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Three essays on public economics in developing countries

Chigozie Andy Ngwaba

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ABSTRACT

THREE ESSAYS ON PUBLIC ECONOMICS IN DEVELOPING COUNTRIES

Chigozie Andy Ngwaba, Ph.D.
Department of Economics
Northern Illinois University, 2018
Jeremy Groves, Director

This dissertation contains three essays that examine aspects of public economics and taxation in developing economies. Although each essay examines different questions, they are linked by findings and implications related to policy implementation that is crucial in developing countries. The first paper examines tax reform and entrepreneurship in South Africa. The second paper evaluates corporate tax policy and foreign direct investments in developing countries. The third paper assesses microfinance policy and financial inclusion in Nigeria.

Chapter 1 focuses the effects of tax reform on entrepreneurship in South Africa using repeated cross-sectional data from the World Bank. The paper adopts a difference-in-difference estimation technique as well as contrasting periods before and after the tax reform. This contrast is achieved by examining individuals in the formal and informal sector and measuring the effectiveness of the reform on self-employment. The results from the analysis indicate that the tax reform had a positive and significant effect on the probability of becoming self-employed in South Africa and is robust across different econometric specifications.

Chapter 2 estimates the impact of corporate taxes on direct foreign investments in developing countries. The paper adds to existing literature using new corporate tax data from

1990–2015 created for the study that includes 65 developing countries. Results from the study indicates that direct foreign investment is not sensitive to corporate taxes in developing economies. This indicates that the flow of foreign investments to developing host nations may be largely driven by other factors.

Chapter 3 examines the impact of the microfinance policy supervisory and regulatory framework of 2012 on financial inclusion in Nigeria. The paper contributes to existing literature by employing a national representative data and correcting the self-selection problem evidenced in previous studies. Using the microfinance policy as a natural experiment to test its impact on financial inclusion in Nigeria, the paper finds an increase in account and credit card ownership and no impact on debit card ownership and health insurance enrollment. These results have important implications for monetary and financial policy implementation by the Central Bank of Nigeria.

NORTHERN ILLINOIS UNIVERSITY
DE KALB, ILLINOIS

MAY 2018

**THREE ESSAYS ON PUBLIC ECONOMICS IN DEVELOPING
COUNTRIES**

BY

CHIGOZIE ANDY NGWABA
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A DISSERTATION SUBMITTED TO THE GRADUATE SCHOOL
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Jeremy Groves

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DEDICATION

To my family, friends and loved ones. Their unwavering support made this possible and for this I am grateful.

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CHAPTER 1

EFFECTIVENESS OF TAX REFORM ON ENTREPRENEURSHIP

1.1 Introduction

Entrepreneurs are of particular interest to researchers and policy makers, since they play a significant role in the economy by providing the much-needed energy behind job creation, technological advancement, and overall economic growth and development (Bruce & Gurley-Calvez, 2013). Researchers have investigated various factors that affect entrepreneurship and found taxes to be one of the most important determinants of entrepreneurial entry; however, empirical estimates of these effects remain inconclusive. Reasons include differences in data and estimation techniques, the definition of entrepreneurship, and the type of taxes being considered. Taxes are expected to mainly affect an individual's decision to enter into entrepreneurship or remain a wageworker because most tax laws treat entrepreneurial income differently from wage income. Furthermore, the taxation of many forms of entrepreneurial income depends on voluntary compliance while most wage tax payments are withheld by employers (Bruce & Gurley-Calvez, 2013). Most of the empirical literature indicates that higher taxes on wage income leads to an increase in entrepreneurial entry and vice versa.

In any study of entrepreneurship, the most important challenge is deciding how to measure entrepreneurial activity. Entrepreneurship as a concept, cannot be measured directly, however, entrepreneurship is a function that usually occurs within the contractual form of self-employment (Henrekson & Sanandaji, 2009). Therefore, like previous studies, I use the

measurable, yet imperfect, proxy for entrepreneurship; self-employment. Specifically, I use individual responses on surveys about the question of self-employment from an 8-year repeated cross-section survey taken from 2000–2007 called the Post-Apartheid Labor Market Series (PALMS) 1994–2012, to investigate whether South African tax reform has any effect on the decision to become self-employed.¹ The goal of the tax reform is to make the South African tax system more progressive and similar to internationally acceptable standards by reducing the statutory tax rates and broadening the tax base. Highlights of the reform include the introduction of a capital gains tax, the introduction of taxes on fringe benefits, and the restructuring of the tax system from a source-based to a resident-based income tax system. I assume these reforms will have a direct impact on wage income while having no clear impact on existing entrepreneurial income. I compute a linear probability model to estimate the impact of tax policy changes on the likelihood of becoming self-employed while controlling for factors that may influence ones decision to become an entrepreneur. Results indicate that the tax reform increase the probability of entrepreneurial entry by approximately 3.1%, which is in line with estimates from previous studies investigating an increase in wage taxes on entrepreneurial entry.

The paper is organised as follows: Section 2 gives a background of the South African post-apartheid tax reform. Section 3 reviews previous literature on how taxes affect the decision to be self-employed and Section 4 introduces the theoretical framework for the study. Section 5 presents data and estimation techniques with Section 6 describing the results while Section 7 gives the concluding remarks.

¹The Post-Apartheid Labor Market Series (PALMS) 1994–2012 dataset is a stacked cross-sectional dataset created by Data First at the University of Cape Town in conjunction with the World Bank. The dataset consists of data from 39 surveys conducted by Statistics South Africa over the time frame.

1.2 Tax Reform in South Africa

The peaceful transfer of power in 1994 to a democratically elected government marked the end of the apartheid system in South Africa. Eliminating the apartheid's socio-economic legacy of income inequality and chronic poverty stood as a very difficult challenge to the new South Africa (Kransdorff, 2010). During the apartheid regime, there were 5 different tax administrations, including one for each of the homeland "states" of Transkei, Bophuthatswana, Venda, and Ciskei. The new government abolished the homelands and placed the majority of the revenue-raising authority with the federal government while granting the 9 newly formed provinces considerable authority over public spending (Aaron & Slemrod, 1999). The Katz Commission, named after its chairman, Michael Katz, was given the directive to investigate the efficiency of the tax system and to develop policy recommendations more in line with internationally accepted tax principles and practices.

The first steps of reform took place in October, 1995, when the government approved the restructuring of the Inland Revenue, Customs and Excise Directorates in the Department of Finance (now the National Treasury) into an autonomous revenue collection agency known as the South African Revenue Service (SARS). The main objective of the new tax authority is to broaden the base and to lower overall rates. This broadening of the tax base could only be achieved through major tax reforms. The number of tax brackets was reduced from 10 to 6, a child rebate was removed to reduce fraud, and primary and secondary rebates were increased.² Additionally, there were efforts to compensate for inflation by adjusting the tax brackets and the tax thresholds (Manuel, 2002).

²To ensure that the direct personal income tax burden on individuals remains reasonable, personal income tax brackets and rebates are adjusted to take account of inflation, the primary rebate was increased from R3800 to R4140 while the secondary rebate was increased from R2900 to R3000. In addition to the primary and secondary rebates, a third rebate was introduced for taxpayers of 75 years and older.

The first base-broadening effort proposed by the tax authority in South Africa is the introduction of capital gains tax. The new capital gains tax was essential for the base-broadening effort because the exemption for capital gains essentially meant there was no tax on the returns from investments. Tax planners had previously been engaged in the artificial re-characterization of ordinary revenue into capital gains to avoid taxes. I do not expect this reform to have a measurable impact on entrepreneurship in my model.

The second base-broadening effort proposed by the tax authority is to replace the South African source-based income tax system with residence-based income tax. Under this regime, South African residents are taxed on their income, irrespective of where in the world that income is earned. Prior to 1994, a strict regime of exchange controls existed, affording South Africans little opportunity to invest abroad. Thus, the government only taxed income arising within its geographical boundaries. In 2001, South Africa began taxing its residents on a worldwide basis, meaning individuals and companies are now taxed on foreign as well as domestic sources of income. Taxing foreign sources of income reflects the new reality that South African businesses are becoming global players while ensuring that individuals and companies do not have an artificial incentive to operate abroad.³ Clearly, this reform does not have an impact on entrepreneurial entry.

The last mechanism for achieving a broader tax base is the removal of tax-free fringe benefits. Structuring remuneration packages in the form of fringe benefits was becoming increasingly prevalent in the 1990s, resulting in a substantial loss of revenue for the government. The tax treatment of fringe benefits was reformed to ensure more consistent treatment of cash and noncash compensation. To reduce the effect of this new tax burden on low and medium income earners, a tax relief structure was introduced for these individuals in form of tax rebates. I expect this reform to have the most observable impact on entrepreneurial

³Appropriate measures were also put in place to avoid potential double taxation on income earned outside of South Africa.

activities compared to the others because it functions as a tax on wage that is likely to have a positive impact on entrepreneurial entry.

1.3 Literature Review

There are variations in the empirical literature on the approach used to estimate the effects of taxation on self-employment including the type of tax measure being estimated (income tax, payroll tax or capital gains tax) or the level of data used (macro or micro level data). Studies using macro-level data finds significant positive and negative relationships between the rate of self-employment and taxation (Parker, 1996 and Robson, 1998) while others do not find any significant relationships. Similarly, studies using individual micro level data show positive, negative or inconclusive results. For this paper, I am going to focus on studies that use micro-level data.

Bruce (2000) examines the impact of US income and payroll taxes on the decision of wage-and-salary employees to become self-employed. Bruce exploits variations in the tax treatment of wage and self-employment income using the Panel Study of Income Dynamics (PSID) that is limited to only male heads of households between the ages of 25 and 54. In his model, an individual decides if he is going to move from wage-and-salary employment at time t to self-employment at time $t + 1$ (The study ignores individuals who are self-employed at time t). Each individuals post-transition tax is a function of all observable and unobservable individual behavior, thus creating an endogeneity problem. To control for the endogeneity of the tax function, Bruce uses the instrumental variable approach suggested by Cummins, et. al. (1994). Bruce computes two separate tax differentials for each t to $t + 1$ transition, and the difference between the two tax differential is used as the instrumental variable. The hypothetical differential captures the difference in the tax rate that would have

existed, had the tax rules remained constant. The goal is to use this variation in relative tax treatment to estimate the incentive or disincentive effects of the U.S. income and payroll tax systems on self-employment. Results indicate that reducing an individual's marginal tax rate on self-employment income, while holding his marginal wage tax rate constant, reduces the probability of entrepreneurial entry. This is an unexpected result because most theoretical and empirical work show the opposite effect. The reason for this result could be because Bruce (2000) restricted his analysis to male head of households between the ages of 25–54.

Cullen and Gordon (2007) show theoretically that taxes can affect an individual's incentive to engage in entrepreneurial risk-taking behavior due to the differences in tax rates on business versus wage income, due to differences in marginal tax rates forced on losses versus profits through a progressive rate structure, and due to risk sharing with the government. Using a series of cross-section samples of personal income tax returns, they show that cutting personal tax rates could substantially reduce the extent of entrepreneurial risk taking behavior. Such a tax cut reduces the taxes saved from deducting business losses, while profits frequently remain taxed at the corporate tax rate, which discourages taking risk. Lower personal tax rate implies less risk sharing with the government, making entrepreneurial risk taking less attractive to risk-averse individuals. The potential tax savings from going into business simply to reclassify earnings as corporate rather than personal income for tax purposes also falls when personal tax rates fall. Cullen and Gordon (2007) add a new dimension to the literature by measuring entrepreneurial risk taking theoretically, which has not been done previously.

Bruce and Gurley-Calvez (2013) use a 12-year panel of tax returns data (1979–1990) drawn from the University of Michigan Tax Research database to examine the effects of tax rate on entrepreneurial activity. The study expands on previous work, by recognizing that many entrepreneurial households also receive wage-and-salary income and addressing whether the effects differ by degree of entrepreneurship. (i.e. full-time vs. part-time). The

empirical specification expresses entrepreneurial entry as a function of the marginal tax rate a filer would face as an entrepreneur, the tax rate he would face as a wage earner, and a vector of other control variables. Results show that cuts in marginal tax rates faced by entrepreneurs increase the probability of entry and are larger than those of the wage sector, suggesting that, tax cut across the board would increase entrepreneurial entry.

The result here does not align with the Bruce (2000) paper that finds a decrease in the tax on entrepreneurial income reduces the probability of ones entry into entrepreneurship. Although, both studies examine the effect of tax rate on entrepreneurial entry, there are major differences in the in data and estimation method. Bruce (2000) limits his analysis to male heads of households between the ages of 25–54, while Bruce and Gurley-Calvez (2013) include all tax filers regardless of age or gender. Bruce and Gurley-Calvez (2013) allow for the possibility that entrepreneurial households may also have wage-and-salary income whereas, Bruce (2000) ignores non-self-employment income in the calculation of self-employment tax rates. Finally, while Bruce (2000) examines survey data on self-reported self-employment status from the PSID, Bruce and Gurley-Calvez (2013) consider reported small business income from federal income tax returns, which likely gives a more accurate reporting of self-employment activities in the U.S.

Stabile (2004) investigates the role of payroll taxes in the decision to be self-employed. The study examines the effects of introducing a payroll tax into the labor market which taxes employers but exempts the self-employed. Using cross-sectional data from the annual Canadian Survey of Consumer Finances, Stabile (2004) investigates the impact of introducing an Employer Health Tax by the province of Ontario on the decision of becoming self-employed. To identify this effect, the study examines the decision to be self-employed before and after the introduction of the tax by contrasting individuals in Ontario with two plausible control groups. First, he uses other Provinces in Canada that have a stable payroll tax environ-

ment over the period as a control group.⁴ As a second control group, Stabile (2004) uses the American States that immediately border Ontario (Ohio, Michigan, and New York). The paper acknowledges that there may be more regulatory differences between U.S. states and Canadian provinces. However, the economies of the U.S. neighbouring states are quite similar to that of Ontario. The study adopts a simple difference-in-difference estimator to examine the impact of being self-employed in Ontario before and after the introduction of the 1990 payroll tax as compared to other provinces in Canada and U.S. states that did not include a payroll tax. Results show an increase ranging from 0.6–1 percentage points in the probability of being self-employed as a result of the introduction of a payroll tax ranging from 1–2%. Including self-employment income in the payroll tax base offset the movement towards self-employment for the affected group almost exactly.⁵

Moore (2004) adds a new dimension to the empirical literature by using individual-level data to assess the effect of tax policy on self-employment. The paper uses repeated cross-sectional data from Surveys of Consumer Finances (SCF) to evaluate the effect of the 1986 and 1993 tax reforms on self-employment of individuals in the United States. The study controls for a variety of factors that may influence the decision to become self-employed. The study uses the 1986 and 1993 tax reforms as a natural experiment that allows for the identification of the effect of taxes on the choice of being self-employed. The study also addresses the econometric problems associated with identifying these tax effects. The first problem is the issue of identifying the effect of a change in the federal tax law on individuals with a

⁴The control provinces include British Columbia, Alberta, Saskatchewan, and the Maritime provinces excluding Newfoundland. Newfoundland, Manitoba and Quebec are excluded because they have their own payroll taxes and experienced rate changes during the period in question that might affect the decision to be self-employed in those provinces. The remaining control provinces did not have any payroll taxes in effect over this period, except for premiums for workers compensation program, the rates of which changed very little from year to year Stabile (2004).

⁵Beginning in 1993, the Ontario government also included self-employed individuals in the payroll tax. Self-employed individuals were exempt from the payroll tax for up to \$40,000 of total net self-employment income. Total net self-employment income includes most business and self-employment income, and is applied to all income whether earned in Ontario or elsewhere.

given set of characteristics that face the same tax rate at a given point in time. The second problem is the endogeneity of the tax function. These problems are addressed by adopting an exogenous and time-invariant variation (education and occupation) for the difference-in-difference estimation. To ensure time-invariance of the variables, Moore restricts his sample to individuals who have completed their education (older than 24) and grouped individuals by broad occupational categories which are blue collar versus white collar. Findings from the study suggest that marginal and average tax rates are negatively related to the propensity to become self-employed. However, these effects are only significant for the 1986 tax reform. Other factors, such as education, industry, wealth, and attitude toward risks, are consistently more important influences on the choice to become self-employed.

Gentry and Hubbard (2002) examine the effect of tax system on the risky investment decision of entering entrepreneurship using time-series and cross-sectional variation in tax schedules faced by households in the PSID over the period 1979–1993. To construct tax variables, they use the TAXSIM model of the National Bureau of Economic Research.⁶ The PSID data is comprised of household characteristics on family size, family structure, age, labor earnings, dividends, interest received, income from other sources (e.g., rental income), and state of residence. Empirical results from the study imply a significant increase in entrepreneurial entry when tax rates are less progressive. For example, empirical estimates show that the Omnibus Budget Reconciliation Act of 1993, which raised the top marginal tax rate; lowered the probability of entry into self-employment for upper-middle-income households by as much as 20 percent. Estimated effects are robust after controlling for differences in family structure, spousal income and measures of transitory income. Results also suggest that both continuing entrepreneurs and new entrepreneurs experience more variability in

⁶TAXSIM is an ongoing project of Dan Feenberg of the NBER and his collaborators. It allows one to calculate "federal and state income tax liabilities from survey data. You prepare the data, the NBER TAXSIM program returns the tax calculations in seconds." The data can be uploaded to the simulator. TAXIM is accessible at <http://www.nber.org/taxsim>.

terms of the distribution of wealth, income, and the ratio of wealth to income. This means entrepreneurship entails more variable payoffs than continuing to work for someone else, which is an important underlying assumption of the study.

Asoni and Sanandaji (2013) analyse the effect of taxes jointly on quality and quantity of entrepreneurship. They use a dynamic forward-looking framework where individuals decide to create firms by taking into account all future utilities and options. Results indicate that in a dynamic setting with a high level of commitment, progressive taxes can increase entry into self-employment while reducing average quality of the firm. When entry is associated with an opportunity cost in terms of searching for better ideas, progressive taxes can decrease the average quality of startups, while increasing their number. Progressive taxes compress the returns to entrepreneurial activity, thus lowering the reward to high-quality ideas relative to mediocre ones. While the paper focuses on entrepreneurship, the model can be interpreted as the impact of taxes on any investment choice that involves taking irreversible decisions at the cost of pursuing better options.

Hansson (2008) examines the impact of wealth tax on entrepreneurship using a simple choice model where an individual decides between becoming an entrepreneur or an employee. The study develops a model illustrating how wealth tax can impede self-employment by reducing the amount of capital available and the pay-off for successful entrepreneurship. The study uses data from 22 OECD countries of which 8 impose taxes on individual's wealth. A simple comparison between OECD countries that tax wealth and countries that do not suggests that there is a remarkable difference in self-employment between these two sets of countries. During the time period, 1980–2003, countries that did not tax wealth had, on average, a self-employment rate that was 2.3 percentage points higher than the rates in countries that taxed wealth. The study adopts a difference-in-difference technique using the elimination of wealth taxes in four countries as a natural experiment and finds a boost in self-employment due to the removal of the tax on wealth. A comparison is made for the change

in self-employment between the countries that abolished the wealth tax and the countries that did not. In addition, different control groups are used to see how sensitive the results are to the choice of control group. However, a more careful analysis reveals that much of the gap can be explained by other inter-country differences and that the actual effect of the wealth tax is much smaller.

Based on economic theory, tax reform changes employment opportunity cost and directly impacts an individual's decision whether to remain in the wage sector or transition into self-employment. Tax reform, if implemented optimally, may generate new revenue for the government. However, it may also change the composition of the labor force. Similarly, taxes can distort labor market activities making individuals move from the formal to the informal sector as a form of tax evasion. According to Stenkula (2010), a tax on self-employment reduces the expected after-tax return on self-employment activities making it less profitable to be self-employed. Since this study focuses primarily on a developing economy, South Africa, I expect a tax on wage employment to encourage entrepreneurial entry. This is achievable through an incentive effect by substituting wage employment for self-employment as a form of income shifting. A key provision of the tax reform is the introduction of taxes on fringe benefits. This should increase self-employment as people now have an incentive to exit the wage sector in favor of self-employment. The Moore (2004) study is applicable to South Africa because it evaluates the 1986 tax reform and 1993 reconciliation act examining its impact on self-employment, while controlling for various occupational and demographic characteristics.

1.4 Theoretical Framework

To provide a theoretical foundation for the empirical model I rely on the work of Bruce and Gurley-Calvez (2008) and Cullen and Gordon (2007). Bruce and Gurley-Calvez combine elements from two strains of theoretical research where agents must allocate work effort between the wage-and-salary sector and a relatively risky entrepreneurship sector. The agent must also decide how much entrepreneurship income to report to the tax authority. Cullen and Gordon show how tax laws can affect individual incentives to engage in entrepreneurial risk, where risk depends on the standard deviation per dollar of expected income.

Consider an agent at time t , deciding whether to enter an entrepreneurial activity at time $t + 1$. Let ϵ represent the share of labor allocated to entrepreneurial activity and $(1 - \epsilon)$ the share allocated to the wage sector. The wage rate per unit of time is ω and the uncertain return to entrepreneurial activity is s which is assumed to be normally distributed with mean (μ_s) and a variance (σ_s^2) . In addition, there is an individual-specific cost of entry (f_i) that is constant for each unit of effort invested in self-employment.

Marginal tax on wage income is represented by τ_ω while, marginal tax on entrepreneurial income is τ_s . While wage income is perfectly monitored by tax authorities (due to third-party reporting), entrepreneurial income is subject to voluntary compliance. The individual reports a share of entrepreneurial income (θ) . For this model, I assume that agents either report all their income which means they operate in the formal sector or none of their income which means they operate in the informal sector.

The individual maximizes utility by deciding how much labor to allocate to entrepreneurship (ϵ) . For simplicity, I assume that individual utility depends solely on the expected value (μ_s) , the variance of income (σ_s^2) , and the heterogeneity of risk preferences (β) . Therefore, the utility of income is defined as:

$$U = E(I) - 0.5\beta Var(I) \quad (1.1)$$

$$I = \omega(1 - \tau_\omega)(1 - \varepsilon) + \theta s(1 - \tau_s)\varepsilon - f_i\varepsilon \quad (1.2)$$

Finding the expected value and variance of the individual's income:

$$E(I) = \omega(1 - \tau_\omega)(1 - \varepsilon) + \theta\mu_s(1 - \tau_s)\varepsilon - f_i\varepsilon \quad (1.3)$$

$$Var(I) = \sigma_s^2\theta^2\varepsilon^2(1 - \tau_s)^2 \quad (1.4)$$

Substituting the equations 1.3 and 1.4 into 1.1 we get:

$$U(I) = \omega(1 - \tau_\omega)(1 - \varepsilon) + \theta\mu_s(1 - \tau_s)\varepsilon - f_i\varepsilon - 0.5\sigma_s^2\theta^2\varepsilon^2(1 - \tau_s)^2 \quad (1.5)$$

Differentiating 1.5 w.r.t ε and solving the f.o.c for optimal effort yields:

$$\varepsilon = \frac{\theta(1 - \tau_s) - \omega(1 - \tau_\omega) - f_i}{\beta\sigma_s^2\theta^2(1 - \tau_s)^2} \quad (1.6)$$

The derivative of 1.6 with respect to wage taxes(τ_ω) yields:

$$\frac{\partial \varepsilon}{\partial \tau_\omega} = \frac{\omega}{\beta\sigma_s^2\theta^2(1 - \tau_s)^2} > 0 \quad (1.7)$$

Equation 1.7 indicates that an increase in the tax on wages leads to an increase in entrepreneurial effort, which is expected, assuming agents operate in the formal sector ($\omega = 1$). It is important to note that if agents operate in the informal sector ($\omega = 0$), the tax has

no impact on self-employment. The impact of other key control variables on entrepreneurial effort (ϵ) can be found in the appendix.

I argue that the introduction of a capital gains tax and the resident based tax system does not have a measurable impact on self-employment in the model. The resident based tax reform clearly has no impact on self-employment activities. However, it is not immediately clear what impact capital gains tax may have on self-employment.⁷ Previous studies have shown that capital gains tax can affect self-employment through venture capitalist activities. However, in 2001, when the tax reform was implemented, South Africa did not attract much venture capitalist investment. Similarly, since self-employment income depends on voluntary reporting, it is possible that the capital gains component of the tax reform has no impact on self-employment because it creates an artificial incentive to operate in the informal sector. I test for this in my model and find that the tax reform does not have a significant effect on the formal sector, which means the tax reform does not encourage individuals to move from the formal to the informal sector (refer to Table 1.10).

However, if we do believe that the capital gains tax has an impact on self-employment, this means the tax reform variable in my model, which is measuring the net effect, will be understated because the impact of taxes on entrepreneurship and wage income move in the opposite direction.

We can show theoretically by taking the derivative of 1.6 with respect to τ_s which yields:

$$\frac{\partial \epsilon}{\partial \tau_s} = \frac{2\beta\sigma_s^2\theta(1 - \tau_s)[\theta\mu_s(1 - \tau_s) - \omega(1 - \tau_\omega) - f_i] - \beta\mu_s\sigma_s^2\theta^2(1 - \tau_s)^2}{[\beta\sigma_s^2\theta^2(1 - \tau_s)^2]^2} \quad (1.8)$$

It is important to recall the assumption that agents either report all their income (operating in the formal sector) or none of their income (operating in the informal sector). Hence,

⁷Part of the return on self-employment can be realized through capital gains which means introducing capital gains tax can reduce the net return to the self-employed. Similarly venture capital may be discouraged to invest in startups as a huge share of their remuneration often comes in the form of capital gains (Stenkula, 2012)

$\theta = 1$ if an individual operates in the formal sector and $\theta = 0$ if an individual operates in the informal sector. If $\theta = 0$ then $\frac{\partial \varepsilon}{\partial \tau_\omega}$ and $\frac{\partial \varepsilon}{\partial \tau_s}$ is not defined, which means the tax policy has no impact in the formal sector.

Substituting $\theta = 1$, and simplyfying (1.8) yields:

$$\frac{\partial \varepsilon}{\partial \tau_s} = \frac{\mu_s(1 - \tau_s) - 2\omega(1 - \tau_\omega) - 2fi}{\beta\sigma_s^2(1 - \tau_s)^2} < 0 \quad (1.9)$$

$$\frac{\mu_s(1 - \tau_s)}{\beta\sigma_s^2(1 - \tau_s)^2} < \frac{2\omega(1 - \tau_\omega) + 2fi}{\beta\sigma_s^2(1 - \tau_s)^2} \quad (1.10)$$

$$\mu_s(1 - \tau_s) - 2f < 2\omega(1 - \tau_\omega) \quad (1.11)$$

If the expected net return on entrepreneurship minus the cost of entry is less than the net wage, the inequality in (1.11) holds. This implies that an increase in entrepreneurial taxes leads to a decrease in the amount of labor allocated to entrepreneurial activity.

1.5 Data and Estimation

1.5.1 Empirical Strategy

This paper examines if the introduction of the tax reform in South Africa encouraged individuals to become self-employed. To identify this effect, I use a difference-in-difference estimation approach examining the decision to be self-employed before and after the introduction of the tax reform. Since there are other factors that may affect the probability of becoming self-employed, I contrast individuals in the formal sector who are affected by the tax reform with individuals who operate in the informal sector that are not affected by the

reform. It should be noted that in South Africa there are wage and self-employed individuals that operate in the informal sector.

The estimated model takes the following form:

$$S_{it} = \beta_0 + \beta_1 F_{it} + \beta_2 T_{it} + \beta_3 T_{it} * F_{it} + \beta_4 X_{it} + \beta_5 \rho_s + \epsilon_{it} \quad (1.12)$$

Where S_{it} takes a value of 1 if the individual is self-employed and 0 if the individual works for a wage. the binary variable T_{it} takes the value of 1 if the response is after the implementation of the tax policy and 0 if the response occurs before implementation of the tax reform. The binary F_{it} takes the value of 1 if the individual operates in the formal sector and 0 if the individual operates in the informal sector. The error term is represented by ϵ . The demographic characteristics includes income, sex, marital status, age, race, and years of education and are represented by the vector X_{it} . The coefficient of interaction between the treatment and the formal sector is the difference-in-difference estimator which measures the impact of tax reform on self-employment. I add specifications that include time and province fixed effects as well as apply the model to different subsamples to test for racial and income effects.

1.5.2 Description of the Data

To measure the effect of the tax reform on the decision to be self-employed in South Africa, I use repeated cross-sectional data from the World Bank. The Post-Apartheid Labor Market Series (PALMS) 1994–2012 dataset is a stacked, cross-sectional dataset and consists of data from 39 surveys conducted by Statistics South Africa between 1994–2012. These include household surveys from 1994–1999, bi-annual Labor Force Survey (LFS) from 2000–2007, and the quarterly labor force survey from 2008–2012.

For this analysis I use the bi-annual LFS data, which is individual level data.⁸ The dataset includes three sets of weights: revised weights from Statistics South Africa, cross-entropy weights designed by Nicola Branson of the University of Cape Town, and a third set created by Takwanisa Machedmedze based on Bransons method.

The pre-policy period consists of the years 2000 and 2001 and the post-policy period consists of the period 2002–2007. For the robustness analysis, I rebalance the sample using a pre-policy period that consists of 2000–2001 and a post-policy period of 2002–2003 to control for the lopsided post-policy period in the initial analysis. Due to the richness of the LSF data, I am able to control for a variety of factors that may influence the decision to become self-employed, such as age, years of education, sector, geographical location, gender, marital status, population group, and real earnings. Responses to the question if individuals are self-employed or if they work for a wage measures entrepreneurial effort, and is represented in the analytical model by ε . The key provision in the tax reform that introduces taxes on fringe benefits is measured by τ_ω , and responses to the question if individuals operate in the formal or informal sector is captured by ω in the theoretical model.

Table 1.1: Summary Statistics (Full Sample)

	Mean	Std Dev	Min	Max	Total obs.
Self-employed	0.1381	0.345	0	1	272,477
Tax reform	0.7591	0.4276	0	1	272,477
Formal sector	0.6836	0.465	0	1	272,477
Age	38.2	11	18	67	272,477
Male	0.55	0.4974	0	1	272,477
Years of education	8.19	4.04	0	16	272,477
Married	0.5422	0.4982	0	1	272,477
ln(real earning)	6.898	1.007	4.35	9.4	272,477

⁸Household level variables may be created using the household id.

Table 1.1 provides the summary statistics of the variables used in the study. Approximately 14% of respondents are self-employed, 68% operate in the formal sector. The average age of respondents is 38 years, 55% of the sample are male, 54% are married and the average years of education is 8 years.

Table 1.2: Summary Statistics (Rebalanced Sample)

	Mean	Std Dev	Min	Max	Total obs.
Self-employed	0.1382	0.345	0	1	131,556
Tax reform	0.501	0.5	0	1	131,556
Formal sector	0.6796	0.467	0	1	131,556
Age	38.2	10.8	18	67	131,556
Male	0.55	0.4974	0	1	131,556
Years of education	8.03	4.099	0	16	131,556
Married	0.5625	0.4961	0	1	131,556
ln(real earning)	6.8695	1.039	4.35	9.4	131,556

Table 1.2 provides summary statistics for the rebalanced sample. The summary statistics is consistent with the full sample shown in Table 1.1.

1.6 Results

The difference-in-difference estimation result shown in Table 1.3 indicates that the South African tax reform increased the probability of becoming self-employed by approximately 3.1%. The difference-in-difference estimate (Tax reform*Formal sector) is positive and significant at a 1% significance level. Two sets of results are presented in the analysis: Column (1) reports coefficients that control for province fixed effects, while Column (2) reports coefficients that control for province and year fixed effects. Most of the variables have the

expected signs: age, marital status, real earnings, and gender have a positive and significant effect on self-employment.

Table 1.3: Full Sample

Self-Employment	(1)	(2)
Tax reform*Formal sector	0.031*** (0.0029)	0.031*** (0.0029)
Tax reform	-0.0307*** (0.00236)	-0.0124*** (0.00311)
Formal sector	-0.38*** (0.00261)	-0.38*** (0.0026)
Age	0.0026*** (0.00006)	0.0026*** (0.00006)
Male	0.031*** (0.0012)	0.031*** (0.0013)
Years of education	0.00832*** (0.0002)	0.00826*** (0.0002)
Married	0.0294*** (0.00126)	0.0299*** (0.00126)
ln(real earning)	-0.00404*** (0.0008)	-0.00445*** (0.0008)
White	0.132*** (0.003)	0.133*** (0.003)
Black	0.031*** (0.0022)	0.031*** (0.0022)
Asian	0.076*** (0.0044)	0.078*** (0.0044)
Other	0.134*** (0.0284)	0.139*** (0.0284)
Intercept	0.173*** (0.0056)	0.166*** (0.0058)
Province fixed effect	Yes	Yes
Year fixed effect	No	Yes
Total Obs.	272,477	272,477

Note: The OLS regression is based on Labor Force Survey (LFS) 2000-2007 taken from the Post-Apartheid Labor Market Series (PALMS) 1994-2012. ***, **, and * denoting statistical significance at 1, 5, and 10 percent level, respectively.

Years of education exhibit a positive and increasing effect on self-employment and remains consistent after controlling for survey and province fixed effects. The sector an individual

operates in plays an important role in the self-employment choice decision. The coefficient of interest (Tax reform * Formal Sector) implies that the policy has a positive and significant effect after controlling for other variables that may affect the decision to become self-employed and after controlling for year and province fixed effects. This result is similar to the Hansson (2008) study that concludes self-employment increased by approximately 2.3% in countries that abolished the wealth tax. Similarly, my results are consistent with Moore (2004), who uses a similar estimation approach and concludes that the 1986 tax reform in the United States had a positive and significant effect on self-employment.

Table 1.3, Column (1) indicates that the formal sector is about 38% less likely to be self-employed. Over the time the tax reform takes effect, the overall trend decreased self-employment by about 3%. For respondents in the formal sector, this is offset by the increase in self-employment of about 3% resulting from the tax policy changing the incentive to become self-employed. Overall, this leads to no observed change among individuals in the formal sector.

Column (2) adopts time fixed effects and shows that the formal sector is about 38% less likely to be self-employed. Over the time the tax reform takes effect, the overall trend decreased self-employment by about 1%. For respondents in the formal sector, this is offset by the increase in self-employment of about 3% resulting from the tax policy changing the incentive to become self-employed. This leads to an overall observed change in self employment among individuals in the formal sector of about 2%.

Table 1.4 presents results from subsamples by income quartile analyzing the effect of the tax reform on the various income groups in South Africa. Since the goal of the tax reform is to broaden the base and reduce overall rates, I argue that the policy has a potential of making the tax system more progressive because taxes on fringe benefits generally have a higher impact on high-income earners. I examine if the effect of the tax policy is different among income groups.

Table 1.4: Subsample by income quartile (full sample)

Self-Employment	0–25%	26–50%	51–75%	76–100%
Tax reform*Formal sector	0.008 (0.007)	0.055*** (0.0057)	0.0105* (0.0055)	-0.0254*** (0.0082)
Tax reform	-0.03*** (0.007)	-0.045*** (0.0059)	-0.0059 (0.00584)	0.035*** (0.00854)
Formal sector	-0.282*** (0.0061)	-0.326*** (0.0051)	-0.455*** (0.00476)	-0.584*** (0.00688)
Age	0.0038*** (0.00014)	0.0018*** (0.0001)	0.0016*** (0.0001)	0.0025*** (0.0001)
Male	0.0306*** (0.0032)	0.0252*** (0.00228)	-0.0084*** (0.002)	0.0392*** (0.0021)
Years of education	0.0163*** (0.00043)	0.0065*** (0.0003)	0.00371*** (0.0003)	-0.00024 (0.00037)
Married	0.057*** (0.0031)	0.0325*** (0.00233)	0.018*** (0.002)	0.0034 (0.0022)
ln(real earning)	-0.126*** (0.0035)	0.056*** (0.0062)	0.0527*** (0.0043)	0.0424*** (0.0025)
White	0.213*** (0.0234)	0.141*** (0.011)	0.104*** (0.00527)	0.116*** (0.0038)
Black	0.088*** (0.0067)	0.026*** (0.0038)	0.0099*** (0.0032)	0.0147*** (0.0036)
Asian	0.202*** (0.0284)	0.89*** (0.127)	0.0325*** (0.0064)	0.0934*** (0.0055)
Other	0.161 (0.112)	0.508*** (0.0726)	0.017 (0.0406)	0.194*** (0.035)
Intercept	0.59*** (0.219)	-0.219 (0.04)	-0.015 (0.0311)	0.155*** (0.0206)
Province fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	yes
Total Obs.	68,318	67,787	68,254	68,118

Note: The OLS regression is based on Labor Force Survey (LFS) 2000-2007 taken from the Post-Apartheid Labor Market Series (PALMS) 1994-2012. ***, **, and * denoting statistical significance at 1, 5, and 10 percent level, respectively.

Column (1) reports estimates for the bottom 25th percentile of the income distribution and coefficients show a positive but insignificant effect of the tax reform on the probability of becoming self-employed. This result should be interpreted cautiously because in the sample

the people who fall into this category have a real monthly income that is 500 ZAR or less (ZAR is the South African Rand; one dollar corresponds to 13.2 South African Rand).

Column (2) presents estimates from the 26–50th percentile of the income distribution. The coefficient of interest (Tax reform*Formal sector) shows that the tax reform leads to a 5.5 percent increase in the probability of becoming self-employed and is significant at 1%. Over the time the tax reform was enacted, the overall trend was a decrease in self-employment of about 4.5% (Tax reform coefficient) leading to an overall observed change in self-employment among individuals in the second quartile of about 1%. This is in line with previous studies on self-employment and taxes.

Column (3) reports estimates from the 51–75th percentile of the income distribution, which shows a positive difference-in-difference (Tax reform*Formal sector coefficient), however, it is significant only at 10%. Since the coefficient of interest (Tax reform*Formal sector) is significant and the policy variable (Tax reform) is not, it means the policy spurred a behavior in the treatment group that otherwise would not have happened.

Column (4) presents the estimates for the top 25th percentile of the income distribution. The difference-in-difference coefficient (Tax reform*Formal sector) has a negative and significant effect at a 1% significance level, which is expected because the major provisions of the reform have the likelihood of impacting the top 25th percentile more than any other income group. The differential and additive result is approximately 1% because the negative and significant difference-in-difference coefficient is offset by a positive trend in self-employment. The overall differential effect is positive because the coefficient of interest (Tax reform*Formal sector) is about -2.5% and significant, while tax reform coefficient is about 3.5%. However, the interpretation does not reveal that the tax reform is more progressive. The analysis presented in Table 1.4 also controls for province and time fixed effects. This result is somewhat consistent with the result of Bruce (2000) that shows decreasing an individual's expected marginal tax rate reduces the probability of entrepreneurial entry. Bruce limits his data

to male heads of households 25–54 years which could explain the negative coefficient in my analysis because male heads of households make up a large proportion of the high-income earners. Similarly, Bruce (2000) examined survey data on self-reported self-employment activities, which is consistent with my data.

Table 1.5: Population group (full Sample)

Self-Employment	Blacks	Whites	Asian	Colored
Tax reform*Formal sector	0.0227*** (0.0033)	-0.113*** (0.0212)	0.0175 (0.026)	0.046*** (0.0053)
Tax reform	-0.0068* (0.004)	0.152*** (0.0224)	-0.0022 (0.0277)	-0.043*** (0.0056)
Formal sector	-0.395*** (0.00302)	-0.432*** (0.017)	-0.548*** (0.0223)	-0.2*** (0.0048)
Age	0.0023*** (0.00075)	0.0057*** (0.00023)	0.0047*** (0.00037)	0.00155*** (0.0001)
Male	0.022*** (0.0015)	0.0996*** (0.0054)	0.0402*** (0.0075)	0.0345*** (0.00185)
Years of education	0.0078*** (0.00021)	0.0211*** (0.00158)	0.0067*** (0.00182)	0.0062*** (0.00031)
Married	0.0373*** (0.0015)	0.0324*** (0.0062)	0.027*** (0.0084)	0.0052 (0.00195)
ln(real earning)	-0.0062*** (0.00093)	-0.0094** (0.129)	0.019*** (0.0056)	0.011*** (0.0013)
Intercept	0.244*** (0.0064)	0.105*** (0.0348)	0.371*** (0.047)	-0.0015 (0.0088)
Province fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Total Obs.	204,061	17,530	6,691	44,082

Note: The OLS regression is based on Labor Force Survey (LFS) 2000-2007 taken from the Post-Apartheid Labor Market Series (PALMS) 1994-2012. ***, **, and * denoting statistical significance at 1, 5, and 10 percent level, respectively.

Table 1.5 presents estimates for the different population groups in the sample. Column (1) reports the estimates for blacks that show a positive and significant effect, which is expected because the black population is approximately 75% of the sample and an accurate representation of the population. This result implies the tax reform did have a positive and significant effect on blacks in South Africa during the time period. A large number of the

black population falls in the lower quartile of the income distribution, which is a result the discriminative policies that were in place during the apartheid regime in South Africa.⁹

The additive and differential effect for the black population show an overall increase in the probability of being self-employed by about 1.5%. The “Formal sector” coefficient is -.395 and is significant indicating that before the reform Blacks in the formal sector were 40% less likely to be self-employed. Over the time the tax reform was enacted, the overall trend was decreased in self-employment of about -0.68%. For those in the formal sector, however, this was offset by an increase in self-employment of about 2.27% resulting from the tax reform policy changing the incentive to be self-employed. This indicates that the reform was very effective among the Black population group.

The difference-in-difference estimate for Whites shown in Column (2) reveal a negative and significant effect, which is expected because there are more Whites in the top 25th percentile of the income distribution than any other race. The additive and differential effect shows an overall increase. The coefficient of interest (Tax reform*Formal sector) is about -11.3% and significant, while the tax reform coefficient is about 15.2%. The overall observed change in self-employment after the reform is about 3%. This may be because the taxes on fringe benefits significantly affect directors of top private companies who are mainly White. The magnitude of the additional tax may not be enough to provide an incentive for the directors to transition from wage employment to self-employment. This result is also similar to Bruce (2000) that limits the sample to only male heads of households.

Column (4) reveal estimates for the Colored population, which has a positive and significant difference-in-difference estimate. the coefficient of interest (Tax reform*Formal sector)

⁹Apartheid became institutionalized after 1948 and operated at the micro, macro and intermediate (meso) level. The micro level emphasized separation between individuals of different groups through separate amenities, prohibition of interracial marriages and sexual relations. The macro level concentrated mostly on fiscal terms by creating black nation-states and finally intermediate (meso) level had the most detrimental economic impact through its effects on the labor market by separating race groups through influx control, urban settlement patterns and separate schools. The government aggressively promoted the employment of whites in state-controlled enterprises and supported mostly white businesses through a variety of measures.

is about 4.6% and significant, while tax reform coefficient is about -4.3% meaning the overall observed change in respondents self-employed operating in the formal sector is about 0.3%.

1.6.1 Robustness Analysis

To test for robustness of the results, I rebalance the sample to specifically compare self-employment two years before and two years after the implementation of the reform. The goal of this specification is to ensure that the estimates are not biased as a result of time trends present in the lopsided data.

Table 1.6 presents the robustness analysis using the period 2000–2001 as the pre-policy period and 2002–2003 as the post-policy period. The purpose of this analysis is to determine if any time-related factors may have affected the final results.

Column (1) reports the regression estimates that control for province fixed effects, while Column (2) controls for province and year fixed effects. The coefficient of interest (Tax reform*Formal sector) remains positive and significant, and other variables have the same signs and are significant just like the results from the full sample (Table 1.3) except for the log of real earnings. This indicates that my results are robust after applying a different specification.

Column (1) show the coefficient of interest (Tax reform*Formal sector) is about 4.8% and significant, while tax reform coefficient is about -5.2% meaning there is no observed change in self-employment after the reform. However, the policy offset the overall trend. Overall there was an observed decrease in self-employment.

Column (2) show the coefficient of interest (Tax reform*Formal sector) is about 4.8% and significant, while tax reform coefficient is about -4.4% meaning there is no observed change in self-employment after the reform. However, the policy offset the overall trend.

Table 1.6: Rebalanced Sample

Self-Employment	(1)	(2)
Tax reform*Formal sector	0.048*** (0.0036)	0.048*** (0.0036)
Tax reform	-0.052*** (0.00294)	-0.044*** (0.00351)
Formal sector	-0.38*** (0.00273)	-0.38*** (0.00273)
Age	0.0025*** (0.00009)	0.0025*** (0.00009)
Male	0.035*** (0.0018)	0.035*** (0.0018)
Years of education	0.0082*** (0.00026)	0.0082*** (0.00026)
Married	0.0282*** (0.00182)	0.0282*** (0.00182)
ln(real earning)	-0.001921* (0.00114)	-0.001807 (0.00114)
White	0.12*** (0.0044)	0.12*** (0.0044)
Black	0.0308*** (0.0033)	0.0308*** (0.0033)
Asian	0.071*** (0.0062)	0.071*** (0.0062)
Other	0.131*** (0.029)	0.131*** (0.029)
Intercept	0.158*** (0.00778)	0.149*** (0.00792)
Province fixed effect	Yes	Yes
Year fixed effect	No	Yes
Total Obs.	131,556	131,556

Note: The OLS regression is based on Labor Force Survey (LFS) 2000–2007 taken from the Post-Apartheid Labor Market Series (PALMS) 1994–2012. ***, **, and * denoting statistical significance at 1, 5, and 10 percent level, respectively.

Table 1.7 presents results from subsamples by income quartiles using the rebalanced sample. The results are very similar to that of the full sample (in Table 1.4); the signs and magnitude remain the same. However, they differ when it comes to the level of significance for the bottom 25th percentile of the income distribution. In table 1.4 above the coefficient

of interest (Tax reform*Formal sector) for the bottom 25th percentile for the full sample is insignificant, but the rebalanced sample picked up significance level at 1%. This difference may be a result of noise in the data or changes in parallel trends between wage-earners and the self-employed in the formal and informal sector in 2004. Results indicate that the coefficient of interest (Tax reform*Formal sector) is positive for all the income groups except the top 25th percentile of the income distribution, which is consistent with my initial result. The additive and differential effects show that there is an overall increase of 2% for the first quartile, no change for the second quartile and a negative effect of about 1% for the top 25th percentile which is consistent.

Table 1.8 reports estimates from the rebalanced sample showing the different population groups in the sample. The results are similar to that of the full sample shown in Table 1.5. All the signs and magnitudes for the coefficient of interest are similar; however, the coefficient for the Asian population picked up significance at 1%, which is not the case for the full sample. The coefficient of interest (Tax reform*Formal sector) for the Asian group is about 8.8% and significant, while tax reform coefficient is about 1% yet insignificant meaning the policy spurred behavior in the treated group that otherwise would not have happened. The additive and differential effect for the Black group is about 0.2%, White is about -12%, while the Colored group reports no change.

Table 1.7: Subsample by income quartile (Rebalanced Sample)

Self-Employment	0–25%	26–50%	51–75%	76–100%
Tax reform*Formal sector	0.045*** (0.008)	0.043*** (0.0057)	0.012* (0.005)	-0.0402*** (0.0011)
Tax reform	-0.026*** (0.007)	-0.044*** (0.007)	0.0084 (0.007)	0.034*** (0.0011)
Formal sector	-0.286*** (0.006)	-0.329*** (0.0055)	-0.455*** (0.0046)	-0.581*** (0.0069)
Age	0.0039*** (0.00019)	0.00137*** (0.0002)	0.0011*** (0.00014)	0.0028*** (0.00015)
Male	0.033*** (0.00415)	0.0245*** (0.0037)	-0.0065** (0.0029)	0.0419*** (0.00303)
Years of education	0.0161*** (0.00056)	0.006*** (0.00055)	0.00306*** (0.0004)	-0.0007 (0.00054)
Married	0.051*** (0.004)	0.04*** (0.0038)	0.0167*** (0.0028)	-0.0032 (0.0032)
ln(real earning)	-0.114*** (0.0045)	0.073*** (0.01)	0.05*** (0.006)	0.0456*** (0.0036)
White	0.212*** (0.03)	0.127*** (0.0166)	0.101*** (0.0074)	0.098*** (0.0056)
Black	0.0848*** (0.0087)	0.016** (0.0065)	0.0061 (0.0048)	0.014*** (0.0054)
Asian	0.218*** (0.0373)	0.87*** (0.0183)	0.028*** (0.0088)	0.077*** (0.0078)
Other	0.15 (0.109)	0.0381 (0.0757)	0.0154 (0.04)	0.179*** (0.035)
Intercept	0.54*** (0.0281)	-0.32 (0.064)	0.0258 (0.0436)	0.122*** (0.0296)
Province fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Total Obs.	37,770	27,762	33,035	32,986

Note: The OLS regression is based on Labor Force Survey (LFS) 2000-2007 taken from the Post-Apartheid Labor Market Series (PALMS) 1994–2012. ***, **, and * denoting statistical significance at 1, 5, and 10 percent level, respectively.

Table 1.8: Population group (Rebalanced Sample)

Self-Employment	Blacks	Whites	Asian	Colored
Tax reform*Formal sector	0.0485*** (0.0041)	-0.118*** (0.0265)	0.088*** (0.0314)	0.036*** (0.0067)
Tax reform	-0.046*** (0.004)	-0.0068*** (0.0268)	-0.01 (0.032)	-0.035*** (0.0067)
Formal sector	-0.4*** (0.0032)	-0.428*** (0.017)	-0.54*** (0.0318)	-0.2*** (0.0049)
Age	0.00214*** (0.00011)	0.0053*** (0.00031)	0.0046*** (0.0005)	0.00194*** (0.00014)
Male	0.025*** (0.0022)	0.103*** (0.0072)	0.05*** (0.0098)	0.035*** (0.0028)
Years of education.	0.0076*** (0.0003)	0.0177*** (0.0021)	0.008*** (0.0024)	0.0067*** (0.00047)
Married	0.0347*** (0.0022)	0.0344*** (0.0082)	0.023** (0.011)	0.0021 (0.003)
ln(real earning)	-0.002 (0.0013)	-0.015*** (0.0053)	-0.0029 (0.0075)	0.01*** (0.0012)
Intercept	0.232*** (0.0086)	0.204*** (0.044)	0.503*** (0.0588)	-0.0052 (0.012)
Province fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Total Obs.	99,131	9,453	3,674	19,189

Note: The OLS regression is based on Labor Force Survey (LFS) 2000-2007 taken from the Post-Apartheid Labor Market Series (PALMS) 1994-2012. ***, **, and * denoting statistical significance at 1,5, and 10 percent level, respectively.

Using sample probability weights, Table 1.9 presents a falsification test using the year 2000 as the pre-policy period and the years 2001–2007 as the post-policy period, controlling for both province and time fixed effects.¹⁰ Analyses of large data sets may create potential econometric problems because the control groups might not entirely eliminate potential confounding factors, hence the reason for a falsification test. The falsification test is a claim distinct from what is being tested, and the goal is to determine if the positive and significant effect shown in the coefficient of interest is because of the tax reform and not

¹⁰Probability weights are another name for sampling weights. They are numbers assigned to each case in the data file normally used to make statistics computed from the data more representative of the population.

some existing trends. Here, the coefficient of interest (Tax reform*Formal sector) is negative and insignificant. The negative coefficient signifies that there was a trend reversed by the reform, which is expected. However, these estimates should be interpreted with care. A more appropriate falsification for the analysis should have a pre-policy period that is backdated beyond the year 2000 but due to data restriction, I could only test using a pre-policy period of 2000.

Table 1.9: Falsification test

Self-Employment	
Tax reform*Formal sector	-0.0118 (0.0077)
Tax reform	0.0135* (0.0081)
Formal sector	-0.374*** (0.0074)
Age	0.0024*** (0.0001)
Male	0.0345*** (0.0018)
Years of education	0.0079*** (0.0004)
Married	0.0324*** (0.0019)
ln(real earning)	-0.0022*** (0.0016)
White	0.133*** (0.003)
Black	0.031*** (0.00217)
Asian	0.08*** (0.0044)
Other	0.138*** (0.0284)
Intercept	0.145*** (0.0061)
Province fixed effect	Yes
Year fixed effect	Yes
Total Obs.	272,477

Note: The OLS regression is based on Labor Force Survey (LFS) 2000-2007 taken from the Post-Apartheid Labor Market Series (PALMS) 1994-2012. ***, **, and * denoting statistical significance at 1, 5, and 10 percent level, respectively.

Table 1.10 presents a linear regression model using the formal sector as the dependent variable and controlling for province and year fixed effects. The goal of this analysis is to determine if the tax reform has any effect on selection into and out of the formal sector. Since the paper investigates the effect of tax reform on self-employment, it is important to show that the tax reform does not create an incentive to make the self-employed move from the formal to the informal sector because if that is the case, the estimate for my analysis is biased. The tax reform estimate is approximately 0.5% and insignificant.

Table 1.10: Effect of tax reform on sector

Formal Sector	
Tax Reform	0.0049 (0.00316)
Age	-0.0046*** (0.00008)
Male	0.1113*** (0.0016)
Years of education	0.00177*** (0.00024)
Married	0.0134*** (0.00165)
ln(real earning)	0.2118 (0.00096)
White	-0.0942*** (0.004)
Black	-0.084*** (0.00284)
Asian	-0.0357*** (0.0058)
Other	-0.188*** (0.0372)
Intercept	-0.567*** (0.00723)
Province fixed effect	Yes
Year fixed effect	Yes
Total Obs.	272,477

Note: The OLS regression is based on Labor Force Survey (LFS) 2000-2007 taken from the Post-Apartheid Labor Market Series (PALMS) 1994-2012. ***, **, and * denoting statistical significance at 1, 5, and 10 percent level, respectively.

Previously, I argued that the capital gains tax component of the tax reform does not impact self-employment in the model because South Africa did not attract venture capital investments during the apartheid regime due to international sanction, and also because taxes on capital gains may create an artificial incentive to operate in the informal sector. Results from this analysis indicate that the tax policy did not encourage individuals to move from the formal to the informal sector which is very important for this study.

1.7 Concluding Remarks

Understanding why individuals choose to become self-employed and how public policies affect this choice is an important area of research in microeconomic and macroeconomic analyses. Implementing an optimal tax policy is often the mechanism by which the government attempts to influence the behavior of individuals and households. This paper examines the effects of the South African post-apartheid tax reform on the probability of an individual choosing self-employment. The results show that the tax reforms studied have had a consistent and significant effect on self-employment decisions. While there is some evidence of a positive and significant effect over the post implementation periods, the results are not sensitive to time-related factors. Other covariates, such as education, age, marital status, real earnings, and geographical location, are consistently important influences on the self-employment decision. Thus, changing marginal tax rates and broadening the tax base seem to be an effective policy tool for promoting self-employment in South Africa. The theory behind the study assumes that self-employment is driven by choice rather than necessity, so a possible extension of the study could be to explore if the decision to become an entrepreneur in a developing country like South Africa is mostly driven by choice or necessity. Another possible extension is to perform the analysis with panel data to see if we can arrive

at similar results and conclusions. Furthermore, it would be interesting to determine if the recent Davis Tax Committee recommendation has any effect on the probability of becoming self-employed in South Africa.¹¹

¹¹On 17 July 2013 the Minister of Finance announced the members of the Tax Review Committee (Davis Tax Committee) to come up with policy recommendation for tax reform in South Africa. This was necessary because of the changes experienced since the last tax commission recommendation (The Katz Commission). The changes to the system, arising from the recommendations, include the establishment of an independent tax and customs administration (the South African Revenue Service), the broadening of the tax base, and the lowering of marginal tax rates.

1.8 Appendix

From (1.6) I perform the following comparative statics to examine how the key control variables affect entrepreneurial effort ε :

$$\frac{\partial \varepsilon}{\partial \omega} = -\frac{1 - \tau_\omega}{\beta \sigma_s^2 (1 - \tau_s)^2} \quad (1.13)$$

All things being equal, we expect that an increase in wage would lead to a decrease in entrepreneurial effort.

$$\frac{\partial \varepsilon}{\partial \mu_s} = \frac{1}{\beta \sigma_s^2 (1 - \tau_s)} \quad (1.14)$$

All things being equal, we expect entrepreneurial effort to be positively correlated with the return on entrepreneurship.

$$\frac{\partial \varepsilon}{\partial \sigma_s} = \frac{2\omega(1 - \tau_\omega) - 2\mu_s(1 - \tau_s) + 2f_i}{\beta \sigma_s^2 (1 - \tau_s)^2} < 0 \quad (1.15)$$

$$\frac{2\mu_s(1 - \tau_s) - 2f_i}{\beta \sigma_s^2 (1 - \tau_s)^2} < \frac{2\omega(1 - \tau_\omega)}{\beta \sigma_s^2 (1 - \tau_s)^2} \quad (1.16)$$

Depending on the risk preference of the agent, it is expected that entrepreneurial effort is negatively correlated with the risk (standard deviation) of entrepreneurial entry. According to Bruce and Gurley-Calves (2008) in the relative risk framework, a change in the tax rate has two different effects. First, the higher relative rate reduces the returns to the entrepreneurial venture relative to wage-and-salary work, decreasing the likelihood of starting an entrepreneurial activity. Conversely, if loss offsets are allowed, an increase in the relative

tax rate compresses the post-tax distribution of returns from entrepreneurial activity and thus reduces the risk of entrepreneurial ventures.

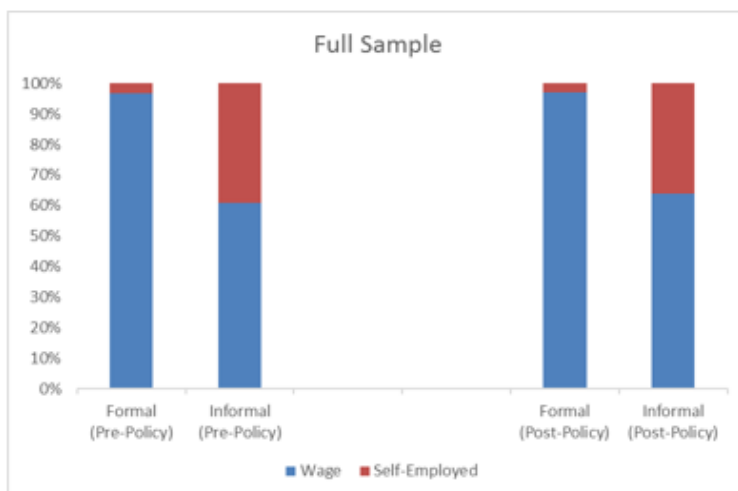


Figure 1.1: Summary Statistics (Full Sample)

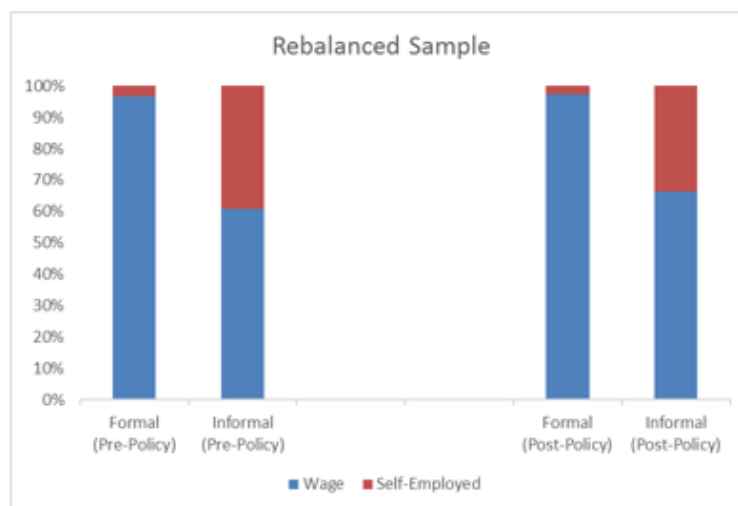


Figure 1.2: Summary Statistics (Rebalanced Sample)

CHAPTER 2

CORPORATE TAXES AND FDI IN DEVELOPING ECONOMIES

2.1 Introduction

When large companies build or purchase subsidiaries in foreign countries they become multinational corporations (MNCs); when these MNCs invest in these foreign subsidiaries it is classified as Foreign Direct Investment (FDI). Foreign investments consist of two broad categories: (i) “direct net transfers from the parent company to a foreign affiliate, either through equity or debt,” and (ii) “reinvested earnings by a foreign affiliate” (De Mooij & Ederveen, 2003, p.3). The decision to invest in a foreign country (also referred to as the host country) is usually very complex process and involves serious planning and strategic decision-making. Foreign investment is very crucial for economic growth of developing countries since they have low domestic savings and poor income levels to support the local economy. This means FDI inflow provides the capital to fill in the deficits between investment supply and demand. In addition, MNCs bring technological know-how and competence into the host country.

The determinants of FDI (both in developing and developed countries) have been analyzed extensively in the literature on international economics and economic development. At the same time, scholars in public finance have focused on the impact of corporate tax rates and other features of international tax policy such as bilateral tax treaties on the location of FDI (Azemar& Dharmapala, 2016). Countries can impose taxes on income generated within

their territory; however, countries differ widely in the tax rates they apply, their definition of the tax base, and the incentives they offer to attract investment (Slemrod, 1990). This means income earned by MNCs and their subsidiaries are also subject to host country's taxation. Hence, offering tax incentives or adjusting tax laws to attract FDI has become a global phenomenon, part of economic globalization, and a controversial political issue. Offering these incentives represents direct government intervention in the host country's domestic markets which has distributive consequences, such as, affecting the allocation of scarce resources and influencing government revenue (Li, 2006).

Multinational corporations have grown at a faster rate than most other international transactions in developing countries, hence it is very important to study FDI flows to the regions. Developing economies attempt to implement policies that create a conducive environment for MNCs to thrive. These policies are aimed to reduce FDI restrictions by liberalizing corporate taxation laws that limit foreign private capital to the host nation. It is known that FDI inflows are sensitive to corporate tax policy in developed economies, however, it is not very clear if these apply to developing economies as well. Studies on FDI in developing countries focus primarily on determinants of FDI other than taxes such as what non-fiscal factors drive FDI in developing countries and how FDI flows impact socio-economic development. To bridge this gap, I examine the impact of corporate taxes on FDI in developing host countries to determine if there is a similarity with developed host countries.

This paper focuses on the effects of corporate taxes on FDI in developing countries using a new corporate tax database drawn from different sources and including 65 developing economies from 1990–2015. The corporate tax database consists of the statutory corporate taxes rates from developing countries across different regions of the world, including Africa, Asia, Latin America, Caribbean and the Middle East.¹ Since the countries in my sample are

¹The corporate tax rates are gathered by searching for available data from the University of Michigan tax database, KPMG and PWC.

taken from different regions of the world, it may be misleading to suggest that the sensitivity of corporate taxes to FDI is consistent across developing economies in those region. To resolve this, I create regional dummies to test my hypothesis across the different regions. To identify these effects, I perform a pooled ordinary least square regression (OLS) with regional dummies to allow for cross-regional variation. Results from the cross-regional variation analysis indicate that FDI is sensitive to corporate taxation in Asia and the Caribbean, but not in Latin America, Africa, and the Middle East. The limitation of this approach is that pooled OLS combines all observations and runs the regression model ignoring heterogeneity or individual effects that may exist across nations. To correct this problem, I employ fixed effect and random effect regression models.² Results from a Hausman and the Breusch-Pagan test reveal that the fixed effect model is the most appropriate for my estimation.³ The results from the fixed effect model indicate that FDI is not sensitive to corporate taxes in developing economies, suggesting that FDI flows to developing economies may be largely driven by other factors like availability of natural resources, infrastructure, trade or government stability.

The paper is organized as follows: Section 2 is the literature review. Section 3 introduces the theoretical framework for the study. Section 4 presents the data and estimation techniques. Section 5 describes the results while Section 6 provides the conclusion.

2.2 Literature Review

Li (2006) examines how democracy, autocracy, and tax incentives can attract FDI by adopting a cross-national analysis approach. Using data from 52 developing countries, Li

²The fixed effect model, allows heterogeneity which may exist because of the different countries from different regions in my data set, hence each group mean does not vary over time (Time Invariant). The Random effect model also allows for heterogeneity across countries, however group mean vary over time.

³The Hausman test results shown in table 4 of the appendix indicates that the fixed effect regression model is the most appropriate model for my analysis. P-value = 0.

(2006) evaluates six types of tax system such as value added tax, corporate income tax, property tax, licensing fees, import duties, and sales tax. For each host country, each of the six types of tax system receives a value 0 and 1, based on the presence or absence of incentive in the country. Li (2006) measures the level of tax incentive in each host country by summing the values on the six types of incentives into an index that ranges from 0 to 6, where larger values indicate higher levels of incentives. The study also estimates the impact of several explanatory variables such as rule of law, democracy, autocracy, and FDI inflow on the tax incentive index. Findings from the study support the author's main theoretical expectation that host countries with better economic conditions provide better investment climate and higher returns for multinational corporations. These countries do not need to offer generous tax incentives to attract FDI inflows. Therefore, host countries that have weak property rights and low policy credibility tend to offer generous tax incentives to attract foreign capital. Furthermore, Li (2006) implies that FDI threatens rival host firms and brings inequality and unfair competition, consequently, tax incentive policies have distributive effects on the host country and these effects intensify the conflict between the winners and losers caused by FDI inflows in the host economy. Li (2006) suggests that investment location decisions are also influenced by some characteristics inherent in the host country, such as endowment of natural resources and labor, the level of economic development, and socio-political conditions.

Eshghi and Eshghi (2016) investigate the impact of corporate tax rate on FDI inflows from Germany on five Central and Eastern European countries (Bulgaria, Czech Republic, Hungary, Poland, and Romania) from 2000–2012. These countries are selected because the level and growth of FDI vary widely among them.⁴ To analyze the impact of taxes on FDI, the authors perform a standard multivariate linear regression model. Regression coefficients are estimated with ordinary least squares and standard errors are calculated using standard

⁴While Czech Republic, Hungary and Poland have attracted substantial foreign capital, Bulgaria and Romania lags behind, making the selected countries good balance to test corporate taxes as a determinant of FDI in the region

asymptotic approximations. They use a forward-looking statutory tax rate to measure the tax burden and find that corporate tax rate has a significant negative impact on FDI inflows in Central and Eastern European countries. This finding is in contrast with findings from previous research where backward-looking tax rates extracted from corporate balance sheets are used as a measure of the tax burden to show that corporate tax rate has no impact on FDI inflow.

Benassy-Quere et al. (2005) use panel data of bilateral FDI flows (inflow and outflows within these countries) among 11 OECD countries from 1984–2000 to show that although agglomerating factors are strong determinants of FDI, tax differentials also play a major role in FDI decisions. The study also investigates non-linearities in the impact of these tax differentials and explores the impact of tax schemes in the host countries. The study employs gravity model, which models the bilateral trade of two countries by their respective size and the distance between them, to examine the impact of tax policies on FDI. The study estimates the impact of taxation on FDI controlling for foreign affiliate, the size of host domestic market and concentration of host domestic demand around the main productive center. The main decision variable is market potential associated with each possible investment location. Findings from the study suggest that a high corporate tax rate discourages FDI inflows after controlling for gravity factors and the provision of public goods in the host country. Further analysis of these results imply that there is an asymmetry in the impact of tax differentials on FDI. Also lowering tax rates does not significantly attract FDI, however, higher taxes tend to discourage FDI inflow in the host country. Furthermore, the impact of positive tax differentials is not homogenous in the base country, which means narrow tax differentials may not necessarily discourage FDI inflows. Finally, the policy implication from the study suggests that even though tax differentials do matter for FDI inflows, it should not lead to zero taxation on MNCs. This is because market potentials and public investments also play a significant role in determining FDI inflows.

Desai et al. (2004) evaluates the effect of multiple taxes in the host nation on FDI activities by American multinational firms and compares the effect of corporate income taxes to the effect of indirect taxes. The purpose of this comparison is to measure the extent to which FDI and rates of indirect taxes are associated as well as to see if failure to account for indirect taxes explain previous claims of a negative association between corporate taxes and FDI. Using affiliate-level data and controlling for parent company and affiliate industry effects, the study suggests that American affiliates located in countries with 10% higher indirect tax rates have 7.1% fewer assets and those in countries with 10% higher corporate tax rates have 6.6% fewer assets. The effects on affiliate output is similar to American affiliates located in countries with 10% higher indirect tax rates that have 2.9% fewer output and also similar to those in countries with 10% higher corporate tax rates that have 1.9% fewer output. This means high corporate income tax rates depress capital or labor ratios and profit rates of foreign affiliates more than indirect taxes.

Blonigen and Davis (2004) estimate the impact of bilateral tax treaties using both U.S. inbound and U.S. outbound FDI over the period 1980–1999. The study presents the first estimates of the effects of bilateral treaties governing the taxation of FDI activities. The authors adopt an estimate based on an empirical model of multinational enterprise activity provided by Carr, Markusen, and Maskus (CMM).⁵ The study makes modifications to the CMM framework to improve data specifications and finds little evidence that bilateral tax treaties increase FDI activity. While there is some heterogeneity in individual country experiences, the study generally finds that the average new treaty effect is not statistically different from zero with a very small point estimate. This is true for U.S. indound and outbound FDI which is in opposition to statements by the OECD that suggest these agreements are meant to increase the efficiency of world capital flows. Results suggest either that

⁵Carr, Markusen and Maskus (CMM, 2001) and Markusen and Maskus (2001, 2002) establish and test an empirical specification of FDI and MNE activities. The CMM specification is based on the Markusens (2002) knowledge-capital MNE model which allows for both the horizontal and vertical motivations for FDI.

the provisions of a treaty have no effect or that the positive and negative aspects of treaty formation largely cancel one another. Results are robust to a wide variety of alternative specifications.

Hines (2000) examines tax sparing and FDI in Japan and the United States.⁶ The study compares Japan that has several tax sparing agreements with the U.S. that does not have any existing tax sparing agreement to examine if tax sparing has a significant effect on the location of outbound FDI. This is expected because most high-income capital-exporting countries, including Japan, that provide tax sparing for foreign investments will be more likely than the U.S. firms to concentrate their outbound FDI in countries where they have these agreements. Japanese firms are taxed at lower rates than the U.S. firms in countries with which Japan has tax sparing agreements. Using the difference between host-country tax rates facing Japanese and U.S. firms as the dependent variable, $\ln(\text{GDP})$, and tax sparing as explanatory variables, results indicate that Japanese FDI shares are approximately 1.7% higher in countries with which Japan has tax sparing agreements. Since Japan does not grant tax sparing on a random basis, there exists the possibility of correlation between FDI and tax sparing. To control for this problem, Hines (2000) uses tax sparing agreements of the United Kingdom, with other developing economies, as an instrument for Japanese tax sparing agreements to show that the estimates are robust. Hines (2000) suggests that it is also necessary to evaluate not only the likely effects of tax sparing on levels of FDI and the policies of host governments, but also the effects of tax sparing on tax compliance and tax complexity; its impact on ongoing treaty negotiations; the effect of outbound FDI on domestic economic performance; and the desirability of enacting major tax provisions through treaties rather than tax legislation.

⁶Tax sparing is the practice by which capital-exporting countries amend their taxation of foreign source income to allow firms to retain the advantages of tax reductions provided by host countries. Specifically, tax sparing often takes the form of allowing firms to claim foreign tax credits against home-country tax liabilities for taxes that would have been paid to foreign governments, in the absence of special abatements, on income from investments in certain developing countries.

De Mooij and Ederveen (2003) review the empirical literature on the impact of host country corporate taxes on the allocation of FDI in the European Union (EU). The study compares outcomes from 25 empirical studies by computing the tax rate elasticity under a uniform definition. The study finds a median tax rate elasticity of foreign capital of about -3.3% (i.e. a 1%-point reduction in the host-country tax rate raises foreign direct investment in that country by 3.3%). There exists substantial variation across studies; however, by performing a meta-analysis, the paper explains this variation by the differences in characteristics of the various studies. Meta-analysis refers to the statistical analysis of results from individual studies and is interesting for the following reasons. First, compared to an ordinary survey, meta-analysis more systematically compares the results of past studies. Second, using meta-analysis, one can assess the importance of choices by researchers for their quantitative results. For instance, the study explores whether there is a systematic impact on the type of tax rate, the type of foreign capital data, control variables and specifications or estimation procedures, on the magnitude of the elasticities that are reported. A third contribution is that meta-analysis itself yields interesting insights for policy makers. For instance, the study explores whether tax elasticities are systematically influenced by the sample period of the underlying data, the source of finance of foreign investments, and whether the investor is in a tax-exempt country or a tax credit country.⁷ Systematic differences between studies are found with respect to the type of foreign capital data used, and the type of tax rates adopted. For instance, studies using data on the number of foreign locations yield systematically lower elasticities, in absolute terms, than those using data on foreign capital. Also, studies using

⁷The return to foreign direct investment may be subject to international double taxation. A foreign subsidiary is always subject to corporate income tax in the host country. These profits of the subsidiary can be taxed again under the corporate income tax in the home country of the parent. As this international double taxation would strongly discourage international business activity, most countries avoid it by means of bilateral tax treaties based on the OECD Model Tax Convention. In the EU, the Parent-Subsidiary Directive ensures that countries either adopt a tax credit system or exempt system to avoid international double taxation within the Union. The US and Japan adopt tax credit systems. In the EU, this holds for Greece, Italy and the UK. All other EU countries adopt the tax-exempt system.

data on mergers and acquisitions (as compared to aggregate FDI data) report smaller elasticities, while those using data on new plants and plant expansions yield higher elasticities. Furthermore, the choice of tax rate matters for the semi-elasticity. In particular, FDI seems more responsive to effective or average tax rates than to statutory tax rates. Additionally, they do not find support for the claim that investments from tax credit countries are less responsive to taxes than investments from tax-exempt countries.

Azemar and Dharmapala (2016) use panel data on bilateral FDI stocks from 23 OECD countries into 113 developing countries to examine the impact of tax sparing provisions from 2002–2012. The dataset is measured at the country-pair-year level, and the baseline sample includes 8,189 observations for 1,103 country-pairs. They code tax sparing agreements by searching the text of all existing bilateral tax treaties between any of the 23 base countries and any of the 113 host countries.⁸ The paper examines both the impact of tax sparing agreements and that of the base country tax system, using two sources of identification. The first is the longitudinal variation generated by the signing or termination of tax sparing agreements, and the second is based on tax reforms in some of the host countries that moved them from worldwide to territorial tax system.⁹ Results from the study indicate that tax sparing agreements are associated with 30% to 123% higher FDI; this effect does not differ across worldwide and territorial base countries. Much of the effect of tax sparing is attributable to its impact on credit for withholding tax on interest and royalties. Furthermore, the study adds extensive sets of leads and lags for the tax sparing variable to analyze the dynamic pattern of the effects. The study finds that there is no anticipation of the tax

⁸In their dataset, some observations are zeros (indicating the absence of any FDI from the residence to the source country in that year). To address the econometric problems that arise from a large number of zeros, they use a Poisson pseudo-maximum likelihood (PML) fixed effects specification (with country-pair fixed effects and year effects). The results are broadly similar when using an OLS fixed effects specification.

⁹A territorial tax system exempts dividend paid by foreign subsidiaries to their parent country hence, profits made by domestic enterprises operating abroad are not subject to the base country corporation tax, even if dividends are repatriated to the parent company. Under the worldwide tax system, taxes are levied on the worldwide income of resident corporation. To avoid double taxation of foreign income, investors can claim foreign tax credit for taxes paid in the host country, up to the base country statutory tax rate.

sparing agreement as the estimated effect is concentrated in the year that the agreement takes effect and to a lesser extent subsequent years. In addition, they adopt an instrumental variable (IV) strategy using the average number of tax sparing agreements signed between the base country and countries that are in the same region as the host country. The IV analysis is also consistent and robust, suggesting that tax sparing is an important determinant of FDI for MNCs from worldwide and territorial host countries.

2.3 Theoretical Framework

Tax incentives encourage FDI if MNCs receive special abatements from host countries, which may come in the form of corporate tax breaks, bilateral tax treaties, and tax sparing. Host country governments are more likely to offer these incentives, and MNCs are more likely to accept, if these incentives are not offset by taxes paid in the home country. To provide a theoretical foundation for my empirical analysis I rely on the work of Hines (2000).

Consider the behavior of a government in the host country that maximizes utility defined as:

$$U = B(I) + \tau\Pi(I, G) - cG \quad (2.1)$$

Where I denotes the level of inbound FDI and $\Pi(I, G)$ denotes profitability of the investment (taxes are levied on corporate profits and not FDI inflow). Foreign Investment to the host country is taxed at a rate τ , hence, $\Pi(I, G)$ is tax revenue from FDI in the host country, $B(I)$ denotes global benefits of FDI to the host country, such as positive externalities, while G is the level of government expenditure on infrastructure and institutions to enhance the host country's attractiveness to foreign investors (I assume G is exogenously determined and constant) and c is the per unit cost of providing such services.

The level of FDI is a function of tax rate τ and the level of government spending G , so investment can be rewritten as a function of taxes (host country taxes) and government expenditure $I(\tau, G)$. Similarly, tax revenue is a function of corporate profits, FDI and government expenditure. Hence, equation (3.3) can be rewritten as:

$$U = B[I(\tau, G)] + \tau\Pi[I(\tau, G), G] - cG \quad (2.2)$$

Differentiating (2.2) with respect to τ yields:

$$U = B'(I)\frac{\partial I}{\partial \tau} + \Pi[I(\tau, G), G] + \tau\frac{\partial \Pi(I, G)}{\partial I}\frac{\partial I}{\partial \tau} \quad (2.3)$$

Simplifying equation (2.3) and solving for $\frac{\partial I}{\partial \tau}$ yields:

$$\frac{\partial I}{\partial \tau} = -\frac{\Pi(I, G)}{B'(I) + \tau\frac{\partial \Pi(I, G)}{\partial I}} \quad (2.4)$$

I expect the marginal benefits from FDI $B'(I)$ to be non-negative and $\Pi(I, G)$ to be positive. Therefore, the sign of $\frac{\partial I}{\partial \tau}$ depends solely on the sign of $\frac{\partial \Pi(I, G)}{\partial I}$. If FDI increases profit, we would expect $\frac{\partial I}{\partial \tau}$ to be negative. Furthermore, if $\frac{\partial \Pi(I, G)}{\partial I}$ is negative and $B'(I)$ is sufficiently large then, $\frac{\partial I}{\partial \tau}$ is also negative, which may be the case in most developing economies. Hence, I expect an increase in corporate taxes to have a negative effect on the profitability of FDI, which means an increase in corporate taxes will lead to a decrease in FDI inflow to the host country. This analysis aligns with the work of Davies (2004), who uses a simple model of double taxation to show that corporate taxes in the home and host countries have a negative impact on FDI.

It is also important to note that if the global marginal benefit ($B'(I)$) or marginal profitability from FDI is extremely large, as we might expect in developing countries, it is

possible to observe $\frac{\partial I}{\partial \tau}$ approaching zero. This result alligns with my empirical random and fixed effects model for the full sample (Table 2.3).

2.4 Data and Estimation

2.4.1 Empirical Strategy

This study examines if FDI is sensitive to corporate taxation in developing host economies. To identify this effect, I perform a pooled ordinary least square regression (OLS), then adopt random and fixed effects regression models. Furthermore, I employ a Hausman and Breusch-Pagan test to examine the effectiveness of my estimation techniques and to determine the most appropriate estimation model. It is well documented that taxes can influence FDI; however, in the unlikely case that FDI affect taxes, endogeneity problem may exist in the model. To correct for potential endogeneity, I include the lead of $\ln(\text{FDI})$ as a response variable in my estimation. The estimate for the regression takes the following form:

$$\ln(FDI_{it}) = \beta_0 + \beta_1 T_{it} + \beta_2 X_{it} + \beta_3 \delta_{it} + \varepsilon_{it} \quad (2.5)$$

Where FDI_{it} is FDI inflow into country i at year t , T_{it} represents statutory corporate tax rate in country i at year t , X_{it} is a vector of control variables which includes market size of the host country, interest rate, inflation rate, exchange rate, and a measure infrastructure, while δ_{it} represent country fixed effects and ε_{it} represents the error term.

2.4.2 Description of the Data

To examine the effect of corporate taxes on FDI inflow in developing economies, I use panel data from 1990–2015 for 65 developing countries. The data on corporate taxes is drawn from the University of Michigan corporate tax database, KPMG and PricewaterhouseCoopers (PWC) tax database. The data for other control variables are drawn from the World Bank development indicators database.

The other factors that can affect the level of FDI inflow into a host country that I control for include market size as measured by GDP per capita, infrastructure, interest rate, exchange rate and inflation. FDI moves to countries with large and expanding markets, where firms can potentially receive high returns on investment. Since my sample is comprised of developing countries, availability of natural resources can also play an important role, which means MNCs invest in host countries with available natural resources and exports to other markets, I include exports as a percentage of GDP to test this effect. I use phone line per 100 people as a measure for infrastructure development in the host country, which is consistent with previous studies. Modern infrastructure aids productivity and stimulates FDI flow to the host nation. Other factors that may influence FDI flows are exchange rate, interest rate, and inflation.

Table 2.1 provides the summary statistics of the variables used in the study. About 40% of the countries in the sample are from Africa, 12% from Asia, 18% from Latin America, 14% from the Caribbean, and 14% from the Middle East. The average phone line per 100 people is 9%. Average exports as a percentage of GDP is about 39%, corporate taxes averaged at 31%, while interest rate and inflation averaged at 10% and 37% respectively.

Table 2.1: Summary Statistics

	Mean	Std Dev	Total obs.	Min	Max
Log(FDI)	19.93	2.17	1,101	9.21	25.34
Log (GDP Per Capita)	7.506	1.33	1,101	4.631	11.391
Corporate Taxes	0.31	0.08	1,101	0.025	0.58
Export (% of GDP)	38.801	28.77	1,101	6.42	231.19
Inflation	36.96	9.57	1,101	0.0167	101.97
Interest rate	10.013	11.607	1,101	0.14	170.54
Phone line per 100	8.79	9.53	1,101	0	49.67
Log (Exchange rate)	2.73	2.65	1,101	0.85	9.18
Africa Dummy	0.39	0.49	1,101	0	1
Asia Dummy	0.12	0.33	1,101	0	1
Latin America	0.18	0.39	1,101	0	1
Caribbean	0.14	0.34	1,101	0	1
Middle East	0.14	0.34	1,101	0	1

2.5 Results

The pooled OLS estimates with regional dummies shown in Table 2.2 indicates that corporate taxes has a negative and significant effect on the $\ln(\text{FDI})$ and the interaction terms between corporate taxes and regional dummies vary across regions. It is important that we interpret these results with caution, because the pooled OLS does not consider heterogeneity or country fixed effects that may exist in the data. According to Nicodeme (2001) corporate taxes maybe cyclical, which means apparent changes in tax rates could be endogenous to FDI inflow. To control for potential endogeneity in the model, I introduce the lead value of $\ln(\text{FDI})$ as a dependent variable.

Table 2.2: Pooled OLS (Full Sample)

Control Variable	ln(FDI)	ln(FDI)	ln(FDI)	ln(FDI)	Lead ln(FDI)	Lead ln(FDI)	Lead ln(FDI)	Lead ln(FDI)
Corporate Taxes	-3.180*** (0.658)	4.383 (3.642)	0.325 (4.265)	3.914 (3.818)	-3.629*** (0.652)	4.491 (3.564)	0.782 (4.169)	3.431 (3.771)
Africa*Taxes		-7.166 (3.856)	-3.02 (4.442)	-3.205 (3.965)		-9.17* (3.769)	-5.393 (4.338)	-4.738 (3.916)
Asia*Taxes		-11.73** (4.139)	-7.343 (4.677)	-10.46* (4.184)		-10.82** (4.052)	-6.794 (4.572)	-9.445* (4.134)
L.America*Taxes		-6.909 (3.9)	-3.224 (4.487)	-4.802 (4.011)		-6.55 (3.824)	-3.235 (4.393)	-4.082 (3.966)
Caribbean*Taxes		-12.20** (4.386)	-3.904 (5.004)	-6.065 (4.479)		-11.38** (4.294)	-3.532 (4.899)	-5.28 (4.434)
M.East*Taxes		-6.541 (3.817)	-2.552 (4.426)	-3.313 (3.952)		-7.264 (3.745)	-3.634 (4.338)	-3.623 (3.916)
Log (GDP per capita)	0.369*** (0.0488)	0.377*** (0.0496)	0.353*** (0.0514)	0.0874 (0.0485)	0.326*** (0.0482)	0.332*** (0.049)	0.303*** (0.0508)	0.0666 (0.0483)
Export (% of GDP)	0.00484* (0.00233)	0.005** (0.0023)	-0.0417 (0.0282)	-0.0114 (0.0251)	0.00497* (0.00230)	0.0053* (0.0023)	-0.0365 (0.0273)	-0.0133 (0.0246)
Exchange rate	-0.000265*** (0.000051)	-0.0003*** (0.00005)	0.0003*** (0.00005)	0.0003*** (0.00005)	-0.000291*** (0.00005)	-0.0003*** (0.00005)	-0.0003*** (0.00005)	-0.0003*** (0.00005)
Inflation	0.0000672 (0.000068)	0.0007 (0.0006)	0.0007 (0.0006)	0.0007 (0.0006)	0.0000624 (0.000066)	0.0007 (0.0006)	0.0006 (0.0007)	0.0007 (0.0006)
Interest Rate	-0.000215 (0.000157)	-0.000194 (0.00016)	-0.000248 (0.000161)	0.00005 (0.000146)	-0.000196 (0.000153)	-0.00014 (0.000158)	-0.0002* (0.00016)	0.00008 (0.00014)
Phone line	0.0799*** (0.00635)	0.0805*** (0.00639)	0.084*** (0.00638)	0.0657*** (0.0058)	0.0765*** (0.00625)	0.0764*** (0.0063)	0.0802*** (0.00628)	0.0625*** (0.0058)
Africa	1.602*** (0.352)	4.048** (1.349)	0.248 (2.53)	1.463 (2.258)	1.568*** (0.348)	4.69*** (1.325)	1.179 (2.48)	1.824 (2.238)
Asia	3.083*** (0.375)	6.732*** (1.392)	2.614 (2.552)	5.236* (2.285)	3.027*** (0.370)	6.45*** (1.368)	2.628 (2.501)	4.779* (2.263)
Latin America	3.278*** (0.358)	5.650*** (1.355)	2.502 (2.548)	4.785* (2.278)	3.247*** (0.355)	5.541*** (1.333)	2.744 (2.5)	4.462* (2.258)
Caribbean	0.948* (0.368)	4.935*** (1.484)	-1.814 (2.682)	0.988 (2.401)	0.917* (0.364)	4.69** (1.459)	-1.672 (2.633)	0.598 (2.383)
Middle East	1.806*** (0.372)	4.053** (1.336)	0.284 (2.53)	1.679 (2.259)	1.790*** (0.369)	4.286** (1.318)	0.853 (2.485)	1.736 (2.243)
Africa*Export (% GDP)			0.0472 (0.0284)	0.0164 (0.0253)			0.0433 (0.0275)	0.0193 (0.0248)
Asia* Export (%GDP)			0.0528 (0.0284)	0.0149 (0.0253)			0.0497 (0.0275)	0.0185 (0.02480)
L.America* Export(%GDP)			0.031 (0.0289)	-0.01 (0.0258)			0.0253 (0.0281)	-0.00832 (0.0253)
Caribbean*Export(%GDP)			0.108*** (0.0306)	0.049 (0.0274)			0.101*** (0.0298)	0.0518 (0.0269)
M.East*Export(%GDP)			0.0467 (0.0281)	0.021 (0.025)			0.0417 (0.0272)	0.022 (0.0245)
Constant	15.44*** (0.593)	12.80*** (1.363)	16.70*** (2.502)	14.77*** (2.502)	16.09*** (0.584)	13.25** (1.339)	16.88*** (2.451)	15.30*** (2.231)
Effects	Regional	Regional	Regional	Regional/Year	Regional	Regional	Regional	Regional/Year
Total Obs.	1101	1,101	1,101	1101	1072	1072	1072	1072
R-Squared	0.406	0.414	0.432	0.567	0.411	0.418	0.436	0.56

Note: The standard errors in brackets. ***, **, and * denoting statistical significance at 1, 5, and 10 percent level, respectively.

Column(1) shows the pooled OLS regression with regional effects excluding the interaction effects. Column (2) reports coefficients of the OLS regression with interaction terms between regions and corporate taxes. Results show that the interaction coefficient (Africa*Taxes) is negative and insignificant, which may be because the flow of FDI to the African continent may not be driven primarily by taxes but by other factors. The coefficient (Asia*Taxes) is negative and significant, which is expected because Asia has a more developed market and can attract FDI inflows by corporate tax reform and other incentives such as tax sparing and bilateral tax treaties. The Latin American dummy produces a positive and significant effect, while the coefficient (L.America*Taxes) is negative and insignificant. The Caribbean dummy and coefficient (Caribbean*Taxes) show negative and significant effects. Similarly, the Middle East dummy shows a positive and insignificant effect while the interaction term (Middle East*Taxes) shows a negative and insignificant effect.

The coefficient capturing market size of the host country, $\ln(\text{GDP per capita})$, is positive and significant at a 1% significance level, which is expected because market size plays an important role in determining FDI inflow. The coefficient that captures infrastructure (Phone lines per 100) has a positive and significant effect on FDI, which is also expected because previous studies show a positive and significant effect of infrastructure on FDI flow. Exchange rate is negative and significant while interest rate and inflation are insignificant. Export as a percentage of GDP is also positive and significant.

Column (5) introduces controls for potential endogeneity, here I use the lead value of $\ln(\text{FDI})$ as the dependent variable against the same covariates. Coefficients are similar to column (1) and (2) above, the signs and significance level remain the same.

In determining the effect of corporate taxes on FDI, it is useful to distinguish between two types of FDI: market seeking and non-market seeking. The main objective of market-seeking FDI is to serve domestic markets, here goods are produced in the host country and sold in the local market, making this type of FDI largely driven by domestic demand

such as large markets and high income, suggesting that FDI in small and poor countries are less likely to be market seeking (Asiedu, 2002). For non-market seeking FDI, goods are produced in the host country but sold abroad, hence demand factors in the host country are less relevant. To capture this effect, I introduce an interaction between the regions and Exports variables as a percentage of GDP. Column (3) introduces these interactions and results show that FDI inflow to the Caribbean is non-market seeking, as explained by the positive and significant estimate of Caribbean* Export (% of GDP), while other regions have positive and insignificant effects. Column (4) introduces year fixed effects to the estimation. The estimates are similar to column (3) above, however our coefficient Caribbean*Export (% of GDP) is positive and insignificant.

Column (7) controls for potential endogeneity, using the lead value of $\ln(\text{FDI})$ as the dependent value while Column (8) introduces year fixed effects. Results are similar to column (3) and (4) respectively. A limitation of the pooled OLS estimation technique is that it does not consider heterogeneity or country fixed effects that may exist in the data. To correct this problem, I introduce the random and fixed effect model estimation technique. In the random effect model countries have a common mean value for the intercept, while the fixed effect model allows for heterogeneity among various countries.

Table 2.3: Random and Fixed Effect Regression (Full Sample)

Control Variables	Log(FDI)	Lead ln(FDI)	Lead ln(FDI)	ln(FDI)	Lead ln(FDI)	Lead ln(FDI)
Corporate Taxes	-0.55 (0.565)	-0.843 (0.556)	0.326 (0.504)	-0.0666 (0.556)	-0.256 (0.548)	0.508 (0.498)
Log (GDP PCapita)	1.232*** (0.0819)	1.137*** (0.0816)	0.13 (0.11)	1.595*** (0.0926)	1.484*** (0.0925)	0.11 (0.16)
Export (% of GDP)	0.0036 (0.0819)	0.0043 (0.0035)	-0.01** (0.0034)	0.009* (0.0034)	0.0094* (0.0039)	-0.017*** (0.0039)
Exchange rate	0.0003*** (0.00007)	0.0003*** (0.00007)	0.0002** (0.00006)	0.0003*** (0.00007)	0.0003*** (0.00007)	0.0002*** (0.00006)
Inflation	-0.00011* (0.00005)	-0.0011* (0.00005)	-0.00008 (0.00005)	-0.0001* (0.00005)	-0.00013* (0.00005)	-0.00011* (0.00005)
Interest Rate	-0.0002 (0.0001)	-0.0002 (0.0001)	-0.0002 (0.0001)	-0.00014 (0.0001)	-0.00014 (0.0001)	-0.0001 (0.0001)
Phone line	0.064*** (0.0103)	0.0648*** (0.0101)	0.047*** (0.0102)	-0.0349** (0.0103)	0.0375** (0.0115)	-0.033** (0.0103)
Intercept	10.03*** (0.674)	10.95*** (0.666)	17.26*** (0.86)	7.320*** (0.725)	8.364*** (0.718)	19.39*** (1.187)
Effects	Random	Random	Random	Ctry-Fixed	Ctry-Fixed	Ctry-Fixed
			Year			Year
Total Obs.	1101	1,072	1,072	1,101	1,072	1,072
R-Squared	0.343	0.33	0.488	0.352	0.34	0.494

Note: The standard errors are in parenthesis. ***, **, and * denoting statistical significance at 1,5, and 10 percent level, respectively.

Table 2.3 presents estimates for the random and fixed effect models. Columns (1) and (2) present the random effect model using log (FDI) and the lead value of ln(FDI) as the dependent variables, respectively, while column (3) introduces time fixed effects. Similarly, columns (4) and (5) present estimates for the fixed effect model using the ln(FDI) and the lead value of ln(FDI) as the dependent variable, while column (6) introduces time fixed effects. Estimates from column (1) indicate that corporate taxes have a negative and insignificant effect on FDI. This result is not consistent with Eshghi and Eshghi (2016), who investigate the impact of corporate taxes on FDI inflow from Germany to five central and eastern European countries. Eshghi and Eshghi (2016) finds that corporate taxes have a negative and significant effect on FDI inflow. Size of the market (GDP per capita) and infrastructure

(Phone line per 100 people) have positive and significant impacts on FDI, which is expected and consistent with previous studies. Exchange rate has a positive and significant effect on FDI, interest rate has a negative and insignificant effect on FDI, and inflation has a negative effect and is significant at a 10% significance level.

Column (2) introduces the lead value of $\ln(\text{FDI})$ as the dependent variable to control for potential endogeneity of the random effect model. Estimates from Column (2) are consistent with that of Column (1); however, introducing time fixed effects in column (3) results in a sign reversal for the coefficient of corporate taxes, which becomes positive and insignificant. Similarly, $\log(\text{GDP per capita})$ remains positive but insignificant. Estimates in Columns (1) and (2) reveal a negative and insignificant effect of corporate taxes on FDI. This means FDI is not sensitive to corporate taxes in developing economies when I employ a random effect model.

Column (4) introduces country fixed effects using $\ln(\text{FDI})$ as the dependent variable and estimates reveal that corporate tax rates have negative and insignificant effect on FDI inflows. Size of the market (GDP) and infrastructure (Phone line per 100 people) and exchange rate remain positive and significant.

Column (5) uses the lead value of $\ln(\text{FDI})$ as the dependent variable and Column (6) introduces time fixed effects. Estimates remain consistent, however, in Column (6) the size of the market (GDP per capita) is positive yet insignificant, while the effects of exchange rate and infrastructure (Phone line per 100 people) remain positive and significant. Estimates here also reveal that FDI is not sensitive to corporate taxes in developing economies with the introduction of a fixed effect model.

Table 2.4 presents estimates from the random effect regression model by region with year fixed effects. Column (1) reports results from Africa using the lead $\ln(\text{FDI})$ as a response variable, and estimates indicate a negative and insignificant effect of corporate taxes on FDI inflow. Similarly, Asia shows a negative and significant impact of corporate taxes on FDI

while Latin America and the Caribbean show negative and significant effects at 10%. The Middle East show a positive and significant effect at 10%.

Table 2.4: Random Effect Regression by Region with Year Fixed Effects

Control Variables	Lead ln(FDI)	Lead ln(FDI)	Lead ln(FDI)	Lead ln(FDI)	Lead ln(FDI)
Corporate Taxes	-0.891 (1.345)	-8.661*** (1.602)	-2.216* (1.072)	-4.686* (2.016)	2.648* (0.818)
Log (GDP PCapita)	-0.115 (0.0977)	0.367*** (0.108)	-0.606*** (0.127)	0.151 (0.112)	0.385*** (0.115)
Export (% of GDP)	0.0083 (0.0058)	-0.0023 (0.0069)	-0.0204** (0.0067)	0.0393*** (0.0099)	0.0033 (0.0028)
Exchange rate	-0.0008*** (0.00013)	0.0004*** (0.0001)	-0.00001 (0.0001)	0.0014* (0.0007)	0.0001 (0.00006)
Inflation	-0.0003* (0.00009)	-0.0085 (0.0064)	0.00046 (0.00065)	0.0053 (0.00956)	0.0001 (0.0099)
Interest Rate	-0.0193** (0.0001)	0.0261 (0.0196)	-0.0001 (0.00025)	-0.0403** (0.015)	-0.0605** (0.0194)
Phone line	-0.0246 (0.0103)	0.0801*** (0.0077)	0.198*** (0.0176)	0.0634*** (0.0124)	0.0792*** (0.0115)
Intercept	17.84*** (0.911)	19.18*** (0.917)	24.61*** (1.149)	18.48*** (1.508)	13.53*** (1.116)
Effects	Year	Year	Year	Year	Year
Region	Africa	Asia	L.America	Caribbean	Middle East
Total Obs.	354	145	209	158	178
R-Squared	0.46	0.48	0.3	0.6	0.76

Note: The standard errors are in parenthesis. ***, **, and * denoting statistical significance at 1, 5, and 10 percent level, respectively.

Table 2.5 reports estimates for the fixed effects model by region with year fixed effects. Corporate taxes have an insignificant effect in every region except for Latin America. Estimates reveal that FDI is sensitive to corporate taxes in Latin America, as shown by the positive and significant effect in Column (3). A possible reason for this result is the strong government institutions available in the Latin American countries. This result is consistent with Li (2006), who concludes that countries with strong rule of law do not need to offer tax incentives to attract FDI inflow. Other variables have the expected signs; however, the significance level differs across regions.

Table 2.5: Fixed Effect Regression by Region with Year Fixed Effects

Control Variables	Lead ln(FDI)	Lead ln(FDI)	Lead ln(FDI)	Lead ln(FDI)	Lead ln(FDI)
Corporate Taxes	0.0797 (1.289)	-1.586 (1.594)	2.679*** (0.642)	-1.048 (1.433)	1.086 (0.906)
Log (GDP PCapita)	0.24 (0.347)	0.0908 (0.705)	0.406 (0.228)	0.0261 (0.305)	0.329 (0.371)
Export (% of GDP)	0.0214 (0.0124)	-0.0273*** (0.0071)	-0.0051 (0.00785)	-0.0115 (0.0126)	-0.0018 (0.0073)
Exchange rate	0.0007*** (0.00021)	0.00001 (0.00045)	-0.0001 (0.0001)	0.0005 (0.0011)	0.00017* (0.00008)
Inflation	-0.0003* (0.00009)	-0.00005 (0.005)	0.00015 (0.00034)	-0.0058 (0.0061)	0.0106 (0.00939)
Interest Rate	-0.0093 (0.006)	0.00024 (0.0154)	-0.00024 (0.00013)	-0.0318** (0.0113)	-0.0592** (0.02)
Phone line	-0.0256 (0.0311)	-0.076 (0.0505)	-0.0408 (0.022)	-0.012 (0.0247)	-0.0079 (0.0201)
Intercept	14.63*** (2.584)	20.43*** (4.921)	17.13*** (1.748)	18.93*** (2.314)	15.26*** (2.89)
Effects	Year	Year	Year	Year	Year
Region	Africa	Asia	L.America	Caribbean	Middle East
Total Obs.	354	145	209	158	178
R-Squared	0.552	0.624	0.625	0.71	0.79

Note: The standard errors are in parenthesis. ***, **, and * denoting statistical significance at 1,5, and 10 percent level, respectively.

I perform a Hausman test to determine if the fixed or random effect panel regression is the most appropriate estimation technique for this analysis. Estimates of the Hausman test reveal that the fixed effect regression model is the most appropriate estimation for the model (refer to Table 2.6 in the appendix, p-value =0). The fixed effect regression indicates that FDI is not sensitive to corporate taxes in developing economies with the exception of the Latin American region. The negative and insignificant results of the fixed effects model for the full sample in Table 2.3 might be as a result of very large marginal effects with regards to the marginal benefits associated with FDI or profitability.

2.6 Conclusion

Offering tax incentives to attract FDI is an important policy strategy for both developed and developing economies because empirical analyses have shown that FDI inflow, for the most part, creates positive externalities, which may lead to growth and development. Using panel data of FDI inflow across 65 developing countries over the 1990–2015 period and new data on corporate taxes, I examine the sensitivity of FDI to corporate taxation. The study controls for factors that affect FDI such as size of the market (GDP per capita), infrastructure (Telephone line per 100), exchange rate, interest rate, inflation, and export (% of GDP). I create regional dummies to examine these effects and compare results across regions. Empirical results for the full sample show that FDI is not sensitive to corporate taxes in developing countries. Similarly, the fixed effect regression by regions show that FDI is not sensitive to corporate taxes in other regions except the Latin American region. The Latin American region shows a positive and significant effect; here, the existence of corporate taxes that is actually collected is less a sign of taxation and more of stable governments institutions capable of imposing and complying with tax laws. Hence, the positive and significant coefficient might be overstated because it also captures stable governmental institutions.

Furthermore, The study performs OLS regression by country with interaction coefficients (refer to the appendix). The results indicate that FDI is not sensitive to corporate taxes in the majority of the developing countries in the sample; however, there are few exceptions. Bangladesh, Bolivia, India, Mozambique, Sierra-Leone, Tanzania, and U.A.E show significant effects.

The use of statutory corporate tax rates for this analysis has its drawbacks; this is because in most cases MNCs pay effective tax rates that is usually different from statutory rates. A

possible extension could be to investigate U.S. FDI inflow to developing economies, calculate effective tax rate from actual tax payment and perform a similar analysis.

Most authors in this field examine the tangible and intangible benefits FDI brings into the host country. A rational argument in favor of FDI is that it helps correct market imperfections that might exist in the host economy, which is also an argument in favor of positive externalities. Policies to attract multinationals like tax holidays and other fiscal incentives can be potentially undone by the tax system of the multinational firms home country. Tax sparing provisions have emerged as a policy that is included in many bilateral tax treaties to prevent host country tax incentives from being nullified by residence country taxation. Some studies show that tax sparing has a significant positive effect on FDI. Another possible extension to this study is to examine if FDI is sensitive to tax sparing and bilateral tax treaties in developing economies. Tax incentives to foreign investors have been widely discussed, adopted, and debated as scholars analyze the political mechanisms that generate such policies.

Offering tax incentives to attract FDI may also create negative externality in the host country. Tax incentives going to multinational companies may create an unfair competition with domestic firms in similar areas of production. Multinational companies may pursue market monopoly and stifle competition, thereby creating negative externality in the host nation. Some empirical work have also shown that FDI inflows can create huge positive spillovers in productivity, wage, capital, and exports in the host nation that outweigh the negative externalities.

2.7 Appendix

Table 2.6: Hausman Test

Control Variables	Fixed	Random	Difference	S.E
Corporate Taxes	0.066	-0.55	0.617	
Log (GDP per capita)	1.6	1.23	0.363	0.0432
Export (% of GDP)	0.0089	0.00355	0.00532	0.00162
Exchange rate	0.000321	0.00024	0.00008	0.00003
Inflation	-0.000055	-0.00004	-0.00012	
Interest Rate	-0.00014	-0.0002	0.000061	
Phone line	0.02618	0.03996	-0.0138	0.0064

P-value = 0.00 $\chi^2 = 120.99$

Table 2.7: Countries in the Sample

Argentina	Ethiopia	Kenya	Paraguay	Thailand
Bangladesh	Gabon	Malawi	Peru	Trinidad
Bolivia	Gambia	Malaysia	Philippines	Tunisia
Brazil	Ghana	Mauritius	Qatar	Uganda
Cambodia	Grenada	Mexico	Saudi Arabia	U. A. E
Cameroon	Guatemala	Morocco	Senegal	Uruguay
Colombia	Haiti	Mozambique	Seychelles	Venezuela
Congo, Dem. Rep.	Honduras	Namibia	Sierra Leone	Yemen
Congo, Rep.	India	Nicaragua	Singapore	Zambia
Costa Rica	Indonesia	Nigeria	South Africa	
Cote d'Ivoire	Iran	Oman	Sudan	
Dominican Republic	Jamaica	Pakistan	Swaziland	
Ecuador	Jordan	Panama	Syria	
El Salvador	Kazakhstan	P. New Guinea	Tanzania	

Table 2.8: Regression by Country

	lnFDI	Lead ln(FDI)
Coporatetaxes	-4.208	-3.45
	-4.793	-4.658
lnGDPPC	1.355	1.208
	(0.105)**	(0.105)**
Exchangerate	0.00026	0.0002
	(0.0001)**	(0.0001)*
Inflation	-0.0001	-0.0001
	(0.00006)	(0.00006)
Interestrates	-0.00007	-0.00007
	(0.00012)	(0.00012)
Phoneline	0.052	0.054
	(0.014)**	(0.014)**
ExportGDP	0.016	0.014
	(0.005)**	(0.005)**
Bangladesh	5.957	6.338
	(2.009)**	(1.971)**
Bolivia	-3.767	-3.464
	(1.842)*	(1.813)
Brazil	-0.295	0.053
	(1.6)	(1.556)
Cambodia	0.576	-1.002
	(2.412)	(2.357)
Cameroon	-1.623	-0.826
	(2.631)	(2.524)
Colombia	0.426	0.069
	(1.733)	(1.689)
Congo, Dem. Rep	-5.328	-3.946
	(9.913)	(9.627)
Costo Rica	-3.839	-3.413
	(3.087)	(3.001)
Dominican Republic	-2.33	-2.494
	(4.918)	(4.778)
El Salvador	2.276	1.369
	(1.96)	(1.908)
Gabon	-3.174	-9.254
	(2.761)	(4.029)*
Gambia	-14.629	-21.834
	(13.765)	(13.367)
Ghana	1.955	2.177
	(1.779)	(1.73)
Grenada	-3.492	-3.191
	(2.281)	(2.218)
Guatemala	-1.331	-1.308
	(2.11)	(2.137)
Haiti	-6.058	-7.48
	(4.682)	(3.654)*

Table 2.9: Regression by Country

Honduras	-2.884 (2.168)	-2.736 (2.106)
India	-1.505 (1.641)	-1.41 (1.596)
Iran, Islamic Rep	0.809 (2.478)	0.765 (2.237)
Jamaica	0.823 (3.683)	1.894 (3.579)
Jordan	(1.62) (1.697)	(1.538) (1.664)
Kazakhstan	-1.669 (2.001)	-1.615 (1.995)
Malawi	-2.079 (4.295)	-0.235 (4.395)
Malaysia	4.025 (1.761)*	3.576 (1.714)*
Mauritius	-4.78 (1.710)**	-4.349 (1.675)**
Mexico	0.583 (3.23)	0.246 (3.141)
Morocco	-0.726 (2.722)	2.585 (2.668)
Mozambique	7.515 (5.894)	9.264 (5.836)
Namibia	11.083 (10.05)	11.621 (10.593)
Nicaragua	-2.689 (6.369)	-3.258 (6.186)
Nigeria	1.241 (3.198)	1.041 (3.108)
Oman	-1.195 (1.584)	-0.449 (1.548)
Pakistan	-2.159 (2.958)	-3.614 (2.922)
Panama	1.361 (4.073)	1.459 (4.207)
P.New Guinea	-9.721 (1.745)**	-9.049 (1.703)**
Paraguay	-7.777 (1.661)**	-7.016 (1.619)**
Peru	6.406 (2.188)**	2.421 (2.351)

Table 2.10: Regression by Country

Philippines	1.936 (2.492)	1.439 (2.424)
Qatar	1.015 (1.652)	0.453 (1.635)
Saudia Arabia	-4.916 (1.997)*	-3.701 (1.988)
Seychelles	-0.882 (0.962)	-0.926 (0.936)
Sierra Leone	0.584 (2.11)	2.106 (2.05)
Singapore	1.587 (2.089)	1.319 (2.032)
South Africa	6.73 (2.023)**	6.324 (1.904)**
Sudan	-1.731 (1.755)	0.29 (1.708)
Syria	-1.544 (2.061)	-1.873 (2.051)
Tanzania	-2.562 (1.583)	-1.59 (1.539)
Thailand	-4.303 (2.464)	-4.045 (2.58)
Trinidad	-5.222 (2.343)*	-4.473 (2.281)
Tunisia	-3.006 (1.974)	-3.764 (1.919)
U.A.E	-3.862 (1.810)*	-2.979 (1.774)
Venezuela	-3.397 (2.265)	-2.726 (2.202)
Yemen	-2.374 (0.564)**	-2.309 (0.552)**
Zambia	-2.413 (2.224)	0.214 (2.045)
Bangladesh*Taxes	-14.88 (6.422)*	-16.434 (6.280)**
Bolivia*Taxes	11.829 (5.862)*	10.52 (5.744)

Table 2.11: Regression by Country

Brazil*Taxes	7.585	6.68
	(5.264)	(5.133)
Cambodia*Taxes	-4.761	4.295
	(11.465)	(11.269)
Cameroon*Taxes	9.211	6.095
	(7.767)	(7.433)
Colombia*Taxes	0.502	1.922
	(5.668)	(5.516)
Congo, Dem. Rep*Taxes	12.032	8.216
	(25.574)	(24.837)
Costo Rica*Taxes	9.748	8.163
	(9.932)	(9.655)
Dominican Republic*Taxes	2.452	3.649
	(17.958)	(17.44)
El Salvador*Taxes	-8.747	-5.985
	(6.382)	(6.21)
Gabon*Taxes	5.545	24.157
	(8.916)	(12.684)
Gambia*Taxes	41.43	61.711
	(40.639)	(39.463)
Ghana*Taxes	-5.605	-6.286
	(5.56)	(5.406)
Grenada*Taxes	5.966	4.154
	(6.569)	(6.386)
Guatemala*Taxes	3.126	2.676
	(6.553)	(6.572)
Haiti*Taxes	7.384	12.127
	(14.658)	(11.655)
Honduras*Taxes	4.526	4.365
	(7.256)	(7.048)
India*Taxes	11.829	12.131
	(5.561)*	(5.402)*
Iran, Islamic Rep *Taxes	-4.609	-4.3
	(7.294)	(6.488)
Jamaica*Taxes	3.754	-0.943
	(11.499)	(11.171)
Jordan*Taxes	-5.3	-4.685
	(5.44)	(5.312)
Kazakhstan*Taxes	3.102	3.494
	(6.69)	(6.648)

Table 2.12: Regression by Country

Malawi*Taxes	0.108	-5.764
	(13.714)	(14.062)
Malaysia*Taxes	-2.015	-1.557
	(6.224)	(6.071)
Mauritius*Taxes	3.147	1.583
	(5.459)	(5.333)
Mexico*Taxes	10.521	11.089
	(10.625)	(10.331)
Morocco*Taxes	5.784	-5.182
	(8.66)	(8.464)
Mozambique*Taxes	-30.992	-35.408
	(17.68)	(17.466)*
Namibia*Taxes	-29.822	-32.156
	(29.305)	(30.805)
Nicaragua*Taxes	0.023	2.867
	(22.964)	(22.302)
Nigeria*Taxes	2.016	2.325
	(10.03)	(9.743)
Oman*Taxes	-3.308	-5.931
	(5.299)	(5.167)
Pakistan *Taxes	7.247	11.333
	(8.598)	(8.449)
Panama *Taxes	-2.128	-2.601
	(14.511)	(14.891)
P.New Guinea*Taxes	10.762	9.668
	(5.388)*	(5.24)
Paraguay *Taxes	8.531	7.218
	(5.012)	(4.881)
Peru *Taxes	-11.278	0.827
	(6.951)	(7.48)
Philippines *Taxes	-12.239	-9.553
	(8.648)	(8.422)
Qatar *Taxes	2.742	3.344
	(5.185)	(5.108)

Table 2.13: Regression by Country

Sierra-leone *Taxes	-12.405 (6.083)*	-16.461 (5.912)**
Singapore *Taxes	0.46 (6.413)	0.446 (6.232)
South Africa *Taxes	-10.493 (6.24)	-10.102 (5.839)
Sudan *Taxes	1.23 (5.474)	-4.202 (5.292)
Syria *Taxes	-0.04 (6.167)	0.836 (6.079)
Tanzania *Taxes	16.925 (5.355)**	12.943 (5.204)*
Thailand *Taxes	5.834 (8.255)	6.394 (8.627)
Trinidad *Taxes	10.718 (8.367)	8.307 (8.139)
Tunisia *Taxes	4.89 (6.173)	7.287 (6.001)
U.A.E *Taxes	13.564 (5.234)**	10.429 (5.117)*
Venezuela *Taxes	10.56 (6.804)	8.473 (6.611)
Zambia *Taxes	5.181 (10.677)	-2.243 (10.38)
cons tant	10.48 (1.699)**	11.582 (1.663)**
R-squared	0.78	0.78
N	1,101	1,072

CHAPTER 3

MICRO-FINANCE AND FINANCIAL INCLUSION IN NIGERIA

3.1 Introduction

The global financial index database shows that less than a quarter of adults in Africa have an account with a formal financial institution and many adults in Africa use informal methods to save and borrow. Financial inclusion is a process that allows for ease of access or availability of a formal financial system and has been broadly recognized as critical in reducing poverty and achieving inclusive economic growth and development. Inclusive financial systems allow broad access to financial services that likely benefit poor people and other disadvantaged groups (Demirguc-Kunt & Klapper, 2015). An inclusive financial system plays an important role in promoting economic growth and development through financial intermediaries by transferring funds from the surplus sector to the deficit sector of the economy. Without an inclusive financial system, individuals must rely on their limited savings to invest in their education, health, and small businesses must rely on limited earnings to pursue growth and expansion opportunities. Small and medium size enterprises (SMEs) in Africa acknowledge that access to finance is a major obstacle towards growth and many firms in developing economies lack proper access to a bank line of credit due to their inability to provide collateral. In addition, other financing sources such as equity markets are underdeveloped (Kpodar & Andrianaivo, 2011). Despite the growing importance of microfinance programs and institutions as development strategies, the research into their impact is limited

and contested. Using Nigeria as a case study, this paper examines if the Microfinance Policy Supervisory and Regulatory Framework (MPSRF) of 2012 adequately improved local credit markets by breaking down barriers to financial services.

Despite being the most populous African nation, Nigeria lags many of its peers in Africa with respect to financial inclusion. In 2010, 34% of adults or roughly 31 million people were served by formal financial services, compared to 68% in South Africa and 41% in Kenya. The Central Bank of Nigeria (CBN) identifies financial inclusion as a key policy to achieving its major objectives of income redistribution, poverty reduction, and economic growth. As such, they set out to define a financial inclusion strategy that is measurable, executable and achievable. Policymakers and regulators have taken numerous steps to improve financial inclusion at both the national and international level. Some have adopted strategies to enhance financial literacy, while others have committed to achieve numerical inclusion targets. A way to achieve these targets is through access to micro-credit or microfinance Institutions (MFIs). Microfinance is the provision of financial services to the economically active poor or lower middle-income individuals who are usually not served by the mainstream financial service providers such as commercial and investment banks. In developing countries, the expansion of microfinance institutions is essential for targeting low income individuals, which is potentially useful for the promotion of financial inclusion.

Studying the effects of microfinance on financial inclusion is important for several reasons. First, financial inclusion enhances financial development, economic growth and poverty reduction, therefore, creating a stable macroeconomic environment. Access to financial services enable the poor to invest in their education and business and to reduce income inequality as well. Second, financial inclusion has important implications for monetary and financial policy implementation by the Central Bank. It may significantly change the behavior of firms and individuals, thereby influencing the efficacy of proposed policies by the Central Bank. Significant improvements in financial inclusion facilitates consumption smoothing; by

allowing households and firms to have easier access to instruments for saving and borrowing, thus making output volatility less costly (Mehrotra & Yetman, 2015).

This study examines the effect of microfinance policy on financial inclusion in Nigeria and the first contribution of the proposed study is the use of national representative data from Nigeria which has not been explored in previous analysis. The study of microfinance or microcredit analysis is a relatively new concept first developed by Mohammed Yunus in 1976, when he founded Grameen Bank of Bangladesh. Since, studies in this field use survey data collected from single towns and villages that do not necessarily represent the whole country. The second contribution of the proposed study is to address the self-selection problems evident in previous studies that use survey data. The most popular studies in the field like Pitt and Khandker (1998), Copestake et al (2005) and Pellegrina (2010) use the implementation of microfinance in a village to determine the treated group (people that reside in the village that introduced microfinance) and the control group (people that reside at another village that did not introduce microfinance). The problem with this approach is it creates the potential for people to self-select into villages that implement the microfinance policy. To address this problem, income quartile is used as a variation in the difference-in-difference probit estimation, assuming that households in the lowest quartile of the income distribution are affected by the policy whereas individuals and households in the top quartile of the income distribution are not. The third contribution of the proposed study is a quasi-experimental analysis using the MPSRF implemented by the CBN in 2012 as a natural experiment to test for its impact on enhancing financial inclusion in Nigeria. A similar approach is Becchetti and Castriota (2010), that examine the impact of microfinance by focusing on its effectiveness as a recovery tool after a natural disaster. A majority of the studies in this field use location, availability and outreach to examine the impact of microfinance on welfare. Finally, I create a financial inclusion index to test for robustness of my

analysis. The results indicate that the MPSRF of 2012 has a positive and significant impact on financial inclusion in Nigeria.

The paper is organized as follows: Section 2 explores the background of microfinance reform in Nigeria. Section 3 presents the literature review. Section 4 introduces the theoretical framework for the study. Section 5 presents the data and estimation technique with Section 6 describing the results. section 7 provides the conclusion.

3.2 Background of Micro-Finance Reform in Nigeria

The failures of formal banks to adequately provide services for individuals and businesses that operate in the rural sector of the economy is a major problem for policy makers in Nigeria. This has given rise to non-traditional formalized microfinance institutions, which provide small uncollateralized loans to poor individuals and small businesses operating along with the commercial banks. The stated objectives of MFIs are: to improve the socio-economic conditions of individuals in the rural areas through the provision of loan assistance, skills acquisition, reproductive health care services, adult literacy and girl child education; to build community capacities for wealth creation among enterprising poor people and to promote sustainable livelihood by strengthening rural responsive banking methodology; and, to eradicate poverty through the provision of microfinance and skill acquisition development for income generation (CBN, 2012).

As of July 2011, Nigeria had 866 microfinance banks (MFBs), the majority of which were formerly community banks and are now single branch institutions. Only 82 MFBs service the North-West and Northeast geopolitical zones while over 500 operate in the South-West and Southeast geopolitical zones. The MFB network serves 3.8% of the adult population (3.2 million clients). Of the 3.2 million MFB clients, 65% use savings products, 14% use credit

products and 4% have an ATM card (CBN, 2012). The biggest challenges faced by MFBs are the high refinancing costs coupled with a low focus on deposits, high operating expenses and low staff capacity, which leads to poor asset portfolios. As such, the vast majority of MFBs lack the scale and operating capacity to have a strong impact on financial inclusion.

The CBN launched a Financial Inclusion Strategy (FIS) with an aim to reduce the financial exclusion rate from 46.3% to about 20%. To enhance the flow of financial services to micro, small and medium enterprises, the Federal Government of Nigeria (FGN) launched the MPRSF in December 2012.

The first policy change mandates existing microfinance banks, community banks and informal institutions to operate under supervisory purview of the CBN. Formerly, these institutions were under the authority of the National Board of Community Banks (NBCB). The goal is to enhance monetary stability and financial infrastructure of the country, and expand these institutions to meet the financial requirements of the poor and SMEs in the country (CBN, 2012). Two departments are directly involved in rural and microfinance; the Development Finance Department (DFD) and the Other Financial Institutions Department (OFID). The DFD is in charge of promoting and developing microfinance institutions while OFID is in charge of regulating and supervising community banks, other non-bank financial institutions, and MFIs. Together, the two departments have taken full responsibility for rehabilitating, restructuring and retraining microfinance banks to be more effective financial service providers.

The second element of the reform is the establishment of a reference credit bureau to mitigate the very high-risk associated with lending to the poor. Previously, the MFIs have not been able to identify people that have defaulted on loans in the past. As a result of the policy microfinance operators are required to provide and obtain credit information from Credit Reference Bureau to aid decision making and minimize credit risk. The goal of the

policy is to address the problem of lack of access to credit by small business operators because MFIs do not have sufficient information about agents credit history.

To bridge the technical skills gap, especially among operators and the directors of MFIs, the CBN recognizes the need to set up an appropriate capacity-building program. In this regard, the CBN put in place the Microfinance Certification Program (MCP) to ensure the acquisition of appropriate microfinance operational skills by staff and management of MFIs in general, and MFBs in particular. In addition, provisions are made for Mandatory Continuing Professional Education (MCPE) to update relevant skills of the staff of each MFB in microfinance banking. Microfinance programs also offer skill-based training to augment productivity and organizational support, and consciousness-raising training to empower the poor.

To promote the development of the sub-sector and provide for the wholesale funding requirements of MFBs and MFIs, the CBN set up a Microfinance Development Fund (MDF). The fund is professionally managed to guarantee its sustainability and provides necessary support for the development of the sub-sector in terms of refinancing/guarantee facility, capacity building, financial education, and other promotional activities. The fund is established and guaranteed by the federal government and the CBN to support the operations of MFIs, international development financing institutions, as well as multilateral and bilateral institutions.

Finally, the CBN established rating agencies to rate microfinance institutions and monitor their operational capabilities and financial base to reduce waste fraud and abuse so MFIs that fail yearly review by the rating agencies get their license revoked.

3.3 Literature Review

According to Hannig and Jansen (2010), financial inclusion can be measured through four criterion. The first criteria is access or the ability to use available financial services and products from formal institutions. The second criteria is quality or the relevance of the financial service or product to the lifestyle needs of the consumer. The third criteria is the ability to go beyond the basic adoption of banking services and focus more on the permanence and depth of financial service and product use. The last criteria is the impact or measurable changes in the lives of consumers that can be attributed to the usage of a financial device or service. Several studies measure the impact of microfinance by comparing the treated and control groups, where the former are microfinance recipients the later are not. In most case, these studies apply non-randomized approaches when selecting individuals that fall in the treated group and control group.

Becchetti and Castriota (2010) analyze the impact of microfinance by focusing on its effectiveness as a recovery tool after a natural disaster. Using randomly collected data from 305 borrowers, the study examines the impact of microfinance loans in helping people who were hit by the tsunami in Sri Lanka in 2004.¹ The tsunami provides a unique quasi-natural experiment to test the impact of microfinance on welfare because it creates two randomly selected groups; one group of borrowers consists of those who are hit by the tsunami, the other group consists of borrowers who are not. Using a dataset containing information for both before and after the tsunami, the study shows that access to microfinance was an

¹In April 2007 one of the authors of the paper and two additional researchers went to Sri Lanka to interview a sample of randomly selected micro finance institution (MFI) borrowers on the southern coast in order to perform an impact evaluation of the Tsunami and to study the recovery process. Interviews were performed face-to-face with the help of professional translators with backgrounds in economics. The 305 selected individuals were clients of a Sri Lankan MFI, Agro Micro Finance (AMF), which received financial support from international organizations and Italian institutions (Dipartimento Protezione Civile and the non-governmental organization ETIMOS) after the December 2004 natural disaster.

important factor in income convergence among borrowers before the tsunami, whereas, the convergence process was severely disrupted after the tsunami. Furthermore, microfinance loans provided after the disaster were instrumental in reducing the income gap between those affected by the tsunami and those who were not. Becchetti and Castriota (2010) show that the positive effect of microfinance loans in improving and converging real incomes is not observed for governmental subsidies, donations, and grants. They also find strong evidence in favor of the effectiveness of microfinance as a recovery tool after a major natural disaster. Their study is one of the very few comprehensive analyses of microfinance and its role in post-disaster situations. The result is crucial and has policy implications for governments and agencies that are active in disaster situations.

Pellegrina (2010) examines the impact of microfinance programs and other types of credit on agricultural investment using data from a World Bank survey of almost 1800 households carried out in Bangladesh during the period 1991–1992. The study makes two major contributions. The first is the impact of microfinance as compared to the impact of two other sources of credit: bank loans and informal credit. The second contribution is about the impact of credit on investment. While most other impact studies tend to focus on income, consumption, and education. After controlling for several measurable determinants of credit agreements such as interest rates and collateral, the study finds that microfinance loans mainly help to increase working capital expenditure which are generally associated with non-agricultural activities. Whereas, bank loans play an important role in accumulating fixed assets which are generally associated with agricultural activities. The latter is important in generating long term productive activities meaning microfinance loans are less effective than bank loans on long-term investments. Pellegrina (2010) suggests that microfinance may be less conducive to building up fixed assets due to lending characteristics such as short and regular repayment schedules and the group lending method. These lending

characteristics may push borrowers more towards investments in projects with short-term revenues.

Rai and Ravi (2011) examine the impact of microfinance on women empowerment studying the situation in which health insurance is extended to husbands or wives of microfinance borrowers. They use a unique dataset consisting of almost 280,000 microfinance borrowers in India; these borrowers are required to purchase health insurance once they get a loan.² In recent years, partnerships between microfinance and health insurance have been used in India to extend health insurance to the poor. Moreover, in many cases, one of the aims of MFIs is to empower women. These partnerships may contribute to this aim, since women in India are less likely to seek and obtain health insurance. The main finding from the study indicates that borrowers make more use of health insurance (in terms of filing claims) than their partners do. Furthermore, with respect to women empowerment, women who are borrowers make significantly more use of health insurance than non-borrowing women who have obtained the insurance through their husbands. These patterns could arise either because of underlying morbidity differences or because women who do not borrow are disempowered. Rai and Ravi (2010) find evidence consistent with the latter explanation.

Pitt and Khandker (1998) estimate the impact of a microfinance credit program on labor supply, schooling, house hold expenditures, and assets in Bangladesh, using household survey data for 1991–1992. The study uses a quasi-experimental survey design to correct the bias from unobserved individual and village-level heterogeneity. In the quasi-experimental survey design, households are sampled in villages with and without the microfinance program, both eligible and ineligible households were sampled in both types of villages, and both program participants and nonparticipants were sampled among the eligible households in villages

²The data includes basic information on all individuals covered by health insurance and some details about the nature of claims. The health insurance program was started in May 2005 and was substantially extended in May 2006: All borrowers between the ages of 18 and 55 who took loans after May 1; 2005 were required to pay a health insurance premium in exchange for modest hospitalization expenses.

with microfinance programs. The two central underlying conditions for identifying program impact were the programs eligibility restriction and its gender-based program design. Any household with a landholding of less than half of an acre is eligible to participate in all microfinance programs in Bangladesh. One can identify the program's impact on participants by distinguishing who participates and who does not from among those who are eligible to participate in the microfinance program.³ Results indicate that access to microfinance increases consumption expenditure, especially if loans are taken by women.

Khandker (2005), in a follow-up study, examines the effects of microfinance on poverty reduction at both the participant and the aggregate levels using panel for 1991-1992 and 1998-1999 data from Bangladesh. The study uses panel data analysis and a dynamic model to estimate the time-varying borrowing effects on consumption for participants and non-participants as well as for average villagers through spillover effects. The results suggest that access to microfinance contributes to poverty reduction, especially for female participants, and to overall poverty reduction at the village level. Microfinance thus helps not only poor participants, but also the local economy, which is consistent with the policy objectives of the government by creating an inclusive financial system. Microfinance raises per capita household consumption for both participants and nonparticipants. The average returns to cumulative borrowing for female members of microfinance programs were as much as 21 percent in 1998-1999, up from 18 percent in 1991-1992. Despite higher returns to cumulative borrowing, the impact on poverty reduction among program participants was lower in 1998-1999 (2 percentage points) than in 1991-1992 (5 percentage points). This result is due to diminishing returns to additional borrowing, so that despite the increase in the stock of borrowing by female members, the resulting increases in consumption were not

³The landholding requirement in the study is not strictly enforced, and so nontarget households are included as program participants. In that case the identification restriction in cross-sectional analysis based on landholding may lose efficiency, although that hypothesis is subject to testing. However, identification restriction does not apply to fixed-effects analysis using panel data, because the household fixed-effect method resolves any time-invariant participation-related endogeneity.

large enough to reduce poverty as expected. Unlike the Pitt and Khandker (1998) study, this study uses panel data for households with more than one observation to estimate program effects without using an instrumental variable method. This analysis is done by estimating a household-level fixed-effects model, which resolves both household and village-level endogeneity, based on the assumption that the error terms of the credit demand equation and consumption equation are uncorrelated.

Chemin (2008) evaluates both benefits to customers and costs borne by microfinance institutions by comparing microfinance with other developmental programs to provide a better guide for the selection of borrowers. Using survey data from Bangladesh, Chemin (2008) applies the propensity score matching technique by comparing participants to matched individuals in non-treated villages and finds that access to microfinance has a positive impact on expenditures, supply of labor, and level of school enrolment for boys and girls. For instance, participants spend 3% more on average than non-participants. However, results of this study contradict the popular perceptions about microfinance that there is a 98% loan repayment rate. The repayment rate even after a 30-day grace period is only about 71%. This lower repayment rate is costly because formal commercial banks hedge against potential losses, whereas microfinance institutions do not.

In contrast to the study by Chemin (2008), Copestake et al. (2005) examines the impact of microfinance on the poor using data from a survey carried out in collaboration with a village banking program, Promuc, in Peru in 2002.⁴ Using a mix of evaluation methods, among which are the difference-in-difference approach and qualitative in-depth interviews,

⁴The study is based on collaboration with Promuc in Peru, a partnership of nongovernmental, not-for-profit organizations formed in 1994 to promote micro-enterprise development as a strategy for poverty reduction and the empowerment of women. Promuc stands for Promocion de la mujer y la comunidad (Promoting women and the community). At the end of 2003, twelve NGOs were active members, and eleven of them operated village banking programs under a common brand name: la chanchita (the piggybank). Together, they had a presence in 14 of the 24 departments of Peru, comprising 1,352 sponsored village banks with a membership of nearly 28,000 (83% of them women). Approximately 25% of the banks were located within the city of Lima, 55% in other urban areas and 20% in rural areas. The loan portfolio was US\$3.6 million (\$130 per member) and members savings amounted to US\$2.2m.

the study finds that the better-off-poor benefit more than the core poor from access to microfinance.

Sarma and Pais (2008) present a cross-sectional empirical analysis of the relationship between financial inclusion and development. Using the index of financial inclusion developed in Sarma (2008), the paper identifies the factors that are significantly associated with financial inclusion. Furthermore, they describe the broad relationship between financial inclusion and human development. The study finds that the level of human development and that of financial inclusion are strongly positively correlated. Empirical analysis indicates that income as measured by per capita GDP is an important factor in explaining the level of financial inclusion in a country, income inequality, adult literacy, and urbanization are also important factors. Furthermore, physical and electronic connectivity and information availability, indicated by road network, telephone, and internet usage, also play a significant role in enhancing financial inclusion. Government ownership of banks is not significantly associated with financial inclusion, and foreign ownership is found to be negatively associated. Similarly, interest rate does not seem to be significantly associated with financial inclusion.

Park and Mercado (2015) extend the existing literature on financial inclusion by focusing on developing Asian economies. They construct a financial inclusion indicator to assess various macroeconomic and country-specific factors affecting the degree of financial inclusion for 37 selected developing Asian economies. The study tests the impact of financial inclusion, along with other control variables, on poverty and income inequality. Results indicate that per capita income, rule of law, and demographic characteristics significantly affect financial inclusion in developing Asia. Furthermore, they find that financial inclusion significantly reduces poverty and income inequality. Findings from the study suggest that investment savings for young and old-age populations, strong rule of law, including enforcement of financial contracts and financial regulatory oversight, broaden financial inclusion, thereby contributing to poverty reduction and lower income inequality.

Schreiner (1999), Sanders (2002), and Bhatt (1999) provide support for the argument that microfinance may not be an effective poverty alleviation policy in the United States. Schreiner (1999) analyzes microenterprise programs in the United States and finds that although some programs can move some people from welfare to self-employment, the change in the absolute number of people that make this transition is probably less than one percent. Additionally, Schreiner shows that most of the people who are successful in the transition are not among the poorest. Rather, they have the most assets, the most years of education, the most skills and experience, the strongest support networks, and one or more wage jobs. Sanders (2002) uses secondary data to compare three groups: low-income micro-entrepreneurs who participated in one of seven U.S. microenterprise assistance programs, low income self-employed workers not attached to microenterprise assistance programs, and low-income wage workers not self-employed. Adopting a quasi-experimental research design, analysis of household income and poverty status over time fail to suggest that microenterprise programs make significant gains for participants and hence, calls into question the effectiveness of microcredit as an antipoverty strategy in the U.S. Bhatt (1999) finds that the evidence for the impact of U.S. microenterprise programs is mixed, while some programs have worked others have failed. Bhatt (1999) provides possible reasons why microcredit programs have not fared very well in the U.S. First, U.S. microcredit programs have been limited in outreach; unlike in developing economies where program workers literally go door-to-door to reach out to potential participants, U.S. programs rely on media advertising. Second, U.S. programs find it difficult to attract potential applicants that are credit worthy. Similarly, applicants at that level lack the skills to manage small businesses, whereas in developing economies people that lack such skills can easily be street vendors. Third, the excessive overhead cost of running microcredit programs in the U.S. is a major problem. The salaries for program employees in the U.S. are much higher than their counterparts in developing

countries. Finally, U.S. microcredit programs can take up to 90 days to disburse funds, while, in developing economies, it takes on average a week to disburse funds.

3.4 Theoretical Framework

Generally, and according to economic theory, the exclusion of poor people from traditional commercial and investment banks can be explained as the high level of market imperfection and asymmetric information such as agency problem, adverse selection, and moral hazard, which raises problems of screening, monitoring, and enforcement. To provide a theoretical foundation for the empirical model I rely on the work of Armendariz and Morduch (2010).

Consider a borrower and a lender. The borrower has a business idea or immediate family needs, but no money to finance it; the agent must then turn to the lender. The agency problem here refers to the lender's inability to observe the borrower's characteristics (e.g., project riskiness), to observe the borrower's effort, or to observe their profit. This asymmetric information problem creates inefficiencies and microfinance can be seen as one attempt to overcome this problem.

The adverse selection problem proposed by Stiglitz and Weiss (1981) pioneered a family of adverse selection models in which banks lack good information about the riskiness of the borrower's projects. This means banks are unable to discriminate against risky borrowers resulting in interest rates becoming exceedingly high for all borrowers. Such rates in turn drive reputable borrowers with low yield projects out of the credit market. This is a market imperfection since worthy borrowers do not participate in the credit market when efficiency would suggest that they should. Consider an economy populated by individuals who seek to maximize profits. Agents can invest \$1 in a one-period project. Individuals do not have wealth of their own, so they need to borrow to carry out their investment projects. For

simplicity, I assume potential borrowers can either be safe or risky. A safe borrower invests \$1 and generates revenue y with certainty, while a risky borrower invests \$1 and generates revenue of y' with probability p , where $0 < p < 1$. When they are lucky, risky borrowers earn higher profits than safe borrowers. However, when risky borrowers are not successful they earn zero with probability $1 - p$ and cannot repay the loan. For simplicity, I assume that both agents have identical expected returns; and that riskier borrowers do better than safe borrowers when lucky ($y' > y$). I assume the lender is a competitive bank committed to break even, which means at minimum the bank tries to cover its gross cost, k , per unit lent. For every dollar lent, $k > \$1$ since the bank must account for other costs associated with generating the loan principal. We can then see that, if the population was made up of only safe borrowers, the competitive bank would set the gross interest rate (i.e., interest plus principal) exactly equal to k , because safe borrowers always repay; there is no risk, and competitive pressures drive the bank's interest rate down to its marginal costs. At this rate, the bank breaks even, and the borrower keeps a net profit of $(y - k)$. Adding risky borrowers to the equation, we can see that when a risky borrower applies for loans, the bank will want to charge them interest rates higher than k to compensate for the added risk. The problem arises because banks cannot distinguish between safe and risky borrowers beforehand. If the lender only knows that a portion q of the loan applications come from safe borrowers and that a portion $1 - q$ comes from risky borrowers, the break-even gross interest rate of the lender will increase from k to r . Now assuming the lender is hoping to just cover costs, the gross interest rate r must be set so that the expected return from lending to a borrower of an unknown type is exactly equal to k , the banks gross cost of funds:

$$[q + (1 - q)p]r = k \tag{3.1}$$

Rearranging equation (3.1) we find that the gross interest rate charged by the bank to break-even is:

$$r = \frac{k}{[q + (1 - q)p]} \quad (3.2)$$

I introduce a new variable A , which is the difference between the new break-even rate r and the former k , so $A = r - k$. Substituting the value for r in equation 3.2 above and solving for A we get:

$$A = \frac{[k(1 - q)(1 - p)]}{q + (1 - q)p} \quad (3.3)$$

Now, all borrowers, whether safe or risky, must pay this higher rate since the bank is unable to tell who is who. If r becomes sufficiently high, they may discourage safe borrowers. Also, the larger $(1 - q)$ or the smaller p , the larger A becomes. I expect higher $(1 - q)$ and lower p among microfinance recipients so A is higher, which excludes them from the market. Hence, the overall goal of the policy is to lower $(1 - q)$.

3.5 Data and Estimation

3.5.1 Estimation Strategy

This paper examines the impact of the microfinance policy (MPSRF) on financial inclusion in Nigeria. To identify this effect, I use a difference-in-difference probit estimation examining the period before and after implementation of the policy. I contrast individuals in the lowest quartile of the income distribution who are affected by the microfinance policy to individuals who are not; hence, I eliminate the self-selection problem from previous studies

by using income distribution as my variation. This is important because agents may not self-select into the treated group which is a problem experienced in previous studies. The idea behind this is that in most developing economies (Nigeria included) it is highly unlikely that an upper or middle-class household will go through the tedious application process to obtain loans of only about \$100 or less. Since the reform was implemented in 2012, I use 2011 as the pre-implementation period and 2014 as the post implementation period. The advantage with this strategy is that there is sufficient time to observe the implementation of the policy and its potential outcome on the most disadvantaged individuals in the economy. There was no prior announcement of the policy before implementation, so I do not expect a change in agent's behavior before implementation of the policy.

Consider:

$$S_{it} = \beta_0 + \beta_1 Q_{it} + \beta_2 T_{it} + \beta_3 T_{it} * Q_{it} + \beta_4 X_{it} + \epsilon_{it} \quad (3.4)$$

Where S_{it} is a binary variable measuring financial inclusion of individual i at time t . The binary variable T_{it} takes the value of 1 if the response is after the implementation of the microfinance policy and 0 if the response occurs before implementation of the policy. The binary variable Q_{it} takes the value of 1 if the individual is in the lowest quartile of the income distribution and 0 if the individual is not in the lowest quartile. The vector of observed demographic characteristics, X_{it} , includes income, sex, age, age squared, and level of education. The error term is represented by ϵ_{it} . The coefficient of interaction between the treated group and the period after implementation of the reform is the difference-in-difference estimator (DID) and it measures the impact of the microfinance policy on financial inclusion.

3.5.2 Description of the Data

To measure the effect of microfinance reform on financial inclusion in Nigeria, I use repeated cross-sectional data from the World Bank. The Global Financial Inclusion index (Global Findex) database provides indicators measuring how people around the world save, borrow, make payments, and manage risk (Demirguc-Kunt and Klapper, 2012). The Global Findex database reveals that, between 2011 and 2014, 700 million adults worldwide became account holders. Statistics show that the number of adults without an account dropped by 20%, globally and that is about 62% of adults have an account, up from 51% in 2011 (Demirguc-Kunt et al 2014). For this analysis, I use the Global Findex database for Nigeria.

Data weighting is used to ensure a nationally representative sample for each part of the economy. Final weights consist of the base sampling weight, which corrects for unequal probability of selection based on household size, and the post stratification weight which corrects for sampling and nonresponse error. Post-stratification weights use economy-level population statistics on gender and age and, where reliable data are available, education or socioeconomic status.

Table 3.1 provides the summary statistics of the variables used in the study. The lowest quartile of the income distribution (treated group) accounts for about 16% of the sample. About 46% of the sample own accounts, 16% own credit cards, and 24% own debit cards. Female respondents account for 45% of the sample and the mean age is 33.

Table 3.1: Summary Statistics

	Mean	Std Dev	Min	Max	Total obs.
Microfinance Policy	0.5	0.5	0	1	1960
Lowest quartile(Treated)	0.31	0.46	0	1	1960
Account	0.46	0.5	0	1	1960
Credit card	0.16	0.35	0	1	1960
Debit card	0.24	0.43	0	1	1960
Female	0.45	0.49	0	1	1960
Education level	1.79	0.49	1	3	1960
Age	32.9	13.6	15	80	1960
Age Square	1267.3	1173.5	225	6400	1960

Note: Education level is 1 if the individual completed elementary school or less, 2 if the individual completed high school and 3 if the individual has a college degree or more.

3.6 Results

The difference-in-difference probit estimation result shown in Table 3.2 indicates that the Nigerian Microfinance reform (MPRSF) has a major impact on financial inclusion when it comes to the poor and unbanked population group. I use various measures of financial inclusion to test this concept. Four sets of results are presented in the analysis; Column (1) reports coefficients using owning a bank account as a measure for financial inclusion. The DID probit coefficient is our coefficient of interest (Microfinance Policy*Lowest quartile (Treated)). The lowest quartile of the income distribution, which is the treated group shows a coefficient of -0.951 and is significant indicating that before implementation of the policy, the poor were about 95% less likely to own an account. Over the time the policy was enacted, the overall trend was increased in account ownership of about 35%. For the poor, there was also an increase in account ownership of about 40% resulting from the microfinance policy. These results suggest that the MPRSF has a positive and significant effect on account ownership in

Nigeria. Most of the other variables have the expected sign; education shows a positive and significant coefficient and age also shows a positive and significant coefficient. For income distribution, the middle-class shows a negative and insignificant coefficient while the upper-middle class shows a negative and significant effect.

Table 3.2: Results

Control Variables	Account	Debit card	Credit Card	Insurance
Microfinance*Lowest quartile(Treated)	0.397** (0.14)	-0.51 (0.0327)	1.365*** (0.209)	0.577 (0.332)
Microfinance Policy	0.350*** (0.0719)	2.632*** (0.157)	-0.0374 (0.133)	-0.0374 (0.024)
Lowest quartile (Treated)	-0.951*** (0.116)	-0.0263 (0.316)	-0.968*** (0.136)	-0.736* (0.29)
Female	-0.225*** (0.0618)	-0.346*** (0.0844)	-0.0311 (0.0834)	-0.152 (0.125)
Education level	0.945*** (0.075)	0.852*** (0.0943)	0.851*** (0.105)	0.431*** (0.128)
Age	0.0730*** (0.0102)	0.11*** (0.0186)	0.101*** (0.0192)	0.0338** (0.0219)
Age-squared	-0.00068*** (0.00011)	-0.0014*** (0.00023)	-0.00116*** (0.000247)	-0.00023 (0.00025)
Upper-Middle Class	-0.314*** (0.0834)	-0.121 (0.111)	-0.385*** (0.109)	-0.231 (0.15)
Middle Class	-0.453 (0.0914)	-0.375*** (0.131)	-0.547*** (0.126)	-0.573*** (0.03613)
Intercept	-3.052*** (0.262)	-5.791*** (0.437)	-3.734*** (0.413)	-3.233*** (0.502)
Total Obs.	1960	1960	1960	1960

Note: The Probit regression model is based on Global Financial Inclusion Index (FINDEX) 2011 and 2014. ***, **, and * denoting statistical significance at 1, 5, and 10 percent level, respectively.

Column (2) reports estimates showing the effectiveness of the microfinance policy using ownership of debit card as a measure for financial inclusion. Estimates show a negative and insignificant effect of the microfinance policy on debit card ownership. This result is unexpected; however, a good reason could be that unlike the U.S., where if you own an account you automatically receive a debit card, in Nigeria individuals must request a debit

card to get one. Similarly, the high illiteracy rate and poor infrastructure might be another contributing factor to this result.

Column (3) uses credit card ownership as a measure of financial inclusion. The coefficient of interaction (Microfinance*Lowest quartile) is positive and significant at a 1%. The lowest quartile of the income distribution, which is the treated group shows a coefficient -0.968 and is significant indicating that before implementation of the policy, the poor were about 97% less likely to own a credit card. Over the time the policy was enacted, the overall trend was a decrease in credit card ownership of about 3.7%. For the poor, however, there was a significant increase in credit card ownership of about 137% resulting from the microfinance policy leading to an overall observed change in credit card ownership of about 134%. This result is expected because the overall goal of the microfinance institutions is to provide affordable loans to the very poor and unbanked sector of the economy.

Following the study of Rai and Ravi (2011), which finds that borrowers make use of health insurance, I test to see whether the micro-finance policy encouraged agents to get health insurance. The results shown in Column (4) use health insurance as a measure for financial inclusion and unlike Rai and Ravi (2011), the analysis finds that the microfinance policy did not improve health insurance utilization in Nigeria. The DID coefficient (Micro-finance Policy*Lowest quartile (Treated)) is positive but not significant. This result seems practical because the health insurance utilization in Nigeria is among the worst of any developing economy and Individuals that have health insurance in Nigeria get it through private firms and the government. Similarly, the micro-finance policy does not require beneficiaries to purchase health insurance and the poor individuals who fall in the treatment group in my study do not have access to affordable health insurance. The coefficient for education level is positive and significant and the coefficient for age is positive and significant as expected because the more educated people have good private sector jobs that provide health insurance, and as an individual gets older, there is a great need for health insurance.

Table 3.3: Results with additional interaction coefficients

Control Variables	Account	Debit card	Credit Card	Insurance
Microfinance*Lowest quartile(Treated)	0.482*** (0.164)	-0.784** (0.378)	1.418*** (0.233)	0.687* (0.352)
Microfinance*Middle Class	0.101 (0.181)	2.823 (137.6)	0.0160 (0.414)	0.673 (0.472)
Microfinance*Upper Middle Class	0.180 (0.167)	-0.685** (0.327)	0.174 (0.277)	0.118 (0.300)
Microfinance Policy	0.264** (0.111)	2.907*** (0.247)	-1.735*** (0.165)	-0.149 (0.177)
Lowest quartile (Treated)	-0.990*** (0.122)	0.213 (0.362)	-0.979*** (0.138)	-0.784*** (0.294)
Middle Class	-0.499*** (0.124)	-3.211 (137.6)	-0.555*** (0.133)	-0.961** (0.388)
Upper-Middle Class	-0.401*** (0.116)	0.472 (0.304)	-0.416*** (0.120)	-0.284 (0.208)
Female	-0.224*** (0.0618)	-0.347*** (0.0846)	-0.0305 (0.0834)	-0.147 (0.125)
Education level	0.946*** (0.0750)	0.852*** (0.0946)	0.850*** (0.105)	0.439*** (0.129)
Age	0.0728*** (0.0102)	0.111*** (0.0186)	0.101*** (0.0192)	0.0336 (0.0218)
Age-squared	-0.000676*** (0.000118)	-0.00136*** (0.000234)	-0.00115*** (0.000247)	-0.000233 (0.000249)
Intercept	-3.009*** (0.265)	-6.047*** (0.475)	-3.718*** (0.414)	-3.199*** (0.503)
Total Obs.	1960	1960	1960	1960

Note: The Probit regression model is based on Global Financial Inclusion Index (FINDEX) 2011 and 2014. ***, **, and * denoting statistical significance at 1,5, and 10 percent level, respectively.

Table 3.3 introduces the interaction coefficients for the middle class and upper middle class income groups to see how the policy impacts these groups. Results indicate that the MPRSF has a positive and significant effect on account ownership, credit card ownership and health insurance ownership for the lowest quartile of the income distribution while the coefficient for debit card ownership remains negative yet is significant. The interaction coefficients for middle class and upper-middle class individuals are not significant, which is

expected because the MPRSF does not have any impact on these income groups. The only exception is debit card, which may be due to the inclusion of non account holders.

Column (1) reports estimates for account ownership. The lowest quartile of the income distribution, which is the treated group shows a coefficient of -0.99 and is significant indicating that before implementation of the policy, the poor were about 99% less likely to own an account. Over the time the policy was enacted, the overall trend was an increase in account ownership of about 48%. For the poor, there was also an increase in account ownership of about 26% resulting from the microfinance policy leading to an overall observed change in account ownership of about 74%. Hence, the positive and significant coefficient of interest added to the general trend.

Column (2) reports estimates for debit card ownership. Over the time the policy was enacted, the overall trend was an increase in credit card ownership of about 2.9 and is significant. For the poor, however, there was a decrease in debit card ownership of about 0.78 resulting from the microfinance policy leading to an overall observed change in account ownership of about 2.1. Here the coefficient of interest reversed the trend, but the overall effect is positive.

Column (3) uses credit card ownership as a measure of financial inclusion. The coefficient of interaction (Microfinance*Lowest quartile) is positive and significant at a 1%. The lowest quartile of the income distribution, which is the treated group shows a coefficient -0.979 and is significant indicating that before implementation of the policy, the poor were about 98% less likely to own a credit card. Over the time the policy was enacted, the overall trend was a decrease in credit card ownership of about 173%. For the poor, however, there was an increase in credit card ownership of about 142% resulting from the microfinance policy leading to an overall observed change in credit card ownership of about -30%. The coefficient of interest reversed the trend, but the overall effect is negative.

Column (4) reports estimates for health insurance utilization. Over the time the policy was enacted, the overall trend was no effect on health insurance utilization. For the poor, however, there was an increase health insurance utilization of about 69% and significant at 10% resulting from the microfinance policy. This means there was no time trend and the microfinance policy spurred a behavior in the poor that otherwise would not have happened.

Table 3.4: Results (Account holders)

Control Variables	Debit Card	Credit Card	Insurance
Microfinance*Lowest quartile(Treated)	-0.710*	1.038***	0.724
	(0.396)	(0.272)	(0.517)
Microfinance Policy	3.340***	-2.207***	-0.120
	(0.180)	(0.137)	(0.158)
Lowest quartile (Treated)	0.337	-0.461**	-0.735
	(0.371)	(0.211)	(0.475)
Middle Class	-0.208	-0.433**	-1.062***
	(0.206)	(0.168)	(0.399)
Upper-Middle Class	0.00760	-0.231	-0.261
	(0.169)	(0.140)	(0.176)
Female	-0.293**	0.134	-0.0922
	(0.132)	(0.111)	(0.154)
Education level	0.538***	0.483***	0.463**
	(0.150)	(0.139)	(0.165)
Age	0.0586*	0.0397	0.0253
	(0.0276)	(0.0264)	(0.0291)
Age-squared	-0.000891**	-0.000546	-0.000112
	(0.000329)	(0.000323)	(0.000326)
Intercept	-3.856***	-1.074*	-2.989***
	(0.628)	(0.566)	(0.654)
Total Obs	918	918	918

Note: The Probit regression model is based on Global Financial Inclusion Index (FINDEX) 2011 and 2014. ***, **, and * denoting statistical significance at 1, 5, and 10 percent level, respectively.

Since holding debit card generally requires one to own an account, I perform the same analysis with a subsample of only account holders in Table 3.4.

Column (1) reports estimates for debit card ownership. Over the time the policy was enacted, the overall trend was an increase in debit card ownership of about 3.34 and is

significant. For the poor, however, there was a decrease in debit card ownership of about 0.71 resulting from the microfinance policy leading to an overall observed change in account ownership of about 2.6. Here the coefficient of interest reversed the trend, but the overall effect is positive.

Column (2) uses credit card ownership as a measure of financial inclusion. The coefficient of interaction (Microfinance*Lowest quartile) is positive and significant at a 1%. The lowest quartile of the income distribution, which is the treated group shows a coefficient -0.461 and is significant indicating that before implementation of the policy, the poor were about 46% less likely to own a credit card. Over the time the policy was enacted, the overall trend was a decrease in credit card ownership of about 220%. For the poor, however, there was an increase in credit card ownership of about 104% resulting from the microfinance policy leading to an overall observed change in credit card ownership of about -116%. The coefficient of interest reversed the trend, but the overall effect is negative.

Column (3) shows a positive and insignificant DID coefficient meaning that health insurance utilization is insignificant. The policy did not improve health insurance among account holders.

Table 3.5 introduces the interaction coefficients for the middle class and upper middle class. Results are consistent with Table 3.3 including the surprising negative and significant result for the upper-middle class for debit card ownership. Also when limited to account holders, the insurance variable is insignificant but may be as a result of the small sample size.

Table 3.5: Results (Account holders with additional interaction)

Control Variables	Debitcard	Creditcard	Insurance
Microfinance*Lowest quartile(Treated)	-0.996** (0.446)	1.027*** (0.295)	0.790 (0.529)
Microfinance*Middle Class	2.955 (106.4)	-0.191 (0.456)	3.495 (144.0)
Microfinance*Upper Middle Class	-0.800** (0.377)	0.0368 (0.304)	0.109 (0.351)
Microfinance Policy	3.627*** (0.274)	-2.196*** (0.178)	-0.185 (0.193)
Lowest quartile (Treated)	0.549 (0.407)	-0.458** (0.214)	-0.764 (0.477)
Middle Class	-3.164 (106.4)	-0.401** (0.188)	-4.246 (144.0)
Upper Middle Class	0.600* (0.324)	-0.241 (0.167)	-0.315 (0.256)
Female	-0.300** (0.133)	0.135 (0.111)	-0.0926 (0.154)
Education level	0.531*** (0.151)	0.484*** (0.139)	0.463*** (0.166)
Age	0.0597** (0.0277)	0.0394 (0.0264)	0.0265 (0.0292)
Age-squared	-0.000906** (0.000330)	-0.000543* (0.000324)	-0.000128 (0.000326)
Intercept	-4.068*** (0.654)	-1.075* (0.566)	-2.978*** (0.655)
Total Obs.	918	918	918

Note: The Probit regression model is based on Global Financial Inclusion Index (FINDEX) 2011 and 2014. ***, **, and * denoting statistical significance at 1,5, and 10 percent level, respectively.

Column (1) reports estimates for debit card ownership. Over the time the policy was enacted, the overall trend was an increase in debit card ownership of about 3.627 and is significant. For the poor, however, there was a decrease in debit card ownership of about 0.996 resulting from the microfinance policy leading to an overall observed change in account ownership of about 2.63. Here the coefficient of interest reversed the trend, but the overall effect is positive.

Column (2) uses credit card ownership as a measure of financial inclusion. The lowest quartile of the income distribution, which is the treated group shows a coefficient -0.458 and is significant indicating that before implementation of the policy, the poor were about 46% less likely to own a credit card. Over the time the policy was enacted, the overall trend was a decrease in credit card ownership of about 220%. For the poor, however, there was an increase in credit card ownership of about 103% resulting from the microfinance policy leading to an overall observed change in credit card ownership of about -115%. The coefficient of interest reversed the trend, but the overall effect is negative.

Column (3) shows a positive and insignificant DID coefficient meaning the policy did not improve health insurance among account holders in the sample.

3.6.1 Robustness Analysis

For the robustness analysis, I create an index of financial inclusion using all four types of financial inclusion measures. Each of the measures receive a value of 1 or 0 based on the presence or absence of the particular measure of financial inclusion and the values are summed to create an index that ranges from 0–4, with 4 indicating the highest level of financial inclusion. Since the financial inclusion variable is an ordered categorical variable, I employ an ordered probit model to explain the effects of my explanatory variables on the index. The coefficient of interest which is the interaction term (Microfinance Policy*Lowest quartile (Treated)), shows a positive and statistically significant effect (5% level of significance) while other coefficients remain consistent (Table 3.6). This means the microfinance policy (MPRSF) has had a positive impact on financial inclusion in Nigeria. The additive and differential effect is positive and very large.

Table 3.6: Results (Robustness Analysis)

Control	Financial Inclusion	
Microfinance*Lowest quartile(Treated)	0.352**	0.455***
	(0.141)	(0.165)
Microfinance*Middle Class		0.155
		(0.1833)
Microfinance*Upper Middle Class		0.192
		(0.168)
Microfinance Policy	0.372***	0.27**
	(0.0726)	(0.112)
Lowest quartile (Treated)	-0.936***	-0.983***
	(0.115)	(0.122)
Middle Class	0.018	-0.495***
	(0.014)	(0.124)
Upper-Middle Class	-0.035***	-0.379***
	(0.0118)	(0.166)
Female	-0.242***	-0.241***
	(0.0623)	(0.0623)
Education Level	0.924***	0.925***
	(0.075)	(0.0749)
Age	0.0718***	0.0716***
	(0.0103)	(0.0103)
Age-Squared	-0.00067***	-0.001***
	(0.000119)	(0.00012)
Intercept	-0.063**	-2.928***
	(0.0314)	(0.266)
Total Obs.	1960	1960

Note: The Probit regression model is based on Global Financial Inclusion Index (FINDEX) 2011 and 2014. ***, **, and * denoting statistical significance at 1,5, and 10 percent level, respectively.

Column (1) reports estimates showing that over the time the policy was enacted, the overall trend was an increase in financial inclusion of about 37% and is significant. For the poor, there was an increase in financial inclusion of about 35% resulting from the microfinance policy leading to an overall observed change in financial inclusion of about 72%. Here the coefficient of interest added to the trend, and the overall effect is positive.

Column (2) includes other quartiles of the income distribution. Over the time the policy was enacted, the overall trend was an increase in financial inclusion of about 27% and is significant. For the poor, there was an increase in financial inclusion of about 45% resulting from the microfinance policy leading to an overall observed change in financial of about 72%. Here the coefficient of interest added the trend, and the overall effect is positive. The upper middle class and middle class groups show insignificant effects.

3.7 Conclusion

While financial inclusion is an objective in many developing countries, the most cost-effective means of achieving the desired objectives can be determined by the culture of the people, financial institutions, and government policy. Microfinance institutions represent a good vehicle for promotion of financial inclusion in developing countries. This paper examines the effect of the microfinance policy (MPRSF) of 2012 on improving financial inclusion in Nigeria. I use nationally representative data, the Global Financial Inclusion database from the World Bank. I observe the period before implementation of the policy and the post implementation period contrasting the low-income group affected by the policy and the high-income groups not affected by the policy. This variation is very important because it solves the self-selection problem evident in previous studies. Results show that the microfinance policy has a consistent and significant effect in improving financial inclusion in Nigeria. The result from this study is consistent with most of the studies on microfinance in developing countries. Additionally, this study shows that the result from Rai and Ravi (2011) showing higher insurance uptake is likely more a result of the insurance requirement than the microfinance policy.

BIBLIOGRAPHY

Aaron, H, & Slemrod, J. (1999, December 6). The South African Tax System: A Nation in Microcosm. Brookings. Retrieved from <https://www.brookings.edu/articles/the-south-african-tax-system-a-nation-in-microcosm/>

Anyanwu, C. M. (2004, November). Microfinance institutions in Nigeria: policy, practice and potentials. In G24 Workshop on *Constraints to Growth in Sub Saharan Africa, Pretoria, South Africa* (pp. 1-31).

Armendriz, B., & Morduch, J. (2010). The economics of microfinance. MIT Press.

Asiedu, E. (2002). On the determinants of foreign direct investment to developing countries: Is Africa different? *World Development*, 30(1), 107-119.

Asoni, A., & Sanandaji, T. (2014). Taxation and the Quality of Entrepreneurship. *Journal of Economics*, 113(2), 101-123.

Awe, A.A., & Olawumi, O.R. (2012), Determinant of income distribution in the Nigerian economy: 1997-2005. *International Business and Management*, 15(1), 126-137

Azmar, C., & Dharmapala, D. (2016). Tax Sparing, FDI, and Foreign Aid: Evidence from Territorial Tax Reforms. Working Paper

Babajide, A. (2011). Impact analysis of microfinance in Nigeria. *International Journal of Economics and Finance*, 3(4).

Babajide, A. A., Adegboye, F. B., & Omankhanlen, A. E. (2015). Financial inclusion and economic growth in Nigeria. *International Journal of Economics and Financial Issues*, 5(3).

- Barr, M. S. (2004). Microfinance and financial development. Working Paper
- Baumol, W. J. (2010). *The microtheory of innovative entrepreneurship*. Princeton University Press.
- Becchetti, L., & Castriota, S. (2011). Post Tsunami intervention and the socioeconomic well-being of microfinance borrowers. *World Development*, 39(6), 898-912.
- Bnassy-Qur, A., Fontagn, L., & Lahrche-Rvil, A. (2005). How does FDI react to corporate taxation? *International Tax and Public Finance*, 12(5), 583-603.
- Bhatt, N., Painter, G., & Tang, S. Y. (1999). Can microcredit work in the United States. *Harvard Business Review*, 77(6), 26.
- Bhorat, H. (2001). *Fighting poverty: Labour markets and inequality in South Africa*. Juta and Company Ltd.
- Blonigen, B. A. (2005). A review of the empirical literature on FDI determinants. *Atlantic Economic Journal*, 33(4), 383-403.
- Blonigen, B. A., & Davies, R. B. (2004). The effects of bilateral tax treaties on US FDI activity. *International Tax and Public Finance*, 11(5), 601-622.
- Brau, J. C., & Woller, G. M. (2004). Microfinance: A comprehensive review of the existing literature. *The Journal of Entrepreneurial Finance*, 9(1), 1.
- Bruce, D. & Gurley-Calvez, T. (2013). Do tax rate cuts encourage entrepreneurial entry? *Journal of Entrepreneurship and Public Policy*, 2(2), 178-202.
- Bruce, D. (2000). Effects of the United States tax system on transitions into self-employment. *Labor Economics*, 7(5), 545-574.

Bruce, D. (2002). Taxes and entrepreneurial endurance: Evidence from the self-employed. *National Tax Journal*, 55(1), 5-24.

Bruce, D., & Gurley-Calvez, T. (2008). Do tax rate cuts encourage entrepreneurial entry? Working Paper.

Central Bank of Nigeria (2011). Review of Microfinance policy, regulatory and supervisory framework, policy guideline. Retrieved from <https://www.cbn.gov.ng/>

Central Bank of Nigeria (2012). Revised Regulatory and Supervisory guidelines for Microfinance Bank (MFBs) in Nigeria. Retrieved from <https://www.cbn.gov.ng/>

Chemin, M. (2008). The benefits and costs of microfinance: evidence from Bangladesh. *The journal of development studies*, 44(4), 463-484.

Copestake, J., Dawson, P., Fanning, J. P., McKay, A., & Wright-Revollo, K. (2005). Monitoring the diversity of the poverty outreach and impact of microfinance: A comparison of methods using data from Peru. *Development Policy Review*, 23(6), 703-723.

Cullen, J. ., & Gordon, R. H. (2007). Taxes and entrepreneurial risk-taking: Theory and evidence for the US. *Journal of Public Economics*, 9/(7-8), 1479-1505.

Davies, R. B. (2004). Tax treaties and foreign direct investment: Potential versus performance. *International Tax and Public Finance*, 11(6), 775-802.

De Mooij, R. A., & Ederveen, S. (2003). Taxation and foreign direct investment: a synthesis of empirical research. *International tax and public finance*, 10(6), 673-693.

Demirg-Kunt, A., Klapper, L. F., Singer, D., & Van Oudheusden, P. (2015). The global finindex database 2014: Measuring financial inclusion around the world.

Desai, M. A., Foley, C. F., & Hines, J. R. (2004). Foreign direct investment in a world of multiple taxes. *Journal of Public Economics*, 88(12), 2727-2744.

- Dharmapala, D., & Hines, J. R. (2009). Which countries become tax havens? *Journal of Public Economics*, 93(9), 1058-1068.
- Domar, E. D., & Musgrave, R. A. (1944). Proportional income taxation and risk sharing. *Quarterly Journal of Economics*, 58(3), 388-422.
- Eshghi, G., Eshghi, A., & Li, R. (2016). Corporate Income Tax as a Determinant of Foreign Direct Investment in Central Europe. *European Journal of Business and Social Sciences*, 4(11), 111-123.
- Gentry, W. M., & Hubbard, R. G. (2001). Tax policy and entry into entrepreneurship. *Columbia University, Graduate School of Business, August 20, 1979-1993*.
- Hansson, A. (2008). The wealth tax and entrepreneurial activity. *The Journal of Entrepreneurship*, 17(2), 139-156.
- Henrekson, M., & Sanandaji, T. (2009). Entrepreneurship and the theory of taxation. *Small Business Economics*, 37(2), 167-185.
- Henrekson, M., Johansson, D., & Stenkula, M. (2010). Taxation, labor market policy and high-impact entrepreneurship. *Journal of Industry, Competition and Trade*, 10(3-4), 275-296.
- Hermes, N., & Lensink, R. (2011). Microfinance: its impact, outreach, and sustainability. *World development*, 39(6), 875-881.
- Hines Jr, J. R. (2000). Tax sparing and direct investment in developing countries. In *International Taxation and Multinational Activity* (pp. 39-72). University of Chicago Press.
- Holtz-Eakin, D. (2000). Public policy toward entrepreneurship. *Small Business Economics*, 15(4), 283-291.

Horton, M. (2005). The role of fiscal policy in stabilization and poverty alleviation. *Post-Apartheid South Africa: The First Ten Years*, 79-112.

Khandker, S. R. (2005). Microfinance and poverty: Evidence using panel data from Bangladesh. *The World Bank Economic Review*, 19(2), 263-286.

Kofi Ocran, M. (2011). Fiscal policy and economic growth in South Africa. *Journal of Economic Studies*, 38(5), 604-618.

KPMG. (n.d) Corporate tax table. Retrieved from <https://home.kpmg.com/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html>

Kpodar, K., & Andrianaivo, M. (2011). ICT, financial inclusion, and growth evidence from African countries.

Kransdorff, M. (2010). Tax incentives and foreign direct investment in South Africa. *Con-silience: The Journal of Sustainable Development*, (3), 68-84.

Li, Q. (2006). Democracy, Autocracy, and Tax Incentives to Foreign Direct Investors: A Cross National Analysis. *Journal of Politics*, 68(1), 62-74.

Manuel, A.T. (2002). The South African Tax Reform Experience Since 1994. Annual Conference of the International Bar Association. South Africa.

Mehrotra, A., & Yetman, J. (2015). Financial inclusion issues for central banks¹. *BIS Quarterly Review*, 83.

Moore, K. B. (2004). The effects of the 1986 and 1993 tax reform on self-employment. FEDS Working Paper No. 2004-05.

Moore, R. L. (1983). Self-employment and the incidence of the payroll tax. *National Tax Journal*, 491-501.

National Bureau of Statistics. (2012), Retrieved from <http://www.nigerianstat.gov.ng/>.

Nicodme, G. (2001). Computing effective corporate tax rates: comparisons and results. *Economic papers* 153, June

Nyamongo, M. E., & Schoeman, N. J. (2007). Tax reform and the progressivity of personal income tax in South Africa. *South African Journal of Economics*, 75(3), 478-495.

Park, C. Y. & Mercado Jr, R. V. (2015). Financial inclusion, poverty, and income inequality in developing Asia.

Parker, S. C. (1996). A time-series model of self-employment under uncertainty. *Economica*, 63(251), 459–475.

Parker, S. C. (2009). *The economics of entrepreneurship*. Cambridge, UK: Cambridge University Press.

Pellegrina, L. (2011). Microfinance and investment: A comparison with bank and informal lending. *World development*, 39(6), 882-897.

Pitt, M. M., & Khandker, S. R. (1998). The impact of group-based credit programs on poor households in Bangladesh: Does the gender of participants matter? *Journal of political economy*, 106(5), 958-996.

PWC. (n.d.) Worldwide tax summaries. Retrieved from <https://www.pwc.com/gx/en/services/tax/worldwide-tax-summaries.html>

Rai, A., & Ravi, S. (2011). Do spouses make claims? Empowerment and microfinance in India. *World Development*, 39(6), 913-921.

Robson, M. T. (1998). The rise in self-employment amongst UK males. *Small Business Economics*, 70(3), 199-212.

- Robson, M. T., & Wren, C. (1999). Marginal and average tax rates and the incentive for self-employment. *Southern Economic Journal*, 65(4), 757-773
- Sanders, C. K. (2002). The impact of microenterprise assistance programs: A comparative study of program participants, nonparticipants, and other low-wage workers. *Social Service Review*, 76(2), 321-340.
- Sarma, M., & Pais, J. (2008). Financial inclusion and development: A cross country analysis. *Indian Council for Research on International Economic Relations*, 1-28.
- Schreiner, M. (1999). Self-employment, microenterprise, and the poorest Americans. *Social Service Review*, 73(4), 496-523.
- Schuetze, H. J. (2000). Taxes, economic conditions and recent trends in male self-employment: a CanadaUS comparison. *Labour Economics*, 7(5), 507-544.
- Schuetze, H. J., & Bruce, D. (2004). Tax policy and entrepreneurship. *Swedish Economic Policy Review*, 77(2), 233-265.
- Slemrod, J. (1990). *The impact of the Tax Reform Act of 1986 on foreign direct investment to and from the United States* (No. w3234). National Bureau of Economic Research.
- Stabile, M. (2004). Payroll taxes and the decision to be self-employed. *International Tax and Public Finance*, 11(1), 31-53.
- Steenekamp, T. J. (2013). The progressivity of personal income tax in South Africa since 1994 and directions for tax reform. *Southern African Business Review*, 16(1), 39-57
- Stenkula, M. (2012). Taxation and entrepreneurship in a welfare state. *Small Business Economics*, 39(1), 7797.
- Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. *The American economic review*, 71(3), 393-410.

The Davis Tax Committee. (n.d.). Retrieved from <http://www.taxcom.org.za/>

The National Bureau of Economic Research. (n.d.). Retrieved from <http://www.nber.org/taxsim/>

The World Bank (n.d.) South Africa - Post Apartheid Labor Market Series 1994-2012 Retrieved from <http://microdata.worldbank.org/index.php/catalog/901>