



Macroeconomics, Trade &amp; Investment

# MTI Practice Notes

## The Impact of COVID-19 on Formal Firms: Evidence from Montenegro

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### SUMMARY

This note uses administrative tax data on firms to measure the direct impact of the lockdown on firms' profitability, employment and exit rates. It separates the economy in three sectors, which face different size shocks and considers two lockdown scenarios: one lasting three months and one lasting five months. It estimates losses to corporate income tax (CIT) revenue, increases in firms' debt levels, cuts in payroll and their mitigation through wage subsidies, and aggregate output losses from firms' exit.

Overall, the impact on the economy is severe, with large falls in tax revenue, increases in debt and loss of employment. Under a three-month lockdown, we estimate that only 34% of firms remain profitable and that almost all firms in the highly-impacted sectors register losses. The CIT would only collect 62% of its baseline revenue in 2020. In addition, firms accumulate losses equivalent to 3.8% of GDP, suggesting that firms will need to substantially increase borrowing to survive. Firms would cut 7.4% of total yearly payroll absent wage subsidies. With the wage subsidies as currently designed, the total yearly payroll loss might be lowered to 5% and the share of non-loss making firms will increase by 10 percentage points. The wage subsidy costs about 38.7 million Euro, but it reduces the tax revenue losses incurred for the CIT, social security contributions and personal income tax by 25.4 million Euro, meaning

that the net cost of the wage subsidy is only 13.3 million Euro. Even with a high wage subsidy, it will be hard to save firms in the high-impact sector (tourism, transport, personal services), where most firms are not expected to make enough revenue to cover their fixed costs.

This note faces important limitations: (i) it does not include the indirect impacts of the shocks which operate through firms' trade linkages, (ii) it only models a demand shock and as such firms have no issues obtaining inputs (materials, labor), (iii) firms do not adapt to the crisis (for example by changing products, selling online etc.), (iv) profits in administrative tax data may be under-reported for tax minimization purposes, so that firms in our data would exhibit artificially low profitability in the pre-Covid baseline<sup>2</sup>, (v) we do not account for the effect of policies other than wage subsidies which were also introduced to support firms (100% tax exemptions in most affected sectors, subsidized loans, electricity bill subsidies, etc). Our results thus show the impact of the shock with wage subsidies but without the additional measures.

Taking into account caveats (i)-(iii), the numbers in this report could be considered as plausible lower bounds arising from direct effects, in partial equilibrium, without taking into account the full set of government support policies. Dynamic general equilibrium models of the economy, with linkages across sectors and firms, are needed to gauge longer term effects.

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<sup>2</sup>We do not observe potential under-reporting directly, and thus use the administrative tax data as is.

**The COVID19 (coronavirus) pandemic and associated containment measures are expected to cause far-reaching damage to economies around the world.** Firms are suffering from reduced demand due to movement restrictions, from reduced labor supply and from constraints to sourcing material inputs. The breakup of otherwise healthy businesses in response to a temporary shock implies large social costs. Governments are therefore intent on designing emergency policies to keep businesses afloat.

**We present simulations using firm-level tax records from Montenegro, which vary the duration of the lockdown and the relative impact across sectors.** In these simulated scenarios, demand shocks induce a loss in revenue which triggers a cut in profitability and possibly cuts in employment or even firm closure. We compare these simulations to a baseline (pre-COVID) situation, which corresponds to the last year of available administrative data. Our analysis relies on a few simple assumptions about the structure of firms' revenue and costs: we assume that firms aim to weather the shock such that they can scale their production capacity back up swiftly at the end of the lockdown. In this stylized world, firms can reduce their material costs proportionally to the drop-in demand, are reluctant to reduce their labor costs as re-contracting

is costly and cannot adjust their fixed costs. Finally, we assume that credit constraints prevent borrowing beyond existing loans used to cover predictable losses (i.e. losses unrelated to the shock).

**We classify sectors into three impact categories - high, medium and low – depending on their expected loss in revenue during the shutdown, displayed in Table 1.** This classification is based on a country-specific ad hoc assessment by the Ministry of Finance. In the high-impact category are sectors which can't operate at all during the lockdown and lose 100% of their revenue during that period. These include tourism, transportation, non-essential retail and entertainment. In the medium impact categories are sectors which operate at half capacity and lose 50% of their revenue. These include manufacturing and education. Finally, the low impact sector only loses 20% of its monthly revenue, in sectors such as essential retail, health, construction and agriculture. Naturally there is still a fair degree of heterogeneity of exposure within the categories, with some sub-sectors experiencing increased revenue. Table 2 shows the number of firms and economic weight of each of the three impact sectors: the high-impact sector contains 35% of the firms and 27% of the wage bill, the medium impact sector contains 29% of the firms and 31% of the wage bill, and the low-impact sector the remaining 37% of the firms and 42% of the wage bill.

**Table 1: Sector Categories and Shocks**

Categories	Sectors (e.g., detailed list of sectors in Appendix Table 4)	Expected Monthly Revenue Loss
<b>High Impact</b>	Accommodation and Food Service Activities, Transportation and Non-essential retail, and other highly affected sectors	100%
<b>Medium Impact</b>	Manufacturing Activities, Education and other moderately affected sectors	50%
<b>Low Impact</b>	Essential Retail, Human Health and Social Work activities and other mildly affected sectors	20%

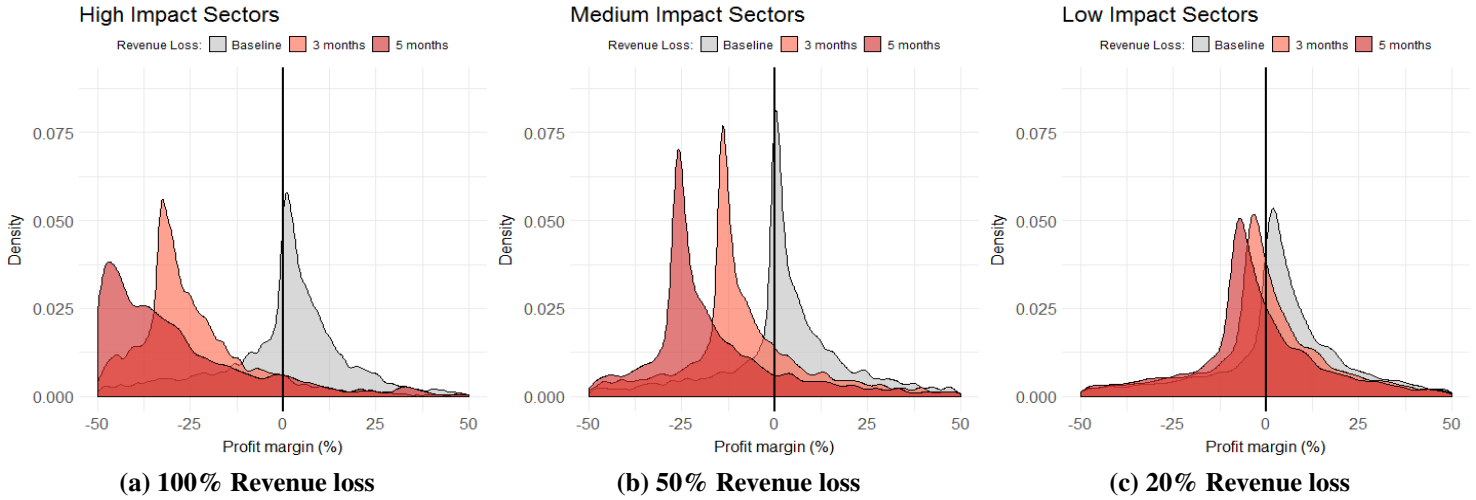
**Table 2: Statistics for High, Medium and Low Impact Sectors**

Categories	Aggregates				Averages				
	Number of firms	Share of firms	Revenue share	Wage bill share	Avg. size (LCU, in thousands)	Avg. Profit margin	Labor costs (% total costs)	Material costs (% total costs)	Fixed costs (% total costs)
<b>High impact</b>	6161	35%	26%	27%	338	6%	31%	43%	26%
<b>Medium impact</b>	5036	29%	28%	31%	461	9%	29%	36%	35%
<b>Low impact</b>	6458	37%	46%	42%	585	9%	35%	35%	30%

In this section, we ask what share of firms would need government support to “stay afloat” under a three-month and a five-month lockdown scenario. Assuming credit constraints, a rough indication for firms’ ability to stay afloat is

a non-negative profit rate. We start by simulating scenarios where firms lose a share of their revenue, while all costs remain constant. The results are displayed in Figure 1, and show that in the high and medium impact sectors the vast majority of firms become unprofitable even under the three-month lockdown scenario.

Figure 1: Firm Profitability Under a Shock to Revenue, No Adjustment to Costs

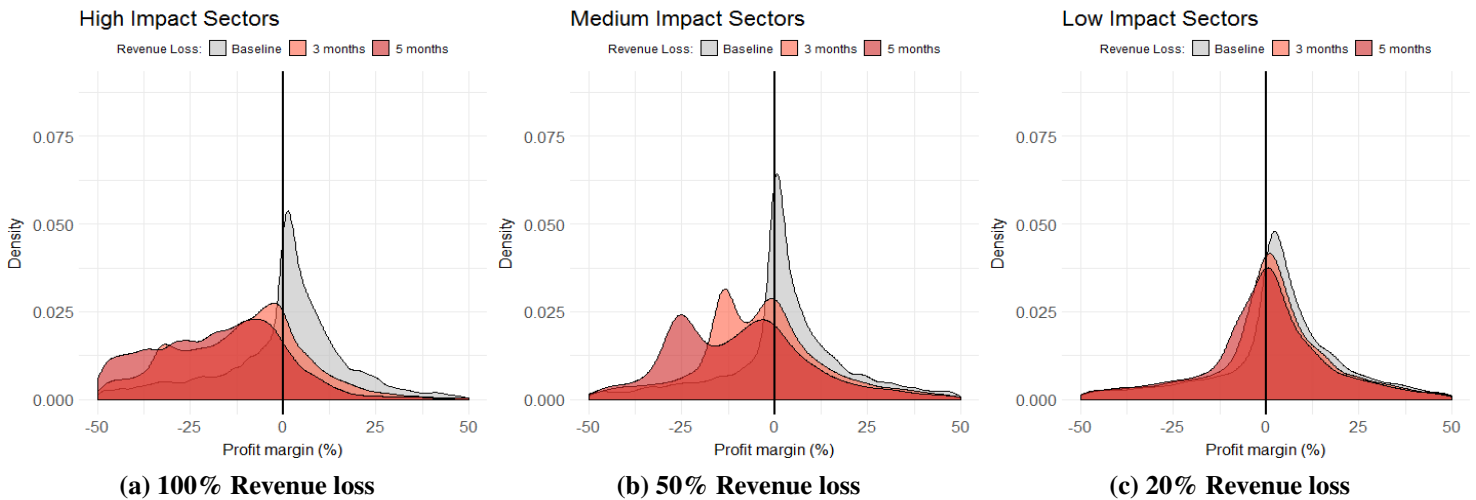


Note: These figures show the distribution of profitability, at baseline, and assuming that firms face a loss in revenue corresponding to either three or five months of loss in yearly revenue. They show the distributions holding all costs constant.

In addition to a pure revenue shock, we simulate a more realistic scenario where firms adjust their material costs proportionally to their revenue loss. The results are displayed in Figure 2: 51.1% of firms in the high-impact sector are profitable at baseline, a number which drops to 18.7% for the three-month lockdown scenario and to 8.7% under a five-month lockdown. The impact is less severe in the medium and low impact sectors, since the shock they face is less severe and since these sectors rely more heavily on material inputs than

the high impact sector. On aggregate, 58.6% of firms were profitable at baseline. Under a three-month (five-month) lockdown, only 34% (27%) of all firms remain profitable. We also observe that the distribution becomes multi-modal for high impact firms: while firms using mainly material inputs and little labor or capital inputs can adjust to some extent and limit their losses, firms with a small share of material inputs in total cost have little margin to adjust and suffer much larger losses.

Figure 2: Firm Profitability Under a Shock to Revenue, Material Costs Adjust in Proportion

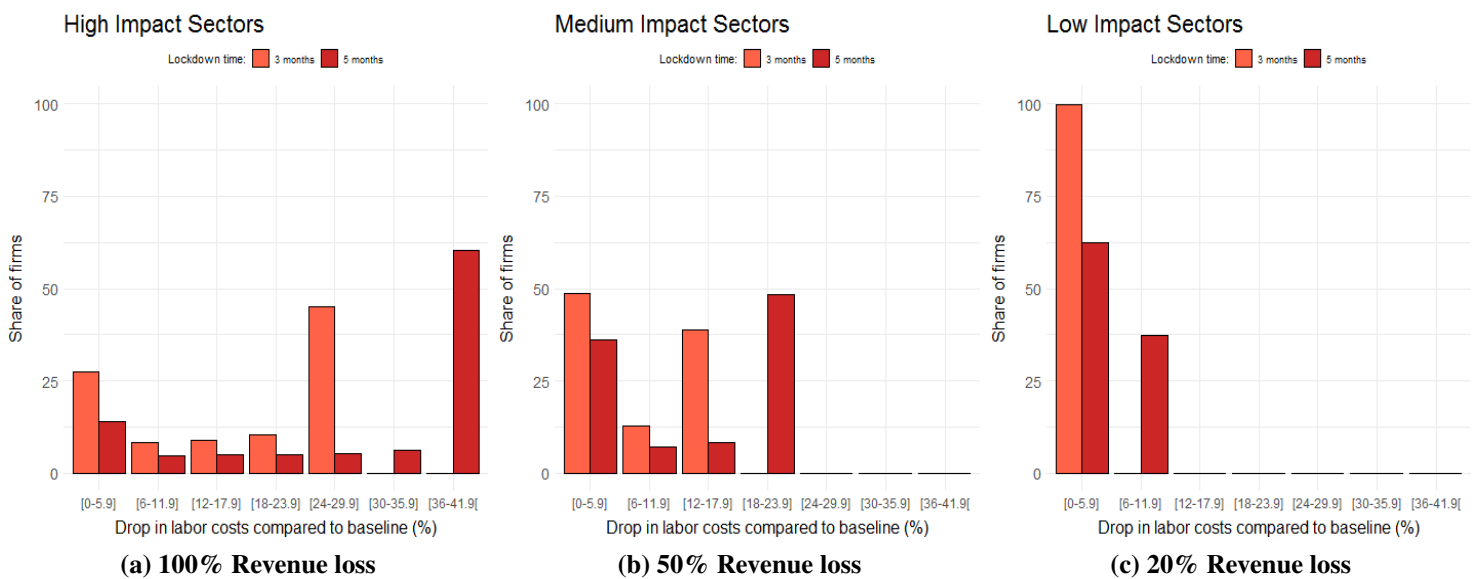


## EFFECT ON EMPLOYMENT AND WAGE SUBSIDIES SIMULATIONS

In this section, we study by how much employers would need to slash their yearly wage bill in the absence of government support. We continue to assume that material inputs adjust first, and that firms only cut their wage bill if they are still unprofitable after the material inputs adjustment. Figure 3 shows the resulting distributions of the reduction in the yearly wage bill for a three or five months lockdown scenario. The figure is bi-modal: The first spike corresponds to firms which are sufficiently profitable at baseline and can absorb the shock and keep paying their workers. The second spike corresponds

to firms which have to cut their wage bill proportionally to the shock in an attempt to stay afloat. In the middle of the distribution, a share of firms reduces their wage bill somewhat (but less than proportionally to the shock) and achieves zero profit (or retains to pre-shock projected losses): providing even modest wage subsidies to these firms has the potential to save jobs. On aggregate, weighting by firms' yearly wage bill, this would lead to a cut in payroll of 7% [resp. 15%] of the formal economy's total yearly wage bill in the three-month lockdown [resp. five-month]. The payroll loss is of course concentrated in the high-impact sectors which would cut 16% [resp. 33%] of payroll under the three-month lockdown [resp. five-month].

**Figure 3: Wage Bill Reduction Needed in Absence of Government Support to Absorb Shock (Material Costs Adjust Proportionally)**

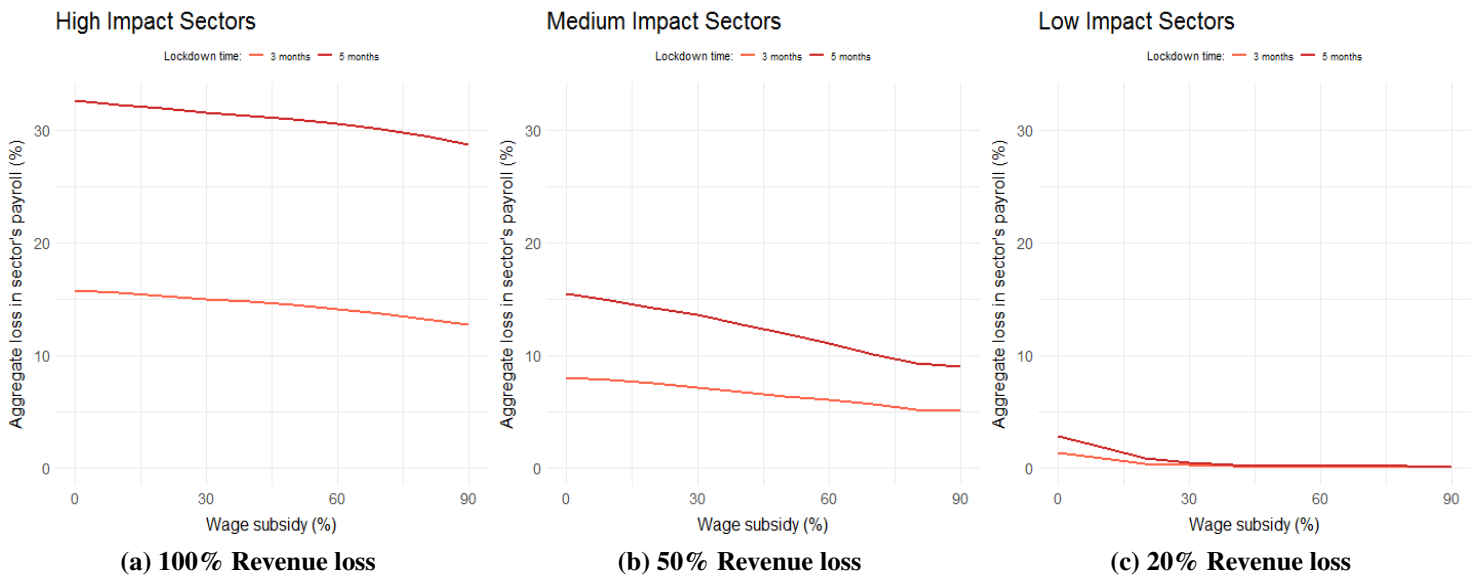


## WAGE SUBSIDY SIZE AND EMPLOYMENT EFFECTS

To counteract the payroll loss and jobs destruction, the government is offering wage subsidies to firms for the months of April and May, in order to protect formal employment. As a function of the subsidy size, how much of each sector's aggregate payroll can be saved? Figure 4 shows each sector's aggregate payroll losses when varying the size of the wage subsidy, measured as the share of firms' payroll paid by the government, over the lockdown period. In the case of a zero-wage subsidy the loss in payroll corresponds to the numbers previously mentioned. As the wage subsidy increases, the loss in payroll decreases, as some firms now return to zero profits (or to their baseline losses). The impact on payroll loss is however very different across the three impact sectors: On the one hand, for the high impact sectors (Figure 3a), the loss in

revenue is too severe to be compensated by wage subsidies and these firms are forced to cut employment, even for large wage subsidies. To understand this, note that we assume that these firms still have to pay their fixed costs (e.g. rent) and a reduction in labor costs is not sufficient to counteract the revenue loss. On the other hand, wage subsidies can save payroll for the low, and especially the medium-impact sector: in the latter sector, a 60% wage subsidy over the lockdown period would roughly halve the sector's payroll loss. On aggregate, applying a 50% wage subsidy across all sectors would reduce the yearly payroll loss from 7.4% to 5.9% (three-month lockdown) or from 14.8% to 12.2% (five-month lockdown). It would take a substantial subsidy to save more payrolls: even with a 90% wage subsidy the loss in yearly payroll would be reduced only to 5.0% (three-month lockdown) or to 10.6% (five-month lockdown).

**Figure 4: Aggregate Sector Loss in Payroll as a function of the Size of the Wage Subsidy**



Note: These figures show to what extent a government wage subsidy for the retained labor force can absorb the aggregate loss in payroll, if the lockdown lasts three or five months. Firms readjust their decision after receiving a wage subsidy: they first adjust their material costs, and then their wage bill. It is still assumed that the drop-in wage bill can't be more than proportional to the revenue fall and that due to re-contracting costs, firms keep paying wages as long as they remain profitable.

#### WAGE SUBSIDIES AS IMPLEMENTED AND IMPACTS ON PROFITABILITY AND EMPLOYMENT

The Government of Montenegro has adopted measures to counter the impact of COVID19 on formal firms and offers wage subsidies which vary by sector. Conditional on meeting eligibility criteria,<sup>3</sup> high impact sector firms benefit from a subsidy of 100% of the gross minimum wage for all employees and medium impact sectors or "endangered" sectors can benefit from a subsidy of 50% of the gross minimum wage.<sup>4</sup> We observe the number of workers of each firm, and we continue to assume that firms adjust their costs in reaction to the subsidy as above. We set the subsidy to 100% (50%) of the gross minimum wage,<sup>5</sup> per month and per worker, for the high (medium) impact sectors, which roughly corresponds to a 50% subsidy of the full payroll (high impact sector) and a 25%

subsidy (medium impact sector).

As previously shown in figure 4, the subsidies offered in theory might not be enough to curtail short term payroll losses significantly in the high impact sector, although they have more of an effect on the medium impact sector. However, they might be able to bring a non-negligible set of firms back to non-loss making territory, which could allow them to survive the lockdown and restart operations thereafter.

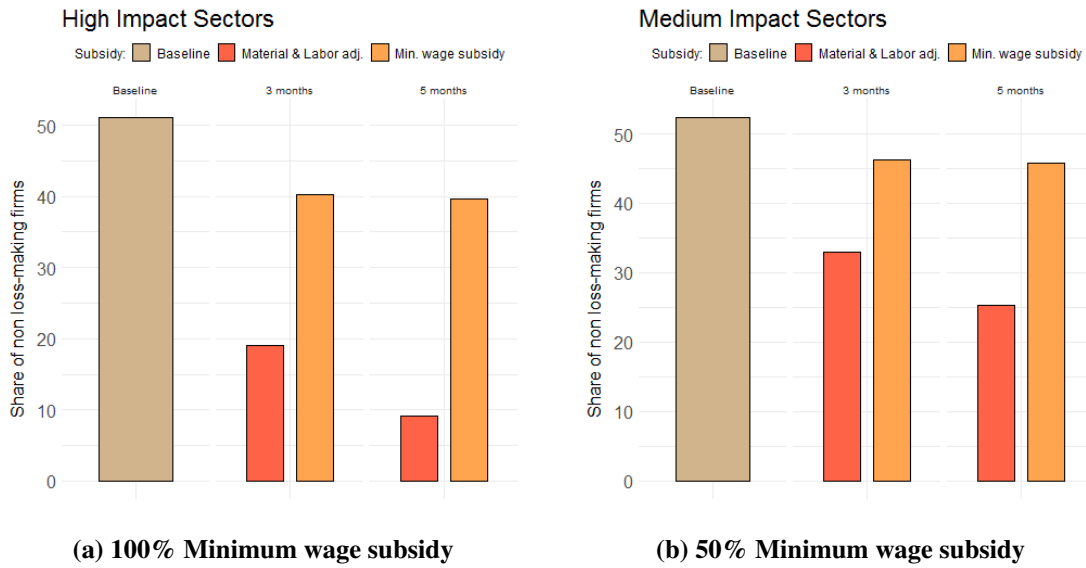
Figure 5 shows that the wage subsidies will push an additional 20 and 10 percentage points of both the high and medium impact sector firms into non-loss making territory. In the three-month lockdown scenario, the share of high impact firms which are not loss making would jump from under 20% without the wage subsidies, to 40% with the subsidies.

<sup>3</sup>Subsidies to entrepreneurs, micro, small, and medium companies; Subsidies of 100% of gross minimum wage for all employees that were registered in February 2020. The taxpayer must have paid tax and contributions for 2019. The taxpayer can get the subsidy if it does not reduce the number of employees (compared to Feb 20) during the duration of the measures.

<sup>4</sup>Other measures from the government's package include subsidies for new employments and employees on paid leave or isolation; however data availability limits our simulations to the gross minimum wage subsidies of existing firms.

<sup>5</sup>In 2017, the gross minimum wage equals EUR363.97, with EUR222 of net minimum wage plus EUR141.97 in taxes and social contributions.

**Figure 5: Firms’ Profitability with and without the Government Wage Subsidies**



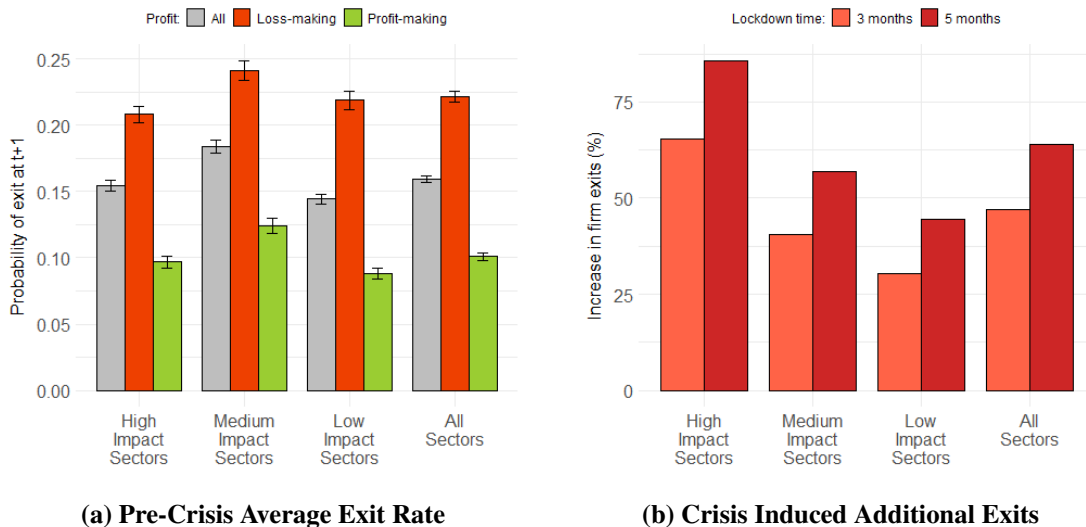
Note: These figures show the share of non-loss making firms after a three or five month lockdown, with or without the wage subsidy implemented by the Government of Montenegro. Non-loss making firms include firms with zero profits.

**FIRMS’ EXIT RATES INDUCED BY THE REVENUE SHOCK**

Here we predict firms’ additional exit rate under the different lockdown scenarios. We use the panel dimension of the data to measure the excess exit rate in pre-crisis years separately for negative and positive profit firms (and in each of the three impact sectors). Figure 6 (a) shows these exit rates in regular times: on average 18% of firms exit in any given year; however firms which had losses in the previous year have an exit rate which is 15 percentage points higher than firms which had positive profits. In our previous analysis, we esti-

mated the share of firms which have negative profits due to the crisis, for each impact sector. We thus combine these results to measure the percentage increase in exits induced by the crisis, by multiplying the share of newly loss-making firms with their excess exit rate. We show the results for the three and five month lockdown scenario in 6 (b): under a three (five) month lockdown scenario, firms’ exits from the formal economy increase by 47% (64%). This loss of firms is of course particularly acute for the high impact sector where the percentage increase in firms’ exits is 66% (86%) compared to the average pre-crisis year.

**Figure 6: Firms’ Exit Rate**



Note: Panel (a) shows the average exit probability for all firms, and then for loss-making and profit-making firms, using panel data before the crisis. Panel (b) shows the percentage increase of firms’ exit induced by a three or five month output loss, compared to baseline levels.



**The impact on the overall economy is severe, with large falls in profits, in tax revenue, and increases in debt.** Table 3 summarizes the key numbers for the three-month and five-month lockdown scenarios and the aggregate impact on the economy. From the 59% profitable firms at baseline, less than 35% of total firms remain profitable after the shock, and almost all firms in the highly impacted sectors register losses. The CIT revenue loss is severe, reaching close to 40% overall in the three-month shock scenario and over 54% in the five-month shock scenario. In the high-impact sectors, almost all CIT revenue is lost. This is because, despite the temporary nature of the shock, the shock generates large losses which are counted against the profits made during the remainder of the year. The absolute increase in losses is 3.8% [7.9%] with the three-month shock [five-month shock], suggesting that firms will need to substantially increase borrowing.

**Employment losses are also substantial and wage subsidies limited in their effectiveness.** Payroll losses range between 7% and 15% of the annual wage bill, with a small response to wage subsidies observed only in the medium and low-impact sectors. The wage subsidy costs about 38.7 million Euro, but it reduces the tax revenue losses incurred for the CIT, social security contributions and personal income tax by 25.4 million Euro, meaning that the net cost of the wage subsidy is only 13.3 million Euro.<sup>6</sup>

**Increases in firm exit are relatively small, meaning that associated output and payroll losses are also small, but this is likely an under-estimate.** Our panel data features only a small number of firms that experience large revenue losses at some point prior to the crisis and hence allow us to estimate the effect, presumably because most such firms exit the panel.

Overall, our estimates mean that the size of government rescue packages for firms and workers needs to be large, and the budget support from donors to lower-income countries even larger, to compensate for the massive loss in tax revenue.

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<sup>6</sup>This calculation takes 2019 tax revenue by tax instrument as the baseline, and applies the revenue changes obtained in the three-month shock scenario with and without the 50% wage subsidy from Table 3.

**Table 3: Aggregate Impacts by Lockdown Duration and by Impact Sectors**

		<b>High Impact</b>		<b>Medium Impact</b>		<b>Low Impact</b>		<b>All Sectors</b>	
		<b>3 months</b>	<b>5 months</b>	<b>3 months</b>	<b>5 months</b>	<b>3 months</b>	<b>5 months</b>	<b>3 months</b>	<b>5 months</b>
<b>Share of firms profitable at baseline</b>		51.1		52.6		60.5		<b>58.6</b>	
<b>Share of firms still profitable (material adj.)</b>		18.7	8.7	32.6	24.9	50.4	44.6	<b>34.3</b>	<b>26.5</b>
<b>CIT revenue loss, relative to baseline (%)</b>		68.9	90.3	37.8	55.2	20.7	33.0	<b>38.4</b>	<b>54.7</b>
<b>CIT revenue loss after 50% wage subsidy relative, to baseline (%)</b>		55.1	84.7	29.8	48.6	3.0	9.4	<b>24.9</b>	<b>41.3</b>
<b>Absolute losses increase (% GDP)</b>		2.1	4.4	1.5	2.9	0.3	0.5	<b>3.8</b>	<b>7.9</b>
<b>Payroll Loss</b>	<b>No wage subsidy</b>	15.8	32.6	8.0	15.5	1.4	2.8	<b>7.4</b>	<b>14.8</b>
	<b>50% wage subsidy</b>	14.5	30.9	6.3	11.9	0.1	0.2	<b>5.9</b>	<b>12.2</b>
	<b>90% wage subsidy</b>	12.7	28.7	5.1	9.0	0.1	0.1	<b>5.0</b>	<b>10.6</b>
<b>Increase in firms' exit relative to baseline</b>		65.5	85.9	40.7	56.8	30.4	44.6	<b>47.0</b>	<b>64.2</b>
<b>Permanent output loss from firm exit (% GDP)</b>		0.4	0.6	0.3	0.5	0.2	0.4	<b>1.0</b>	<b>1.4</b>
<b>Permanent payroll loss from firm exit (% GDP)</b>		3.2	4.2	2.5	3.5	2.2	3.2	<b>8.0</b>	<b>11.0</b>



**Table 4: Sectors and Impact Categories**

SECTORS (ISIC Rev 4 code)	High - Medium - Low Impact	
<b>A AGRICULTURE, FORESTRY AND FISHING</b>	Low Impact	
<b>B MINING AND QUARRYING</b>	Low Impact	
<b>C MANUFACTURING</b>	Low Impact	Medium Impact
	Food products; Beverages; Tobacco products; Basic pharmaceutical products and pharmaceutical preparations	Textiles; Wearing apparel; Leather and related products; Wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials; Paper and paper products; Printing and reproduction of recorded media; Coke and refined petroleum products; Chemicals and chemical products; Rubber and plastic products; Other non-metallic mineral products; Basic metals; Fabricated metal products, except machinery and equipment; Computer, electronic and optical products; Electrical equipment; Manufacture of machinery and equipment n.e.c.; Motor vehicles, trailers and semi-trailers; Other transport equipment; Furniture; Other manufacturing; Repair and installation of machinery and equipment
<b>D ELECTRICITY, GAS, STEAM AND AIR CONDITIONING SUPPLY</b>	Medium Impact	
<b>E WATER SUPPLY; SEWERAGE, WASTE MANAGEMENT AND REMEDIATION ACTIVITIES</b>	Medium Impact	
<b>F CONSTRUCTION</b>	Medium Impact	

<b>G WHOLESALE AND RETAIL TRADE other than food, pharmacies, gas stations</b>	High Impact	Low Impact
	Automobile Dealers; Other Motor Vehicle Dealers; Furniture Stores; Home Furnishings Stores; Clothing Stores; Shoe Stores; Jewelry, Luggage, and Leather Goods Stores; Sporting Goods, Hobby, and Musical Instrument Stores; Book Stores and News Dealers; Department Stores; Florists; Office Supplies, Stationery, and Gift Stores; Other Miscellaneous Store Retailers; Consumer Goods Rental; General Rental Centers; Apparel, Piece Goods, and Notions Merchant Wholesalers; Automotive Parts, Accessories, and Tire Stores; Direct Selling Establishments	Remaining sub-categories
<b>H TRANSPORTATION AND STORAGE</b>	High Impact	Medium Impact
	Scheduled Air Transportation; Nonscheduled Air Transportation; Taxi and Limousine Service; School and Employee Bus Transportation; Other Transit and Ground Passenger Transportation; Support Activities for Air Transportation; Support Activities for Water Transportation; Traveler Accommodation	
<b>I ACCOMMODATION AND FOOD SERVICE ACTIVITIES</b>	High Impact	Medium Impact
	Special Food Services; Drinking Places (Alcoholic Beverages); Restaurants and Other Eating Places	Remaining sub-categories

<b>J INFORMATION AND COMMUNICATION</b>	Low Impact	
<b>K FINANCIAL AND INSURANCE ACTIVITIES</b>	Medium Impact	
<b>L REAL ESTATE ACTIVITIES</b>	Medium Impact	
<b>M PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES</b>	Low Impact	
<b>N ADMINISTRATIVE AND SUPPORT SERVICE ACTIVITIES</b>	Low Impact	
<b>O PUBLIC ADMINISTRATION AND DEFENCE; COMPULSORY SOCIAL SECURITY</b>	Low Impact	
<b>P EDUCATION</b>	Medium Impact	
<b>Q HUMAN HEALTH AND SOCIAL WORK ACTIVITIES</b>	Low Impact	
<b>R ARTS, ENTERTAINMENT AND RECREATION</b>	High Impact	Medium Impact
	Performing Arts Companies; Spectator Sports; Independent Artists, Writers, and Performers; Amusement Parks and Arcades; Gambling Industries; Other Amusement and Recreation Industries	Remaining sub-categories
<b>S OTHER SERVICE ACTIVITIES</b>	High Impact	Medium Impact
	Offices of Dentists; Personal Care Services; Other Personal Services	Remaining sub-categories

### CALCULATION DETAILS FOR TABLE 3

Each figure is calculated for a specific Impact category (High, Medium, Low impact and All sectors) and for a specific lockdown scenario (three and five months):

1. Share of firms profitable at baseline: (1) number of firms with positive profit margin before output shock, divided by (2) total number of firms, expressed as percentage.
2. Share of firms still profitable (material adj.): (1) number of firms with positive profit margin, after material costs adjustment proportional to the shock, divided by (2) total number of firms, expressed as percentage.
3. CIT revenue loss relative to baseline: (1) sum of all firms' profits at baseline multiplied by the corporate income tax rate minus (2) sum of all firms' profits after lockdown multiplied by the corporate income tax rate, divided by (1) and expressed as percentage.
4. Absolute losses increase (% GDP): (1) absolute value of the sum of all firms' losses after lockdown minus (2) absolute value of the sum of all firms' losses at baseline, divided by (3) GDP (current LCU of the same year), expressed as percentage.
5. Payroll Loss, at different wage subsidy rate: (1) sum of all firms' new labor costs under lockdown, divided by (2) the sum of all firms' labor costs at baseline, expressed as percentage.
6. Percentage increase in exit rate relative to baseline: (1) exit rate of firms after lockdown minus (2) exit rate of firms at baseline, divided by (2) and expressed as percentage.
7. Permanent output loss from firm exit (% GDP): (1) additional exit rate relative to baseline multiplied by (2) the sum of all firms' turnover at baseline, divided by (3) GDP (current LCU of the same year), expressed as percentage.
8. Permanent payroll loss from firm exit (% GDP): (1) additional exit rate relative to baseline multiplied by (2) the sum of all firms' labor costs at baseline, divided by (3) GDP (current LCU of the same year), expressed as percentage.