

## Marginal Effective Tax Rates on New Investments in Armenia\*

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Abstract – This paper provides estimates of effective tax rates on new investments in equipment and structures in Armenia. The user cost of capital is calculated for a large category of assets and major industries, and this is followed by estimates of the effective tax rates. Despite a flat statutory Profit Tax rate of 20 percent, the estimated effective tax rates vary by type of asset and industry and are about half the statutory rate even after accounting for property taxes. Accelerated depreciation allowances account for much of this dispersion, and along with the tax deductibility of debts, are the primary sources of the estimated lower effective tax rates.

Keywords: Marginal effective tax rates, user cost of capital, new investment, Armenia.

JEL Classification: H21, H25, H32, D61

## 1. INTRODUCTION

The taxation of businesses is a topic of continued interest to policymakers in Armenia. This interest reflects general concerns about whether high tax rates reduce business investments. It also reflects interest in tax preferences as means to stimulating investment in particular sectors or regions of the country.

Taxes introduce a wedge between the rate of return on an investment and its after-tax rate of return. And this wedge, in turn, may reduce the incentives to invest. Moreover, because taxes may apply unevenly to different assets and industries, they are also likely to distort investments decisions and perhaps exacerbate the misallocation of investments among various sectors of the economy.

Successive Armenian governments embarked on liberalizing the tax treatment of businesses and reducing the tax burden. A scant literature has addressed the tax burden on

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businesses, and how this may vary across assets and industries. Questions of interest include how burdensome are business taxes, and how this burden varies across assets and industries.

This paper estimates the effective tax rate for taxes levied on businesses in Armenia. It builds on Joulfaian and Melikyan (2004) to explore the effects of Armenian taxes on the user cost of capital for investments in equipment and structures. It extends the analysis to reflect debt vs. equity financing of investments, accounts for tax law changes, and incorporates minor methodological changes related to data sources and tax parameters. The analysis abstracts from temporary features of the tax code and focuses on the long-run permanent law. Shareholders are assumed to maximize the value of their firms, and macroeconomic conditions are held constant and assumed fully anticipated.

Several features of Armenian taxes embody differential tax levies. Different industries and assets put in place may face different tax rates. Similarly, allowances for tax-deductible expenses may vary by type of asset, industry, as well as geographic location. These features create differential effects on measured incentives and effective tax rates on investments. Accordingly, we first set out to measure the cost of capital and then calculate the marginal effective tax rates. And we calculate these tax rates for each asset, industry, and the economy as a whole.

While businesses face a statutory tax rate is 20 percent in 2019, the period under study, we find that estimated effective tax rates on new investments are well below this statutory rate. The overall effective corporate tax rate is 7.5 percent only, with a rate of 6.1 percent for equipment and 8.2 percent for structures. Equally important, the findings show corporate effective tax rates vary widely across industries, with a tax rate of 4.3 percent for lodging and a rate of 12.1 percent for construction. These low rates can be attributed to accelerated depreciation allowances, and to the tax advantages of debt financing. When property taxes are considered, the overall effective tax rate increases from 7.5 to 10.65 percent, with a rate of 7.5 percent for equipment and 12.4 percent for structures.

The remainder of the paper is organized as follows. Section II describes how effective tax rates are measured. Section III summarizes the features of capital taxes in Armenia, including the Corporate Tax and property taxes. Section IV presents estimates of the cost of capital and the resulting effective tax rates. Section V concludes.

## 2. MEASURING EFFECTIVE TAX RATES

We employ an investment incentive model based on the neoclassical rental rate approach following Hall and Jorgenson (1967) to compute effective tax rates on new investments. This framework captures the effects of various provisions of the Armenian tax code but abstracts from risk.

### 2.1. A. The user cost of capital.

Under the neoclassical rental rate approach, the competitive profit maximizing condition yields a cash flow from an investment with a present value at least equal to its acquisition cost or price. At equilibrium, the two are equal.

For a marginal investment of  $q$  of one Armenian *Dram*, this equilibrium is solved for the user cost of capital  $c$ :

$$(1) \quad c = \frac{r - \pi + \delta}{1 - \tau} (1 - \tau z)$$

where  $r$  is the firm's nominal discount rate,  $\pi$  is the (constant) expected inflation rate,  $\delta$  is the rate of economic depreciation,  $\tau$  is the statutory corporate tax rate, and  $z$  is the present value of tax-depreciation allowances. The user cost of capital is simply the real gross return required to cover the return demanded by shareholders, economic depreciation, and taxes. When an asset is expensed, then  $z = 1$  and (1) simplifies to  $c = r - \pi + \delta$ ; taxes don't matter.

Equation (1) can be further modified to include property taxes at rate  $w$ , as in Fullerton (1985), as well as consumption taxes when extended to investment goods, at tax rate  $v$ , as in Joulfaian and Mackie (1992):

$$(2) \quad c = \frac{r - \pi + \delta}{1 - \tau} (1 - \tau z) + w + v$$

The nominal discount and inflation rates,  $r$  and  $\pi$ , are constant across all assets, while  $\tau$ ,  $z$ ,  $w$ ,  $v$ , and  $\delta$ , may vary by asset and industry.

## 2.2. The discount rate.

The discount rate,  $r$ , is defined as the firm's after-tax risk-free rate of return. It represents a firm's minimum after-tax return, allowing the ultimate investor to pay his tax and still leave him with his required after-tax rate of return. In effect, this is the firm's opportunity cost to invest. Conceptually, the discount rate may depend on the source of financing (debt vs. equity).

More specifically, the firm's real discount rate,  $r - \pi$ , is defined as the weighted average of market interest rate ( $i$ ) and the required after-tax real return on equity ( $E$ ):

$$(3) \quad r - \pi = f [b i (1 - \tau) - \pi] + (1 - f) E$$

where  $f$  is the fraction of the investment that is debt-financed, and  $b$  is the fraction of interest expenses that are tax deductible. Unlike the returns to shareholders, a corporation's interest payments on debt are deductible in computing taxable income. This tax deduction creates an incentive for corporations to use more debt to finance investments.<sup>1</sup>

## 2.3. The effective tax rates.

Effective tax rates are calculated using the cost of capital estimates for new investments. These tax rates represent the difference between the pre-and post-tax rates of return as a proportion of the pre-tax rate of return. The real before-tax return a corporation requires on the marginal investment is  $c - \delta$ . And the real after-tax rate of return is  $s - \pi$  defined as:

<sup>1</sup>When borrowed from a foreign parent company, and unlike borrowing from banks and other lenders, this represent income shifting. This debt bias has no deadweight cost other than the necessary tax planning.

$$(4) \quad s - \pi = f(i - \pi) + (1 - f)E$$

or the weighted average of the real returns paid on debt-financed investments and equity-financed investments net of the firm's paid taxes (e.g., financed by retained earnings). The marginal effective total tax rate shows the portion of marginal capital costs attributable to taxes, or simply:

$$(5) \quad METR = [(c - \delta) - (s - \pi)] / (c - \delta)$$

Again, note that this effective tax rate abstracts from personal level taxes and reflects a single-level business taxation layer.

### 3. DATA AND PARAMETERS

In measuring the effective tax rate on new investments, we employ parameters for tax law in effect as of January 1, 2019, and consider all taxes faced by firms. Following from the above framework, we focus on the corporate Profit Tax and the property tax. More specifically, we ignore transitory provisions and only consider permanent features of tax law. For example, agricultural activities are assumed to be subject to corporate tax even though they are exempt through December 31, 2024. We also ignore potential value added taxes (VAT) on purchases and set  $v = 0$ .<sup>2</sup>

We do not consider the tax treatment of intangibles. These are generally amortized and deducted from gross income, except for goodwill which we believe is not deductible. Similarly, we do not consider the treatment of inventories which are stated at cost, FIFO

<sup>2</sup>If a business were to purchase a new structure, it will have to pay value added taxes on the new building. But if it commissions it itself, it will avoid the tax; all the inputs on the self-constructed property avoid the VAT. We assume that tax minimizing investors will self construct. In another example, imported equipments are often subject to VAT. These are refunded, but delays in refunds can be burdensome. We assume the latter is more of a temporary feature of tax administration and not permanent tax law.

typically. And because we only consider firm-level taxes, we do not consider shareholder-level taxes.

### 3.1. The Profit Tax.

The Armenian Profit tax shares many of the features of corporate taxes levied around the world. Gross receipts of the firm, for instance, are reduced by operating expenses, such as wages paid to employees and interest expenses, and capital consumption allowances, such as depreciation and amortization, in determining taxable income.

#### 3.1.1. *Tax rates.*

Firms face a statutory tax rate ( $\tau$ ) of 20 percent on their taxable profits.

#### 3.1.2. *Depreciation allowances.*

Generally assets, other than inventory and land, fall into several categories. Some assets, such as (1) computers, are expensed, (2) other machinery and equipment are depreciated straight line over 8 years, unless employed in “production” where the tax life declines to 5 years, and (3) structures employed in lodging, health, and education, are accorded 10 year tax lives, and (4) other structures with 20 year tax lives.

#### 3.1.3. *Interest expenses.*

With few exceptions, interest on debt acquired in funding new investments are deducted from revenues in deriving taxable income.<sup>3</sup>

### 3.2. Property Taxes.

In addition to taxes on profits, businesses are also subject to property taxes. More specifically, the owners of real estate and motor vehicles are subject to annual property taxes.

#### 3.2.1. *Tax base.*

Property taxes apply to real estate structures, buses, trucks, cars, and boats. In the case of real estate, the tax applies to the cadastre value, often the purchase price, of the new property. In the case of real estate, the tax applies to the cadastre value, often the purchase

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<sup>3</sup>The portion of interest exceeding the double of the settlement rate fixed by the Central Bank of Armenia on December 31st of the taxation year is not deductible (the current rate is 24%).

price, of the new property. In the case of personal property, however, the tax is generally unrelated to the acquisition cost. For instance, in the case of cars, the tax is based on the number of horsepowers of the new vehicle.

### 3.2.2. *Tax Rates.*

Property tax rates vary by type of assets and extend to building, motor vehicles, buses, trucks, and boats, as noted earlier. Structures such as buildings and hotels are subject to a tax rate of 0.3 percent. For motor vehicles, buses, trucks, and boats, the tax is typically levied on the number of horsepowers of the asset acquired and not its actual value. For passenger servicing automobiles with up to 10 seats, the is:

- (a) 200 drams per horsepower when under 120 horsepower;
- (b) 300 drams per horsepower, when between 120 and 250 horsepower;
- and (c) 500 drams per horsepower, when 250 and more.

In the case of passenger servicing automobiles with more than 10 seats and for the trucks, the tax is:

- (a) 100 drams for each horsepower, when under 200 horsepower; and
- (b) 200 drams per horsepower, when 200 horsepower and more. Similar rules also apply to boats.

For watercraft, the tax is set at 150 drams for each horsepower.

### 3.3. **Concessions and Preferential Treatments.**

Armenia employs fiscal incentives to channel and stimulate investments. As a result, tax concessions may vary by sector, type of assets invested in, and discriminate among domestic and foreign investors. These breaks take a number of forms, summarized below.

#### 3.3.1. *Reduced profit tax rates.*

Firms with profits from the production of agricultural products are exempt from the profit tax through 2024. Because we focus on the long, this exemption is ignored in the analysis below. Firms that produce exclusively for export purposes are taxed at a 5 percent tax rate

if the value of their exports exceeds 40 billion Drams, 2 percent if it exceeds 50 billion.<sup>4</sup> This preference is likely to be very small overall and is consequently omitted from the analysis below. Certain firms in select border regions face a zero tax rate. The latter is also ignored as little in physical capital is likely to benefit from this preference.

Free Economic Zones (FEZ) faces a zero tax rate over a number of years. The Alliance FEZ in Yerevan was formed in 2013 focusing on IT and medical instruments. Because of the small size of investments, and the 10 year duration of the tax benefits, it is ignored in computing the effective tax rates. Another FEZ in Yerevan, the Meridian, was launched in 2015 and specializes in jewelry and watchmaking for a duration of 10 years. While important in terms of jobs, very little in investments are realized. It is also ignored in the computations. The Meghri FEZ, in the south of the country, was formed in December of 2017, and covers all aspects of economic activity. While it has the widest potential applications with a duration of 50 years for tax benefits, virtually no investments have taken place as speculators bought up much of the land in the area. It too is ignored below.

### 3.3.2. *Accelerated depreciation allowances.*

The tax code provides preferential treatment to investments in the 1988 earthquake zone. Transmission devices, buildings and hotels, and other structures located in the disaster area may be expensed. For firms operating in Gyumri, the second largest city that was severely damaged during the earthquake, all equipments and structures are expensed.

### 3.4. **Economic depreciation.**

The economic depreciation rate,  $\delta$ , for various assets is obtained from the US Department of Commerce, Bureau of Economic Analysis (1997). In many ways, these rates are similar or build upon those reported by Hulten and Wykoff (1981). More specifically, in the analysis below, we employ economic depreciation rates for 45 types of assets.

### 3.5. **Assets by type and industry.**

Information on the size and distribution of assets by type and industry is needed to derive

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<sup>4</sup>In 2019, 1 USD=478 Drams.

estimates of the cost of capital and the related effective marginal tax rates. Unfortunately, such information is not available for Armenia. Accordingly, we employ data on the distribution of assets in the US. While there is little doubt this can introduce measurement errors given the dramatic differences in the countries' respective economies, such errors are unlikely to affect the qualitative findings below.

More specifically, we rely on US data on capital assets by type and industry published by the Commerce Department's Bureau of Economic Analysis for 2001. While this solves a computational problem, it may introduce measurement errors as the structures of the two economies vary drastically. With the shortcomings in mind, we narrow our focus to 12 somewhat broadly defined sectors of the economy and 45 types of assets. The sectors include farms, metal mining, construction, food manufacturing, telecommunication, utilities, trade, hotels, business services, and health services.

### 3.6. Summary of parameters.

Our analysis requires information on statutory income tax rates, economic depreciation rates, capital cost recovery allowances, financing shares, property tax rates, inflation, and the real after-tax and risk-free rate of return.

#### *Statutory profit tax rates -- $\tau$*

We set the corporate tax rate  $\tau$  equal to 0.20. In addition, because we focus on the fully phased-in law, the tax rate for firms engaged in agriculture is also set to 20.

#### *Economic depreciation -- $\delta$*

Estimates of economic depreciation rates are summarized in Table 1. These rates, obtained from Hulten and Wykoff (1981) and the US Department of Commerce (2003), are provided for 29 types of equipment and 16 types of structures.<sup>5</sup>

#### *Capital cost recovery tax allowances -- $z$*

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<sup>5</sup>See Charles R. Hulten and Frank C. Wykoff, 1981, "The Measurement of Economic Depreciation" in *Depreciation, Inflation, and the Taxation of Capital Income*, Washington, DC: The Urban Institute, pp. 81-125; U.S. Department of Commerce, Bureau of Economic Analysis, 2003, "Fixed Assets and Consumer Durable Goods in the United States, 1925-1997" (September)

The tax lives provided under Armenia's profit tax are reported in the middle panel of Table 1. Capital expenditures are depreciated over these lives using the straight line method. For assets expensed,  $z$  is equal to 1. And for assets with lives  $n > 1$  year tax lives, the present value of tax allowances is calculated as:

$$(6) \quad z = \frac{1 - e^{-rn}}{rn}$$

The last two columns of Table 1 provide the tax lives and corresponding present of depreciation tax allowances for equipment used in production. Table 2 presents similar parameters but limited to structures.

*Fraction of interest expenses deductible –  $b$*

We set the fraction of deductible interest expenses  $b = 0.75$ , consistent with Congressional Budget Office (2014), hereafter CBO, due to lack of data.

*Property tax rate –  $w$*

All equipment are generally exempt from taxation, except for buses, truck, and cars. The tax laws do not provide a specific tax rate for these assets. Accordingly, specific tax amounts are converted to ad valorem tax rates. This rate for vehicles is set at one percent in Joulfaian and Melikyan (2004). Using administrative records, this rate is computed by considering the price of the vehicles, the horsepower, and applicable per unit tax, or:

$$\text{Tax rate} = (\text{tax per horsepower} * \text{number of horsepowers}) / \text{price}$$

These rates actually vary considerably, as the underlying prices of the vehicles vary. We do not have access to the administrative records used earlier, and hence adjust the measured tax rate to reflect the change in new auto prices over the period 2003 and 2018.

TABLE 1. Equipment: Depreciation rates and tax lives

Asset	Economic Depreciation Rates	Tax Lives	PV Depreciation	Tax Lives (production)	PV Depreciation
1 Computers	0.4009	1	1.0000	1	1.0000
2 Communication equipment	0.1125	1	1.0000	1	1.0000
3 Instruments	0.1511	1	1.0000	1	1.0000
4 Photocopy and related equipment	0.1800	1	1.0000	1	1.0000
5 Office and accounting equipment	0.3119	8	0.7611	8	0.7611
6 Nuclear fuel	0.2672	1	1.0000	1	1.0000
7 Other fabricated metal products	0.0917	5	0.8404	3	0.8998
8 Steam engines	0.0516	5	0.8404	5	0.8404
9 Internal combustion engines	0.2063	5	0.8404	5	0.8404
10 Metalworking machinery	0.1023	5	0.8404	5	0.8404
11 Special industry machinery	0.1023	5	0.8404	5	0.8404
12 General industrial machinery	0.0998	5	0.8404	5	0.8404
13 Electrical transmission & distribution	0.0500	20	0.5312	20	0.5312
14 Trucks and buses	0.1725	8	0.7611	5	0.8404
15 Autos	0.3330	8	0.7611	5	0.8404
16 Aircraft	0.0687	8	0.7611	5	0.8404
17 Ships and boats	0.0611	8	0.7611	5	0.8404
18 Railroad equipment	0.0589	8	0.7611	5	0.8404
19 Household furniture	0.1375	8	0.7611	8	0.7611
20 Other furniture	0.1179	8	0.7611	8	0.7611
21 Farm tractors	0.1452	8	0.7611	5	0.8404
22 Construction tractors	0.1633	8	0.7611	5	0.8404
23 Agricultural machinery, except tractors	0.1179	8	0.7611	5	0.8404
24 Construction machinery, except tractors	0.1550	8	0.7611	5	0.8404
25 Mining and oilfield machinery	0.1500	8	0.7611	5	0.8404
26 Service industry machinery	0.1650	5	0.8404	5	0.8404
27 Household appliances	0.1650	8	0.7611	8	0.7611
28 Other electrical equipment	0.1834	8	0.7611	5	0.8404
29 Other nonresidential equipment	0.1473	8	0.7611	8	0.7611

TABLE 2. Structures: Depreciation rates and tax lives

	Asset	Economic Depreication Rates	Tax Lives	PV Depreciation
30	Industrial buildings	0.0314	20	0.5385
31	Office buildings	0.0247	20	0.5385
32	Commercial warehouses	0.0222	20	0.5385
33	Other commercial buildings, n.e.c.	0.0262	20	0.5385
34	Hospital and institutional buildings	0.0188	10	0.7194
35	Hotels	0.0281	10	0.7194
36	Amusement and recreational buildings	0.0300	10	0.7194
37	Multimerchandise shopping	0.0262	20	0.5385
38	Telecommunication structures	0.0237	20	0.5385
39	Electric light and power	0.0211	20	0.5385
40	Gas	0.0237	20	0.5385
41	Farm structures	0.0239	20	0.5385
42	Mining exploration, other then pet and gas	0.0450	20	0.5385
43	Railroad structures	0.0166	20	0.5385
44	Railroad track replacement	0.0249	20	0.5385
45	Other nonfarm structures	0.0237	20	0.5385

Accordingly, we set the tax rates on trucks, buses, and cars at 0.94 percent down from one percent.<sup>6</sup> Following Joulfaian and Melikyan, we set the rate for boats at 0.004 percent.<sup>7</sup>

#### *Other parameters*

We set the inflation rate,  $\pi$ , to 2.4 percent, the interest rate  $i$  to 6.8 percent, the real after-tax return to equity  $E$  to 5.8 percent, and the fraction of investment that is debt-financed at 35 percent.<sup>8</sup> All parameters, other than those related to depreciation, are summarized in Table 3.

#### 4. ESTIMATES OF EFFECTIVE TAX RATES

Using the various parameters reported above, we estimate equations (2) and (5) for each asset in every industry. In addition, we make a number of assumptions to facilitate the measuring of effective tax rates. We assume that firms are able to take advantage of

<sup>6</sup>The change in new auto prices is obtained from the US Bureau of Labor Statistics, [https://data.bls.gov/timeseries/CUUR0000SETA01?output\\_view=data](https://data.bls.gov/timeseries/CUUR0000SETA01?output_view=data). Prices in the US increased by less than 6 percent only. It is very likely that prices in Armenia may have increased considerably more as imports may have switched from eastern to more expensive western sourced manufacturers. And if this is true, than measured property tax rates should have declined considerbaly over this period.

<sup>7</sup>The treatment of boats is inconsequential to the estimates below, but is considered for completeness.

<sup>8</sup>These parameters are consistent with those cited in CBO.

TABLE 3. Summary of other parameters

Variable	Description	Value
$\tau$	Statutory tax rate	0.20
$i$	Interest rate	0.068
$b$	Fraction of interest expense deductible	0.75
$E$	Real after-tax return on equity	0.058
$f$	debt-financed fraction of investments	0.35
$w$	Property tax on car/buses/trucks	0.0094
$w$	Property tax on boats/ships	0.004
$w$	Property tax on structures	0.003

all tax preferences, and do not engage in tax evasion and comply with the prevailing tax laws.

For each investment in asset  $i$  invested in industry  $j$ , we calculate the cost of capital and the implied marginal effective tax rate  $METR_{i,j}$ . Next, the economy-wide METR is calculated by weighing each  $METR_{i,j}$  using information on the allocation of assets by type and industry. As noted earlier, and due to lack of data for Armenia, the US distribution of assets for 2001 is employed. This is obtained from the Bureau of Economic Analysis (BEA) of the US Department of Commerce.<sup>9</sup> More specifically, economy wide METR is calculated as:

$$METR = \sum_{i=1}^{45} \sum_{j=1}^{12} METR_{i,j} * A_{i,j} / TA$$

where  $A$  is the value of assets by type  $i$  in industry  $j$ , and  $TA$  is the sum total of assets (equipment and structures) in the economy. A similar procedure is employed in calculating the METR for the aggregate investments in asset  $i$  and for that of each industry  $j$ .

Focusing on the corporate tax (CIT), the overall METR is estimated at 7.45 percent and is well below the statutory rate of 20 percent, as shown in Table 4. When property taxes are considered, METR increases to 10.65 percent. Property taxes seem to have the effect of increasing the effective tax rate by about 42 percent, and add considerably to the tax

<sup>9</sup>Of course, we recognize the measurement noise that this may introduce given the differences in technology and industrial structure.

TABLE 4. Marginal Effective Tax Rates by Asset Type: statutory tax rate=0.20

Corporate Income Tax (CIT) only	
Equipment	0.0608
Structures	0.0820
Total	0.0745
CIT plus Property Tax	
Equipment	0.0751
Structures	0.1238
Total	0.1065

burden. Nevertheless, the estimated METR remains close to one half the value of the statutory tax rate.

#### 4.1. Inter-asset disparities.

Table 4 also reports the effective tax rates for equipment and structures. Again focusing on CIT, the METR for equipment is 0.0608 or less than one-third of the statutory tax rate of 0.20. The tax rate for structures is 0.082, or about 40 percent of the statutory rate. When property taxes are considered, both effective tax rates increase, but increase more for structures; METR of 0.0751 for equipment and 0.1238 for structures.

It should come as no surprise that equipment face a lower METR than structures. These assets are typically depreciated over tax lives that are shorter than economic lives. As a case in point, computers are expensed, and accordingly face an effective tax rate of zero. In addition, most equipments are not subject to property taxes unlike structures. It should also not come as a surprise that structure face an effective tax rate below the statutory tax rate reflecting on their short tax lives.

#### 4.2. Sectoral disparities.

In addition to the wedge between the effective tax rates for equipment and structures, we also observe considerable variation in effective tax rates across industries as gleaned from Table 5. For the lodging industry, the corporate METR is only 0.043 reflecting on the short tax life of hotels as they are depreciated over ten years for tax purposes. In contrast, the METR for investments in constructions is 0.121, but still well below the statutory rate.

TABLE 5. Marginal Effective Tax Rates by Sector: statutory tax rate=0.20

Industry	CIT only	CIT plus Property Tax
Agriculture	0.0953	0.1207
Mining	0.1157	0.1477
Utility	0.0883	0.1192
Construction	0.1210	0.1557
Manufacturing'	0.0669	0.0878
Trade	0.0863	0.1225
Transportation	0.0860	0.1053
Telecom	0.0465	0.0768
Finance, Insurance, Real Estate	0.0938	0.1366
Business Services	0.0618	0.0940
Health Services	0.0096	0.0454
Lodging	0.0430	0.0890
All	0.0745	0.1065

When property taxes are considered, the METR for the lodging industry more than doubles to 0.089. The effective tax rates also increase across all industries, with construction continuing to have the highest METR at 0.156. With and without property taxes, investments in health services enjoy the lowest effective tax rates. As with lodging, they benefit from accelerate depreciation on structures and expensing on certain equipment. With no preferential tax rates for agriculture, the effective tax rate is 0.095, or 0.121 after accounting for property taxes.

#### 4.3. Regional disparities.

The tax treatment also varies by region. As noted earlier, the 1988 earthquake zone receives a special treatment. Investments in equipment in the Shirak marz, or province, is expensed. And all investments in equipment and structures in Gyumri are expensed. And so the effective tax rate on investments in Gyumri is zero. It is also zero, on investments in equipment in the rest of Shirak. To the extent that the bulk of structures in Shirak are located in Gyumri, Armenia's second largest city, We assume that all investments in the marz face an effective tax rate of zero.

As with the country, we do not have information on the size and allocation of investments in the region. There are some measures of economic activity that we use as proxies

for the share of Armenia's assets located in the region. According to Armstat, the Armenian statistical agency, manufacturing in the marz in 2016 accounted for 2.8 percent of Armenia's share, agriculture for 11.6 percent, construction for 3.3 percent, retail trade for 3.8 percent, and services for 1.7 percent.<sup>10</sup> Obviously, this does not cover all the industries listed in Table 5, and we set the share to 1.7 percent for the remainder. Reflecting on the relatively small share of economic activity, the tax preferences for the marz have a miniscule effect on the nation's METR, reducing it from 0.1065 to 0.1035.

## 5. CONCLUSION

This paper estimated marginal effective tax rates on new investments in 45 types of equipment and structures by 12 sectors in Armenia. While the statutory corporate tax rate is 20 percent, the estimated marginal tax rates are well below this rate. There is considerable dispersion in rates among industries and assets. And when property taxes are considered, the estimated rates become larger but continue to be well below the statutory tax rate; property taxes have the effect of increasing the effective tax rate by over 40 percent.

The stylized facts gleaned from the findings suggest that overall marginal effective tax rates are well below the statutory rates levied by the government. In addition, these rates vary significantly and range from zero in the case of computers compared to 11 percent for all assets. Similarly, rates vary by industry, with the lowest for health services and lodging. Geographically, investments in Gyumri face the lowest burden with rates close to zero, zero when property taxes are ignored.

There are a number of data shortcomings that need to be overcome. US data on the allocation of assets by type and industry are likely to be poor proxies for Armenia. Pending the development such data, weighted measures of the cost of capital and effective tax rates should be viewed as tentative as they are likely to suffer from measurement errors. Furthermore, and to allow for better measurement of incentives, we need data on the geographic allocation of assets as well.

<sup>10</sup>See (in Armenian) <https://www.armstat.am/file/doc/99504978.pdf>

One important caveat about our findings is that they are likely to be subject to measurement errors in the presence of poor and uneven administration of the tax code. Some industries are more prone to tax evasion than others. Detection rates for evaded income in cash-based sectors, for instance, might be low. Also, they may not be equally prone to evasion reflecting managerial preferences (Joulfaian, 2000) or in response to differential taxation (Joulfaian and Rider, 1998). Evaded capital income may affect the measurement of the cost of capital and effective tax rates and lead to greater misallocation of resources (Fullerton and Karajan, 1994).

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