THE COST OF CREATION
DO INCOME TAXES INFLUENCE SMALL RETAIL ENTREPRENEURSHIP?

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By

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ABSTRACT

A common concern about tax policies is their influences on entrepreneurial activity. Basic theory of taxation posits that a tax alters individual behavior, often yielding less output than in the absence of the tax. Income taxes may provide a disincentive to work, and they also limit an individual’s total capital in the absence of the income tax. This likely decreases the total amount one has to invest in businesses and entrepreneurial activities. This study examines the relationship between income taxation and entrepreneurship. It utilizes a panel dataset constructed from the Census Bureau’s Statistics of United States Businesses as well as Tax Foundation’s dataset on state income taxes in addition to other datasets on state and federal taxes, federal loan expenditures and state populations. Using OLS, random and fixed effects regressions, this paper will examine the hypothesis that there is a negative relationship between small retail establishment creation and U.S. State personal income tax rates for the years 1998 to 2007. The findings are inconclusive indicating that, while income tax may influence small retail firm birth, there are likely other significant influential factors as well. A combination of state tax policies may potentially impact retail establishment birth while access to start-up capital is a significant variable for entrepreneurs. Policies crafted to encourage retail entrepreneurship should focus on all facets of tax reform as well as factors that impact access to capital.
Acknowledgements

To my wife Rayan, thank you for all your love and encouragement during this process. Your patience during my many days staring at Stata helped me complete this massive undertaking. I could not have done it without your support.

To Dr. Bednarzik, thank you for guiding me through this process and making sure I presented the best possible product. To my professors, the knowledge you have given me is invaluable. I could not have even begun the thesis process without your wisdom and encouragement.

To my friends and colleagues, thank you for your encouragement, and words of wisdom. I could not have finished this without your perspectives and advice.
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INTRODUCTION

Given the current anemic rate of U.S. job growth, job creation and small business growth are pertinent issues. A study of entrepreneurship and job growth during the 1990s in the United States and Europe found that new firms and new establishments account for much of the newly created jobs (Bednarzik, 2000). Furthermore, very small firms—firms under 20 employees—accounted for, “About half of the net new jobs” (Bednarzik, 2000).

What policies foster business growth? What policies incentivize risk-taking entrepreneurship? How do policymakers encourage businesses to set up shop? These questions are at the forefront of the economic debate going on in the United States of America. The answers have policy implications on tax rates, tax loopholes and incentives as well as government grants, loans and regulations. In particular, tax rates are a strong tool for governments trying to influence behavior and can have distortive effects on consumption, investment, entrepreneurship and even migration (Cohen, Lain and Steindel 2011).

Within the larger literature, there is not a specific industry level focus on entrepreneurship and state income tax rates. Small business ownership, particularly retail, represents the entrepreneurial notion of taking a risk to chase the “American Dream.” Such risk taking is a major driver of economic progress and the retail sector has a distinct role in this process (Burke, Fok, Thurik, van Stel 2010). Additionally, these startups often account for a disproportionate number of new jobs created in the United States.

The data show that among all establishment births retail operations created a dominant proportion of new jobs between 1998 and 2007. In this time span, very small retail
establishments—those with fewer than 20 employees—account for an average of about 71 percent of jobs created by new retail establishments.

Very small retail establishments are a large driver of new jobs giving an economic boost to communities and providing much needed work experience through the creation of new employment opportunities. This type of entrepreneurial growth is likely influenced by tax rates, income taxes in particular. The expected negative relationship between individual income tax rates and small retail establishment birth at the state level will be examined here.

**Corporate Tax, Individual Income Tax and Entrepreneurship**

Entrepreneurs often use personal capital to fund new businesses, supplementing loans and grants with individual income to open a new store. In a panel study on entrepreneurship, Paul D. Reynolds and Richard Curtin (2008) defined entrepreneurial activity stating, “Almost all concepts of entrepreneurship—utilized by business persons, policy makers, and academic researchers—include the creation of a new venture, product or organization as a central aspect.” This paper borrows from Curtin and Reynolds’ analysis defining entrepreneurship as the creation of a new firm or a new establishment that did not exist in the previous year.

Defining establishment birth, and by extension entrepreneurial growth, this paper uses the Census Bureau statistical definition of establishment birth, “Births are establishments that have zero employment in the first quarter of the initial year and positive employment in the first quarter of the subsequent year” (Census 2012).

Traditionally, economic analysis focused on the adverse effects of corporate tax rates on business growth (Djankov, Ganser, McLiesh, Ramalho and Shleifer 2010). Furthermore, access to and taxation of personal capital affects startups; however, in a study of taxation and
entrepreneurship, Magnus Henrekson and Tino Sanandaji (2009) highlight that, “The simple cost of capital formulas have a tendency to underestimate the distortions caused by taxing entrepreneurial firms.” While Henrekson and Sanandaji (2009) go on to study the separate taxation of capital and labor in Nordic startups, their study notes, “Most entrepreneurs in the U.S. are taxed according to the individual income tax schedule.”

Despite the potential influence of income tax on entrepreneurship, marginal income rates are usually studied in conjunction with labor supply and work disincentives (Romer and Romer 2012). Meanwhile, entrepreneurs starting or expanding small retail establishments are more likely to be individually funded and therefore subject to the effects of income tax rates.

Small Business Retail Entrepreneurship

Historically, business growth studies, literature and polices focused on the relationship between government and large corporations. Additionally, where it exists, much of the entrepreneurship literature analyzes broad, country level business creation and growth eschewing local, state and industry level assessments for analysis of macroeconomic policies. One study that does analyze industry level entrepreneurship focuses on employment and notes varying levels of job creation when the data are broken down by industry classification and employment size (Bednarzik 2000). This study highlights the importance of service-sector job creation. Taxes likely have different effects on different industries and businesses sizes.

Djankov, Ganser, McLiesh, Ramalho and Shleifer (2010) reference dozens of studies on international business issues, country level entrepreneurship and macroeconomic assessments of business climates. Only one reference in their study focuses on industry level analysis—an assessment of employment migration across countries.
Taxation likely different influences industries differently; a factor that likely explains some of the variation in entrepreneurial outcomes relative to firm classification and size. For instance, individual income tax rates likely affect an entrepreneur’s ability to start or expand a retail store in a different manner than a hedge fund entrepreneur for whom access to capital through personal wealth and loans is much greater.

Furthermore, in contrast to a large employer like big box retail or franchised establishments, smaller retail stores are more likely funded by a few individuals and therefore influenced by income tax rates. In a University of Oxford analysis of small business taxation, Claire Crawford and Judith Freedman (2011) concluded that,

Whilst income from employment is clearly labour income, income from self-employment and that derived through an incorporated business may be a mixture of labour income, income from capital and—possibly—a return to risk taking or ‘entrepreneurship.’

Entrepreneurs who face individual income taxes have less capital with which to invest in their own or another business.

Discussing United Kingdom small business tax policies, Crawford and Freedman (2011) go on to claim, “It is not entirely clear whether income representing a reward for [risk and entrepreneurship] should be taxed as a return to capital or in the same way as labour income (or in some other way).” Additionally, within the United States, retail firms and restaurants are major drivers of startup growth.

Table 1 describes the share of total establishment births in the United States between 1998 and 2007 by industrial classification. Within this data set, retail establishments account for a plurality, 13.3 percent, of establishment births, the largest among the industry
classifications. Again, among retail establishment births, about 71 percent are under 20 employees.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Total Birth</th>
<th>Classification</th>
<th>Total Birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, forestry, fishing, &amp; hunting</td>
<td>0.4%</td>
<td>Real estate, rental, leasing</td>
<td>5.2%</td>
</tr>
<tr>
<td>Mining</td>
<td>0.3%</td>
<td>Professional, scientific, technical services</td>
<td>12.0%</td>
</tr>
<tr>
<td>Utilities</td>
<td>0.2%</td>
<td>Management of companies</td>
<td>0.7%</td>
</tr>
<tr>
<td>Construction</td>
<td>11.9%</td>
<td>Administrative support, waste management</td>
<td>5.9%</td>
</tr>
<tr>
<td>Mining</td>
<td>3.0%</td>
<td>Educational services</td>
<td>1.1%</td>
</tr>
<tr>
<td>Construction</td>
<td>11.9%</td>
<td>Administrative support, waste management</td>
<td>5.9%</td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>4.8%</td>
<td>Health care &amp; social assistance</td>
<td>8.1%</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>13.3%</td>
<td>Arts, entertainment, recreation</td>
<td>1.6%</td>
</tr>
<tr>
<td>Transportation, warehousing</td>
<td>3.4%</td>
<td>Accommodation, foodservices</td>
<td>8.7%</td>
</tr>
<tr>
<td>Information</td>
<td>2.5%</td>
<td>Other services (except public administration)</td>
<td>7.9%</td>
</tr>
<tr>
<td>Finance insurance</td>
<td>7.2%</td>
<td>Unclassified</td>
<td>1.9%</td>
</tr>
</tbody>
</table>

Source: Census Bureau 2012

When studying variables that may adversely affect small retail establishments, much of the literature focuses on the “big box” threat to small retail businesses colloquially referred to as “mom and pop stores.” Marc Levinson’s (2011) seminal study of retail competition framed through the rise and fall of A&P details the small business struggle against big box competitors. Furthermore, a study from researches at the Census Bureau and the NBER found that in some cases there is a statistically significant negative relationship between big box retailers and small business retail entrepreneurship. Despite this, the researchers at NBER and the Census Bureau note that big box retailers have a positive relationship with some types of small business establishments like restaurants (Haltiwanger, Jarmin and Krizan 2010). Additionally, their study does not include any tax, loan or regulatory controls in the models—three variables that likely influence small business establishment birth.

Combined with the focus on corporate taxation, studying the effects of big box crowd-out misses the role of individual income taxation in retail establishment growth. Current
studies ignore the potentially negative effects of personal income tax on establishment birth in the United States controlling for corporate tax, big box competition and government loans. This paper seeks to address this gap in the literature by examining the relationship between individual state income taxation and small business establishment growth in the state, what many call risk taking or entrepreneurship.

**LITERATURE REVIEW**

A number of empirical studies have analyzed the relationship between corporate taxation and business growth. Djankov, Ganser, McLiesh, Ramalho and Shleifer (2010) reviewed the negative impact of corporate taxation on entrepreneurship at the macroeconomic level. Their model will serve as a framework for the model used here. Their model includes top marginal income rates as an independent variable while their dependent variables measuring entrepreneurship are business density and average entry rate. They found that income tax rates were not significant; however, their data and measure of entrepreneurship presented limitations. The study was only at the country level, using business density and average entry rate over only 4 years to operationalize entrepreneurship. The model does not parse out the effects of taxation on entrepreneurship among individual industrial sectors or within smaller firms.

Several other studies contributed to the development of this paper’s model. They were a joint analysis of the big-box crowd-out hypothesis by the Census Bureau and NBER (Haltiwanger, Jarmin and Krizan 2010), a panel study of entrepreneurship by Richard Curtain and Paul Reynolds (2008) and a study of national factors that effect entrepreneurship by Paul Reynolds (2010).
The Census—NBER paper controls for size of retail establishment in a manner similar to this paper and examines small business retail establishments that employ less than 10 people. This paper builds off their analysis looking at retail establishments with under 20 employees as the dependent variable.

Paul D. Reynolds’ (2010) empirical assessment of establishment births also contributes to this paper’s model. He examined demographic factors that predict the prevalence of business creation. The paper here borrows some explanatory variables from the Reynolds model, including presence of informal investors and income inequality.

A quantitative panel study of 1,214 entrepreneurs looked at various demographic and social factors to predict entrepreneurial activity (Curtin and Reynolds 2008). They determined that individual motivation and personal attributes have little explanatory value in predicting whether an entrepreneur opens a new establishment. This finding questions the need to include a set of individual, firm level variables that are difficult to operationalize and measure. It provides a conceptual definition of entrepreneurship while informing the use of a panel dataset in this paper.

The qualitative analysis behind this paper draws from a series of sources that look at the history, trends and policy implications in taxation of small retail establishments. Traditionally, the literature investigated the negative impact of big box outfits on small retail establishments. Marc Levinson (2011) chronicles the rise of the big box model pioneered by The Great Atlantic and Pacific Tea Company. Levinson’s book (2011), The Great A&P and the Struggle for Small Business in America, detailed the development of the large chain retail system noting that Wal-Mart took this model from A&P.
A handful of policy and legal papers helped frame the historical analysis on which this paper builds. The papers *Entrepreneurship and the theory of taxation*, *Taxation and entrepreneurship in a welfare state* and *Small Business Taxation* look at the trends in taxation of new establishments as well as small business establishments. Historically, policymakers tailor corporate taxes to encourage cross-border business migration. *The Gentle Art of Corporate Seduction: Tax Incentives in the United States and the European Union* and *Growing Pennsylvania’s High-Tech Economy: Choosing Effective Investments* detail flaws in targeted tax incentives. This paper builds on their policy recommendations to assess tax policies that affect small business establishment birth within the United States.
Chart 1 compares the 10-year trend in retail establishment births of less than 20 employees with marginal income tax rates. The original data come from Tax Foundation’s list of the top marginal income tax rates in each state and the Census Bureau’s Statistics of U.S. Businesses. For this chart, the data are averaged annually over 50 states and the District of Columbia to show the potential relationship between income taxes and entrepreneurship. The relationship appears negative.
Chart 3 describes the average top marginal tax rate across 50 states as well as the District of Columbia for lagged by one year and the average establishment birth rate. The birth rate data describes the net change in small retail establishment births as computed by the Census Bureau in their Statistics of U.S. Businesses. The lagged rate differs from the rate described in Chart 2 which is an annual effective tax rate compiled from NBER’s TAXSIM model.

There appears to be a potential negative relationship between establishment birth rate and tax rates; however, the initial chart is inconclusive.
This paper will examine the importance of income tax rates to retail firm entrepreneurship development which could be as important as loan rates. Policy wise, government loan policies as well as tax policies could influence firm behavior. The volume of literature that informs this paper likely overlooks the effect of tax policies on specific entrepreneurial sectors and businesses sizes. This paper seeks to address this gap in the literature by examining the potential relationship between marginal income tax rates and entrepreneurship in the retail sector specifically.

**HYPOTHESIS**

Among states, there is a negative relationship between small retail establishment creation and state personal income tax rates for the years 1998 to 2007.

**RESEARCH DESIGN**

**Dataset and Model**

The data and models used in this paper and described in Table 2 analyze the relationship between retail establishment births and state income tax rates. The parameter controls for excise, capital gains and corporate tax rates that may influence an entrepreneur’s ability to open an establishment independent of income tax rate. The model also controls for Small Business Administration loans as well as economic and population growth factors that likely have a positive influence on firm births. Two different dependent variables are examined in six specifications. The first dependent variable is a count of the number of retail establishments created in each year that employ less than 20 persons. The second is the net change in small retail births in each state and year. The independent variable of interest is highest statutory marginal income tax rates at the state level, lagged for one year.
This paper uses two fixed effects models and two random effects models to analyze panel data from 50 states and the District of Columbia over 10 years. This paper also uses two OLS regressions with a dummy variable to dichotomize tax burden as “high” and “low” on a per capita basis of the state tax burden. The total number of observations is 510.

**Dependent Variables:** $Y_1, Y_2$

The paper examines the relationship between small retail establishment entrepreneurship and marginal tax rates at the state level in the United States over a 10-year period from 1998 to 2007. The definition of the dependent variable—under 20 employee retail establishment births—comes from three sources. The first is paper by Haltiwanger, Jarmin and Krizan (2010) who look at the relationship between similar size retail establishments to analyze the relationship between so called “mom-and-pop” stores and big-box retail chains. The second is an analysis of entrepreneurship and taxation by Magnus Henrekson and Tino Sanandaji (2011), which looks at the effects of income taxation on entrepreneurship. The third is a paper on entrepreneurship and job growth including establishment birth within different industrial sectors and employment classes by Robert Bednarzik (2000).

This paper uses firm births to analyze entrepreneurship and differentiates between firm sizes defining “small” business as firms employing less than 20 persons. Two dependent variables are used—nominal count of total retail firm births and the rate of change in retail firm births employing less than 20 persons. The dataset comes from the Census Bureau’s Statistics on United States Business. These statistics track business establishment birth, death and longevity among 7 employment sizes, 20 industries, 50 states and the District of Columbia.
Key Independent Variable: \( X_1 \)

The independent variable of interest is the highest statutory marginal tax rates on income at the state level, lagged for one year. The examination of marginal tax rates follows a paper on marginal rates and migration at the state level written by Roger Cohen, Andrew Lai and Charles Steindel (2011). Their analysis used a dataset from the NBER’s TAXSIM program that models average marginal tax rates in each state and year controlling for the deductibility of federal taxes paid, which significantly alters the actual tax rate faced by individuals and entrepreneurs at the state level. Moreover the importance of using income taxes was shown by Donald Bruce and Mohammed Mohsin (2006) who found a negative relationship between the top federal marginal income tax rates and entrepreneurial growth. This paper’s dataset uses the highest statutory marginal state income tax rate derived from Tax Foundation’s (2012) data on state income tax and The Book of the States from The Council of State Governments.

Independent Variables: \( X_2 \ X_3 \ X_4 \ X_5 \ X_6 \ X_7 \ X_8 \ X_9 \ X_{10} \ X_{11} \ X_{12} \ X_{13} \)

In order to isolate the association of entrepreneurship and taxes, other important factors must be accounted for. Mainly they are other taxes and availability of loans. Two such important taxes are corporate taxation and capital gains taxation. Donald and Mohsin’s (2006) examination of corporate taxation and capital gains taxation, demonstrated a negative relationship between them and entrepreneurial activity. Cohen, Lai and Steindel’s (2011) use of NBER’s TAXSIM model provides the dataset for the capital gains tax variable which is an average marginal rate faced by individuals at the state level annually from 1977-2010.

Five types of excise taxes are also included. They are tabulated by Tax Foundation using data published each year in The Book of the States by The Council of State Governments. Where Tax Foundation and The Council of State Governments did not have some excise and sales data from the 1999 rates, the statutory rate as of January 1, 2000 is used. Based on a study of excise taxes by Akin Seber, and Andac Arslan (2012), this paper predicts a negative relationship between excise taxes and establishment births. According to Seber-Arslan (2012),
firm behavior shows an aversion to facing greater excise taxes—hence a negative relationship is predicted to establishment births in the presence of excise taxation.

Small Business Administration Loans are designed to help people start new businesses or expand old businesses. A panel study by Donald Brown and John Earle (2012) reference a positive relationship between SBA loans and firm survival, they found a statistically significant, positive relationship between SBA loan disbursement and job creation. Using Paul Reynolds’s (1994) analysis of firm births and a series of policy and demographic factors, population is likely to have a positive effect on establishment births since more people provide more consumers for small retailers and more individuals that might try to start a new retail establishment. This paper uses per capita GDP to control for economic and population growth.

While this paper examines the impact of statutory marginal tax rates, variations in overall tax burden likely impacts entrepreneurship as well. This means that states with comparatively high per capita tax burdens might perform less well in economic growth and entrepreneurship measurements than states with comparatively low per capita tax burdens. According to a study by Stephen Slivinski (2012), “For every 1 percentage point increase in tax burden, there’s a corresponding 1 percentage point drop in the entrepreneurship rate.” It is likely that the sensitivity of retail entrepreneurship to changes in personal income tax is different in states with comparatively low levels of total per capita tax burden than states with high levels of total per capita tax burden. This can be accounted for in the model by adding a variable as to whether the state had a “high” or “low” tax burden ranking. The high-low dichotomy is not included in the regression on $Y_1$ because the model already includes dummies for each state and year. Adding this indicator did not significantly improve the model diagnostics and it likely over-controls for state level effects.
Analyzing the relationship between personal taxation and economic growth, a paper from Frida Widmalm (2011) found that share of tax revenue derived from personal income was negatively correlated with economic growth. She controlled for overall tax burden across countries and time including sales, excise, capital gains and corporate taxes.

Widmalm (2011) goes on to note that economic theory justifies an expectation that increased tax burden predicts less economic growth. Finally Widmalm uses a bounded analysis of high and low levels of tax revenues. This type of model restricts estimators in a linear regression to a set of bounded characteristics essentially predicting how “extreme” or “sensitive” they can be given an upper and lower limit (Leamer 2008). Widmalm’s “high” and “low” bound analysis comes from a model created by Ross Levine and David Renelt (1992) who look at long run average growth rates and changes in economic policies across countries.

While this paper does not employ the exact model Widmalm uses to distinguish “high” versus “low” levels of tax share, it derives the logic from her paper. Using data from Tax Foundation’s annual assessment of per capita state tax burden the twenty-five states that have the highest tax average burden can be distinguished from those with the lowest. This creates the dichotomy necessary to perform an OLS analysis of entrepreneurship and state marginal income tax policy without needing individual dummy variables for each state.

Adding the interaction term of corporate and personal income taxes was deemed necessary following the original model diagnostics. The intuition is that states may decide to get their revenue from either companies or people. So when taxes are high on a business, they tend to be low on people. To the extent that this the case, the two taxes could be related. Moreover both corporate and personal income tax have high income elasticity’s (White 1979).
Furthermore, a previous study on the impact of different tax regimes includes an interaction between income and consumption based taxation (Meade 1995).

**Exhibit 1. Definition and expected relationship of all variables**

<table>
<thead>
<tr>
<th>Definition</th>
<th>Variable Names</th>
<th>Expected Sign</th>
<th>Justification</th>
<th>Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y1 Continuous variable measuring number of retail establishments under 20 employees created in year t</td>
<td>TOTBIRTH</td>
<td>N/A</td>
<td>Haltiwanger, Jarmin and Krizan 2010; Henrekson and Sanandaji 2010; Bednarzik 2000</td>
<td>Census Bureau 2012</td>
</tr>
<tr>
<td>Y2 Net change accounted for by retail births under 20 employees in year t</td>
<td>NETCHANGE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Independent Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X1 Continuous variable measuring highest marginal income tax rate in state i and year t-1</td>
<td>STRATEN1</td>
<td>-</td>
<td>Cohen, Lain and Steindel 2011; Henrekson and Sanandaji 2011</td>
<td>Tax Foundation 2012: CSG 1998-2001</td>
</tr>
<tr>
<td>X2 Continuous variable measuring effective capital gains tax rates in state i and year t-1</td>
<td>STGAINN1</td>
<td>-</td>
<td>Cohen, Lain and Steindel 2011; Donald and Mohsin 2006</td>
<td>NBER 2011</td>
</tr>
<tr>
<td>X3 Continuous variable measuring gas tax rates in state i and year t</td>
<td>GAS</td>
<td>-</td>
<td>Akin and Andac 2012</td>
<td>Tax Foundation 2012; CSG 1998-2001</td>
</tr>
<tr>
<td>X7 Continuous variable measuring tobacco tax rates in state i and time t</td>
<td>CIGS</td>
<td>-</td>
<td>Akin and Andac 2012</td>
<td>Tax Foundation 2012; CSG 1998-2001</td>
</tr>
<tr>
<td>X8 Continuous variable measuring federal SBA 7a loan spending in year t</td>
<td>SBALOAN</td>
<td>+</td>
<td>Brown and Earle 2012</td>
<td>NAGGL 2011</td>
</tr>
<tr>
<td>X11 GDP per capita in state i and year t</td>
<td>GDPCAPITA</td>
<td>+</td>
<td>Reynolds 1994</td>
<td>BEA 2012</td>
</tr>
<tr>
<td>X13 Dichotomous variable differentiating between states with “high” and “low” per capita tax burdens</td>
<td>HIGHTAX</td>
<td>-</td>
<td>Widmalm 2011; Levine and Renalt 1992</td>
<td>Tax Foundation 2012</td>
</tr>
</tbody>
</table>
Exhibit 2. Parameterization

\[ Y_1 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + X_{it} + \mu \]

\[ Y_2 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + X_{it} + \mu \]

\[ Y_2 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + X_{it} + \mu \]

where:

\( Y_1 = \) TOTBIRTH
  - Number of retail establishments opened in year \( t \) that employ less than 20 persons

\( Y_2 = \) NETCHANGE
  - Net change in new retail establishments under 20 employees over the previous year

\( X_1 = \) STRATEN1
  - Marginal income tax rate for each year \( t-1 \) and state \( i \)

\( X_2 = \) STGAINN1
  - Long term capital gains tax rates in state \( i \) and time \( t-1 \)

\( X_3 = \) GAS
  - Gas SBA loan disbursements in year \( t \)

\( X_4 = \) SPIRIT
  - Liquor beverage tax rate for year \( t \) and state \( i \)

\( X_5 = \) WINE
  - Wine tax rate for year \( t \) and state \( i \)

\( X_6 = \) BEER
  - Beer tax rate for year \( t \) and state \( i \)

\( X_7 = \) CIGS
  - Tobacco tax rate for year \( t \) and state \( i \)

\( X_8 = \) SBAloan
  - Federal 7(a) and 503 SBA loan disbursements in year \( t \)

\( X_9 = \) STCORP
  - Highest marginal corporate tax rates in state \( i \) and year \( t \)

\( X_{10} = \) STSALES
  - Sales tax for year \( t \) and state \( i \)

\( X_{11} = \) GDPCAPITA
  - State GDP per capita in year \( t \)

\( X_{12} = \) CORPINC
  - Interaction between income and corporate tax rates in state \( i \) and year \( t \)

\( X_{13} = \) HIGHBURDEN
  - Dummy variable to differentiate between high and low per capita tax burdens

\( X_{it} = \) State and Time Dummy Variables
POLICY IMPLICATIONS

Current Policies
State policymakers often focus on tax breaks, incentives and programs to attract companies from other regions; however, these are not necessarily effective drivers of economic growth. A series of case studies on targeted tax breaks within the United States concluded that, ”Recruiting companies from other states is costly and provocative but low-impact. Better to reinforce ties between employers and place-based institutions and the ties among companies in the state.” (McIlvaine, Fisher, Peters, Hoffer, Herzenberg, Price, Goozner and Mattera 2010).

Citing evidence presented to the 109th Congress, a legal assessment of migratory tax policies concluded, “Tax incentives are marginal among the many factors businesses use to decide where to locate and are often only influential [as] a tie-breaker between comparatively similar business locations” (Kaye 2008). Across the United States, state policymakers pursue targeted tax incentives to encourage corporate migration thereby chasing zero-sum economic growth.

Policymaker actions and the associated literature show that tax policies often target cuts at specific sectors or even firms to attract growth. For instance, Charlotte, North Carolina offered significant tax breaks to attract Chiquita Banana from Cincinnati. Meanwhile the aforementioned study of Pennsylvania’s tax policies reveal a concerted effort by legislators to attract out-of-state high-tech jobs through targeted tax breaks. While the policy recommendations in Paul Reynolds’ (2010) paper downplay the role of legal and regulatory factors in establishment creation, this paper draws from his model to investigate tax policy recommendations for small business creation.
Potential Policy Changes

A more effective tax policy might encourage business growth from the ground up. As the aforementioned case studies recommend, “Grow your own existing employers rather than recruit from other states” (McIlvaine, Fisher, Peters, Hoffer, Herzenberg, Price, Goozner and Mattera 2010). This paper seeks to examine whether tax policies which encourage entrepreneurship and risk taking are associated with greater establishment births at the state level. For policymakers, for tax law may be an important mechanism to encourage home-grown entrepreneurship.

RESULTS AND ANALYSIS

The results of the models described in Table 2 examine the relationship between income tax and small retail entrepreneurship.\(^1\) Six specifications of the dependent variables are presented.\(^2\) The first and second regression have the nominal count of total retail firm births under-20 employees as the dependent variable. Recoding this variable to a ratio describing the annual increase or decrease in retail firm births from the previous year creates a new dependent variable that is used in the third and fourth model specifications.

Converting the dependent variable from a nominal count of retail firm births to net change in retail births annually preserves the hypothesis while perhaps focusing more on policy interests. Furthermore, previous studies used a similar variable—rate of firm entry—to operationalize entrepreneurship (Djankov, Ganser, McLiesh, Ramalho, Shleifer 2010). The Chow test on this model indicates the models can be pooled.

---

1. The initial regression of the model indicated multicollinearity, heteroskedasticity and omitted variable bias.
2. After improving the model, additional specification tests were undertaken to determine if the new model should be a fixed effects, random effects or OLS regression. The Chow test indicates the models can be pooled. An F-test on the state and time dummies indicate that they are jointly significant and should be included in the model. We must also determine whether fixed effects or random effects would be better. A Hausman test indicates that random effects is the correct specification for models 3 and 4 while a fixed effects regression is preffered for models 1 and 2. See appendices for the results of these diagnostics.
The fifth and sixth specifications use an OLS approach rather than fixed or random effects. These models also differ because they include a dichotomous indicator variable to differentiate between states with relatively “high” and “low” per capita tax burdens. The indicator is coded 1 if the state has a low burden and 0 if it has a comparatively high tax burden. Models 2, 4 and 6 also include an interaction between corporate and personal income taxation which enhances model specification and the significance of certain variables. These models are the most highly specified within this study.

It was hypothesized that state income tax is negatively associated with small retail entrepreneurship within the United States from 1998 to 2007. The independent variable of interest—lagged top marginal state income tax rate—is not statistically significant in Models 1 through 5. The hypothesis is supported by Model 6 which predicts that an increase in statutory marginal tax rates is associated with a decline in retail firm birth rate.

Overall the results are inconclusive and reveal that, while income tax may influence small retail firm birth, there are likely other significant influential factors as well. This follows the results in many studies including one by Sander Wennekers, André van Stel, Roy Thurik and Paul Reynolds (2005) that noted, “The level of entrepreneurial activity is complex and even paradoxical (Verheul 2002). . . For a selection of 12 OECD countries spanning the period 1972-1996, Parker and Robson (2004) find a significantly positive effect of personal income tax rates.
on self-employment.” Future studies should include potential omitted factors like local property taxation and access to private capital to make a more definitive conclusion on the relationship between income tax and retail entrepreneurship.

Table 2

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1) Total Births</th>
<th>(2) Total Births</th>
<th>(3) Net Change in Firm Births</th>
<th>(4) Net Change in Firm Births</th>
<th>(5) Net Change in Firm Births</th>
<th>(6) Net Change in Firm Births</th>
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<td>Income Tax</td>
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<td>-0.0691</td>
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<td></td>
<td>(181.4)</td>
<td>(2,838)</td>
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<td>(-0.77)</td>
<td>(-0.87)</td>
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<td>Cap Gains Tax</td>
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<td>1,484**</td>
<td>0.273*</td>
<td>0.281*</td>
<td>0.140</td>
<td>0.234*</td>
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<tr>
<td></td>
<td>(659.5)</td>
<td>(600.1)</td>
<td>(1.91)</td>
<td>(1.94)</td>
<td>(1.26)</td>
<td>(1.92)</td>
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<td>Liquor Tax</td>
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<td>-0.00117</td>
<td>0.00126</td>
<td>0.00146</td>
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<td></td>
<td>(8.394)</td>
<td>(8.536)</td>
<td>(-0.36)</td>
<td>(-0.38)</td>
<td>(1.39)</td>
<td>(1.59)</td>
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<td>Wine Tax</td>
<td>80.33</td>
<td>105.6</td>
<td>0.0338***</td>
<td>0.0348***</td>
<td>-0.000820</td>
<td>-0.00226</td>
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<td></td>
<td>(111.8)</td>
<td>(119.4)</td>
<td>(3.03)</td>
<td>(3.02)</td>
<td>(-0.19)</td>
<td>(-0.52)</td>
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<td>Beer Tax</td>
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<td>-315.0</td>
<td>-0.0540</td>
<td>-0.0554</td>
<td>0.00553</td>
<td>0.0119</td>
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<tr>
<td></td>
<td>(277.5)</td>
<td>(283.2)</td>
<td>(-1.07)</td>
<td>(-1.10)</td>
<td>(0.48)</td>
<td>(1.00)</td>
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<td>Tobacco Tax</td>
<td>23.74</td>
<td>24.33</td>
<td>0.00277</td>
<td>0.00267</td>
<td>-0.00616</td>
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<td></td>
<td>(26.98)</td>
<td>(27.07)</td>
<td>(0.77)</td>
<td>(0.73)</td>
<td>(-1.55)</td>
<td>(-1.65)</td>
</tr>
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<td>Gas Tax</td>
<td>301.4</td>
<td>288.9</td>
<td>0.0225</td>
<td>0.0235</td>
<td>-0.0356</td>
<td>-0.0361</td>
</tr>
<tr>
<td></td>
<td>(210.5)</td>
<td>(211.4)</td>
<td>(0.71)</td>
<td>(0.73)</td>
<td>(-0.99)</td>
<td>(-1.00)</td>
</tr>
<tr>
<td>Sales Tax</td>
<td>819.4</td>
<td>829.6</td>
<td>0.0925</td>
<td>0.0929</td>
<td>-0.115</td>
<td>-0.184*</td>
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<tr>
<td></td>
<td>(523.9)</td>
<td>(517.2)</td>
<td>(0.58)</td>
<td>(0.58)</td>
<td>(-1.14)</td>
<td>(-1.71)</td>
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<td>Corporate Tax</td>
<td>-199.5</td>
<td>1,236</td>
<td>0.239</td>
<td>0.0997</td>
<td>-0.282***</td>
<td>-0.389***</td>
</tr>
<tr>
<td></td>
<td>(1,157)</td>
<td>(1,408)</td>
<td>(1.18)</td>
<td>(0.46)</td>
<td>(-3.58)</td>
<td>(-3.97)</td>
</tr>
<tr>
<td>SBA Loans</td>
<td>-3.81e-05</td>
<td>-8.86e-05</td>
<td>-5.80e-05***</td>
<td>-5.82e-05***</td>
<td>-1.44e-06**</td>
<td>-1.40e-06***</td>
</tr>
<tr>
<td></td>
<td>(0.00423)</td>
<td>(0.00414)</td>
<td>(-3.12)</td>
<td>(-3.13)</td>
<td>(-2.98)</td>
<td>(-2.91)</td>
</tr>
<tr>
<td>GDP/Capita</td>
<td>0.00425</td>
<td>0.00407</td>
<td>4.81e-07</td>
<td>5.15e-07</td>
<td>1.60e-07</td>
<td>5.68e-08</td>
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<tr>
<td></td>
<td>(0.00607)</td>
<td>(0.00598)</td>
<td>(1.01)</td>
<td>(1.06)</td>
<td>(1.24)</td>
<td>(0.40)</td>
</tr>
<tr>
<td>Corp*Income Tax</td>
<td>-35.81</td>
<td>3.376</td>
<td>3.939*</td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>(28,899)</td>
<td>(0.73)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Burden/Capita</td>
<td>0.009**</td>
<td>0.0484***</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>978.1***</td>
<td>850.0***</td>
<td>1.14***</td>
<td>1.15***</td>
<td>0.036***</td>
<td>0.0924***</td>
</tr>
<tr>
<td></td>
<td>(232.9)</td>
<td>(258.0)</td>
<td>(2.99)</td>
<td>(3.00)</td>
<td>(2.54)</td>
<td>(3.07)</td>
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<tr>
<td>Observations</td>
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<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
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<td>R-squared</td>
<td>0.296</td>
<td>0.299</td>
<td>0.556</td>
<td>0.556</td>
<td>0.063</td>
<td>0.069</td>
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<tr>
<td>F-Statistic</td>
<td>8.77</td>
<td>7.09</td>
<td>2.77</td>
<td>2.83</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*** p<0.01, ** p<0.05, * p<0.1

t and z statistics in parentheses
Much of the literature demonstrates that income tax is not a consistent influence on entrepreneurship; however, those studies focus on macro level analysis. This paper seeks to fill a gap in that literature looking at micro level impacts of income tax on a specific industry. It is worth noting that many small retail establishments might not even face the top marginal income tax rate. Surprisingly, the results were not significant in five of the six specifications.

Models 5 and 6 estimate a negative relationship between corporate tax and retail entrepreneurship. This follows the conclusions of the supporting literature which consistently points to corporate tax as significantly negatively related to entrepreneurship and economic growth.

Surprisingly, the variable indicating high tax burden is positive and significant here. The data determining high tax burden is taken from Tax Foundation’s ranking of states based on per capita tax burden. This data set might be signaling that states with a high per capita tax burden tax individuals more and corporations less. Conversely states with low per capita taxation might shift the burden of taxation onto businesses. A study from the University of Arizona’s Carey School of Business indicates that this does occur in Arizona whereby the state’s, “Low overall burden is the result of a very low tax burden for individuals and a moderate tax burden for businesses” (Rex 2009).

This could provide an unintended benefit to entrepreneurs whose new businesses face a comparatively low corporate tax burden because the per capita tax burden on individuals is high.

The variable describing the lagged cap gains rate is significant in all but one model. In each case, capital gains taxation is associated with greater retail firm birth. Perhaps individuals
are realizing capital gains in earlier years to avoid the anticipation of future capital gains taxes. This increases the pool of available capital for start-up investment consequently having a positive relationship to entrepreneurship. This model uses an NBER TAXSIM dataset which computed the average effective capital gains rate in each state and year. Effective tax rates measure average taxes across entire populations and are inherently biased metrics. For instance, a state’s effective tax rate would be significantly impacted by rapid increases in population. This increases the number of taxpayers but potentially not the amount of tax revenue. Consequently, this effective tax rate would be lower for such a state than the rate people actually paid. Statutory marginal rates do not have this inherent bias problem.

A lagged model of capital gains tax rates could actually be indicating less available capital in the current year as individuals sold stock last year to avoid future capital gains tax rate increases. Studies indicate capital gains are more sensitive to taxation and small increases in capital gains tax rates might actually lead to decreases in tax revenue whereby individuals realize capital gains earlier to avoid anticipated future taxation which might lend support to this analysis (Grimm and Moore 2008). Future studies should analyze different levels of lagging capital gains taxation to see how earlier or later realization of capital gains might impact future retail entrepreneurship activities.

Interestingly, the variable describing wine tax is positive and slightly significant in models 3 and 4. Excise taxes and substitution are well documented in the literature indicating that higher taxes on one product drive consumption to others. A study of cigarette and smokeless tobacco consumption indicates a significant substitution effect to smokeless tobacco in the face of higher cigarette taxes (Boyle and Ohsfeldt 1994). In this study, wine taxes might
actually push customers to substitute towards beer or liquor which would drive up sales in retail stores and encourage entrepreneurship.

Surprisingly, Small Business Administration loans are associated with lower retail firm births in models 3, 4, 5 and 6; however, they are not in other studies. SBA loans might indicate a poor economy, particularly for retail entrepreneurs, and states with poor economies make more use of SBA loans. The results here are not likely economically significant as a $1 million increase in SBA Loan predicts a decrease in the rate of retail establishment birth of less than 0.01 percentage points.

Additionally, as noted earlier small retail businesses might not even face the top marginal income tax rate in their respective states. With many states employing a progressive tax system, small business owners likely have a much lower effective tax rate than the marginal rate used here. Modeling effective tax rates is possible; however, to account for the aforementioned bias the model should include additional controls such as population, economic growth and number of taxpayers. This might decrease model specification. Statutory marginal tax rates influence effective tax rates, but population growth, income growth and economic growth also impact effective rates. This makes effective rates a biased estimator and is therefore beyond the scope of this paper.

The various excise tax controls are statistically insignificant. Since these types of taxes can be almost completely passed on to the consumer, retail firms might not be impacted by a sin-tax rates at the startup or birth of the firm. However, in the long term, loss of consumer base relative to high excise taxes might negatively impact firm births. Future studies should asses the larger, long term affect of excise taxes and demand elasticity on retail firm birth.
POLICY ANALYSIS

While the results here are associative and not causal, they do reflect the outcome of many studies. Corporate tax often appears in statistical analysis as significantly impacting business growth and entrepreneurial activity in multiple industrial sectors. The effect of income tax is inconclusive which follows previous analysis of entrepreneurship. This paper adds to those studies further indicating that corporate income tax reform, rather than income tax might be a strong policy tool. Lowering the top marginal corporate rate at the state level may lead to greater entrepreneurial growth.

While the analysis of SBA loans showed a potential negative impact on retail entrepreneurship; it is unclear what they are signaling. SBA loans should not be abandoned as a policy tool. They have shown less default rates in other sectors and their success in encouraging growth and entrepreneurship in other industries should not be overlooked. (Glenon and Nigro 2005). Furthermore, the SBA (2013) recently expanded its definition of a “small business” growing the pool of recipients across multiple industries and increasing the chance for successful lending to small entrepreneurs.

The impact of income tax on small retail entrepreneurship was inconclusive here; however, income tax reform might impact an economy in other ways. According to a study from Art Laffer and Stephen Moore (2012), states without income tax consistently experienced higher overall economic growth than states with income taxes. A study by Barry Poulson and Jules Kaplan (2008) noted an inverse relationship between income growth and high levels of personal tax in addition to negative economic drivers. Broad income tax reform might help drive overall personal income and economic growth rather than more entrepreneurial activity.
Because this study focuses on one industry, it may overlook the microeconomic impact of income tax rates on other industries like manufacturing and services. Furthermore, a robust dataset describing property tax rates in each state over 10 years was not available. Consequently this study did not model property tax rates. Property taxes can vary substantially at both the state and local level and can present a significant barrier to acquiring land and facilities to start a business. An older study of small business start ups by Timothy J. Bartik (1989) notes, “The particularly strong negative effect of property taxes may occur because property taxes are paid regardless of profits. Many small businesses are not profitable in their first few years, so high property taxes would be much more relevant than profits-based taxes.” This policy likely hampers entrepreneurial activity. Future studies should look specifically at the impact of property taxation while local policymakers should consider property tax reform as a tool to encourage economic development.

The volume of literature also overlooks industry level relationships focusing instead on broader analysis of entrepreneurship. While this paper fills a small gap in that literature, future studies should analyze the impact of effective tax rates, progressive tax structures and the effect of taxation on other industrial classes.

APPENDIX

Multicollinearity

The data used reflects state tax policies that often act in concert influencing behaviors in the same direction or creating opposing outcomes. This presents a multicollinearity problem. Table 3 assesses multicollinearity in the independent variables describing pairwise correlation between the independent variables.
The large number of control variables generates a specification problem and indicates multicollinearity. Gross State Product and Population are almost perfectly collinear. SBA Spending and Federal Tax Rates are both above the threshold of 0.80 when multicollinearity becomes a problem. The new model drops the Federal Tax Rates as they do not vary annually within states and would therefore be unnecessary in an analysis of statutory state tax policies. Gross State Product and Population are dropped in favor of Per Capita Gross Domestic Product which functions as a control variable to explain both population and economic growth.

Table 4 describes multicollinearity after dropping the federal rates and adding GDP Per Capita and an interaction between corporate and personal income rates. This specification is much simpler eliminating redundant variables describing non-varying federal rates, economic growth and population growth. Though the pairwise correlation between income tax rate and the presence of an alcohol control board is high, it is not above the 0.80 threshold. The pairwise correlation between state income and the interaction corporate*income is high; however, it is necessary to boost the model specification diagnostics described later. The key variables used in subsequent iterations of the first and second models, are not multicollinear.
Serial Correlation

Testing for autocorrelation issues in the fixed and random effects models indicates serial correlation is not a major concern. For Models 1 and 2, the autocorrelation tests generate p-values of 0.20 and 0.13 respectively. For Models 3 and 4, the autocorrelation tests generate p-values of 0.40 and 0.37 respectively. While the low p-value on Model 2 presents some concern, it is still above the threshold where serial correlation is a problem in the

Heteroskedasticity

An informal analysis of heteroskedasticity in models 1 and 2 indicates it they are highly heteroskedastic. Charts 3 and 4 describes this test and the data points appear to fan out as the fitted values get larger—this is textbook heteroskedasticity. The Bruesch-Pagan test confirms heteroskedasticity here with a p-values of 0.00 for both models therefore robust standard errors are used for models 1 and 2.

Table 4

<table>
<thead>
<tr>
<th></th>
<th>State Tax</th>
<th>State Gain</th>
<th>Liquor</th>
<th>Wine</th>
<th>Beer</th>
<th>Tobacco</th>
<th>Gas</th>
<th>Sales</th>
<th>Corp.</th>
<th>SBA Loan</th>
<th>GDP/Capita</th>
<th>Corp*Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Tax</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>State Gain</td>
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<td></td>
<td></td>
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</tr>
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<td>Wine</td>
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<tr>
<td>Beer</td>
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<td>Corp.</td>
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</tr>
<tr>
<td>SBA Loan</td>
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<td>-0.01</td>
<td>0.05</td>
<td>0.04</td>
<td>0.05</td>
<td>-0.13</td>
<td>-0.04</td>
<td>-0.05</td>
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<td>-0.12</td>
<td>0.05</td>
<td>0.01</td>
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<td>Corp*Income</td>
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<td>-0.13</td>
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<td>0.19</td>
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<td>0.65</td>
<td>-0.04</td>
<td>0.11</td>
<td><strong>1.00</strong></td>
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</table>

**Chart 3**

**Chart 4**
Charts 5 and 6 describes the informal test for heteroskedasticity in models 3 and 4 which includes the new dependent variable describing the net change in retail births.

Informally there appears to be heteroskedasticity. The Bruesch-Pagan and White tests have p-values of 0.01 and 0.04 respectively which confirms heteroskedasticity. Iterations of models 3 and 4 include robust standard errors.

The fifth and sixth models include the dichotomy variable for “high” and “low” tax burdens. Charts 7 and 8 describe the informal test for heteroskedasticity indicating the some potential variation in the residuals. Generating p-values of 0.69 and and 0.01 the Breusch-Pagan and white tests indicate Model 5 is homoskedastic. Generating p-values of 0.59 and 0.15 respectively, the Breusch-Pagan and White tests indicate Model 6 is homoskedastic. Thus, robust standard errors are not necessary in these regressions.
**Model Specification**

In the first model, the Ramsey test has an F-stat of 26.7 and a p-value of 0.00 indicating omitted variable bias. Adding the interaction variable corporate*income improves the F-stat; however, the p-value is still 0.00. For the third model, after changing the dependent variable to rate of change as described above, the Ramsey RESET test generates a p-value of 0.29 and adding the interaction increases this to 0.85 meaning there is little omitted variable bias. The Ramsey test on the fifth model generates an initial p-value of 0.68 and a p-value of 0.90 after adding in the interaction on corporate and income tax in model 6.

The Hausmann test to determine fixed effects on models 1 and 2 generates a chi\(^2\) statistic of 128.23 indicating fixed effects is preferred. The Hausmann test on models 3 and 4 generates a chi\(^2\) statistic of -0.06. A visual test of the results of both fixed and random effects models reveals no significant differences in the coefficients generated. These tests indicate a random effects model is preferable and models 3 and 4 are estimated using random effects.

The Linktest on the models 1 and 2 show \(_\hat{\text{a}}\) and \(_\hat{\text{a}}^2\) values of -1.83 and 6.50 and -1.54 and 6.88 which indicate specification errors. The Linktests on model 3 generates \(_\hat{\text{a}}\) and \(_\hat{\text{a}}^2\) values of 4.56 and 0.25 indicating it is correctly specified. In model 4, adding the interaction of corporate and personal tax increases the specification from model 3. The Linktest on model 4 generates values of 5.24 and 0.06 indicating it is correctly specified. The Linktest on model 5 generates \(_\hat{\text{a}}\) and \(_\hat{\text{a}}^2\) values of 5.06 and 0.40 respectively. Adding the interaction of corporate and personal tax to model 6 generates Linktest values of 5.67 and 0.02 indicating that model 6 is specified correctly. Comparing the specification tests across all models, model 6 is the most correctly specified model.
REFERENCES


