

Capstone Project

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Corporate Income Tax Credits:
***Examining the Relationship between Tax Credits
and Employment***

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I. EXECUTIVE SUMMARY

Tax incentives - in particular, corporate tax credits - have been a prominent topic of discussion among government administrators, public economists, and political scholars. This capstone project will contribute to the discussion by addressing the relationship between tax credits and employment, and provide an empirical analysis to aid in determining the effect that tax credits may have on employment.

The study uses aggregate data spanning ten years, from 1999 to 2008, and representing 18 industrial sectors with 180 observations. The data are analyzed with the help of the two panel data regression models: *Fixed Effects* and *Between Effects*. The findings show that there is no statistically significant relationship between tax credits and employment, indicating that tax credits do not incentivize firms to hire. A factor that has turned out to be statistically significant due to its strong effect on employment in the two estimation models is corporate tax deductions.

The study results, however, should be viewed as preliminary due to existing limitations. Future research should continue to focus on the role that tax credits may play in regard to employment. Refinement of the data - in particular, further analysis on the individual firm level rather than the aggregate industry level - and the model presented in this capstone project, as well as specification of the type of tax credit provided, may lead to a more precise estimation of the relationship between tax credits and employment.

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II. INTRODUCTION

According to the *Business Cycle Dating Committee of the National Bureau of Economic Research (NBER)*, the United States economy entered a recession in December 2007.¹ In February 2009, the U.S. Congress passed and President Obama signed into law the *American Recovery and Reinvestment Act of 2009*. The \$787 billion economic stimulus package included \$286 billion in tax reductions to aid in stimulating the economy. Among the tax cuts, many were tax incentives, including tax credits, targeted at businesses.² In particular, the *Work Opportunity Tax Credit (WOTC)* was introduced and offered to employers who would hire individuals from nine disadvantaged groups, including welfare recipients, ex-offenders, and youth among others. In November 2011, President Obama expanded the *WOTC* by signing into law the *Vow to Hire Heroes Act of 2011*, which established a new disadvantaged group for unemployed veterans.

“*The Work Opportunity Tax Credit (WOTC)* is a Federal tax credit incentive that the Congress provides to private-sector businesses for hiring individuals from nine target groups who have consistently faced significant barriers to employment. The main objective of this program is to enable the targeted employees to gradually move from economic dependency into self-sufficiency as they earn a steady income and become contributing taxpayers, while the participating employers are compensated by being able to reduce their federal income tax liability. WOTC joins other workforce programs that help incentivize workplace diversity and facilitate access to good jobs for American workers.”³

¹ *NBER* defines a *recession* as “a period of falling economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales.” (<http://www.nber.org/cycles/sept2010.html>)

² http://www.recovery.gov/About/Pages/The_Act.aspx

³ <http://www.doleta.gov/business/incentives/opptax/>

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Additionally, many observers have supported further business tax credits to encourage investment and employment. For instance, former Representative Joe Sestak introduced the *Jobs Opportunity and Business Stability Act of 2009* (H.R. 4056), which would provide small businesses with a credit against income tax if they increased employment.⁴

The current U.S. unemployment rate is 8.3 percent. While the economy has started to recover, job growth tends to be a lagging indicator. That is why, since the outbreak of recession in 2007, the Obama Administration has been continuously pushing for tax credits for employers to increase incentives to invest and create new jobs in the United States. Thus, in order to spur investment and job creation in clean energy manufacturing, for instance, the *American Recovery and Reinvestment Act* contained a tax credit for investments in manufacturing facilities for clean energy technologies.

In his *2010 Economic Report*, the President of the United States argued that there was a major need to restore balance in the country's corporate tax system as the current tax system encouraged businesses to move jobs overseas and transfer profits to tax havens abroad in order to avoid taxes at home. He believes that a plan to reform tax laws would diminish these incentives (Economic Report of the President 2010; 155).

Consequently, in February 2012 the White House in collaboration with the Department of the Treasury released the *President's Framework for Business Tax Reform*,⁵ which proposes to reduce the statutory corporate income tax rate from 35 percent to 28 percent. It also stresses continuing to strengthen American manufacturing and innovation, for investments in manufacturing boost innovations, and innovation spurs economy-wide productivity growth. One

⁴ <http://thomas.loc.gov/cgi-bin/query/L?c111:/list/c111h.lst:4001>

⁵ <http://www.treasury.gov/press-center/news/Pages/02222012-tax.aspx>

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of the tax provisions in the framework is that of expanding and making permanent tax credits for Research and Development (R&D) and clean energy manufacturing.

The purpose of this study is to examine the relationship between tax credits and employment, and see whether the availability of tax credits affects the number of people employed. It should shed light on a long claimed argument that tax credits provide incentives to hire. The literature in regard to the conceptual framework of the study is examined in *Section 3*. *Section 4* provides a research design, including the model specification and data description. *Section 5* interprets the statistical results using the *Between Effects* and the *Fixed Effects* regression models, and outlines limitations. Finally, *Section 6* concludes.

Operational Definitions

Employment - an act or instance of hiring someone by a firm.

Tax credit - an amount of money that a firm subtracts from the amount of tax that it owes to the government. Unlike *deductions*, which reduce the amount of a firm's taxable income, tax credits reduce the actual amount of tax owed. Governments may grant a tax credit to promote a specific behavior, such as hiring, for instance.

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III. CONCEPTUAL FRAMEWORK

Why tax corporations?

A *corporation* is a separate legal entity, a form of business organization, which is characterized by the limited liability of its owners and the issuance of shares of transferable stock. Since the owners of corporations are people, whose personal incomes are taxed, a question arises: Why tax corporations? Some economists argue that it is a way to control the managers of corporations, who are only loosely controlled by their owners/stockholders. Others claim that a corporate income tax can be seen as a user fee that a corporation has to pay for providing a benefit to the society in the face of limited liability of its stockholders. And, finally, the presence of a corporate tax reduces stockholders' incentives to keep their earnings within the corporation in order to avoid being taxed. Of course, sooner or later the money will be paid out to its owners in the form of taxable dividends but until then deferred taxes are saved taxes (Rosen 2005; 428-429).

How is corporate income tax defined?

The corporate income tax, which plays a significant part of the United States' tax system, is a tax that must be paid by a corporation based on the amount of profit it generates. The amount of tax - and how it is calculated - varies depending upon the region in which the company is located. The United States has a graduated tax rate structure, i.e. tax increases along with the taxable base. Corporate tax is imposed at the federal, most state, and some local levels. Under the United States federal income tax, the statutory corporate tax rate ranges from 15% to 35%. Most corporate income is taxed at the 35% rate. Furthermore, United States is the sole country that taxes domestic corporations on their foreign income (Rosen 2005; 429-430).

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Corporate income is measured net of the expenses that a company incurs to earn it. One of these expenses is labor compensation: wages and benefits paid out to workers are not included in the taxable income of a corporation. Purchases of raw materials, goods and services are another type of deductible expense, as are interest payments from incurring debt through borrowing. However, dividends paid to stockholders from issuing stock are not excluded from taxable income. Another deductible corporate expense is the depreciation of a company's capital assets (Rosen 2005; 430-433).

Statutory Tax Rate vs. Effective Tax Rate

The *statutory corporate tax rate* is the rate that is imposed on taxable income of corporations, which is equal to corporate receipts less deductions for labor costs, materials, interest payments and depreciation of capital assets. Therefore, for a corporation to determine its total corporate income tax, first, it has to calculate its taxable income. Afterwards, it applies a schedule of statutory tax rates to that income and deducts tax credits and other tax incentives (Congressional Budget Office 2005; 11). In contrast, the *effective corporate tax rate* measures the actual income tax paid divided by net taxable income before taxes. "For corporate earnings, the effective tax rate (ETR) may be defined as the ratio of tax paid to pre-tax profits for a given period" (Dittmer 2011; 2). Therefore, an effective tax rate is the rate a company actually pays on all of its taxable income and, as a result, effective tax rates are broader measures of the corporate tax burden than statutory corporate tax rates since they account for both the rate at which corporate profits are taxed and the tax base to which it is applied.

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Tax Rates: Brief Cross-Country Comparison

In the past decade, the majority of the Organization for Economic Cooperation and Development (OECD)⁶ nations, excluding the United States, has cut statutory corporate income tax rates. Twenty-seven out of the thirty countries in the *OECD* have reduced their corporate taxes since 2000. The United States instead enacted various tax incentives to assist domestic production and, as a result, aided manufacturing, research and development, green energy and other specific industries. Nevertheless, additional tax burdens in the face of state and local corporate taxes and sales taxes on capital purchases increase the overall statutory and effective tax rates respectively, which discourage incentives for new investment. Consequently, the statutory corporate income tax rate is the world's second highest in the United States, standing at about 40%. The U.S. effective corporate tax rate is calculated to be 35%, which is 15.5% higher than the *OECD* average. Only a few countries, including Argentina, Chad, Brazil, India and Uzbekistan, appear to have higher effective corporate tax rates as of 2009 findings (Chen and Mintz 2010).

Recent *OECD* research findings show that the rate cuts mentioned above benefited governments and their economies. Capital investment has gone up and corporate tax revenues - as a share of Gross Domestic Product (GDP) - have grown in many *OECD* countries as the companies' profits have risen. In the *OECD* area, the average corporate tax rate has been reduced from 47% in 1981 to approximately 28% in 2007. Additionally, the *OECD* research findings demonstrate adverse effect on investment by high corporate taxation (Johansson 2008; 15-16, 31-41).

⁶ *OECD* - an international organization that helps governments tackle the economic, social and governance challenges of a globalized economy.

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International Distortions: Location of Capital

Corporations have a choice as to where to locate their capital, which has become increasingly mobile across international borders. As a result, there is a growing pressure on governments to attract new capital and preserve that which already exists. “Corporate income taxes can affect the rate of capital accumulation and hence GDP per capita. Since firms’ investment decisions are driven by the cost of and the expected return to investment projects, corporate taxes can have a negative effect on corporate investment by reducing its after-tax return. The extent of this effect can, in turn, be expected to depend on the degree of openness of the economy, with a more open economy likely to suffer more from an excessively high corporate tax than a more closed economy” (Johansson 2008; 31-32).

Some studies find a substantially negative effect of the average tax rates on investment decisions while, at the same time, some other studies do not find a significant relationship between tax rates and investment decisions. According to Devereux and Griffith’s review of corporate income taxation, there is some evidence that corporate income taxes have an impact on companies’ investment decisions and, as a result, location of capital and job creation. Nevertheless, it is uncertain as to what extent such an impact occurs (Devereux and Griffith 2002; 98).

Thus, on average, high corporate income taxes distort incentives for domestic and foreign investment as businesses have a tendency to locate their capital partially based on tax considerations. As a result, countries that impose relatively high corporate income taxes have a higher chance to lose capital investments to countries with comparatively lower corporate income taxes (Congressional Budget Office 2005; 5-9). Consequently, “less investment means slower wage growth and reduced living standards over the long run” (Chen and Mintz 2010; 3).

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Business Tax Incentives: Inception and Rationale

*Business tax incentives*⁷ are widespread around the world and are continually advancing. They can be defined as a deduction from a tax liability for certain economic activities or sectors offered to induce economic growth. Tax incentives are used as a fiscal instrument for various reasons. Among some of them are social goals, such as stimulation of economic activity in poor regions, and the need to maintain a competitive tax system to attract capital and implicitly expand a job market in a constantly evolving global economy (Klemm 2009; 3).

The need for tax incentives to encourage economic activity is contingent on the state of the economy. Their use dates back to the mid-1950s with the first major milestone, however, being the 1960s when the Kennedy Tax Cut of 1962 followed right after the 1960-61 recession. That was the time when the *investment tax credits* (ITC) - reductions in tax liabilities determined as a certain percentage of an investment - and the *accelerated depreciation* method - allows firms to write off assets at a faster schedule than true economic depreciation - emerged (Klemm 2009; 4). It resulted in a substantial decrease of the effective tax rates. Since then, the ITCs have been set at various rates, suspended, increased, decreased, and even completely eliminated in the Tax Reform Act of 1986 (Fisher 1985).

Since the Kennedy Tax Cut of 1962, the rationale for business tax incentives has always come down to job creation via investment and capital formation. They have been frequently used as an instrument of fiscal policy. The study by Charles H. Hulten, George E. Peterson, and Robert M. Schwab (1982) argues that the tax cut reform of the 1960s contributed to an increase in investment during that time. Other researchers also support an argument that tax incentives have a positive effect on investment (Hall and Jorgenson 1967).

⁷ *Typical Tax Incentives*: different types of tax credits, tax holidays, special zones, investment allowances, accelerated depreciation, reduced tax rates, exemptions from various taxes, financing incentives (Klemm 2009; 4).

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Employment Tax Credits: What are the facts?

The two major implemented tax programs to boost hiring in the late 1970s were the New Jobs Tax Credit (NJTC) and the Targeted Jobs Tax Credit (TJTC). The NJTC was enacted in 1977, a few years after the recession of 1973-1975. The credit was incremental and applied only to employment that was higher than 102% compared to the previous year. According to the Bureau of the Census mail questionnaire survey analysis by Perloff and Wachter (1979), employment at the companies that knew about the credit grew about 3% faster than at other companies between 1976 and 1977. They note, however, that it is possible that those companies that were likely to hire new workers were also likely to pursue tax benefits. Additionally, the firms that knew about the credit were not randomly drawn, which may have led to overestimation of the tax credit's effect on employment.

In his study of 1981, John Bishop estimated that the NJTC accounted for 150,000 to 670,000 of the 1,140,000 increase in employment in the construction and distribution industries between mid-1977 and mid-1978. He used the same key explanatory variable, as Perloff and Wachter (1979) did, which was the proportion of companies that knew about the tax credit. The statistical effect, however, differs greatly from one industry to another and from one statistical specification to another for the same industry.

Thus, while both studies suggest that the NJTC may have been successful in increasing employment, showing the relationship between the firms' knowledge of the credits and an employment increase does not necessarily indicate that one caused the other due to the existing caveats of the analyses such as limited data and short periods of observation.

Not all NJTC evaluation studies were positive. According to Tannenwald (1982), who analyzed data from a survey of private firms in Wisconsin, the NJTC did not contribute to

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employment growth as expected. Over half of the firms, that did not expand employment in response to the tax credit, said that the level of employment was contingent on the consumer demand for their product. Several companies reported that they were reluctant to take advantage of the NJTC due to its complex nature.

The U.S. Departments of Labor and Treasury report to Congress (1986) also cast doubt on the employment effect of the NJTC. In a mail survey sponsored by the Department of Labor, when firms were asked, only 2.4% of them reported having made a conscious effort to boost employment due to the enacted tax credit. The NJTC complexity may have diminished its employment effect, for at the time of hiring many employers were not sure whether they would be qualified for the credit or not.

Studies on the other employment tax credit program also report mixed results. The TJTC provided a wage subsidy to employers that hired targeted groups (welfare recipients, ex-felons, disadvantaged youth, etc.). According to Kevin Hollenbeck and Richard Willke (1991), the TJTC enhanced employment for non-white youth but not for the other eligible groups. Bishop and Montgomery (1993) estimated that the TJTC somewhat contributed to new employment. At least 70% of the credits, however, were claimed for hiring individuals that would have been hired anyway. In his study of the employment tax credit programs, Dave O'Neill argues that programs targeted to narrow socioeconomic groups are not likely to "achieve the desired effect of significantly increasing the employment level of the target group" (O'Neill 1982; 449).

Altogether, the results of the various aforementioned studies suggest that in theory tax credits may increase employment, but in practice may not be as effective as expected. There are several reasons why this may be the case. First, a firm does not know if it is eligible for the credit at the time of hiring, for the eligibility is determined when it files an annual tax return. Second,

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employment tax credits are complex in nature and, as a result, many employers, in particular small firms, may not wish to incur administrative record-keeping costs. Third, a lot of employers may not even know about the availability of tax credits until they file tax returns.

Unfortunately, there seem to be no recent studies estimating the direct effect of tax credits on employment. Therefore, I hope that this capstone project will be a starting point for future and/or existing but limited research on the effect that tax credits have on employment.

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IV. RESEARCH DESIGN

Data

For this capstone project I am using available aggregate corporation income tax returns data by North American Industry Classification System (NAICS) Industrial Sector from 1999 to 2008, obtained through the Internal Revenue Service website.⁸ Tax years start in July of a given year and end in June of the following year. The data incorporate eighteen industrial sectors.⁹

The current study attempts to estimate whether tax credits have had any effect on employment over a ten-year time period. Therefore, I have added annual industry employment data and national unemployment rate from 1999 to 2008, obtained from the Bureau of Labor Statistics website.¹⁰

Thus, the dependent variable being analyzed is the industry employment, and the key explanatory variable is tax credits. My additional control variables are: number of tax returns, total assets, net worth, total deductions, and national unemployment rate. Altogether, the data represent 18 industries with a total of 180 observations spanning a ten-year time period.

A list of variable descriptions is presented in *Table 1*. Summary statistics can be found in *Table 2*. For supplemental material, refer to *Appendix A*.

⁸ <http://www.irs.gov/taxstats/article/0,,id=175864,00.html>

⁹ See *Appendix A*

¹⁰ <http://www.bls.gov/data/>

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Table 1: Variable Descriptions

Variable	Description
Employment (in thousands)	Number of people employed in a given industry in a given year;
Tax Credits (in billions)	Calculated by subtracting an industry's <i>Total Income Tax after Credits</i> from <i>Total Income Tax before Credits</i> in a given year;
Industry	18 NAICS industrial sectors;
Year	Tax/Income years from 1999 to 2008, starting in July of a given year and ending in June of the following year;
Returns	Number of tax returns filed by active corporations in a given industry in a given year;
Assets (in billions)	Sum of current and long-terms assets by active corporations in a given industry in a given year;
Net Worth (in billions)	The shareholders' equity in the corporations, that is total assets minus total liabilities;
Deductions (in billions)	Comprised of the following items: (1) the cost of goods sold; (2) the ordinary and necessary business deductions from gross income; and (3) net loss from sales of noncapital assets;
Unemployment (in %)	National annual unemployment rate from 1999 to 2008;

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Table 2: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Returns	180	302674.3	273259.6	7044	1001211
Assets	180	3331.3	6918.8	13.3	39470.0
Net Worth	180	1173.5	2864.3	4.9	17560.4
Deductions	180	1232.7	1868.0	22.5	7892.3
Tax Credits	180	4.4	11.8	.007	79.1
Employment	180	6245.5	5579.1	502.6	21531.9
Unemployment	180	5.03	.68	4	6

Note: Assets, Net Worth, Deductions, Tax Credits - in \$billions; Employment - in thousands; Unemployment - in percentage points.

Model Specification

This study estimates the effects that tax credits may have on employment. Since I am using panel data, also called cross-sectional time series data, or data where multiple cases are observed over a period of time, panel data regression is appropriate and efficient.

There are two types of information in the study's panel data: the cross-sectional information shown in the differences between industries; and the time series or within-industry information shown in the changes within industries over time. Panel data regression techniques are necessary to take advantage of these two different types of information. Therefore, two methods of estimation - the *Between Effects* and the *Fixed Effects* - will be used to address the two research questions.

It is possible to use ordinary multiple regression models on cross-sectional time series data but they are not efficient and might be subject to omitted variable bias if there is some uncontrolled variable or variables which might affect the dependent variable. Furthermore, the standard errors

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are not correct because observations of the same industry or time period are correlated. With *Between Effects* and *Fixed Effects* models, however, it is possible to control for some types of omitted variables which are fixed within industries or within time periods by observing changes in the dependent variable - in this case employment - over time, and a set of industries at each time period.

Fixed Effects Regression Model

I am using the *Fixed Effects* model to be able to control for omitted variables that are constant over time but differ between industries and can potentially decrease the ability to isolate the effects of the variable of interest, tax credits, and other explanatory variables.

The model focuses on examining the changes in the variables of each industry over time, making it possible to determine whether those changes have an effect on employment. Therefore, the model estimates whether a change *within* a particular industry is associated with an increase or a decrease in employment in that industry over time. In other words, the *Fixed Effects* will let me use the changes in the variables over time to estimate the effects of the independent variables, primarily of my key explanatory variable, on employment.

Research Question 1: Do changes in tax credits affect changes in employment?

H₀- There is no relationship between tax credits and employment.

H₁- There is a non-zero relationship between tax credits and employment.

Below is the *Fixed Effects* regression model:

$$\begin{aligned} \mathbf{D. EMPLOYMENT}_{it} = & \beta_0 + \beta_1 \mathbf{D. TAX CREDITS}_{it} + \beta_2 \mathbf{D. ASSETS}_{it} + \\ & + \beta_3 \mathbf{D. NET WORTH}_{it} + \beta_4 \mathbf{D. RETURNS}_{it} + \beta_5 \mathbf{D. DEDUCTIONS}_{it} + \\ & + \beta_6 \mathbf{D. UNEMPLOYMENT}_t + \alpha_i + \mathbf{e}_{it}^{11} \end{aligned}$$

¹¹ D. refers to the first difference or annual change over time in the explanatory variable.

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where:

EMPLOYMENT_{it} - Employment for industry i in year t

TAX CREDITS_{it} - Tax Credits for industry i in year t

ASSETS_{it} - Total Assets for industry i in year t

NET WORTH_{it} - Net Worth for industry i in year t

RETURNS_{it} - Number of Tax Returns for industry i in year t

DEDUCTIONS_{it} - Total Deductions for industry i in year t

UNEMPLOYMENT_t - Annual National Unemployment Rate in year t

α_i - Unobserved Industry Effect (an indicator representing all other non-time-varying omitted variables)

e_{it} - Random Error

Between Effects Regression Model

I am also using the *Between Effects* regression model to look at differences between industries that affect employment. It estimates the effect of averages among the variables on average employment, and whether those averages are associated with an increase or a decrease in employment. Briefly, it looks at averages among the variables between the industries, whereas *Fixed Effects* look at changes. Averages and changes can have different effects, especially in matters like employment or business, where predictability matters. Stable averages can be anticipated and built into plans and contracts.

Research Question 2: *On average, is there a relationship between tax credits and employment?*

H₀ - There is no statistically significant relationship between tax credits and employment.

H₁ - There is a statistically significant relationship between tax credits and employment.

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Below is the *Between Effects* regression model:

$$\text{EMPLOYMENT}_{it} = \beta_0 + \beta_1 \text{TAX CREDITS}_{it} + \beta_2 \text{ASSETS}_{it} + \\ + \beta_3 \text{NET WORTH}_{it} + \beta_4 \text{RETURNS}_{it} + \beta_5 \text{DEDUCTIONS}_{it} + \alpha_i + e_{it}^{12}$$

where:

EMPLOYMENT_{it} - Employment for industry *i* in year *t*

TAX CREDITS_{it} - Tax Credits for industry *i* in year *t*

ASSETS_{it} - Total Assets for industry *i* in year *t*

NET WORTH_{it} - Net Worth for industry *i* in year *t*

RETURNS_{it} - Number of Tax Returns for industry *i* in year *t*

DEDUCTIONS_{it} - Total Deductions for industry *i* in year *t*

α_i - Unobserved Random Effect (or industry-specific fixed unobserved factors)

e_{it} - Random Error

For both regression models, employment will be regressed on the aforementioned control variables - total assets, net worth, tax returns, total deductions, unemployment rate – and the key explanatory variable, which is the variable of interest, tax credits.

¹² There is no D. (difference) because these are averages. The UNEMPLOYMENT variable is omitted from the model, for it represents the national unemployment rate, which is the same across all industries.

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V. FINDINGS AND DISCUSSION

Based on the results presented in *Tables 3* and *4*, tax credits do not show any statistically significant effect on employment in any of the estimation models. Interestingly enough, there is one control variable which shows a significantly strong effect on employment in both regression models.

Table 3: Fixed Effects Regression Results

Independent Variable	Coefficient	t-statistics	p-value
Tax Credits	2.638	0.56	0.575
Assets	-.060	-0.90	0.368
Net Worth	.076	0.58	0.561
Returns	.001	0.38	0.702
Deductions*	.586	5.32*	<0.001*
Unemployment*	-86.6	-4.85*	<0.001*
_cons	18.8	1.16	0.247

* Significant at the 95% confidence level

Table 4: Between Effects Regression Results

Independent Variable	Coefficient	t-statistics	p-value
Tax Credits	-31.2	-0.22	0.828
Assets	-.245	-0.48	0.640
Net Worth	.220	0.18	0.858
Returns	.006	1.18	0.261
Deductions*	2.254	2.23*	0.046*
_cons	2471.0	1.59	0.137

* Significant at the 95% confidence level

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Fixed Effects Results

The *Fixed Effects* analysis (Table 3) does not show any statistically significant relationship between the dependent variable, employment, and the key explanatory variable, tax credits. Thus, according to the regression estimate, there is no statistical evidence that tax credits have an effect on employment. The result is identical for a number of other variables included in the model: total assets, tax returns and net worth variables do not show any statistically significant relationship with tax credits. Therefore, there is no evidence that they affect employment either.

According to the *Fixed Effects* model, there are two independent variables that have an impact on the study's dependent variable. They are unemployment rate and deductions. The *coefficient* for the unemployment variable is -86.6, which means that for every percent increase in the national unemployment rate, the average industry employment is estimated to decrease by approximately 866 people. A *t-statistic* equals to -4.85 and a *p-value* is less than 0.05. Consequently, the relationship between employment and unemployment rate is statistically significant, which is an expected outcome.

One more variable that shows a strong effect on employment is deductions. The *coefficient* for this variable is 0.586, which indicates that every additional billion dollars in corporate deductions increases the average employment by approximately 600 people. The result is statistically significant, for a *t-statistic* equals to 5.32 and a *p-value* is less than 0.05.

Between Effects Results

Similarly to the *Fixed Effects* regression analysis, the *Between Effects* regression results (Table 4) do not show any statistically significant relationship between tax credits and

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employment. Thus, according to the regression estimates of the model, there is no statistical evidence that tax credits matter in regard to employment, and neither do tax returns, total assets or net worth.

One control variable which again yields a statistically significant relationship with employment as it does in the *Fixed Effects* estimation model is deductions. The regression results show that deductions have a positive effect on employment. A *t-statistic* equals to 2.23 and a *p-value* is less than 0.05. The *coefficient* for the variable is 2.25. It means that for every additional billion dollars in deductions, the average number of people employed increases by 2,250.

As a result of the *Fixed Effects* and the *Between Effects* regression model analyses, the null hypotheses for both models, which state that there is no relationship between tax credits and employment should not be rejected.

The answer to *Research Question 1* is negative, for the changes in tax credits do not affect the changes in employment based on the *Fixed Effects* model estimation.

The answer to *Research Question 2* is also negative since, on average, there is no statistically significant relationship between the tax credits and employment as a result of the *Between Effects* regression model.

The results strongly support the conclusion that employment is enhanced by total corporate tax deductions, rather than tax credits. It should be noted that total tax deductions always increase the take-home profit - whether in the form of dividends or in the form of capital gains - for owners of the company, and employment is the result of the expansion of businesses in general. Consequently, it follows that reducing taxes overall, rather than providing, often complex, targeted tax credits, increases employment both on average and year to year. While that is not the

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focus of this capstone project, it is clear that corporate deductions appear to increase employment.

One may question: could employment influence deductions enough to produce serious endogeneity? Since all inputs are deductible, they all could produce endogeneity. Employment, however, is a function of many other important factors, such as skill distribution, for instance, and corporate deductions are a function of tax law provisions, including tax credits, so both have independent variation. Therefore, while endogeneity is possible, it is not as strong. Furthermore, strong endogeneity would imply that all deductions and tax credits should predict strongly, which is not the case.

Study Limitations

One of the study limitations is the use of aggregate data for analysis. All industry characteristics obtained from the *IRS* website, such as tax returns, total assets, tax credits and deductions are estimates based on samples. These samples, however, are representative of an industry, which makes the data valid and reliable. Nevertheless, it would be more helpful to have individual firm data, which would let the study break down the model even further and observe differences on an individual firm level. Furthermore, the study looks at overall effect of tax credits on employment without focusing on a specific industry.

Additionally, it is unknown what type of tax credits are included in the data, as well as what subsectors are included within an industrial sector. Having that information - in particular, knowing the type of credits given to industries - could help phrase research questions more precisely and interpret the results in a more suitable way. The supposed policy implication behind any type of a credit is that it implicitly - investment tax credits - or explicitly -

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employment tax credits - encourages hiring. If it is equipment tax credit, however, it is very unlikely that employers will be incentivized to create new jobs but rather take advantage of it to buy new more advanced equipment. Therefore, knowing what kind of credits is controlled for in the study would help interpret the results more accurately.

Expanding a time period, getting an industry unemployment rate if possible, and adding more industrial sectors, with the aforementioned breakdown by subsectors on an individual firm level, could also aid in getting more reliable estimates over time.

Despite the existing limitations, the current study does provide an insight into a long-debated policy issue in the face of tax credits. While, of course, there may be a number of missing variables that should be added to provide more accurate results, the current study with its 18 industrial sectors, and only 180 observations over a ten-year time frame, incorporates a sufficient number of variables - which account for size, value and macroeconomics - into the estimation models to take a look at the relationship between tax credits and employment. Thus, an addition of more control variables would call for an addition in the number of observed industries and years to avoid collinearity.

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VI. CONCLUSION

The objective of this capstone project is to examine the relationship between tax credits and employment. Previous studies - the majority of which used individual firm data and a particular type of credit (NJTC, TJTC, etc.) - provided mixed results in regard to estimating the impact of a credit on employment.

The results of this study offer current insight into the relationship between tax credits and employment over time. The *Fixed Effects* and the *Between Effects* findings show that there is no statistically significant relationship between the two variables, which implies that there is no statistical evidence that tax credits matter in determining employment. A factor that has turned out to be significant in the two estimation models is corporate deductions, whether on average or as changes from year to year. The conclusion is that, overall, tax deductions are more effective than tax credits in stimulating employment.

Therefore, the policy implication behind the findings in this study is that the government may be giving away dollars that do not meet the primary policy objective of any tax incentive - new jobs creation. The findings provide evidence that policymakers currently supporting increased tax credits are not necessarily correct in the assumption that they will stimulate employment. Based on the results, deductions seem to be a more fruitful policy to undertake: allow employers to deduct more from their taxable income, and that may incentivize them to expand, and thus to hire.

The study findings, however, should be viewed as preliminary due to existing limitations highlighted in the previous section. Moreover, this area begs for more research. Problems exist with the accurate measurement of the effect of tax credits on employment and with the data collected to make this measurement.

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Future research in this area should continue to focus on the role that tax credits may play in hiring decisions. Refinement of the data - in particular, analysis on the individual firm level rather than the aggregate industry level - and the model presented in this study may lead to an even better estimation of the relationship between the credits and employment. This will benefit the policymakers in their continuous debates and consequent decisions they have to make in regard to whether they should provide tax credits to firms in order to reach the goal of higher employment. Most importantly, it will provide information to the tax payers, whose money is being spent, about how effective the tax credit policy is.

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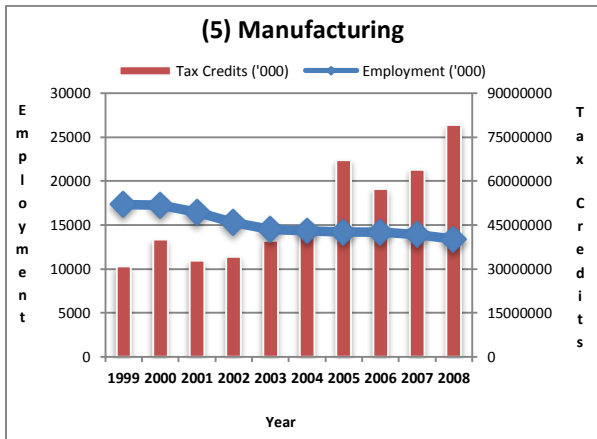
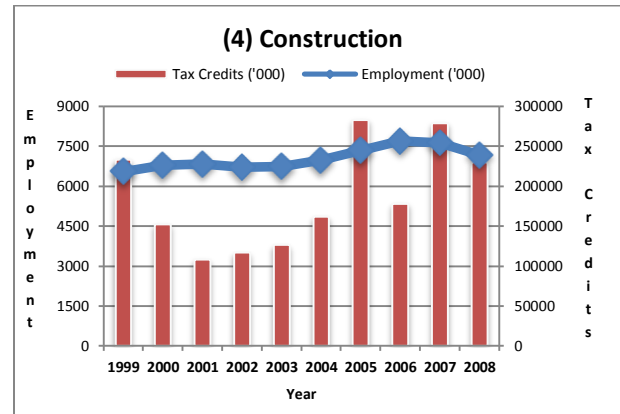
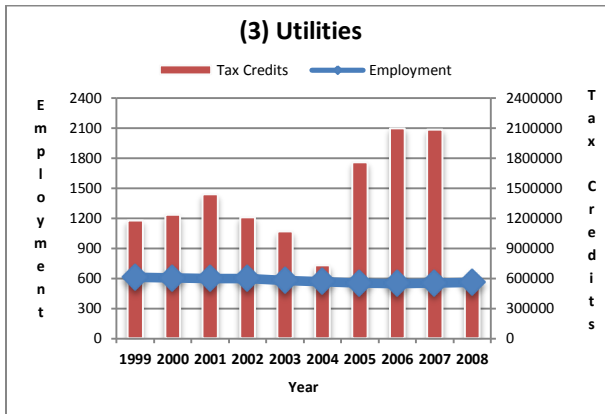
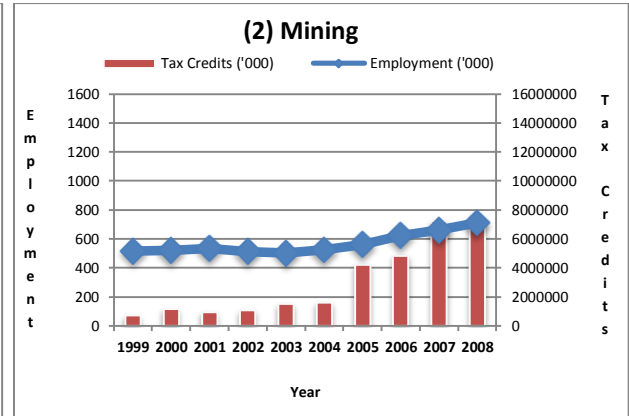
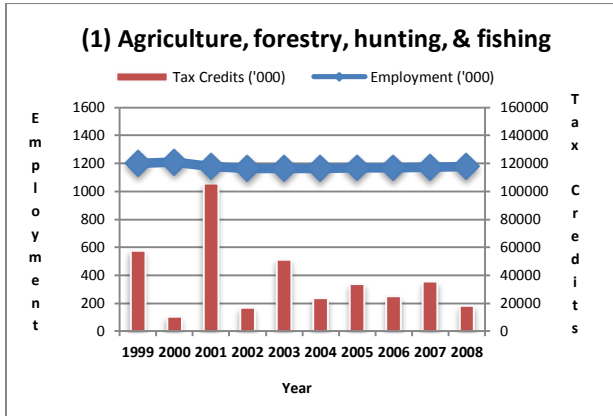
Appendix A – **Supplemental Material**

Industrial Sectors

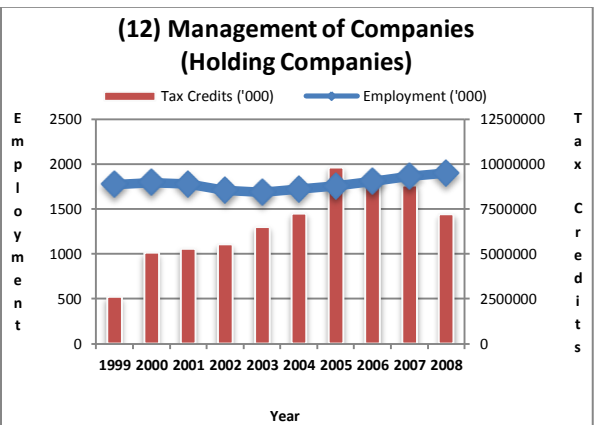
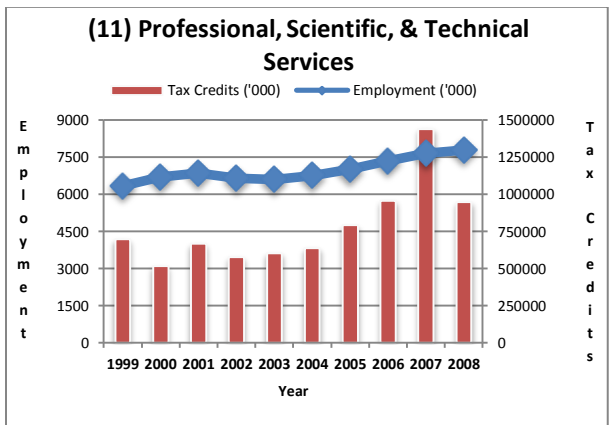
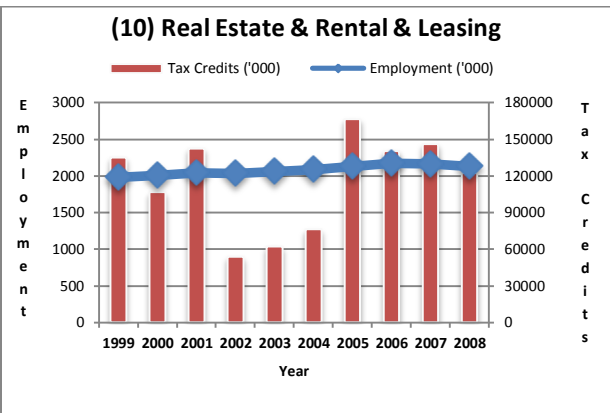
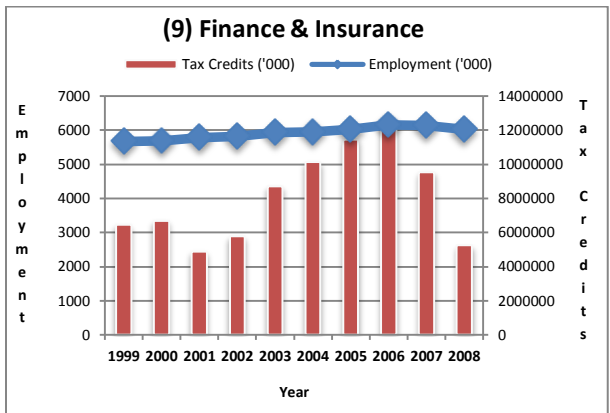
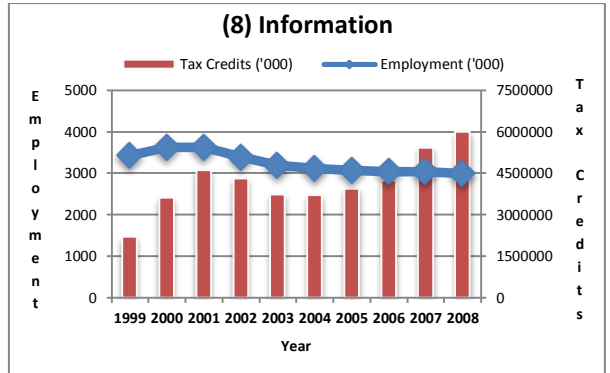
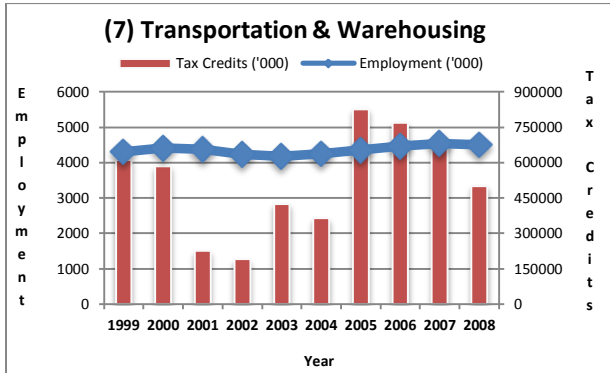
1. AGRICULTURE, FORESTRY, HUNTING, AND FISHING
2. MINING
3. UTILITIES
4. CONSTRUCTION
5. MANUFACTURING
6. WHOLESALE AND RETAIL TRADE
7. TRANSPORTATION AND WAREHOUSING
8. INFORMATION
9. FINANCE AND INSURANCE
10. REAL ESTATE AND RENTAL AND LEASING
11. PROFESSIONAL, SCIENTIFIC, and TECHNICAL SERVICES
12. MANAGEMENT OF COMPANIES (HOLDING COMPANIES)
13. ADMINISTRATIVE AND SUPPORT AND WASTE MANAGEMENT AND REMEDIATION SERVICES
14. EDUCATIONAL SERVICES
15. HEALTH CARE AND SOCIAL ASSISTANCE
16. ARTS, ENTERTAINMENT, AND RECREATION
17. ACCOMMODATION, FOOD SERVICES, AND DRINKING PLACES
18. OTHER SERVICES

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Industry Employment and Tax Credits Graphs, 1999-2008



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