From Outsourcing to In-House: Firm Responses to Professional Services VAT *

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Abstract

This paper studies how value-added taxes (VAT) distort firms' labor outsourcing decisions and the implications for in-house employment and firm performance. To do so, we use a unique input-output dataset from Chile and a matching difference-in-differences design that exploits variation from a tax policy reform that increased VAT on professional service purchases. We first document a partial pass-through of VAT into prices net of taxes charged by professional service providers. In response to these higher input costs, firms reduce outsourcing of professional services along both extensive and intensive margins and substitute toward in-house employment. Despite individual-to-business transactions remaining VAT-exempt, price spillovers limit substitution towards this type of supplier. We find no effects of this reallocation on firms' growth or efficiency. Overall, our findings provide new evidence on the incidence of VAT on firms' make-or-buy decisions, challenging the traditional neutrality of VAT under full input tax crediting.

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1 Introduction

The value-added tax (VAT) is the dominant form of consumption taxation worldwide, adopted in more than 160 countries and accounting, on average, for 30% of total tax revenues (de Mooij and Swistak, 2022). Its global appeal rests on the principle of neutrality: by allowing firms to claim taxes paid on inputs, the VAT is designed to avoid cascading and preserve efficient intermediate consumption choices (Slemrod and Velayudhan, 2022). In practice, however, this neutrality often breaks down. Evasion, informality, exemptions, and imperfect competition cause the VAT to distort firms' input choices and reshape production networks (e.g., De Paula and Scheinkman, 2010; Gadenne et al., 2019; Liu et al., 2021). In particular, how these distortions in intermediate consumption affect real economic outcomes remains an open question, central to understanding the incidence of the VAT and improving the design of tax systems worldwide.

The lack of empirical evidence on this topic stems primarily from the absence of input–output datasets that comprehensively record flows of goods and services across industries and firms. Moreover, the limited availability of detailed information on the buyers and sellers involved in these transactions makes it difficult to link sourcing decisions to firms' real economic outcomes to assess the broader economic implications.

This paper uses a unique input–output dataset linked to firm-level real economic outcomes to study how value-added taxes (VAT) distort firms' labor outsourcing decisions and the implications for in-house employment and firm performance. To do so, we exploit exogenous variation from a policy reform in Chile that removed VAT exemptions on professional service purchases (e.g., legal, accounting, and marketing services). Prior to the reform, VAT applied only to services associated with activities listed in Article 20 of the Chilean Income Tax Law. Law No. 21,420 of 2022 repealed this restriction, extending VAT to all services starting in January 2023. Using a matching difference-in-differences design, we compare firms highly exposed to the reform through a higher share of professional service purchases with otherwise similar firms facing lower exposure, before and after the reform.

The 2022 VAT reform in Chile provides an ideal setting to study how intermediate consumption responds to VAT increases. First, as previously mentioned, Chile offers a unique input-output dataset that records the universe of intermediate input flows across industries and firms. In particular, data on business-to-business (B2B) and individual-to-business (I2B) transactions allow us to trace firms' purchases of professional services, with transaction-level information on prices, quantities, and product descriptions for B2B

transactions, and total transaction values for I2B transactions. Moreover, these transaction-level data can be linked, through unique firm identifiers, to firm-level real economic outcomes, enabling us to study substitution toward in-house employment and the efficiency implications of firms' make-or-buy decisions. Finally, the reform provides a clean identifying variation, as it was not accompanied by changes in payroll or corporate taxes and primarily eliminated existing VAT exemptions for selected services.

Our findings confirm the presence of VAT distortions on firms' make-or-buy decisions, even under full input tax crediting. We first show that the reform led to a statistically significant increase in prices net of taxes charged by firms selling professional services. In particular, average prices of professional services suppliers increase by roughly 3 percent relative to similar unexposed firms, reflecting not only tax pass-through but also administrative and compliance costs associated with entering the VAT system, such as organizing invoices, compiling information, and adapting accounting practices.

We then show that firms responded to these higher input costs by adjusting their sourcing strategies and reorganizing production: purchases of professional services declined significantly along both the extensive and intensive margins, for both transactions with firms and with independent contractors (or individuals). In particular, despite independent contractors remaining VAT-exempt, we show that price spillovers limited substitution toward them. At the same time, firms expanded in-house employment and wage bills, and at least part of this increase comes from workers previously employed by professional service providers or operating as independent contractors that report professional services as their main economic activity.

We further document heterogeneous responses that shed light on the underlying mechanisms. First, we show that firms with a higher share of VAT-exempt sales experienced larger reductions in professional service purchases and stronger increases in employment, pointing to an additional channel beyond higher input prices. In particular, because these firms cannot fully claim input VAT credits, the reform could have increased the effective cost of outsourcing by reducing cash flows through unrecovered VAT payments. Second, we also find that responses are more pronounced among larger firms and those with more seasonal use of professional services, consistent with these types of firms being more likely to rely on professional services purchases either because they face lower costs of outsourcing (larger firms) or because they benefit more from outsourcing due to intermittent service needs (seasonal firms).

Given our finding that the VAT reform induced a reallocation from outsourcing to-

ward in-house employment, a natural question is whether this substitution affected firms' efficiency. In particular, existing work highlights efficiency gains as a motive for outsourcing; for instance, professional service providers benefit from economies of scale while also allowing firms to purchase services intermittently. Using a subsample of firms that report detailed income statements, we find no evidence of an impact on profit margins or sales following the reform, suggesting that, in this context, outsourcing of professional services was not primarily driven by efficiency considerations.

Finally, to strengthen the internal validity of our main findings, we present a series of robustness checks. Our main strategy compares firms highly exposed to the reform, measured by their pre-reform share of professional service purchases, to a matched group of less exposed firms, before and after the reform. Identification relies on the assumption that, absent treatment, outcomes for treated and control firms would have followed similar trends. This assumption is supported by pre-reform parallel trends, as shown by both event-study estimates and raw means prior to 2022. However, even with parallel pre-trends, other threats to identification remain. A first concern is that contemporaneous shocks could differentially affect treated and control firms. Matching on observable characteristics in the pre-reform period, including age, size, and labor costs, partially addresses this concern. We further rule out this concern, as we find no differential trends in the purchases of other inputs, not affected by the reform, across treated and control firms. Finally, the results are robust to estimations using the full sample without matching, indicating that the findings are not driven by the particular matching procedure used to build the control group.

Related Literature This paper contributes to three main strands of the literature. First, it adds to the growing literature on the incidence of value-added taxes (VAT). While early studies relied on the principle of VAT neutrality and assumed full pass-through to consumers, recent empirical work using rich administrative data has challenged these assumptions. For instance, a series of papers document incomplete pass-through and a sharing of the tax burden between consumers and firms selling VAT-liable goods and services (e.g., Kosonen, 2015; Benzarti and Carloni, 2019; Benzarti et al., 2020). Kosonen (2015) shows that hairdressers in Finland reduced prices by only half of what full pass-through would predict following a large VAT cut. Similarly, Benzarti and Carloni (2019) find that restaurant owners in France retained more than 55% of a substantial VAT reduction. This paper contributes to this literature by studying VAT incidence on intermediate

consumption rather than final consumption and by evaluating the real economic consequences of distortions at this intermediate stage of production. The closest related works are De Paula and Scheinkman (2010) and Gadenne et al. (2019), who show how VAT affects firms' sourcing decisions through the segmentation of formal and informal supply chains. In this paper, we take a step forward by analyzing the real economic implications of intermediate consumption distortions to VAT changes, particularly focusing on professional services outsourcing and the implications for in-house employment and firm efficiency.

Second, our paper contributes to the literature on labor outsourcing. Due to data limitations, the bulk of existing studies typically focus on the outsourcing of specific occupations (often low-paid) and on particular sectors (e.g., Autor, 2003; Dube and Kaplan, 2010; Goldschmidt and Schmieder, 2017; Bertrand et al., 2021; Estefan et al., 2024; Felix and Wong, 2025). Using a unique input–output dataset linked to firm-level real outcomes, we study the impact of an increase in outsourcing costs across a wide range of occupations and sectors. In particular, we focus on the outsourcing of professional services, which includes, among other occupations, lawyers, accountants, engineers, marketing, and IT professionals. Moreover, unlike outsourcing in low-paid occupations, which is often driven by cost-saving motives, outsourcing of professional services is more closely related, at least in theory, to efficiency considerations, making this setting particularly informative.

Finally, we contribute to the public finance literature in developing countries. While existing work highlights the desirable enforcement properties of VAT in these low compliance contexts (e.g., Pomeranz, 2015; Carrillo et al., 2017; Naritomi, 2019; Waseem, 2023), we study how VAT shapes firms' sourcing decisions and the subsequent real economic effects on employment and efficiency. This is particularly relevant in developing-country contexts, where distortions in intermediate consumption are more likely to arise due to the prevalence of evasion, widespread exemptions, and the coexistence of formal and informal sectors.

The rest of the paper proceeds as follows. Section 2 presents a conceptual framework that clarifies how VAT works in practice and the theoretical link between higher VAT on professional services and the incidence on final goods producers purchasing these services. Section 3 provides the institutional background on Chile's VAT system and the changes introduced by the 2022 reform relevant for the empirical analysis. Sections 4 and 5 describe the data and empirical strategy. Section 6 presents the main findings, and

Section 7 concludes.

2 Conceptual Framework

This section presents a simple conceptual framework to illustrate how firms are affected by an increase in the VAT on purchases of professional services.

The framework features a final-goods producer (Firm A) that purchases professional services (e.g., accounting, legal, or IT services) from a supplier (Supplier B), which may be either a self-employed individual or a firm. Firm A sells its output to a final consumer (Individual A), who may also purchase professional services directly from Supplier B (see Figure 1). The professional services provided to Firm A and to Individual A may differ, and therefore their prices could too.

The government levies VAT using the credit-invoice method, under which VAT liability equals tax debits minus input tax credits. As a result, VAT revenue depends on which transactions are subject to VAT.

2.1 Baseline: professional services not subject to VAT

Consider first a baseline scenario in which professional service purchases are VAT-exempt, while final goods consumption is subject to VAT at a rate of 19%. In this case, VAT revenue is collected solely at the final consumption stage. Firm A remits VAT on its final goods sales and has no input VAT credits to claim, since professional services are not taxed.

2.2 Introducing VAT on professional services

Now consider an increase in the VAT rate on professional service purchases from zero to 19%. Under this regime, VAT revenue is collected from two sources. First, Firm A remits VAT on the value added of its final goods sales or, in other words, sales net of the cost of professional services. Second, the professional services supplier remits VAT on the value of services sold to both Firm A and Individual A. We assume that Supplier B has no input VAT credits, consistent with professional service providers typically being individuals or small firms whose main cost is in-house labor.

The effects of this VAT increase on Firm A depend on how prices of professional services respond and on the firm's liquidity constraints.

Scenario 1: prices net of taxes remain unchanged If Supplier B keeps prices net of taxes constant to Firm A and simply charges VAT on top of existing prices, Firm A's production costs remain unchanged. Although Firm A pays VAT on its service purchases, it fully recovers this amount as an input tax credit. In this case, the additional tax burden is borne entirely by Individual A, the final consumer of services. This scenario corresponds to the standard neutrality result of the VAT with respect to intermediate inputs.

Scenario 2: prices net of taxes adjust In practice, VAT neutrality may fail if prices net of taxes change. Several mechanisms can lead professional service suppliers to increase net prices. First, becoming subject to VAT can generate additional administrative and compliance costs, such as issuing invoices, maintaining records, and filing regular VAT returns, which suppliers may pass on through higher prices. Second, suppliers may not fully shift the VAT burden onto final consumers. Instead, they may adjust net prices differently across buyers. For instance, they could increase net prices for firms while lowering them for final consumers in order to share the tax burden.

In general, when prices net of taxes increase, firms purchasing professional services face higher real input costs. These cost increases can lead firms to adjust along real margins, including how much professional services they choose to outsource and how much they prefer to keep in-house.

Liquidity costs Even when prices net of taxes remain unchanged, a higher VAT can affect firms through liquidity costs. Firms typically pay VAT on inputs upfront and recover input tax credits with a delay, creating cash-flow pressures that are more severe for liquidity-constrained firms. Moreover, firms can only offset input VAT credits against sufficient VAT debits, which may not be the case when a share of their output is VAT-exempt. These liquidity frictions imply that an increase in VAT on professional services can generate real economic effects even under the credit-invoice system.

Overall, an increase in the VAT on professional services can raise costs for firms purchasing these services through changes in prices net of taxes or through liquidity costs. These higher costs may, in turn, affect firms' outsourcing decisions, in-house employment, as well as related economic outcomes. In the following sections, we explore empirically the incidence of the VAT across these dimensions of intermediate consumption.

3 Institutional Background

This section outlines the institutional background necessary to understand the VAT reform and its implications for firms' outsourcing decisions in Chile. The VAT is a central component of the Chilean tax system, accounting for roughly half of total tax revenues (48% in 2024). Chile applies a single VAT rate of 19 percent, collected monthly under the credit-invoice method. Firms remit VAT on the difference between VAT charged on sales (tax debits) and VAT paid on inputs (tax credits), with excess credits carried forward to subsequent months. This structure ensures that VAT is levied at each stage of production while avoiding cascade taxation.

Before 2023, the scope of VAT on services was limited by the Law on Sales and Services Tax (Decree-Law 825), which restricted VAT liability to services listed in paragraphs 3 and 4 of Article 20 of the Income Tax Law. This list included activities such as manufacturing, commerce, mining, transportation, insurance, banking, and brokerage services. This changed with the approval of Law 21,420 in January 2022, which broadened the VAT base to include "any action or service performed for another in exchange for remuneration." The reform aimed to raise resources to finance the Universal Guaranteed Pension introduced in 2022. As a result, previously VAT-exempt services became subject to VAT starting in January 2023. A substantial share of the newly taxed activities corresponds to what we refer to as professional services, which include legal, consulting, or accounting activities (Table A.1 lists all the activities that correspond to professional services and become subject to VAT in 2023).

Despite the expansion of the VAT base, several exemptions remained in place. Public transportation, education, and ambulatory medical services continued to be VAT-exempt. In addition, individuals providing professional services as independent contractors (individual-to-business transactions, or I2B), and firms that transitioned to a new legal status known as "professional societies" could remain exempt. In particular, to qualify as a professional society, firms had to meet the following requirements: (i) their aim should be the provision of professional services or consulting; (ii) the services must be provided by the shareholders; (iii) all the shareholders must practice their professions for the firm; (iv) all shareholders had to hold similar or complementary educational backgrounds. For example, a law firm owned and composed exclusively of lawyers practicing their profession could register as a professional society and remain VAT-exempt. Although the original deadline to transition was June 30, 2023, and was later extended to December 31, 2023, the Chilean Tax Authority reports that take-up of this option was

lower than expected.

Figure 2 illustrates the reform in the data. Firms are grouped into three groups: those that remained exempt, those that were always subject to VAT, and firms selling professional services that were affected by the reform through a higher VAT rate. The figure plots the quarterly share of VAT due relative to total sales for each group from 2021 to 2025. As expected, for professional service firms, VAT due increased sharply beginning in 2023, with the share rising from approximately 5 percent to 14 percent. The increase does not mechanically reach 19 percent because, although professional services are their main activity, many firms also engage in secondary activities that remain VAT-exempt.

At the aggregate level, the revenue effects of the reform appear limited in the short run. According to the Chilean Tax Authority, the VAT-to-GDP ratio declined from 9.3 percent in 2022 to 8.6 percent in both 2023 and 2024. This low aggregate response of VAT to the reform could relate to agents adjusting along real behavioral margins that offset the mechanical revenue gains from base broadening. In the following sections, we study one such margin: the decision of firms to purchase or outsource professional services.

4 Data

This section describes the data sources and outcome variables used in the analysis. The empirical analysis relies on administrative microdata collected by the Chilean Internal Revenue Service (*Servicio de Impuestos Internos*, SII) and provided anonymously to the Central Bank of Chile. The main variables are drawn from different tax forms that jointly provide detailed information on firms' purchases of professional services and on their real economic outcomes.

Our primary data source is a comprehensive business-to-business (B2B) transaction-level dataset constructed from electronic invoices, covering the universe of domestic transactions between firms in Chile.[1] This dataset is highly granular and includes identifiers for buyers and sellers, product descriptions, prices, quantities, and tax treatment. Importantly, we are able to link this transaction level data to the economic activity of buyers and sellers, from which we will infer purchases of professional services. From this dataset, we construct quarterly firm-level measures of the total value of purchases, the value of professional services purchases, and total VAT payments. Moreover, to understand the

[1] Electronic invoices are classified into three types: Type 33 corresponds to VAT-taxed invoices, Type 34 to VAT-exempt invoices, and Type 46 to self-issued invoices, which are issued by the buyer when the seller is not in capacity to do so.

mechanisms behind buyers' responses, we will also use the more granular information on prices, quantities, and descriptions contained in the invoices.

To capture professional services purchased from individuals, we use tax form F1879, which reports individual-to-business (I2B) transactions subject to income tax. This form allows us to recover the value of firms' purchases from individuals using information on withholding amounts. In particular, from this form, we construct quarterly firm-level measures of total purchases and purchases of professional services from individuals. As with B2B transactions, we identify professional services purchases using information on sellers' economic sectors.

Furthermore, to analyze firms' real responses, we draw on additional tax forms that provide information on firm-level economic outcomes. Labor outcomes are obtained from employer-employee records reported to the tax authority via form F1887. From this source, we construct quarterly measures of total employment and total wage bills.

To gather additional firm-level outcomes, we use forms F29 and F22. Form F29 is Chile's monthly tax return filed by firms subject to VAT. From this form, we construct quarterly measures of total sales, total costs, materials, profits, and firm age. Similarly, form F22 is the annual income tax return filed by firms and individuals, from which we obtain annual firm-level balance sheet data.

The main sample merges all data sources into a quarterly firm-level panel spanning the first quarter of 2021 through the fourth quarter of 2024. The resulting dataset contains detailed information on firms' purchases, disaggregated by economic sector and by B2B and I2B transactions, as well as firm-level outcomes including employment, wage bill, sales, costs, profits, materials, and assets. All datasets are merged using unique firm identifiers provided by the tax authority.

Finally, for the main empirical analysis, we restrict the sample to firms that report positive sales, purchases, materials, and employment in each quarter of 2021. Since the focus is on firms affected by the reform through higher VAT on their purchases, we further exclude firms that sell services directly affected by the reform. Finally, all outcome variables are winsorized at the 1st and 99th percentiles.

5 Empirical Strategy

To identify the impact of a higher VAT on firms that rely heavily on the outsourcing of professional services, we use a matching difference-in-differences (DiD) design. The strategy

compares changes in outcomes for firms with high exposure to the reform, measured with their share of professional services purchases prior to the reform, to those of a matched group of similar firms with lower exposure, before and after the reform was approved in January 2022. By combining matching with a DiD framework, the approach ensures comparability between treated and control firms along key pre-reform characteristics while also controlling for time-invariant unobserved heterogeneity.

Matching Strategy To build the matched sample, we first define treated and control firms based on the share of professional services purchases in total purchases in the baseline year (2021). Treated firms are defined as those in the top quartile (above the 75th percentile) of this distribution. Firms with a lower share of professional services purchases or below the top quartile constitute the pool of potential controls. In particular, a firm qualifies as a potential control for a treated firm if it satisfies the following criteria in the baseline period: (i) its share of professional services purchases lies below the top quartile; (ii) it belongs to the same decile of average quarterly sales, materials, total labor costs, and purchases of non-professional services; (iii) it falls within the same age quintile; and (iv) it operates in the same two-digit economic sector. Among all eligible candidates, we select the control firm with the closest propensity score. The propensity score is estimated using a linear probability model that predicts treatment status as a quadratic function of the variables listed in (ii) and (iii).

This procedure yields a matched sample of 23,046 treated firms and 23,046 control firms, corresponding to a match rate of 49% percent.

Summary Statistics Table 1, Panel A, presents summary statistics for treated and control firms in the matched sample. Treated firms devote, on average, 6.3 percent of total purchases to professional services, compared to only 0.5 percent among control firms. By construction, there are no statistically significant differences between the two groups in the share of purchases of other services or in key firm characteristics, including assets, sales, total costs, materials, and labor share. Although treated firms are slightly older on average, the difference in age is economically small, amounting to less than a quarter.

Panel B of Table 1 shows that treated and control firms are well balanced across economic sectors. The largest shares of firms are concentrated in trade, restaurants, and hotels, followed by construction and business services, patterns that reflect the service-intensive structure of the Chilean economy.

Finally, Panel C highlights the dimensions along which treated and control firms are expected to differ by design. While the two groups are comparable in size, costs, sales, labor intensity, and sectoral composition, they differ markedly in how labor inputs are sourced. Treated firms rely more heavily on outsourcing, as reflected in higher purchases of professional services through both B2B and I2B transactions, and correspondingly exhibit lower employment levels and wage bills. These differences capture the core dimension of exposure to the VAT increase on professional services and motivate the analysis that follows.

Event Study To estimate the impact of the higher VAT on professional services purchases on firms' real outcomes, we estimate the following event-study specification on the matched sample:

$$Y_{jt} = \sum_{\tau=2021m1}^{2024m12} \beta_\tau \mathbb{1}[t = \tau] \times D_j + \mu_j + \mu_t + \epsilon_{jt} \tag{1}$$

Where Y_{jt} defines the outcome variable of firm j on year-quarter t. The main preliminary outcomes include in natural logarithms: (i) the value of professional services purchases (both from B2B electronic invoices and I2B bills); (ii) employment; and (iii) wage bill. Furthermore, D_j is an indicator of firm j exposed to the reform or with a high proportion of professional services purchases (above the 75th percentile) on baseline. μ_j and μ_t are firm and quarterly-year fixed effects, respectively, and standard errors are clustered at the firm level.

We will also summarize the results on firm-level outcomes by estimating the following model:

$$Y_{jt} = \beta Post_t \times D_j + \mu_j + \mu_t + \epsilon_{jt} \tag{2}$$

Where $Post_t$ is a dummy variable indicating each quarter after the reform was approved in January 2022.

Identification relies on the parallel trends assumption: absent the reform, outcomes for treated and control firms would have evolved similarly. Although this assumption cannot be directly tested, we assess its plausibility in two ways. First, we ensure comparability in baseline observable characteristics through the matching procedure described above. Second, we examine pre-reform trends by estimating the coefficients β_τ for quarters prior to 2022.

Prices Net of Taxes As an additional empirical strategy, we use an event-study design to examine the effect of the VAT increase on prices net of taxes charged by firms selling professional services. This analysis relies on detailed information from B2B electronic invoices, including product descriptions, prices net of taxes, and quantities. In particular, for the purpose of our analysis, we restrict the sample to non-voided invoices with positive prices and quantities. Moreover, to track price changes for comparable goods or services over time, we further restrict the sample to product descriptions that, within the same seller, are observed both before and after the reform, thereby holding the composition or bundle of products constant.

Using this product-level information, we construct a firm-level quarterly panel by computing average prices at the firm level. To identify the causal effect of the reform, we compare the average prices of firms that sell professional services, whose sales became subject to VAT, to a matched group of firms whose sales were unaffected by the reform. In particular, treated firms are defined as those selling professional services in the baseline period. Moreover, a firm qualifies as a potential control if it does not provide professional services or any other service affected by the reform, operates within the same quintile of average quarterly sales, materials, and employment, and falls within the same age quintile in 2021. Among eligible candidates, we select the control firm with the closest propensity score, estimated using a linear probability model with quadratic terms in the matching variables. In particular, to estimate the impact of the higher VAT on average prices net of taxes of professional services suppliers, we estimate the same event study outlined in 1 on this new matched sample.

6 Results

This section presents the effects of the VAT increase on professional services on firms' prices and real economic outcomes. We first document the direct effect of the reform on prices net of taxes charged by firms selling professional services, and then we study how firms purchasing these services respond to higher prices by modifying their sourcing decisions, employment, and related economic outcomes.

6.1 First stage: Price Net of Taxes

Figure 3 shows the estimated effects of the reform on prices net of taxes for firms selling professional services, relative to a matched group of firms whose sales were unaffected by

the reform. Prior to 2022, prices evolve similarly across exposed and non-exposed firms, with event-study coefficients close to zero. Following the approval of the reform, there is a statistically significant increase in the prices charged by professional services firms. In particular, there is an increase of approximately 3% relative to the control group. This result indicates a pass-through of the VAT increase to prices net of taxes, raising the cost of professional services used as intermediate inputs.

While prices net of taxes are observed only for B2B transactions and the increase is clearly depicted in Figure 3, earnings data for individual providers show a similar pattern, which is consistent with spillover effects to this type of transactions. Figure A.3 reports event-study estimates of a similar specification, but using earnings of individuals selling professional services as the outcome, and comparing to individuals selling services unaffected by the reform. Earnings increase by about 5 percent at the time of the reform and by approximately 12 percent by the end of 2024, suggesting that higher prices extend to I2B transactions.

6.2 Professional Services Purchases (Outsourcing)

We next examine how firms purchasing professional services respond to higher input costs. Figure 4 panel (a) and panel (b) plot event-study estimates from equation (1) using, respectively, an indicator of whether the firm purchases professional services and the logarithm of the value of such purchases as dependent variables. Pre-reform trends are flat and close to zero before the reform, supporting the parallel trends assumption. Following the reform, firms significantly reduce outsourcing along both the extensive and intensive margins. At the time of enactment, the probability of purchasing professional services falls by about 10 percent, while the value of purchases declines by roughly 20 percent. These effects grow over time to approximately a 30 percent fall in the probability of purchasing and a 60 percent fall in purchase values by the last quarter of 2024.

As mentioned in Section 4, the value of professional services purchases comes from two sources: business-to-business (B2B) transactions and individual-to-business (I2B) transactions. Although the reform directly applied only to B2B transactions, as services provided by independent contractors remained VAT-exempt, firms typically rely on both sources. Therefore, it is important to understand both margins of adjustment.

Figures 5 and 6 show that outsourcing declines sharply in both B2B and I2B transactions. By the end of 2024, the probability of purchasing professional services falls by roughly 15% for B2B and 25% percent for I2B transactions, while purchase values decline

by about 60% and 40%, respectively. The higher value on the fall of B2B transactions is particularly relevant as these transactions were directly affected by the reform. Moreover, the decline in I2B purchases, despite their VAT exemption, is consistent with price spillovers across professional services suppliers.

6.3 In-House Employment and Wage Bill

We then study labor responses along two margins: employment and total wage bill. Figure 7, panel (a) and panel (b) present event study coefficients from equation (1) when the dependent variables are the natural logarithm of these two variables. The results show that both employment and wage bill trends are similar across treated and control firms prior to the reform. After the reform's approval, treated firms show a significant increase in employment of approximately 8% relative to control firms. Consistent with this increase in employment, the total wage bill exhibits a similar increase.

To assess whether this employment growth reflects the insourcing of previously outsourced professional services, we infer professional services workers using two strategies: (i) we identify current workers who were previously employed by professional service firms; and (ii) we identify current workers who were previously employed as independent contractors and reported the provision of professional services as their main activity. Restricting employment and wage bill measures to this group of workers, Figure 8 shows that the increase in employment is consistent with an increase in workers previously engaged in the provision of outsourced professional services. It is important to clarify that the strategy used to identify professional service workers provides an imperfect measure that could be a lower bound of the real effect on professional service workers, as it does not identify all workers who are hired inside the firm to perform these activities.

To further understand the transition from outsourcing to in-house employment, Figure 9 compares the decline in the value of professional services purchases with the increase in the total wage bill. While outsourcing falls sharply, the rise in the wage bill offsets more than half of this decline, indicating that firms substitute outsourced services with in-house labor rather than eliminating the value of this activity altogether.

Taken together, the results show that the VAT reform increased prices net of taxes for professional services and induced firms to reorganize production. Higher input prices lead firms to reduce outsourcing from both firms and individuals and to expand in-house provision of professional services. This pattern is consistent with in-house employment acting as a substitute for the entire outsourced margin, and highlighting the importance

of real behavioral responses of firms' intermediate consumption choices to VAT reforms.

6.4 Heterogeneity

While the effects on prices net of taxes help clarify the mechanism behind firms' outsourcing responses, additional heterogeneity analyses provide further insight into alternative channels and help identify which types of firms are most affected by the reform.

Liquidity costs A first source of heterogeneity relates to liquidity costs related to the VAT payment. As discussed in Section 2, even if prices net of taxes remain unchanged, higher VAT can increase the cost of outsourcing through cash-flow frictions. Firms must pay VAT on inputs upfront and recover credits with delay, and those with a large share of VAT-exempt sales may be unable to fully offset input VAT credits in the short run. To test this mechanism in the data, Figure 12 reports difference-in-differences estimates from equation (2) separately for firms with a high share of VAT-exempt sales (above the sample median) and for firms below this threshold. The results show that both the reduction in professional services purchases and the increase in employment are slightly larger among firms with a higher share of VAT-exempt sales, consistent with liquidity costs from VAT payments amplifying the impact of the reform.

Firm size We further explore heterogeneity by firm size. Figure 10 splits the sample by firm size, defined using total sales, with large firms above the sample median and small firms below it. The responses of professional services purchases and employment to the VAT increase are more pronounced among larger firms. These results are in line with prior work showing that as firms grow, they tend to increase their share of outsourcing. In particular, these firms are more likely to be more exposed to the reform, potentially due to their lower outsourcing costs, and therefore exhibit stronger real responses.

Seasonality Finally, we examine heterogeneity by the seasonality of professional services purchases. Unlike core production activities, professional services are often purchased intermittently rather than continuously throughout the year. For instance, accounting, legal, or marketing services may be required only in specific periods. We classify firms based on the quarterly distribution of their professional services purchases, distinguishing between low-seasonality firms, which purchase professional services in all quarters of the year, and high-seasonality firms, which concentrate purchases in fewer

quarters.[2] Figure 11 presents difference-in-differences estimates for these two groups. The results show substantially larger responses among high-seasonality firms, consistent with a higher propensity to outsource services, likely because these firms benefit more from outsourcing due to intermittent service needs.

Overall, the heterogeneity exercises are informative about both the mechanisms at play and the types of firms more exposed to the reform. The stronger responses among firms with a higher share of VAT-exempt sales point to the importance of liquidity costs, beyond the effect operating through higher prices net of taxes. The remaining heterogeneity results speak to which firms are more exposed to the reform. In particular, larger firms and firms with more seasonal use of professional services exhibit larger adjustments, consistent with these groups relying more heavily on professional service purchases prior to the reform.

6.5 Robustness

This section presents additional robustness checks to strengthen the internal validity of the empirical results. In particular, our empirical compares firms with high reliance on professional service purchases to a matched group of less exposed firms, before and after the enactment of the reform. Identification relies on the assumption that, absent treatment, outcomes for treated and control firms would have evolved similarly. The event-study estimates for all main outcomes are close to zero prior to the reform, providing support for this assumption. Figure A.2 further supports this assumption by illustrating the evolution of raw means of treated and control groups. The figure shows that both groups of firms followed parallel trends before 2022, after which outcomes diverge, with faster growth among treated firms. However, even with evidence of parallel pre-trends, additional identification concerns remain.

An initial concern is the presence of contemporaneous shocks that may differentially affect treated and control firms and bias the estimated effects. The matching procedure mitigates this risk by ensuring that treated and control firms are comparable along key observable characteristics, reducing the likelihood of differential exposure to contempora-

[2]To classify treated firms as low or high seasonality, using the baseline year (2021), we compute the total share of each quarter purchases of professional services on the total yearly purchases of professional services. We then measure the deviation of these quarterly shares from a perfectly uniform distribution across quarters, equal to 1/4. Summing these deviations across the four quarters yields a seasonality index that ranges from 0 (no seasonality) to 1.5 (maximum seasonality). Using the distribution of this index in the baseline period, we classify treated firms as low- or high-seasonality depending on whether their index lies below or above the median, respectively.

neous shocks. To further mitigate this concern, Figure A.3 reports event-study estimates using other inputs not affected by the reform as the main dependent variable. The absence of an impact on these other inputs supports the interpretation that the observed responses are driven mainly by changes in the VAT on professional services rather than by confounding shocks that differentially affected both groups and could have produced responses in other inputs.

Finally, we verify that the results are not driven by the specific matching procedure used to construct the control group. To do so, we re-estimate equation (2) using the full sample without matching. Although the magnitudes are lower, the direction and significance of the estimates are the same, alleviating concerns that the findings are sensitive to the matching design.

6.6 Firm Growth and Efficiency

Existing literature highlights two main motives for outsourcing services. First, firms may outsource for efficiency reasons, as external providers are specialized, benefit from economies of scale, and allow firms to purchase services intermittently. Second, firms may outsource solely to reduce costs, given that outsourced labor implies lower labor expenses, greater flexibility, and lower firing costs. Given that our main results show a shift from outsourcing toward in-house employment, an important question is whether this substitution affects firm efficiency or related economic outcomes.

To examine this issue, we use a subsample of firms that report detailed income statements through Form F22. Table A.3 reports difference-in-differences estimates on profit margins and the logarithm of sales. The results show no evidence that the increase in the VAT on professional services and the resulting firm responses affected firms' efficiency, which could suggest that in our context, firms do not seem to be outsourcing professional services for efficiency motives.

7 Conclusions

This paper shows that value-added taxes can distort firms' make-or-buy decisions, even when input tax credits are available. Exploiting a VAT reform in Chile that extended VAT to previously exempt professional services, we find that the reform increased prices net of taxes charged by professional service providers, reflecting both tax pass-through and additional compliance costs. Firms exposed to the reform responded by reducing

purchases of professional services and reallocating activity toward in-house production, leading to higher employment and wage bills.

We find no evidence that the shift from outsourcing to in-house employment affected firms' sales or profit margins, suggesting that outsourcing of professional services was not primarily driven by efficiency gains in this setting. Taken together, the results provide new evidence that VAT can affect intermediate input choices and production organization, with real effects on employment, even under a credit-invoice system. Overall, our findings highlight the importance of considering production distortions when evaluating VAT design and reforms.

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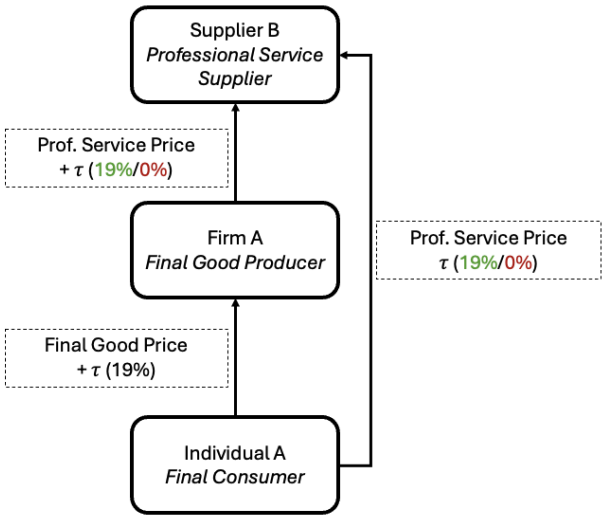
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8 Figures and Tables

Figure 1: Value Added Tax collection along the supply chain



Note: This diagram illustrates how value-added tax collection operates along the supply chain. In particular, it depicts a simplified economy with just one final consumer, one final good producer, and one professional service supplier. The red and green tax rates for professional services represent scenarios with and without VAT reform, respectively.

Appendix A Supporting Figures and Tables

Table 1: Descriptive Statistics

	Treated (1)	Control (2)	Diff (1)-(2) (3)
Number of firms	23,046	23,046	0
Share of professional services on total cost	0.063	0.005	0.058***
	(0.000)	(0.000)	
Share of other services on total cost	0.047	0.048	-0.001
	(0.001)	(0.001)	
Panel A: Firm Characteristics			
Ln(Sales)	18.727	18.729	-0.002
	(0.011)	(0.011)	
Ln(Assets)	19.149	19.106	0.043
	(0.019)	(0.021)	
Ln(Total Costs)	18.547	18.552	-0.005
	(0.010)	(0.010)	
Ln(Materials)	17.976	17.990	-0.014
	(0.012)	(0.012)	
Labor Share	0.238	0.238	-0.000
	(0.001)	(0.001)	
Age (in quarters)	44.14	45.00	-0.861***
	(0.211)	(0.212)	
Panel B: Industry Shares (percent)			
Agricultural	10.43	10.43	0.00
Manufacturing	18.00	18.00	0.00
Construction	19.18	19.18	0.00
Trade, Restaurants, and Hotels	37.68	37.68	0.00
Transportation, Information, and Communications	9.55	9.55	0.00
Others	5.14	5.14	0.00
Panel C: Outsourcing vs. In-House Labor			
Ln(Employment)	1.525	1.756	-0.231***
	(0.008)	(0.009)	
Ln(Wage Bill)	16.893	17.091	-0.198***
	(0.010)	(0.010)	
Ln(I2B Bills)	15.148	14.427	0.721***
	(0.012)	(0.015)	
Ln(B2B Electronic Invoices)	14.828	13.785	1.043***
	(0.018)	(0.024)	

Note: This table presents summary statistics of treated and control firms for the matched sample. Treated firms are defined as those with a share of professional services purchases on total purchases above the 75th percentile in the baseline year 2021. Columns (1) to (3) report the characteristics of treated firms and control firms, and the difference in means between both groups. Standard deviations are reported in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Effects of VAT on Efficiency

	(1)	(2)	(3)
	Dependent Variable		
	Profit Margins	Gross Profit Margins	$Ln(\text{Sales})$
Post × Treated	-0.002	0.001	-0.009
	(0.008)	(0.006)	(0.018)
Observations	21,660	21,905	21,669
R-squared	0.333	0.655	0.902
Firm FE	Yes	Yes	Yes
Number of Firms	5,879	5,921	5,879

Note: This table presents the impact of the higher VAT on professional services on firms' efficiency outcomes. Columns (1) through (e) display the difference-in-differences coefficients from estimation of equation (2) on profit margins, gross profit margins, and the natural logarithm of sales. Treated firms correspond to firms with a high share of professional services purchases in baseline and post to years after enactment of the reform or after 2021. All specifications include year and firm fixed effects. The standard errors are clustered at the firm level and are reported in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.1: Professional Services in Chile

Code	**Description**
091002	Support for oil and gas extraction
099002	Support for other mining and quarrying
620100	Computer programming services
662100	Risk assessment and insurance
691001	Legal advice and representation
691009	Arbitration, bankruptcy trustees, and other legal activities
692000	Accounting, bookkeeping, auditing, and tax consulting
701000	Head office management activities
702000	Management consulting services
711001	Architectural design and drafting services
711003	Engineering and technical consulting
721000	Research and experimental development in natural and engineering sciences
722000	Research and experimental development in social sciences and humanities
731002	Advertising services
732000	Market research and public opinion polling
741001	Fashion and apparel design services
741002	Interior design and decoration services
741009	Other specialized design services
742002	Photography services and activities
742003	Personal photography services
749003	Translation and interpretation services
749009	Other professional, scientific, and technical services

Note: This table lists all the specific economic activities classified as professional services in Chile and affected by the VAT reform that changed their tax treatment from VAT-exempt to subject to a VAT of 19 percent. The first column shows the code according to Chile's classification of economic activities and the second column presents the corresponding description

Table A.2: Effects of Professional Services VAT on Outsourcing vs. In-House

	(1)	(2)	(3)	(4)
	Dependent Variable			
	Ln(Prof. Services Purchases)	*Ln*(I2B Bills)	*Ln*(B2B Invoices)	*Ln*(Employment)
Post × Treated	-0.402***	-0.282***	-0.375***	0.055***
	(0.009)	(0.009)	(0.017)	(0.004)
Observations	424,321	327,136	190,400	622,147
R-squared	0.811	0.803	0.734	0.909
Firm FE	Yes	Yes	Yes	Yes
Number of Firms	36,677	30,415	21,061	46,050

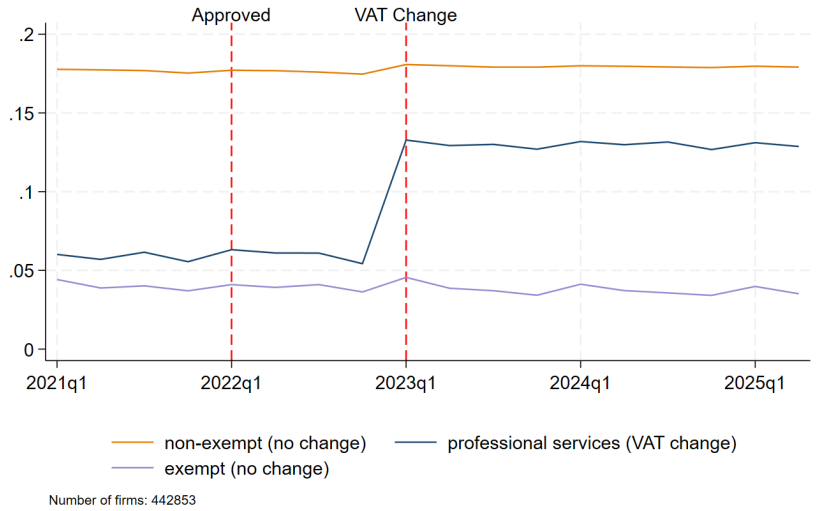
Note: This table presents the main results of the paper, showing the impact of the higher VAT on professional services on firms' sourcing decisions. Columns (1) through (4) display the difference-in-differences coefficients from estimation of equation (2) on the natural logarithm of professional services purchases, the value of I2B transactions, the value of B2B transactions, and total employment. Treated firms correspond to firms with a high share of professional services purchases in baseline and post to years after enactment of the reform or after 2021. All specifications include year and firm fixed effects. The standard errors are clustered at the firm level and are reported in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.3: Effects of Professional Services VAT on Outsourcing vs. In-House (Full Sample)

	(1)	(2)	(3)	(4)
	Dependent Variable			
	Ln(Prof. Services Purchases)	*Ln*(I2B Bills)	*Ln*(B2B Invoices)	*Ln*(Employment)
Post × Treated	-0.304***	-0.202***	-0.289***	0.009***
	(0.00440)	(0.00445)	(0.00865)	(0.00260)
Observations	1,612,406	1,240,772	692,008	2,687,052
R-squared	0.814	0.807	0.766	0.906
Firm FE	Yes	Yes	Yes	Yes
Number of Firms	144,875	118,080	80,134	198,174

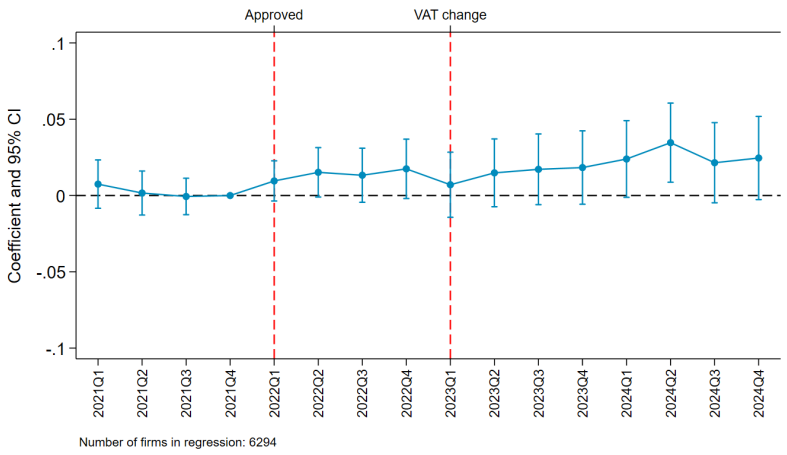
Note: This table presents the main results of the paper, showing the impact of the higher VAT on professional services on firms' sourcing decisions using the full sample before the matching procedure. Columns (1) through (4) display the difference-in-differences coefficients from estimation of equation (2) on the natural logarithm of professional services purchases, the value of I2B transactions, the value of B2B transactions, and total employment. Treated firms correspond to firms with a high share of professional services purchases in baseline and post to years after enactment of the reform or after 2021. All specifications include year and firm fixed effects. The standard errors are clustered at the firm level and are reported in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure 2: VAT on Sales by Category of Seller



Note: This figure plots the changes on VAT payments across different groups of firms. Firms are grouped into three groups: those that remained exempt, those that were always subject to VAT, and firms selling professional services that were affected by the reform through a higher VAT rate. The figure plots the quarterly share of VAT paid relative to total sales for each group from 2021 to 2025.

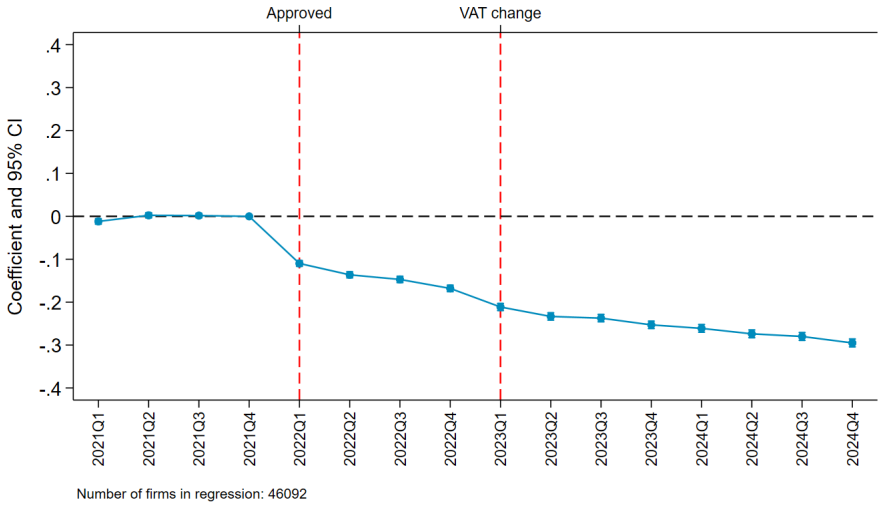
Figure 3: Ln(Prices Net of Taxes)



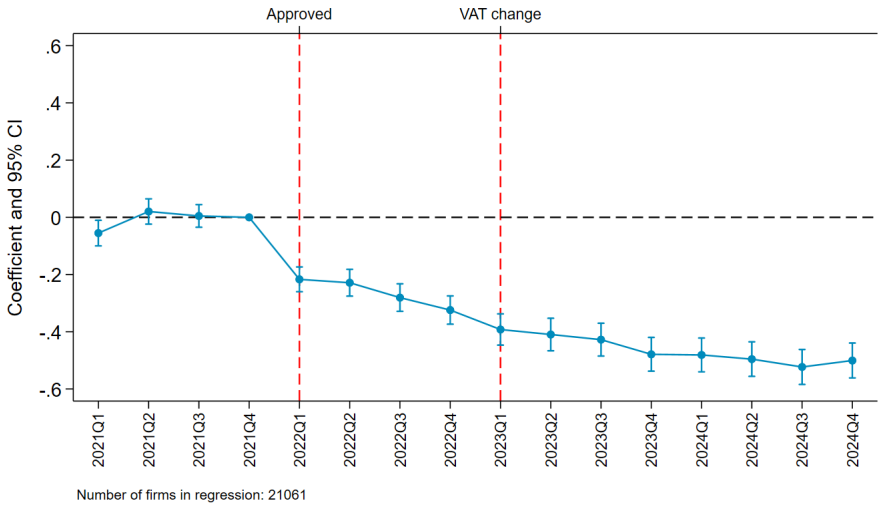
Note: This figure reports event-study estimates after fitting equation (1) on the average prices of firms computed from B2B electronic invoices. The coefficients capture the effect of the reform on the natural logarithm of average prices of firms selling professional services, relative to similar firms unaffected by the reform. The dashed vertical red lines mark the time of approval and of effective change in the VAT. Blue lines denote 95% confidence intervals, with standard errors clustered at the firm level.

Figure 4: Professional Services Purchases

(a) Probability of Buying Professional Services



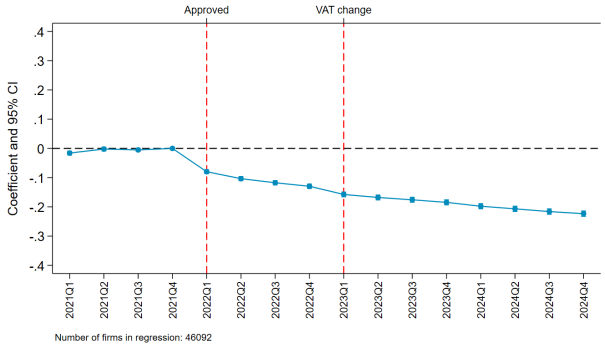
(b) Ln(Professional Services Purchases)



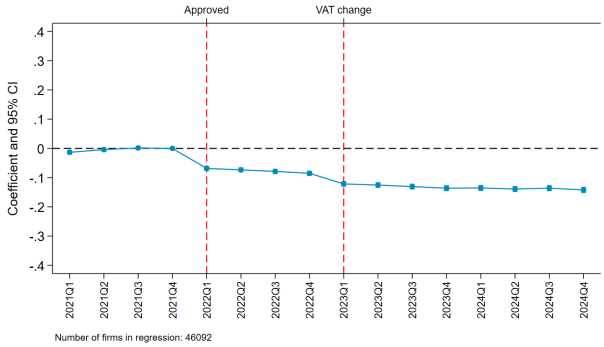
Note: Panels (a) and (b) report event-study estimates after fitting equation (1) on a dummy variable of whether the firm purchases professional services (panel (a)) or the natural logarithm of professional services purchases (panel (b)). The coefficients capture the effect of the reform on professional services purchases along both the extensive and intensive margin. The dashed vertical red lines mark the time of approval and of effective change in the VAT. Blue lines denote 95% confidence intervals, with standard errors clustered at the firm level.

Figure 5: Probability of Buying Professional Services by Outsourcing Type

(a) Independent Contractor Bills



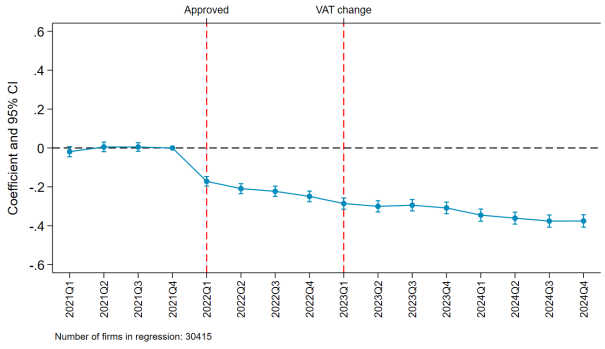
(b) B2B Electronic Invoices



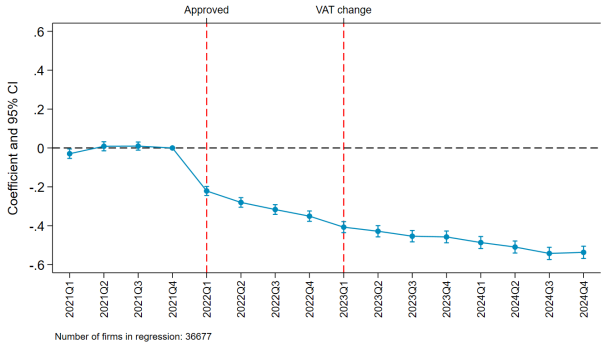
Note: Panels (a) and (b) report event-study estimates after fitting equation (1) on a dummy variable of whether the firm purchases professional services either through I2B (panel (a)) or B2B (panel (b)) transactions. The coefficients capture the effect of the reform on the probability that firms purchase professional services. The dashed vertical red lines mark the time of approval and of effective change in the VAT. Blue lines denote 95% confidence intervals, with standard errors clustered at the firm level.

Figure 6: Ln(Professional Services Purchases) by Outsourcing Type

(a) Independent Contractor Bills



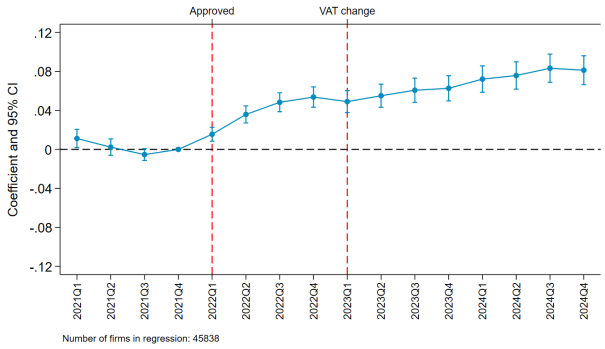
(b) B2B Electronic Invoices



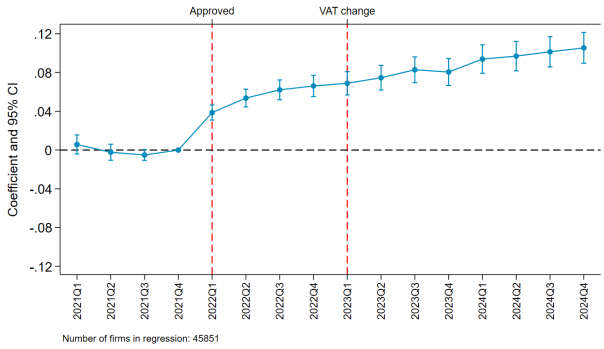
Note: Panels (a) and (b) report event-study estimates after fitting equation (1) on the natural logarithm of professional services purchases either through I2B (panel (a)) or B2B (panel (b)) transactions. The coefficients capture the effect of the reform on the value of professional service purchases. The dashed vertical red lines mark the time of approval and of effective change in the VAT. Blue lines denote 95% confidence intervals, with standard errors clustered at the firm level.

Figure 7: Employment and Wage Bill

(a) Ln(Employment)



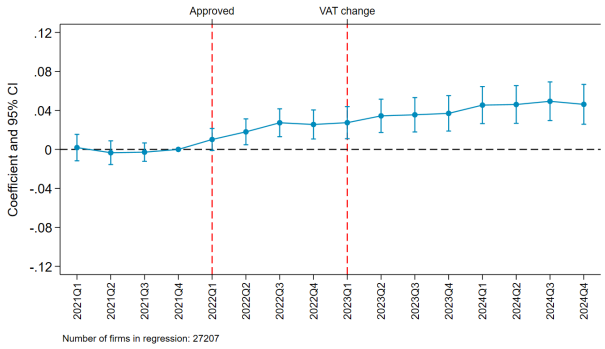
(b) Ln(Wage Bill)



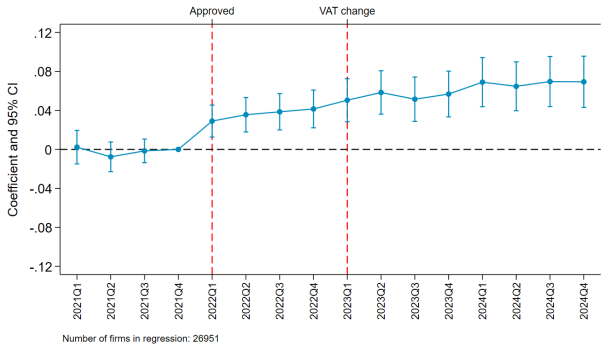
Note: Panels (a) and (b) report event-study estimates after fitting equation (1) on the natural logarithm of total employment (panel (a)) or the natural logarithm of total wage bill (panel (b)). The coefficients capture the effect of the reform on in-house employment and total wage bill. The dashed vertical red lines mark the time of approval and of effective change in the VAT. Blue lines denote 95% confidence intervals, with standard errors clustered at the firm level.

Figure 8: Employment and Wage Bill (professional service workers)

(a) Ln(Employment)

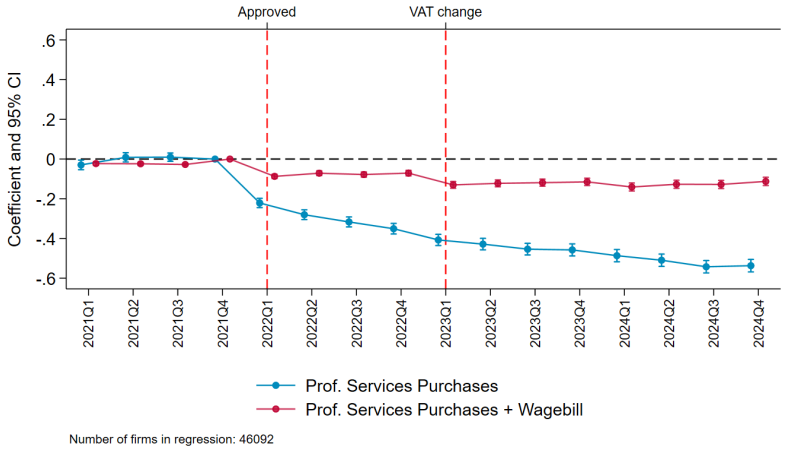


(b) Ln(Wage Bill)



Note: Panels (a) and (b) report event-study estimates after fitting equation (1) on the natural logarithm of total employment (panel (a)) or the natural logarithm of total wage bill (panel (b)), after reducing the sample to workers identified as providing professional services. We infer professional services workers using workers who were previously employed by professional service firms and those previously employed as independent contractors reporting the provision of professional services as their main activity. The coefficients capture the effect of the reform on in-house employment and total wage bill. The dashed vertical red lines mark the time of approval and of effective change in the VAT. Blue lines denote 95% confidence intervals, with standard errors clustered at the firm level.

Figure 9: Δ Professional Services Purchases vs. Δ Wage Bill

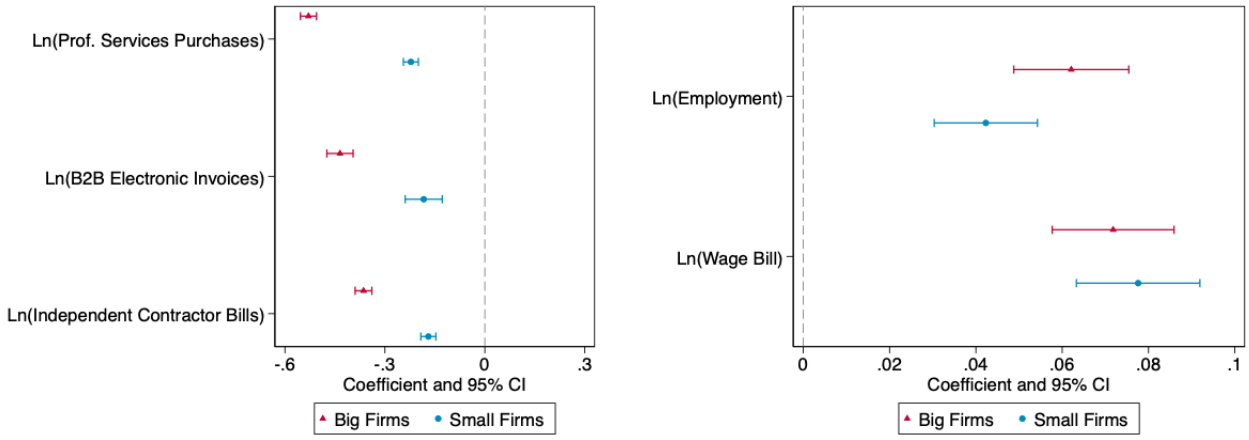


Note: This figure plots event-study estimates after fitting equation (1) on the natural logarithm of the total value of professional services purchases (blue line) or the natural logarithm of professional services purchases plus the total wage bill of in-house employees (red line). The dashed vertical red lines mark the time of approval and of effective change in the VAT. Blue lines denote 95% confidence intervals, with standard errors clustered at the firm level.

Figure 10: Outsourcing Professional Services and In-House Employment by Firm Size

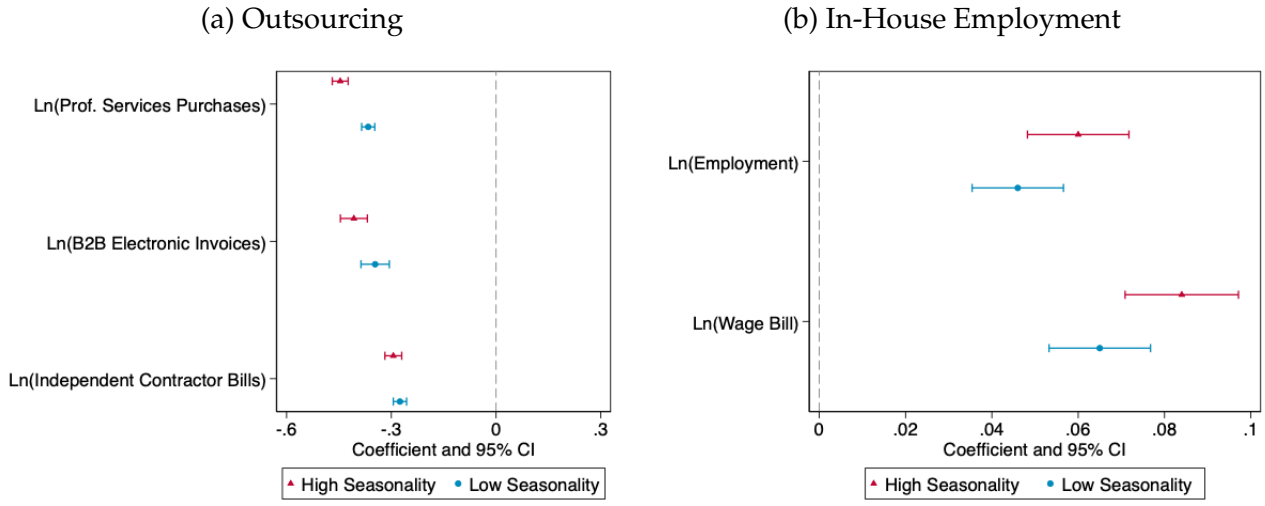
(a) Outsourcing

(b) In-House Employment



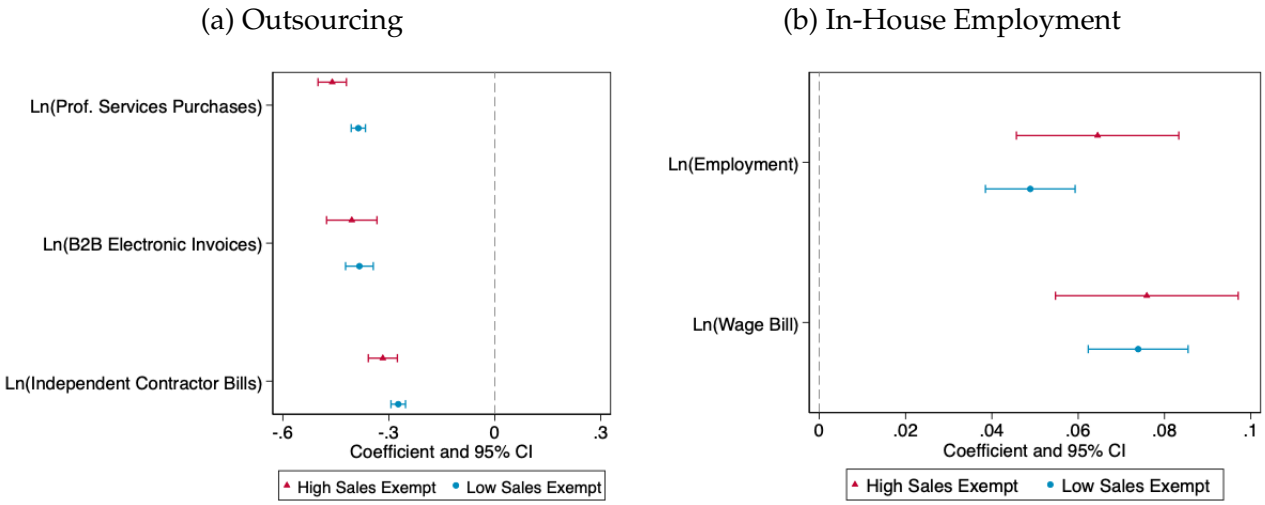
Note: This figure plots difference-in-differences estimates after fitting equation (2) on the natural logarithm of professional services purchases, both through B2B and I2B transactions (panel (a)) and the natural logarithm of employment and total wage bill (panel (b)). Each line corresponds to a different regression. The blue line reports coefficients for a sample of firms classified as large, and the red line plots estimates for the rest of the sample or small firms. In particular, I classify firms as large when they report above the median of total sales in the pre-reform sample. Blue lines denote 95% confidence intervals, with standard errors clustered at the firm level.

Figure 11: Outsourcing Professional Services and In-House Employment by Seasonality of Professional Services



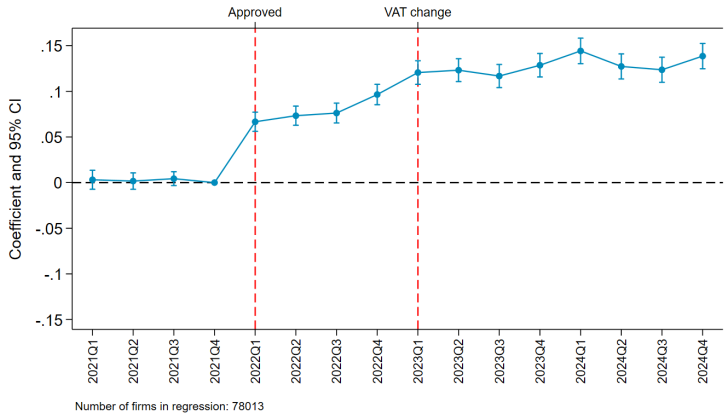
Note: This figure plots difference-in-differences estimates after fitting equation (2) on the natural logarithm of professional services purchases, both through B2B and I2B transactions (panel (a)) and the natural logarithm of employment and total wage bill (panel (b)). Each line corresponds to a different regression. The blue line reports coefficients for a sample of firms classified as having high seasonality of professional services purchases, and the red line plots estimates for the rest of the sample or firms with low seasonality. In particular, I classify firms as high or low seasonality depending on the intermittency of professional services purchases throughout the baseline year 2021. Blue lines denote 95% confidence intervals, with standard errors clustered at the firm level.

Figure 12: Outsourcing Professional Services and In-House Employment by Share of Sales VAT-Exempt



Note: This figure plots difference-in-differences estimates after fitting equation (2) on the natural logarithm of professional services purchases, both through B2B and I2B transactions (panel (a)) and the natural logarithm of employment and total wage bill (panel (b)). Each line corresponds to a different regression. The blue line reports coefficients for a sample of firms classified as having a high share of VAT-exempt sales, and the red line plots estimates for the rest of the sample, or firms with a low share of VAT-exempt sales. In particular, I classify firms as high or low share of VAT-exempt sales depending on whether they are above or below the median share for the sample in the baseline year 2021. Blue lines denote 95% confidence intervals, with standard errors clustered at the firm level.

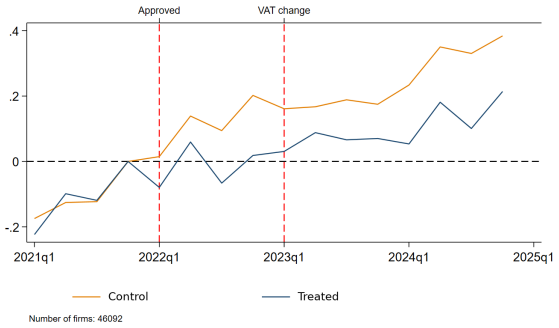
Figure A.1: Professional Services Earnings Net of Taxes



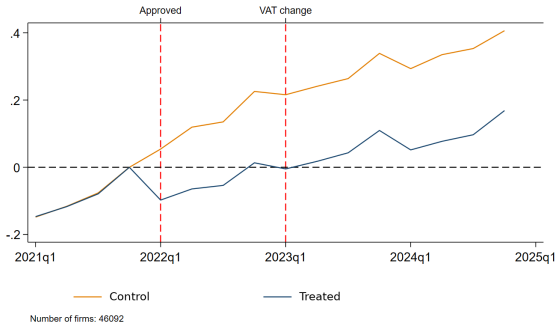
Note: This figure reports event-study estimates after fitting equation (1) on the average earnings of individuals purchasing professional services. The coefficients capture the effect of the reform on the natural logarithm of earnings of individuals selling professional services, relative to the earnings of similar individuals unaffected by the reform. The dashed vertical red lines mark the time of approval and of effective change in the VAT. Blue lines denote 95% confidence intervals, with standard errors clustered at the firm level.

Figure A.2: Raw Means

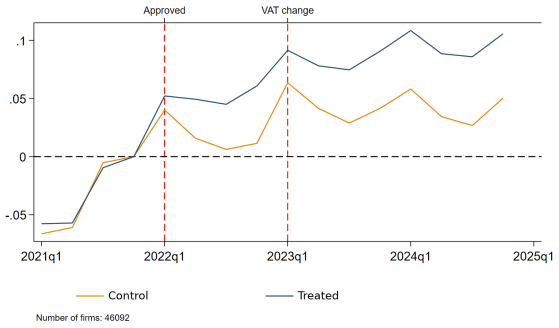
(a) Ln(B2B Electronic Invoices)



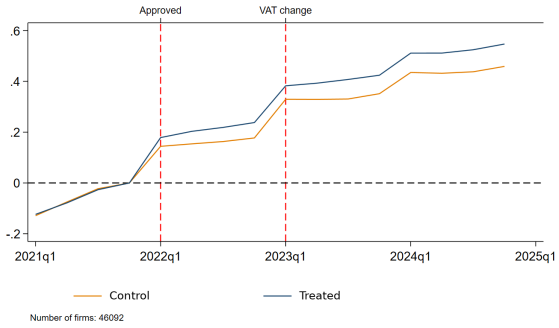
(b) Ln(Independent Contractor Bills)



(c) Ln(Employment)

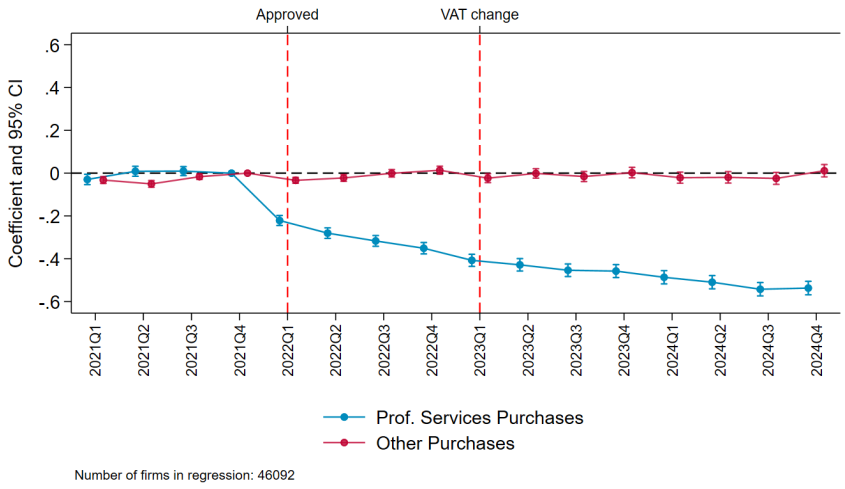


(d) Ln(Wage Bill)



Note: Panels (a) through (d) plot the trajectories of the natural logarithm of B2B transactions, I2B transactions, employment, and wage bill. All values are raw means, normalized to be zero in the last quarter of 2021, just before the enactment of the VAT reform.

Figure A.3: Professional Services and Other Services Purchases



Note: This figure plots event-study estimates after fitting equation (1) on the natural logarithm of the total value of professional services purchases (blue line) or the natural logarithm of other inputs purchases (red line). The dashed vertical red lines mark the time of approval and of effective change in the VAT. Blue lines denote 95% confidence intervals, with standard errors clustered at the firm level.