Indian Public Policy Review 2022, 3(1): 42-58

Incidence of Corporate Income Tax: Estimates from Indian Manufacturing Firms

Sankarganesh Karuppiah

K R Shanmugam*

Abstract

The purpose of this paper is to examine the incidence of corporate tax on capital and labour in Indian manufacturing sector. The paper employs 'Seemingly Unrelated Regression Method' with add-up restriction based on the work of Desai, Foley and Hines (2007). The study shows that, for the manufacturing sector in India for the period 2005-19, the corporate tax has a significant adverse impact on both wages paid to employees and profit after tax. Capital owners bear 96.3% of the tax burden and labours bear only 3.7%. The adverse effect on wages is slightly higher in public firms than in private firms. The relative tax burdens of labour and capital remained the same in the pre-2008 global economic crisis and post-crisis periods. The impact on both wages and profits increase with age and size of firms but decrease with leverage. These results will be useful to policymakers and other stakeholders to take appropriate strategies to design the corporate tax policy such that it is more redistributive, and not a burden for labour in manufacturing firms in India. The paper contributes to the scant empirical literature on corporate tax incidence.

Keywords: Corporate tax incidence, General equilibrium analysis, Indian manufacturing firms, Panel data, SUR estimation method

JEL Classification: H32, J30, H25, H22, C33

Publication Date: 14 January 2022

* K. Sankarganesh is a Ph.D. Scholar and Dr. K.R. Shanmugam is the Director and Professor at Madras School of Economics.

I Introduction

Tax incidence analysis is important as it distinguishes between who is legally responsible for paying a tax and who ultimately bears the tax burden. As the corporate income tax (CIT) is an important direct tax, an understanding of who bears the burden of corporate income tax (CIT) is necessary for policy-makers and taxpayers alike. Harberger (1962) has initiated the theoretical debate on who bears the burden of CIT. Using a closed economy model, he has shown that capital bears the entire burden of the CIT in U.S. Several extensions of Harberger's closed economy model have emerged by allowing product differentiation (e.g., Gravelle and Kotlikoff, 1993) and several market imperfections (e.g., Atkinson and Stiglitz, 1980).

However, open economy models have produced different outcomes. For instance, Diamond and Mirrlees (1971) use a small open economy model and demonstrate that if capital is perfectly mobile, labour will bear the entire burden of the CIT. Revisiting the corporate tax incidence in an open economy framework, Harberger (1995) finds that the burden of CIT fully shifts to labour. Gravelle (2013), however, after reviewing open economy models argues that results of many of these studies cast some doubt on the conclusion that labour bears the all or bulk of the burden of CIT. Thus, there is no consensus among economists on who, theoretically, bears the burden of CIT.

Empirical literature on the topic is relatively new. Results from recent studies suggest that the corporate tax burden is borne at least to some extent by labour, though there is disagreement on the extent of the burden borne by labour (see Hassett and Mathur 2006, 2015; Desai, Foley, and Hines 2007; Arulampalam, Devereux, and Maffini 2012; and Ebrahimi and Vaillancourt 2016).

In India, the Central Government levies the CIT. As India's CIT rate was relatively high (the statutory rate peaked at 64.8% in 1989-90) as compared to many other nations, various committees including Kelkar Committee (2002) recommended reduction in the CIT rate. As a result, the rate has been reduced over the years. The CIT revenue (nominal) in India increased from Rs. 5,335 crores in 1990-91 to Rs. 35,696 crores in 2000-01, and further to Rs. 6,10,500 crores in 2019-20. Given the revenue significance of CIT and changes in its structure over the years in India, the central question is: who bears the burden of corporate tax in India-- capital owners or labourers? and by how much? In this study, an attempt is made to answer the question by estimating the relative burden of CIT shared by capital and labour in India, using the data from 10,676 manufacturing firms during 2005-2019.

This study extends the existing empirical works on this sparsely researched issue in the following ways. Following Lall (1967), which was based on a sample size of 257 Indian public limited manufacturing firms during 1956-1965, we analyse the incidence of CIT on capital and wages of manufacturing firms. While most other existing studies analyse the efficiency effect of CIT, this study analyses the relative burden of CIT shared by the labour and capital of Indian manufacturing firms based on the methodology proposed by Desai, Foley, and Hines (2007). Agarwal and Chakraborty (2017) also utilise this framework, using the data from 5666 listed corporate firms from all sectors in India during 2000-2015. The present study uses the latest data available for all (listed and non-listed) manufacturing firms in India.

As the global economic crisis of 2008 affected the growth rate and buoyancy of corporate income tax, which declined significantly during the post crisis period in India, this study analyses the incidence of CIT during the pre-crisis and post-crisis periods separately. The Indian experience may be useful as an example to understand the impact of global crisis on the incidence of CIT.

The rest of this Study proceeds as follows: Section 2 briefly reviews the literature on the study topic while Section 3 explains the empirical model, the data and estimation technique used in the study. Section 4 presents and discusses the empirical results, and the final Section 5 provides the summary and conclusion.

II Brief Review of Literature

The theoretical literatures in general follow an approach to specify a general equilibrium model of the (closed or open) economy, parameterize that model based on the estimates of key variables, and simulate the effect of a change in the CIT on prices, wages, profit/income, well-being etc. They use one of the two channels through which corporate tax can be passed on to labour: the indirect effect and the direct effect. The indirect models find that a hike in CIT rate will affect wages indirectly through its impact on capital and demand for labour (e.g., Harberger 1962). The direct models show that firms earn quasi rents due to imperfect competition and other market frictions.[1] Both firms (capital owners) and labourers bargain for these rents. The CIT will reduce the rents available for distribution which will lead directly to a reduction in wages (e.g., Arulampalam, Devereux, and Maffini 2007).

The Indirect Effect Models: The pioneering study by Harberger (1962) develops a two-sector general equilibrium model of the U.S economy. It assumes that the corporate sector is subject to CIT which has output as well as substitution effects, while the non-corporate sector is not. Due to the output effect, the CIT increases the cost of production, thereby reducing the production and increasing the output price. The substitution effect leads to distortion on the prices of factors of production, leading to substitution of lower-priced factors in place of higher-priced factors. The output effect leads to flight of capital and labour from corporate to non-corporate sector, and their price undergoes a change depending on the relative factor intensity of corporate and non-corporate sector. If the corporate sector is labor-intensive, the non-corporate cannot absorb all the labour, leading to low price of labour. The corporate sector can substitute labour in the place of capital. It leads to an increase in the price of labour in the corporate sector, and decrease in the price of the capital. Thus, capital bears the entire incidence of CIT. Several extensions of Harberger's closed economy model have emerged by allowing product differentiation and several market imperfections. However, Gravelle and Smetters (2006), Auerbach and Slemrod (1997) etc. criticize these closed economy models, mostly for their assumptions of fixed supply of capital and labour and complete mobility of factors of production.

Dimond and Mirrlees (1971) employed an open economy model in which the capital is mobile and the price of capital is fixed at the world rate of return. If the tax on capital income increases, capital will fly until its marginal productivity at home is driven up to the point at which the after-tax return to capital at home equals the world rate of return. This reduction in capital will decrease labour productivity, thereby the wages. Thus, the immobile labour bears the entire burden of the CIT.

Harberger (1995) also revisits the corporate tax incidence in an open economy framework and finds that labour bears more than 100% burden of tax (Kotlikoff and Summers 1987). [2] Developing a four-sector model, Harberger (2008) also shows that 130% of the tax falls on the labour.

Gravelle (2013) after reviewing the open economy models, particularly four important U.S studies - Grubert and Mutti (1985), Gravelle and Smetters (2006), Randolph (2006) and Harberger (2008), remarks that results of many of these studies cast some doubt on the conclusion that labour bears the all or bulk of the burden of CIT in an open economy setting, mainly due to their assumptions on degree of capital mobility, substitutability between domestic and foreign products, size of the economy, degree of substitutability of labour for capital and factor intensities. Reconciling these differences across models, she finds that for the U.S. the CIT burden shared between the capital and labour is 6:4.

Hasset and Mathur (2006) is one of the pioneering empirical studies on the impact of CIT on wages. Utilizing panel data covering 72 OECD countries during 1981 to 2002, it shows that a 1% increase in statutory CIT leads to about 0.95% decline in wages in the long run. However, this study is criticized for controlling the value added per worker, which is likely to be influenced by corporate tax (by affecting the capital). Re-estimating Hasset and Mathur (2006) model, Gravelle and Hungerford (2008) find that for every $1 increase in corporate tax, wages fall by 22 to 26 cents. They argue that the findings of Hasset and Mathur (2006) are also sensitive to specification choices like the use of five-year average, inflation, and PPP adjustments. Later, Hassett and Mathur (2015) expand their previous study to include the spatial effect and finds that a 1% increase in statutory rate leads to 0.5% reduction in wages. Randolph (2006) finds that in the US, labour and capital bear the burden of the tax in the ratio of 73:27.

Using household survey data on wages for 30 countries during 1979 to 2002, Felix (2007) finds that a 1%increase in the marginal CIT rate leads to 0.7%decrease in wages. Utilizing the Current Population survey data during 1997 to 2005, covering 50 U.S states, Felix (2009) finds that wages decline in the range of 0.14% to 0.36%for a 1%increase in the marginal state corporate taxes. Carroll (2009) also studies the incidence using the data from 50 U.S. states during 1970 to 2007, and shows that a 1%increase in the CIT leads to 0.014%decline in real wages.

Nils ausdem Moore, Kasten, and Schmidt (2009), using the data from German, French, and UK firms and a difference-in-differences approach, show that wage rises with a fall in corporate tax. Bauer and Siemers (2017), using the regional level panel data for Germany, find that 65 to 93%of tax burden is shifted to labour. Using the spatial equilibrium model and variations in state corporate tax and apportionment rules of U.S state corporate tax, Serrato and Zidar (2016) estimate that firm owners bear roughly 40%, workers bear 30-35%, and landowners bear 25-30%of the incidence.

Ebrahimi and Vaillancourt (2016) use the Canadian household data from Statistics Canada's Labour Force Survey (LFS) from 1998 to 2013 and show that for a 1% increase in the CIT rate, real wages fall by 0.15 to 0.24%. Employing panel data of Canadian provinces during 1981 to 2014, McKenzie and Ferede (2017) also find that the CIT rate adversely affects the capital/labour ratio which in turn reduces wages. For every $1 increase in CIT revenue due to an increase in the provincial CIT rate, the decline in aggregate wages ranges between C$1.52 for Alberta to C$3.85 for Prince Edward Island. Desai, Foley, and Hines (2007), using the data on foreign activities of U.S. multinational companies in 50 OECD countries during 1989 to 2004, and seemingly unrelated

regression (SUR) estimation method by imposing the restriction that the effect of tax on wage and capital adds up to unity, estimate that labour bears between 45%and 75%of the CIT burden.

In the Indian context, Lall (1967) using the data for 257 public limited manufacturing companies for the two five-year periods 1956 to 1960 and 1961 to 1965, shows that the burden seems to have fallen largely on labour and not on capital. Shome (1978) also shows that a part of corporate tax burden is shifted to labour (in 1971-72). However, following Desai, Foley, and Hines (2007) and using panel data on corporate firms listed on the BSE and NSE during 2000 to 2015, Agarwal and Chakraborty (2017) estimate that capital bears more burden of CIT in India than labour.

The Direct Effect Models: These models assume that firms earn quasi-rents due to imperfect competition, etc. Firms and labour unions bargain over these quasi-rents. The CIT will reduce these rents, which will directly affect wages. Felix and Hines (2009) show that the impact of an increase in CIT on wages is ambiguous, assuming that firms and unions bargain over the economic rent. On the one hand, a rise in the CIT rate lowers the rent available for distribution, which in turn leads to a reduction in wage. On the other hand, if the indirect effect of the tax on the competitive wage via the marginal productivity of labour increases the rent, this effect may offset the reduction. If the latter effect is small enough, then an increase in tax rate will lead to a reduction in union wage; if this effect is larger, the union's bargaining power will be stronger.

Riedel (2011) also identifies two opposite effects. She uses wage bargaining model in which the bargaining of a domestic subsidiary happens over the profits of the parent and as well as the subsidiary companies. She predicts that an increase in domestic country tax rate of subsidiary leads to higher wages, as wage is a deductible expenditure. It helps in reduction of tax without affecting the parent company's profit. The effect is opposite if tax is increased in the domicile country of the parent company. Arulampalam, Devereux and Maffini (2012) in their model show that the impact on an increase in the CIT rate on wages depends on workers' bargaining power.

A few empirical studies have emerged to examine the direct effect of CIT on wages. Felix and Hines (2009), using individual data from 2000 households across 50 U.S. states, find that high-tax states have lower union premiums than low-tax states, and that labour captures just over 50%of the lower tax rates. Arulampalam, Devereux, and Maffini (2007), using firm-level data of 55,000 European companies across 9 countries during the 1996-2003 period, estimate that labour bears nearly 100%of the CIT burden in the long run. However, Arulampalam, Devereux, and Maffini (2012) use firm-level data from 9 European nations during 1999-2003 and show that a $1 increase in CIT would reduce wages by $0.49.

aus dem Moore (2014) finds that, for France, a 1 Euro increase in the corporate tax lowers manufacturing wages by 0.66 Euro; in UK, it is 77 pence. Fuest, Peichl, and Siegloch (2015) estimate that for 1euro increase in tax bill in Germany, wage bill comes down by 0.56 euro. However, Dwenger, Rattenhuber, and Steiner (2019) use industry- and regional-level wage data from Germany during 1998-2006 and find that a 1 Euro decrease in the corporate tax leads to an increase in the corporate wage bill by 0.19 to 0.29 Euro. Using industry-level data for the US during 1982, 1992, and 1997, Liu and Altshuler (2013) show that labour bears 40 to 80% of the corporate tax burden.

III Empirical Model, Data and Estimation

This study utilizes the empirical model of Desai, Foley, and Hines (2007) and derives wage and return-to-capital equations to be estimated. Consider a firm which produces output (Q) using capital (K) and labour (L) inputs and a production function denoted by Q (K, L). Assume that the output price is normalized to unity and firm's capital investments do not depreciate and are financed with a combination of debt (D) and equity (E). Labour's wage is w; debt holders receive a return of r; and equity holders receive after corporate tax rate of return of ρ. Denoting the corporate tax rate by T, it is shown that:

$$\rho E \equiv [Q(K,L) - wL - rD](1 - T) \quad (1)$$

Differentiating the equation (1) with respect to T produces:

$$\frac{d\rho}{dT} E + \frac{dw}{dT} L(1 - T) + \frac{dr}{dT} D(1 - T) = -[Q(K, L) - wL - rD] \quad (2)$$

First term on the left side of (2) is change in returns to equity holders, the second is the change in the after-tax labour cost and the third is the change in after tax borrowing costs. The right side is the effect of a tax change on after-tax profits. The equation (2) indicates that higher tax costs must be compensated by a wage reduction or capital returns, i.e., some factor inputs must bear the burden of tax. As output prices are normalized to one, they do not change for change in CIT. In an open economy, this assumption rules out effects that arise from inter-sectoral re-allocation of resources or changing terms of trade between countries. But in a single-sector closed economy, this represents a normalization of inputs.

Suppose that capital investments are financed with a fraction θ of debt and (1- θ) of equity. Then the equation (1) becomes:

$$\rho(1 - \theta)K \equiv [Q(K, L) - wL - r\theta K](1 - T) \quad (3)$$

Suppose that investors are indifferent between receiving certainty-equivalent returns in the form of bond interest and equity returns. Then ρ = r. Differentiating the equation (3) with respect to T gives:

$$\frac{d\rho}{dT}(1 - \theta T)K + \frac{dw}{dT} L(1 - T) = -[Q(K, L) - wL - r\theta K] \quad (4)$$

If θ≅ 0 in an extreme case and investments are financed entirely with equity, the equation (4) becomes:

$$\frac{dr}{dT} K + \frac{dw}{dT} L(1 - T) = -[Q(K, L) - wL] \quad (5)$$

The equation (5) clearly indicates that both labour and capital bear the incidence of corporation tax. Under these conditions, using the equation (3) the equation (5) becomes:

$$\frac{1}{r}\frac{dr}{dT} rK + \frac{1}{w}\frac{dw}{dT} Lw(1 - T) = -\frac{rK}{(1-T)} \quad (6)$$

Rearranging the terms, the equation (6) becomes:

$$\frac{1}{r}\frac{dr}{dT} + \frac{1}{w}\frac{dw}{dT}\frac{Lw}{rK}(1 - T) = -\frac{1}{(1-T)} \quad (7)$$

Let the labour share of output as, $s \equiv \frac{wL}{Q}$. It follows that $\frac{Lw(1-T)}{rK} = \frac{Lw}{Q-Lw} = \frac{s}{1-s}$. By also applying that $\frac{dr}{dT} = -\frac{dr}{d(1-T)}$ and $\frac{dw}{dT} = -\frac{dw}{d(1-T)}$, the equation (7) becomes:

$$\frac{(1-T)}{r}\frac{dr}{d(1-T)} + \frac{(1-T)}{w}\frac{dw}{d(1-T)}\frac{s}{(1-s)} = 1 \quad (8)$$

In order to estimate a framework to assess the impact of corporate income tax on wages and capital, the following two equations are used. Let X denote a vector of attributes determining wages other than corporate tax rate and defines$^* \equiv \frac{(1-s)}{s}$. Then the traditional framework for estimating wages can be framed as:

$$\ln w = \beta X + \eta_1 . s^* \ln(1 - T) + \varepsilon \quad (9)$$

where $\eta_1 = \frac{(1-T)}{w}\frac{dw}{d(1-T)}\frac{s}{(1-s)}$. This is the second half of the left-hand side of equation (8). Similarly, a parallel framework for estimating interest rates can be framed as:

$$\ln \rho = \beta' X' + \eta_2 \ln(1 - T) + \varepsilon' \quad (10)$$

where $\eta_2 = \frac{(1-T)}{\rho}\frac{d\rho}{d(1-T)}$ (as r=ρ). This is the first half of the left-hand side of equation (8). The relationship shown in the equation (8) carries empirical implications for the estimated relationships of the equations (9) and (10). These two equations are not independent, but instead must satisfy an adding up restriction:$\eta_1 + \eta_2 = 1$. This adds the coefficients of wages and returns to capital to one and measures the relative burden of the corporate tax on wages and capital. Therefore, this cross-equation restriction must be employed when jointly estimating the equations (9) and (10). To see how they indicate the respective shares, note that $(1 - s) = \frac{Q-wL}{Q} = \frac{rK}{Q}$ and so:

$$(1 - s)\frac{dr}{d\ln(1-T)}\frac{1}{r} = \frac{K}{Q}\frac{dr}{d\ln(1-T)} \quad (11)$$

Similarly, $s = \frac{wL}{Q}$, so

$$s\frac{dw}{d\ln(1-T)}\frac{1}{w} = \frac{L}{Q}\frac{dw}{d\ln(1-T)} \quad (12)$$

The equations (11) and (12) directly lead to:

$$\frac{\eta_1}{\eta_2} = \frac{\frac{s}{(1-s)}\frac{dr}{d\ln(1-T)}\frac{1}{w}}{\frac{dr}{d\ln(1-T)}\frac{1}{r}} = \frac{L\left[\frac{dw}{d\ln(1-T)}\right]}{K\left[\frac{dr}{d\ln(1-T)}\right]} \quad (13)$$

From the equation (13), the effect of change in tax rate on returns to labour is given by L $[\frac{dw}{dln(1-T)}]$, and the effect of change in tax rate on returns to capital is given by K $[\frac{dr}{dln(1-T)}]$. Hence the right side of (13) is simply the ratio of the burdens borne by labour and capital, respectively, to a small change in tax. This ratio equals the ratio of the two estimated coefficients, η_1 and η_2.

Equations (9) and (10) can be estimated jointly, using the panel data methodology with imposition of adding up restriction, $\eta_1 + \eta_2 = 1$ (i.e., relative burden of the corporate tax on wages and capital adding up to 1) and firm-level data. As there is greater possibility for errors in these equations to be correlated, due to firm-specific characteristics that affect wages and capital, the Seemingly Unrelated Regression (SUR) estimation method can be used to capture the efficiency due to correlation of errors in these equations. Due to non-availability of per employee wage data, the study uses total compensation paid to employees as wage variable, following Agarwal and Chakraborty (2017). Since interest is not considered as factor income, only the return to equity, which is measured in terms of real profit after tax, is considered as returns to capital. The firm-specific effective CIT rate, which is the ratio of CIT paid by the firm to profit before tax, is used.

As per the Pecking Order Theory of capital structure (Myers and Majluf 1984) leverage and profitability have an inverse relationship. The empirical studies like Booth et al. (2001) also confirm this inverse relationship. Hence, the LEVERAGE (leverage ratio) is used as one of the determinants in returns to capital equation. The other X variables considered are SIZE (log of Real Sales), AGE (log of age of firm), R&D (Research & Development Expenses Ratio in percent) and ES (Export Sale Ratio in percent). Further, in order to check whether the relative burdens of labour and capital vary in different types of firms or not, three dummy variables representing private firms, public firms, and foreign firms are allowed to interact with the tax variable. Finally, separate (split sample) analyses are done for the periods before the global financial crisis (2005-2008) and after (2009-2019), because post-crisis the growth and buoyancy of CIT in India started decreasing.

The study uses the firm-level data drawn from the Centre for Monitoring Indian Economy Prowess database during 2005 to 2019. It provides the accounting information for about 17,000 manufacturing firms operating in India. But for every year the data for some firms are not available due to irregular reporting, new entry of firm, missing data problem etc. (this is the reason why the study does not attempt the dynamic panel estimation methods). Further, the study includes only firms having net sales value above zero. The use of natural log of main variable tax rate and other control variables led to loss of some more observations. The data is also cleaned for outliers using Mahalanobis distance method. As a result, the final data set used in the study is an unbalanced panel, having 10,676 firms, and 69,706 total observations used. Table 1 provides the descriptive statistics of the study variables.

Table 1 Means and Standard Deviations of the Study Variables.

Variable	Definition	Full Sample (2005-2019)	Pre-Crisis (2005-2008)	Post Crisis (2009-2019)
Ln(Wages)	Natural log of Real Compensation to Employees (in Rs. million)	3.922 (1.762)	3.717 (1.755)	3.983 (1.76)
Ln(PAT)	Natural log of Profit After Tax (in Rs. million)	3.328 (2.236)	3.174 (2.195)	3.374 (2.245)
Ln(1- τ)	Natural Log of (1-tax Rate)	-0.258 (0.151)	-0.212 (0.161)	-.272 (.145)
((1-s)/s*ln (1- τ)	Ratio of share of wage in total output to share ratio of others in total output multiplied by natural log of (1-tax Rate)	-9.036 (16.429)	-7.069 (14.927)	-9.623 (16.807)
Leverage Ratio	Leverage Ratio	0.317 (0.202)	0.34 (0.2)	0.311 (0.202)
Size	Natural Log of Sales (in Rs. million)	6.901 (1.688)	6.587 (1.651)	6.994 (1.688)
ES	Export Sale Ratio (%)	13.322 (52.741)	13.825 (24.602)	13.172 (58.574)
R&D	Research and Development expenses Ratio (%)	0.212 (1.146)	0.181 (0.998)	0.222 (1.187)
AGE	Log of Age in years	2.996 (0.717)	2.92 (0.75)	3.019 (0.705)
PRIVATE	Dummy Variable=1 for private ltd firm and 0 otherwise	0.317 (0.465)	0.17 (.375)	0.361 (0.48)
PUBLIC	Dummy Variable=1 for public ltd firm and 0 otherwise	0.683 (.465)	0.83 (0.375)	0.639 (0.48)
FOREIGN	Dummy Variable=1 for foreign firm and 0 otherwise	0 (.008)	0 (0)	0 (0.01)
N	No of Observations	69706	16019	53,687

Standard deviations in parentheses.

IV Empirical Results

(1) Full Sample Results: Table 2 presents the joint estimation results of wage and capital return equations (10) and (11) for Indian manufacturing firms during 2005-2019 using SUR estimation method, with add-up restriction in equation (12). As explained above, these equations are not separate regressions but instead, components of a single regression. Column (1) shows the results of the two equations including only respective tax variable and no other control variable. Column (2) includes all control variables along with tax variable while Column (3) replaces the respective tax variable with three of its interaction with public firm dummy, private firm dummy, and foreign firm dummy, in order to capture the relative share of labour and capital in the total tax burden in public, private, and foreign firms.

The main variable of interest is the effect of respective tax variable on wages ((1-s)/s*ln (1-Tax rate)) and returns to capital (Ln (1-Tax Rate)). It is noted that the impact of tax on wages and capital return should be negative. But in this study the tax variable used is log form of one minus corporate income tax, and therefore the expected sign of tax should be positive. In all columns, as expected, the coefficient associated with this variable and its interaction with public, private, and foreign dummies is positive and statistically significant at 1%level of significance, except its interaction with foreign dummy in wage equation in Column (3). These results provide a strong support for the theoretical prediction that the burden of corporation income tax is shared between labour and capital owners of manufacturing firms in India during 2005-2019.

The estimated parameter (η_1) of tax variable in the ln-wage equation in Column (1) is 0.0256, implying that higher tax rates are associated with lower wages, and the labour bears only 2.56% of the corporate tax incidence. The estimated coefficient η_2 is 0.9744, indicating the negative impact of tax on profit after tax, and the capital bears the remaining 97.44% of tax burden. In Column (2) after controlling for other determinants of wages and return on equity, the estimated coefficients of η_1 and η_2 are 0.037 and 0.963. These results suggest that labour bears 3.7% and capital bears the remaining 96.3% of tax incidence.

In Column (3) of Table 2, coefficients of tax interacting with public, private, and foreign dummies are 0.039, 0.034, and 0.024 respectively in wage equation, and coefficients of tax interacting with public, private, and foreign dummies are 0.961, 0.966 and 0.976 respectively in return on equity equation. These results suggest that the adverse impact of tax on wages is slightly higher in public firms than in private firms. In the case of foreign firms, the tax coefficient is not significant, indicating that the impact of tax on wage of foreign firms is negligible.[3] The impact of tax on return on equity is higher in foreign firms than in private firms and the impact in private firms is higher than the public firms. Results also indicate that in public firms, the labour bears 3.9%, and the capital bears 96.1% of tax incidence. In private firms, the respective tax burden shares are 3.4% and 96.6% and in foreign firms, the respective shares are 2.4% and 97.6%.

As expected, all four control variables- the export sales ratio, R&D expenses ratio, age, and size -- have positive and statistically significant coefficients in both wage and return on equity equations in both Columns (2) and (3). These results suggest that wages and returns to equity are higher for larger and/or older firms, and for firms with higher export sales ratio and/or R&D expenses ratio. On average, a 1% increase in size leads to about 0.9% increase in wage and about 1.1% increase in return on equity. A 1%increase in firm's age leads to about 0.3% increase in wage and 0.09% increase in return on equity. The leverage variable has a negative and statistically significant coefficient in return on equity equation in both Columns (2) and (3) of Table 2. This result indicates that a 1% increase in the leverage ratio leads to about 0.63% decline in the returns to capital. These results are in conformity with the Pecking Order theory of capital structure.

Table 2 SUR Estimation Results of Corporate Tax Incidence Equations for Indian Manufacturing firms (2005-2019)

Dependent Variable /Independent Variables	(1)		(2)		(3)	
	Ln(wage)	Ln(PAT)	Ln(wage)	Ln(PAT)	Ln(wage)	Ln(PAT)
((1-s)/s*ln (1-Tax rate)	0.0256***		0.037***			
	(0.000)		(0.000)			
Ln (1-Tax Rate)		0.9744***		0.963***		
		(0.000)		(0.000)		
((1-s)/s*ln (1-Tax rate) * PUBLIC					0.039***	
					(0.000)	
Ln (1-Tax Rate)*PUBLIC						0.961***
						(0.000)
((1-s)/s*ln (1-Tax rate) * PRIVATE					0.034***	
					(0.000)	
Ln (1-Tax Rate)*PRIVATE						0.966***
						(0.000)
((1-s)/s*ln (1-Tax Rate) * FOREIGN					0.024*	
					(0.096)	
Ln (1-Tax Rate)* FOREIGN						0.976*
						(0.096)
ES			0.001***	0.001***	0.001***	0.001***
			(0.000)	(0.000)	(0.000)	(0.000)
R&D			0.078***	0.107***	.078***	0.107***
			(0.002)	(0.004)	(0.002)	(0.004)
SIZE			0.877***	1.056***	0.878***	1.056***
			(0.002)	(0.003)	(0.002)	(0.003)
AGE			0.305***	0.089***	0.308***	0.089***
			(0.004)	(0.007)	(0.004)	(0.007)
Leverage ratio				-1.910**		-1.908**
				(0.023)		(0.023)
Constant			-2.736**	-3.412**	-2.748**	-3.412**
			(0.015)	(0.027)	(0.015)	(0.027)
R. Sqr.	0.0713	-0.0144	0.8415	0.7149	0.8420	0.7149
No of Observations	69706	69706	69706	69706	69706	69706

p-values are in the parentheses.
*** p<.01, ** p<.05, * p<.1

(2) Pre-Global Economic Crisis Period Results: Table 3 depicts the SUR estimation results of wage and return on equity equations for Indian manufacturing firms during pre-global economic crisis periods (2005-08). Column (1) includes all control variables along with tax variable, while Column (2) replaces the respective tax variable in wage and capital return equations with its interaction with public firm, private firm, and foreign firm dummies. The estimated coefficients of tax and its interaction with ownership dummies in both wage and capital equations are positive and statistically significant at the 1% level, indicating that the tax had an adverse impact on wages and capital in all (public, private, and foreign) firms during the pre-crisis period. These results suggest that (i) in all firms' case, labour's share in total tax burden was 3.7% and capital's share was 96.3%; (ii) in public firms, the tax incidence on labour was 3.8% and on capital was 96.2%; and (iii) in private firms, the tax incidence was shared between labour and capital at 3.4%: 96.6%. As expected, all four control variables-- export sales ratio, R&D expenses ratio, age and size -- have positive and significant effects on wages and on capital returns in both Columns (1) and (2). As expected, leverage has a negative and significant effect on capital.

(3) Post-global Economic Crisis Results: Table 3 depicts the SUR estimation results during post-global economic crisis period (2009-2019). The estimated parameters of tax and its interaction with ownership dummies in both wage and capital equations are positive and statistically significant at the 1% level. While the results are more or less similar to that of the pre-crisis period, the magnitude of tax parameters relating to public, private, and foreign firms slightly vary. The relative share of labour of public firms marginally increased to 3.9% as against 3.8% during pre-crisis period and that of private firms increased to 3.5%instead of 3.4% during pre-crisis period. In case of foreign firms, the share of labour was 3.2% as against 2.4% in the full sample, and the share of capital was 96.8% as against 97.6% in the full sample. All coefficients of control variables have expected signs and are significant in both columns (1) and (2). The magnitudes of coefficients of almost all variables (except age and leverage) are more or less the same as in pre-crisis period. For age, the magnitude of the parameter declined to 0.27 in labour equation from 0.43 in pre-crisis period and the magnitude of the parameter declined to 0.09 in capital equation from 0.105 in pre-crisis period. The coefficient value of leverage changed from -1.2 during pre-crisis period to -2.1 during the post crisis period.

Table 3: SUR Estimation Results of Corporate Income Tax Incidence Equations for Indian Manufacturing firms: 2005-2008 and 2009-2019

Variables	Pre-Crisis (2005-2008)				Post-Crisis (2009-19)			
	(1)		(2)		(3)		(4)	
	Ln (wage)	Ln (PAT)	Ln (wage)	Ln (PAT)	Ln (wage)	Ln (PAT)	Ln (wage)	Ln (PAT)
Constant	-2.928 (0.031)	-3.557 (0.056)	-2.930 (0.015)	-3.557 (0.056)	-2.676 (0.0160)	-3.423 (0.031)	-2.692 (0.016)	-3.423 (0.031)
((1-s)/s*ln (1-Tax rate)	0.037 (0.000)	-	-	-	0.0371 (0.000)	-	-	-
Ln (1-Tax Rate)	-	0.963 (0.000)	-	-	-	0.963 (0.000)	-	-
((1-s)/s*ln (1-Tax rate)*PUBLIC	-	-	0.038 (0.000)		-	-	0.039 (0.000)	-
Ln (1-Tax Rate)*PUBLIC	-	-		0.962 (0.000)	-	-		0.961 (0.000)
((1-s)/s*ln (1-Tax rate)*PRIVATE	-	-	0.034 (0.001)	-	-	-	0.035 (0.001)	-
Ln (1-Tax Rate)*PRIVATE	-	-	-	0.966 (0.000)	-	-	-	0.965 (0.000)
((1-s)/s*ln (1-Tax rate)* FOREIGN	-	-	-	-	-	-	0.032 (0.093)	-
Ln (1-Tax Rate)* FOREIGN	-	-	-	-	-	-	-	0.968 (0.093)
ES	0.002 (0.000)	0.003 (0.000)	0.002 (0.000)	0.003 (0.000)	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)
R&D	0.095 (0.004)	0.117 (0.010)	0.095 (0.006)	0.117 (0.010)	0.074 (0.003)	0.103 (0.004)	0.074 (0.002)	0.103 (0.004)
SIZE	0.852 (0.004)	1.060 (0.006)	0.853 (0.002)	1.0619 (0.006)	0.885 (0.002)	1.061 (0.004)	0.886 (0.002)	1.061 (0.003)
AGE	0.427 (0.008)	0.105 (0.013)	0.427 (0.008)	0.105 (0.013)	0.266 (0.004)	0.090 (0.007)	0.269 (0.004)	0.090 (0.007)
LEVERAGE		-1.225 (0.049)		-1.224 (0.049)		-2.141 (0.025)		-2.140 (0.025)
R. Square	0.8146	0.6834	0.8148	0.6834	0.8500	0.7279	0.8500	0.7279
No. of observations	16,019				53,687			

p-values are in parentheses.

V Concluding Remarks

This Study has attempted to estimate the relative burden of corporate income tax borne by capital and labour during 2005 to 2019, using firm-level data of manufacturing sector in India. Following Desai, Foley, and Hines (2007), the wage and profit after tax equations are specified and estimated jointly using the SUR estimation method with add-up restriction. The empirical results provide a strong support for the theoretical predictions that corporate income tax has an adverse impact on both wages paid to employees and profit after tax, and the burden of CIT is shared between labour and capital owners of manufacturing firms in India during 2005-2019.

These results suggest that capital bears 96.3%of the corporation tax burden and labour bears the remaining 3.7%. These results are consistent with Agarwal and Chakraborty (2017), which estimated that labour bears only about 1%and capital bears about 99% burden during 2000-2015 in the case of firms listed in stock exchanges. However, the results of the current study are in contradiction with Lall (1967), who showed that labour shared most of the corporate tax in India during 1956 to 1960 and 1961 to 1965, and Shome (1978), who also showed that a part of corporate tax burden was shifted to labour in 1971-72.

Results also indicate that adverse effect of tax on wages is slightly higher in public firms than in private firms and the impact on return on equity is higher in foreign firms than in private and public firms. The relative shares of labour and capital (3.7% and 96.3%) have remained the same in the pre- and post-crisis periods. However, the estimated tax burden for labour in public firms in the pre-crisis period (3.8%) was slightly lower than that in the post-crisis period (3.9%). In private firms as well, the labour share (3.4%) in the pre-crisis period was slightly less than that in the post crisis period (3.5%). In the post-crisis period, the labour incidence increased to 3.2% as against 2.4% in the full-sample period for foreign firms. We hope that these findings are useful to researchers, policymakers, and other stakeholders to design the corporate income tax in India such that its incidence falls entirely on capital owners.

References

Agarwal, Samiksha, and Lekha S. Chakraborty. 2018. "Corporate Tax Incidence in India." *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3100911.

Arulampalam, Wiji, Michael P. Devereux and Giorgia Maffini. 2007. "The Direct Incidence of Corporate Income Tax on Wages". Working Papers 0707, Oxford University Centre for Business Taxation.

Arulampalam, Wiji, Michael P. Devereux, and Giorgia Maffini. 2012. "The Direct Incidence of Corporate Income Tax on Wages." *European Economic Review* 56 (6). https://doi.org/10.1016/j.euroecorev.2012.03.003.

Atkinson, AB-Stiglitz, and Joseph Stiglitz. 1980. *Lectures on Public Economics*. New York*:* McGraw Hill.

Auerbach, Alan and Joel Slemrod. 1997. "The Economic Effects of the Tax Reform Act of 1986" *Journal of Economic Literature* 30: 589-632.

aus dem Moore, Nils, Tanja Kasten, Christoph M. Schmidt. 2009. "Do wages rise when corporate tax rates fall? Difference-in-Differences Analyses of the German Business Tax Reform 2000". *Ruhr Economic Papers* No 532.

aus dem Moore, Nils. 2015. "Shifting the Burden of Corporate Taxes Heterogeneity in Direct Wage Incidence." *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2579678.

Bauer, Thomas K, and Lars-Hinrich R. Siemers. 2017. "Business taxation and wages: Redistribution and asymmetric effects". *MAGKS Joint Discussion Paper Series in Economics* No. 32-2017.

Booth, Laurence, Varouj Aivazian, Asli Demirguc-Kunt, and Vojislav Maksimovic. 2001. "Capital Structures in Developing Countries." *Journal of Finance* 56 (1). https://doi.org/10.1111/0022-1082.00320.

Carroll, Robert. 2009. "Corporate Tax and Wages: Evidence from the 50 State". *Tax Foundation* Working Paper no 8.

Desai, MA, CF Foley, and JR Hines. 2007. "Labor and Capital Shares of the Corporate Tax Burden: International Evidence." *Harvard University and NBER*, December. http://piketty.pse.ens.fr/files/Desaietal2007.pdf.

Diamond, Peter A, and James A Mirrlees. 1971. "American Economic Association Optimal Taxation and Public Production I: Production Efficiency." *Source: The American Economic Review*. Vol. 61.

Dwenger, Nadja, Pia Rattenhuber, and Viktor Steiner. 2019. "Sharing the Burden? Empirical Evidence on Corporate Tax Incidence." *German Economic Review* 20 (4). https://doi.org/10.1111/geer.12157.

Ebrahimi, Pouya, and François Vaillancourt. 2016. "The Effect of Corporate Income and Payroll Taxes on the Wages of Canadian Workers." *Fraser Institute*, no. January.

Felix, R. Alison. 2007. "Passing the Burden: Corporate Tax Incidence in Open Economies". *Federal Reserve Bank of Kansas City* Working Paper.

Felix, R Alison. 2009. "Do State Corporate Income Taxes Reduce Wages?" *Federal Reserve Bank of Kansas City Economic Review* 94 (2).

Felix, R.Alison, and James R Hines Jr. 2009. "Corporate Taxes and Union Wages in the United States." *NBER Working Paper Series*.

Fuest, Clemens, Andreas Peichl, and Sebastian Siegloch. 2015. "Do Higher Corporate Taxes Reduce Wages?" *Iza Dp* 108 (2).

Gravelle, Jane, G.,and Laurence J. Kotlikoff (1993), "Corporate Tax Incidence and Efficiency when Corporate and Non-corporate goods are Close Substitutes", *Economic Inquiry* 31 (4). https://doi.org/10.1111/j.1465-7295.1993.tb00887.x.

Gravelle, Jane G, and Kent A. Smetters. 2006. "Does the Open Economy Assumption Really Mean That Labor Bears the Burden of a Capital Income Tax?" *Advances in Economic Analysis & Policy* 6 (1). https://doi.org/10.2202/1538-0637.1548.

Gravelle, Jane G. and Thomas Hungerford. 2008. 'Corporate Tax Reform: Should We Really Believe the Research?' *Tax Notes*, 419-429.

Gravelle, Jennifer. 2013. "Corporate Tax Incidence: Review of General Equilibrium Estimates and Analysis." *National Tax Journal*. https://doi.org/10.17310/ntj.2013.1.07.

Grubert, Harry, and John Mutti. 1985. "The Taxation of Capital Income in an Open Economy: The Importance of Resident-Nonresident Tax Treatment." *Journal of Public Economics* 27 (3). https://doi.org/10.1016/0047-2727(85)90053-2.

Harberger, Arnold C. 1962. "The Incidence of the Corporation Income Tax." *Journal of Political Economy* 70 (3). https://doi.org/10.1086/258636.

Harberger, Arnold C. 1995. "The ABCs of Corporation Tax Incidence: Insights into the Open-Economy Case". in *Tax Policy and Economic Growth*. Washington, D.C.: American Council for Capital Formation.

Harberger, Arnold C. 2008. 'Corporate Tax Incidence: Reflections on what is Known, Unknown and Unknowable'. edited by John W. Diamond and George R. Zodrow, in *Fundamental Tax Reform: Issues, Choices, and Implications*. Cambridge, MA: MIT Press, 283 -308.

Hassett, Kevin A. and Aparna Mathur. 2006. "Taxes and Wages". *American Enterprise Institute Working Paper* no. 128, June.

Hassett, Kevin A., and Aparna Mathur. 2015. "A Spatial Model of Corporate Tax Incidence." *Applied Economics* 47 (13). https://doi.org/10.1080/00036846.2014.995367.

Kotlikoff, Laurence J., and Lawrence H. Summers. 1987. "Chapter 16 Tax Incidence." *Handbook of Public Economics* 2. https://doi.org/10.1016/S1573-4420(87)80011-3.

Lall V.D. 1967. 'Shifting of Tax by Companies'. *Economic and Political Weekly*, 2(18): 839- 849.

Liu, Li, and Rosanne Altshuler. 2013. "Measuring the Burden of the Corporate Income Tax under Imperfect Competition." *National Tax Journal* 66 (1). https://doi.org/10.17310/ntj.2013.1.08.

McKenzie, Kenneth J. 2017. "The Incidence of the Corporate Income Tax on Wages: Evidence from Canadian Provinces." *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2957893.

Myers, Stewart C., and Nicholas S. Majluf. 1984. "Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have." *Journal of Financial Economics* 13 (2). https://doi.org/10.1016/0304-405X(84)90023-0.

Randolph, William C. 2006. "International Burdens of the Corporate Income Tax". *CBO Working Paper* no. 2006-09. Washington, D.C.: Congressional Budget Office.

Riedel, Nadine. 2011. "Taxing Multinationals under Union Wage Bargaining". *International Tax and Public Finance,* 18(4), 399-421.

Serrato, Juan Carlos Suárez, and Owen Zidar. 2016. "Who Benefits from State Corporate Tax Cuts? A Local Labor Markets Approach with Heterogeneous Firms." *American Economic Review*. https://doi.org/10.1257/aer.20141702.

Shome, Parthasarathi. 1978. "The Incidence of the Corporation Tax in India: A General Equilibrium Analysis." *Oxford Economic Papers* 30 (1). https://doi.org/10.1093/oxfordjournals.oep.a041405.

Notes

[1] Surplus earning of a factor over its transfer earning is called quasi rent. Here, it refers to excessive profit.

[2] This means that a 100 rupees of tax collected leads to more than 100 rupees reduction or loss in wage to the labour (ie., wage comes down by more than 100 rupees). It refers to the dead weight loss.

[3] One reason could be that foreign firms in the total sample constitute only 0.0001 percent.