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Abstract

Along with several structural reforms, Chile embarked upon a major income tax reform in the eighties. Its basic feature was a significant reduction in the corporate income tax rate. The purpose of this paper is to investigate empirically the link between the tax reform and the investment performance of Chile since the reform. Macroeconomic and microeconomic evidence is found to be consistent with the hypothesis of the reduction in the corporate income tax as being one of the determinants of the investment boom of the late eighties and nineties in Chile. Macro data for the period 1975-2003 are used and the evidence indicates that the tax reform explains an increase in private investment of three percentage points of the GDP. On the other hand, information on 87 publicly held companies is used to construct a panel for the period 1980-2002. The microeconomic evidence confirms that investment was positively affected by the tax reform.

Keywords: Private investment; Corporate income tax; User's cost of capital.

JEL classification: E22, H25, H32.

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1. Introduction

Chile experienced an investment boom starting in the mid-1980's. Private investment went from 12% of GDP in 1985 to 18% of GDP in 1990 and 23% in the mid-nineties. Along with many other market-oriented reforms, Chile undertook a tax reform that substantially reduced the corporate income tax. Tax on retained earnings was lowered from more than 50% in the early 1980s to 10% later in that decade.

The period between 1985 and 1997 is considered the "golden age" of the Chilean economy. GDP grew 7.6% on average and the percentage of the population below the poverty line was reduced from 40% to about 20%. This period coincides with the tax reform and the investment boom. But Chile also undertook several other reforms that aimed at having a more proper market economy and at increasing the rate of economic growth.[1] Some simple growth accounting shows that capital accumulation explains about one-third of the higher growth in Chile during this period (Vergara, 2003).

The purpose of this paper is to investigate empirically the link between the tax reform and the investment performance of Chile in 1975-2003. Figure 1 shows both the corporate income tax and private investment during this period. The corporate income tax rate began to fall in 1984, which is about the same time when private investment starts to show an upward trend that would last until the late nineties. On the other hand, the previous literature on this matter has produced mixed results. Hsieh and Parker (2002) present evidence that the reduction in tax on retained earnings increased the amount of funds available to constrained firms, hence producing an investment surge in these companies.

[1] See Larraín and Vergara (2001).

They argue that in countries with poorly developed financial markets, the taxation of retained profits removes internal funds from some firms where the marginal value of these funds exceeds the real interest rate. In this manner, a lower tax can have a significant effect on investment and growth. Medina and Valdés (1998) find that the availability of internal funds is a key determinant in the investment decisions of companies. In this case, the tax on retained earnings would negatively affect investment. However, they do not test directly for this effect.

Bustos et al. (2004) use a panel of 83 publicly held firms during 1985-1995 and make calculations of the user's cost of capital.[2] They conclude that taxes have very little effect on the desired capital stock because they are offset by the fact that the tax code allows for the deduction of interest and depreciation. This is not inconsistent with Hsieh and Parker since Bustos et al. use a panel of firms that are supposedly not financially constrained. In contrast, it seems inconsistent with Medina and Valdés given that both studies use the same data set. Although the work is interesting, there might be some features not captured by this methodology, which casts some doubts on the results. First, the tax code is sometimes much more complicated than just simple rules about the tax rate, the depreciation allowances and interest payments. Most of the times taxes actually paid are difficult to replicate by simple formulas.[3] If this were the case, it would be more accurate to use the tax rate directly instead of a simple version of the user's cost of capital. If the evidence shows that changes in the tax rate significantly affect investment, it would also be

[2] Jorgenson (1963), Hall & Jorgenson (1967).
[3] For instance, there are tax credits, allowances for new projects, taxes on interest and taxes on capital gains, among others, that make the analysis more complicated. In addition, the user's cost of capital is different if there are liquidity constraints, debt overhang problems and the like.

indirect proof that they also affect the user's cost of capital (measured properly). Second, in its pure form, this methodology assumes that if the project has losses at the beginning, the government will refund taxes. It is the usual practice that firms can carry forward losses but not that they get refunds for those losses when they occur. This small difference can have a significant impact on the present value of a project and hence, on the investment decision of a firm. Third, the rate of discount used for depreciation allowances has also been a matter of debate. Summers (1988) argues, based on evidence from 200 major corporations in the USA, that there is little basis for confidence in tax policy assessments relying upon specific assumed discount rates that are constant across companies. If this were the case, the return demanded on marginal projects would vary by much more across firms than do conventional capital cost measures. Finally, it is difficult to believe that in practice, capital accumulation would be the same regardless of whether the corporate tax rate is 1% or 99%, which is a result derived from this analysis.

On theoretical grounds, most models indicate that higher taxes should reduce the desired capital stock. However, there are cases (such as the user's cost model) where it is not always so and, depending upon certain parameters, it is possible for the desired capital stock to increase as taxes rise. This mixed result derived from the theoretical literature is why recent literature has focused on empirical estimates. In this paper I present macroeconomic and microeconomic evidence on this matter for Chile in the last three decades.

The tax reform in Chile was implemented with the explicit objective of increasing private investment. There were two types of arguments in regard to the reduction of the tax

rate for private investment. On the one hand, it was argued that a lower corporate income tax rate would reduce the cost of capital, thus increasing investment. On the other hand, there was the sense that lower taxes would increase funds available for firms and then induce firms to invest more.[4]

The paper is organized as follows. In section 2, I briefly discuss some theoretical models as well as empirical investment equations for developing countries. In section 3, macroeconomic evidence is presented to find out whether the reduction in corporate income taxes in Chile is related to the investment boom.

Section 4 presents microeconomic evidence on the subject. A panel of 87 publicly held companies is used for 1980-2002 to see whether the reduction in the tax rates caused an effect on their investment. The results are consistent with the macro evidence. Both the macro and micro evidence show that the tax reform of the 1980s had a significant positive effect on private investment. Section 5 presents my conclusion.

2. Investment equations for developing countries

In a neoclassical model, investment decisions are modeled assuming a representative firm that produces a good Y using capital (K) and labor (L). Supposing a very simple model, this firm maximizes the present value of the shareholders' dividends:

$$\underset{K,L}{Max}\int_0^{\infty} e^{-rt}\left[(1-t)\left(F(K_t,L_t)-wL_t\right)-\left((1-t(b+z)\right)p_t I_t\right]dt \qquad (1)$$

[4] This second argument is the same argument used by Hsieh and Parker (op. cit.).

subject to:

$$\dot{K}_t = I_t - dK_t \qquad (2)$$

where r is the interest rate, t is the corporate income tax rate, b is the fraction of investment financed with debt, z is the present value of the depreciation allowances, for tax purposes, of $1 invested today, p is the price of investment and I is investment.

From the first order conditions we find that the marginal product of capital is equal to the user's cost of capital:

$$\frac{F_K}{P} = \frac{1-t\,(b+z)}{1-t}(r+d) - \frac{\dot{P}}{P} = \text{CC} \qquad (3)$$

Equation (3) states that the desired level of capital depends on its user's cost. The user's cost, in turn, depends on the tax rate. But it depends on the tax rate in two different ways. On the one hand, a higher tax rate directly increases the cost of capital, reducing the desired capital stock. On the other hand, the fact that interest and depreciation are discounted for tax purposes reduces the cost of capital. In theory, if (b+z) is equal to one, then taxes do not affect the desired capital stock.[5] The classical example is when there is no debt (b = 0) and taxes are on the firm's cash flow (meaning that investment is depreciated instantaneously, i.e. z = 1). In this case:

[5] Bustos et al. (op. cit.) estimate b and z and conclude that their sum is close to one.

$$F_K = (r + d)p - \dot{p}$$

which implies that taxes are not relevant in the determination of the optimal stock of capital. It could also be the case that (b+z) > 1, which implies that the cost of capital decreases as taxes increase.

Although these cases are theoretically plausible, it could be misleading to consider such a simple tax code as the relevant one in investment decisions. In the case of Chile, there are taxes on capital gains, on interest, tax credits for investments, different types of depreciation, special rules for small firms, etc, which make it very difficult to draw conclusions from such a simple rule. In addition, in a developing country there might be a large number of firms that are liquidity-constrained, which implies that the user's cost of capital is only part of the whole story. Arguments such as the debt overhang could also affect the relevant cost of capital.

This is the reason why the strategy followed in this paper for the empirical estimations is to use directly the tax rate and other components of the user's cost of capital, such as the interest rate and the expected change in the price of capital. This is done both for the macroeconomic estimations as well as for the panel of firms (microeconomic estimations). Income taxes actually paid by firms are also used for the microeconomic estimations. As there is no long series of aggregate corporate taxes available, it is not possible to use corporate tax revenues in the macroeconomic regressions.

Let us assume a CES production function:

$$Y = g\left[dK^{-r} + (1-d)L^{-r}\right]^{-1/r} \qquad (4)$$

The marginal product of capital is equal to the cost of capital:

$$A\left[\frac{Y}{K}\right]^{\frac{1}{s}} = CC \qquad (5)$$

where: A = dg^{-r} and $s = \frac{1}{1+r}$

The desired stock of capital as a fraction of output is obtained from (5). It depends on the cost of capital. This, in turn, depends on the interest rate, taxes and the expected change in the price of capital (equation 3). Usually, the models assume that there are adjustment costs which, along with the accumulation identity ($\Delta K = I - dK$), allow the lagged investment to be introduced to the investment equations.

Investment equations for developing countries usually include other variables that may be derived as well as more restrictions or variables in the theoretical model. For instance, since the work of McKinnon (1973) and Shaw (1973), it has been accepted that financial deepening might be an important determinant to investment. The lack of a properly developed financial market introduces credit constraints that affect investment. This is clearly more important for developing than for developed countries. Larraín and Vergara (1993) find evidence of credit constraints being a significant factor determining to

investment in East Asian countries. Cardoso (1993) finds similar evidence for Latin American countries. Medina and Valdés (op.cit.) show that internal cash flow is an important determinant to investment in Chilean firms, suggesting the presence of liquidity constraints. In theoretical models, a constraint is imposed so that investment expenditures are bound by the availability of funds (Rama, 1993).

From a macroeconomic point of view, the foreign debt burden can also be an important determinant in investment. There are at least three channels for this effect. First, a large debt requires large foreign payments, which, under conditions of limited foreign financing, lead to a reduction in investment. Secondly, a large foreign debt can be seen as a source of potential tax increases that reduces the return on investment. Third, a high foreign debt can be seen as a source of macro instability. As its burden depends on uncertain world economic conditions (such as world interest rates, terms of trade and other variables that are beyond the control of the country), it will have an effect on economic policy decisions. Empirical evidence of this effect has been found for Latin America, Asia and a larger group of developing countries (Servén and Solimano, 1993). From a firm's perspective, a larger debt burden reduces the funds available for investment in the presence of liquidity constraints. As the firm becomes riskier, it also increases its relevant interest rate.

Political and economic instability also play a major role in investment decisions. The irreversibility literature has put emphasis on the cost of an irreversible investment in an uncertain scenario as compared to the value of waiting. The more unstable the economic environment, the greater the effect on investment. The empirical literature for developing

countries has used variables (such as exchange rate volatility, inflation volatility and the like) to capture uncertainty.[6]

Public investment is another variable that has usually been included in private investment equations. The traditional view is that public investment crowds our private investment. However, it could also be argued that public investment, specially in infrastructure, is a complement to private investment. In other words, the public capital stock enters the production function and increases the productivity of private investment. This effect has been found to be significant in different studies on developing countries (Servén and Solimano, op.cit.).

3. Macroeconomic Evidence

Investment equations for Chile were estimated for the period 1975-2003 using annual data. This covers the period in which the corporate income tax was reduced significantly. It went from 50% in the first few years to 10% in the second half of the 80% and to 0% in 1989. Then it was increased to 15% in 1990. The tax reform of 2001 increased the corporate income tax from 15% to 17% in a three-year period. It rose to 16% in 2002, to 16.5% in 2003 and to 17% in 2004.

Private investment was calculated as the difference between total capital formation and public investment. Capital formation data were obtained from national accounts and public investment data from the Budget Office. Both are in real terms (CH$ of 1996). Public investment was deflated by the same deflator as total capital formation. Private and public

[6] See Rama (op. cit.), Larraín and Vergara (1993), Cardoso (op.cit.).

investment are expressed as a percentage of both GDP and the stock of capital. The stock of capital is obtained from the Ministry of Finance (2001).

The credit granted by the banking system to the private sector as a percentage of GDP was used as a proxy for credit constraints. The credit data were obtained from the IMF. A series of foreign debt minus international reserves was used to take the debt overhang argument into account. The source of these data is the Central Bank of Chile. The variable is expressed as a percentage of GDP. The lagged variable was used in both cases to avoid possible problems with simultaneity.

The interest rate corresponds to the real rate for deposits from 90 days to 1 year. The data for interest rates on deposits are of better quality in Chile than the data for interest rates on loans. Furthermore, official series for rates on loans exist only since 1980. Taking into account that, according to different studies on the Chilean economy,[7] changes in interest rates have a lagging affect on aggregate spending, the interest rate in (t-1) is used for our estimations.

The relative price of capital goods is defined as the investment deflator divided by the GDP deflator. The relevant variable (see equation 3) that affects investment is the expected change in this variable. Perfect foresight is assumed, i.e. each year the expected variation in the relative price of capital is equal to the actual variation.

The regressions are presented in Table 1. In the first two equations, the dependent variable is private investment as a percentage of GDP while in the second two, it is private

[7] Mies et al. (2002) provide a comprehensive summary of the different studies made on the monetary policy transmission mechanism in Chile. They find a lag of between one and four quarters, depending upon the period considered. Other studies find longer lags.

investment as a percentage of the capital stock. In equation (1), all the coefficients have the expected sign[8] and are significant, with the exception of private credit, which is not. Public investment appears to be a substitute for private investment. The tax variable has a negative sign and it is significant. The coefficient indicates that for each 10 points that the tax rate decreases, private investment as a percentage of GDP increases by 0.57 percentage points in the short term and by 0.9 percentage points in the long term.

In equation (2), we took out the credit variable, which is not significant in equation 1. The rest of the coefficients basically remain unchanged. The coefficient associated with the tax rate remains virtually the same. This means that the tax reform in the mid-eighties that, after some changes in between, reduced the corporate income tax rate from 50% to 15%, caused, *ceteris paribus*, an increase in private investment of 2 percentage points of the GDP in the short term and of 3.1 percentage points of the GDP in the long term. If we take 1980 as the starting point, this means that the reform is responsible for approximately 40% of the total increase in private investment between that year and the mid-nineties.

The real exchange rate volatility, defined as the coeffcient of the variation in the real exchange rate, was used as a proxy for uncertainty, but it did not turn out to be significant.

As some variables show changes in levels, there is a presumption that some of them might be non-stationary. The degree of integration of the individual variables was checked using the augmented Dickey-Fuller test. It was verified that some of them are indeed I(1). Then co-integration among the variables was reviewed. A straightforward approach is to

[8] In the case of public investment, the expected sign is ambiguous since the traditional view is that it crowds out private investment; however, it could also be argued that at least some type of public investment (for instance, in infrastructure) is complementary to private investment.

conduct a unit root test for the estimated residuals. The null hypothesis of no co-integration was rejected at a1% level with a t statistics of -4.8.

A battery of tests was run to check for the properties of the residuals. They indicate the absence of autocorrelation (Lagrange Multiplier test) and heteroskedasticity (White test) as well as normality in the residuals (Jarque-Bera). Stability tests (CUSUM and CUSUMSQ) also indicate a stable equation.

In equations 3 and 4, we check our results using the dependent variable of private investment as a percentage of the capital stock. In fact, this is the dependent variable in most of the theoretical models. To be consistent, we use public investment also as a percentage of the total capital stock. The result confirms that private investment is negatively affected by higher corporate tax rates. In this case, however, both public investment and the interest rate became non significant.

Like in the first two regressions, we check for co-integration. The unit root test for the residuals rejects the hypothesis of no co-integration. We also check that the properties of the residuals are the desired ones.

In summary, the macroeconomic evidence is consistent regarding the effect of taxes on investment in Chile in the period 1975-2003. Indeed, it shows that the lower corporate income tax rate in Chile after the reform of 1984 had a signficant positive effect on private investment.

4. Microeconomic evidence

The next step is to obtain microeconomic evidence from a large group of firms. We use a panel of publicly held firms, those that publish Standardized Financial Reports[9] between 1980 and 2002. Data before 1980 are scarce and generally not comparable with the data after that year. The panel consists of the 87 firms that had information in 1980 and that still exist and have information today. The frequency is annual.

The dependent variable is the ratio of investment to fixed assets. Investment is defined as the difference between fixed assets in t and fixed assets in (t-1), adjusted by depreciation. In order to have both current and lagged fixed assets in currency for the same year, fixed assets in (t-1) are indexed by the inflation rate (CPI) of t.[10] Hence, investment is constructed as:

$$I_t = FA_t - FA_{t-1}(1+p_t) + dep_t$$

where FA corresponds to fixed assets and dep stands for depreciation. In the denominator, we use fixed assets in t-1 inflated by the CPI.

The same approach followed in the previous section is used for the explanatory variables. To capture the liquidity constraint effect, we use the operating profits in (t-1) divided by fixed assets in t-1. The debt effect is captured by the ratio of debt to total assets (both in t-1). The interest rate is also used as an explanatory variable. Real GDP growth is used to capture the general macroeconomic conditions. For the tax variable we use, like in

[9] Spanish acronym: FECU.

[10] Medina and Valdés (op. cit) index fixed assets in (t-1) by the investment deflator. However, in Chile, balance sheets are indexed by the CPI inflation rate. For instance, if there is neither depreciation nor new investment, then fixed assets in t will be equal to fixed assets in (t-1) indexed by the inflation rate in t. This is the reason why, for the purpose of comparing fixed assets in two different periods in Chile, it is more appropriate to use the inflation rate as the price index.

the previous section, the statutory tax rate. Here, however, we also use taxes actually paid by firms as a percentage of before-tax profits.

One of the problems with this large microeconomic data set is that there are some firms that have huge jumps in some variables in particular years, specifically in their fixed assets. Most of these jumps are due to changes in accounting practices. Fortunately, in this data set there are very few of these observations, but in order to avoid spurious results, we decided to eliminate these extreme cases by suppressing 1% of the observations that had the highest increase in fixed assets and 1% that had the highest decline in fixed assets.[11] This allows us to work with observations not contaminated by exogenous changes in accounting practices.

The panel regressions are estimated using fixed effects. The results are shown in Table 2. The tax variable in these regressions is the statutory tax rate. The coefficient of this variable has a negative sign and it is significant, confirming the conclusions obtained with the macroeconomic evidence. The interest rate and the debt ratio are, as expected, negative and significant. Lagged GDP growth is positive and significant. The operating profits are insignificant, which suggests the absence of liquidity constraints in these firms. However, it could be the case that the debt ratio, in addition to capturing the debt burden effect, is also capturing some liquidity constraint effect. Indeed, the larger the debt, the less funds available for new investment.

[11] In practice, this means eliminating observations where fixed assets increased more than five-fold in one year and observations where fixed assets declined by more than 70% in one year.

As opposed to the macroeconomic results, the variation in the investment deflator is not significant in this case. Different measures of macroeconomic instability (such as the real exchange rate volatility) did not prove to be significant.

A second exercise (Table 3) was conducted, but using actual taxes paid by the firms instead of the statutory tax rate. Taxes actually paid are expressed as a percentage of before-tax profits. The appeal of this variable is that the taxes actually paid by each firm are the best proxy for the tax burden since they consider all the numerous details and exceptions of the tax code. However, there is a problem with the variable itself and with the interpretation of the coefficient. Indeed, there are many cases where taxes are positive while after-tax profits are negative. The variable is then negative, suggesting a low tax burden, while in practice it is exactly the opposite (positive taxes with negative profits). For this reason, the decision was made to eliminate all the negative observations for these particular estimations. This is why instead of 1795 observations, the regressions in Table 3 use 1501 observations. Although many observations are missing, the estimated coefficient is not subject to misinterpretation. A larger value means higher taxes. Thus, a negative coefficient indicates that higher taxes reduce investment.

The results presented in Table 3 show that the tax variable is negative and significant, indicating that higher taxes reduce investment. Like in the previous regressions, the interest rate and the debt ratio are, as expected, negative and significant. Lagged GDP growth is positive and significant. The operating profits do not prove significant.

The regressions in Tables 2 and 3 suggest that the corporate tax variable is likely to affect private investment in Chile through two channels. On the one hand, higher taxes

increase the cost of capital, hence reducing the desired stock of capital and investment. This effect is more likely to be captured by the statutory tax rate in the regressions in Table 2. On the other hand, higher taxes reduce funds available for investment. This effect is captured when taxes actually paid are used as the tax variable (Table 3). Although the fact that operating profits are not significant in the regressions seems to be contradictory with the liquidity constraint interpretation, it is possible, as explained above, that the debt burden variable is capturing the liquidity constraint effect.

Both tax variables are included in equation 4 of Table 3: the tax rate and taxes actually paid. Both are negative and significant. This indicates, as suggested before, that taxes affect investment through the cost of capital channel and through the liquidity channel.

5. Conclusions

Along with several structural reforms, Chile embarked upon a major income tax reform in the eighties. The corporate income tax was significantly reduced from 50% at the beginning of the decade to 10% in the second half of the 1980's, and even to 0% for a single year in 1989. In 1990, the corporate income tax was raised to 15% and recently to 17%. From the mid-eighties to the late 1990's, the macroeconomic performance of Chile was impressive by almost any standard. GDP growth averaged 7.6% between 1985 and 1997 while unemployment and inflation dropped in a scenario of overall macroeconomic stability. Private investment showed an impressive performance, climbing from 12% of GDP in 1984-86 to 22.5% of GDP in 1995-97.

This paper addresses the issue of the relationship between the corporate income tax reform and the performance of private investment. Macroeconomic and microeconomic evidence is found to be consistent with the hypothesis that the reduction in the corporate income tax is one of the determinants in the investment boom. Macroeconomic evidence for the period 1975-2003 in Chile indicates that the tax reform explains an increase in private investment of three percentage points of the GDP.

Information on 87 publicly held companies is used to construct a panel for the period 1980-2002. The microeconomic evidence confirms that investment was positively affected by the tax reform. Either with the statutory tax rate or with taxes actually paid by firms, we found that lower taxes induced a higher private investment ratio. Our estimations indicate that there are two channels in which taxes affect investment: on the one hand, higher taxes increase the cost of capital (cost of capital channel); and on the other, they reduce internal funds available for investment (liquidity constraint channel).

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Table 1
Estimated Results: Macroeconomic Regressions

Dependent Variable	Private Investment as a % of GDP		Private Investment as a % of capital stock	
Variable	Equation 1	Equation 2	Equation 3	Equation 4
Constant	21.00**	20.85**	9.71**	9.55**
	(5.83)	(5.86)	(4.76)	(4.69)
Private Investment as a % of GDP in t-1	0.39**	0.36**	-	-
	(2.53)	(2.44)	-	-
Private Investment as a % of capital stock in t-1	-	-	0.46**	0.41**
	-	-	(2.90)	(2.71)
Net Foreign Debt in t-1	-6.60**	-7.05**	-3.56**	-3.92**
	(-4.42)	(-5.17)	(-3.83)	(-4.52)
Public Investment as a % of GDP	-1.02*	-0.99*	-	-
	(-1.83)	(-1.81)	-	-
Public Investment as a % of capital stock	-	-	-1.38	-1.34
	-	-	(-1.59)	(-1.55)
Tax Rate	-0.06*	-0.06*	-0.04**	-0.04**
	(-1.94)	(-1.94)	(-2.41)	(-2.41)
Investment Deflator (% change)	0.07*	0.07*	0.04*	0.04*
	(1.96)	(2.03)	(1.99)	(2.07)
Interest Rate in t-1	-0.26**	-0.25*	-0.11	-0.09
	(-2.09)	(-2.00)	(-1.55)	(-1.38)
Private Credit in t-1	-0.01	-	-0.01	-
	(-0.76)	-	(-1.04)	-
Observations	28	28	28	28
R2	0.91	0.91	0.92	0.92
Test F	30.02	35.66	33.12	38.32

t statistic in parenthesis. ** 5% significance. * 10% significance.

Table 2
Estimated Results: Microeconomic Regressions
Tax Rate

Dependent Variable: Investment as a % of fixed assets

Variable	Equation 1	Equation 2	Equation 3
Constant	0.980**	0.980**	0.990**
	(23.74)	(23.70)	(23.65)
Operating Profits/Total Assets in t-1	0.001	0.001	0.002
	(0.09)	(0.08)	(0.12)
Total Liabilities/Total Assets in t-1	-0.210**	-0.209**	-0.198**
	(-2.96)	(-2.95)	(-2.78)
Tax Rate	-0.479**	-0.434**	-0.429**
	(-2.91)	(-2.24)	(-2.22)
Interest Rate	-0.026**	-0.026**	-0.027**
	(-3.43)	(-3.45)	(-3.48)
Real GDP Growth	0.006*	0.007*	0.006*
	(1.88)	(1.93)	(1.73)
Real Exchange Rate Volatility	-	-0.002	-0.005
	-	(-0.45)	(-0.95)
Change in Investment Deflator	-	-	-0.002
	-	-	(-1.45)
Number of Observations	1795	1795	1795
Number of groups	87	87	87
R-squared	0.071	0.071	0.072
F-statistic	25.91	21.62	18.84
Prob (F-statistic)	0.000	0.000	0.000

t statistic in parenthesis. ** 5% significance. * 10% significance.

Table 3
Estimated Results: Microeconomic Regressions
Tax Burden

Dependent Variable: Investment as a % of fixed assets

Variable	Equation 1	Equation 2	Equation 3	Equation 4
Constant	1.012**	1.014**	1.018**	1.016**
	(21.97)	(21.97)	(21.79)	(22.04)
Operating Profits/Total Assets in t-1	0.006	0.006	0.006	0.006
	(0.39)	(0.38)	(0.40)	(0.39)
Total Liabilities/Total Assets in t-1	-0.332**	-0.331**	-0.327**	-0.335**
	(-4.18)	(-4.16)	(-4.09)	(-4.21)
Taxes/Before-Tax Profits	-0.001**	-0.001**	-0.001**	-0.001**
	(-2.78)	(-2.79)	(-2.79)	(-2.77)
Tax Rate	-	-	-	-0.333*
	-	-	-	(-1.87)
Interest Rate	-0.046**	-0.044**	-0.044**	-0.033**
	(-9.40)	(-8.11)	(-8.11)	(-3.84)
Real GDP Growth	0.012**	0.011**	0.011**	0.007**
	(4.83)	(4.68)	(4.45)	(2.02)
Real Exchange Rate Volatility	-	-0.003	-0.004	-
	-	(-0.73)	(-0.89)	-
Change in Investment Deflator	-	-	-0.001	-
	-	-	(-0.54)	-
Number of Observations	1501	1501	1501	1501
Number of groups	87	87	87	87
R-squared	0.084	0.084	0.084	0.086
F-statistic	25.76	21.54	18.50	22.08
Prob (F-statistic)	0.000	0.000	0.000	0.000

t statistic in parenthesis. ** 5% significance. * 10% significance.

Figure 1
Private Investment (%GDP) and the Corporate Income Tax Rate