ABSTRACT

FIRM FINANCING AND CORPORATE TAX CHANGES

by Anna Jinna Gu

The objective of this paper is to investigate the relationship between corporate income tax and firm financing decision. Based on the raw data from the WBES and OECD statistics, I gather firm-level information and use three types of corporate income tax rate. The ordinary least square regression results evidence that under the expectation of high corporate tax rate, firms appear to seek out external financing rather than internal financing. Furthermore, firms with relatively low labor cost tend to pick up external financing.

FIRM FINANCING AND CORPORATE TAX CHANGES

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Dedication

To my beloved family.

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Chapter 1

Introduction

Corporate income tax is a central topic for financial corporate economics and it is one of the most important tax types that businesses need to pay. Some economists focus on the international effect of corporate income tax on income distribution (Randolph [2006], Auerbach [2018] and Bawa and Vu [2020]). Some are particularly concerned about the investment aspect in response to high or low corporate income tax rate (Sandmo [1974], Boadway and Bruce [1979] and Edgerton [2012]). Since corporate income tax affects the supply of funds available in a firm as well as corporate financing structures, the incentives for investors to make a new investment are dramatically influenced by the change of corporate income tax. The two major sources for firm financing or capital allocation are internal funds and external funds. Internal funds is a self-sufficient source and it refers to the cash that shareholders generate from the inside of companies, such as sales of business services, stocks, and assets. One major benefit of internal funds is that the internal providers are able to monitor and control the assets directly since they have better access to the internal flow information. The external funds, however, comes from outside of the companies, such as banks, the stock market, and even friends and relatives (Gertner et al. [1994]). The availability of external funds is preferred since it means a much larger amount of new sources to companies, compared to raising funds from

internal funds source only (Dobrovolsky [1958]). Furthermore, internal financing and external financing are strongly relevant to each other. For example, according to Dobrovolsky [1958], when facing a high marginal tax rate, the internal market may be constrained, but the loss of internal financing can be partially offset by an increased use of external funds. External funds sources, such as borrowing from new bank credit, can have a stimulating impact and they are more available to use.

One major goal of almost all firms is to pursue profit maximization. To achieve this goal, it is crucial to make appropriate financing decisions with regards to the expected change on the corporate income tax rate since different firm financing strategies will significantly affect cost-effectiveness. In this paper, I investigate the nexus between corporate income tax rate and firm financing decision with the consideration of labor cost of firms as an additional control. Based on the data derived from the *World Bank Enterprise Survey* (WBES) and the *Organisation for Economic Cooperation and Development* (OECD) statistics, I find that there is a negative effect of (combined) corporate income tax rate on internal financing, but a positive impact on the external financing, especially for the percentage of capital borrowed from bank sectors as well as others such as friends, relatives and money lenders. However, the effects of corporate income tax rate less deductible on any capital financing decision are not significant. Additionally, the labor cost only plays a role in the financing decision when depending on any types of corporate income tax rate. Using the ordinary least square(OLS) regression, the results evidence that under the expectation of high corporate tax rate, firms appear to seek out external financing rather than internal financing. Furthermore, firms with relatively low labor cost tend to pick up external financing.

In the remainder of this paper, section 2 describes the related literature on relationships between corporate income taxation and firm financing decisions. Section 3 presents the collected main data, which have been analyzed and processed. Section 4 shows the main methodology for this paper. Section 5 discusses the main results from the data. In section 6, the major conclusions are drawn.

Chapter 2

Literature Review

There is growing economic literature on the relationship between corporate income tax and corporate financing decisions. In particular, Buettner et al. [2009], Egger et al. [2014] and Overesch and Wamser [2010] underscore the correlation between a high local corporate income tax and internal borrowing financing for multinational firms. They all use Microdatabase Direct Invest (MIDI), which are provided by the Deutsche Bundesbank (German Central Bank), to analyze foreign affiliates of German MNEs with internal capital markets. Buettner et al. [2009] and Egger et al. [2014]point out that there is likely a positive relationship between the local corporate tax rate and internal debt financing. The magnitude is not very large but still statistically significant. In terms of the tax sensitivity for this internal debt financing, the results might be underestimated if potential constraints (such as interest-stripping rules or thin-capitalization rules) are given. Overesch and Wamser [2010] apply bilateral tax-rate differentials to investigate the correlation between local income tax and internal debt financing. They find that even only applying thin-capitalization rules, the positive relationship between the local income tax and internal debt financing still holds. The aforementioned publications focus more on the effects of high corporate tax on internal market channels. In addition, the researchers mainly explore German multinational enterprises instead

of other countries. Therefore, the results are highly constrained since the corporate income tax rate is dramatically different between high-tax and low-tax countries. Due to these reasons, the corresponding corporate financing policies might also be quite different for the non-Germany firms regardless the size and other unobserved characteristics. For example, their results seem to be contradictory to the conclusions I drew in this paper. The details of my results will be thoroughly discussed in the following sections.

Other researchers from financial economy, Lintner [1954], Lamont [1997], Wu and Yue [2009] and Okoyeuzu et al. [2012], state that a higher corporate income tax indeed hurts the internal funds availability. Both Lamont [1997] and Okoyeuzu et al. [2012] adopt panel data methods to exploit the relationships between corporate tax and financing decisions in Nigeria and Italy, separately. They stress that when corporate tax rate is high, capital financing from internal funds earnings is decreasing. This is due to the reason that the sale of fixed assets, which could provide additional financial support if needed for a company, as well as debt collection would decrease. Similar to other reported publications, the conclusions drawn from this paper are highly limited since the financing decisions only apply to firms on the internal funds channel in one country within a short period. Lamont [1997], however, emphasizes more on the effects of corporate income tax changing on the internal funds available for investment by using the demand and supply theory. According to the results, the author points out that firms retain lower profit in response to a higher corporate income tax, which will result in much less internally available financing. In the meantime, the dividend payments to stockholders may also be reduced, leading to reduced investment. The increased corporate income tax rate will lead to the decreased supply of internal funds and increased reliance on external financing ([Lamont, 1997]). Even though this paper mentioned external financing, the interaction between corporate tax and external financing was not fully revealed.

Another major field, which attracts a great amount of attentions, is the relationship between the corporate tax rate and use of debt financing. Gordon and Lee [2007] and Steinmüller et al. [2019]

state that when the corporate tax is high, the incentive for firms to use debt finance will also be high so that firms will be able to partially avoid profit tax from deductible interest cost. The paper written by Gordon and Lee [2007] take the interaction between corporate tax rate and interest rate into account and find that 11.3 percentage points increase on the use of debt could be expected when moving the effective tax rate on corporate income from the minimum to maximum. To validate their assumptions, Steinmüller et al. [2019] adopt the survey approach and survey corporate tax rates in 142 countries. Even though the survey data may bias the result in a positive or negative way. Similarly, Graham and Harvey [2001] conduct survey-based analysis in U.S and Canada and state that there is a positive correlation between the corporate income tax rate and the debt financing usage. However, when taking firm size into consideration, they stress that firms with smaller sizes may have lower corporate income tax and usually have more reliance on the use of debt for financing borrowing.

On the contrary, large corporations may have a higher income tax rate and they benefit much more from the tax-induced advantages, therefore, large corporations have higher tax incentives to use debt from external resources. Some other papers (such as Gordon and Lee [2001] and Ohrn [2018]) also treat the firm size as an additional control to estimate impacts of corporate taxes on debt financing. Interestingly, the work from Ruf [2011] illustrates that there is no empirical evidence that external debt financing can be used as a tax planning tool for tax incentives among multinationals of different sizes. For all these reported publications, sample sizes are quite small and the surveyed scopes are restricted to only one or two countries. As indicated by Feldstein et al. [1979] and Auerbach [2002], the change in tax rate would alter the return earned on both equity and debt investment, thus affecting the debt-to-equity ratio (a measurement of financial risk for firms). The authors point out that tax deduction could decrease the cost of equity capital relative to debt for firms. Therefore, debt-to-equity ratio would be lowered and corporations are more willing to borrow from debt.

Nonetheless, this debt-to-equity ratio measurement may expose specification bias and have a lower

effect at the margin since it is based on years of separate decisions cumulatively. To address this problem, MacKie-Mason [1990], Gropp [1997] and Alworth and Arachi [2001], utilize an incremental choice approach to avoid specification bias resulted from using the debt-to-equity ratio. Particularly, MacKie-Mason [1990] and Alworth and Arachi [2001] exploit firms marginal tax rate, which is an additional taxable income paid by the firm, and point out that companies with lower anticipation on the marginal tax rate with respect to the interest deduction tend to be unlikely to use debt financing, since these firms are not likely to finance new investment with them.

Gropp [1997] comes up with the same conclusion using effective corporate tax rates. Results show that the effective tax rates for firms and level of debt financing are positively related. As can be seen from the discussion above, a substantial amount of reported publications shows that there is a positive correlation between estimating the effect of corporate tax and external financing (especially the debt financing). Such a conclusion is also consistent with one of the main findings drawn from my paper. It should be noted that a paper, which was written by Ashton [1991], holds a different opinion. The author contends that the corporate taxation only plays a negligible role, rather than major, in shaping financial policy under the UK taxation system and companies with tax advantages in the UK are less likely to use debt finance. This could be true for the UK in the 80s-90s, but this finding may be dated since the taxation system has been changing across time for all the countries.

From the above, some papers research on the (marginal) corporate tax rate and internal debt financing channel, whereas most papers in this field concentrate more on the relationship between corporate tax and external debt financing. This paper, however, investigates the effects of both internal and external channels. Secondly, this paper uses an expansive database across a 50-year period over 163 countries and 250,862 firms. As a comparison, most sample sizes in the literature are relatively small and the reported publications mainly focus on a single country. In addition, this paper might benefit firms in deciding corporate financing strategy adoption with respect to the expected change on corporate income tax rate by providing valuable information.

Chapter 3

Data

This paper uses the data from the *World Bank Enterprise Survey* (WBES) and the *Organisation for Economic Cooperation and Development* (OECD) statistics. The WBES follows the normal survey instructions to gather firm-level information on the business environment from the top managers and business owners. It covers a broad range of topics including finance access, obstacles to growth, labor, performance measure and other topics that may affect firm-level productivity. The aim of this survey is to advise the government to develop new policies or programs so as to improve the overall productivity growth at firm-level. The OECD statistics provides a platform for users to research and extract data on a wide number of subjects from many countries. In this paper, only corporate income tax rates are used to study the effects of changes in corporate income tax rate on other variables. The sample data in this essay contains 163 countries and 250,862 firms from 1970 to 2020.

Table 3.1 reports the descriptive statistics of main variables in the regression using the data from both the WBES data and OECD statistics data. Combined Corporate Income Tax Rate", Corporate Income Tax Rate" and Corporate Income Tax Rate Less Deductible" are the three main types of corporate income tax rates used in this paper. Capital Financed From Internal Funds Earnings",

Table 3.1: Descriptive Statistics

Variable	Mean	Std. Dev.	N
Combined Corporate Income Tax Rate (%)	26.83	9.23	147,102
Corporate Income Tax Rate (%)	26.68	9.18	147,102
Corporate Income Tax Rate Less Deductible (%)	26.43	9.16	144,167
Capital Financed From Internal Funds Earnings (%)	70.98	33.98	96,085
Capital Borrowed From Banks (%)	13.15	25.29	95,485
Capital Borrowed From Non-Bank Financial Institutions (%)	1.61	7.77	95,578
Capital Purchased On Credit From Suppliers/Customers (%)	10.68	21.34	95,331
Capital Financed By Other (%)	3.67	13.78	89,207
Log of Labor Cost	11.16	2.46	148,508

Capital Borrowed From Banks", Capital Borrowed From Non-Bank Financial Institutions", Capital Purchased on Credit From Suppliers/Customers" and Capital Financed By Others" measure the proportion of firm establishment's working capital that was financed from these five resources. These five resources are dependent variables in the regression and also the indicators of the financing strategy for firms. Log of Labor Cost" measures the log of total labor cost (per dollar) including wages, salaries, bonuses etc. in the last fiscal year. The third column in table 3.1 represents the observations of each sample.

Figure 3.1 reveals the distribution of the proportion of firm establishments working capital, which was financed from those five resources. As illustrated, most firms have a very high percentage of working capital financed from internal refunds or retaining earnings, whereas, these firms do not borrow much from banks and non-bank financial institutions to finance their working capital. Another major conclusion that can be drawn from the figure is that firms tend to purchase less on

credit from suppliers or customers as well as finance less from other resources including money lenders, relatives or friends.

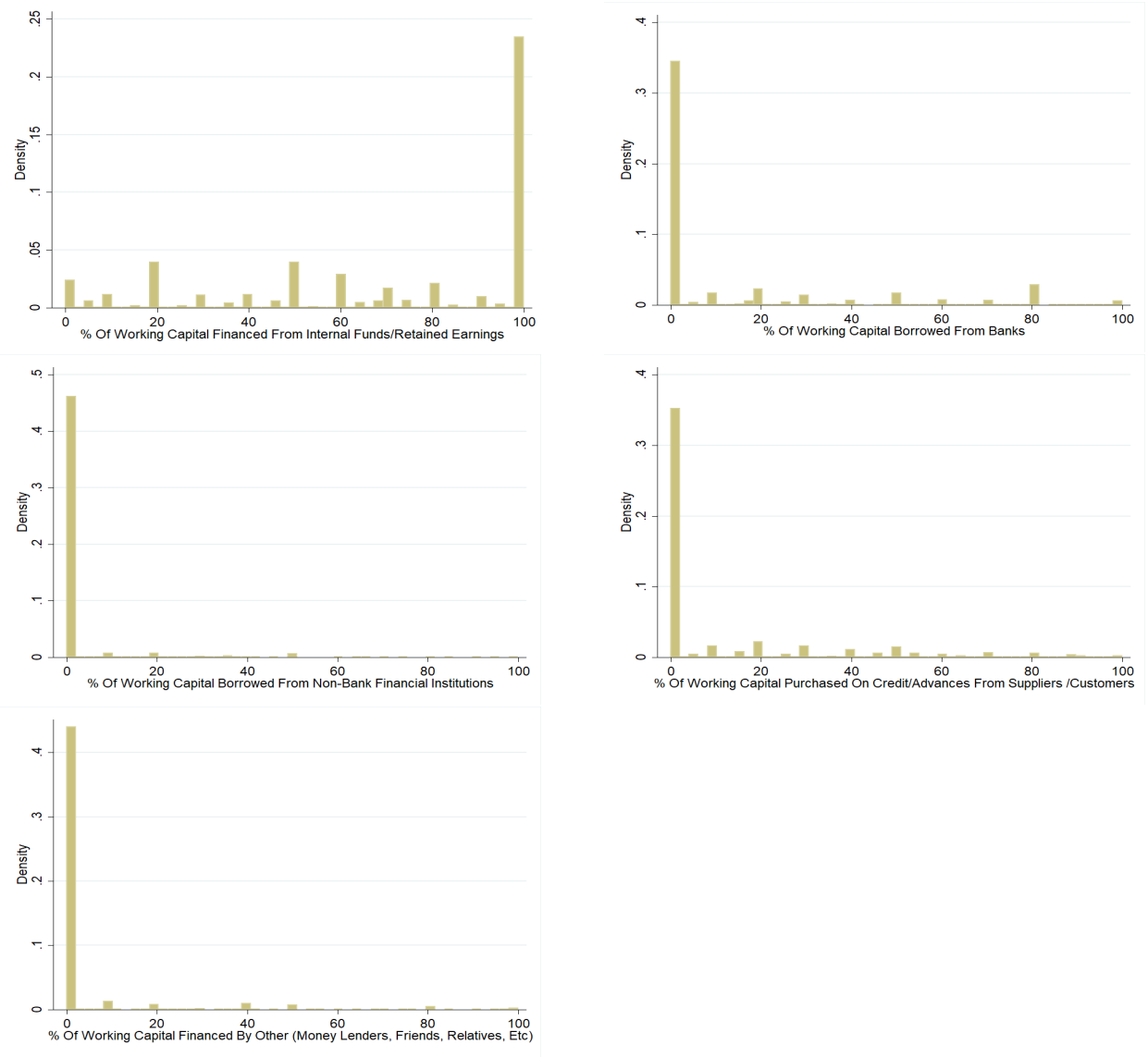

Figure 3.1: The distribution of the proportion of firm establishments working capital that was financed from different resources

Chapter 4

Methodology

In this paper, the impact of corporate tax changes on firm financing is estimated using the following equation:

$$\begin{aligned} Financing = \beta_1 \ (Corporate\ Tax\ Rate) + \beta_2 \ ln(Labor\ Cost) \\ + \beta_3 \ [(Corporate\ Tax\ Rate) \times ln(Labor\ Cost)] \\ + \delta_1(Year) + \delta_2 \ (Country) + \epsilon \end{aligned}$$

where the dependent variable *Financing* represents the proportion of firm establishment's working capital that was financed from those five different resources. The independent variables are the following: *Corporate Tax Rate* represents three main types of corporate income tax that could affect the firm financing (including combined corporate income tax, corporate income tax and corporate income tax less deductible), which could affect the firm financing; The interaction term captures whether any type of corporate income taxes have a different effects on the outcome depending on the log of labor cost; *ln(Labor Cost)* is the log of total labor cost in the last fiscal year; Besides, *Year* and *Country* include as controlling for year and country fixed effect specific to the firm financing.

The identification strategy adopted by this paper is that taxes changing in macro level impacts individual firm behavior, but given the individual firm behavior, it does not impact how the corporate tax changes.

In our methodology, I assume that the exogeneity assumption holds. That is, the error term ε has to be uncorrelated with the corporate income tax rate for all the time period. Even though I did not test the contemporaneous exogeneity for this key regressor, I can fairly assume that corporate income tax rate changes are unpredictable by past information. For example, if any change in corporate income tax depends on politics or different parties which make different policies on state legislation, then tax is independent of economic performance. Therefore, the endogeneity issue should not be a concern in this paper.

However, potential measurement errors might arise resulting from the imperfect measurement of the true variables. The data gathering for the log of labor cost is from WBES, which is a survey data source. Due to this reason, the response from top managers may be inaccurate and the results may be biased. In Addition, the estimation of the key regressor (corporate income tax rate) may also suffer potential measurement error. According to Goolsbee [2000], it is evidenced that measurement error exists in the tax component of cost of capital, accounting for more than 10 percent of the tax term's variance when estimating the impact of corporate income tax on investment. The Instrumental Variable (IV) estimator could be a solution to eliminate this error-in-variables bias. This paper does not specifically focus on the cost of capital. Therefore, it is hard to judge how big measurement errors are. Further study needs to be researched in the future.

Chapter 5

Results

In this section, the effects of three types of corporate income tax rate as well as labor cost on firms decision on financing will be presented and analyzed through OLS regression, respectively.

The regression reported in table 5.1 focuses on the effects of combined income tax rate and labor cost on financing behavior of the sample firms. It indicates that 1 percentage point increases in the combined corporate income tax rate is associated with 2.35 percent decrease in the internal financing for firms, 0.14 percent increase in the non-bank financing, 1.66 percent increase in other external financing at 10 percent level, keeping other variable constant. However, the effects of combined corporate income tax rate on the percentage of capital borrowed from Banks or purchased on credit are not statistically significant. As a result, it can be seen that higher combined corporate income tax rate would encourage firms to seek out external financing instead of internal financing.

When there is a high expectation of tax increasing for firms, the investment from investors will be constrained since there is a low expectation that they could get a high return, the profits retaining from firms now becomes lower, meaning that any dividend payment to stockholders are more likely to decrease (Lamont [1997]). In this case, there won't be enough cash flow from the internal funds earnings to serve as firm financing. Therefore, firms have to raise money from external resources.

Table 5.1: The effects of combined corporate income tax rate and labor cost on financing behavior of firms

	(1)	(2)	(3)	(4)	(5)
	Internal	Banks	Non-Bank	Credit	Others
(Combined)					
Corporate Income Tax Rate	-2.349*	-0.636	0.136*	1.330	1.655*
	(1.060)	(1.151)	(0.0641)	(0.966)	(0.811)
Log Labor Cost	-0.00982	0.120	-0.0290	-0.115	0.0599
	(0.0888)	(0.0869)	(0.0278)	(0.0744)	(0.0635)
Constant	61.04**	10.51	4.272**	24.49	-47.54
	(20.34)	(17.75)	(1.468)	(13.27)	(27.41)
N	45,716	45,635	45,574	45,585	41,887

Note: In column (1), the dependent variable "Internal" measures the percentage of capital financed from internal funds earnings; Column (2) "Banks" measures the percentage of capital borrowed from banks; column (3) "Non-Bank" measures the percentage of capital borrowed from non-bank financial institutions; column (4) "Credit" measures the percentage of capital purchased on credit from suppliers/customers; column (5) "Others" measures the percentage of capital financed by others (money lenders, friends, relatives etc.). Here I cluster the standard error at the country level. Additionally, I also control for year and country dummy in this regression. They have been trimmed from the table for presentation purposes. Standard errors are in parentheses beneath the coefficient estimates.*,** and *** denote statistical significance at the 10%, 5%, and 1% levels respectively.

Taking debt financing - an external financing resources as an example, debt financing can be considered as a reduced discount rate, then the cost of this external financing becomes tax deductible (Steinmüller et al. [2019]). As a result, when corporate income tax rate is high, companies tend to choose debt finance, because they can avoid some business profit tax from deductible interest cost (Gordon and Lee [2001]). However, the change in the labor cost does not impact much on how

firms' financing decision from the results showing on this table since it is statistically insignificant through all the channels.

Table 5.2: The effects of combined corporate income tax rate and labor cost on financing behavior of firms (with interaction)

	(1)	(2)	(3)	(4)	(5)
	Internal	Banks	Non-Bank	Credit	Others
(Combined)					
Corporate Income Tax Rate	-2.114*	-0.795	0.110	1.244	1.663*
	(1.056)	(1.152)	(0.0633)	(0.957)	(0.808)
Log Labor Cost	0.609	-0.298	-0.0979*	-0.341	0.0830
	(0.327)	(0.230)	(0.0454)	(0.240)	(0.144)
(Combined) Corporate Income					
Tax Rate × Log Labor Cost	-0.0216	0.0146	0.00240*	0.00791	-0.000808
	(0.0113)	(0.00873)	(0.00119)	(0.00695)	(0.00415)
Constant	53.01*	15.93	5.165**	27.43*	-47.79
	(21.05)	(18.22)	(1.652)	(13.56)	(27.42)
N	45,716	45,635	45,574	45,585	41,887

Note: In column(1), the dependent variable "Internal" measures the percentage of capital financed from internal funds earnings; Column (2) "Banks" measures the percentage of capital borrowed from banks; column (3) "Non-Bank" measures the percentage of capital borrowed from non-bank financial institutions; column (4) "Credit" measures the percentage of capital purchased on credit from suppliers/customers; column (5) "Others" measures the percentage of capital financed by others (money lenders, friends, relatives etc.). Here I cluster the standard error at the country level. Additionally, I also control for year and country dummy in this regression. They have been trimmed from the table for presentation purposes. Standard errors are in parentheses beneath the coefficient estimates.*,** and *** denote statistical significance at the 10%, 5%, and 1% levels respectively.

The results form table 5.1 are slightly different from table 5.2 after adding the interaction term between combined corporate income tax and log of labor cost. Now combined corporate income tax does not have a significant statistical impact on the percentage of capital borrowed from non-bank financing. However, the log of labor cost and interaction do have the impacts on this channel. The quantitative interpretation for these two variables are difficult. After standardizing the result, it shows that on average, one standard deviation increase in the log of labor cost of firms in our sample is associated with a 0.031 decrease in the percentage for the capital borrowed from non-bank financial institutions at 10 percent level, ceteris paribus. The interaction would be one standard deviation increase in the corporate income tax rate conditional on one standard deviation increase in the log of labor cost is associated with 0.034 increase in the percentage for the non-bank financing, ceteris paribus. Hence, the results evidence that firms with relatively low labor cost are more likely to pick up this external financing channel.

The effects of corporate income tax rate and labor cost on firm financing behavior with or without interaction term are illustrated in table 5.3 and table 5.4, respectively. Both table 5.3 and table 5.4 have exactly the same statistically significance with table 5.1 and table 5.2, because the results are almost the same. The only difference lies on the constant term on capital borrowed from non-bank financial institutions as well as capital purchased on credit from suppliers or customers for both of the two regressions. However, the constant term itself does not imply any significance for the results on this paper. The effect or the change is negligible.

Table 5.3: The effects of corporate income tax rate and labor cost on financing behavior of firms

	(1)	(2)	(3)	(4)	(5)
	Internal	Banks	Non-Bank	Credit	Others
Corporate Income Tax Rate	-2.349*	-0.636	0.136*	1.330	1.655*
	(1.060)	(1.151)	(0.0641)	(0.966)	(0.811)
Log Labor Cost	-0.00982	0.120	-0.0290	-0.115	0.0599
	(0.0888)	(0.0869)	(0.0278)	(0.0744)	(0.0635)
Constant	61.04**	10.51	-6.113*	-46.39	-47.54
	(20.34)	(17.75)	(2.688)	(31.34)	(27.41)
N	45,716	45,635	45,574	45,585	41,887

Note: In column (1), the dependent variable "Internal" measures the percentage of capital financed from internal funds earnings; Column (2) "Banks" measures the percentage of capital borrowed from banks; column (3) "Non-Bank" measures the percentage of capital borrowed from non-bank financial institutions; column (4) "Credit" measures the percentage of capital purchased on credit from suppliers/customers; column (5) "Others" measures the percentage of capital financed by others (money lenders, friends, relatives etc.). Here I cluster the standard error at the country level. Additionally, I also control for year and country dummy in this regression. They have been trimmed from the table for presentation purposes. Standard errors are in parentheses beneath the coefficient estimates.*,** and *** denote statistical significance at the 10%, 5%, and 1% levels respectively.

Table 5.4: The effects of corporate income tax rate and labor cost on financing behavior of firms (with interaction)

	(1)	(2)	(3)	(4)	(5)
	Internal	Banks	Non-Bank	Credit	Others
Corporate Income Tax Rate	-2.112*	-0.797	0.110	1.243	1.662*
	(1.056)	(1.152)	(0.0634)	(0.957)	(0.808)
Log Labor Cost	0.615	-0.301	-0.0974*	-0.342	0.0802
	(0.328)	(0.230)	(0.0448)	(0.238)	(0.142)
Corporate Income Tax Rate					
× Log Labor Cost	-0.0218	0.0147	0.00239*	0.00794	-0.000711
	(0.0114)	(0.00881)	(0.00118)	(0.00692)	(0.00413)
Constant	52.94*	15.97	-5.374*	-43.93	-47.76
	(21.05)	(18.22)	(2.651)	(31.15)	(27.41)
N	45,716	45,635	45,574	45,585	41,887

Note: In column (1), the dependent variable "Internal" measures the percentage of capital financed from internal funds earnings; Column (2) "Banks" measures the percentage of capital borrowed from banks; column (3) "Non-Bank" measures the percentage of capital borrowed from non-bank financial institutions; column (4) "Credit" measures the percentage of capital purchased on credit from suppliers/customers; column (5) "Others" measures the percentage of capital financed by others (money lenders, friends, relatives etc.). Here I cluster the standard error at the country level. Additionally, I also control for year and country dummy in this regression. They have been trimmed from the table for presentation purposes. Standard errors are in parentheses beneath the coefficient estimates.*,** and *** denote statistical significance at the 10%, 5%, and 1% levels respectively.

As for how the corporate income tax rate less deductible and labor cost take an effect on firm financing decision. The regression results reveal that both corporate tax rate less deductible and labor cost are not statistically significance across all the firm financing channels, as shown in table 5.5. A tax deduction is able to lower the tax liability for firms, because corporations subtract the amount of deductible taxation from their business income. Here, corporate income tax deductions include office supplies, business insurance, business travel and meals expense etc. Even though corporate income tax less deductible is statistically insignificant for the firm financing decision based on the result, the outcome will be different when the log of labor cost and interaction are taken into consideration.

From table 5.6 on column (3), it is clear that both the logs of labor cost and interaction term are statistically significant on the percentage of non-bank financing institutions. For all regressions which include the interaction term, the absolute coefficient value of log of labor cost in table 5.6 is slightly larger, compared with that in table 5.2 and table 5.4. Despite this difference, the overall effect is almost the same. To better compare results, all the variables are standardized. On average, a one standard deviation increase in the log of labor cost of firms is associated with a 0.032 decrease in the percentage for non-bank financing at 10 percent level, ceteris paribus. The interaction would be one standard deviation increase in the corporate income tax rate conditional on one standard deviation increases in the log of labor cost is associated with a 0.036 increase in the percentage for the non-bank financing, ceteris paribus. Again, firms with low labor cost are more likely to choose external financing.

Table 5.5: The effects of corporate income tax rate less deductible and labor cost on financing behavior of firms

	(1)	(2)	(3)	(4)	(5)
	Internal	Banks	Non-Bank	Credit	Others
Corporate Income Tax Rate					
Less Deductible	-2.433	0.313	0.140	1.079	1.052
	(1.390)	(0.915)	(0.0806)	(1.348)	(0.649)
Log Labor Cost	-0.0148	0.0915	-0.0276	-0.0973	0.0759
	(0.0894)	(0.0935)	(0.0285)	(0.0758)	(0.0651)
Constant	60.58**	15.40	4.274**	23.06	-27.54
	(21.01)	(17.84)	(1.498)	(15.74)	(22.62)
N	44,560	44,479	44,418	44,429	41,029

Note: In column (1), the dependent variable "Internal" measures the percentage of capital financed from internal funds earnings; Column 2) "Banks" measures the percentage of capital borrowed from banks; column (3) "Non-Bank" measures the percentage of capital borrowed from non-bank financial institutions; column (4) "Credit" measures the percentage of capital purchased on credit from suppliers/customers; column (5) "Others" measures the percentage of capital financed by others (money lenders, friends, relatives etc.). Here I cluster the standard error at the country level. Additionally, I also control for year and country dummy in this regression. They have been trimmed from the table for presentation purposes. Standard errors are in parentheses beneath the coefficient estimates.*,** and *** denote statistical significance at the 10%, 5%, and 1% levels respectively.

Table 5.6: The effects of corporate income tax rate less deductible and labor cost on financing behavior of firms (with interaction)

	(1)	(2)	(3)	(4)	(5)
	Internal	Banks	Non-Bank	Credit	Others
Corporate Income Tax Rate					
Less Deductible	-2.188	0.154	0.111	0.976	1.074
	(1.382)	(0.923)	(0.0794)	(1.338)	(0.666)
Log Labor Cost	0.630	-0.328	-0.102*	-0.366	0.134
	(0.339)	(0.224)	(0.0444)	(0.243)	(0.118)
Corporate Income Tax Rate					
Less Deductible × Log Labor Cost	-0.0227	0.0147	0.00261*	0.00946	-0.00204
	(0.0119)	(0.00845)	(0.00114)	(0.00701)	(0.00320)
Constant	52.20*	20.85	5.239**	26.56	-28.15
	(21.79)	(18.37)	(1.668)	(16.25)	(23.12)
N	44,560	44,479	44,418	44,429	41,029

Note: In column (1), the dependent variable "Internal" measures the percentage of capital financed from internal funds earnings; Column (2) "Banks" measures the percentage of capital borrowed from banks; column (3) "Non-Bank" measures the percentage of capital borrowed from non-bank financial institutions; column (4) "Credit" measures the percentage of capital purchased on credit from suppliers/customers; column (5) "Others" measures the percentage of capital financed by others (money lenders, friends, relatives etc.). Here I cluster the standard error at the country level. Additionally, I also control for year and country dummy in this regression. They have been trimmed from the table for presentation purposes. Standard errors are in parentheses beneath the coefficient estimates.*,** and *** denote statistical significance at the 10%, 5%, and 1% levels respectively.

Chapter 6

Robustness Check

This section discusses whether adding additional recession year dummy across different sub-samples (small firm size vs large firm size, G-14 countries vs non G-14 countries) will change the conclusion in this paper.

The statistics of variable *recession* is from *National Bureau of Economic Research* (NBER) which includes the U.S. recession year data, I use this data for all countries in the sample. The regressions reported in table 6.1, table 6.2 and table6.3 show the results when controlling for recession in the regression. It gives the identical numbers and statistical significances comparing with table 5.2, table 5.4 and table 5.6. As a result, this clearly validates the main conclusion which demonstrated from this paper.

However, after controlling for firm sizes with adding recession dummy, the results seems to be different. Seeing from table 6.4, table 6.5 and table 6.6, it evidences that recession year plays an important role for capital financing borrowed from internal funds and other sources (such as bank lenders, friends or relatives). For example on table 6.4, when there is a recession, the percentage of capital borrowed from internal financing funds is associated with a 34.02 increases at 10% level but a 24.36 decreases for external financing at 1% level. However, the change on any types of corporate

Table 6.1: The effects of controlling recession on the firm financing behavior

	(1) Internal	(2) Banks	(3) Non-Bank	(4) Credit	(5) Others
(Combined) Corporate Income Tax Rate	-2.114*	-0.795	0.110	1.244	1.663*
	(1.056)	(1.152)	(0.0633)	(0.957)	(0.808)
Log Labor Cost	0.609	-0.298	-0.0979*	-0.341	0.0830
	(0.327)	(0.230)	(0.0454)	(0.240)	(0.144)
(Combined) Corporate Income Tax Rate × Log Labor Cost	-0.0216	0.0146	0.00240*	0.00791	-0.000808
	(0.0113)	(0.00873)	(0.00119)	(0.00695)	(0.00415)
Recession	-6.922	18.94	5.311	-3.865	-18.40**
	(15.40)	(18.46)	(4.076)	(5.484)	(6.690)
Constant	53.01*	15.93	5.165**	27.43*	-47.79
	(21.05)	(18.22)	(1.652)	(13.56)	(27.42)
N	45,716	45,635	45,574	45,585	41,887

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6.2: The effects of controlling recession on the firm financing behavior

	(1) Internal	(2) Banks	(3) Non-Bank	(4) Credit	(5) Others
Corporate Income Tax Rate	-2.112*	-0.797	0.110	1.243	1.662*
	(1.056)	(1.152)	(0.0634)	(0.957)	(0.808)
Log Labor Cost	0.615	-0.301	-0.0974*	-0.342	0.0802
	(0.328)	(0.230)	(0.0448)	(0.238)	(0.142)
Corporate Income Tax Rate × Log Labor Cost	-0.0218	0.0147	0.00239*	0.00794	-0.000711
	(0.0114)	(0.00881)	(0.00118)	(0.00692)	(0.00413)
Recession	-6.921	18.94	5.311	-3.865	-18.40**
	(15.40)	(18.46)	(4.076)	(5.483)	(6.690)
Constant	52.94*	15.97	-5.374*	-43.93	-47.76
	(21.05)	(18.22)	(2.651)	(31.15)	(27.41)
N	45,716	45,635	45,574	45,585	41,887

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6.3: The effects of controlling recession on the firm financing behavior

	(1) Internal	(2) Banks	(3) Non-Bank	(4) Credit	(5) Others
Corporate Income Tax Rate Less Deductible	-2.188	0.154	0.111	0.976	1.074
	(1.382)	(0.923)	(0.0794)	(1.338)	(0.666)
Log Labor Cost	0.630	-0.328	-0.102*	-0.366	0.134
	(0.339)	(0.224)	(0.0444)	(0.243)	(0.118)
Corporate Income Tax Rate Less Deductible × Log Labor Cost	-0.0227	0.0147	0.00261*	0.00946	-0.00204
	(0.0119)	(0.00845)	(0.00114)	(0.00701)	(0.00320)
Recession	-6.702	16.71	5.301	-3.277	-17.05*
	(15.52)	(18.17)	(4.073)	(5.937)	(6.550)
Constant	52.20*	20.85	5.239**	26.56	-28.15
	(21.79)	(18.37)	(1.668)	(16.25)	(23.12)
N	44,560	44,479	44,418	44,429	41,029

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

income tax rate and log of labor cost do not impact the financing behavior for small size firms since they are not statistically significant from zero.

Similarly, refer to table 6.7, table 6.8 and table 6.9, choosing internal or external financing strategy for large firms seems to be unaffected by any types of corporate income tax rate and log of labor cost because they are statistically insignificant though all the channels. Nonetheless, the impact of recession variable on financing behaviour of large firms is completely opposite, compared to small size companies. For example in table 6.7, holding other variable constant, the percentage of capital borrowed from internal financing funds is associated with a 35.18 decreases at 1% level but a 46.63 increases for the percentage of capital borrowed from banks at 1% level, a 2.532 decreases for the percentage of borrowing from non-banks financing institutions at 10% level, a 15.82 decreases for the percentage of capital financed from credit at 5% level as well as a 3.783 increases for percentage of borrowing from others at 10% level in a recession year. In short, the recession year is statistically significant through all the firm financing channels. Generally speaking, it can be concluded that large firms tend to rely more on external financing rather than internal financing in a recession year since the magnitudes of capital borrowed from internal sources and banks are relatively large.

Table 6.4: The effects of combined corporate income tax rate on the financing behavior of small size firms

	(1) Internal	(2) Banks	(3) Non-Bank	(4) Credit	(5) Others
(Combined) Corporate Income Tax Rate	-1.937	-0.403	0.0712	1.417	1.307
	(1.393)	(0.440)	(0.0715)	(1.272)	(0.674)
Log Labor Cost	0.547	-0.285	-0.0491	-0.126	-0.0879
	(0.340)	(0.206)	(0.0368)	(0.252)	(0.178)
(Combined) Corporate Income Tax Rate × Log Labor Cost	-0.0194	0.0111	0.000760	0.00308	0.00463
	(0.0115)	(0.00742)	(0.00122)	(0.00925)	(0.00625)
Recession	34.02*	-10.31	2.655	-9.175	-24.36***
	(15.24)	(14.90)	(4.725)	(6.786)	(6.070)
Constant	114.8**	32.90***	2.572	-22.54	7.769
	(37.39)	(7.965)	(2.520)	(29.77)	(9.157)
N	30,950	30,889	30,844	30,856	27,622

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6.5: The effects of corporate income tax rate on the financing behavior of small size firms

	(1) Internal	(2) Banks	(3) Non-Bank	(4) Credit	(5) Others
Corporate Income Tax Rate	-1.931	-0.405	0.0715	1.413	1.306
	(1.393)	(0.440)	(0.0716)	(1.272)	(0.674)
Log Labor Cost	0.560	-0.287	-0.0481	-0.135	-0.0920
	(0.340)	(0.206)	(0.0364)	(0.251)	(0.176)
Corporate Income Tax Rate × Log Labor Cost	-0.0200	0.0112	0.000727	0.00340	0.00480
	(0.0116)	(0.00746)	(0.00122)	(0.00926)	(0.00625)
Recession	34.02*	-10.31	2.655	-9.176	-24.36***
	(15.23)	(14.90)	(4.725)	(6.786)	(6.070)
Constant	114.6**	32.93***	2.562	-22.45	7.824
	(37.39)	(7.965)	(2.520)	(29.77)	(9.160)
N	30,950	30,889	30,844	30,856	27,622

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6.6: The effects of corporate income tax rate less deductible on the financing behavior of small size firms

	(1) Internal	(2) Banks	(3) Non-Bank	(4) Credit	(5) Others
Corporate Income Tax Rate Less Deductible	-1.954	-0.473	0.0804	1.913	0.773
	(1.664)	(0.530)	(0.0824)	(1.581)	(0.602)
Log Labor Cost	0.571	-0.294	-0.0548	-0.196	-0.0421
	(0.350)	(0.205)	(0.0360)	(0.223)	(0.147)
Corporate Income Tax Rate Less Deductible × Log Labor Cost	-0.0206	0.0116	0.00103	0.00552	0.00346
	(0.0120)	(0.00746)	(0.00119)	(0.00780)	(0.00526)
Recession	34.12*	-10.14	2.622	-10.56	-22.91***
	(15.49)	(14.94)	(4.717)	(7.200)	(5.762)
Constant	32.30	32.71***	2.964	-34.83	-22.74
	(16.67)	(8.366)	(1.585)	(33.83)	(13.52)
N	30,466	30,405	30,360	30,372	27,401

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6.7: The effects of combined corporate income tax rate on the financing behavior of large size firms

	(1) Internal	(2) Banks	(3) Non-Bank	(4) Credit	(5) Others
(Combined) Corporate Income Tax Rate	-0.170	-0.940	0.0661	1.143	-0.151
	(1.070)	(0.700)	(0.0913)	(1.380)	(0.235)
Log Labor Cost	0.165	0.0361	-0.0366	-0.164	0.0449
	(0.248)	(0.176)	(0.0476)	(0.178)	(0.0520)
(Combined) Corporate Income Tax Rate × Log Labor Cost	-0.00204	-0.00315	0.00234	0.00290	-0.000936
	(0.00615)	(0.00463)	(0.00160)	(0.00425)	(0.00116)
Recession	-35.18***	46.63***	-2.532*	-15.82**	3.783*
	(3.724)	(5.912)	(1.002)	(5.664)	(1.886)
Constant	93.44*	-20.82	-0.835	-42.39	0.284
	(38.88)	(25.34)	(2.589)	(46.45)	(5.547)
N	14,766	14,746	14,730	14,729	14,265

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6.8: The effects of corporate income tax rate on the financing behavior of large size firms

	(1) Internal	(2) Banks	(3) Non-Bank	(4) Credit	(5) Others
Corporate Income Tax Rate	-0.169	-0.941	0.0658	1.143	-0.151
	(1.070)	(0.700)	(0.0913)	(1.380)	(0.235)
Log Labor Cost	0.168	0.0330	-0.0374	-0.165	0.0466
	(0.248)	(0.175)	(0.0478)	(0.178)	(0.0521)
Corporate Income Tax Rate × Log Labor Cost	-0.00214	-0.00306	0.00236	0.00293	-0.000990
	(0.00614)	(0.00460)	(0.00161)	(0.00425)	(0.00117)
Recession	-35.18***	46.63***	-2.533*	-15.82**	3.783*
	(3.724)	(5.912)	(1.002)	(5.664)	(1.887)
Constant	93.40*	-20.79	-1.208	-42.38	-0.310
	(38.88)	(25.34)	(3.118)	(46.44)	(4.661)
N	14,766	14,746	14,730	14,729	14,265

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6.9: The effects of corporate income tax rate less deductible on the financing behavior of large size firms

	(1) Internal	(2) Banks	(3) Non-Bank	(4) Credit	(5) Others
Corporate Income Tax Rate Less Deductible	0.798	0.0764	-0.00711	-0.582	-0.383
	(1.284)	(0.679)	(0.109)	(1.175)	(0.272)
Log Labor Cost	0.156	0.0275	-0.0358	-0.153	0.0523
	(0.250)	(0.176)	(0.0512)	(0.181)	(0.0539)
Corporate Income Tax Rate Less Deductible × Log Labor Cost	-0.00204	-0.00275	0.00245	0.00252	-0.00110
	(0.00613)	(0.00447)	(0.00180)	(0.00430)	(0.00119)
Recession	-37.18***	44.51***	-2.387*	-12.24**	4.160*
	(3.752)	(5.293)	(0.951)	(4.421)	(1.968)
Constant	57.04	-1.594	-4.161	15.80	12.72
	(37.26)	(26.26)	(3.621)	(39.98)	(9.217)
N	14,094	14,074	14,058	14,057	13,628

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

At last, I divide the sample into G-14 and non G-14 countries without adding recession dummy. Table 6.10, table 6.11 and table 6.12 investigate the effects of corporate income tax rate on the firm financing behavior for G-14 countries. These tables reveal that any types of corporate income tax rates are important for all the financing channels since they are all statistically significant at different levels. Although the log of labor cost and interaction term are not statistical significance on the percentage of capital financed from non-bank institutions as seeing from table 5.2, table 5.4 and table 5.6. It is indeed statistically significant for the percentage of capital borrowed from bank sectors. Therefore, the main conclusion in this paper still holds. That is, firms with relatively low labor cost prone to choose external financing.

However, it becomes a different story after only using non G-14 countries. According to table 6.13 and table 6.14, one percentage point increases on the (combined) corporate income tax rate is associated with around 2.2 percent decreases on the capital borrowed from retained earnings at 10% level, ceteris paribus. Other variables including log of labor cost and interaction term in the regressions are not statistically significant through all channels. Whereas for the effects of corporate income tax rate less deductible and log of labor cost on firm financing behavior. Table 6.15 demonstrates that it fails to be statistically significant for both internal and external financing. As a consequence, the main results from this paper is mainly driven by the developing countries.

Table 6.10: The effects of combined corporate income tax rate on the firm financing behavior for G-14 countries

	(1) Internal	(2) Banks	(3) Non-Bank	(4) Credit	(5) Others
(Combined) Corporate Income Tax Rate	0.264*	0.364***	0.0341*	-1.806***	1.183***
	(0.0716)	(0.0167)	(0.0138)	(0.0685)	(0.0458)
Log Labor Cost	-0.00341	-0.293**	-0.0416	0.284	0.0978
	(0.269)	(0.0702)	(0.0481)	(0.246)	(0.167)
(Combined) Corporate Income Tax Rate × Log Labor Cost	-0.000720	0.00841***	0.00177	-0.00780	-0.00139
	(0.00588)	(0.00131)	(0.00119)	(0.00576)	(0.00382)
Constant	69.27***	-5.679***	-0.608	66.06***	-30.20***
	(3.224)	(0.859)	(0.571)	(2.913)	(1.983)
N	16,473	16,391	16,331	16,343	15,846

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6.11: The effects of corporate income tax rate on the firm financing behavior for G-14 countries

	(1) Internal	(2) Banks	(3) Non-Bank	(4) Credit	(5) Others
Corporate Income Tax Rate	-0.199*	0.493***	0.0538**	-1.740***	1.443***
	(0.0804)	(0.0181)	(0.0143)	(0.0753)	(0.0480)
Log Labor Cost	0.0259	-0.290**	-0.0422	0.254	0.0937
	(0.280)	(0.0671)	(0.0467)	(0.254)	(0.162)
Corporate Income Tax Rate × Log Labor Cost	-0.00157	0.00837***	0.00179	-0.00697	-0.00128
	(0.00611)	(0.00125)	(0.00117)	(0.00590)	(0.00369)
Constant	89.11***	-11.18***	-1.456	63.16***	-41.31***
	(3.611)	(0.925)	(0.599)	(3.226)	(2.089)
N	16,473	16,391	16,331	16,343	15,846

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6.12: The effects of corporate income tax rate less deductible on the firm financing behavior for G-14 countries

	(1) Internal	(2) Banks	(3) Non-Bank	(4) Credit	(5) Others
Corporate Income Tax Rate Less Deductible	-0.198*	0.490***	0.0535**	-1.731***	1.435***
	(0.0804)	(0.0181)	(0.0143)	(0.0754)	(0.0480)
Log Labor Cost	0.0266	-0.290**	-0.0422	0.253	0.0936
	(0.280)	(0.0670)	(0.0467)	(0.254)	(0.162)
Corporate Income Tax Rate Less Deductible × Log Labor Cost	-0.00159	0.00837***	0.00179	-0.00695	-0.00128
	(0.00612)	(0.00125)	(0.00117)	(0.00590)	(0.00369)
Constant	89.05***	-11.05***	-1.440	62.78***	-41.00***
	(3.613)	(0.923)	(0.599)	(3.230)	(2.088)
N	16,473	16,391	16,331	16,343	15,846

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6.13: The effects of combined corporate income tax rate on the firm financing behavior for non G-14 countries

	(1) Internal	(2) Banks	(3) Non-Bank	(4) Credit	(5) Others
(Combined) Corporate Income Tax Rate	-2.245*	-0.261	0.00973	1.268	1.741
	(1.029)	(1.300)	(0.0890)	(0.966)	(0.964)
Log Labor Cost	0.898	-0.203	-0.0986	-0.452	0.0257
	(0.471)	(0.261)	(0.0727)	(0.380)	(0.185)
(Combined) Corporate Income Tax Rate × Log Labor Cost	-0.0308	0.00924	0.00137	0.00974	0.00332
	(0.0170)	(0.00987)	(0.00323)	(0.0141)	(0.00792)
Constant	48.79*	25.60*	15.13***	-47.65	-60.75
	(20.93)	(10.06)	(3.608)	(33.66)	(33.37)
N	29,243	29,244	29,243	29,242	26,041

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6.14: The effects of corporate income tax rate on the firm financing behavior for non G-14 countries

	(1) Internal	(2) Banks	(3) Non-Bank	(4) Credit	(5) Others
Corporate Income Tax Rate	-2.243*	-0.262	0.0101	1.270	1.739
	(1.029)	(1.300)	(0.0891)	(0.966)	(0.963)
Log Labor Cost	0.900	-0.205	-0.0978	-0.447	0.0212
	(0.472)	(0.262)	(0.0730)	(0.381)	(0.185)
Corporate Income Tax Rate × Log Labor Cost	-0.0310	0.00933	0.00134	0.00959	0.00351
	(0.0171)	(0.00993)	(0.00326)	(0.0142)	(0.00798)
Constant	48.76*	25.63*	15.12***	-47.70	-60.70
	(20.93)	(10.05)	(3.606)	(33.65)	(33.36)
N	29,243	29,244	29,243	29,242	26,041

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6.15: The effects of corporate income tax rate less deductible on the firm financing behavior for non G-14 countries

	(1) Internal	(2) Banks	(3) Non-Bank	(4) Credit	(5) Others
Corporate Income Tax Rate Less Deductible	-2.339	0.885	-0.0149	0.978	1.102
	(1.373)	(1.071)	(0.108)	(1.375)	(0.680)
Log Labor Cost	0.966	-0.152	-0.109	-0.555	0.0674
	(0.487)	(0.279)	(0.0762)	(0.378)	(0.159)
Corporate Income Tax Rate Less Deductible × Log Labor Cost	-0.0341	0.00537	0.00186	0.0149	0.00269
	(0.0178)	(0.0107)	(0.00353)	(0.0139)	(0.00741)
Constant	54.95***	25.09**	3.049**	20.77	-36.47
	(9.704)	(8.554)	(1.079)	(16.70)	(24.59)
N	28,087	28,088	28,087	28,086	25,183

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Chapter 7

Conclusion

In this paper, a simple econometrics approach is used to investigate the relationship between firm financing and corporate income tax using the database from the WBES and the OECD. In total, three types of corporate income tax and five financing resources are taken into account. Additionally, this paper estimates the effect of adding labor cost and its interaction with corporate tax rates as an additional control to analyze if there is a significant change in the outcome.

Based on the results, it can be concluded that, in general, there appears to be a negative relationship between (combined) corporate income tax rate and internal financing, whereas a positive correlation for external financing channel, particularly for the percentage of capital borrowed from non-banking financing and others. The labor cost is statistically significant when the interaction item is added. It shows that industries with lower cost are prone to use external financing when their expectation for corporate income tax rate is high. Nonetheless, When it comes to the impact of corporate income tax rate less deductible across any firm financing channel, however, my results show that it is not statistically significant.

There are several limitations in this paper. First, the frequency of this data is limited since the WBES data does not track the same firm over time. Consequently, this low frequency results in no

true panel. The results may be skeptical without having a panel due to unobserved characteristics for different types of firms. Second, even though I consider that adding only log of labor cost as control in the model is adequate based on the data at the firm level, the results might still be under or overestimated due to the omitted variable bias.

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