

# Measuring the tax cost of investment in India

Through estimation of marginal effective tax rates (METRs)

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# Introducing the METR



# Introducing the METR

## Tax affects investment decisions

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- ▶ Business investment decisions are typically based on
  - ▶ The after-tax NPV of projects
  - ▶ Or equivalently, comparing after-tax IRR to a hurdle rate
- ▶ Economic analysis is consistent with business decision-making, but focuses on the market & not one business
- ▶ In a market, investment occurs as long as economic profits are positive
  - ▶ As long as  $IRR \geq \text{cost of finance} = \text{hurdle rate}$ , investment flows into the market
- ▶ Taxes insert a wedge between before- and after-tax returns to investors
  - ▶ This changes the volume and distribution of investment

# Introducing the METR

## Definition

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- ▶ The marginal effective tax rate or METR is a statistic measuring this tax wedge ( $\omega$ )
- ▶ We can also think of the tax wedge as
  - ▶ Investment rate of return – savings rate of return
  - ▶ Pre-tax rate of return – post-tax rate of return
- ▶ The marginal effective tax rate (METR) is a statistic measuring the tax wedge on a marginal investment

Pre-tax real rate of return on capital  $\xrightarrow{\omega}$   $r_g$   $-$   $r_n$   $\xleftarrow{\quad}$  Post-tax real rate of return

$$METR = \frac{\omega}{r_g} = \frac{r_g - r_n}{r_g}$$

- ▶ Taxes considered are corporate income taxes, sales taxes, asset-based taxes, transfer taxes, distribution taxes and personal taxes

# Introducing the METR

- ▶ For the marginal firm,
- Econ. depreciation rate
- Marginal rev. product  $\rightarrow F' = r_g + \delta = UCC$  ← User cost of capital
- ▶ User cost is interpreted as economic depreciation plus real cost of finance, adjusted for taxation
- ▶ Suppose
- ▶ Real cost of finance = 6%, inflation = 2%, total tax impact = 4%
  - ▶ This implies a UCC or hurdle rate of 12%
- ▶ With  $\delta = 0$ , a project would need nominal IRR,  $r_g > 12\%$
- ▶ If the hurdle rate rose further then the nominal IRR would also rise
- ▶ Marginal projects would be dropped
  - ▶ Aggregate investment in the economy would fall

# Introducing the METR

## METRs vs CIT rates as tax competitiveness measures

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METRs are better measures of the investment climate and tax competitiveness than statutory CIT rates

1. Most companies do not pay statutory CIT rates
  - ▶ They avail of measures in the tax code
2. The METR captures the impacts of these measures
  - ▶ The CIT (by definition) cannot
3. CIT rates do not account for non-tax factors (e.g. inflation) and their impact on investment decisions
4. CIT rates do not account for some tax factors (e.g. accelerated depreciation) and their impact on investment

# Introducing the METR

## METRs vs ATRs as tax competitiveness measures

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- ▶ Some experts use average tax rates (ATRs) to measure of tax competitiveness

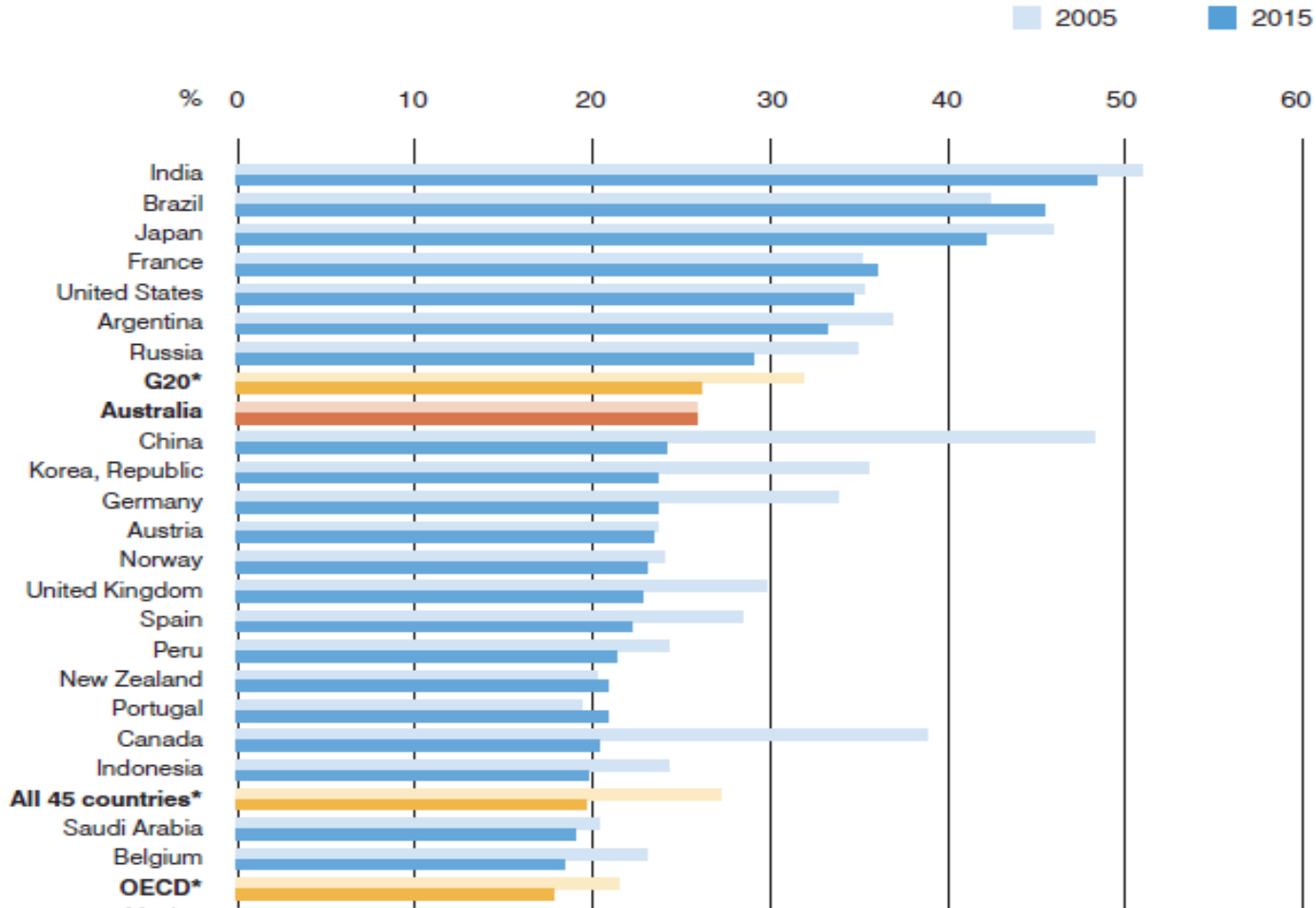
$$ATR = CIT \text{ revenue} / \text{book revenue}$$

- ▶ ATRs are useful when examining lumpy investments or revenue impacts of tax policy
- ▶ But ATRs have limitations vis-à-vis investment incentives
  1. ATRs are based on income from current & past investment
  2. ATRs are based on all business income. One cannot measure the tax system effect on investment composition
  3. Book income  $\neq$  real profit when inflation exists as book income is based on historic cost accounting



# Introducing the METR

## An international comparison



Source: Chen & Mintz (2016)

# The METR model



# The METR model

## Assumptions

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- ▶ METR estimation comes down to estimating  $r_g$  and  $r_n$
- ▶ Our model assumptions are
  1. Inflation, interest rates and equity rates of return are exogenous to the firm
  2. Firms pay all their taxes and use all available tax benefits
  3. Physical capital does not yield real capital gains
  4. Firms maintain a fixed debt / equity ratio
  5. Statutory taxes and inflation are known and constant over time
- ▶ These assumption impose structure on firm behavior

# The METR model

## Modelling $r_n$

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- ▶ An investor provides funds iff expected returns are weakly greater than returns from the outside option
  - ▶ These are nothing but the real rate of return accruing to the market
- ▶ It follows then that

$\beta$  = share of debt in portfolio

$i$  = nominal market rate of interest

Nominal equity rate of return

Real return  $r_n = r = \beta i + (1 - \beta)\rho - \pi$  Inflation rate

- ▶  $r_n$  is the post-tax return that must accrue to the marginal investment, which is paid to the investors
  - ▶ Investors may then need to pay personal income tax on  $r_n$
- ▶ In a world without taxes,  $r_n = r_g$  and  $METR = 0$

# The METR model

## Modelling $r_n$

- ▶ Nominal interest rate  $i$  is known from market sources
- ▶ However, the nominal equity rate of return  $\rho$  is unknown
- ▶  $\rho$  is estimated by assuming that for the financier, post-tax returns from debt and equity are equal, i.e.

$$i(1 - m) = \rho(1 - at_d - (1 - a)t_d)$$

Personal income tax rate  
 Proportion of equity paid out as dividends  
 Dividend dist. tax rate  
 Capital gains tax rate

- ▶ On LHS,  $i$  is debt income, on which  $im$  personal income tax is paid, leaving  $i(1 - m)$  are post-tax income
- ▶ On RHS,  $a\%$  of equity income is through dividends and  $(1 - a)\%$  is capital gains income
  - ▶ After paying relevant taxes, the remaining income is as per RHS

# The METR model

## Modelling $r_g$

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- ▶  $r_g$  is pre-tax return on capital for a marginal investment
  - ▶ By definition, it is the difference between the marginal revenue product of capital ( $F'$ ) and the economic depreciation rate ( $\delta$ )
  - ▶  $F'$  is the additional return from the last unit of capital invested and is a measure of productivity
  - ▶  $\delta$  occurs for two reasons: (1) physical wear and tear of the asset and (2) inflation

$$r_g = F' - \delta$$

- ▶ In a world without taxes, profit maximization requires that

$$F' = \text{MC} \text{ --- Marginal cost}$$

- ▶ When taxes exist, profit maximization requires that

$$\text{CIT rate} \text{ --- } (1 - u)F' = \text{MC}$$

# The METR model

## Modelling $r_g$

- ▶ Applying the user cost of capital model (Jorgenson, 1963)

$$F' = \frac{MC}{1 - u} = UCC$$

- ▶ And UCC has 3 components
  - ▶ Financing cost, which is a combination of debt and equity
  - ▶ Economic depreciation of the asset
  - ▶ Taxes
- ▶ For depreciating assets like machinery, UCC is defined as

$$UCC_D = \frac{MC_D}{1 - u} = \frac{(1 + ST)(\delta + r_f)(1 - A)}{1 - u}$$

Sales taxes (pointing to  $ST$ )  
Real cost of finance to firm (pointing to  $MC_D$ )  
PV of tax depreciation allowances (pointing to  $A$ )

# The METR model

## Modelling $r_g$

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- ▶ The real cost of finance to the firm is

Nominal cost of firm's debt

$$r_f - \beta i(1 - u) + (1 - \beta)\rho_f - \pi$$

- ▶ The firm's cost of finance differs from the market cost of finance because of the deductibility of the firm's interest expenses

- ▶ The present value of tax depreciation is

Initial allowance for expensing

$$A = u \cdot (IA) + (1 - IA) \cdot \frac{\alpha}{\alpha + r_f + \pi}$$

Tax depreciation allowance rate  
Nominal cost of firm's finance

- ▶ Using the relationships between  $F'$ ,  $UCC$ ,  $r_f$  and  $A$ , one may estimate  $r_g$  on depreciable assets



# The METR model

## Modelling $r_g$

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- ▶ Analogously, one may estimate  $r_g$  for non-depreciable assets like land

- ▶ Since  $\delta = 0, \alpha = 0$

$$UCC_L = \frac{(1 + ST)r_f}{1 - u}$$

- ▶ And  $r_g$  for inventories

- ▶ We account for inventory under FIFO rules, yielding

$$UCC_I = \frac{(1 + ST)(r_f + u\pi)}{1 - u}$$

- ▶ Note that firms pay additional tax of  $u\pi$  on inventory because of inflation

# Estimating METRs



# Estimating METRs

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- ▶ The equations in the previous section allow for estimation of METRs of a universe of marginal investments
  - ▶ These are defined as per their parameter values ( $u, \alpha, \pi$  etc.)
- ▶ A marginal investment will have the following attributes
  - ▶ Specific industry
  - ▶ Specific asset mix (e.g. land, structures, machinery, inventory)
  - ▶ Financed from different sources (e.g. debt, equity)
- ▶ There is no unique marginal investment in an economy
- ▶ Each marginal investment may have a different METR
- ▶ When estimating METRs at the national or sectoral level, it is necessary to consider this heterogeneity

# Estimating METRs

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- ▶ We estimate METRs using a bottom-up approach
  - ▶ Consistent with the literature
- ▶ METRs are estimated for many different types of marginal investment
- ▶ These are then aggregated upward to the sector and national levels
- ▶ We classify all investment in India according to four characteristics
  - ▶ These characteristics are relevant for their tax and economic impacts
  - ▶ Sector, asset type, firm size, tax payer type

# Estimating METRs

## Marginal investment types considered

Sector	Asset type	Firm Size	Tax payer type
Agriculture, forestry & fishing	Buildings		
Construction	Furniture & fittings	Small firms, with investment < INR 250 million	CIT payer
Electricity, steam, gas & AC supply	Inventory		
Finance & insurance	Land		
Information & communication	Machinery		
Manufacturing	Transport	Large firms, with investment > INR 250 million	MAT payer
Wholesale & retail trade, repair of motor vehicles & motorcycles			
Transportation & storage			
Other			

►  $9 \times 6 \times 2 \times 2 = 216$  investment types are considered

# Estimating METRs

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- ▶ The 8 selected sectors account for 93% of all Indian investment in 2015 (“Other” captures the remainder)
  - ▶ NIC system of classification was used
- ▶ Asset classes are selected as per the needs of the METR model & tax treatment under Indian rules
  - ▶ E.g. buildings and furniture have different tax depreciation rates
- ▶ Large firms could avail of investment allowances, lowering METRs
- ▶ MAT-paying firms have different METRs than those that do not

# Estimating METRs

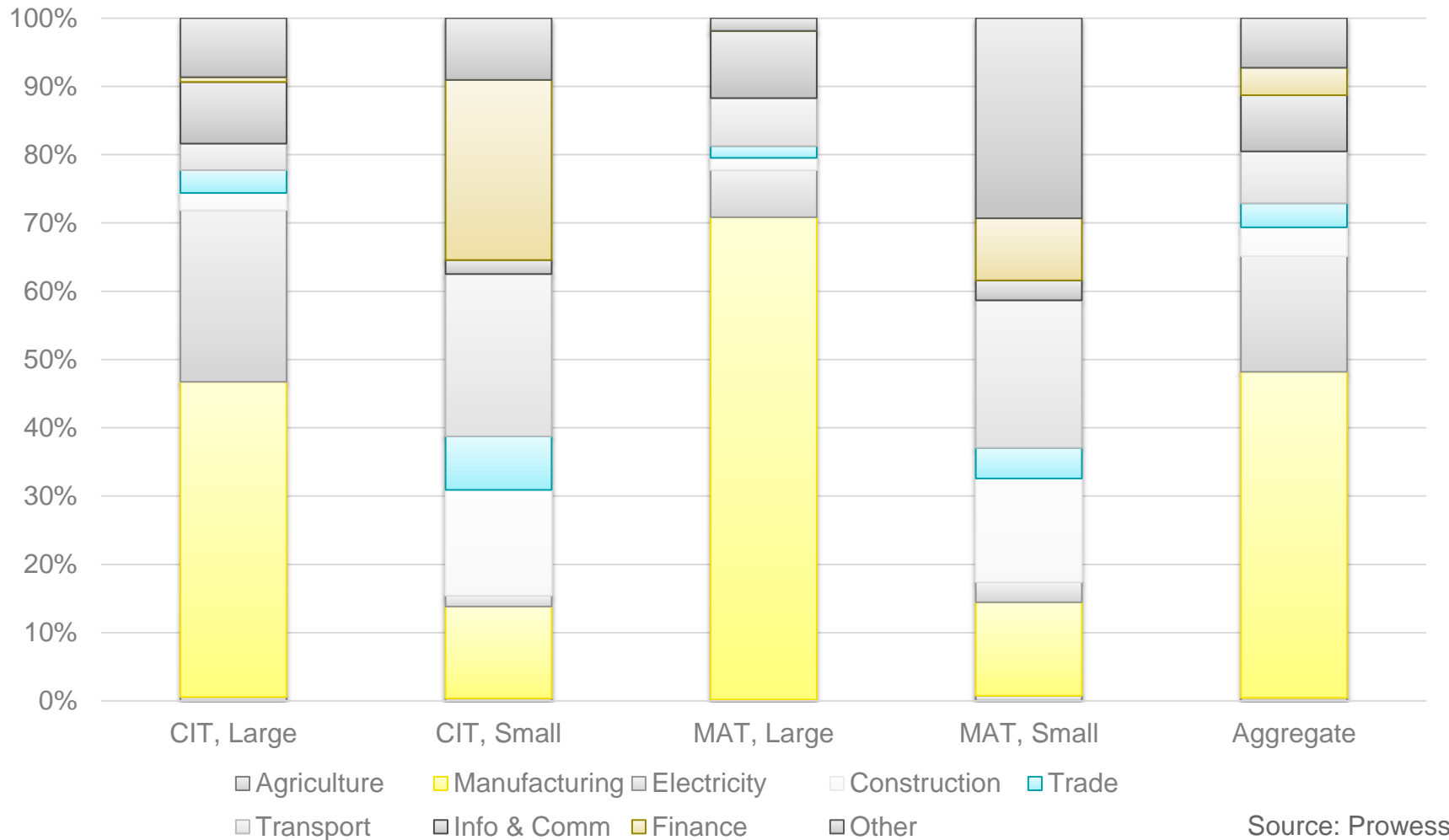
## Aggregation principles

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- ▶ 216 METRs are estimated as per the equations shown
- ▶ Higher level METRs (e.g. sector or national level) are calculated as weighted averages
  - ▶ E.g. a sectoral METR is a weighted average of  $216 / 9 = 24$  lower level METRs
- ▶ Capital shares are used as weights
  - ▶ The proportion of total new investment capital in the economy that is allocated to a given marginal investment type
- ▶ If type A attracts more investment than type B then A will have a greater impact on higher level METRs
  - ▶ This is consistent with A's greater importance as a recipient for investment

# Estimating METRs

## Capital structure of the Indian economy, FY2015





# Modeling the METR in the Indian context

## Data sources

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- ▶ To model the METR we used the following data

Variable	Data Source
Capital structure	Prowess
Market interest rates	Thomson Reuters EIKON
Leverage ratios	Prowess
Inflation rate	Ministry of Statistics and Program Implementation (MOSPI)
Economic depreciation rates	National account statistics
Tax rates (diverse direct and indirect)	Income tax act, internal EY reference materials, discussions with EY experts, assorted guidance material

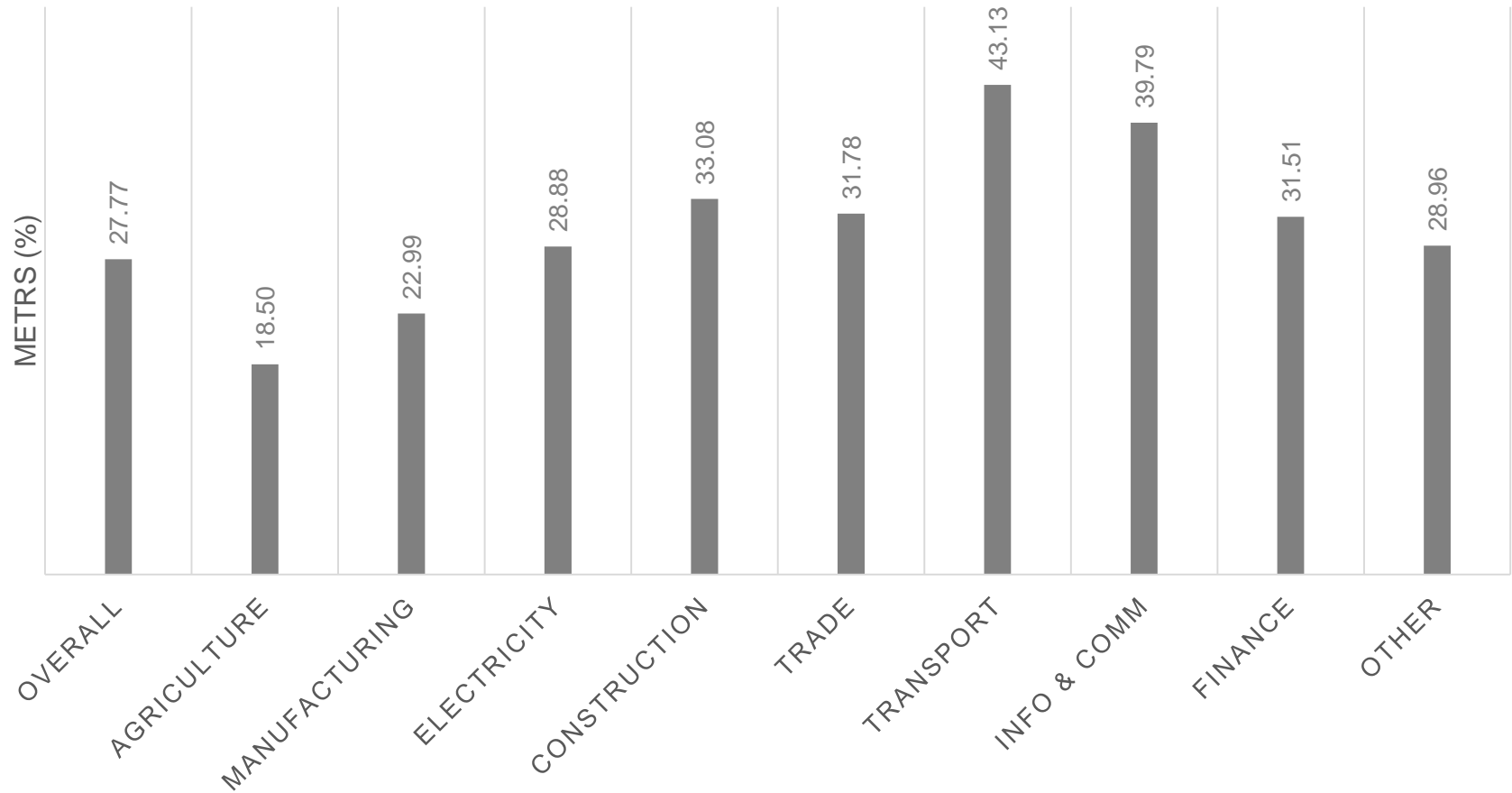
# METRS for investment in India



# METRS for investment in India

## Pre-GST METRs

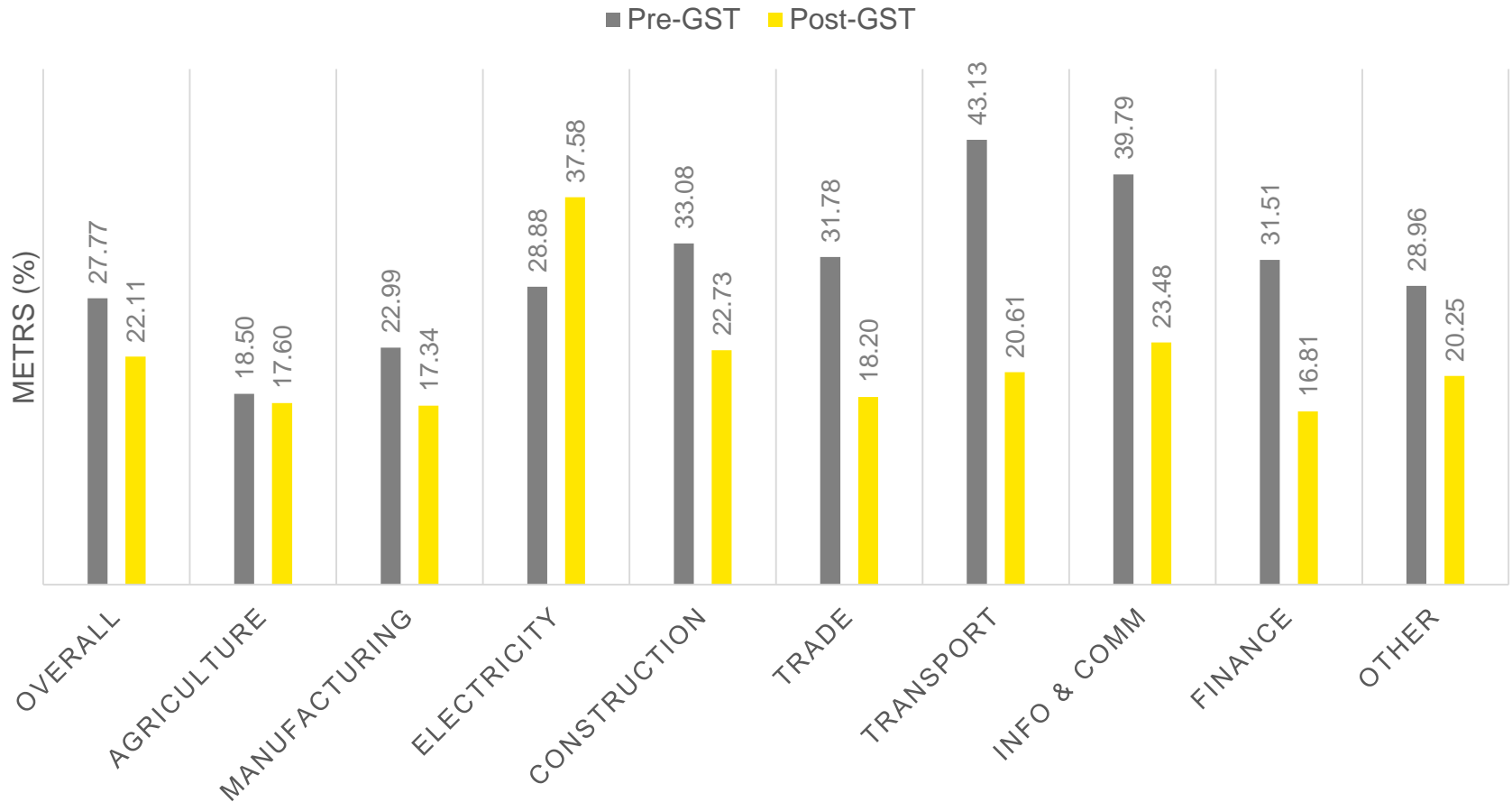
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▶ Service sectors had higher METRs

# METRS for investment in India

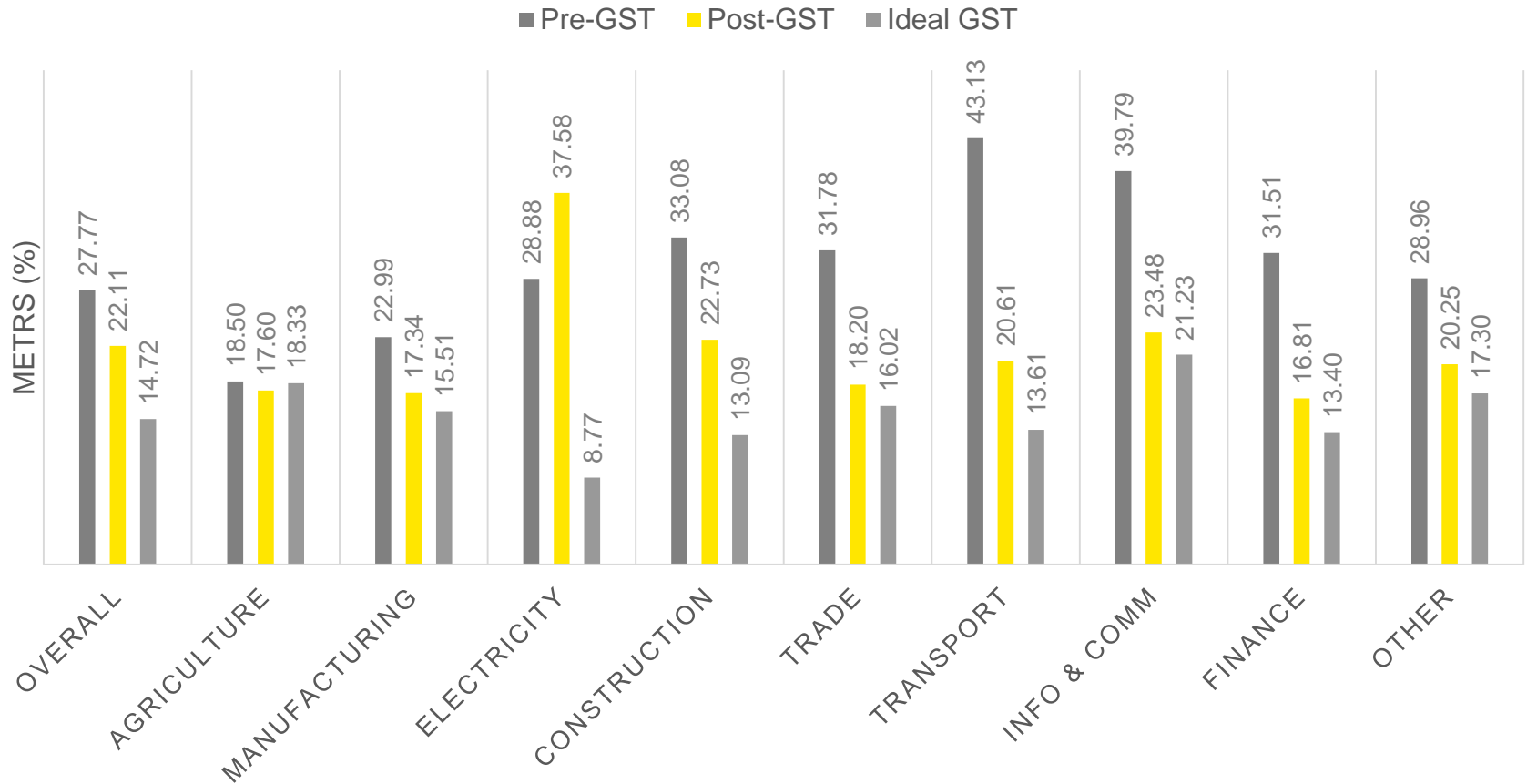
## Pre-GST and post-GST METRs



► The GST brings down METRs in most sectors

# METRS for investment in India

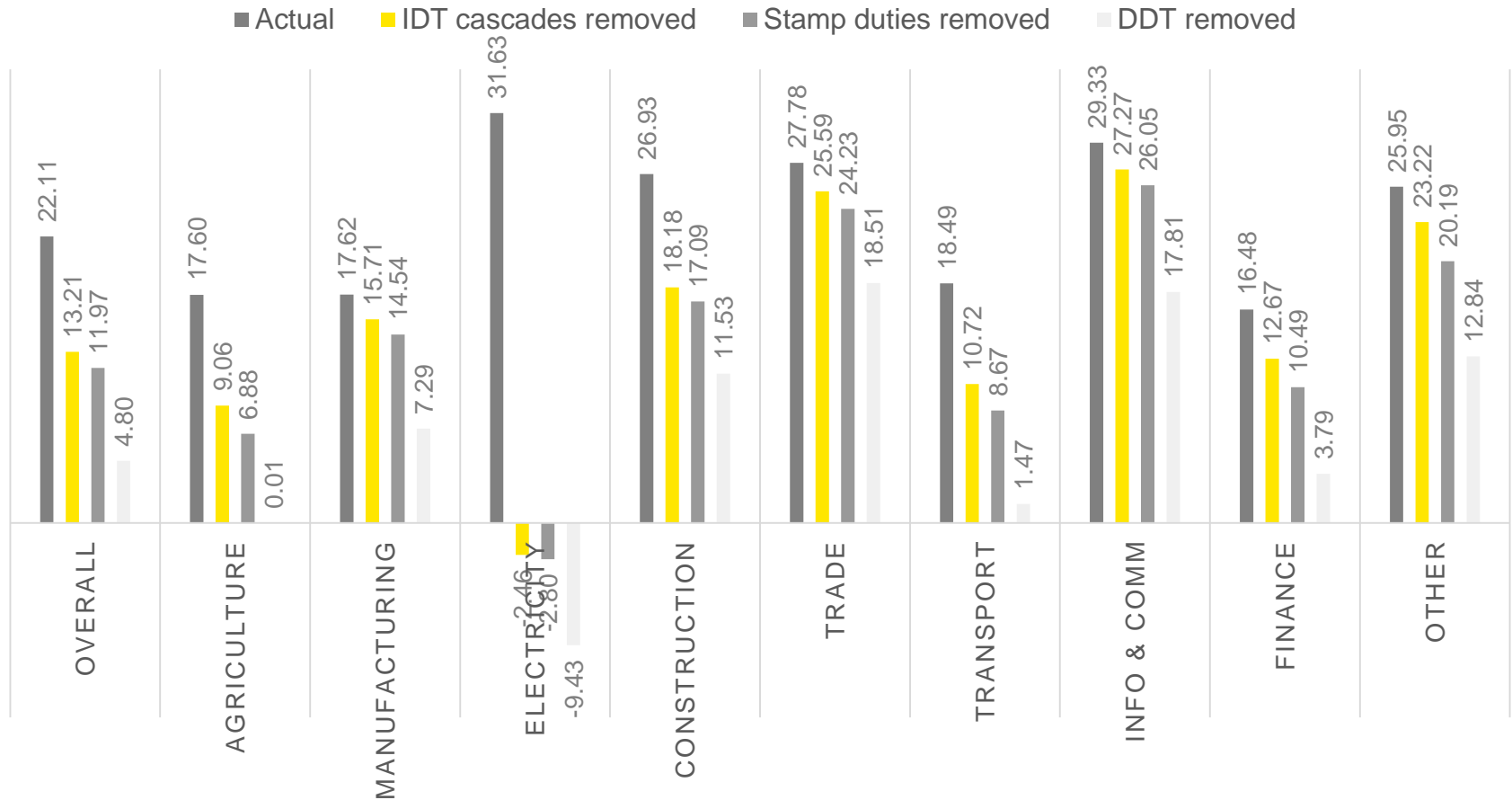
## Pre-GST, post-GST and ideal GST METRs



▶ METRs can be further reduced by removing exemptions

# METRS for investment in India

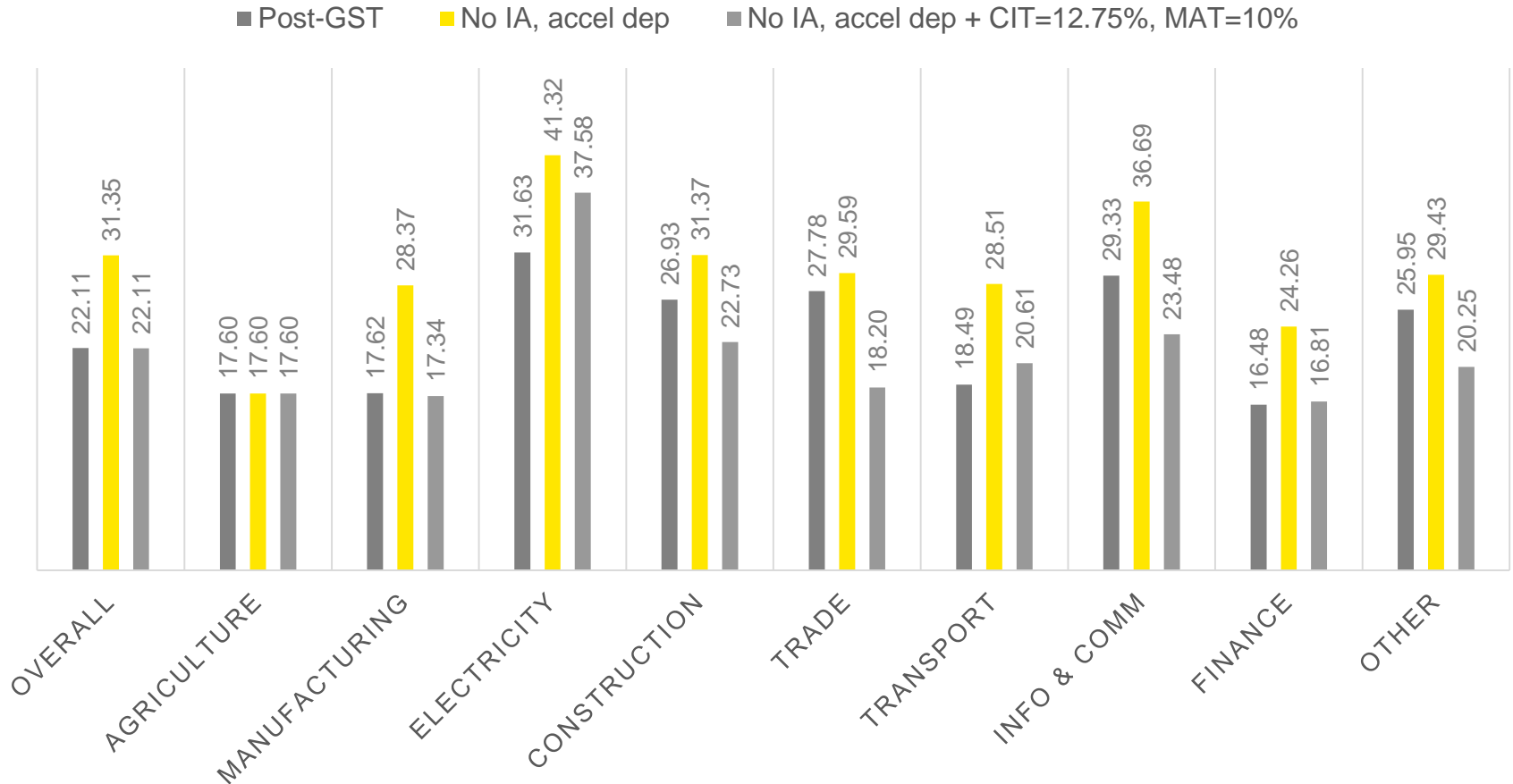
## Decomposition: impacts of different taxes



- ▶ Indirect taxes and dividend distribution taxes have a large impact on METRS

# METRS for investment in India

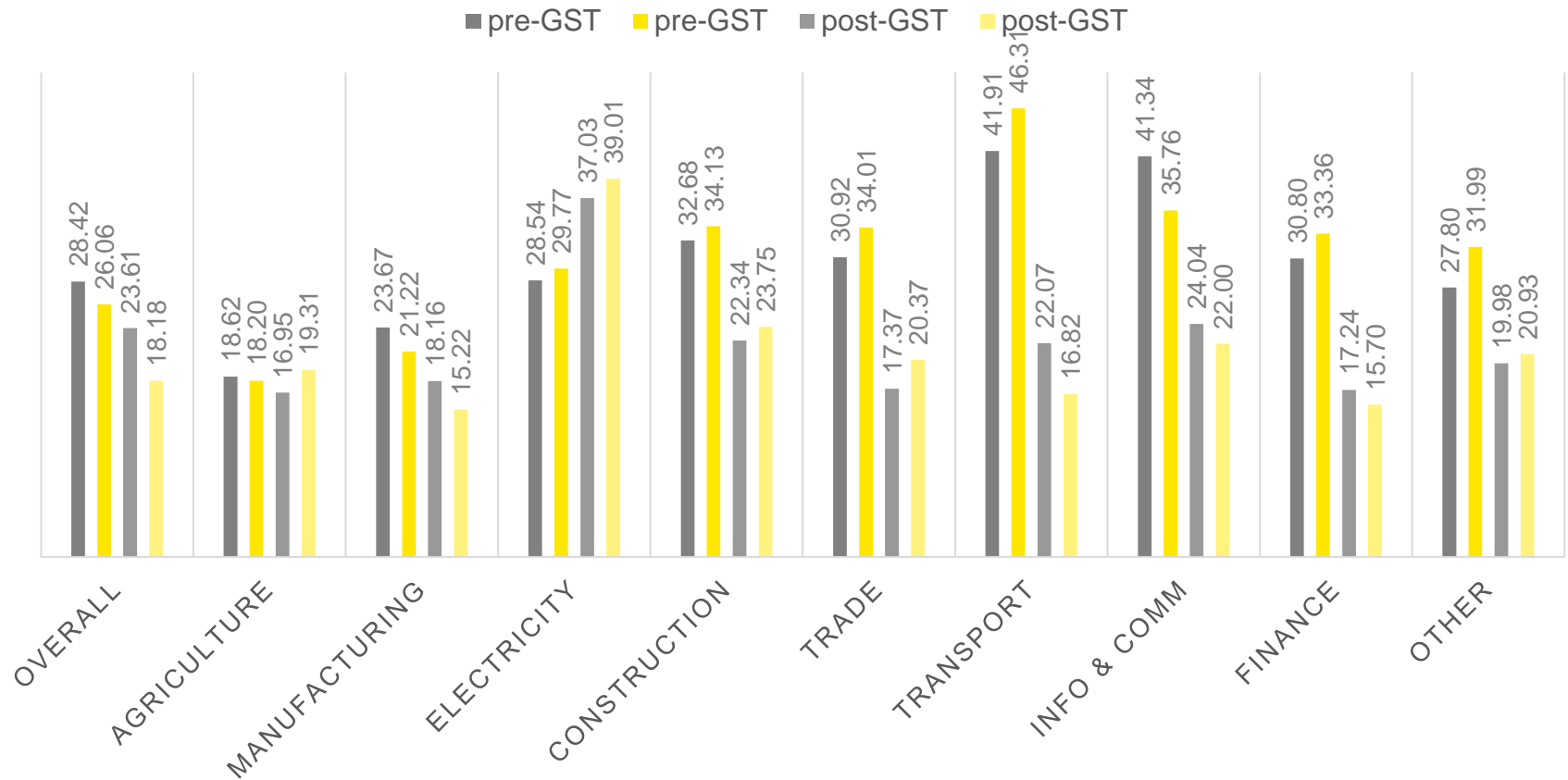
## Direct tax incentives and their impact



- ▶ Initial allowances and accelerated depreciation are significant incentives

# METRS for investment in India

## Tax distortions: CIT vs MAT, pre- and post-GST

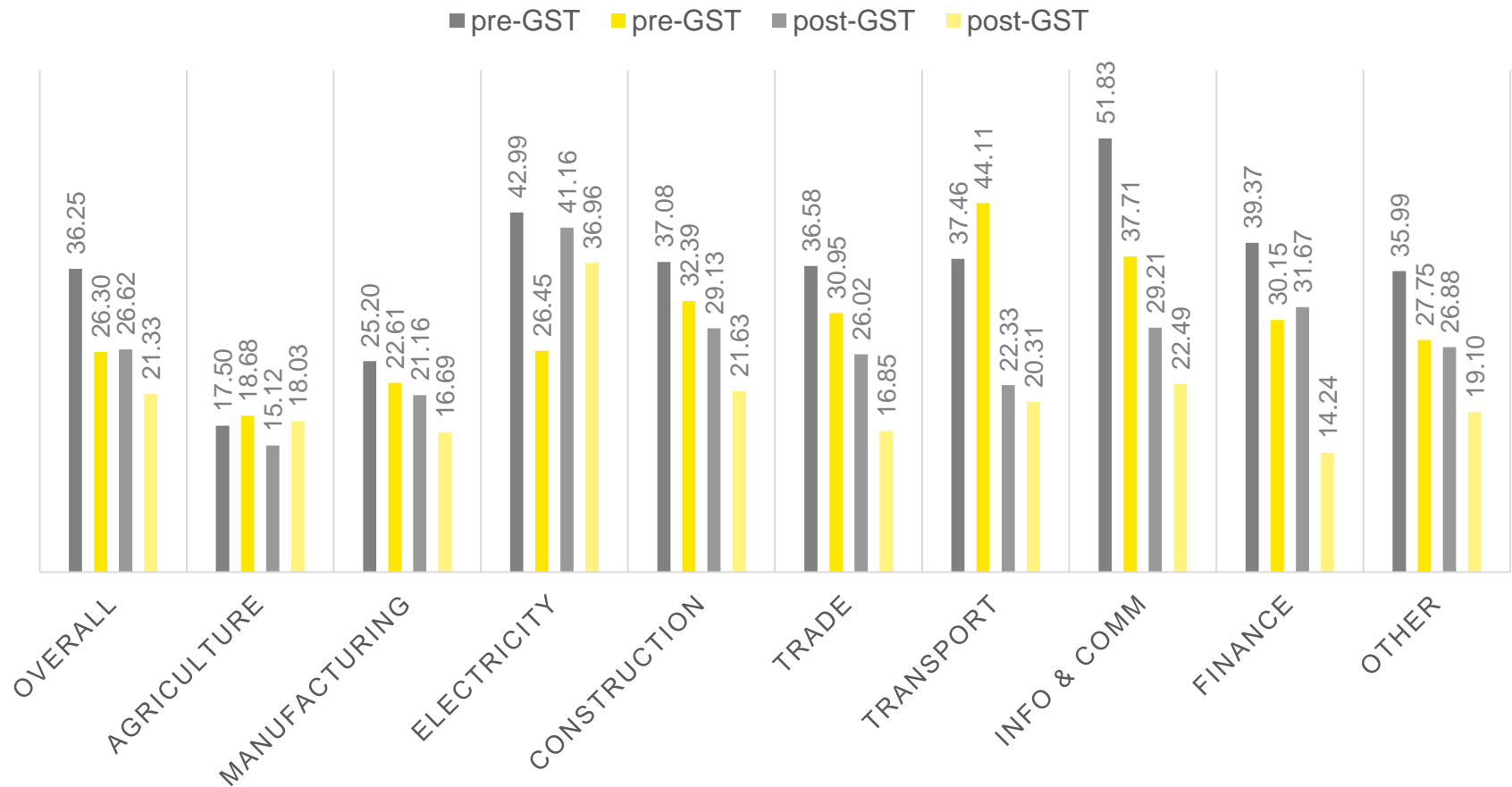


► MAT-paying firms tend to have higher METRS



# METRS for investment in India

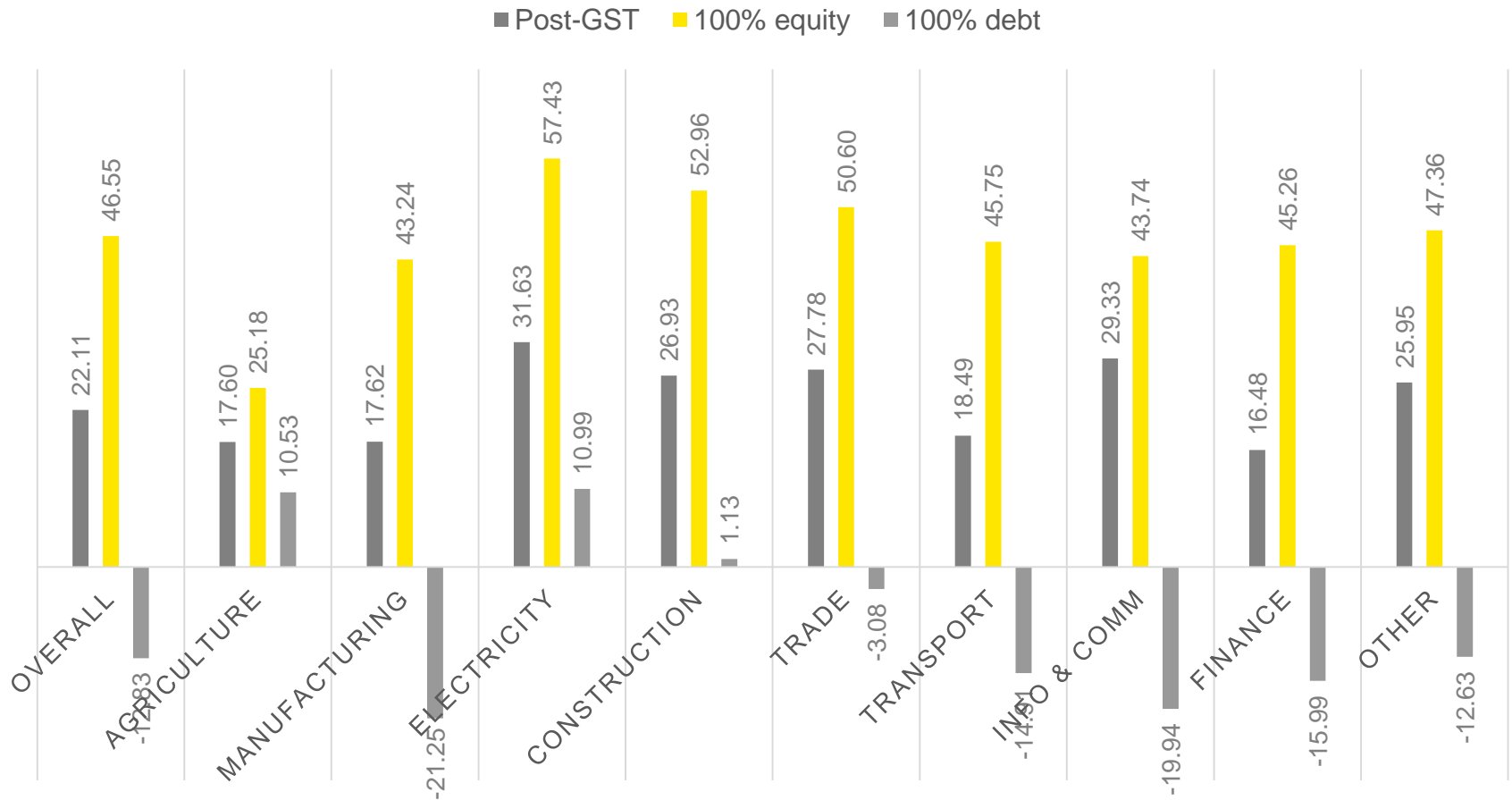
## Size distortions: large vs small, pre- and post-GST



► Smaller firms tend to have higher METRs

# METRS for investment in India

## Financing distortions: debt vs equity

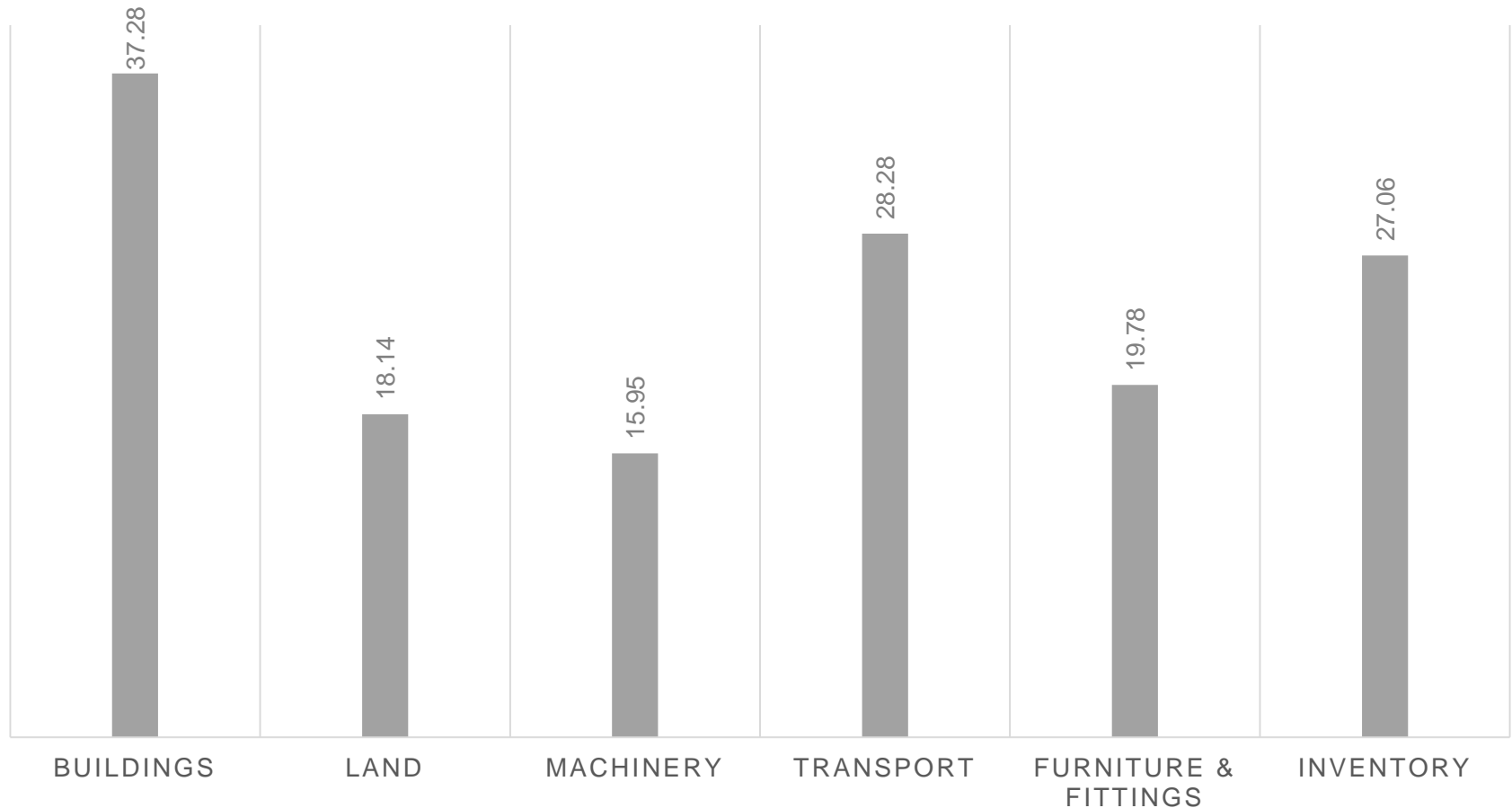


- ▶ Highly indebted firms have lower METRs because of interest rate deductibility

# METRS for investment in India

## METRs across different asset classes

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- ▶ Machinery has the lowest METR because of initial allowances and accelerated depreciation

# Summary



# Summary

## Methodological notes

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- ▶ The METR is a theoretically consistent method for evaluating a tax system's impact on investment incentives
- ▶ The METR is a better measure of for this purpose than
  - ▶ Statutory corporate income tax rates
  - ▶ Average tax rates
- ▶ The METR estimates the tax wedge between the pre- and post-tax returns of the marginal firm
  - ▶ Direct taxes, indirect taxes and tax incentives are considered
- ▶ The METR is a bottom-up methodology
  - ▶ Sectoral and national METRs are estimated by aggregating across lower-level METRs
- ▶ We have estimated 216 METRs across 9 sectors

# Summary

## METRs in India

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- ▶ The GST reduced national METR from 27.8% to 22.1%
  - ▶ Could increase national-wide investment by 5.1%
- ▶ If remaining GST exceptions are removed, METR would fall further to 13.26%
  - ▶ Nationwide investment should increase by another 6.6%
- ▶ Decomposition analysis shows that indirect taxes contribute as much as 40% of post-GST METRs
- ▶ Direct tax incentives significantly reduce to the METR
  - ▶ E.g. accelerated depreciation and initial allowances
  - ▶ If removed, the CIT and MAT rates can be reduced to 12.75% and 10.0% without affecting the METR

# Summary

## METRs in India

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- ▶ MAT paying firms tend to have higher METRs
  - ▶ Because they do not avail of some direct tax incentives
- ▶ Large firms tend to have lower METRs
  - ▶ Because they receive initial allowances
  - ▶ The tax code may therefore work against small firms scaling up
- ▶ High debt levels reduce METRs
  - ▶ Therefore, low METRs are not necessarily a good thing, particularly when associated with high debt levels
  - ▶ This is seen particularly in the power, construction and transport sectors
  - ▶ Pre-GST, power received many incentives, but it was also heavily indebted → low METRs

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