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How Well-Targeted Are Payroll Tax Cuts as a Response to COVID-19? Evidence from China

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Abstract

Numerous countries cut payroll taxes in response to economic downturns caused by COVID-19. This includes China, which completely exempted most firms from making social insurance (SI) contributions, resulting in an average tax cut of 21 percentage points on formal labor costs and approximately 20% of total tax remittances made by firms. We use novel data on 900,000 firms in one Chinese province to document new facts about the structure of SI in China and evaluate payroll tax cuts as a COVID-19 relief measure. We calculate that labor informality causes 54% of tax-registered firms—representing 24% of aggregate economic activity—to receive no benefits. Labor formality also increases with firm size, further skewing the benefit of payroll tax cuts towards large firms. But despite the mis-targeting that results from these facts, the benefit of the tax cuts relative to firms' operating costs and liquidity is likely larger both for smaller firms and in industries most affected by the COVID-19 shock because these firms and industries are more labor-intensive.

JEL Codes: H25, H26, H55
Keywords: payroll taxes, social insurance, labor informality, COVID, China

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Governments around the world enacted large stabilization measures in 2020 to respond to economic downturns caused by the COVID-19 pandemic. The mitigation of employer obligations for payroll taxes or social insurance (SI) contributions featured prominently in these policies (IMF, 2020; International Labour Organization, 2020). Many countries permitted deferrals of payments of SI premiums, while a smaller but still significant number of countries—both high-income countries like Finland, Norway, and Sweden and emerging economies like Argentina and Thailand—enacted temporary payroll tax cuts (Table A.1).

China adopted perhaps the most substantial payroll tax cut. It completely exempted most firms from the employer portion of three types of SI contributions—pension, unemployment, and workplace injury—for 11 months in 2020. The exemption reduces the payroll tax rate by 21 percentage points (p.p.) on average. In addition, employer contributions to mandatory medical insurance (MI) were also reduced by half for 5 months in certain regions. China also stands out in its reliance on payroll tax mitigation as the main component of its fiscal response to COVID-19: the cost to the nation's SI system was estimated to exceed CNY 576 billion for the first half of 2020[1], dwarfing the cost of other COVID-19-related tax cuts such as the reduction of small taxpayers' VAT rate.

The mitigation of employer contributions to SI should improve business cash flow and reduce labor costs, which directly support business retention of workers during the downturn, increase the probability of firm survival, and even facilitate the hiring of new workers during COVID-induced reallocation. In these regards, short-term payroll tax cuts share the aims of many other temporary measures adopted to support business liquidity and encourage worker retention, but may be superior in certain regards. For instance, the benefits of payroll tax cuts are delivered immediately through taxpayer self-assessment, making them administratively simple and avoiding mis-allocations that could arise from using financial intermediaries (Bonomo et al., 2015; Granja et al., 2020; Ornelas et al., 2019). Yet the use of payroll tax cuts as a response to COVID-19 has received little attention in the economic literature.

In this study we offer what may be the first calculation of the extent of government assistance

[1] http://www.xinhuanet.com/fortune/2020-07/27/c_1126287738.htm

to employers through payroll tax cuts in response to COVID-19. We analyze the distribution of China's 2020 reductions across firm sizes and sectors, in part to address one potential critique of such policy: that these cuts may deliver windfall benefits to large, resilient firms, while delivering insufficient support to the firms and sectors most vulnerable to the downturn. Additionally, we consider the degree of firm participation in SI, which is a significant consideration for policy effectiveness in China and many other developing countries with large informal economies (Loayza and Pennings, 2020).

For this analysis, we use a unique taxpayer data set from one large province in China that offers two critical advantages. First, the data set covers all firms in the province. Because China is unusual in having a very high degree of *firm* formality (tax registration)—while large portions of firms display low *labor* formality (participating in SI)—we can use this data to study the extent to which labor informality limits the reach of government assistance through payroll taxes. Second, SI statistics at the national and provincial level are unreliable and only reported in the aggregate. Firm-level SI remittance data obtained through tax administration is more reliable and offers a vital ground-up perspective on the SI tax base. Since our firm-level data contains 2016 filings, we rely on the assumption that the distribution of firm SI participation at the beginning of 2020 is similar to what obtained at the end of 2016.

We find that because SI contributions represent one of the largest business tax bases, payroll tax cuts allow the government to confer meaningful and immediate benefits to firms. Moreover, while labor informality reduces government support to small firms, the regressive tax structure of SI contributions, and the greater labor intensity of small firms and sectors affected by COVID-19, still allow such cuts to deliver substantial benefits to vulnerable firms. More specifically:

Coverage and Magnitude of the Tax Cut: SI contributions account for 20% of total taxes remitted by firms.[2] The median magnitude of the SI tax cut among firms that make SI contributions is 2.9% of total annual business costs under normal circumstances. Among formal-labor firms, the

[2]Our data on tax remittance includes only the employer portion of SI contributions and does not include employee contributions withheld by the employer.

tax cuts reduce the median average tax rate (ATR) on labor by 21.25 p.p.. However, 54% of active firms—representing 24% of aggregate economic activity—do not make SI contributions, and therefore receive no support from the policy.

Distribution of the Tax Cut Across Firm Size: Non-participation is far higher among small firms. Only 22% of the smallest decile of firms make SI contributions compared to 78% of the top decile. However, despite non-participation, we find that because of the greater labor-intensity of small firms, on average they still receive greater subsidies relative to their costs and liquidity than do large firms. Among the lowest decile of firms that participate in SI, the subsidy accounts for 14% of annual expenses. This is approximately 20% of cash holdings the median small firm has on hand. Additionally, because the SI system creates high ATRs for low-wage firms, the tax cut reduces median ATRs among the smallest firms by approximately 40 p.p..

Correlation with Exposure to the Economic Downturn: To measure whether assistance is proportional to firms' exposure to economic shocks, we rely on estimates of sales declines across industry and firm size categories reported in Chen et al. (2020b). We find that industry-level benefits from the tax cut are weakly positively correlated with industry exposure to the economic downturn. This is largely driven by the greater labor-intensity among affected industries. By contrast, different SI participation patterns across sectors do not undermine the targeting of tax cuts to vulnerable sectors.

Our work contributes to several strands in the evolving literature on governmental responses to COVID-19. The first comprises studies using pre-2020 administrative data to investigate the likely distribution of fiscal relief (Alstadsaeter et al., 2020; Ganong et al., 2020; Bachas et al., 2020; Brockmeyer and Bachas, 2020). A second strand analyzes various forms of subsidies for employee retention (Bartik et al., 2020; Bennedsen et al., 2020; Birinci et al., 2020; Granja et al., 2020; Kaplan et al., 2020), such as the U.S. Paycheck Protection Program. Payroll tax cuts both bear analogies and present distinct alternatives to these policies already studied. Third, our study may be the first to empirically analyze the role of labor informality in determining the effectiveness

of policies targeted at businesses in response to COVID, adding important insights to the literature on the appropriate government response to the pandemic in developing countries (Alon et al., 2020; Bruhn, 2020; Loayza and Pennings, 2020; Alfaro et al., 2020). The level of labor informality in China is much higher than that observed in developed countries, yet China is unique in having a very high degree of firm formality defined as being registered for tax purposes. This allows us to use firm-level data to make direct comparisons between firms characterized by labor informality and firms with formal labor.[3]

Finally, our distributional findings complement early preliminary evidence suggesting that payroll tax mitigation bolstered Chinese firms' ability to weather the economic downturn. Based on a survey of 2,044 firms, Chen et al. (2020a) indicate that deferrals of SI contributions provided by Chinese cities in early February 2020 improved the cash flow of small and medium enterprises (SMEs) in the first months of the pandemic, whereas government-supported lending did not. Further, SMEs with a larger share of highly-skilled workers, which the authors argue are more likely to practice formal employment and shoulder higher SI expenses, are more responsive to the deferrals in their re-opening decisions. With respect to the subsequent SI contribution cuts that are the focus of our analysis, the surveyed Chinese firms also report that they improve cash flow, re-opening, and the likelihood of having a majority of employees return to work. Likewise, Chen et al. (2020b) claim that China's payroll tax exemptions had a positive effect on business activities (measured in terms of sales) during February to April. These recent studies highlight the need for studying the implied distribution of fiscal support.

[3] Ulyssea (2018) provides an intuitive framework for considering policies in the presence of both firm informality and labor informality. Our work also contributes to a nascent literature on Chinese social insurance (Fang and Feng, 2018). Progress in documenting even basic patterns about firm compliance has been hindered by data gaps. Early efforts to investigate firm participation relied on small firm samples (Maitra et al., 2007; Nielsen and Smyth, 2008; Nyland et al., 2011). Subsequent research turned to the National Bureau of Statistics (NBS) survey of large private industrial and state-owned firms (Gao and Rickne, 2014, 2017; Rickne, 2013), but NBS data excludes small firms and all privately-owned firms in the service sector. These firms represent a large share of the aggregate economy and are highly affected by the COVID-19 shock. Our data contains both small firms and service industries, which allows us to study SI participation across all sectors and to characterize the likely distribution of fiscal relief achieved through the payroll tax cut.

1 Policy Background

Beginning in late January, 2020, many Chinese cities announced economic stabilization policies in response to COVID-19. Two most frequently-mentioned measures were the deferral of the employer portion of SI contributions and partial refunds of prior-year unemployment insurance (UI) contributions for firms that retain their employees. The wide adoption of these measures is explained by the fact that both pre-dated 2020. Since 2011, China's Ministry of Human Resources and Social Security (MOHRSS) had allowed discretionary grants of SI payment deferrals. Because China's SI budgetary units are highly fragmented, the authority for granting such deferrals frequently rested with county-level SI administrations. In early February 2020, cities began to announce eligibility standards specifically applicable to the COVID-19 emergency: some jurisdictions aimed at precise targeting, while others tied deferrals to employee retention. The policy of refunding 50% of prior-year employer UI contributions not only predated 2020 but was in fact a national directive: since 2014, China's State Council, MOHRSS and other national ministries have promoted this policy to encourage employee retention for firms under financial distress. As with the deferral of SI contributions, eligibility criteria for UI refunds varied considerably across jurisdictions.

The national policies introduced on February 20, 2020 by MOHRSS superseded these prior policies and provided a far larger stimulus. First, they entailed a temporary exemption or reduction for three types of SI contribution (pension, unemployment and injury). As initially announced in February, all firms other than "large firms" and all individual proprietors received an exemption from employer contributions for 5 months (February-June); and all large firms and non-business organizations received a 50% reduction in contribution obligations for 3 months (February-April).[4] On June 22, 2020, MOHRSS extended the exemption for the first group of firms to the end of 2020, and the 50% reduction for the second group firms to June. Second, delays in SI contributions for

[4]The Ministry of Industry and Information Technology (MIIT) sets revenue, asset, and employee thresholds for each industry which determine whether firms are Micro, Small, Medium, or Large. The revenue threshold delineating medium from large ranges from CNY 20,000,000 for Agricultural firms to CNY 2,000,000,000 for Real Estate firms. Table B.4 shows the full set of revenue thresholds.

firms that have residual obligations were allowed for up to 6 months (and must end by December 2020). Firms were now automatically eligible for such delays and no application was necessary.

On February 21, 2020, China's Nation Healthcare Security Administration announced guidelines for mitigating employer contributions for medical insurance (MI)—the second largest component in China's SI system after pension insurance. Under these guidelines, local jurisdictions that form MI pooling units may in principle *either* reduce employer MI contributions by half for 5 months (February to June) *or* continue any prior practice of providing for deferrals of contributions for up to 6 months. The choice depended on whether the pooling unit's cumulative balance provided sufficient cushion for current expenditures. In contrast, the MOHRSS-announced tax cuts apply in conjunction with payment deferrals. These guidelines leave greater discretion to local governments than the MOHRSS-announced policy, reflecting the fact that MI pooling in China is even more fragmented than for other types of SI. As the rates for employer MI contributions vary across pooling units (within provinces and even within some prefectures), the magnitude of any tax cut also varied. In the province we study, all prefectures chose to adopt rate reductions instead of payment deferrals for MI contributions, with the rate reduction ranging from 3% to 4.5%. In the analyses below we include the temporary MI rate cuts in calculating benefits to firms, while reminding readers that such cuts may not have been uniformly adopted in China.

The combined tax rate of the pension, unemployment, and injury contributions that statutorily fall on firms was on average 21% and 17.25% in 2016 and 2019, respectively, in the province represented in our data. MI and maternity/reproductive insurance constituted 8.6-8.7%. Across all categories, the combined rates were 29.6% and 25.93% in 2016 and 2019 respectively, some of the largest in the world. The temporary measures in place from February to June lowered rates by 21.25 p.p. for non-large firms and 10.625 p.p. for large firms. The July to December provisions lowered rates by 17.25 p.p. for non-large firms but reinstated the full rates on large firms.

SI obligations are determined on a monthly basis in China. The rate (τ) for each category is applied to each employee i's monthly wage w_i to determine the liability for that employee.

However, w_i is bounded above and below by $[.6\bar{w}_c, 3\bar{w}_c]$, where $\bar{w}_c$ approximates the average monthly wage in city c, to create a minimum and maximum SI contribution per employee. Panel A of Figure 1 illustrates this schedule. Panel B shows the derivation of marginal and average tax rates for a given monthly wage, and compares the statutory rates in 2016 to those in 2019. The collared structure has implications for the nature of labor adjustment and the effect of cutting SI taxes. First, for firms paying monthly wages outside of $[.6\bar{w}_c, 3\bar{w}_c]$, the marginal tax rate on each employee's additional earnings is zero. In contrast, the average tax rate is non-zero and substantial for all firms. As a result, SI tax cuts may have a limited effect on intensive margin adjustment (monthly hours or wages per worker) and more substantial effects on extensive margin decisions (employee retention and hiring). Second, low-wage firms ($w_i < .6\bar{w}_c$) face the highest average tax rates, and as a result, receive the largest reduction in the average tax rate from the temporary exemption. Third, because the minimum contribution is applied monthly, rather than annually, firms may have even stronger incentives to lay off employees in the face of temporary demand shocks.

2 Data and Sample

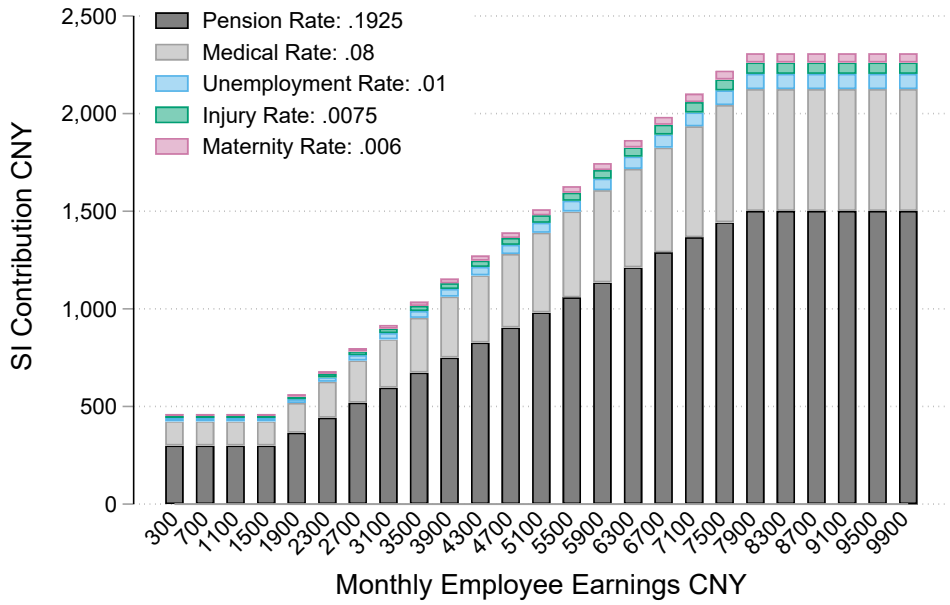
2.1 Tax Return and Financial Statements:

We exploit an administrative data set from a large province in China containing financial records, tax returns, tax remittance, and tax registry information for the universe of firms in 2016.[5] This data provides three advantages for describing the nature of firm participation in SI. First, it contains all tax-registered firms, including those that do not make SI contributions. China is unusual in having a very high degree of tax registration such that most labor informality manifests at tax-registered firms, as opposed to labor hired by non-registered, informal firms. As a result, we can offer a unique view of the varying degrees of labor formality across the entire firm-size distribution. Second, our data contains detailed remittance information at the firm level, whereas publicly available

[5]This data set was first used in Cui et al. (2020) to study tax preferences for investment in the corporate income tax. The current paper presents the first analysis of social insurance patterns.

Figure 1: **The SI Employer Contribution Schedule**

(a) **2016 Rates**



(b) **Marginal and Average Tax Rates**

	$w_i < .6\bar{w}_c$	$w_i \in [.6\bar{w}_c, 3\bar{w}_c]$	$w_i > 3\bar{w}_c$
MTR	0	τ	0
ATR	$\tau \times \frac{.6\bar{w}_c}{w}$	τ	$\tau \times \frac{3\bar{w}_c}{w}$

Category	$100 \times \tau_{2016}$	$100 \times \tau_{2019}$
Pension	19.25	16
Unemployment	1	.5
Injury (Inferred)	.75	.75
Medical	8	7.88
Maternity	.6	.8
Total	29.6	25.93

Note: Panel A illustrates the schedule for SI remittances for a fully compliant firm using 2016 rules. The tax base w_i is the monthly wage for employee i. The SI contribution statutorily required by the employer is the base multiplied by the statutory rate τ. The taxable base is bounded below and above by $.6\bar{w}_c$ and $3\bar{w}_c$, where $\bar{w}_c$ approximates the average monthly wage in city c. Panel B illustrates implicit marginal and average payroll tax rates. The marginal payroll tax rate for an employee is the increase in SI contributions when the firm increases the employee's monthly wage by a dollar. The average payroll tax rate is the ratio of total SI contributions for an employee over that employee's monthly wage. Panel B also compares the statutory rates in 2016 to those in 2019.

SI budgetary information is exceptionally lacking in detail.[6] Third, unlike the NBS survey of industrial firms, our data covers firms of all sizes and industries, which is critical for analyzing the distribution of payroll tax cuts across the economy.

Table B.1 reports the number of tax-registered firms from this cross-section. We observe 1.4 million firms in the tax registry; 1.05 million of which filed non-empty financial returns; 922,000 of those reported positive revenue and costs on their financial return; and 893,402 of this last set had non-zero tax remittance (in any tax category). We take the 893,402 firms as our analysis sample under the intuition that firms without any tax remittance or revenue/costs are likely inactive entities.[7]

We use several variables from this data set:

Total Costs and Liquidity: We define total costs as the sum of (i) costs of goods sold and (ii) non-financing business expenses. The former is an approximation of the "direct cost" of the goods and services produced. Business expenses are overhead costs, including sales and management expenses (but excluding financing expenses). Labor costs are included in both and apportioned according to these definitions. We define a firm's liquidity as the total value of liquid assets reported on its balance sheet which includes cash holdings.

Total Wages and Employees: Total wages paid for the tax year are reported on the corporate income tax return. The number of employees is reported in the tax registry which we observe a snapshot of for 2017. This record reflects information gathered at the most recent time in which the firm's registration information was updated. We do not observe the date of the most recent update, so the employee number may reflect employment from earlier years. Additionally, even if employee records were fully updated, this would be a noisy measure due to turnover in the workforce throughout a given year. The measure of employees, therefore, is observed with error.

[6] Because SI budgetary units in China are highly fragmented, reported budgetary figures for SI contributions aggregated at the national or even provincial level are prone to reporting errors and discrepancies, while similar figures from the most basic units of SI pooling (often at the county-level) are difficult to access.

[7] Our data includes only taxpayers that are business entities and not individual proprietors (most of the latter would also be unlikely to participate in SI).

2.2 Sales Shocks from VAT Transactions:

Chen et al. (2020b) use 1.5 billion VAT transactions in China, from January 1st, 2019 to April 16th, 2020, to estimate how firm sales changed in the twelve-week period following the onset of Wuhan's lock down (January 23, 2020). Specifically, they estimate the average percentage change in total sales filed through the VAT reporting system, relative to the same time period in 2019, at both the aggregate industry level and for firm size bins interacted with industry. Their VAT data accounts for 11% of total firm sales in China.[8] We merge their revenue change estimates with our data to examine the correlation between exposure to economic shocks and the magnitude of the SI tax cut. We focus specifically on the estimated change in sales for the 9 to 12 week period following the lock-down (March 26th to April 16th, 2020), as this provides a better measure of the likely medium-term effect. One caveat is that transactions made by small firms that are exempt from the VAT are excluded, and so revenue changes are better measured for larger firms.

3 Results

3.1 Magnitude of SI Remittance and Participation

We begin by documenting the magnitude of firm SI remittances as a fraction of their total tax payments. We contrast SI remittance against four other categories of tax remittance—corporate income tax, VAT and sales taxes,[9] personal income tax withholding, and all other taxes (such as property taxes)—to illustrate the size of SI contributions relative to other tax levers the government has at its disposal.

In particular, we split firms into revenue deciles d.[10] Then for each decile d and tax type k, we calculate $\frac{1}{N_d}\sum_{i\in d}\frac{t_{i,k}}{\sum_k t_{i,k}}$ where $t_{i,k}$ is the amount remitted by firm i for tax k. Figure 2 plots the

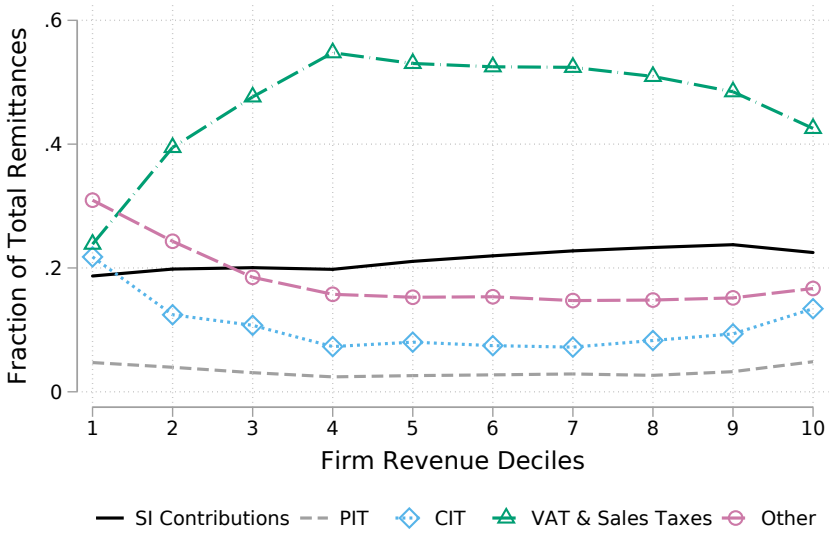
[8] The transactions cover 3.9 million unique corporations and 1.7 million self-employed.

[9] Sales taxes include the Business Tax (*yingyeshui*) and Excise Tax (*xiaofeishui*); the former was replaced by the VAT in 2016.

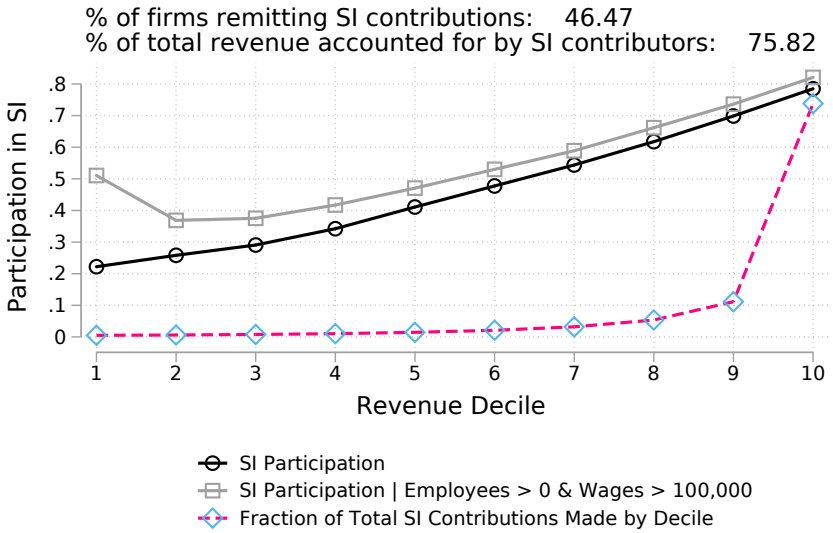
[10] Table B.2 provides the decile cutoffs.

Figure 2: **Firm Remittances Across Tax Types**

(a) **Tax Composition**



(b) **SI Participation**



Note: For each firm size (revenue) decile, Panel A shows the fraction of total tax remittances accounted for by each of the five main tax categories: SI contributions, personal income tax withholding, corporate income tax, VAT and other sales taxes, and all other tax payments. That is, for each decile d and tax type k, we calculate $\frac{1}{N_d}\sum_{i\in d}\frac{t_{ik}}{\sum_k t_{ik}}$. $d = 1$ is the smallest decile and $d = 10$ is the largest. In Panel B, the black series plots the fraction of firms that remitted SI contributions in 2016 in each firm revenue decile. Approximately 46% of active firms remitted SI contributions. Only 22% of the smallest decile participate, while 78% of the largest decile do. The grey series plots the fraction of firms within each decile that remitted SI contributions out of the restricted sample of firms that reported employees and more than CNY 100,000 in wages on their corporate income tax returns. The dashed magenta series plots the fraction of aggregate SI remittance that was made by each firm decile. The top decile of firms contribute 73.8% of all SI contributions.

results. On average, SI contributions make up approximately 20% of firms' total tax remittances. This fraction increases with firm size, ranging from 18.7% for the lowest decile to 22.5% in the largest decile. For the top eight revenue deciles, SI contributions are the second highest share of taxes paid next only to VAT and sales taxes. This suggests that cuts to payroll taxes have the potential to deliver some of the most significant cash benefits to businesses compared to other taxes borne by businesses (such as the corporate income tax).

Panel B characterizes firm participation in SI, defined as making any SI contributions. First, note that only 46% of firms make SI contributions. These firms account for 76% of aggregate revenue in the province we study. This leaves 54% of firms and 24% of economic activity out of the reach of the SI cut. Second, and unsurprisingly, non-participation is much higher among small firms. Participation is only 22% among the smallest firms, and gradually rises to 78% among the largest. The largest decile of firms account for 73.8% of total SI contributions. Panel B also shows that this pattern of non-participation obtains in the restricted sample of firms with reported employees and more than CNY 100,000 in wages claimed on corporate income tax returns.[11] This pattern of labor informality ensures not only that large firms receive bigger dollar benefits from the SI rate cut, but also that a greater portion of large firms receive the benefits than the portion of smaller firms doing so.

3.2 Average Tax Rates Generated by the SI Contribution Schedule

We next turn to the effective Average Tax Rates (ATRs) generated by SI obligations. High ATRs are a primary *a priori* explanation for firm non-participation. Moreover, a reduction in the ATR among participating firms directly affects their extensive margin employment incentives—how many workers to hire and retain. This is crucial given that a central objective of the temporary rate cut is to induce firms to maintain employment.

We construct ATRs as follows. For each firm, we divide its total wage bill by the number

[11] CNY 100,000 is approximately 8 months of work for a single employee earning the minimum SI wage base.

of employees, then further divide by twelve to calculate the monthly wage per employee. With monthly wage, we calculate an ATR (see Panel B of Figure 1) applying the relevant rates. The ATR varies across firms because it is a declining step function of the monthly wage. To visualize this variation, Panel A of Figure 3 plots the median ATR, using 2016 rates, for each revenue decile separately for SI contributing firms and non-contributing firms.

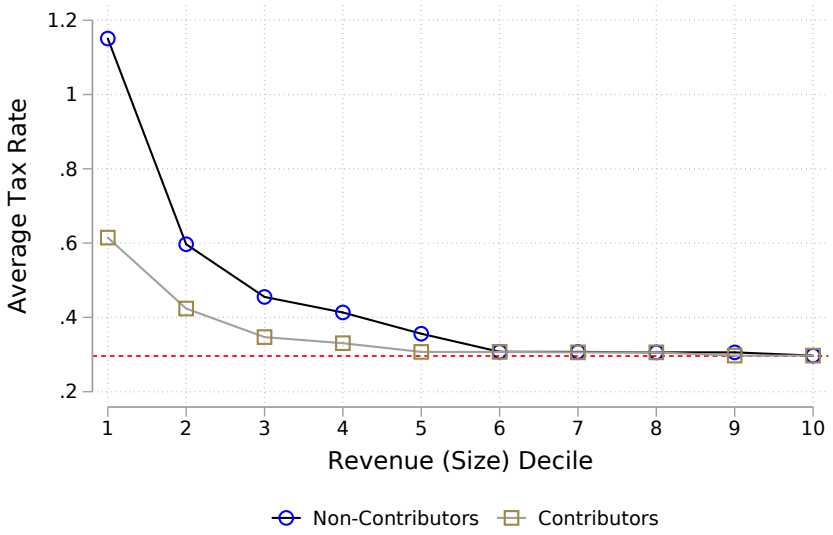
Two facts are apparent. First, the ATR is greater than the statutory rate (τ) for the lower half of the firm distribution. This is caused by low monthly wages at smaller firms, often below the minimum SI wage base. Second, among the bottom half, SI contributing firms have lower ATRs. This suggests that firms select into SI based on the ATR they face, and that part of the labor informality gradient is driven by higher ATRs among smaller firms. As further descriptive evidence for ATRs influencing participation, Figure B.1 shows that cross-industry variation in SI participation is positively correlated with average industry wages (and therefore negatively correlated with ATRs).

Panel B explores the effect of the COVID tax cut. We keep only SI contributing firms—since only they stand to benefit from the cut—then calculate the median ATR as described above. We show the implied ATRs for (i) 2019, (ii) February to June 2020, and (iii) July to December 2020. In 2019, median ATRs are 25.93% for the top five firm deciles, and up to 52% for the lowest decile. The February-to-June-2020 exemption of pension, UI, and injury contributions, and the 50% reduction in MI contributions, lower median ATRs to 4.68% for the largest 50% of firms and to less than 10% for the smallest. As the 50% reduction in MI contributions expired in June, the median ATRs rise to 8.7% for the largest half of firms, and 17.7% for the smallest. The provisions applying to firms classified as large are not visible since these firms make up only approximately 0.3% of all firms.

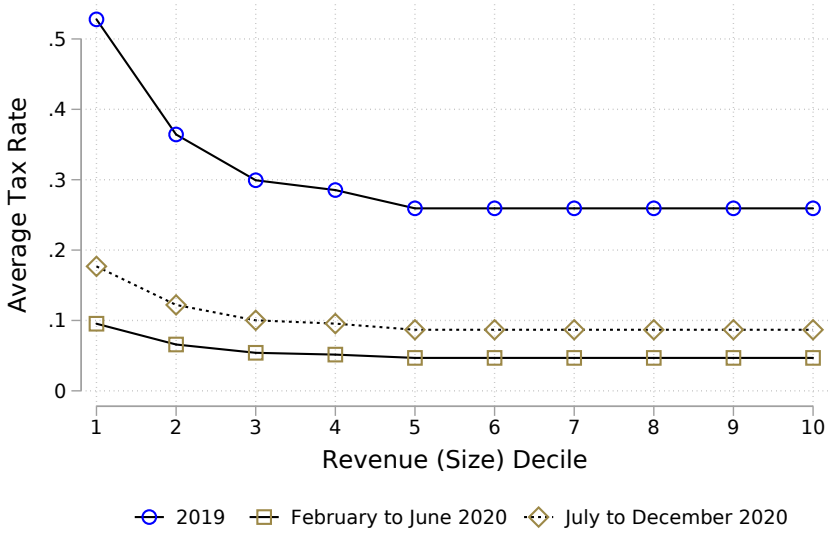
Dividing total wages by the number of employees may provide a downward bias of wages when employees are mis-measured, and therefore an upward bias in the ATR. As a robustness check on this division bias, in Figure B.2 we instead calculate ATRs in each group based on that group's aggregate wage. We define the aggregate wage for group g as $\sum_{i \in g} W_i$ divided by $\sum_{i \in g} E_i$, where

Figure 3: **Average Tax Rates**

(a) **Average Tax Rates in 2016**



(b) **Effect of 2020 Cuts Among SI Contributors**



Note: Panel A plots the average tax rate (ATR) for each revenue decile as follows: (1) Revenue deciles are calculated for the full sample. (2) Each decile is split into SI contributing and non-contributing firms, creating 10×2 bins. (3) For each bin, the median of firm average monthly wages is calculated. For firm i, its average wage w_i is calculated as its total annual wage bill divided by the total number of employees, then further divided by 12. (4) The ATR is then calculated for each firm following the formula shown in Figure 1. (5) The median ATR is then plotted for each bin. The red horizontal line demarcates the combined statutory rate across all contribution categories in 2016. If $w_i \in [.6\bar{w}_c, 3\bar{w}_c]$, the ATR is equal the statutory rate. Panel B repeats this exercise, for contributing firms only, but applying (a) the 2019 rates, (b) the reduced rates available for February to June 2020, and (c) the reduced rates available for July to December 2020. Both panels restrict to firms with positive wages (from corporate income tax returns) and employees (from the tax registry).

W_i and E_i denote firm i's annual wage bill and total employees, respectively. By summing within the denominator and numerator, mean-zero measurement error collapses to zero. The tradeoff is that the aggregate wage is overly influenced by the largest firms in a group (high W and E), and so represents a size-weighted estimate. As shown in Figure B.2, however, the resulting patterns in ATRs are qualitatively unchanged.

3.3 Estimating the Effective Subsidy Relative to Firms' Costs and Liquidity

In addition to maintaining employment, another primary motivation for SI cuts is to provide liquidity by reducing firms' expenses. We turn to this next by estimating the amount of cash saving (which we refer to as subsidy) provided by the SI cut, and how well-targeted those benefits are. Our approach is to pose the counterfactual question: *If a firm's total wage bill remained constant, how much would the SI cuts generate in tax savings*? We construct this counterfactual using tax remittance data from 2016 as follows:

1. **Non-Large Firms**: Calculated as 11/12ths of the firm's pension, UI, and injury contributions—corresponding to the complete exemption for 11 months—and 5/24ths of its MI contributions—corresponding to a 50% reduction for 5 months.

2. **Large Firms**: Calculated as 5/24ths of the firm's pension, UI, injury, and MI contributions—corresponding to a 50% reduction for five months.

3. Because statutory rates have declined slightly since 2016 (see Figure 1), we shrink 2016 contributions for each contribution type k by multiplying firm i's remittance T_{ik} by $\frac{\tau_{2019,k}}{\tau_{2016,k}}$.

Critical for our inferences is the assumption that the distribution of SI participation did not change markedly from 2016 to the beginning of 2020. While we cannot completely rule out the possibility of change, we have also not seen any affirmative evidence for significant increases in participation in official statistics. Also relevant is the fact that since 2016, the Chinese government has continued to implement policies to promote business formation , which resulted in a large

influx of new and small firms into the tax registries. These firms are less likely to participate in SI than older or larger firms and therefore are unlikely to have raised the level of firm SI participation.

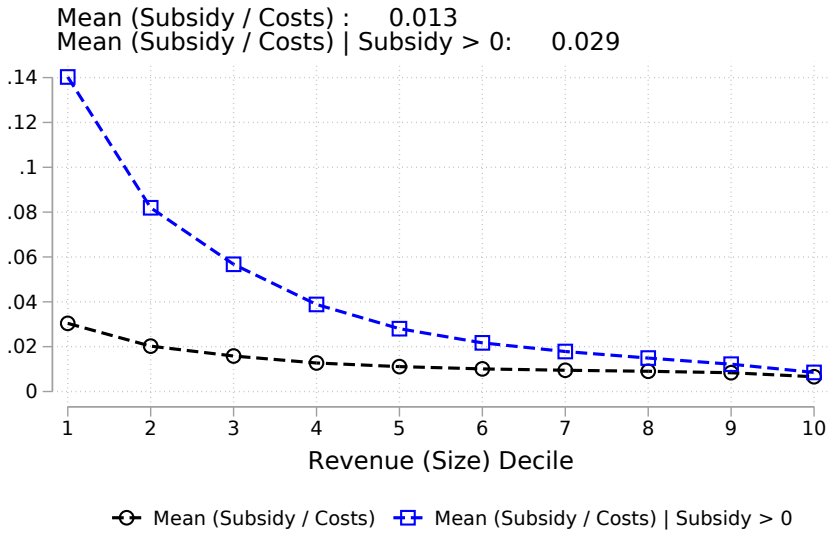
Figure 4 plots the average of this implied subsidy across the firm size distribution relative to total costs (Panel A) and total firm liquidity (Panel B). The average subsidy-to-costs ratio is .013 (1.3% of costs) across the full sample and .029 among SI contributing firms. Notably, the benefit of the implied subsidy is far more substantial for small firms. Contributing firms in the smallest decile receive an effective reduction in costs of 14%, while for firms in the largest decile, the subsidy is less than .8% of costs. This size gradient stems from two sources. The first is the much higher labor intensity of small firms, illustrated in Figure B.3, Panel A. The second is the regressive tax structure of China's SI contribution scheme, with its floors and caps on contributions. We find similar size gradients when expressing the effective subsidy relative to firms' total liquidity. The average subsidy-to-liquidity ratio is .022 across the full sample and .048 among SI contributors. The average subsidy in the smallest decile represents 35% of liquidity among contributors compared to 1.8% in the top decile.

Figure 4 also shows that labor informality among small firms dramatically reduces the average subsidy delivered to them. The average ratio of subsidy to liquidity drops from 35% to 5% when non-participating firms are taken into account. Nonetheless, it is notable that the size gradient of subsidies (relative to either cost or liquidity) remains weakly negative in the entire population. In this sense, payroll tax cuts have desirable targeting properties.

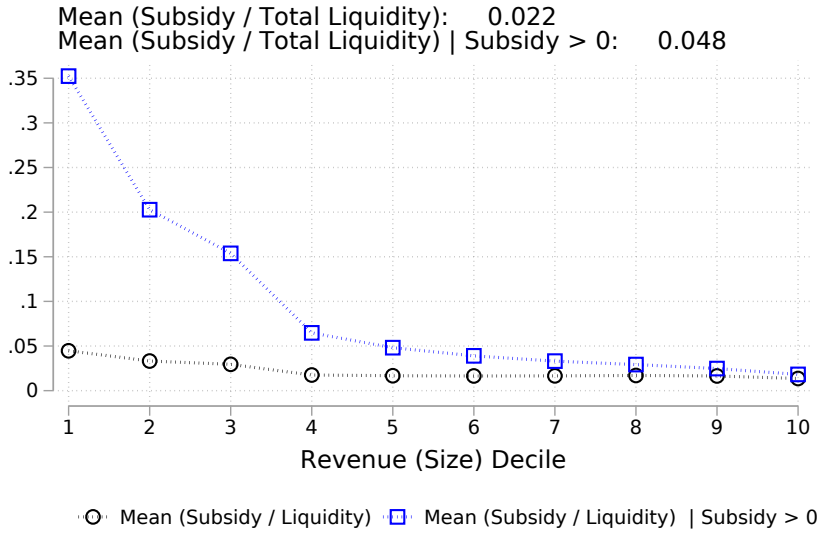
How much liquidity do firms have to begin with? Panel B of Figure B.3 plots the median of cash and total liquidity relative to total annual costs. The median firm has enough cash holdings to cover 13% of normal annual operating expenses. Including all forms of liquid assets, that rises to 85%. Small firms have higher liquidity relative to their costs than large firms, perhaps because the latter have superior access to external forms of financing.

Figure 4: **Simulated SI Cut Relative to Operating Costs and Liquidity**

(a) **Subsidy over Operating Costs**



(b) **Subsidy over Total Liquidity**



Note: For each revenue decile, this figure plots the mean of the imputed subsidy-over-costs and subsidy-over-liquidity ratios, for both the full sample of firms, and the restricted sample of firms that made contributions to SI (and therefore stand to receive a tax cut). The calculation of the simulated subsidy is described in Section 3.3 of the main text. This calculation predicts the size of the tax cut each firm receives if its 2019 payroll is equal to its 2016 payroll. Costs are as reported on firms' financial statements. Liquidity refers to total liquid assets reported on firms' financial statements. The subsidy-to-cost and subsidy-to-liquidity ratios are winsorized at the 1st and 99th percentiles within each revenue decile.

3.4 Targeting Across Sectors

Firm size is just one dimension for assessing whether the stimulus is well-targeted. Exposure to economic shocks varies substantially across industries, with public-facing industries more exposed. To examine how well the SI tax cut directs relief based on economic exposure, we leverage the estimated sales declines by industry (Chen et al., 2020b) as described in Section 2.

Panel A of Figure 5 correlates the level of subsidy with the estimated percent change in sales at the industry-size level. There are 4 firm size bins and 18 industries resulting in 72 bins.[12] For each bin, we sum the implied subsidy and the costs among the firms in the bin, then plot the ratio on the y-axis. Panel A shows that the subsidy is weakly higher among industries with greater sales declines for micro, small, and medium-sized firms. This fact indicates some degree of targeting.

Panel B aggregates to the industry-level. The most affected industries—lodging and food services, education, health and social work, rental and business services, and entertainment—receive a greater subsidy as a proportion of baseline operating costs than unaffected industries. Table B.3 provides a full break-down of measures of the implied subsidy for each industry group. This targeting pattern appears to be driven by differences in labor-intensity across industries, as opposed to differences in participation in SI. Figure B.4 demonstrates that SI participation does not seem to vary with the degree to which industries are exposed to COVID-19 (Panel A) but labor intensity does (Panel B).

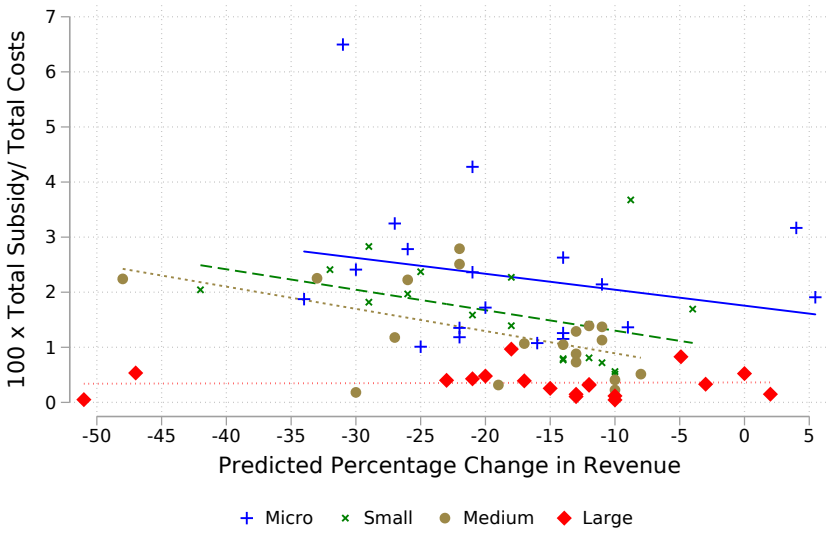
4 Discussion and Conclusion

Our analysis of the SI tax base among Chinese firms holds two overall implications. First, among participating firms, SI contribution obligations represent one of the largest tax bases—dominating the corporate income tax base, for example—which allows the government to confer meaningful

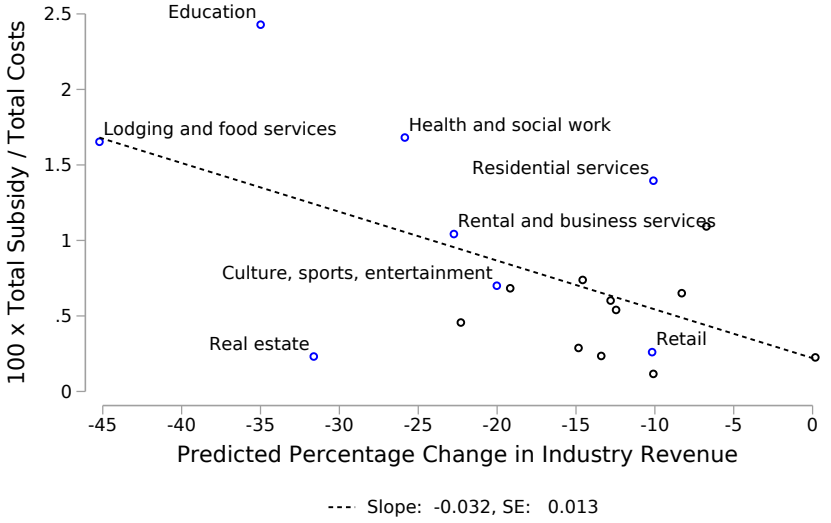
[12] Chen et al. (2020b) construct size bins using annual firm revenue from 2019 following the MIIT size revenue cutoffs.

Figure 5: **Subsidy versus Predicted Change in Revenue**

(a) **Firm Size × Industry Bins**



(b) **Change in Revenue**



Note: This x-axis is the mean percent change in revenue caused by the COVID-19 shock estimated by Chen et al. (2020b) for the period March 26th to April 16th, 2020 (9-12 weeks following the onset of the Wuhan lock down). They report revenue changes for 4 firm size bins and 18 industries, resulting in 72 bins, which we show in Panel A. The y-axis is the ratio of (i) the bin's total simulated subsidy over (ii) its total operating costs, as reported in our data. The calculation of the simulated subsidy is described in Section 3.3 of the main text. Panel B aggregates up to industry bins. To do this, the predicted percent change for an industry is calculated as cost-weighted average among firms of all sizes in that industry. In Panel B, the blue circles denote industries with a text label attached in the graph.

and immediate benefits to firms during an economic downturn with minimal administrative burden. Second, labor formality does severely reduce the reach of these benefits, especially among small firms; yet among the minority of firms that do participate in SI, SI tax cuts are in fact more apt to deliver benefits to small firms. This is for two reasons. One is the regressive tax structure of SI contributions (which is not unique to China): just as low-wage, small firms suffer from a higher ATR under the regular SI scheme, they experience a greater rate reduction during payroll tax cuts (although these firms may still face higher ATRs after a rate reduction than do large firms). The other reason is the fact that small firms are more labor-intensive, and therefore receive larger tax reductions on inputs relative to large firms that rely more heavily on material and capital inputs.

It is useful to consider these conclusions in the context of China's labor markets and the purposes served by payroll tax reductions generally. First, because the minimum contribution rules require Chinese firms to make SI payments even if employees are temporarily not working (and not receiving wage payments),[13] firms with formal labor arrangements face an additional monthly obligation during a lock-down. Temporary payroll tax cuts provide cash flow to these firms and may even contribute to formalizing labor practice. Moreover, the COVID shock is also a reallocation shock: many firms across numerous sectors are responding to increased demand for new products and services. Barrero et al. (2020) estimate that in the U.S., for every ten jobs lost, three new ones were created. They further argue that labor-retention incentives blunt the productivity gains from this re-allocation. SI rate cuts may improve labor reallocation where cash schemes tied to retention of existing employees do not.

Second, imperfect coverage of small firms is not unique to SI. For instance, in both developed and developing countries (including in the United States (Granja et al., 2020)), government-sponsored credit programs typically struggle to reach small firms (Bonomo et al., 2015; Ornelas et al., 2019). This is consistent with preliminary evidence indicating that China's COVID lending program did not affect SME firm liquidity or survival (Chen et al., 2020a). In contrast to such

[13]The practice of furloughs is new to China and there are no direct legal provisions for it, though it has become more widely discussed because of COVID-19—employment lawyers claim to have facilitated such arrangements on a purely contractual basis.

lending programs, payroll tax cuts have the benefit of administrative simplicity and non-reliance on private intermediaries.

Third, we have made positive statements about the extent to which China's payroll tax cuts target small firms and vulnerable sectors. However, an evaluation of such targeting ultimately depends on the normative framework. For example, while payroll tax reductions encourage preservation of the employer-employee relationship, not every employer-employee match has equal social value, and the greatest return to the government's expenditure may come from the preservation of high-productivity matches (Birinci et al., 2020), which may be in the formal sector. On the other hand, the destruction of low-productivity matches may have long-lasting economic effects if these workers find it especially difficult to re-establish employment (Gregory et al., 2020). These perspectives suggest that normative evaluations of the exclusion of firms that rely on informal labor from government assistance may be complex.

In conclusion, using Chinese taxpayer data, our study offers what may be the first calculation of the extent of government assistance to employers through payroll tax cuts in response to COVID-19. Our use of Chinese administrative data offers a perspective not only on policy developments in one of the world's most important economies, but also—and equally importantly—on a critical question that faces all of the world's developing economies: how much does government intervention matter when the informal economy is very large? The high level of firm tax registration in China means that the large population of firms that we observe as not participating in SI would have simply been unobserved informal firms in other countries. Because Chinese administrative data allows us to observe such would-have-been-informal firms, we can uniquely quantify the degree to which informality alters the effectiveness of payroll tax cuts.

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Appendix A SI Contribution Deferments and Cuts

Table A.1: **Payroll Tax Responses Around the World**

	Deferral of SSC	Rate reduction or exemptions
Argentina	Employers affected by quarantine that provide required information have March 2020 employer contributions automatically postponed to mid-June	Employers providing healthcare-related services enjoy a 95% reduction of employer contributions for 150 days after 20th March.
Brazil	March/April payment to be paid in August and October 2020, respectively.	
Czech Republic	Late payments of SSC by employers (24.8%) for May-July 2020 receive lower penalty.	
Finland		Private sector employer contribution reduced by 2.6% from 16.95% of wages paid (applicable Jun 20 to Dec 20)
France	Companies with <50 (>50) employees can postpone March-May (April-May) payment for employer and employee contribution for up to 3 months.	
German	SSC for March-May 2020 may be deferred under the end of June 2020.	
Greece	Companies in listed industries may delay payment of SSC due in March-April to September and October.	
Hungary		March-June reduction for select sectors (Hospitality, tourism; Entertainment, film industry, performing art; Sport services; Event organization; Gambling): employers exempt from normal contribution (17.5%+1.5%); employees only liable for 4% healthcare premium (instead of 18.5% SSC) On 1 July 2020, employer rate reduced to 15.5%.
Iceland	Employers may postpone payment for up to 3 payments of SSC that fall due 1 March– 1 December. All must be paid by 15 January 2021. Conditions: substantial operational difficulties; no dividend paid in 2020; no prior delinquencies or failure to file.	
Italy	Withholding tax on employment income, SSC and VAT due from enterprises in April-May 2020 (March-April for the self-employed) is deferred to 30 June.	
Japan	If a taxpayer's gross income for a period (at least one month) on or after 1 February decreases by 20% or more as compared to the previous year's corresponding period, payment deferrals are available for up to one year upon application. Deferral available for SSC as well as corporate income tax and consumption tax	
Jordan		For private sector, for a period of 3 months starting March 1, reduced SSC rate from previous 14.25% employer and 7.5% for employee to 4.25% and 1% respectively.
Lebanon	Deferral of SSC related to the first 6 months of 2020 for an additional 6 months from the original deadlines.	
Malaysia	Deferment of Monthly Tax Installment Payments including SSC: April-June for SMEs; April-September for firms in tourism	
Montenegro	90-day postponement for businesses economically affected by pandemic to pay March-May tax liabilities, including SSC.	
Netherland	Businesses facing financial difficulties as a result COVID-19 may request deferral of payment for many taxes for 3 months, including SSC. Measure retroactive as of March 12, 2020. Further deferral may be granted if taxpayer does not distribute dividends, award bonuses or redeem shares.	

Payroll Tax Responses Around the World Continued

Norway	March/April payments postponed to August; May/June payments postponed to October.	Contribution rate reduced by 4% (from 14.1%) for salary payments May-June. Some areas already benefiting from 0% rate will enjoy 4% subsidy.
Poland	Entrepreneurs in "difficult situations" may apply for 3-month deferral for February-April.	Micro-firms with up to 9 employees enjoy exemption from SI contributions for 3 months. For companies employing from 10-49 employees, 50% of SI contributions is waived.
Portugal	Reduced employer SSC for March-May payable in July-September (three instalments) or July-December (six instalments),	Reduction of employer SSC to 1/3 in March-May.
Russia	6-month deferral for March-May; 4-month deferral for June-July period All companies operating in sectors most affected by crisis (aviation, tourism, sport, culture and others) may apply for tax deferral (3 months to 1 year) or payment in instalment (3-5 years) for taxes including SI contributions.	All SMEs enjoy rate reduction from 30% to 15% for contributions on salaries exceeding the minimum statutory wage starting from Apr. 1.
Serbia	Deferral of payments of salary tax and SSC on salaries for March-May (or April-June if March salary was paid by 10 April) until January 4, 2021. Deferred tax obligations can be paid over 2 years without late-payment interest.	
Slovakia	Postponement of payment of employer contributions in case of sales decrease of more than 40%.	
Spain		Companies severely affected: for company with <50 (>= 50 workers) (as of 29-02-20), May-June contributions completely (75%) exempted; Companies less severely affected: for company with <50 (>=50) workers, for workers returning to work, 85% (60%) exemption on May's contribution and 70% (45%) on June's contribution.
Switzerland	Deferral is granted on case-by-case basis for unspecified duration; interest on late payments is suspended for 6 months. From Monday, 23 March 2020 until further notice, interest on arrears will be charged at 0% on all social security contribution claims.	
Sweden		SSC to be reduced from 31.42% to 10.21% for the period Mar. 1-Jun. 30; applies to up to 30 employees per employer and for salaries up to SEK 25,000 per month for each employee.
Thailand		The rate for employers and employees decrease from 5% to 4% for 6-months, March-August.
United States	Employer contribution to social security taxes (Mar 17 to end of 2020) can be deferred, 50% to be paid by end of 2021 and remainder by end of 2022.	
Vietnam	Suspends SSC for those who are affected by the Covid-19 epidemic until December without interest charge for late payment. Conditions: involved in passenger transport, tourism, accommodation, restaurants or other sectors where either 1) unable to find enough work for employees and 50% or more of workers enrolled in SI scheme temporarily stopped working; or 2) suffering a loss equivalent to at least 50% of total value of assets (excluding land).	

Note: This table reports Social Security Contribution (SSC) deferments and temporary cuts enacted in response to the COVID-19 economic downturn. We collected these from a wide range of sources, largely announcements by major accounting firms advising firms on the new tax measures.

Appendix B Supplementary Results

Table B.1: **Sample Sizes**

Full Sample	Tax Registrants as of Jan. 2017, registered before Jan. 2016	1401838
Cut 1:	and Filed Non-Empty Financial Statements in 2016	1047818
Cut 2:	and Positive Revenue and Costs in 2016	922185
Cut 3 (Analysis Sample):	and Non-Zero Net Tax Remittance in 2016	893402

Note: These figures do not include non-business units or sole proprietors. The tax registry snapshot is as of 2017. We start by excluding firms that registered after December 2015 (to account for any delayed firm enrollment in SI) and denote this the "Full Sample". Firms are required to file financial statements with tax authorities; "Cut 1" restricts to firms that filed non-empty statements. "Cut 2" restricts to firms with positive revenue on the financial statement. "Cut 3" restricts to firms with non-zero net tax remittance in 2016. Net tax remittance is defined as the total remittance across all categories of taxes minus the sum of refunds across categories. Firms that have zero tax remittance and zero revenue on financial statements are likely non-active firms. We take Cut 3 as our analysis sample for the paper.

Table B.2: **Decile End Points**

Revenue (CNY)

	Minimum (10,000s)	Maximum (10,000s)
0	0	10
1	10	25
2	25	45
3	45	79
4	79	135
5	135	228
6	228	394
7	394	765
8	765	2,092
9	2,092	

Note: This table contains the end points for the revenue decile bins used in Figures 2, 3 and 4. The maximum in the 10th decile is omitted. Revenue refers to business revenue reported on financial statements.

Table B.3: **Industry Patterns**

	% of Firms	% Paying SI	% of Total SI Payment	$100 \times \frac{\text{Total Subsidy}}{\text{Total Costs}}$	Mean $\frac{100 \times Subsidy}{Costs}$	$100 \times \frac{\text{Total Subsidy}}{\text{Liquidity}}$	Mean $\frac{100 \times Subsidy}{Liquidity}$
Health and social work	0.11	77.59	0.27	1.48	3.37	2.87	9.22
Financial services	0.43	72.74	4.93	0.25	2.24	0.11	3.57
Energy and utilities	0.20	67.75	1.62	0.16	1.43	0.33	3.05
Education	0.16	59.76	0.13	2.38	4.40	2.96	12.21
Hydrolics, environment and other	0.13	59.02	0.57	0.82	1.86	0.30	2.26
Real estate	2.14	58.65	2.56	0.24	2.21	0.05	3.84
Equipment, Chemical, Metal Manuf	25.11	56.40	44.23	0.43	1.22	0.54	1.33
Textile, Food Manufacturing	8.34	51.77	8.73	0.53	1.09	0.66	1.57
Lodging and food services	1.04	47.28	1.17	1.73	2.09	1.75	5.62
Residential services	2.82	46.20	2.90	1.36	2.45	0.56	4.49
Construction	6.49	46.14	5.40	0.26	1.34	0.18	1.42
Telecommunication, software, IT	2.20	45.75	2.63	0.47	2.07	0.53	3.68
Science, research, technology	3.61	45.17	2.72	0.61	1.56	0.57	2.54
Rental and business services	8.35	44.32	7.61	0.96	2.42	0.17	4.86
Wholesale	22.33	40.24	5.73	0.10	0.81	0.20	1.19
Transportation and logistics	3.06	37.95	3.85	0.59	0.96	0.83	1.97
Retail	12.22	36.15	4.42	0.23	1.04	0.38	1.65
Culture, sports, entertainment	0.53	32.46	0.26	0.63	1.82	0.35	4.39
Agriculture, forestry, fisheries	0.74	22.86	0.27	0.15	0.61	0.13	0.60

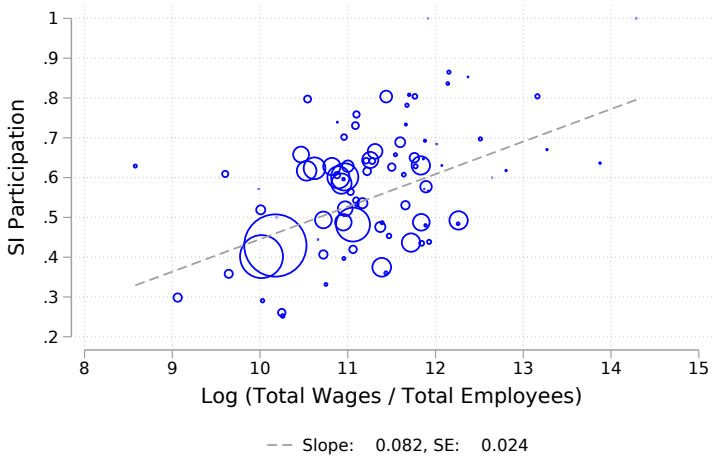
Note: This table reports industry-level statistics on SI participation and the simulated magnitude of the SI tax cut. Column 1 reports the percent of all active firms accounted for by each industry. Column 2 reports the percent of firms that remit SI contributions. Column 3 reports the percent of total SI contributions accounted for by each industry. Columns 4 and 6 report the total implied subsidy from the SI tax cut over total costs and total liquid assets in the industry. Columns 5 and 7 report the average subsidy-to-cost and subsidy-to-liquid assets ratio among the firms in the industry after winsorizing at the 1st and 99th percentiles.

Table B.4: **Revenue Thresholds Used in Chen et al. (2020a) When Estimating Sales Declines**

	Micro	Small	Medium
Agriculture	500000	5000000	20000000
Mining	3000000	20000000	400000000
Manufacturing	3000000	20000000	400000000
Utilities	3000000	20000000	400000000
Construction	3000000	60000000	800000000
Wholesales & retail	1000000	5000000	200000000
Trans. & logistics	1000000	10000000	300000000
Hotels & catering	1000000	20000000	100000000
IT & comm tech	500000	10000000	100000000
Financial services	500000	5000000	100000000
Real Estate	1000000	10000000	2000000000
Leasing & services	500000	5000000	100000000
Sci & tech	500000	5000000	100000000
Environmental	500000	5000000	100000000
Resid. services	500000	5000000	100000000
Education	500000	5000000	100000000
Health services	500000	5000000	100000000
Entertainment	500000	5000000	100000000

Note: This table reports the revenue cutoffs used by Chen et al. (2020a) to classify firms into size bins for the purpose of estimating the change in sales due COVID-19 across industry and size bins. The revenue cutoffs correspond to the office MIIT size classification. Each column displays the right-hand end point for that bin. Firms with revenue greater than the "Medium" column are large. All values are in CNY and are applied to annual revenue.

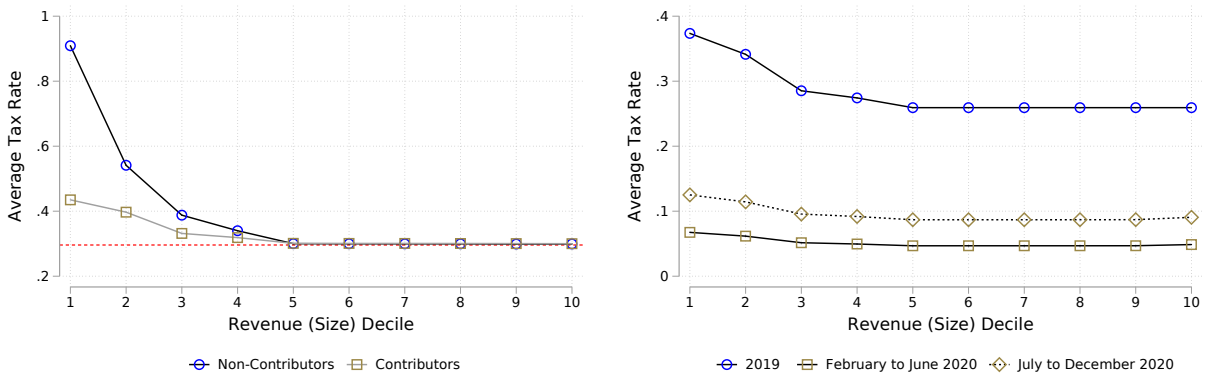
Figure B.1: **Industry-Level Participation and Average Wages**



Note: This figure plots SI participation rates against the average wage in two-digit industry bins. The average wage is calculated as total wages over total employees in the bin. High-wage industries tend to face a lower contribution per-worker due to the cap on per-worker contribution. Wages are reported on the corporate income tax return. The number of employees are reported in the tax registry as of 2017. Circle size is proportional to the number of firms.

Figure B.2: **Average Tax Rate Robustness**

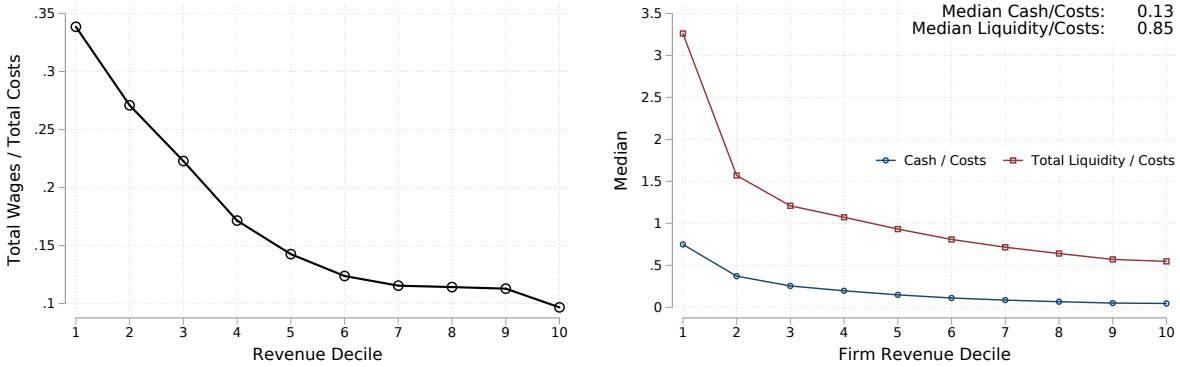
(a) **Average Tax Rates in 2016** (b) **Effect of 2020 Cuts Among SI Contributors**



Note: Panel A plots the average tax rate (ATR) for each revenue decile as follows: (1) Revenue deciles are calculated for the full sample. (2) Each decile is split into SI contributing and non-contributing firms, creating 10×2 bins. (3) For each bin, sum the total wages and total employees across firms in that bin (after winsorizing at the 1st and 99th percentiles). (4) Calculate the average wage as the sum of total wages over the sum of total employees. (5) Calculate the ATR for each group following the formula shown in Figure 1. The red horizontal line demarcates the combined statutory rate across all contribution categories in 2016. If $\sum_{i \in g} W_i / \sum_{i \in g} E_i \in [.6\bar{w}_c, 3\bar{w}_c]$, the ATR is equal the statutory rate. Panel B repeats this exercise, for contributing firms only, but applying (a) the 2019 rates, (b) the reduced rates available for February to June 2020, and (c) the reduced rates available for July to December 2020. Both panels restrict to firms with positive wages (from corporate income tax returns) and employees (from the tax registry).

Figure B.3: **Labor Intensity and Liquidity Across the Size Distribution**

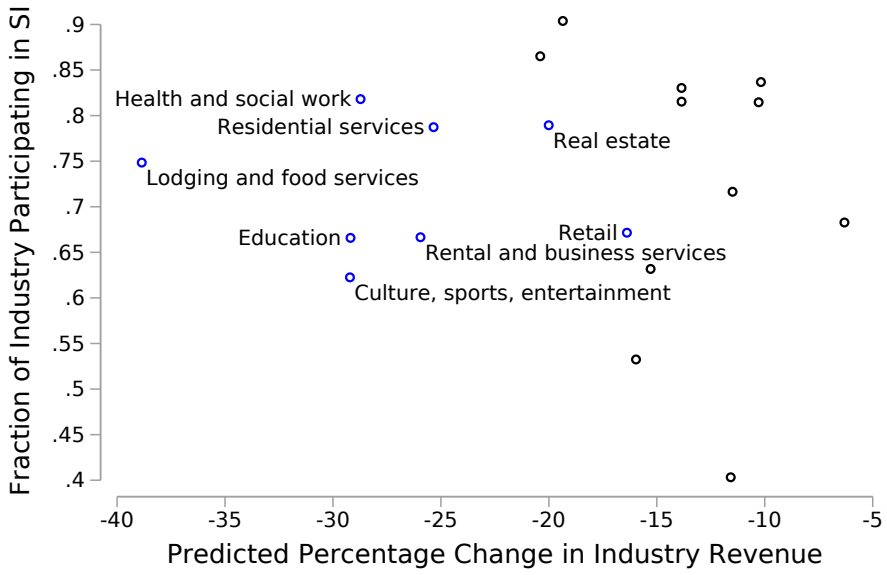
(a) **Labor Intensity** (b) **Liquidity**



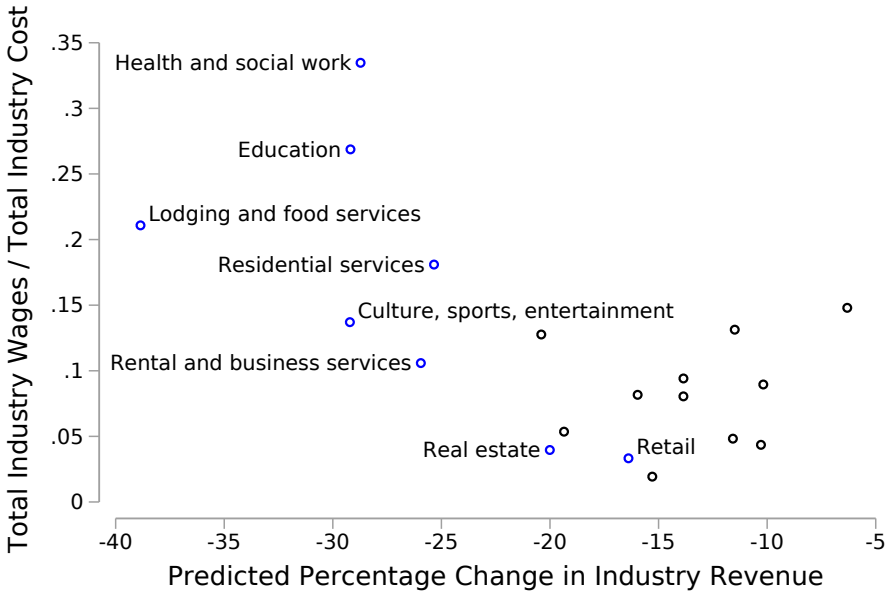
Note: Panel A plots average labor intensity across the firm size distribution. For each firm, we calculate the ratio of wages to total costs. We winsorize this ratio at the 1st and 99th percentiles within each revenue decile, then take the average. Wages are as reported on corporate income tax returns. Panel B plots the median of cash-to-costs and total liquidity-to-costs ratios for each firm revenue decile. Cash holdings and total liquidity are as reported on the balance sheet. Revenue is as reported on income statements.

Figure B.4: **SI Participation and Labor Intensity versus Predicted Change in Revenue**

(a) **Participation**



(b) **Total Wages / Total Costs**



Note: This x-axis is the mean percent change in revenue caused by the COVID-19 shock estimated by Chen et al. (2020b) for the period March 26th to April 16th, 2020 (9-12 weeks following the onset of the Wuhan lock down). Using 1.5 billion VAT transactions, they report revenue changes for 4 firm size bins and 18 industries, resulting in 72 bins. The predicted percent change we plot is the cost-weighted average among all firms (in our data) in the industry. In Panel A, the y-axis is the fraction of total operating costs, in a given industry that is accounted for by SI participating firms. In Panel B, the y-axis is the ratio of total industry wages over total industry costs (labor intensity). Wages are as reported on corporate income tax returns, whereas total operating costs are as reported on financial returns.