially constrained. We partition our sample into two groups: route-year-quarters with at least one financially constrained loss airline and those without any financially constrained loss airline, and re-estimate equation 1 in these subsamples.

Following Zwick and Mahon (2017), we identify airlines that are financially constrained based on whether they pay dividends and the amount of cash they hold on their balance sheets. Specifically, we classify an airline as financially constrained in a year-quarter if it did not pay dividends in the previous three years and its cash balance (as a percent of total assets) is in the bottom two terciles. A recent study by Farre-Mensa and Ljungqvist (2016) finds that firms classified as financially constrained, using several commonly used proxies, do not behave as if they are constrained. Unfortunately, the newer text-based measures of financings constraints (see e.g., Hoberg and Maksimovic 2015; Buehlmaier and Whited 2018) are not available during our sample period, forcing us to rely on a relatively noisier proxy. We caution readers regarding our use of the above financing constraints proxy but note that our research design (e.g., the use of airline × year-quarter fixed effects) mitigates the concern that correlated omitted firm characteristics explain the evidence we find.

Table 4 presents the results. When the dependent variable is *LN(PRICE)*, the coefficient for *AGG MKT SHARE LOSS AIRLINES* × *LOSS AIRLINE* × *POST86* is 0.049 (t-stat.=5.40) in the regression estimated on the subsample of markets with at least one financially constrained loss-making airline (column 1). In contrast, the coefficient for *AGG MKT SHARE LOSS AIRLINES* × *LOSS AIRLINE* × *POST86* is 0.013 (t-stat.=0.95) in the regression estimated on the subsample of markets without any financially constrained loss-making airline (column 2). Further, we find that the coefficient for *AGG MKT SHARE LOSS AIRLINES* × *LOSS AIRLINE* × *POST86* is significantly different across columns 1 and 2. These results tell us that the TRA led to an increase in the price wedge between flights operated by loss- vs. profit-making airlines only in markets where at least one of the incumbent operators is both loss-making and financially constrained. Columns 3 and 4 in Table 4 present the results when the dependent variable is *MARKET SHARE*. The table shows that coefficient for *AGG MKT SHARE LOSS AIRLINES* × *LOSS AIRLINE* × *POST86* is -0.036 (t-stat.=-5.52) in markets with at least one financially constrained loss-making incumbent (column 3) and is -0.014 (t-stat.=-1.41) in markets without any financially constrained loss-making incumbent (column 4). These results suggest that after the TRA, profitable firms gain market share from their loss-making rivals only in markets where at least one of the loss-making rivals is financially constrained. Overall, the data suggest that following the passage of the TRA, profitable airlines engage in a predation strategy only in markets in which at least one of the incumbents is both loss-making and financially constrained.

5.2. Effect of TRA on entry and exit patterns

Having documented the asymmetric effect of the TRA on price changes by profitable and loss-making airlines and their consequences for market share, we next examine whether profitable and loss-making airlines differ with respect to their decision to enter into, and exit from, some markets, following the TRA. If the TRA increased profitable firms' incentives to prey on their loss-making rivals, we should see that, after the TRA, profitable airlines are more likely to enter routes in which loss-making airlines have greater market share while loss-making airlines are more likely to exit such markets. We estimate the following regression to test these predictions:

$$y_{r,t} = \beta_1\, AGG\ MKT\ SHARE\ LOSS\ AIRLINES_{r,t-1} + \beta_2\, AGG\ MKT\ SHARE\ LOSS\ AIRLINES_{r,t-1} \times POST86 + \alpha_r + \alpha_t + \alpha_t \times LN(DISTANCE) + \gamma' X + \varepsilon_{r,t} \quad (2)$$

where r and t index routes and year-quarters, respectively; $y_{r,t}$ represents the number of airlines entering or exiting from a route in a given period. The other variables are as defined earlier. Note that in the above equation, we change our unit of analyses to the route-year-quarter level from the airline-route-year-quarter level. Further, we no longer constrain our sample to routes in which at least two airlines operate. When examining the effect of the TRA on changes in price and market share, we impose the above restriction so we can compare the decisions made by a profitable airline with that of a loss-making airline, holding the economic environment (i.e., the route-year-quarter) constant. Our entry and exit analyses do not require such a restriction. Table 5 presents the results from estimating equation 2.

In column 1, the dependent variable is *#ENTRY*, which measures the number of airlines entering a route. The coefficient for *AGG MKT SHARE LOSS AIRLINES* × *POST86* is 0.008 (t-stat.=2.51), suggesting that markets dominated by loss-making incumbents see a significant increase in new entrants, following the TRA. Columns 2 and 3 break down *#ENTRY* into the number of profitable airlines entering a market (*#ENTRY - PROFIT AIRLINES*) and the number of loss airlines entering a market (*#ENTRY - LOSS AIRLINES*). The coefficient for *AGG MKT SHARE LOSS AIRLINES* × *POST86* is 0.006 (t-stat.=2.30) and 0.002 (t-stat.=1.37) when the dependent variable is *#ENTRY - PROFIT AIRLINES* and *#ENTRY - LOSS AIRLINES*, respectively. These results tell us that the increase in entry into markets dominated by loss-making incumbents is due to profitable airlines entering the market. In terms of economic magnitude, a one standard deviation increase in *AGG MKT SHARE LOSS AIRLINES* leads to a 3.6% increase in the number of profitable airlines entering the market after the TRA.

Columns 4 to 6 in Table 5 examine airline exit rates. Column 4 shows that the coefficient for *AGG MKT SHARE LOSS AIRLINES* × *POST86* is 0.015 (t-stat.=2.14) when the dependent variable is *#EXITS*, suggesting that markets dominated by loss-making incumbents see a significant increase in airline exits after the TRA. Further, the coefficient for *AGG MKT SHARE*

LOSS AIRLINES × *POST86* is -0.002 (t-stat.=-0.82) and 0.017 (t-stat.=2.36) when the dependent variable is *#EXIT- PROFIT AIRLINES* and *# EXIT - LOSS AIRLINES*, respectively. These results imply that the entire increase in exits is driven by loss-making airlines. In economic terms, a one standard deviation increase in *AGG MKT SHARE LOSS AIRLINES* leads to a 21.5% increase in the number of loss-making airlines exiting the market after the TRA. Collectively, the evidence in Table 5 suggests that the TRA leads to a significant increase in the number of profitable airlines entering markets dominated by loss-making incumbents and a simultaneous increase in the number of loss-making airlines exiting those very same markets.

To explore further, we examine whether profitable airlines are more likely to enter markets in which at least one of the incumbent airlines is not only loss-making but also financially constrained. We re-estimate equation 2 after partitioning our sample into: 1) route-year-quarters in which an incumbent is both loss-making and financially constrained, and 2) route-year-quarters in which none of incumbents are *both* loss-making and financially constrained. Consistent with our prediction, columns 1 and 2 in Table 6, Panel A show that airlines are almost four times as likely to enter markets in which an incumbent is both loss-making and financially constrained than in other markets, after the TRA. Specifically, when the dependent variable is *#ENTRY*, the coefficient for *AGG MKT SHARE LOSS AIRLINES* × *POST86* is 0.037 (t-stat.=3.73) in routes in which an incumbent is both loss-making and financially constrained compared to a coefficient of 0.010 (t-stat.=2.63) in other routes.

Columns 3 to 6 decompose *#ENTRY* into *#ENTRY - PROFIT AIRLINES* and *#ENTRY - LOSS AIRLINES*. Consistent with the evidence in Table 5, we find that, post-TRA, profitable airlines are more likely to enter routes dominated by loss-making incumbents on average. Further, the rate at which profitable airlines enter a market post-TRA is 3.5 times greater when an incumbent airline is both loss-making and financially constrained. The table also shows that, post-TRA, even loss-making airlines have a higher entry rate into markets in which an incumbent airline is both loss-making and financially constrained, although the economic magnitude is significantly smaller than the entry rate of profitable airlines. Collectively, the evidence in Table 6, Panel A implies that the TRA leads to a significant increase in rates at which profitable airlines enter markets dominated by loss-making incumbents, especially when the loss-making incumbents are financially constrained.

In Table 6, Panel A, our analysis exploits cross-sectional variation in the characteristics of the incumbent airlines operating in a route. In Table 6, Panel B, we exploit cross-sectional variation in the characteristics of the entrant into a route. We argue that the TRA has a greater effect on the ability of financially-constrained profitable airlines to prey on their loss-making rivals than it has on the ability of financially *un*constrained profitable airlines to do so. Specifically, the cash tax savings airlines realize from the passage of the TRA are likely to relax the financing constraints of those that were constrained pre-TRA, thereby increasing their ability to engage in a predation strategy. In contrast, profitable airlines that were financially unconstrained pre-TRA and continue to remain financially unconstrained post-TRA should be minimally affected by the TRA-induced cash tax savings, at least with respect to their ability to prey on rivals. As such, we predict that the TRA leads to an increase in the likelihood that financially *constrained* profitable airlines enter routes in which loss-making airlines have greater market share compared to the likelihood that financially *unconstrained* profitable airlines enter such routes post-TRA.

Consistent with our prediction, Table 6, Panel B shows that the coefficient for *AGG MKT SHARE LOSS AIRLINES* × *POST86* is positive and significant only in column 1, where the dependent variable is the number of financially constrained profitable airlines entering a market

(*#ENTRY - PROFIT FC AIRLINES*). Columns 2 to 4 show that the coefficient for *AGG MKT SHARE LOSS AIRLINES* × *POST86* is statistically insignificant when the dependent variable is the number of 1) financially unconstrained profitable airlines entering a market (*#ENTRY - PROFIT NOT FC AIRLINES*), 2) financially constrained loss airlines entering a market (*#ENTRY – LOSS FC AIRLINES*), and 3) financially unconstrained loss airlines entering a market (*#ENTRY – LOSS NOT FC AIRLINES*).

Finally, we dwell deeper into the characteristics of airlines that exit markets dominated by loss-making airlines after the TRA. As discussed earlier, financially constrained firms are more prone to predation risk since they typically do not have the liquidity to survive a prolonged price war. Thus, we predict that the TRA leads to an increase in the rate at which financially constrained loss-making airlines exit the market. Table 7 presents the results from six regressions that decompose the airlines exiting a market into 1) those that are financially constrained vs. those that are not financially constrained, 2) profitable airlines that are financially constrained vs. profitable airlines that are not financially constrained, and 3) loss airlines that are financially constrained vs. loss airlines that are not financially constrained. We find that the TRA leads to an increase in the exit rates only among airlines that are both loss-making and financially constrained.

Collectively, our analyses of entry and exit patterns of airlines following the passage of the TRA show that the TRA helps profitable airlines, especially those that were financially constrained pre-TRA, prey on their loss-making rivals, especially those that are financially constrained. In other words, the TRA leads financially constrained profitable airlines to prey on their financially constrained loss-making rivals.

6. Evidence from changes in state-level corporate income tax rates

An important limitation of our analyses thus far is that the inferences based on the airline industry might not generalize to the broader economy. To mitigate this concern, we move to an entirely different setting to test our research question. We use variation in state corporate income taxes to examine how tax changes affect the market share of profit and loss-firms operating in the state. State tax rate changes occur frequently and at different times in different states. Thus, this setting allows us to devise a difference-in-differences research design that compares changes in the market share of profit vs. loss firms operating in a state that changes its tax rate to the changes in market share of profit vs. loss firms operating in other states that do not change tax rates at the same time. Several recent studies use state tax changes to understand how taxes affect leverage (Heider and Ljungqvist 2015), risk taking (Ljungqvist et al. 2017) and the reallocation of business activity across states (Giroud and Rauh 2019). We follow the approach in these studies to devise an alternative test of our hypotheses. We estimate regressions of the following form:

$$y_{i,t} = \beta_1\, TAX\ LOSS_{i,t-1} + \beta_2\, TAX\ LOSS_{i,t-1} \times TAX\ RATE\ DECREASE_{i,t-1} + \beta_3\, TAX\ LOSS_{i,t-1} \times TAX\ RATE\ INCREASE_{i,t-1} + \alpha_i + \alpha_t \times \alpha_s + \alpha_t \times \alpha_{ind} + \gamma' X + \varepsilon_{i,t} \quad (3)$$

where *i*, *t*, *s*, and *ind* index firms, fiscal years, states of headquarters, and industries, respectively; $y_{i,t}$ is the change in the market share of firm 'i' from year 't-1' to 't,' measured as the percent change in the sales of a firm minus the percent change in aggregate industry sales (Fresard 2010). We group firms based on the 2-digit SIC industry classification as well as the Hoberg and Phillps (2016) 100 and 500 industry classifications. *TAX LOSS* is an indicator variable for firms in a tax loss position. We classify a firm as being in a tax loss position if it reports negative pre-tax income and also has an NOL carryforward (Mills, Newberry, and Novack 2003). *TAX RATE DECREASE* is the magnitude of the tax rate decrease in a state and *TAX RATE INCREASE* is the magnitude of the tax rate increase in a state. These variables equal zero in years in which there is no tax change.

We control for firm fixed effects, year interacted with state fixed effects, year interacted with industry fixed effects and several other variables following Fresard (2010) and Heider and Ljungqvist (2015). Standard errors are clustered at the state level.

Note that in the regression above, we examine the effect of tax rate changes on market share changes. By focusing on both market share and tax rate changes, our research design accommodates multiple tax shocks to the same firm over time, treatment reversals (i.e., instances where a tax hike is followed by a tax cut later), and asymmetric responses to tax changes. Controlling for firm fixed effects removes unobserved firm-specific factors that affect market share changes and the inclusion of year × state and year × industry indicators controls for all time-varying and time-invariant state- and industry-level factors that affect market share changes.

6.1. Data and descriptive statistics

We collect data on the state-level corporate income tax rates from Giroud and Rauh (2019).[15] Following prior research, we assume that state tax changes affect only firms headquartered in the state (Heider and Ljungqvist 2015, Giroud and Rauh 2019). We obtain the historic headquarter (HQ) locations of firms from Bill McDonald on his website, which are based on scrapped 10-X header data (Loughran and McDonald 2016).[16] For observations with no historic HQ data (which are roughly 5% of our sample), we use current HQ locations instead. We group firms as operating in the same product market if they belong to the same 2-digit SIC industry or the same Hoberg and Phillps (2010, 2016) 100- or 500-industry (henceforth, HP 100 and 500 industry). We measure financing constraints using the text-based approach proposed by Hoberg

[15] http://www.columbia.edu/~xg2285/
[16] https://sraf.nd.edu/data/augmented-10-x-header-data/

and Maksimovic (2015), and obtain these data from their website. All other variables used in our analyses are constructed using data from Compustat.

To construct a sample for the state tax change setting, we start with all firm-year observations in Compustat between 1996 and 2013 since this is the period for which we have data on state tax changes. We drop firms operating in the following industries: finance (SIC codes=6000-6999), utilities (SIC codes=4900-4999) and public sector (SIC codes=9000-9999) since they are regulated, which gives us an initial sample of 198,062 firm-year observations. We then require firms to have positive values for total assets and non-missing historic SIC codes and central index key (CIK), leaving us with 135,701 observations.[17] We delete firm-year observations 1) headquartered outside the U.S., in Puerto Rico and the Virgin Island, 2) not traded on a major U.S. stock exchange (i.e., NYSE, AMEX, or NASDAQ) and 3) with a CRSP share code > 11 (e.g., real estate investment trusts). Dropping such observations, as well as, observations with missing data needed to construct main variables, leaves us with 59,105 firm-year observations. Finally, we delete firms that change their headquarters during the sample period, which leaves us with a final sample of 50,215 firm-year observations. For analyses based on the HP 100 and 500 industry classifications, our final samples reduce to 45,168 and 45,079 observations, respectively. Table 8 presents the sample selection procedure.

Table 9 presents the descriptive statistics for the variables used in our regressions. The average market share change based on the SIC industries (HP 100 and HP 500) is 7.2% (2% and -6%). Further, there is considerable cross-sectional variation in these variables. 16.7% of the observations rate to firms with tax losses. The average tax rate decrease (increase) across all firm-year observations is 0.063% (0.014%). The low percentages are because the vast majority of firm-

[17] CIK is needed to match the Compustat sample with *historic* headquarter data (Loughran and McDonald 2016).

year observations do not experience a tax rate change. However, conditional on having a tax change, the average tax rate increase (decrease) is 1.40% and 0.66% at the state-year level. These descriptive statistics are similar to those reported in prior studies.

6.2. Results

Table 10 presents the results from estimating equation 3. In Panel A, we find that the coefficient for *TAX LOSS* × *TAX RATE DECREASE* is negative and statistically significant at the 5% level or better regardless of the specification used – i.e., whether we group firms based on the SIC, HP 100 or HP 500 industry classifications and regardless of whether we include time-varying firm-level control variables. These results imply that state tax decreases lead to reductions in the market shares of loss firms relative to profitable firms. Specifically, a one percentage point decrease in the tax rate is followed by a 1.1 to 1.5 percentage point decrease in the market share of loss firms. These results are consistent with those reported in the airline setting and support our main hypothesis that tax cuts benefit profitable firms at the expense of loss-firms.

We do not find any evidence that tax increases have a differential effect on the market share of profit- and loss-making firms. While it is conceivable that the effect of tax increases on market share is different than that of tax decreases, we note that the economic magnitude of the average tax increase is less than one-fourth the size of the average tax decrease. Thus, the insignificant coefficient for *TAX LOSS* × *TAX RATE INCREASE* could be due to a lack of power.

Table 10, Panel B presents the results from dynamic regressions that examine the effect of tax increases and decreases on changes in market share in each of the five years around the tax changes. We find no evidence of a pre-treatment trend in the difference between the market share changes of profit and loss firms, and a significant decrease in the market share of loss firms relative to profit firms in the two years after a tax rate cut. Note that our regressions measure the year-over-year changes in market share differential for profit vs. loss firms. Thus, the insignificant coefficients for *TAX LOSS* × *TAX RATE DECREASE [2+]* imply that the decrease in market share that loss firms experience in the first two years after a tax cut does not reverse in the later years – the increase in the market share of profitable firms is persistent. Figure 2 provides a graphical representation of the above results.

Finally, we examine whether financially constrained loss firms are more prone to losing market share to their profitable rivals following a tax cut. We use the text-based measure of financing constrained developed by Hoberg and Maksimovic (2015) who analyze firms' discussion of liquidity in the MD&A section of the 10-K filing to identify financially constrained and unconstrained firms. To test our prediction, we interact our proxy for financing constraints (*FIN CONSTRAINED*) with *TAX LOSS* and *TAX RATE DECREASE*. Table 11 presents the results.

Consistent with our prediction, we find that the coefficient for *TAX LOSS* × *TAX RATE DECREASE* × *FIN CONSTRAINED* is negative and statistically significant at the 10% level or better regardless of the industry classification approach used. Specifically, a one percentage point decrease in the tax rate is followed by a 1.5 to 2.3 percentage point decrease in the market share of loss firms if they are financially constrained. In contrast, we find that the coefficient for *TAX LOSS* × *TAX RATE DECREASE* is negative but statistically insignificant, implying that it is the financially constrained loss firms that are at risk of predation following a tax cut. These results closely parallel the evidence from the airline setting and imply that state tax decreases lead to reductions in the market shares of financially constrained loss firms. We do not find any evidence that tax increases have a differential effect on the market share of profit- and loss-making firms.

7. Conclusions

We examine the effect of tax losses and tax rate changes on market predation behavior. Tax loss firms are an important part of the economy. Thus, it is important to understand their behavioral response and economic consequences following a tax law change. We use the airline setting for our tests because data on product, market share, and product price are available.

We predict and find that profitable airlines respond to the passage of the TRA86 by reducing ticket prices relative to financially constrained loss-making airlines, particularly in routes where loss-making airlines have greater market share (and thus profitable airlines have more to gain by lowering price). This evidence suggests that tax law changes affect product market behavior, and that it affects behavior differently for profitable firms versus loss firms. Tax loss firms, especially financially constrained firms, lose market share because profitable firms change their pricing strategy and enter markets that hurt the tax-loss firms. The research design in our study suggests it is more than profitable firms having more cash after a tax rate cut and decreasing prices everywhere; rather, the price declines and route entries support the case that the behavior is targeted towards routes where loss firms are more dominant, in other words a strategy of predation. Our study contributes both to our understanding of the consequences of tax law asymmetries for profit and loss firms and also to our understanding of product market behavior in response to taxation. Our setting allows for a detailed look at prices and product market entry and exits allowing for more direct tests of the predictions. We look forward to future studies in other industries as more unique data become available.

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Appendix A
Variable Definitions

This table provides a detailed description of the procedure used to compute each variable used in our analyses. All continuous variables except for the tax rate change variables (e.g., *TAX RATE DECREASE)* are winsorized at 1% and 99% of the distribution. The variables are listed in alphabetical order.

Variable	Definition
#AIRLINES	The number of airlines in route r in year-quarter t. The data is obtained from the DB1A database (http://data.nber.org/data/dot-db1a/).
#ENTRY	The number of new entries in route r in year-quarter t. If an airline hasn't operated in the route for the previous 8 quarters and starts to operate in year-quarter t, it is regarded as an entry. Entries triggered by airline mergers are excluded.
#ENTRY_LOSS AIRLINES	The number of new entries of tax-loss airlines (i.e., *LOSS AIRLINE*=1) in route r in year-quarter t.
#ENTRY_PROFIT AIRLINES	The number of new entries of tax-profit airlines (i.e., *LOSS AIRLINE*=0) in route r in year-quarter t.
#EXIT	The number of exits of airlines in route r in year-quarter t. If an airline exits the route in year-quarter t and doesn't operate in the next 8 quarters, it is regarded as an exit. Exits triggered by airline mergers or cessation (e.g., due to bankruptcy) are excluded.
#EXIT_LOSS AIRLINES	The number of exits of tax-loss airlines (i.e., *LOSS AIRLINE* =1) in route r in year-quarter t.
#EXIT_LOSS FC AIRLINES	The number of exit of airlines that were tax-loss and were financially constrained (i.e., *FIN CONSTRAINED* =1) in the previous fiscal year in route r in year-quarter t.
#EXIT_LOSS NOT FC AIRLINES	The number of exit of airlines that were tax-loss and were not financially constrained (i.e., *FIN CONSTRAINED* =0) in the previous fiscal year in route r in year-quarter t.
#EXIT_PROFIT AIRLINES	The number of exits of tax-profit airlines (i.e., *LOSS AIRLINE* =0) in route r in year-quarter t.
#EXIT_PROFIT FC AIRLINES	The number of exit of airlines that were tax-profit and were financially constrained in the previous fiscal year in route r in year-quarter t.
#EXIT_PROFIT NOT FC AIRLINES	The number of exit of airlines that were tax-profit and were not financially constrained the previous fiscal year in route r in year-quarter t.
#EXITS - FC AIRLINES	The number of exit of airlines that were financially constrained in the previous fiscal year in route r in year-quarter t.
#EXITS - NOT FC AIRLINES	The number of exit of airlines that were not financially constrained the previous fiscal year in route r in year-quarter t.

%CONNECTING - AIRLINE	The share of passengers traveling connect for airline j in route r in year-quarter t (airline-route-year-quarter level). The data is obtained from the DB1A database.
%CONNECTING - ROUTE	The share of passengers traveling connect in route r in year-quarter t (route-year-quarter level). The data is obtained from the DB1A database.
Δ*MARKET SHARE HP100*	The percentage change in sales (data SALE) minus its industry's percentage change in sales. The Hoberg and Phillps (2010, 2016) 100 industry classification is used.
Δ*MARKET SHARE HP500*	The percentage change in sales (data SALE) minus its industry's percentage change in sales. The Hoberg and Phillps (2010, 2016) 500 industry classification is used.
Δ*MARKET SHARE SIC*	The percentage change in sales (data SALE) minus its industry's percentage change in sales. The 2-digit SIC industry classification is used.
ACQUISITION	Lag acquisitions (data AQC) scaled by lag total assets (data AT).
AGG MKT SHARE LOSS AIRLINES	The previous quarter's market share of airlines that were in tax-loss positions in the previous fiscal year in route r in year-quarter t. Market share is defined as the number of passengers of airline j in route r in year-quarter t scaled by the number of passengers in route r in year-quarter t. The data is obtained from the DB1A database.
AVG. PASSENGERS	The average number of passengers for airline j in route rover the sample period (1982 – 1992). The data is obtained from the DB1A database.
CAPEX	Lag capital expenditures (data CAPX) minus lag sale of property (data SPPE) scaled by lag sales (data SALE). Missing CAPEX and SPPE values are filled with zero.
FIN CONSTRAINED (airline)	An indicator that equals one if an airline did not pay dividends (data DVC) in any of the previous three fiscal years and its lag cash (data CH) scaled by lag total assets (data AT) was in the low two terciles. Ranks are defined by year-quarter.
FIN CONSTRAINED (state)	An indicator that equals one if a firm's delaycon was in the top two terciles in the previous calendar year; 0 otherwise. Ranks are defined by industry-year. Delaycon is from Hoberg and Maksimovic (2015) and is a financial constraint measure estimated based on the discussion of liquidity in the MD&A Section of the 10-K filing.
LEVERAGE	Lag long-term debt (data DLTT) plus lag debt in current liabilities (data DLC) scaled by lag total assets (data AT).
LN(DISTANCE)	The natural log (distance+1) of the route r. The data is obtained from the DB1A database.
LN(INCOME)	The natural log of the arithmetic average of income per-capita across the core-based statistical areas (CBSAs) at the two endpoints of route r in year t. The data is obtained from the Bureau of Economic Analysis

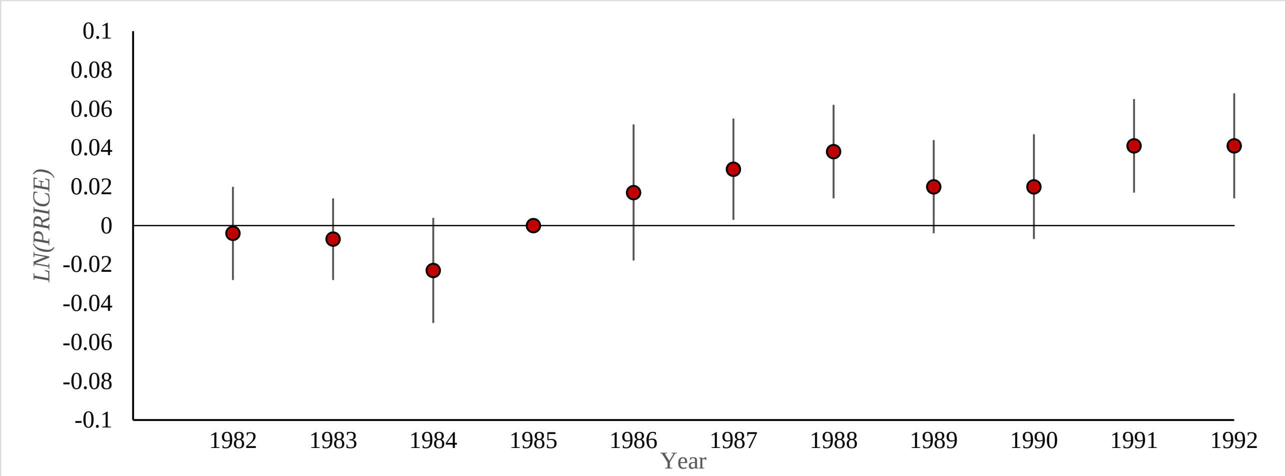
	(https://apps.bea.gov/regional/downloadzip.cfm). To identify the FIPS code for each airport, Azar et al. (2018)'s Airport-CBSA Xwalk data and Severin Borenstein's airport list data are used. If the income data is available only for one of the endpoints, the natural log of that income per-capita is used.
LN(MVE)	The natural log of lag market value of equity (data PRCC_F * CSHO).
LN(POPULATION)	The natural log of the arithmetic average of the population across the core-based statistical areas at the two endpoints of route r in year t. The data is obtained from the Bureau of Economic Analysis (https://apps.bea.gov/regional/downloadzip.cfm). To identify the FIPS code for each airport, Azar et al. (2018)'s Airport-CBSA Xwalk data and Severin Borenstein's airport list data are used. If the population data is available only for one of the endpoints, the natural log of that population is used.
LN(PRICE)	The natural log of the average ticket price of airline j in route r in year-quarter t. The data is obtained from the DB1A database.
LOSS AIRLINE	An indicator that equals one if an airline was in a tax loss position in the previous fiscal year. An airline is in a tax-loss position if it has negative pretax income (data PI) and positive net loss carryforward (data TLCF).
MARKET SHARE	The market share of airline j in route r in year-quarter t. Market share is defined as the number of passengers of airline j in route r in year-quarter t scaled by the number of passengers in route r in year-quarter t. The data is obtained from the DB1A database.
MTB	Lag market value of equity (data PRCC_F * CSHO) scaled by lag total assets (data AT).
POST86	An indicator that equals one for the calendar year 1986 and beyond.
ROA	Lag net income (data NI) scaled by lag total assets (data AT).
TAX LOSS	An indicator that equals one if a firm was in a tax loss position in the previous calendar year. A firm is in a tax-loss position if it has negative pretax income (data PI) and positive net loss carryforward (data TLCF)
TAX RATE DECREASE	The magnitude of a state corporate income tax rate cut in a firm's headquarter state in the previous calendar year. The corporate income tax rate data is from Giroud and Rauh (2019).
TAX RATE DECREASE [0]	The magnitude of a state corporate income tax rate cut in a firm's headquarter state in the current calendar year.
TAX RATE DECREASE [1]	The magnitude of a state corporate income tax rate cut in a firm's headquarter state in the previous calendar year (i.e., One-year lag term of *TAX RATE DECREASE [0])*.
TAX RATE DECREASE [-1]	One-year lead term of *TAX RATE DECREASE [0]*.

TAX RATE DECREASE [-2]	Two-year lead term of *TAX RATE DECREASE [0]*.
TAX RATE DECREASE [2+]	Two-or-more-years lag term of *TAX RATE DECREASE [0]*.
TAX RATE INCREASE	The magnitude of a state corporate income tax rate increase in a firm's headquarter state in the previous calendar year. The corporate income tax rate data is from Giroud and Rauh (2019).
TAX RATE INCREASE [0]	The magnitude of a state corporate income tax rate increase in a firm’s headquarter state in the current calendar year.
TAX RATE INCREASE [1]	The magnitude of a state corporate income tax rate increase in a firm’s headquarter state in the previous calendar year (i.e., One-year lag term of *TAX RATE INCREASE [0])*.
TAX RATE INCREASE [-1]	One-year lead term of *TAX RATE INCREASE [0]*.
TAX RATE INCREASE [-2]	Two-year lead term of *TAX RATE INCREASE [0]*.
TAX RATE INCREASE [2+]	Two-or-more-years lag term of *TAX RATE INCREASE [0]*.
YEAR82	An indicator that equals one for the calendar year 1982.
YEAR83	An indicator that equals one for the calendar year 1983.
YEAR84	An indicator that equals one for the calendar year 1984.
YEAR86	An indicator that equals one for the calendar year 1986.
YEAR87	An indicator that equals one for the calendar year 1987.
YEAR88	An indicator that equals one for the calendar year 1988.
YEAR89	An indicator that equals one for the calendar year 1989.
YEAR90	An indicator that equals one for the calendar year 1990.
YEAR91	An indicator that equals one for the calendar year 1991.
YEAR92	An indicator that equals one for the calendar year 1992.

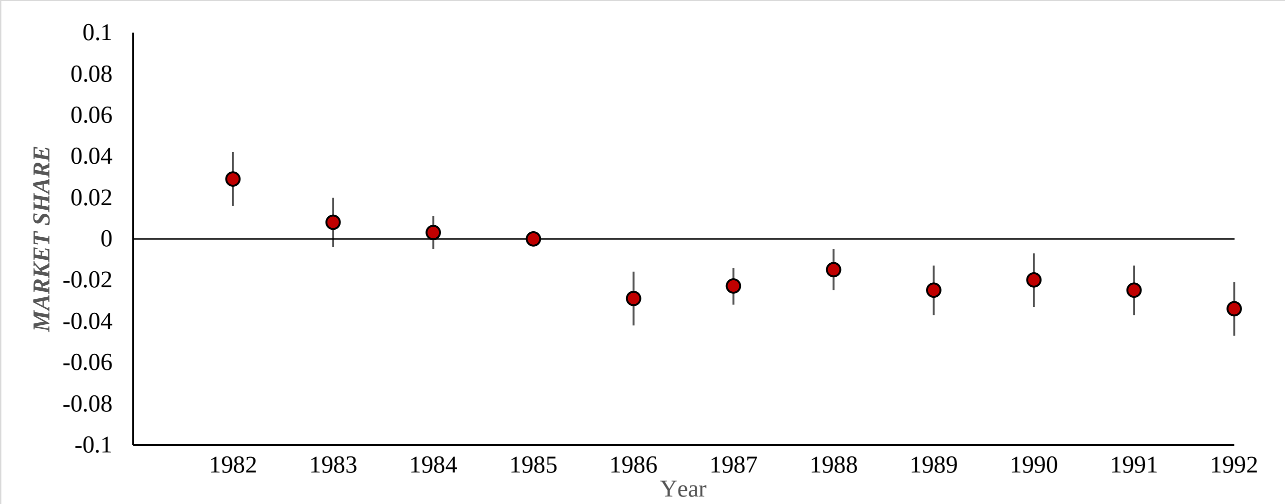
FIGURE 1

Dynamic effect of TRA on ticket prices and market share of loss-making relative to profit-making airline carriers

Panel A: Effect of TRA on ticket prices



Panel B: Effect of TRA on market share

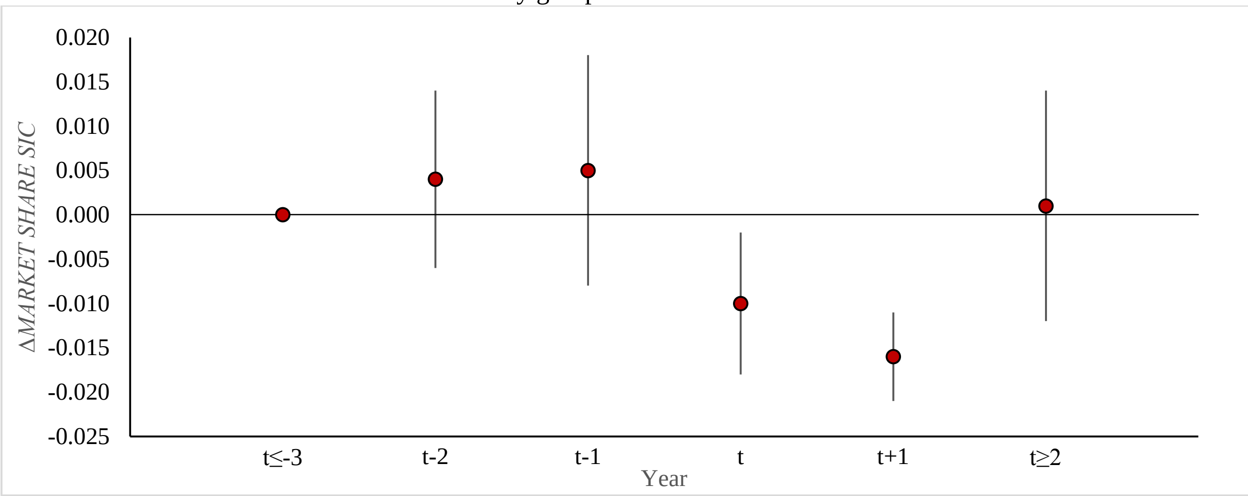


Notes: In the figures above, the x-axis represent years centered around the enactment of the Tax Reform Act (TRA) of 1986. In Panel A, the y-axis represents the natural logarithm of average ticket price airlines charged their customers in each route in each period, and in Panel B, the y-axis represents the market share of each airline in each route in each period. The coefficient estimate in Panel A captures the percentage change in the average ticket price charged by loss-making airlines relative to profit-making airlines each period. The Panel A figure corresponds to the regression tabulated in Column 2 in Table 3, Panel A. In Panel B, the coefficient estimate captures the change in market share for loss-making airlines relative to profit-making airlines each period. The Panel B figure corresponds to the regression tabulated in Column 4 in Table 3, Panel A. The figures also plot the two-tailed 90% confidence interval around each point estimate.

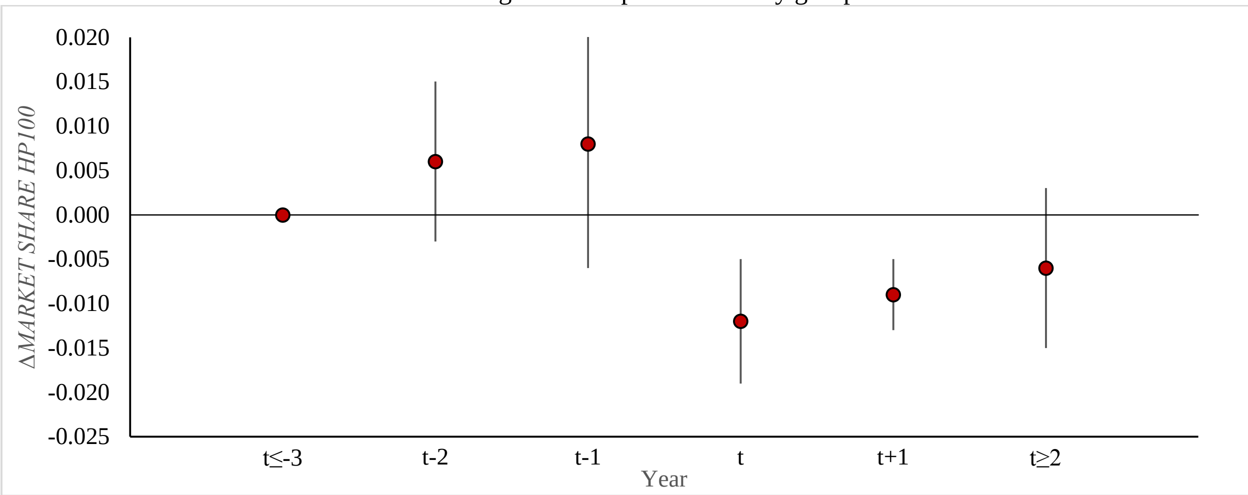
FIGURE 2

Dynamic effect of state tax rate changes on changes in the market shares of loss-making vs. profit-making firms

Panel A: Market shares measured in SIC industry groups



Panel B: Market shares measured in the Hoberg and Phillips 100-industry groups



Panel C: Market shares measured in the Hoberg and Phillips 500-industry groups

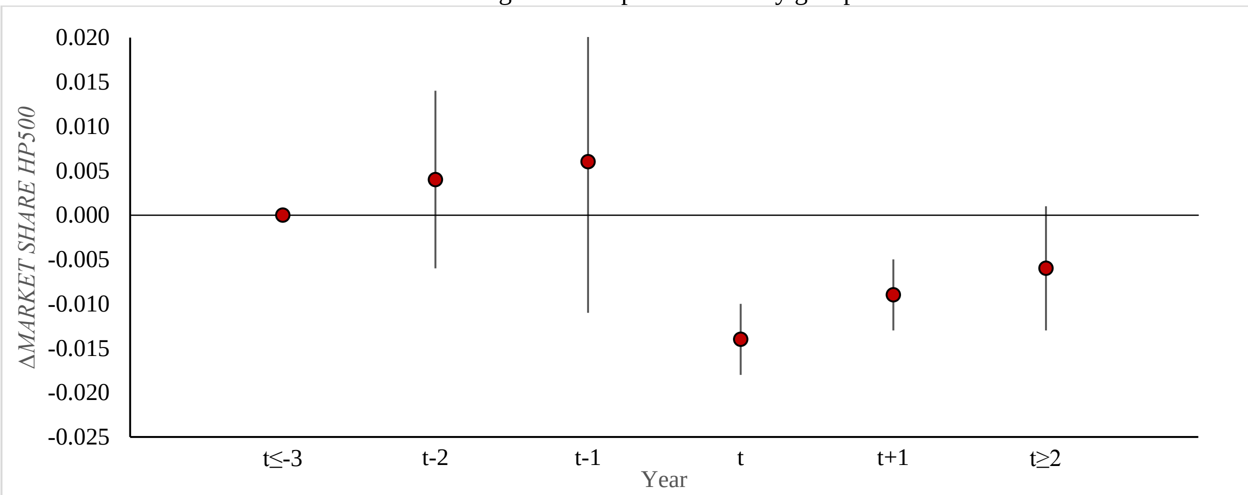


FIGURE 2 – *continued*

Notes: In the figures above, the x-axis represents time relative to the year in which a state changes its corporate income tax rate and the y-axis represents market share growth. The coefficient estimate captures the change in market share growth for loss-making airlines relative to profit-making airlines each period. The figure plots the two-tailed 90% confidence interval around each point estimate.

TABLE 1

Sample Selection: Tax Reform Act of 1986 setting

No.	Sample composition	Observations dropped	Observations remaining
(1)	Airline-route-quarter observations with more than 20 (40) passengers for connected (direct) flights in a quarter		1,002,678
(2)	*Less:* Flights operated by multiple airlines	43,552	959,126
(3)	*Less:* Duplicate observations identified by merging connecting flights with direct flights for each airline-route-quarter	110,456	848,670
(4)	*Less:* Observations with unidentified airports	1,529	847,141
(5)	*Less:* Observations without a Compustat match in period *t* and *t-1*	39,671	807,470
(6)	*Less:* Observations with missing population and income data	49	807,421
(7)	*Less:* Route-quarters with fewer than two airlines	226,833	580,588
(8)	*Less:* Route-quarters without at least one profitable and one loss-making airline	205,290	375,298
(9)	Restricting the sample period to 1982 Q1 - 1992 Q4.	10,486	364,812
Final sample of carrier-route-quarter observations available for analyses			364,812

Notes: This table presents the sample selection procedure of our main analyses employing data from the airline industry and the Tax Reform Act of 1986.

TABLE 2

Descriptive statistics: Tax Reform Act of 1986 setting

Variables	Mean	SD	P25	P50	P75	N
LN(PRICE)	5.045	0.341	4.860	5.071	5.268	364,812
MARKET SHARE	0.267	0.231	0.073	0.200	0.411	364,812
LOSS AIRLINE	0.329	0.470	0.000	0.000	1.000	364,812
*AGG MKT SHARE LOSS AIRLINES**	0.309	0.258	0.103	0.241	0.453	364,812
AVG. PASSENGERS	3,186	6,533	525	976	2,309	364,812
#AIRLINES	4.598	2.042	3.000	4.000	6.000	364,812
%CONNECTING - AIRLINE	0.809	0.363	1.000	1.000	1.000	364,812
%CONNECTING - ROUTE	0.652	0.378	0.263	0.837	1.000	364,812
LN(POPULATION)	14.662	0.760	14.126	14.627	15.138	364,812
LN(INCOME)	9.810	0.187	9.676	9.833	9.954	364,812
MKT WITH FCON LOSS AIRLINE	0.728	0.445	0.000	1.000	1.000	364,812

Notes: This table presents the descriptive statistics for the variables used in our analyses conducted using the airline setting and the 1986 Tax Reform Act. In the table above, * indicates that the variable is standardized to have a mean of zero and standard deviation of one in our regression analyses. See Appendix A for variable definitions.

TABLE 3

Effect of Tax Rate Reductions on the Ticket Prices and Market Shares of Loss-Making vs. Profitable Airlines

Panel A: Static Analyses

Dependent Variable:	*LN(PRICE)*		*MARKET SHARE*	
	(1)	(2)	(3)	(4)
	Coef.	Coef.	Coef.	Coef.
	t-Stat.	*t*-Stat.	*t*-Stat.	*t*-Stat.
AGG MKT SHARE LOSS AIRLINES	0.004	0.001	-0.029***	-0.027***
	(0.789)	(0.153)	(-11.200)	(-13.014)
AGG MKT SHARE LOSS AIRLINES × LOSS AIRLINE	-0.013*	-0.010	0.096***	0.086***
	(-1.924)	(-1.581)	(15.919)	(16.821)
AGG MKT SHARE LOSS AIRLINES × POST86	-0.008	-0.005	0.009***	0.009***
	(-1.221)	(-0.711)	(3.524)	(4.282)
AGG MKT SHARE LOSS AIRLINES × LOSS AIRLINE × POST86	0.046***	0.042***	-0.037***	-0.033***
	(5.236)	(4.977)	(-5.321)	(-5.695)
#AIRLINES		-0.011***		-0.029***
		(-3.924)		(-35.768)
%CONNECTING - AIRLINE		-0.007		-0.277***
		(-0.799)		(-44.142)
%CONNECTING - ROUTE		0.125***		0.185***
		(8.899)		(31.091)
LN(POPULATION)		-0.359***		-0.006
		(-3.091)		(-0.298)
LN(INCOME)		0.040		0.003
		(0.242)		(0.115)
Fixed effects				
Airline × Route	Included	Included	Included	Included
Airline × Year-Quarter	Included	Included	Included	Included
Year-Quarter × *LN(DISTANCE)*	Included	Included	Included	Included
R-Squared	89.9%	90.1%	82.2%	85.7%
No. of Observations	364,812	364,812	364,812	364,812

TABLE 3 – *continued*

Panel B: Dynamic Analyses

Dependent Variable:	*LN(PRICE)*		*MARKET SHARE*	
	(1)	(2)	(3)	(4)
AGG MKT SHARE LOSS AIRLINES	0.005	-0.000	-0.018***	-0.020***
	(0.938)	(-0.052)	(-10.070)	(-11.837)
AGG MKT SHARE LOSS AIRLINES × LOSS AIRLINE	-0.004	-0.002	0.087***	0.077***
	(-0.360)	(-0.124)	(13.968)	(14.366)
AGG MKT SHARE LOSS AIRLINES × YEAR82	0.006	0.010	-0.025***	-0.015***
	(0.795)	(1.347)	(-7.209)	(-5.308)
AGG MKT SHARE LOSS AIRLINES × YEAR83	0.001	0.004	-0.012***	-0.006*
	(0.185)	(0.663)	(-4.602)	(-1.989)
AGG MKT SHARE LOSS AIRLINES × YEAR84	-0.009	-0.008	-0.014***	-0.007***
	(-1.193)	(-1.066)	(-7.720)	(-3.944)
AGG MKT SHARE LOSS AIRLINES × YEAR86	-0.037**	-0.031*	0.005	0.006*
	(-2.260)	(-1.872)	(1.267)	(1.803)
AGG MKT SHARE LOSS AIRLINES × YEAR87	-0.010	-0.005	0.004*	0.008***
	(-1.314)	(-0.615)	(1.897)	(4.798)
AGG MKT SHARE LOSS AIRLINES × YEAR88	-0.012	-0.007	-0.005**	-0.000
	(-1.396)	(-0.749)	(-2.183)	(-0.113)
AGG MKT SHARE LOSS AIRLINES × YEAR89	0.008	0.013	-0.006**	0.000
	(0.908)	(1.596)	(-2.576)	(0.084)
AGG MKT SHARE LOSS AIRLINES × YEAR90	-0.005	-0.001	-0.009***	-0.003
	(-0.405)	(-0.060)	(-3.624)	(-1.436)
AGG MKT SHARE LOSS AIRLINES × YEAR91	-0.000	0.005	-0.007***	-0.000
	(-0.002)	(0.628)	(-3.192)	(-0.078)
AGG MKT SHARE LOSS AIRLINES × YEAR92	-0.012	-0.007	0.003	0.008***
	(-1.224)	(-0.732)	(1.545)	(4.396)
AGG MKT SHARE LOSS AIRLINES × LOSS AIRLINE × YEAR82	-0.004	-0.004	0.036***	0.029***
	(-0.285)	(-0.309)	(3.903)	(3.720)
AGG MKT SHARE LOSS AIRLINES × LOSS AIRLINE × YEAR83	-0.005	-0.007	0.007	0.008
	(-0.419)	(-0.523)	(0.945)	(1.078)
AGG MKT SHARE LOSS AIRLINES × LOSS AIRLINE × YEAR84	-0.024	-0.023	0.005	0.003
	(-1.471)	(-1.476)	(0.944)	(0.635)
AGG MKT SHARE LOSS AIRLINES × LOSS AIRLINE × YEAR86	0.023	0.017	-0.033***	-0.029***
	(1.060)	(0.807)	(-4.003)	(-3.896)
AGG MKT SHARE LOSS AIRLINES × LOSS AIRLINE × YEAR87	0.032**	0.029*	-0.024***	-0.023***
	(2.054)	(1.907)	(-3.416)	(-3.905)
AGG MKT SHARE LOSS AIRLINES × LOSS AIRLINE × YEAR88	0.042***	0.038**	-0.016**	-0.015**
	(2.939)	(2.640)	(-2.261)	(-2.445)
AGG MKT SHARE LOSS AIRLINES × LOSS AIRLINE × YEAR89	0.024*	0.020	-0.027***	-0.025***
	(1.686)	(1.424)	(-3.193)	(-3.448)
AGG MKT SHARE LOSS AIRLINES × LOSS AIRLINE × YEAR90	0.025	0.020	-0.019**	-0.020**
	(1.520)	(1.275)	(-2.206)	(-2.529)
AGG MKT SHARE LOSS AIRLINES × LOSS AIRLINE × YEAR91	0.044***	0.041***	-0.027***	-0.025***
	(3.049)	(2.878)	(-3.050)	(-3.289)
AGG MKT SHARE LOSS AIRLINES × LOSS AIRLINE × YEAR92	0.044**	0.041**	-0.038***	-0.034***
	(2.659)	(2.509)	(-4.099)	(-4.304)
Airline-route level time varying controls	Not included	Included	Not included	Included
Fixed effects: Airline×Route Airline×Year-Quarter & Year-Quarter×*LN(DISTANCE)*	Included	Included	Included	Included
R-Squared	90.0%	90.1%	82.2%	85.7%
No. of Observations	364,812	364,812	364,812	364,812

TABLE 3 – *continued*

Notes: This table presents the results from regressions of 1) the natural logarithm of average ticket prices charged by airlines in each route-year-quarter or 2) airlines' market shares in each route-year-quarter on the aggregate market share of loss-making airlines operating in the route-year-quarter, an indicator variable that equals one for whether the airline made a tax loss the previous year, an indicator variable that equals one for the post-1986 TRA period, interaction terms between these variables and control variables. We use weighted least squares when the dependent variable is ticket prices, with weights based on the average number of passengers traveling with an airline in a route over the entire sample period. The regressions in Panel A estimate a single post-treatment indicator for the period after the anticipated enactment of the TRA 1986, and the regressions in Panel B estimate separate coefficients for each of the years in our sample, excluding 1985 which serves as the base year. See Appendix A for variable definitions. Standard errors are clustered at the route and year-quarter levels. ***, **, and * denote statistical significance at the two-tailed 1, 5, and 10 percent levels, respectively.

TABLE 4

Cross-Sectional Effects Based on Airline Financings Constraints

Dependent Variable:	***LN(PRICE)***		***MARKET SHARE***	
	(1)	(2)	(3)	(4)
	Coef.	Coef.	Coef.	Coef.
	t-Stat.	*t*-Stat.	*t*-Stat.	*t*-Stat.
	Route-year includes at least one *financially constrained* loss-making airline?			
	Yes	**No**	**Yes**	**No**
AGG MKT SHARE LOSS AIRLINES	0.009	-0.004	-0.022***	-0.035***
	(1.606)	(-0.513)	(-10.343)	(-11.256)
AGG MKT SHARE LOSS AIRLINES × *POST86*	-0.009	-0.005	0.007***	0.015***
	(-1.344)	(-0.472)	(3.205)	(3.813)
AGG MKT SHARE LOSS AIRLINES × *LOSS AIRLINE*	-0.023***	0.010	0.083***	0.077***
	(-2.964)	(0.945)	(14.290)	(10.250)
AGG MKT SHARE LOSS AIRLINES × *LOSS AIRLINE* × *POST86*	0.049***	0.013	-0.036***	-0.014
	(5.396)	(0.950)	(-5.515)	(-1.410)
p Value for difference in coefficient for: *AGG MKT SHARE LOSS AIRLINES* × *LOSS AIRLINE* × *POST86*	0.023		0.028	
Airline-route level time varying controls	Included	Included	Included	Included
Fixed effects				
Airline × Route	Included	Included	Included	Included
Airline × Year-Quarter	Included	Included	Included	Included
Year-Quarter × *LN(DISTANCE)*	Included	Included	Included	Included
R-Squared	90.0%	94.6%	86.5%	90.2%
No. of Observations	265,708	99,104	265,708	99,104

Notes: This table presents the results from regressions of 1) the natural logarithm of average ticket prices charged by airlines in each route-year-quarter or 2) airlines' market shares in each route-year-quarter on the aggregate market share of loss-making airlines operating in the route-year-quarter, an indicator variable that equals one for whether the airline made a tax loss the previous year, an indicator variable that equals one for the post-1986 TRA period, interaction terms between these variables and control variables. We use weighted least squares when the dependent variable is ticket prices, with weights based on the average number of passengers traveling with an airline in a route over the entire sample period. The full sample is partitioned into two groups based on whether or not a financially constrained airline operates in the route-year. See Appendix A for variable definitions. Standard errors are clustered at the route and year-quarter levels. ***, **, and * denote statistical significance at the two-tailed 1, 5, and 10 percent levels, respectively.

TABLE 5

Effect of Tax Rate Reductions and Tax Loss Status on Airline Entry into New Routes and Exit from Old Routes

Dependent Variable:	***#ENTRY***	***#ENTRY - PROFIT AIRLINES***	***#ENTRY - LOSS AIRLINES***	***#EXITS***	***#EXITS - PROFIT AIRLINES***	***#EXITS - LOSS AIRLINES***
	(1)	(2)	(3)	(4)	(5)	(6)
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
	t-Stat.	*t*-Stat.	*t*-Stat.	*t*-Stat.	*t*-Stat.	*t*-Stat.
AGG MKT SHARE LOSS AIRLINES	-0.002	0.006**	-0.008***	0.002	-0.008***	0.010***
	(-0.652)	(2.682)	(-4.457)	(0.547)	(-6.067)	(3.379)
AGG MKT SHARE LOSS AIRLINES × POST86	0.008**	0.006**	0.002	0.015**	-0.002	0.017**
	(2.514)	(2.296)	(1.372)	(2.135)	(-0.818)	(2.359)
%CONNECTING - ROUTE	0.012*	0.013**	-0.001	-0.006	-0.003	-0.003
	(1.755)	(2.036)	(-0.303)	(-0.979)	(-0.654)	(-0.986)
LN(POPULATION)	0.042	0.044**	-0.002	-0.042	-0.077**	0.035
	(1.178)	(2.170)	(-0.082)	(-1.515)	(-2.425)	(1.602)
LN(INCOME)	0.223***	0.145***	0.078**	0.240***	0.081**	0.159**
	(3.711)	(3.098)	(2.409)	(3.169)	(2.514)	(2.141)
p Value for difference in coefficient for: *AGG MKT SHARE LOSS AIRLINES × POST86*		0.138			0.014	
Fixed effects						
Route	Included	Included	Included	Included	Included	Included
Year-Quarter	Included	Included	Included	Included	Included	Included
Year-Quarter × *LN(DISTANCE)*	Included	Included	Included	Included	Included	Included
R-Squared	16.0%	16.2%	11.7%	16.0%	16.2%	11.7%
No. of Observations	358,801	358,801	358,801	358,801	358,801	358,801

Notes: This table presents the results from regressions of the number of profitable and loss-making airlines that enter and exit a route each year-quarter on the aggregate market share of loss-making airlines operating in the route-year-quarter, an indicator variable that equals one for the post-1986 TRA period, an interaction term between these variables, and control variables. See Appendix A for variable definitions. Standard errors are clustered at the route and year-quarter levels. ***, **, and * denote statistical significance at the two-tailed 1, 5, and 10 percent levels, respectively.

TABLE 6

Effect of Tax Rate Reductions and Tax Loss Status on Airline Entry into Markets conditioning on Financial Constraints

Panel A: Cross-sectional variation in financing constraints of incumbent loss-making airlines

Dependent Variable:	***#ENTRY***		***#ENTRY - PROFIT AIRLINES***		***#ENTRY - LOSS AIRLINES***	
	(1)	(2)	(3)	(4)	(5)	(6)
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
	t-Stat.	*t*-Stat.	*t*-Stat.	*t*-Stat.	*t*-Stat.	*t*-Stat.
	Route-year includes at least one *financially constrained* loss-making airline?					
	Yes	**No**	**Yes**	**No**	**Yes**	**No**
AGG MKT SHARE LOSS AIRLINES	0.001	-0.003	0.012	0.003	-0.011**	-0.006***
	(0.118)	(-1.065)	(1.521)	(1.422)	(-2.198)	(-3.249)
AGG MKT SHARE LOSS AIRLINES × POST86	0.037***	0.010**	0.028***	0.008***	0.009**	0.002
	(3.731)	(2.626)	(3.255)	(3.083)	(2.117)	(0.853)
%CONNECTING - ROUTE	0.025*	0.010	0.019*	0.011*	0.006	-0.001
	(2.014)	(1.260)	(1.696)	(1.730)	(1.029)	(-0.408)
LN(POPULATION)	0.186**	0.029	0.163***	0.033	0.023	-0.004
	(2.500)	(0.830)	(3.196)	(1.506)	(0.411)	(-0.175)
LN(INCOME)	0.583***	0.192***	0.413***	0.109***	0.170**	0.083***
	(3.880)	(3.930)	(3.055)	(2.746)	(2.470)	(2.758)
p Value for difference in coefficient for: *AGG MKT SHARE LOSS AIRLINES × POST86*	0.007		0.033		0.035	
Fixed effects						
Route	Included	Included	Included	Included	Included	Included
Year-Quarter	Included	Included	Included	Included	Included	Included
Year-Quarter × *LN(DISTANCE)*	Included	Included	Included	Included	Included	Included
R-Squared	11.4%	8.1%	10.6%	6.5%	8.9%	7.3%
No. of Observations	78,564	280,237	78,564	280,237	78,564	280,237

TABLE 6 – *continued*

Panel B: Cross-sectional variation in financing constraints of airline entering new market

Dependent Variable:	***#ENTRY - PROFIT FC AIRLINES***	***#ENTRY - PROFIT NOT FC AIRLINES***	***#ENTRY - LOSS FC AIRLINES***	***#ENTRY - LOSS NOT FC AIRLINES***
	(1)	(2)	(3)	(4)
	Coef.	Coef.	Coef.	Coef.
	t-Stat.	*t*-Stat.	*t*-Stat.	*t*-Stat.
AGG MKT SHARE LOSS AIRLINES	-0.001*	0.007***	-0.004**	-0.003***
	(-1.845)	(3.883)	(-2.501)	(-6.217)
AGG MKT SHARE LOSS AIRLINES × *POST86*	0.006***	0.001	0.001	0.001
	(4.012)	(0.228)	(0.812)	(1.056)
%CONNECTING - ROUTE	0.008	0.005	0.001	-0.001
	(1.466)	(1.296)	(0.378)	(-0.896)
LN(POPULATION)	0.023*	0.021	0.026	-0.028**
	(1.986)	(1.430)	(1.177)	(-2.217)
LN(INCOME)	0.068**	0.077**	0.018	0.059**
	(2.510)	(2.271)	(0.850)	(2.459)
p Value for difference in coefficient for: *AGG MKT SHARE LOSS AIRLINES* × *POST86*	0.069		0.778	
Fixed effects				
Route	Included	Included	Included	Included
Year-Quarter	Included	Included	Included	Included
Year-Quarter × *LN(DISTANCE)*	Included	Included	Included	Included
R-Squared	5.4%	4.7%	5.3%	4.5%
No. of Observations	358,801	358,801	358,801	358,801

Notes: Panel A in this table presents the results from regressions of the number of profitable and loss-making airlines that enter a route each year-quarter on the aggregate market share of loss-making airlines operating in the route-year-quarter, an indicator variable that equals one for the post-1986 TRA period, an interaction term between these variables, and control variables. In Panel A, the full sample is partitioned into two groups based on whether or not a financially constrained loss-making airline operates in the route-year. Panel B presents results from regressions on the number of airlines that enter a route each year-quarter conditioning on whether the airline is financially constrained on the aggregate market share of loss-making airlines operating in the route-year-quarter, an indicator variable that equals one for the post-1986 TRA period, an interaction term between these variables and control variables. See Appendix A for variable definitions. Standard errors are clustered at the route and year-quarter levels. ***, **, and * denote statistical significance at the two-tailed 1, 5, and 10 percent levels, respectively.

TABLE 7

Effect of Tax Rate Reductions on Airline Exits by Financial Constrained vs. Unconstrained Incumbent Airlines

Dependent Variable:	***#EXITS - FC AIRLINES***	***#EXITS - NOT FC AIRLINES***	***#EXITS - PROFIT FC AIRLINES***	***#EXITS - PROFIT NOT FC AIRLINES***	***#EXITS - LOSS FC AIRLINES***	***#EXITS - LOSS NOT FC AIRLINES***
	(1)	(2)	(3)	(4)	(5)	(6)
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
	t-Stat.	*t*-Stat.	*t*-Stat.	*t*-Stat.	*t*-Stat.	*t*-Stat.
AGG MKT SHARE LOSS AIRLINES	-0.001	0.003	-0.003***	-0.006***	0.002	0.009***
	(-0.302)	(1.442)	(-5.829)	(-4.226)	(0.572)	(6.693)
AGG MKT SHARE LOSS AIRLINES × POST86	0.012*	0.002	-0.002	0.000	0.015**	0.002
	(1.714)	(0.853)	(-1.533)	(0.020)	(2.095)	(0.926)
%CONNECTING - ROUTE	-0.001	-0.005	-0.001	-0.002	-0.000	-0.003
	(-0.513)	(-1.024)	(-0.596)	(-0.532)	(-0.096)	(-1.389)
LN(POPULATION)	0.006	-0.048***	-0.020	-0.056***	0.027**	0.008
	(0.301)	(-3.058)	(-0.966)	(-3.864)	(2.558)	(0.487)
LN(INCOME)	0.144*	0.096**	0.050***	0.031	0.094	0.065***
	(2.018)	(2.669)	(3.042)	(0.991)	(1.303)	(3.551)
p Value for difference in coefficient for: *AGG MKT SHARE LOSS AIRLINES × POST86*	0.194		0.336		0.097	
Fixed effects						
Route	Included	Included	Included	Included	Included	Included
Year-Quarter	Included	Included	Included	Included	Included	Included
Year-Quarter × *LN(DISTANCE)*	Included	Included	Included	Included	Included	Included
R-Squared						
No. of Observations	358,801	358,801	358,801	358,801	358,801	358,801

Notes: This table presents the results from regressions of the number of airlines that exit a route each year-quarter on the aggregate market share of loss-making airlines operating in the route-year-quarter, an indicator variable that equals one for the post-1986 TRA period, an interaction term between these variables and control variables. We partition entries/exits by whether an airline is profitable or loss-making, and whether it is financially constrained or not. See Appendix A for variable definitions. Standard errors are clustered at the route and year-quarter levels. ***, **, and * denote statistical significance at the two-tailed 1, 5, and 10 percent levels, respectively.

TABLE 8

Sample Selection: State Tax Changes Setting

No.	Sample composition	Observations dropped	Observations remaining
(1)	Sample of firm-years in Compustat from 1996 to 2013 that do not belong to the financial, utilities or public sectors		198,062
(2)	*Less:* Observations with missing or negative total assets, missing historical SIC codes, and CIK	62,361	135,701
(3)	*Less:* Observations headquartered outside the U.S.	29,342	106,359
(4)	*Less:* Observations that are not traded on a major US stock exchange or with a CRSP share code >11	36,458	69,901
(5)	*Less:* Observations missing data needed to construct main variables used in the regressions	10,796	59,105
(6)	*Less:* Firms that change their headquarters during the sample period	8,890	50,215
	Final sample of firm-year observations available for analyses		50,215
(7)	*Less:* Firm-year observations missing the Hoberg-Phillips 100-industry classification code	5,047	45,168
	Final sample of firm-year observations available for analyses		45,168
(8)	*Less:* Firm-year observations missing the Hoberg-Phillips 500-industry classification code	89	45,079
	Final sample of firm-year observations available for analyses		45,079

Notes: This table presents the sample selection procedure of our analyses employing data for all non-financial firms in Compustat and the changes in state corporate income tax rates from 1996 to 2013.

TABLE 9

Descriptive statistics: State Tax Changes Setting

Variables	Mean	SD	P25	P50	P75	N
ΔMARKET SHARE SIC	0.072	0.429	-0.106	0.019	0.168	50,215
ΔMARKET SHARE HP100	0.020	0.527	-0.174	0.020	0.220	45,168
ΔMARKET SHARE HP500	-0.060	0.782	-0.210	0.002	0.224	45,079
TAX LOSS	0.167	0.373	0.000	0.000	0.000	50,215
*TAX RATE DECREASE**	0.063	0.300	0.000	0.000	0.000	50,215
*TAX RATE INCREASE**	0.014	0.187	0.000	0.000	0.000	50,215
LN(MVE)	5.504	2.089	3.963	5.446	6.895	50,185
LEVERAGE	0.204	0.207	0.011	0.158	0.326	50,021
MTB	1.600	1.714	0.565	1.042	1.927	50,185
ACQUISITION	0.024	0.061	0.000	0.000	0.011	50,215
ROA	-0.039	0.245	-0.047	0.033	0.078	50,215
CAPEX	0.106	0.268	0.017	0.035	0.074	50,215
FIN CONSTRAINED	-0.013	0.091	-0.079	-0.021	0.045	36,139
%COMPETITION	0.596	0.475	0.248	0.456	0.811	24,628

Notes: This table presents the descriptive statistics for the variables used in our analyses conducted using the state tax rate changes setting. See Appendix A for variable definitions.

TABLE 10

Effect of Tax Rate Changes on the Market Share of Loss-Making vs. Profitable Companies

Panel A: Static Analyses

Dependent Variable:	*ΔMARKET SHARE SIC*		*ΔMARKET SHARE HP100*		*ΔMARKET SHARE HP500*	
	(1)	(2)	(3)	(4)	(5)	(6)
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
	t-Stat.	*t*-Stat.	*t*-Stat.	*t*-Stat.	*t*-Stat.	*t*-Stat.
TAX LOSS	0.015	0.002	0.016	0.001	0.022**	0.006
	(1.342)	(0.160)	(1.647)	(0.104)	(2.107)	(0.459)
TAX LOSS × TAX RATE DECREASE	-0.012**	-0.015***	-0.011**	-0.013**	-0.012**	-0.014**
	(-2.524)	(-3.288)	(-2.349)	(-2.561)	(-2.236)	(-2.517)
TAX LOSS × TAX RATE INCREASE	0.003	0.001	0.004	0.002	0.004	0.001
	(0.608)	(0.114)	(0.833)	(0.354)	(0.682)	(0.137)
LN(MVE)		-0.035***		-0.030***		-0.030***
		(-6.539)		(-5.079)		(-5.814)
LEVERAGE		-0.067***		-0.045*		-0.038
		(-2.856)		(-1.748)		(-1.167)
MTB		0.068***		0.064***		0.065***
		(16.831)		(15.115)		(13.735)
ACQUISITION		0.715***		0.661***		0.652***
		(12.894)		(11.262)		(10.822)
ROA		-0.083***		-0.094***		-0.100***
		(-3.795)		(-3.565)		(-3.137)
CAPEX		0.547***		0.533***		0.534***
		(18.876)		(15.680)		(12.844)
Fixed effects						
Firm	Included	Included	Included	Included	Included	Included
Year × State	Included	Included	Included	Included	Included	Included
Year × Industry	Included	Included	Included	Included	Included	Included
R-Squared	34.4%	41.1%	61.5%	65.0%	83.2%	84.7%
No. of Observations	50,215	49,991	45,168	44,976	45,079	44,887

TABLE 10 – *continued*

Panel B: Dynamic Analyses

Dependent Variable:	*ΔMARKET SHARE SIC*		*ΔMARKET SHARE HP100*		*ΔMARKET SHARE HP500*	
	(1) Coef. *t*-Stat.	(2) Coef. *t*-Stat.	(3) Coef. *t*-Stat.	(4) Coef. *t*-Stat.	(5) Coef. *t*-Stat.	(6) Coef. *t*-Stat.
TAX LOSS	0.027***	0.013	0.022**	0.009	0.024**	0.009
	(2.691)	(1.184)	(2.487)	(0.863)	(2.290)	(0.618)
TAX LOSS × TAX RATE DECREASE [-2]	0.004	0.004	0.006	0.006	0.004	0.004
	(0.849)	(0.624)	(1.481)	(1.151)	(0.888)	(0.661)
TAX LOSS × TAX RATE DECREASE [-1]	0.005	0.005	0.007	0.008	0.005	0.006
	(0.860)	(0.638)	(0.960)	(0.959)	(0.490)	(0.576)
TAX LOSS × TAX RATE DECREASE [0]	-0.007	-0.010**	-0.009**	-0.012**	-0.011***	-0.014***
	(-1.388)	(-2.235)	(-2.050)	(-2.665)	(-4.039)	(-5.356)
TAX LOSS × TAX RATE DECREASE [1]	-0.012***	-0.016***	-0.006**	-0.009***	-0.005**	-0.009***
	(-3.362)	(-5.335)	(-2.660)	(-3.637)	(-2.314)	(-4.092)
TAX LOSS × TAX RATE DECREASE [2+]	0.006	0.001	0.002	-0.006	0.004	-0.006
	(0.997)	(0.131)	(0.450)	(-1.185)	(0.706)	(-1.442)
TAX LOSS × TAX RATE INCREASE [-2]	-0.014	-0.018**	-0.015	-0.019**	-0.021	-0.026*
	(-1.615)	(-2.610)	(-1.368)	(-2.068)	(-1.248)	(-1.707)
TAX LOSS × TAX RATE INCREASE [-1]	-0.005	-0.008	-0.002	-0.004	0.001	-0.002
	(-0.647)	(-1.150)	(-0.211)	(-0.501)	(0.144)	(-0.262)
TAX LOSS × TAX RATE INCREASE [0]	-0.000	0.000	0.002	0.003	0.001	0.003
	(-0.048)	(0.002)	(0.217)	(0.297)	(0.129)	(0.257)
TAX LOSS × TAX RATE INCREASE [1]	-0.004	-0.006*	-0.002	-0.004	-0.006	-0.008
	(-0.960)	(-1.789)	(-0.582)	(-1.109)	(-1.036)	(-1.412)
TAX LOSS × TAX RATE INCREASE [2+]	-0.001	0.000	-0.000	0.002	-0.000	0.002
	(-0.183)	(0.066)	(-0.026)	(0.304)	(-0.018)	(0.263)
Time varying control variables	Not incl.	Included	Not incl.	Included	Not incl.	Included
Fixed effects						
Firm	Included	Included	Included	Included	Included	Included
Year × State	Included	Included	Included	Included	Included	Included
Year × Industry	Included	Included	Included	Included	Included	Included
R-Squared	34.8%	40.5%	63.1%	65.8%	85.4%	86.5%
No. of Observations	32,395	32,250	25,725	25,623	25,681	25,579

Notes: This table presents the results from regressions of changes in market share for each firm-year on an indicator variable that equals one for whether the firm incurred a tax loss the previous year, a continuous variable that captures the percentage point decrease in the state tax rates each year, a continuous variable that captures the percentage point increase in state tax rates each year, interaction terms between these variables and control variables. The regressions in Panel A estimate changes in market share in just the year after the tax change, and the regressions in Panel B estimate separate coefficients for each of the two years immediately before and the three years after any changes in state tax rates. See Appendix A for variable definitions. Standard errors are clustered by state. ***, **, and * denote statistical significance at the two-tailed 1, 5, and 10 percent levels, respectively.

TABLE 11

Effect of Financing Constraints on the Relation between Tax Changes and Market Share

Dependent Variable:	**Δ*MARKET SHARE SIC***	**Δ*MARKET SHARE HP100***	**Δ*MARKET SHARE HP500***
	(1)	(2)	(3)
	Coef.	Coef.	Coef.
	t-Stat.	*t*-Stat.	*t*-Stat.
TAX LOSS	-0.005	0.004	0.012
	(-0.437)	(0.314)	(0.771)
FIN CONSTRAINED	-0.016***	-0.012*	-0.013**
	(-3.962)	(-1.937)	(-2.486)
TAX LOSS × FIN CONSTRAINED	0.026**	0.009	0.003
	(2.119)	(0.618)	(0.193)
TAX RATE DECREASE × FIN CONSTRAINED	0.000	-0.003**	-0.000
	(0.077)	(-2.193)	(-0.054)
TAX RATE INCREASE × FIN CONSTRAINED	-0.002	-0.005	-0.005**
	(-0.765)	(-1.358)	(-2.011)
TAX LOSS × TAX RATE DECREASE	-0.002	-0.006	-0.005
	(-0.604)	(-0.978)	(-0.533)
TAX LOSS × TAX RATE DECREASE × FIN CONSTRAINED	-0.023**	-0.012*	-0.015*
	(-2.135)	(-1.787)	(-1.730)
TAX LOSS × TAX RATE INCREASE	0.000	-0.003	0.002
	(0.094)	(-0.470)	(0.267)
TAX LOSS × TAX RATE INCREASE × FIN CONSTRAINED	0.002	0.009	0.001
	(0.162)	(0.731)	(0.052)
LN(MVE)	-0.030***	-0.029***	-0.027***
	(-4.018)	(-3.966)	(-3.773)
LEVERAGE	-0.060**	-0.064**	-0.051
	(-2.196)	(-2.270)	(-1.509)
MTB	0.064***	0.063***	0.064***
	(11.621)	(12.094)	(10.164)
ACQUISITION	0.683***	0.680***	0.677***
	(10.903)	(12.194)	(11.331)
ROA	-0.082***	-0.083***	-0.094***
	(-3.716)	(-3.407)	(-3.054)
CAPEX	0.517***	0.522***	0.526***
	(16.384)	(15.687)	(12.951)
Fixed effects			
Firm	Included	Included	Included
Year × State	Included	Included	Included
Year × Industry	Included	Included	Included
R-Squared	37.6%	60.0%	84.2%
No. of Observations	35,781	35,575	35,507

Notes: This table presents the results from regressions of changes in market share for each firm-year on an indicator variable that equals one for whether the firm incurred a tax loss the previous year, a continuous variable that captures the percentage point decrease in the state tax rates each year, a continuous variable that captures the percentage point increase in state tax rates each year, an indicator variable for firms estimated to be financially constrained, interaction terms between these variables and control variables. See Appendix A for variable definitions. Standard errors are clustered by state. ***, **, and * denote statistical significance at the two-tailed 1, 5, and 10 percent levels, respectively.