Income Tax and Salesforce Performance: A Micro Perspective[1]

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Abstract

How does the change in income tax affect sales performance? Our paper explores the link between economic policy and salesforce management at the transactional level, using data from a large fashion retailer in China. The analysis shows that the implementation of a nationwide personal income tax cut in October 2018 improves sales performance more among those salespersons who benefited from the policy, compare to others. The performance gain is observed after the tax cut and persisted in future months, and is particularly significant in low-income regions. We also find that the performance gain is largely due to an increase in sales of pricier items, rather than more reliance on discounts. Finally, the research shows that the net effect of the tax cut is an increase in the government's revenue due to the firm's higher sales and corresponding increase in corporate tax paid.

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Keywords: salesforce productivity, public policy, incentive, income tax.

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1 Introduction

Regulations affect marketing strategies in many aspects. Industry-specific regulations, such as Section 5 of the FTC Act on advertising in the US and the Pharmaceutical Pricing Regulation Scheme in the UK, impose various constraints on practitioners in their decisions. More general regulations such as anti-trust laws and sales tax affect a wider economic scope. Among all the regulations, tax policy is an essential part and a key component of the "Context" in the 5C marketing framework. Recent research, mainly in the field of economics, has examined the impact of various tax or subside policies such as sales taxes (Anderson et al. 2010), industry-specific taxes such as cigarette tax (Gordon and Sun 2015)and soda tax (Seiler et al. 2020), and government subsidies (Xiao et al. 2020), but few studies in marketing examine the effect of income tax on sales-related outcomes.

As a major economic policy, personal income tax directly affects disposable income. It affects not only the demand side of the market but also the supply side, especially in labor market participation and work intensity. When a government initiates an income tax cut, the after-tax wage of employees increases, thus shifting employees' indifference curve on leisure vs. income and affecting their motivation to work. Labor economists have extensively studied the relationship between salary tax and labor supply, mainly in two areas: labor market participation (Hausman 1985, Fieldhouse 2013, McClelland and Mok 2012, Eissa and Liebman 1996) and hours of work (Oettinger 1999, Farber 2008, Ziliak and Kniesner 2005).

But if the number of working hours is fixed, e.g., salespersons working in a retail store, how does the change in income tax affect employee productivity? Few existing studies have explored this issue. As the after-tax wage rate increases, does the tax cut incentivize employees to work harder? Or, as they can achieve their earnings targets easier, would the tax cut make employees work less hard? [1]

In this paper, we study the impact of the change in the income tax policy on labor productivity with the micro-level sales and wage data, in a retail setting where employees' working hours are mainly fixed. In October 2018, the standard deduction in China changed from ¥3,500 to ¥5,000 per month, a tax cut for middle-level earners, but not affecting those who make less than ¥3,500.

[1] One of the well-known studies is Camerer et al. (1997), which studied New York Taxi drivers and find them stop working earlier on rainy days when the hourly rate was higher

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This presented an opportunity to study the impact of income tax on productivity.

Using internal data from a large fashion retailer, we compare the salespersons' performance before and after the tax cut. After the tax policy change, we find that those salespersons who expect to benefit from the tax cut improve their sales performance, compared to others. Our results suggest that the tax cut enhances productivity due to the increase in individual effort, which compliments the existing finding in increased labor market participation (McClelland and Mok 2012) and longer work hours (Ziliak and Kniesner 2005).

How did the salespersons increase their performance after the tax cut? We find that the sales improvement did not come at the cost of lower prices, i.e., selling items with deeper discounts. Rather, the improvement came from upselling: salespersons spent more time with each potential customer and obtained higher sales value from each transaction. Their intensive margin, instead of extensive margin, improved after the tax cut. We also find that the performance gain of salespeople who expect to benefit from the tax cut is higher in low-income regions compared to that in high-income regions. Our findings provide strategic implications on how firms can adjust their marketing strategies, such as retail assortment planning and sales promotion, in response to tax policy changes.

Finally, from the perspective of the government, what is the net impact of the tax cut on fiscal revenue? Our analysis indicates that, in the context of our study, a reduction of personal income tax can lead to more, instead of less, fiscal revenue due to the increase in firms' sales and consequently more revenue from corporate tax.

The number of salespersons accounts for a significant portion of the labor force. In the U.S., over 14 million people work in sales and sales-related occupations (The Bureau of Labor Statistics 2019). Just within the insurance industry in China, there are more than 9 million salespersons (China Banking and Insurance Regulatory Commission 2020). This study contributes to the literature on examining what and how to motivate salespersons to exert more effort effectively, a key management issue among marketing practitioners and researchers. Recent studies have largely focused on the sales compensation structure (Misra and Nair 2009, Chung et al. 2014) and peer interaction (Chan et al. 2014b). As those changes are usually confounded with a firm's strategies in other domains such as product, marketing, competition, and pricing, it is challenging to empirically isolate the net effect of salespersons' response to the changes in salary structure. In

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this study, the income tax cut came as an external shock and the fashion retailer under our study did not have any major strategic changes in the period. This gives us a clean setting to estimate the impact of compensation incentives on salespersons. In addition, this study sheds light on understanding the impact of macroeconomics policies at the micro-level, i.e., on the behavior of individuals and firms, adding to a growing stream of literature as detailed in Section 2 of the paper.

The remainder of the paper is organized as follows. Section 2 reviews the literature on income tax, labor supply, and salesforce motivation. Section 3 describes the institutional background of China's income tax cut in August 2018 and explains the data and sample construction. Section 4 provides some model-free evidence from the data on the impact of tax policy change on salesforce performance. Section 5 develops the model and empirical strategy, with the detailed findings reported in Section 6. Finally, Section 7 evaluates the income and revenue implications of the tax policy change on different stakeholders from the micro perspective, and Section 8 concludes.

2 Related Research

The impact of salary tax on the economy has been widely discussed. Some researchers focus on macroeconomics and fiscal policy (Mirrlees et al. 2010, Diamond 1998, Hungerford 2012), and many others studied the impact on the labor market (Kleven et al. 2009, Blundell et al. 1998, Blundell and Macurdy 1999, Hausman 1985).

Income tax affects the labor market in several dimensions. The first is labor market participation. On one hand, a lower income tax means higher net income from the same salary. Thus, off-work time becomes relatively less valuable, or the opportunity cost of leisure increases. This may motivate more people to work. On the other hand, higher net income also means higher demand for leisure. These two forces work in opposite directions and the net impact of a reduced income tax remains theoretically unclear (Hausman 1985). Empirically, labor economists have found an increase in tax rate generally leads to a modest decrease in labor supply (McClelland and Mok 2012). While such response from the labor market is consistent across different income groups, lower income groups tend to be slightly more responsive (Fieldhouse 2013). Eissa and Liebman (1996) examined the impacts of the expansion of earned income tax credit from the Tax Reform Act of 1986 on labor force participation and hours of work. They found an increase in

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labor force participation but the hours of work remain unchanged with the tax reduction.

Income tax policy also affects the labor market through the current workers' intensity or hours of work (Ziliak and Kniesner 2005). Farber (2008) examined the relationship between wage increases and the work hours of cab drivers. From a similar perspective, Oettinger (1999) studied how the expected wage change influenced the work hours of stadium vendors.

While there is rich literature on the subject, few studies have examined the impact of tax on labor productivity (Fieldhouse 2013). Hungerford (2012) found a modest positive correlation between labor productivity and top income tax rate, i.e., increasing tax for higher incomers could slightly enhance their productivity. Indirectly, several papers examined the impact of wage change on labor productivity. Fehr and Goette (2007) found that employees respond to wage increases with reduced effort input. In other words, a higher salary may lead to a decrease in productivity. Lazear (2000) found a significant productivity gain in an auto glass factory when the company switched from paying hourly wages to paying piece rates. Booth and Frank (1999) studied performance-related pay and its impact on productivity and found a similar pattern. While the literature showed mixed findings with respect to the wage effect on productivity, it is understandable. The impact of pay structure change on employee productivity can be influenced by a variety of confounding factors such as external labor market opportunities, workers' talent levels, as well as companies' internal administrations.

There is also abundant literature on executive pay and tax changes (Fieldhouse 2013). Many of them focus on the overall impact on the economy as well as firm performance, while we focus on the performance of ordinary employees and distinguish the differential impacts of the tax policy change on the performances of ordinary salespersons by their income levels.

In the context of salesforce productivity management, Albers et al. (2010) reviewed the literature on factors affecting salesforce performance. Misra and Nair (2009) developed a comprehensive model to study the incentive structure of salesforce management. Chung et al. (2014) examined various aspects of salesforce performance and its relationship to bonus systems. Chung and Narayandas (2017) found that performance-related pay motivates all salespersons but unconditional pay is more effective for those with better skills. Chan et al. (2014b) studied knowledge transfer among peer salespersons. Chan et al. (2014a) examined the competing effects among peer salespersons.

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We also contribute to the literature about how regulations and public policy affect marketers. Much existing research is about the impact of government regulation on firms' marketing activities, treating the regulations as constraints. For example, industries such as insurance services, construction services, food producers, and airline travel are subject to substantial regulation if not industry-specific acts of parliament (Dulleck and Kerschbamer 2006). In the pharmaceutical industry, firms are affected by regulations in aspects ranging from typical marketing variables such as pricing, direct-to-consumer advertising, and salesforce detailing, to measures including patient co-payment and physician prescription budgets (Stremersch and Lemmens 2009). To the best of our knowledge, our research is the first one that provides direct evidence regarding the impacts of the personal income tax changes on salespersons' performance and helps marketers better understand its implications.

3 Institutional background

In China, an employee's tax is calculated in two steps: first, social securities (pension and public health insurance) are deducted from her gross income, and this gives her adjusted gross income. Second, a standard individual-level deduction is applied before calculating her taxable income. With this taxable income, her tax is calculated according to a progressive model: the lowest marginal rate is 3% and the highest is 45%. Most employees receive their salaries monthly, and their income taxes are automatically withheld from their payrolls. In October 2018, the monthly standard deduction changed from ¥3,500 ($510) to ¥5,000 ($729).[2]and the tax brackets also shift at multiple levels. Table 1 provides detailed tax rate change.

For example, a person with an adjusted gross income of ¥5,000 was paying a tax of ¥45 and she received a net income of ¥4,955. Starting from October 2018, her salary tax is zero and she receives a net income of ¥5,000. In 2018, the average disposable income in China was ¥2,352 per month.[3] The average housing expenditure was ¥387. Monthly spending on food and beverage was ¥469, or 28% of the total expenditure. An increase of ¥45 in net income covers meal costs for 2-3 days, not negligible to an average employee.

The company in our study is a women's fashion retailer in China, with annual revenue of close

[2]Based on the exchange rate of October 5th (the first work day), 2018, $1 = ¥6.86

[3]Data source: Chinese National Bureau of Statistics

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Monthly taxable income		
Before Oct 2018	After Oct 2018	Tax rate (%)
¥0 − ¥3,500	¥0 − ¥5,000	0
¥3,501 − ¥5,000	¥5,001 − ¥8,000	3
¥5,001 − ¥8,000	¥8,001 − ¥17,000	10
¥8,001 − ¥12,500	¥17,001 − ¥30,000	20
¥12,501 − ¥38,500	¥30,001 − ¥40,000	25
¥38,501 − ¥58,500	¥40,001 − ¥60,000	30
¥58,501 − ¥83,500	¥60,001 − ¥85,000	35
¥83,501 and beyond	¥85,001 and beyond	45

Table 1: Change of taxable income bracket and tax rate in October 2018

to ¥10 billion in 2017. The company has over 10,000 salespersons nationwide. These salespersons work in the company's more than 5,000 stores across the country. Each store is roughly 100-200 square meters with about 2-3 salespersons, a store manager, and sometimes a cashier and a warehouse staff shared by multiple stores.

Within a store, salespersons serve incoming customers on a rotating basis. In other words, salespersons do not compete for visitor traffic. Rather, a salesperson's job is to evaluate the purchasing potential of the visitor she serves and to persuade the customer to make a purchase.

The tax policy change was announced on August 31, 2018, and was effective from October 1, 2018. The company did not adjust its salary structure in response to the new tax policy. We obtained the monthly salary information of each salesperson and their daily sales data from March 1 to December 31, 2018. To exclude potential influences from new recruits and resigns, we only focus on those salespersons who were active throughout the time period, and this gives us a total of 11,468 salespersons in the data. The distribution of their monthly salary is shown in Figure 1. Their salary mainly consists of two parts: fixed salary and performance-based pays. The average monthly fixed salary is ¥1,751 and the average monthly performance-based pay is ¥1,013, a significant part (about 37% on average) of salespeople's income is directly related to their performance.

The summary of the data is provided in Table 2. In the sample, for each working day, an average salesperson conducted 6.11 transactions and sold ¥1,474 (about $221) worthy of products. On average, 32% discount on official full retail prices was given by a salesperson.

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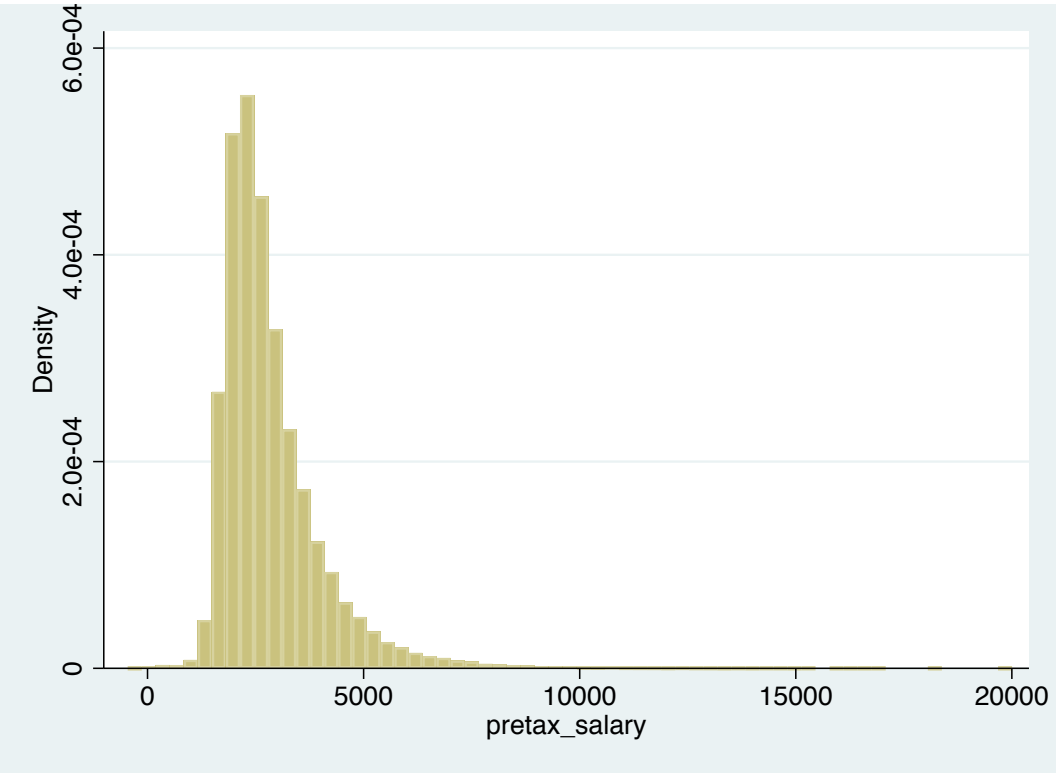

Figure 1: Salary distribution of all salespersons in March-Dec 2018

4 Data Exploration

We first employ a Lasso method to understand the significance of the tax cut on salesperson performance in terms of daily sales revenue. The Lasso estimation entails a process whereby a selection of coefficients for the explanatory variables is systematically shrunk to zero. With the shrinkage applied, Lasso selects variables that continue to have non-zero coefficients to maximize the explanatory power of the model. In the Lasso process, we include variables such as units sold, number of daily transactions, month dummies, day of week dummies, day of month dummies, dummies for the city of the stores, the province dummies, regional disposable income, tax cut dummies, average monthly salaries of each salesperson before the tax cut, the type of the stores (counters in a department store vs stores in a shopping mall), etc. To reduce the computational burden, we use 10% of our total sample. Table 3 shows the top variables selected by the Lasso process according to the penalized coefficients of standardized variables. Even with dummy

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	Observations	Mean	SD	5%	Median	95%
Daily sales (¥)	2,167,029	1,474.12	2,299.16	152	888	4,423
# of daily transactions	2,167,029	6.11	7.65	1	4	18
Daily average discount	2,167,029	0.32	0.21	0	0.34	0.62

Table 2: Summary statistics of an average salesperson in the sample

variables for each month, the tax cut dummy is still selected as one of the top variables. This suggests that the tax policy change plays an important role in explaining the output changes of the salespersons.

Other variables, such as "the number of transactions" and "units sold" on the top of the list are expected, and "December" is a holiday season that generates more sales. The 11th of the month is also among the top selected variables, probably because the 10th is the payday of the firm and there might be an immediate effect of the paycheck. Note that while the payday of the company is on 10th of the month, the wage paid is for the work done during the previous calendar month. For example, wage paid on October 10th is based on the work done from September 1st to September 30th. Also note that as an offline retailer, the November 11th Single's Day (a day known for heavy promotion by online retailers in China) actually did not have any major impact on the sales of the company on that day.

How does the tax cut affect salespersons? Assume that before the tax cut, salespeople were at the equilibrium point where the marginal benefit equals the marginal cost of their effort. When the monthly tax deduction is raised from ¥3,500 to ¥5,000, a salesperson with an expected salary higher than ¥3,500 understands that her marginal benefit of additional sales increases. If she makes more sales, her net income will be higher compared with the scenario without the tax cut. In other words, the monetary return to her productivity will be higher under the new tax policy. From Figure 2, we can infer that for this sample of salespersons, the higher one's salary is, the more she will benefit.

For those who expect to make less than ¥3,500 a month, their marginal benefit of additional sales does not change, because they did not pay any tax even before the policy and they would experience no immediate gain from the tax cut. Therefore, their incentive to deviate from their original equilibrium, if any, is much weaker, compared to those who expect to make more than ¥3500.

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Variables Selected by Penalized Coefficient	Lasso Coefficient
# of Transactions	922.82
Units Sold	746.63
December	283.02
Tax Cut	153.73
11th of the Month	124.58
July	-116.21
Average Salary	114.85
November	112.42
August	-76.8
Monday	65.08
June	-64.81
Department Store vs Shopping Malls	-63.9
31st of the Month	47.37
49 more, mostly citie IDs and province IDs	…

†: Using BIC, the penalty coefficient $\lambda = 5.758645$ is selected

Table 3: Variables selected with Lasso Method

We then use a synthetic difference-in-differences(Arkhangelsky et al. 2021) model to assess the impact of the tax cut on salespersons' performance. We compare the performance changes in two groups based on salaries of September of 2018, the month before the tax cut: a treatment group with salaries above ¥3,500 and a control group with salaries less than ¥3,500. The use of September salary serves as a proxy measure of the salespersons' expectations of their performance level in the coming months. If a salesperson made less than ¥3,500 in September, she understood that she would be less likely to benefit from the tax cut. On the other hand, if a salesperson's September salary was above ¥3,500, she observed her tax from the salary slip and likely knew that she might pay less tax after the tax cut.

As the SKUs and prices of fashion goods may vary at different times of year (e.g., off-seasons) and salespersons' efforts depend on the expected revenue, affected by price, this poses a challenge to the parallel trend assumption and precludes the use of the standard DID approach. To explore the data pattern in our setting, we adopt the synthetic DID method, which combines the strength of DID and Synthetic Control (SC) methods and is particularly suitable to the case where there is a large number of treatment units. In our case, we have over 10,000 salespersons' performance records from March to December of 2018, which is a large panel dataset. Similar to the SC

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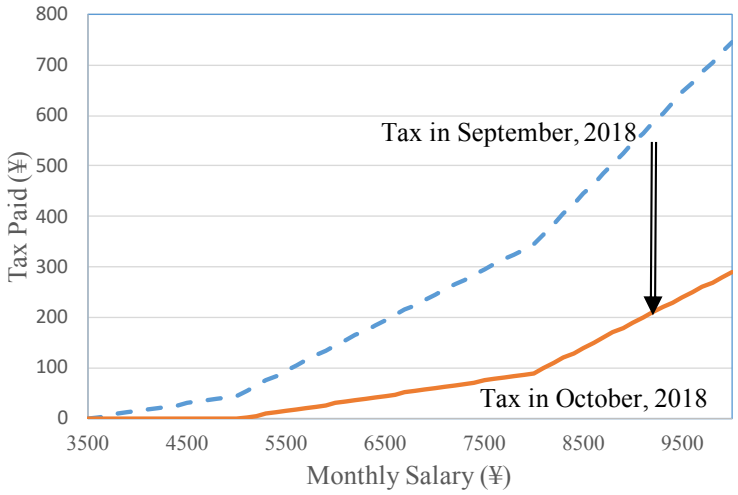

Figure 2: Change of income tax for salary between ¥3,500 and ¥10,000

method, the synthetic DID method essentially re-weights and matches pre-exposure trends to weaken the reliance on parallel trend assumptions. Different from the SC method, the synthetic DID does not require an exact match and convergence of the control and treatment units before the exposure, rather, it only matches the trends.

The synthetic DID requires that all units are exposed to the treatment at the same time period. When the tax policy became effective on October 1st of 2018, not every salesperson works on that day (Oct. 1st), as salespersons take shifts, while everyone is affected in that month (October). Thus, we use monthly sales, instead of daily sales, in applying the synthetic DID method.

We now explain our application of synthetic DID. Denote the impact of tax policy by $\hat{\delta}$, the traditional DID method computes a $\hat{\delta}^{did}$ in Equation (1).

$$(\hat{\delta}^{did}, \hat{\alpha}, \hat{\beta}_i, \hat{\gamma}_m) = \underset{\delta,\alpha,\beta_i,\gamma_m}{\arg\min} \left\{ \sum_{i=1}^{N} \sum_{m=3}^{12} (s_{im} - \delta - \alpha - \beta_i - \gamma_m)^2 \right\}, \tag{1}$$

where s_{im} is the sales of salesperson i in month m, α is the intercept, β_i is the fixed effect on salesperson i, and γ_m is the fixed effect of month m.

The synthetic DID adds a unit weight $\hat{\omega}_i$ and a time weight $\hat{\theta}_m$ (Equation (2)), to align the pre-policy trends in the outcome of the control group with those of treatment group. More specifically, the unit weights $\hat{\omega}_i$ are computed to match the pre-tax-cut trends of the control group

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with those in the treatment group, and the time weights $\hat{\theta}_m$ are computed to align the post-policy performance with the pre-policy performance of each salesperson in the control group so that they only differ by a constant.[4] As Arkhangelsky et al. (2021) suggested, the time weights eliminate the role of time periods that are different from the post-treatment periods, thus removing bias and improving precision.

$$(\hat{\delta}^{sdid}, \hat{\alpha}, \hat{\beta}_i, \hat{\gamma}_m) = \underset{\delta,\alpha,\beta_i,\gamma_m}{\arg\min} \left\{ \sum_{i=1}^{N} \sum_{m=3}^{12} (s_{im} - \delta - \alpha - \beta_i - \gamma_m)^2 \hat{\omega}_i \hat{\theta}_m \right\} \tag{2}$$

Our synthetic DID analysis shows that after the tax cut (from October to December of 2018), the monthly sales of the treatment group increased by ¥8,087.40 per salesperson (standard error = 845.30)[5], compared to the control group. Figure 3 shows the sales output of the treatment group and the control group. This suggests that a reduction in income tax leads to a performance gain for those who are likely to benefit from the policy.

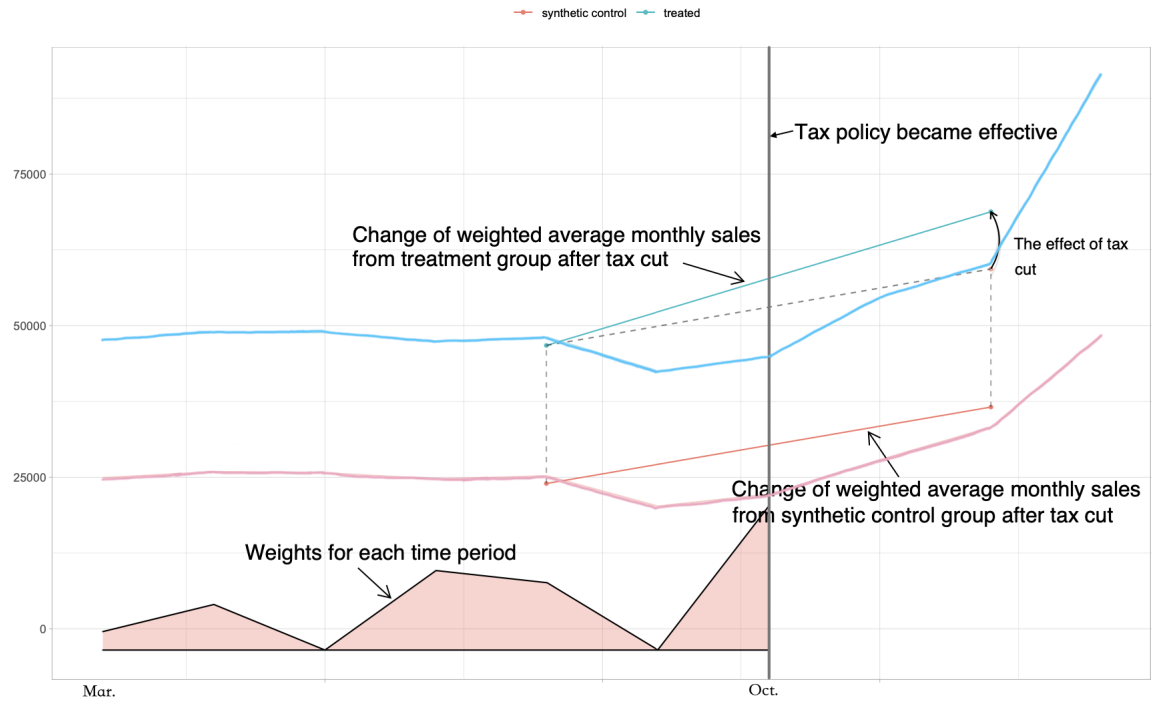

Figure 3: Monthly sales change using synthetic DID.

[4]For more details of the synthetic method, please refer to Arkhangelsky et al. (2021).

[5]Standard error is computed using bootstrapping method as in Arkhangelsky et al. (2021).

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While the result from the synthetic DID again suggests that there is a performance gain after the tax policy change, the evidence is not yet sufficient to suggest that this comes from the increased effort by salespersons. For example, one may argue that from the demand side consumers benefit from the increased disposable income through the same tax policy change as well and, as a result, they may potentially purchase more clothes. If the past salary level is correlated with the skill of the salesperson and the more skillful salesperson is more likely to turn potential demand into actual sales, then even with the effort unchanged, we may still observe a performance gain from those salespersons with higher past salary level after the tax cut due to increased potential demand. The results from synthetic DID, however, cannot exclude such an explanation. To tackle this issue, in the next section, we first examine a salesperson's optimal decision of investing in her sales effort with a general theoretical model. Based on the insights derived, we then set up and estimate an empirical model with the consideration of the interactions between salespersons' skills and the demand conditions to further investigate the impact of tax policy change on salesperson performance.

5 The Model and Empirical Approach

To understand the impact of the tax policy on salespersons' performance, we first consider a simple analytical model, which serves as the theoretical base for the empirical model adopted in our data analysis.

Consider a salesperson i who chooses her optimal effort level by maximizing her expected utility as a function of her after-tax wage net of the cost of her sales effort, i.e., the salesperson's optimization problem is defined as in Equation (3):

$$\max_{c_i} u_i(w_i(\tau_i, s_i)) - c_i, \tag{3}$$

where u_i is the expected utility of salesperson i, w_i is the expected after-tax wage, which is a function of the effective tax scheme (τ_i) faced by the salesperson and the expected sales made (s_i), and c_i is the cost associated with the sales effort, which can be regarded as the investment in the sales effort. To simplify the notations, we suppress the subscript, t, on the time dimension that can be added to all the variables.

Furthermore, we assume that $s_i = s_i(a_i, c_i)$, where a_i captures the demand factors faced by

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i. We denote the marginal return of the cost invested in selling effort on sales, $\frac{\partial s_i}{\partial c_i}$, as $\frac{\partial s_i}{\partial c_i} = s_i'(c_i, f_i, z_i)$, where f_i is the selling skill of the salesperson, with $\frac{\partial s_i'}{\partial f_i} > 0$, and z_i are the demand factors that interact with the effort made by the salesperson in affecting the sales. Note that z_i is a subset of a_i, as some consumers at some times may make purchases even without the sales efforts by the salesperson so that demand can be positive even at c_i =0.

The first order condition from Equation (3) with regard to c_i leads to

$$\frac{\partial u_i}{\partial w_i} \cdot \frac{\partial w_i}{\partial s_i} \cdot s_i'(c_i, f_i, z_i) - 1 = 0. \tag{4}$$

From Equation (4), the optimal level of investment in sales effort by the salesperson, c_i^*, depends on $\frac{\partial u_i}{\partial w_i}$, which is the marginal utility of income; $\frac{\partial w_i}{\partial s_i}$, which is a function of commission structure as well as tax policy; and $s_i'(c_i, f_i, z_i)$, which is the marginal effect of selling effort investment on sales.

A tax policy change will affect the expected sales, $s_i = s_i(a_i, c_i^*)$, through its impact on c_i^*, as implied by in Equation (4), via the change in $\frac{\partial w_i}{\partial s_i}$, as the marginal effect of sales on the after-tax income to a salesperson may change due to the tax policy change.

Note that we can derive $\frac{\partial c_i^*}{\partial \tau}$ by taking derivative on both sides of Equation (4) and solving for $\frac{\partial c_i^*}{\partial \tau}$, which results in

$$\frac{\partial c_i^*}{\partial \tau} = \frac{-(\frac{\partial^2 u_i}{\partial w_i^2} \cdot \frac{\partial w_i}{\partial \tau} \cdot \frac{\partial w_i}{\partial s_i} \cdot \frac{\partial s_i}{\partial c_i} + \frac{\partial u_i}{\partial w_i} \cdot \frac{\partial^2 w_i}{\partial s_i \partial \tau} \frac{\partial s_i}{\partial c_i})}{\frac{\partial^2 u_i}{\partial w_i^2}(\frac{\partial w_i}{\partial s_i}\frac{\partial s_i}{\partial c_i})^2 + \frac{\partial u_i}{\partial w_i}\frac{\partial^2 w_i}{\partial s_i^2}(\frac{\partial s_i}{\partial c_i})^2 + \frac{\partial u_i}{\partial w_i}\frac{\partial w_i}{\partial s_i}\frac{\partial^2 s_i}{\partial c_i^2}}. \tag{5}$$

The denominator of (5) is negative as required by the second order condition of the optimization problem given by Equation (3). Because we expect $\frac{\partial w_i}{\partial \tau} < 0$, $\frac{\partial u_i}{\partial w_i} > 0$, $\frac{\partial w_i}{\partial s_i} > 0$, $\frac{\partial s_i}{\partial c_i} > 0$, and $\frac{\partial^2 w_i}{\partial s_i \partial \tau} < 0$, we have $\frac{\partial c_i^*}{\partial \tau} < 0$ if $\frac{\partial^2 u_i}{\partial w_i^2} \geq 0$, i.e., $\frac{\partial c_i^*}{\partial \tau} < 0$ when utility as a function of income is constant or convex. But $\frac{\partial c_i^*}{\partial \tau} > 0$ may occur if $\frac{\partial^2 u_i}{\partial w_i^2}$ is highly negative, i.e., when utility as a function of income is sufficiently concave. This result suggests that lower taxes will increase salespersons' effort investment, which in turn will increase the expected sales if her utility of income is not too concave. We expect this will be the case in our data as the overall wage level of the salespersons in that company is moderate so that a marginal income increase is highly desirable for those employees. Nevertheless, our empirical model allows for the flexibility of $\frac{\partial c_i^*}{\partial \tau} > 0$.

From the above discussion, we can infer that the resultant expected sales level $s_i = s_i(a_i, c_i^*)$ is a function of the demand factors faced by salesperson i, the marginal utility of income of

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the salesperson, the commission structure, tax policy, the selling skill of the salesperson and the interacting demand factors with the selling effort. To capture these influencers on sales, we adopt the following regression model based on the insights derived above.

$$\begin{aligned} s_{it} = \alpha_0 + \alpha_1 D_{w,i} + \alpha_2 D_{tax,t} + \alpha_3 D_{w,i} \cdot D_{tax,t} + \alpha_4 p_{i,m_t} \cdot w_{i,m_t-1} \cdot D_{tax,t} \cdot D_{w,i} \\ + \alpha_5 p_{i,m_t} + \alpha_6 p_{i,m_t} \cdot w_{i,m_t-1} + \beta_i + \gamma_t^{month} + \gamma_t^{dow} + \epsilon_{it}, \end{aligned} \tag{6}$$

where

s_{it} is the daily sales by salesperson i on day t;

$D_{w,i} = 1$ if salesperson i's September wage is higher than ¥3,500, and $D_{w,i} = 0$ otherwise;

$D_{tax,t} = 0$ if date is before October 1st, 2018, and $D_{tax,t} = 1$ otherwise;

p_{i,m_t} is the average price of the region where salesperson i works in the month m_t of day t;

w_{i,m_t-1} is the wage of salesperson i in the month before day t;

β_i is the salesperson fixed effect;

γ_t^{month} is the fixed effect of month, and γ_t^{dow} is the fixed effect of day of the week.

Essentially, the salesperson fixed effect (β_i) in the model of Equation (6) captures the fixed demand factors faced by i, such as the fixed demand factors specific to the location of the store the salesperson works at, the marginal utility of income of the salesperson, and the commission structure, which are time-invariant. The fixed effects of months (γ_t^{month}) and the fixed effect of day of the week (γ_t^{dow}) capture the time-variant demand factors common across locations, which help us to take into account any shift in seasonal demand or market trend as well as demand differences over weekdays and weekends.

In business practice, the fashion retailer in the study divides the national market into more than 80 management regions with prices set at the region level. Obviously, prices may affect sales revenue so we have included the p_{i,m_t} term in Equation (6). In addition, if prices are optimally set according to market conditions, then favorable market condition (favorable demand factors) implies higher prices given everything else equal. Therefore, p_{i,m_t} also contains the information that reflects the underlying variations of demand conditions across regions and over time.

With this insight, we further include an interaction term of w_{i,m_t-1} and p_{i,m_t} in the empirical model specified in Equation (6), where the past wage w_{i,m_t-1} is used to proxy the skill level of the salesperson, as skill is expected to be positively correlated with the earning. This interaction

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term, therefore, helps capture the interaction of selling skill and time-varying demand factors. Note that the interaction of selling skill and time-*invariant* demand factors has already been captured by the fixed effects in the model.

To capture the effect of tax policy change, we introduce the dummy variable $D_{tax,t}$. Furthermore, since the tax cut only directly benefits those who make more than ¥3,500, we divide the salespersons into two groups based on their salary in September 2018 and introduce the dummy $D_{w,i}$. Later in the paper, we also explore the alternative definitions of wage groups by using the average wage before the tax cut to reflect the salespersons' expectations.

In our empirical model, $D_{tax,t}$ and $D_{w,i} \cdot D_{tax,t}$ capture the average effect of tax policy change on sales by the groups of salespersons who are unlikely/likely affected by the tax cut. Those terms may in fact capture changing demand due to tax cut. For example, α_3 can be either positive or negative depending on how tax-related changes in demand factor, e.g., changes in the disposable income of consumers, may be correlated with the distribution of salespersons unlikely/likely affected by the tax cut across locations.

The term $p_{i,m_t} \cdot w_{i,m_t-1} \cdot D_{tax,t} \cdot D_{w,i}$ offers a direct indication on $\frac{\partial c_i^*}{\partial \tau}$, i.e., the change of salesperson's effort due to tax cut, as a positive α_4 implies that for those affected by tax cut (monthly income over ¥3,500) their sales performance increases after the tax cut (when $D_{tax,t} = 1$) even with the similar demand condition and selling skills (i.e. when keeping p_{i,m_t} and w_{i,m_t-1} constant). Therefore, a positive α_4 can be reasonably attributed to an increase in selling effort. From the insights drawn from the theoretical model as discussed above, we expect α_4 to be positive and should be higher for those with the marginal utility of income remaining to be high when income increases (i.e., $\frac{\partial^2 u_i}{\partial w_i^2}$ is larger), which is likely for those employees in regions with lower average income. The overall impact of tax policy change on sales performance is captured by the combined effect of $\alpha_3 D_{w,i} \cdot D_{tax,t} + \alpha_4 p_{i,m_t} \cdot w_{i,m_t-1} \cdot D_{tax,t} \cdot D_{w,i}$.

6 Empirical Results

We first present the estimates directly related to the sales performance as in Equation (6), followed by various robustness checks, the examining of regional differences in terms of heterogeneity in purchasing power, and the additional analyses to understand the sources of the sales performance

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gain.

6.1 Tax effect on sales performance

The estimation results of Equation (6) are reported in Table 4 below. As mentioned in the previous section, the impact of tax policy is measured by the combined estimates of α_3 and α_4 in Equation (6):

	Daily Sales (¥)
Parameters	Estimates(std err)
Tax Dummy (α_2)	607.11(12.85)***
Wage Group*Tax Dummy (α_3)	-240.65(19.09)***
Wage Group*Tax Dummy * Monthly average price in the region * Last month wage (α_4)	3.38e-4(7.25e-6)***
Monthly average price in the region (α_5)	2.20(0.05)***
Monthly average price in the region * Last month wage (α_6)	2.62e-4(1.07e-5)***
Constant (α_0)	1194.05(13.24)***
Salesperson FE	Yes
Month FE	Yes
Day of week FE	Yes
Observations	2,167,029
R-squared	0.20

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Impact of tax cut on sales performance

From Table 4, α_6 is positive and significant. This is intuitive as it suggests that better demand conditions along with higher selling skills lead to stronger sales performance. More importantly, Table 4 shows that α_4 is positive and significant, which, as we discussed earlier, implies that $\frac{\partial c_i^*}{\partial \tau} < 0$, i.e., salespersons impacted by the tax cut (those with wages higher than ¥3,500) increased their effort levels after the tax policy change. The average salary of the high-wage group was ¥4,575 and the average regional price[6] after the tax cut for this group was ¥370.Therefore, the overall performance gain after the tax cut was $\alpha_3 + \alpha_4 * ¥4,575 * ¥370 = ¥203$ (standard error

[6]Average weighted by the number of observations in each region.

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= ¥9.16). In other words, those who earned more than ¥3,500 per month generated ¥203 more revenue in daily sales after the tax cut, a 10% increase in sales compared with their March-September performance (average daily sales is ¥1,975). Notice that the tax cut does not cost the company anything and the extra sales come from those who expect to benefit from the tax policy. To a salesperson, this tax cut is different from an increase in commission rate: A higher commission rate affects every salesperson, but the tax cut only benefits those who can make more than ¥3,500 per month. In a way, this is similar to the over-achievement commission (Chung et al. 2014), available only to the group with better performance. An important feature of our estimation is that the tax policy change is an external shock, while any change in compensation structure can be endogenous and as a part of an overall strategic adjustment from the firm.

The estimates tell us that a tax cut has a positive impact on sales performance. While the results are consistent with previous research on labor supply (Farber 2008, Oettinger 1999), our findings are different in two aspects. First, we focus on the output instead of the input of the labor force. Our interest is to examine the impact of a macroeconomic policy from a micro perspective, i.e., the sales output of individual salespersons. Second, our results are about productivity instead of working hours or labor market participation. In our research context, the working hours are stable, as the stores operate for 12 hours in the daytime, and the work shift is based on days (each salesperson works 12 hours per day and then takes the next day off).[7] Because of a fixed operating time, the salespersons do not have much room to increase their working hours. Consequently, an increase in sales output in a fixed amount of time suggests a productivity gain. To our knowledge, this aspect has not yet been explored empirically in the previous literature.

6.2 Robustness checks

We further test the robustness of our findings with alternative ways to construct wage groups. In the estimation of the main model, we have used the salary from September 2018 to define the groups of salespersons expected to be affected by the tax policy change. We now use the average salary of the salesperson before October as an alternative measure. With this measure,

[7] A salesperson of this company normally works for a full day every other day, and also needs to work two days in a row twice every month, which enables her to reach the average 8 hours per weekday required by the labor law for a full-time job.

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we redefine the higher wage group as those whose average monthly salary was higher than ¥3,500, i.e., $D_{w,i} = 1$ if a salesperson i's average monthly wage before October was higher than ¥3,500, and $D_{w,i} = 0$ otherwise.

	Daily Sales (¥)
Parameters	Estimates(std err)
Tax Dummy (α_2)	607.34(12.88)***
Mean Wage Group*Tax Dummy (α_3)	-112.90(19.73)***
Mean Wage Group*Tax Dummy * Monthly average price in the region * Last month wage (α_4)	1.84e04(1.08e05)***
Monthly average price in the region (α_5)	2.18(0.05)***
Monthly average price in the region * Last month wage (α_6)	3.71e04(7.13e06))***
Constant (α_0)	1164.90(13.26)***
Salesperson FE	Yes
Month FE	Yes
Day of week FE	Yes
Observations	2,167,029
R-squared	0.20

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Estimation results using the average monthly salary before tax policy change to define the groups that expected/not expected to benefit from tax cut

The estimation results reported in Table 5 are largely consistent with our previous analysis. Those salespersons whose past average wage were above ¥3,500 also increased their effort levels ($\alpha_4 > 0$), compared with those with past average wages below ¥3500. With the alternative definition of wage groups, the average salary of the high-wage group was ¥4,265, and the average regional price after the tax cut for this group was ¥363. The overall impact of tax cut on sales performance was $\alpha_3 + \alpha_4 * ¥4,265 * ¥363 = ¥172$ (standard error = ¥9.37). This is slightly smaller than our previous model estimates.

Next, we consider a subsample of low wage group which contains those whose monthly salaries were *always* below ¥3,500 (before the tax cut), and a high wage group in which salespersons' salaries were *always* above ¥3,500. By excluding those salespersons whose salaries fluctuate

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around ¥3,500, we have a smaller, but cleaner sample to examine the policy's impact. The average salary of the high-wage group was ¥5,052, and average regional price after the tax cut for this group was ¥364. This leads to an overall performance gain of $\alpha_3 + \alpha_4 * ¥5,052 * ¥364 = ¥89.97$ (Column (1) of Table 6, standard error = ¥16.42).

Lastly, we examine another subsample which only contains the salespersons whose September salaries were between ¥3,000 and ¥4,000 (Column 2 of Table 6). This subsample excludes those with extreme performance, and thus effectively reduces the potentially latent difference between the wage groups. Our estimates in this subsample are consistent with previous analyses: the overall performance gain was $\alpha_3 + \alpha_4 * ¥3,912 * ¥364 = ¥45$ (standard error = ¥18.92). As expected, the performance difference between the two more similar wage groups is smaller. More importantly, α_4 remains positive and significant, which suggests that the high-wage group did exert more effort after the tax cut.

The difference between the two sub-samples is worth noting. In the first sub-sample, salespersons in the low-wage group had never earned more than ¥3,500, thus their expected benefit from the tax cut would be minimal. On the contrary, those in the high-wage group would very likely to observe an increase in their net income after the tax cut even without any effort change. In other words, the two wage groups have distinctively different expectations of the tax cut, which allows us to have a clear picture of the tax policy's impact.

In the second sub-sample, we limit the salary range to ¥3,000-¥4,000. The high-wage group earned between ¥3,500 and ¥4,000, and the low-wage group earned between ¥3,000 and ¥3,500. The two groups are relatively similar and therefore, the expected performance gain from the tax cut would be smaller as revealed in this sub-sample. The results confirm this as the performance gain from the second sub-sample is ¥45, significantly smaller than the difference found using the full sample.

6.3 The impact of local purchasing power heterogeneity

An underlying assumption in our study is that the amount of extra income is meaningful to the salespersons, i.e., the monetary incentive is strong enough for the high-wage group to react differently from the low-wage group. Moreover, according to the discussion based on our theoretical model, the change in the investment of selling efforts due to tax cuts is expected to be higher

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	Daily Sales(¥)	
	(1)	(2)
	Wage always below or above ¥3,500	Sept Wage between ¥3,000 and ¥4,000
Tax Dummy (α_2)	447.71(13.70)***	893.86(36.20)***
Wage Group*Tax Dummy (α_3)	-57.12(36.00)	-303.22(41.53)***
Wage Group*Tax Dummy * Monthly average price in the region * Last month wage (α_4)	8.00e05(1.70e05)***	2.45e-04(2.62e-05)***
Monthly average price in the region (α_5)	2.32(0.05)***	2.58(0.15)***
Monthly average price in the region * Last month wage (α_6)	4.33e04(9.65e06)***	2.71e-04(1.77e-05)***
Constant (α_0)	736.77(13.97)***	1805.03(38.41)***
Salesperson FE	Yes	Yes
Month FE	Yes	Yes
Day of week FE	Yes	Yes
Observations	1,401,209	405,107
R-squared	0.19	0.18

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Performance change with alternative definitions of wage groups expected to benefit/not benefit from the tax cut

for employees from low-income regions. We now explore the moderating role of the purchasing power in the regions where the salespersons were located to our results. The tax cut was uniform across the country. The same amount of money, however, would have different purchasing power in cities with different incomes per capita. While ¥20 can only buy you a bowl of noodles in Beijing, it is enough for a day's meal in a small town in a less developed region. The purchasing power of income depends on the relative wealth level of the region. The company has more than 5,000 stores nationwide, distributed in different cities with different income levels. We mean-split the regions into two subsamples according to the local disposable income and estimate the model (Equation (6)) on each subsample respectively. The results are presented in Table 7.

In the low-income regions, the average price was ¥390, and the average salary of the high-wage group was ¥4307. Overall performance gain in the low income region was $\alpha_3 + \alpha_4 * ¥4307 *$

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	Daily Sales (¥)	
	(1)	(2)
	B*elow* average income regions	A*bove* average income regions
Tax Dummy (α_2)	324.78(17.41)***	801.64(19.60)***
Wage Group*Tax Dummy (α_3)	-262.96(34.21)***	-279.73(25.54)***
Wage Group*Tax Dummy * Monthly average price in the region * Last month wage (α_4)	3.66e-04(1.87e-05)***	2.38e-04(1.42e-05)***
Monthly average price in the region (α_5)	2.90(0.07)***	1.81(0.08)***
Monthly average price in the region * Last month wage (α_6)	3.28e-04(1.06e-05)***	3.03e-04(1.42e-05)***
Constant (α_0)	635.52(16.86)***	1733.44(21.43)***
Salesperson FE	Yes	Yes
Month FE	Yes	Yes
Day of week FE	Yes	Yes
Observations	1,075,801	1,091,228
R-squared	0.17	0.20

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: The Impact of the tax cut in low-income vs. high-income regions

¥390 = ¥352 (standard error = ¥16.79). In contrast, the performance gain in the rich region was $\alpha_3 + \alpha_4 * ¥4662 * ¥364 = ¥123$ (standard error = ¥12.61).

In the low-income regions, the increase in sales performance was about 2.9 times compared to the increase in the high-income regions. The employees in low-income regions put in more effort after the tax cut, as the same amount of income means more purchasing power and thus offers a stronger incentive. We also notice that α_4 is about 54% larger in low-income regions than in the high-income regions, indicating that the high-wage group in low-income regions exerted even more effort after the tax cut, compared to their counterparts in high-income regions.

6.4 Sources of Performance Gain

Previous sections focus on the impact of income tax policy on sales performance, and the results indicate that a tax cut can incentivize salespersons to improve their sales output. This perfor-

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mance gain may come from both the demand side (consumers) and the supply side (i.e., the salesforce productivity). On the demand side, we have controlled the effects of income increase (through the tax dummy), price, and seasonality (through the month dummies). On the supply side, several factors could contribute to the performance increase: more working hours as many labor economists have studied (Oettinger 1999, Ziliak and Kniesner 2005, Farber 2008), incentive system change (i.e., salary structure), more effort in selling, or more discounts offered under the discretion of the salespersons.

In the context of our study, the incentive system (salary and commission structure) was not changed and the working hours of the retailer did not change either. Within fixed work time, how exactly could the salespersons improve their sales performance? As one possibility, advocating items with deeper discounts may promote consumers to close the deals, which means quicker sales and more transactions. Alternatively, salespersons could talk the customers into buying more items or more expensive items, which takes more time to serve a customer and consequently fewer transactions in a day. With the transactional level data, we examined the daily discount rate and the number of transactions each salesperson conducted.

The daily average discount offered by a salesperson is defined by $1-\frac{\sum_1^M(\text{selling price}\cdot\text{units sold})}{\sum_1^M(\text{list price}\cdot\text{units sold})}$, where M is the total number of items sold by a salesperson; and the daily number of transactions is measured by the total number of sales slips in a day where a sales slip contains all the items and total amount paid by one customer.

Since both the daily average discount and daily number of transactions can be viewed as the function of demand factors (a_i) and the optimal level of investment in selling effort (c_i^*), we adopt the same empirical model functional form as that of Equation (6)) but with the daily average discount and the daily number of transactions as the dependent variable, respectively, in our analyses. The estimation results are reported in Table 8.

Table 8 shows that there was no significant increase in the discount for those in the high wage group (overall discount was $\alpha_3 + \alpha_4 * ¥4,575 * ¥370 = 9.33\text{e}^{-4}$, standard error $= 7.18e^{-4}$). This suggests that salespersons in the high-wage group did not abuse the discount.

For the number of daily transactions by each salesperson, we find that there is a significant *decrease* within the high wage group ($\alpha_3+\alpha_4*¥4,575*¥370 = -0.98$, standard error $= 0.03$). As a transaction is recorded if a patron makes a purchase, which results in a sales slip, the number of

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	Sources of performance gain	
	Discount	# of transactions
Tax Dummy (α_2)	0.30(0.001)***	1.35(0.042)***
Wage Group*Tax Dummy (α_3)	-6.71e-02(1.50e-03)***	-0.77(0.062)***
Wage Group*Tax Dummy * Monthly average price in the region * Last month wage (α_4)	3.91e-08(8.42e-10)***	-1.25e-07(3.49e-08)***
Monthly average price in the region (α_5)	-5.90e-04(3.93e-06)***	-4.98e-03(1.63e-04)
Monthly average price in the region * Last month salary (α_6)	6.86e-09(5.69e-10)***	1.80e-07(2.36e-08)***
Constant (α_0)	0.42(0.001)***	9.07(0.043)***
Salesperson FE	Yes	Yes
Month FE	Yes	Yes
Day of week FE	Yes	Yes
Observations	2,167,029	2,167,029
R-squared	0.43	0.23

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Impact of tax cut on sales discount and number of daily transactions

daily transactions can be considered as the number of successful conversions from store visits to actual purchases by a salesperson. Recall that salespersons served each store visitor on a rotation basis. When a potential patron walks into a store, the salesperson who was in the first place in the rotation queue would serve this visitor. If the visitor left the store, with or without a purchase, the salesperson would be placed at the end of the rotation queue. The results in Table 8 thus imply that, on average, the tax policy change led to about one fewer transaction per day for those who were expected to benefit from the tax cut. Taking into account that their daily sales on average increased by ¥203 as the results of tax cut, one can infer that those who benefited from the tax cut put more focus on each store visitor and tried to persuade customers to spend more.

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7 Evaluate Tax Policy from Micro Perspective

Besides the impact on individual sales performance, how does the tax policy affect salespersons' income and the firm's performance? And consequently, what is the impact on the fiscal revenue of the government? In this section, we present some simple calculations to understand the effects of the tax policy change on individual income, firm profitability, and government tax revenue.

Table 9 reports the estimates for the performance-based pay and the resultant income tax to the individual salespersons [8]. The high wage group was able to obtain significantly more performance-based pay after the tax cut (Column 1, $\alpha_3 + \alpha_4 * ¥4,575 * ¥370 = ¥398$, standard error = ¥2.82), consistent with our main results regarding the sales. Furthermore, salespersons paid ¥4.28 less in their income tax (Column 2) even with increased incentives pays ($\alpha_3 + \alpha_4 * ¥4,575 * ¥370 = ¥(-4.26)$, standard error = ¥0.15).

From a salesperson's point of view, her salary slip shows the payoff from her increased productivity, and at the same time, she also pays less tax. In other words, the tax cut makes the tax benefit directly observable to employees while motivating them to work harder.

To understand the implication of individual performance gain to the retailer, we use a simple method to calculate the company profit. From the company's historical record and annual report, we obtained its gross margin rate, which is roughly 62.5%. In our dataset, salespersons normally worked 17 days per month, then those with September wages more than ¥3500 generated ¥203*17=¥3,451 more in sales revenue per person per month and that translates into a gross profit of ¥2,157 for the company using the 62.5% margin.[9]

As the company benefits from the tax cut, what about the government? Does the government collect less tax? We also estimate the potential fiscal impact on the government. As the company receives more revenue and higher profit, it also pays more corporate tax, about 25% of its reported profit in China. In our calculation, we use the past tax/revenue ratio of the company, a more reliable indicator for paid tax than simply using 25% of reported profit, as the corporation has

[8]Since both dependent variables can be viewed as the function of demand factors (a_i) and the optimal level of investment in selling effort (c_i^*), we adopt the same empirical model as that of Equation (6) in our analyses.

[9]The reason we use gross margin rate instead of EBIT is that the majority of the company's fixed costs is rent, negotiated annually or once per 2-3 years. The cost of extra sales from the tax cut contains mostly the COGS and the sales commissions. Therefore, we choose the gross margin rate as the basis for profit calculation.

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	Monthly Salary and Income Tax Paid	
	(1)	(2)
	Performance-based pays (¥)	Income tax Paid (¥)
Tax Dummy (α_2)	881.85(3.95)***	2.39(0.21)***
Wage Group*Tax Dummy (α_3)	-774.19(5.87)***	-13.53(0.31)***
Wage Group*Tax Dummy * Monthly average price in the region * Last month wage (α_4)	6.93e-04(3.30e-06)***	5.47e-06(1.74e-07)***
Monthly average price in the region (α_5)	-0.87(0.02)***	-5.47e-03(8.08e-04)***
Monthly average price in the region * Last month salary (α_6)	3.23e-04(2.23e-06)***	1.88e-06(1.18e-07)***
Constant (α_0)	856.95(4.07)***	7.40(0.21)***
Salesperson FE	Yes	Yes
Month FE	Yes	Yes
Day of week FE	Yes	Yes
Observations	2,167,029	2,167,029
R-squared	0.62	0.34

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Impact of tax cut on salesperson income and tax

the flexibility to adjust its reported profit by shifting costs.[10] Furthermore, the tax/revenue ratio is an all-inclusive measure, reflecting the company's behaviors after observing its revenue and taking into account other issues in management such as reinvestment, dividend decisions, etc.

Based on the annual revenue and tax payment information of the internal financial document of the company, we have that the company's tax/revenue ratio in 2017 was 2.14%. If the company had a similar tax/revenue ratio in 2018, then the company pays about ¥74 per salesperson per month (¥3,451*2.14%) in extra corporate tax. Taking into account that the government

[10]When companies observe or expect an increase in revenue, they tend to change their spending and re-investment behaviors. For example, a company can increase the annual bonus for its senior executives with a high revenue gain. A company can also choose to invest in fixed assets or even spend more on intangibles such as employee training and company advertising. These kinds of behaviors will reduce the taxable income of the company.

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on average collected ¥4.26 less in monthly income tax per person, the government's monthly fiscal revenue was increased by ¥69.74 per salesperson. Thus, as summarized in Table 10, the government recouped the personal tax reduction from the increase in corporate tax and even increased its overall fiscal revenue.

	Individual Income Tax Change	Company Revenue Gain	Coporate Tax Change	Government Fiscal Revenue Change
Per person per month (¥)	-4.26	3,451	74	69.74

Table 10: The Impact of Income Tax Cut on Fiscal Revenue

The simple analysis reveals that a personal income tax cut can in fact increase the overall fiscal tax revenue. The reduced tax revenue from individual employees can be more than offset by the gain from increased corporate tax revenue, which essentially comes from increased productivity at the individual level. Putting all stakeholders into one picture, enabled by the analysis from the micro-perspective, one can find that the tax cut benefited all parties: employees received more income and worked harder, resulting in improved company revenue, which in turn led to more fiscal revenue for the government.

We should note that if not done properly, an economic relief plan, such as a tax cut, could also negatively impact the labor market. For example, instead of tax reduction, another popular way to boost the economy is to just provide stipends to people directly, which, however, may reduce their incentive to work. In the US, on April 26, 2021, Wall Street Journal (Haddon 2021) reports that "Nationwide chains and independent eateries alike said they can't hire enough workers to staff kitchens and dining rooms." According to the article, one of the major reasons was the supplemental unemployment benefit by the US government during the COVID pandemic, making people less willing to seek jobs, as they were just happy with their free time and living on government benefits. Therefore, micro-level analysis analogous to what we have conducted is valuable for decision-makers to properly design economic relief plans.

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8 Conclusion

In this study, we examine the impact of an income tax policy change on salesperson performance. While previous studies have examined income tax policy's impact at the macro level, our paper is among the first ones to link a general tax policy and sales productivity with micro-level evidence. The transaction-level data allows us to examine the detailed behavioral- and outcome-related changes brought by a nationwide salary tax cut.

In this study, we investigate the impact of a tax policy change on salesperson performance. While previous research has examined the impact of tax policy at the macro level, our paper is among the first to link general tax policy and sales productivity using micro-level evidence. The transaction-level data allows us to analyze the detailed behavioral and outcome-related changes resulting from a nationwide salary tax cut.

We find that the tax cut increases sales performance. On average, the salespersons who were expected to benefit from the tax cut generated more sales per day than those who were not affected, and the increment is about 10

As to the sources of the performance gain, from the daily transactional level data, we find that the increased sales performance was likely through upselling, i.e., persuading each customer to buy more or trade up for more expensive items, instead of simply serving more customers and offering more discounts.

Our evidence suggests that tax policy changed not only the amount of effort but also the direction of selling, as salespersons spent extra effort to upsell. To a firm, understanding such changes brought by macroeconomic policy is important. For example, in our case, observing such behavioral change, companies should adjust their product assortment by putting more expensive items in the inventory, or better control their discount policy since salespersons are more willing to upsell with less discount. It also signifies certain directions in salesforce training. In the context of a tax cut, or more generally a commission rate increase, our findings suggest that sharpening employees' upselling skills can generate more synergy with the inherent motivation of the salesforce.

In addition, our analysis sheds light on the overall after-effect of the tax cut on fiscal revenue. Our calculation shows that a reduction in income tax may lead to more fiscal revenue, as employees respond to the tax cut with more effort in working, and the improved productivity

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further increases firms' revenue, resulting in more corporate profit tax paid to the government. Hence, a properly designed economic stimulus plan can relieve the individual tax burden, enhance productivity, boost corporate profit, and increase fiscal revenue, all at the same time.

Our study is not without caveats: One limitation is that our data only covers one fashion retailer in China. Another limitation is that it is not feasible to conduct a long-term follow-up study of the tax cut event due to the impact of COVID-19, on the brick-and-mortar retail industry. The pandemic, from the start of 2020, has affected various aspects of the industry, including fashion demand, purchase behavior, work schedules, and labor supply. Future studies that include more industries or occupations and have longer time horizons are called for to reach a more comprehensive conclusion on this subject.

Electronic copy available at: https://ssrn.com/abstract=4315172

References

Albers S, Mantrala MK, Sridhar S (2010) Personal Selling Elasticities: A Meta-Analysis. *Journal of Marketing Research* 47(5):840–853, ISSN 0022-2437, URL http://dx.doi.org/10.1509/jmkr.47.5.840.

Anderson ET, Fong NM, Simester DI, Tucker CE (2010) How Sales Taxes Affect Customer and Firm Behavior: The Role of Search on the Internet. *Journal of Marketing Research* 47(2):229–239, ISSN 0022-2437, URL http://dx.doi.org/10.1509/jmkr.47.2.229.

Arkhangelsky D, Athey S, Hirshberg DA, Imbens GW, Wager S (2021) Synthetic Difference-in-Differences. *American Economic Review* 111(12):4088–4118, ISSN 0002-8282, URL http://dx.doi.org/10.1257/aer.20190159.

Blundell R, Duncan A, Meghir C (1998) Estimating Labor Supply Responses Using Tax Reforms. *Econometrica* 66(4):827, ISSN 0012-9682, URL http://dx.doi.org/10.2307/2999575.

Blundell R, Macurdy T (1999) *Handbook of Labor Economics*, chapter Labor supply: a review of alternative approaches, 1559–1695 (Amsterdam: Elsevier Science).

Booth AL, Frank J (1999) Earnings, Productivity, and Performance-Related Pay. *Journal of Labor Economics* 17(3):447–463, ISSN 0734-306X, URL http://dx.doi.org/10.1086/209927.

Camerer C, Babcock L, Loewenstein G, Thaler R (1997) Labor Supply of New York City Cabdrivers: One Day at a Time. *The Quarterly Journal of Economics* 112(2):407–441, ISSN 0033-5533, URL http://dx.doi.org/10.1162/003355397555244.

Chan TY, Li J, Pierce L (2014a) Compensation and peer effects in competing sales teams. *Management Science* 60(8):1965–1984.

Chan TY, Li J, Pierce L (2014b) Learning from Peers: Knowledge Transfer and Sales Force Productivity Growth. *Marketing Science* 33(4):463–484, ISSN 0732-2399, URL http://dx.doi.org/10.1287/mksc.2013.0831.

Chung DJ, Narayandas D (2017) Incentives versus Reciprocity: Insights from a Field Experiment. *Journal of Marketing Research* 54(4):511–524, ISSN 0022-2437, URL http://dx.doi.org/10.1509/jmr.15.0174.

Chung DJ, Steenburgh T, Sudhir K (2014) Do bonuses enhance sales productivity? a dynamic structural analysis of bonus-based compensation plans. *Marketing Science* 33(2):165–187.

Electronic copy available at: https://ssrn.com/abstract=4315172

Diamond P (1998) Optimal income taxation: An example with a u-shaped pattern of optimal marginal tax rates. *American Economic Review* 88(1):83–95.

Dulleck U, Kerschbamer R (2006) On Doctors, Mechanics, and Computer Specialists: The Economics of Credence Goods. *Journal of Economic Literature* 44(1):5–42, ISSN 0022-0515, URL http://dx.doi.org/10.1257/002205106776162717.

Eissa N, Liebman JB (1996) Labor supply response to the earned income tax credit. *The Quarterly Journal of Economics* 111(2):605–637.

Farber HS (2008) Reference-Dependent Preferences and Labor Supply: The Case of New York City Taxi Drivers. *American Economic Review* 98(3):1069–1082, ISSN 0002-8282, URL http://dx.doi.org/10.1257/aer.98.3.1069.

Fehr E, Goette L (2007) Do workers work more if wages are high? evidence from a randomized field experiment. *American Economic Review* 298–317.

Fieldhouse A (2013) A review of the economic research on the effects of raising ordinary income tax rates. Issue brief, The Century Foundation.

Gordon BR, Sun B (2015) A Dynamic Model of Rational Addiction: Evaluating Cigarette Taxes. *Marketing Science* 34(3):452–470, ISSN 0732-2399, URL http://dx.doi.org/10.1287/mksc.2014.0885.

Haddon H (2021) Restaurants serve up signing bonuses, higher pay to win back workers. *Wall Street Journal* .

Hausman JA (1985) *Handbook of Public Economics*, chapter Taxes and Labor Supply, 213–263 (North-Holland: Elsevier Science Publishers).

Hungerford TL (2012) Taxes and the economy: An economic analysis of the top tax rates since 1945. Technical report, Congressional Research Service.

Kleven HJ, Kreiner CT, Saez E (2009) The optimal income taxation of couples. *Econometrica* 77(2):537–560.

Lazear EP (2000) Performance Pay and Productivity. *American Economic Review* 90(5):1346–1361, ISSN 0002-8282, URL http://dx.doi.org/10.1257/aer.90.5.1346.

McClelland R, Mok S (2012) *A Review of Recent Research on Labor Supply Elasticities*. Congressional Budget Office, Washington, D.C.

Mirrlees J, Adam S, Besley T, Blundell R, Bond S, Chote R, Gammie M, Johnson P, Myles G, Poterba J (2010) *Dimensions of Tax Design* (Oxford University Press).

Electronic copy available at: https://ssrn.com/abstract=4315172

Misra S, Nair H (2009) A Structural Model of Sales-Force Compensation Dynamics: Estimation and Field Implementation. *SSRN Electronic Journal* 9(3):211–257, ISSN 1570-7156, URL http://dx.doi.org/10.2139/ssrn.1474462.

Oettinger GS (1999) An empirical analysis of the daily labor supply of stadium venors. *Journal of Political Economy* 107(2):360–392, ISSN 0022-3808, URL http://dx.doi.org/10.1086/250063.

Seiler S, Tuchman A, Yao S (2020) *The Impact of Soda Taxes: Pass-through, Tax Avoidance, and Nutritional Effects*. Working Paper.

Stremersch S, Lemmens A (2009) Sales growth of new pharmaceuticals across the globe: The role of regulatory regimes. *Marketing Science* 28(4):690–708, ISSN 0732-2399, URL http://dx.doi.org/10.1287/mksc.1080.0440.

Xiao P, Xiao R, Liang YS, Chen XJ, Lu W (2020) The Effects of a Government's Subsidy Program: Accessibility Beyond Affordability. *Management Science* 66(7):3211–3233, ISSN 0025-1909, URL http://dx.doi.org/10.1287/mnsc.2019.3334.

Ziliak JP, Kniesner TJ (2005) The Effect of Income Taxation on Consumption and Labor Supply. *Journal of Labor Economics* 23(4):769–796, ISSN 0734-306X, URL http://dx.doi.org/10.1086/491611.

Electronic copy available at: https://ssrn.com/abstract=4315172