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The Effect of Services Deductibility on VAT Compliance

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Abstract

This paper provides an empirical analysis of the effectiveness of tax subsidies implemented by the German government as a measure to combat evasion of taxes on services purchased by private households. Based on a theoretical analysis of the choice between formal and informal provision of services, we provide a difference-in-difference analysis which contrasts the VAT performance of firms in industries, whose services have become deductible from the income tax, with the VAT performance of other firms. We use the German VAT taxpayer panel and employ different identification strategies. A first set of results focuses on the construction sector and exploits the fact that only purchases of firms that specialize in specific services are subsidized. A second strategy focuses on the VAT performance of industries that are particularly prone to evasion. Our results point at significant effects of the tax deduction. In particular, we find some evidence that taxable sales relative to input VAT increase. This indicates that the increase in sales is not simply a demand effect from subsidized services. Rather, firms seem to respond at the formal-informal margin and a larger fraction of sales is carried out formally and taxed.

Keywords: Tax compliance; VAT; Tax deductibility; Shadow economy; Informal sector

JEL classification: H26; H24

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1 Introduction

Imposing taxes on sales to private households is one of the cornerstones of modern tax systems. Most countries employ some form of VAT, other countries simply impose a sales tax. As both taxes drive a wedge between the price charged by the producer and price paid by the consumer, they are associated with an incentive to shift activities into the informal sector, if producer and consumer collaborate and agree to carry out their trade informally. This is detrimental not only for VAT revenues but also for revenues from taxes on employment and social security contributions. Moreover, important legislation regarding employment such as the minimum wage and market regulation is not enforced in the informal sector. To combat evasion and prevent shifting of activities into the informal sector, governments have implemented various measures. In Europe, where countries have raised the VAT rate substantially in recent years, measures include reduced tax rates on specific types of services that are often provided informally ([European Commission, 2015](#)), tax lotteries (*e.g.*, [Fabbri and Hemels, 2013](#)) as well as tax deduction schemes.¹²

Tax deduction schemes basically allow tax payers to deduct expenses for products and services from the tax base of other taxes such as the income tax. Hence, if done formally and taxed with VAT, purchases of income tax payers are subsidized. From a theoretical perspective, the subsidy is associated with a decline in the effective tax rate, and, thus, decreases the incentive to make an informal purchase and evade VAT. However, even if this contributes to a higher volume of taxable sales, gains in revenues from VAT are offset by losses in other taxes. Moreover, since deductions are typically not restricted to a specific group of tax payers, they lower the tax burden also on sales of products and services that are already taxed. Therefore, the total revenue effect is ambiguous.

This paper provides an empirical analysis of the effectiveness of a tax deduction scheme implemented by the German government to combat evasion of taxes on services purchased by private households. I couldn't find any reference saying that the §35a was introduced to combat tax evasion, instead it is always referred to two goals to combat illegal employment and support household-related

¹According to European Commission (2015), tax deduction schemes have been implemented in Germany, Belgium, Finland, France, and Italy.

²According to Naritomi, 2018 related incentive scheme (lotteries, fines or tax deductions) have also been implemented in Argentina, Bolivia, Brazil, China, Chile, Colombia, Indonesia, Italy, Portugal, Puerto Rico, South Korea and Slovakia (Fookan et al.2015; Bird 1992; Cowell 2004; Fabbri 2015; Marchese 2009).

employment (see e.g. *Beschlussempfehlung des Ausschusses für Wirtschaft und Arbeit, Bundestags-Drucksache 15/77, 13. November 2002, S. 54ff* or *EY Endbericht, 2013, S.1 and S.50 ff*) In order to provide testable empirical predictions, we use a theoretical analysis of the choice between formal and informal provision of services. The empirical analysis uses a VAT taxpayer panel based on the universe of VAT tax files provided by the Statistical Offices in Germany. The data is an annual panel covering more than 6,000,000 German firms in the time period between from 2001 to 2011. The empirical analysis uses difference-in-difference estimations that contrast the VAT performance of firms whose services are deductible with the performance of other firms. Grouping firms by legal form and firm size, we are able to narrow down the analysis to firms with a minimum of auditing and information requirements, where tax evasion can take place at low concealment cost. In order to determine reasonable comparison groups, we use two alternative identification strategies. The first strategy focuses on services provided by the construction sector and exploits the fact that only purchases of firms that specialize in specific services are subsidized. The VAT performance of other firms in the construction sector is used to construct a counterfactual. The second strategy exploits information about the extent of tax evasion by industry. More specifically, we use industry-level data on fines imposed for reasons of evasion of taxes and social security contributions provided by the Federal Office of Justice. Based on this data we identify industries that are particularly prone to evasion. Those industries that are not targeted by the tax deductions are used to construct an alternative counterfactual for subsidized industries.

Our (preliminary) results point at significant effects of the subsidy on taxable sales by affected industries. In particular, we find that taxable sales relative to input VAT increase. This indicates that the increase in sales is not simply the consequence of an expansion of demand for subsidized services. Rather, firms respond at the formal-informal margin and a larger fraction of sales is carried out formally and taxed with VAT.

These results indicate that consumers may play an important role for combating tax evasion as suggested in the recent optimal taxation literature (see e.g. [Gordon and Li, 2009](#); [Kleven et al. 2011](#); [Pomeranz, 2015](#); [Kumler et al., 2015](#); [Jensen, 2016](#); [Naritomi 2018](#)).³ Without additional monetary incentives for consumers the great benefit of the VAT - the self-enforcement incentive for

³The traditionally view of the optimal taxation literature is the one of being likely to engage in tax evasion ([Allingham and Sandmo, 1972](#).)

third-party reporting⁴ - breaks down at its last (consumer) stage. However, if given a monetary compensation for the time consuming reporting (asking for receipts and issuing them to the tax offices) consumers may become an important provider of third-party information which leaves a paper trail for the tax authority, increasing the risk of the firm of being audited and caught of committing tax avoidance by the government (Arbex and Mattos, 2015).

Our paper contributes to the theoretical discussion concerning the role of consumers for tax evasion (see e.g. Marchese, 2009; Fabbri, 2013; Arbex and Mattos, 2015) as well as to the literature developing indicator for increasing tax evasion (see e.g. Agha and Haughton, 1996; Matthews and Lloyd-Williams, 2001).

Most importantly, we contribute to the empirical literature on tax evasion, in particular the one studying the importance of third-party reporting for effective taxation. Up to now, the number of related studies is small (see e.g. Kleven et al., 2011; Pomeranz, 2015; Naritomi, 2018) because of the several obstacles coming along with detecting tax evasion due to its inhering informal (publicly unknown) nature. Moreover, applicable micro-empirical data is limited and in general highly confidential (Slemrod and Yitzahki, 2002, Pomeranz, 2015).⁵ The empirical evaluation of the effectiveness of financial incentives to increase third-party reporting is even more scarce. Naritomi (2018) and Mattos et al. (2013) are the only related studies we know of. Naritomi (2018) investigates how monetary incentives (through a lottery system) for consumers who ask for receipts affects revenue reporting of Brazilian firms. Her results indicate that the underlying anti-tax evasion program increases substantially firms reporting (21 percent over four years) and that this outcome can be attributed to shifts in detection probability due to whistle-blower threats. Mattos et al. (2013) evaluates another incentive program of the state of Sao Paulo (Brazil) that rewards consumers who request sales receipts with a discount on the taxes collected in retail sales. In their aggregated anal-

⁴Along the supply chain each...

⁵Two recent experimental contributions that provide empirical evidence that third-party reporting may play an important role in tax enforcement are the studies by Kleven et al. (2011) and Pomeranz (2015). Kleven et al. (2011) conducted a field experiment in Denmark where 40.000 individual tax payers were randomly selected for auditing. Comparing individuals that were subject to third-party reporting with those who self-reported, they find that tax evasion of third-party reported incomes is generally very low and does not react to an higher probability of detection by an audit. This indicates that third-party reporting is an effective measure to limit tax evasion. Following the same methodology Pomeranz (2015) conducted a similar experimental study in Chile and compared the firms responds on their transactions. Pomeranz (2015) has similar findings, the response of the firms subject to paper trail was much smaller than for those firms not covered by paper trail.⁶

ysis, the authors estimate that the deduction scheme increases in sales tax collection in hard-to-tax firms by 5 percent.

Our study is an empirical contribution to the findings of the related literature in various ways. First, it is the first study that analyzes the effect of a tax deduction scheme in an advanced economy country. Second, we use a very unique data set containing the universe of German firms⁷ and exploit one of the largest tax subsidy reforms of the German tax system (that hasn't been studied before) to estimate the effects of the reform on the employment, sales and an indicator for (a change in) tax evasion. Based on these results we derive policy implications and thus contribute to the policy debate on sales tax enforcement (see e.g. Tufano 2008, Kearney et al. 2010)).

The paper proceeds as follows. The following section provides a description of tax deduction policies in Germany. Section 3 discusses effects of a tax subsidy in a market for services where formal and informal providers compete and derives empirical predictions. The data is described in Section 4 before the empirical methodology is discussed in Section 5. Section 6 provides the results. Section 7 concludes.

2 The German Income Tax Deduction for Services

In 2003, the German government introduced the §35a EStG (Federal Income Tax), an income tax subsidy that allows individuals to claim income tax deductions for household related services and employment up to certain limits. This subsidy was part of a larger labor market reform (*Zweites Gesetz für moderne Dienstleistungen am Arbeitsmarkt*⁸) and was implemented for two reasons at that time: First, to increase household's incentives to provide household related employment, and, second, to fight illegal employment in this sector ([Bundesministerium der Finanzen, 2003](#)). Since then, the §35a EStG has been subject to several adjustments and has become one of the largest tax subsidies in the German tax system ([Bundesrechnungshof, 2011](#)).

Initially, households could deduct between 10 and 20 percent of service costs from income tax

⁷above a threshold

⁸The 2nd act to modernize services at the labor market

depending on the type of employment.⁹ These deductions applied to a fixed list of services such as the preparation of meals, cleaning of taxpayer's home, gardening and the care and support of children, the sick, the elderly or people in need of care. To receive income deductions households needed to meet several requirements. They had to provide bills as well as the proof of the payment on a bank account to the tax office (cash payments were not accepted). Furthermore, bills needed to differentiate between fees for manual work, driving to work and the cost of materials because only fees for manual work and for driving to the workplace were allowed for deduction.¹⁰¹¹

In 2006, a second act, the Act of Tax Incentives Growth and Employment (*Gesetz zur steuerlichen Förderung von Wachstum und Beschäftigung*), added craftsmen services to the list of favored services, implying a substantial expansion of the §35a EStG. Household's could now deduct 20 percent of related expenditures for measures of renovation, maintenance or modernisation from their income tax up to a maximum of 600 euros per year. Moreover, care and support services, formerly subgroup of household-related service subsidy, became now an own favored group with increased deductions possibilities (20 Percent up to 1,200 euros).¹²

In the course of the financial crises the §35a EStG underwent a third major adjustment. In 2008, the German parliament passed the stimulus package I (*Konjunkturpaket I*) to strengthen and stabilize the economy, save jobs and relieve the pressure on households. As part of this stimulus package the maximum deduction limits for household-related employment and services as well as care and support services were increased to 4,000 euros, the maximum deduction limits for craftsman services were increased to 1,200 euros. Moreover, from 2010 on, 20 percent of the expenses for marginal employment can be deducted. In particular, the high limits for care services should combat the

⁹Households could deduct 10 percent of marginal employment but at max 510 euros, 20 percent of household related services (that are not marginal employment) but at max 600 euros and 12 percent of household-related employment but at max 2400 euros.

¹⁰To receive the full subsidy household had to provide the proofs for every month of employment. If not, the deduction limit was reduced by one-twelfth with every passing month without proof. Source: <https://www.buzer.de/gesetz/4499/a14152-0.htm>

¹¹Since 2007, households no longer have to provide invoices automatically but only on demand of the tax authorities. Whether households must provide proofs is mainly driven by the outcome of an mechanical risk assessment assigning individual risk values to each household. If values exceed certain thresholds households are assessed in detail by the tax authority, otherwise no assessment takes place. As a result of this machine risk management, 79% of household services were not audited in 2007. For the craftsmen services, 66% of the cases were not checked ([Bundesrechnungshof, 2011](#)).

¹²The motivation of the 2006 expansion was very similar to its initial motivation, to strengthen small and medium-sized firms in related sectors as well as to combat illegal employment ([Bundesministerium der Finanzen, 2010](#).)

illegal employments in this service sector. Since 2010, several other but rather minor changes of the §35a EStG have been made. For an overview see Table 4.

Since its implementation, the volume of this tax subsidy has substantially increased and has reached more than 1.9 billion euros in 2013 (latest number).¹³ All in all, more than 11 billion euros have been deducted within the eleven years' period. This measure is also of significance in terms of the number of tax payers using it. In 2013, 26 Percent (10.6 million) of all German tax payers deducted related expenditures from their income tax under this act. Figure 2 depicts volumes and number of tax payers for the different types of deductible household services (marginal employment, household related employment and/or services, craftsman services). It shows that craftsmen services make up by far the largest part of total deductions (2013: 1.5 billion euros). Household-related services and employment (2013: 0.4 billion) as well as marginal employment (2013: 0.072 billion), in contrast, play only a minor role. This distribution is also reflected in the number of tax payers deducting service costs from their income tax. In 2013, more than 9.2 million people applied deductions for craftsman services whereas only 3 million people used deductions for either household related services and employment and 0.25 million people for marginal employment, respectively. On average each household received deductions between 126 and 288 euros per year in the observed period (see Table 5).

3 Theoretical Analysis

This section discusses effects of a tax subsidy in a market for services where producers and consumers can choose between a tax compliant purchase and an informal purchase without VAT.

Firms provide services X to final consumers. They can deliver these services formally ($X - I$), *i.e.* with a bill including VAT, or informally (I) without bill and taxes. As a consequence, prices differ. Let p denote the price of formally delivered services and q be the price if the service is carried out informally without VAT. Profits are:

$$\Pi = (1 + \tau)p(X - I) + qI - wa_LX - (1 + \tau)pa_XX - T - C.$$

¹³Source: Statistical Bureau

The cost of production consists of labor cost, cost of intermediate inputs, tax and cost of tax evasion. The labor cost equals wages for the labor input, where a_L is the input coefficient of labor and w is the wage rate. Cost of intermediate inputs equals price times input, where a_x is the input coefficient for intermediate inputs.

The cost of inputs is deductible from VAT, hence the tax is

$$T = \tau [p(X - I) - pa_X X],$$

where τ is the tax rate.

The cost of evasion is assumed to be increasing in the volume of informal sales, hence $C = C(I)$ with $C', C'' > 0$. Hence, the profit function can be rearranged to get:

$$\Pi = p(X - I) + qI - wa_L X - pa_X X - C(I)$$

In the market equilibrium, firms have no incentive to increase sales:

$$\frac{\partial \Pi}{\partial X} = p - wa_L - pa_X \stackrel{!}{=} 0,$$

which implies that the price equals unit cost

$$p = a_L w + a_X p = \frac{a_L}{1 - a_X} w. \quad (1)$$

The optimal supply of informal sales requires

$$\frac{\partial \Pi}{\partial I} = q - p - C'(I) \stackrel{!}{=} 0. \quad (2)$$

This suggests that in an interior equilibrium, *i.e.* when firms engage in both formal and informal sales, the supply price for informal sales exceeds the supply price for formal sales.

Turning to the demand size, consumers derive utility from formal and informal purchases of the service and from another good, which is untaxed, say leisure. If formal (F) and informal (I) purchases are perfect substitutes, the utility function can be written as $U = U(F + I, Z)$. The

consumer budget is

$$Y = p(1 + \tau - s)F + qI + Z. \quad (3)$$

Note that the consumer price for formal purchases differs from the producer price p by the tax rate τ and a subsidy s on formal purchases of services. The consumer optimum is characterized by

$$\frac{\partial U}{\partial X} - \lambda(1 + \tau - s)p \stackrel{!}{=} 0$$

$$\frac{\partial U}{\partial X} - \lambda q \stackrel{!}{=} 0$$

and

$$\frac{\partial U}{\partial Z} - \lambda \stackrel{!}{=} 0.$$

The first two conditions suggest that an interior solution with households purchasing both formal and informal services can only be obtained if

$$q \stackrel{!}{=} (1 + \tau - s)p. \quad (4)$$

Together, with equations (1) and (2) this determines the equilibrium amount of informal services. Figure 1 provides a graphical solution.

A sufficient condition for an interior equilibrium is:

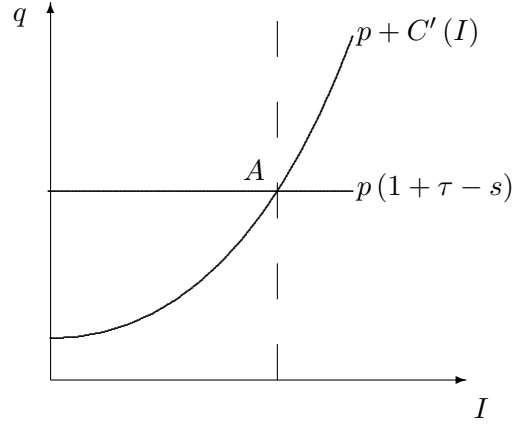
$$(\tau - s)p > C'(0)$$

This requires that the tax wedge is larger than the marginal cost of evasion at zero informal sales.

The first and the third of the optimality conditions imply that optimal consumption of services is characterized by

$$\frac{U_X}{U_Z} = p(1 + \tau - z). \quad (5)$$

Figure 1
Informal Services in Equilibrium



Together with the household budget constraint this determines the demand for services

$$X = X(p(1 + \tau - z), Y). \quad (6)$$

If services are a normal good, an increase in the subsidy rate increases demand for services.

In terms of empirical predictions, we consider first tax payments on sales.

$$T = \tau p(X - I)$$

If the subsidy rate increases, this indicator increases unambiguously. To see this, take the derivative and determine the (semi-) elasticity of taxes

$$\gamma \equiv \frac{1}{T} \frac{\partial T}{\partial s} = \frac{1}{X - I} \left(\frac{\partial X}{\partial s} - \frac{\partial I}{\partial s} \right). \quad (7)$$

Equations (1) to (4) determine the supply of informal goods. As shown by Figure 1 a higher subsidy rate s is associated with a decline in informal services. From the demand for services (6) we know that a higher subsidy rate s also gives rise to higher demand for services. As a consequence the tax revenues are increasing in the subsidy rate. However, this would hold even in a corner solution, where $I = 0$.

Tax payments on sales relative to input taxes are

$$R = \frac{\tau p(X - I)}{\tau p a_X X} = \frac{1}{a_X} \left(\frac{X - I}{X} \right).$$

If the subsidy rate increases, also this indicator increases unambiguously. We take the derivative and determine the semi-elasticity as

$$\beta \equiv \frac{1}{R} \frac{\partial R}{\partial s} = \frac{1}{X - I} \left(\frac{\partial X}{\partial s} - \frac{\partial I}{\partial s} \right) - \frac{1}{X} \frac{\partial X}{\partial s}. \quad (8)$$

The size of the elasticity depends on the fraction of informal sales. In a corner solution, where $I = 0$, the effect is zero. Hence, a positive effect on indicator R is only obtained in an interior equilibrium, *i.e.* when firms engage in both formal and informal sales. This suggests that a positive effect of the subsidy on R confirms the existence of evasion.

Further predictions can be derived from the comparison between the two elasticities. More specifically, from equation (7) and (8)

$$\frac{1}{X} \frac{\partial X}{\partial s} = \gamma - \beta.$$

Hence, if the responses of the ratio R and the revenues from sales (T) measured by the elasticities γ and β are of equal size, the subsidy does not cause an expansion of production. In this case, the increase in revenues comes entirely from the formal-informal margin and a larger fraction of sales is carried out formally and taxed. If, however, γ exceed β , the increase in revenues is partly or fully driven by an expansion in taxable sales.

4 Data

The empirical analysis uses taxpayer data for the German Value Added Tax. Access to the VAT Taxpayer Panel (Umsatzsteuer-Panel) is provided by the Research Data Centres of the Federal Statistical Office and the Statistical Offices of the Länder (Forschungsdatenzentren der Statistischen Ämter des Bundes und der Länder). The dataset is an annual panel from 2001 to 2011 covering more than 6,000,000 German firms, except those whose turnover is below the German VAT collection

threshold¹⁴, that paid less than 1,000 Euro in VAT in the preceding year¹⁵, or that do not incur a tax burden due to being exclusively engaged in tax-free transactions.

The data contains a rich set of statistics on firms' total sales, both taxable and tax-free, output taxes charged on the selling price of goods and services as well as deductible VAT on inputs, each divided into detailed sub-categories as described in Table 6. The tax variables are based on monthly and quarterly advance VAT returns and do not capture final adjustments in firms' annual VAT declarations (Vogel and Dittrich, 2008). In addition, the VAT panel includes information on the location of firms within Germany's sixteen federal states, a five-digit industry classification number, Wirtschaftszweig (WZ), legal form, and number of employees liable to pay social insurance (see also Vogel and Dittrich (2008)). For descriptive statistics of the full data set, refer to Table 7 in the Appendix.

From the full sample we keep two legal forms: partnerships (Personengesellschaften) and corporations (Kapitalgesellschaften). We further drop firms that have reported VAT sales taxed at 0% or 7%, firms that are exporters, and firms that belong to a tax group in the sense of Article 2(2) of the German VAT law.¹⁶ Last, we drop all treated firms that enter the panel from the year of treatment (2003 or 2006) onwards. In a similar manner, we drop the corresponding control firms. This restriction is useful, not only because of the negative cash flow problem of VAT for start-ups. Newly established firms often experience excessive input tax credits because they pay VAT on setup costs before they start trading and collecting VAT on sales.

Precise lists of personal and household services as well as craft services eligible for tax deductions are not part of the German Income Tax Law but exist in clarification letters of the Federal Ministry of Finance to the tax authorities elucidating the application of §35a EStG (Bundesministerium der Finanzen, 2010.) To identify firms which are most likely to be affected by §35a EStG, we match the description of the services on the Ministry of Finance lists to their closest corresponding industries.

¹⁴All suppliers should register for VAT but are relieved from collecting the tax when their annual turnover is below the collection threshold. The threshold was 16,620 Euro until 2003, and is 17,500 Euro since.

¹⁵According to article 18 (2) of the German turnover tax law firms with a VAT below a certain threshold in the preceding year must not provide advance turnover tax returns to the tax office. This threshold was raised once within the panel's period, in 2009 from 512 to 1,000 Euro.

¹⁶Tax groups of independent legal personalities are allowed based on the existence of a financial, economic, or organizational relationship (Vogel and Dittrich, 2008).

Table 1*EXAMPLE OF MULTIPLE WZ 2003 CODES MAPPING INTO ONE WZ 2008 CODE*

Code and title WZ 2003	Code and title WZ 2008
29.32.2 Maintenance and repair of other agricultural and forestry machinery 29.41.0 Manufacture of portable hand-held tools 29.56.4 Manufacture of other special purpose machinery 52.72.1 <i>Repair of electrical household goods (excluding radio and television goods)</i>	95.22.0 Repair of household appliances and home and garden equipment

For example, the eligible service “Repair, maintenance, replacement, modernization, and work on floor coverings” is classified as industry “Floor and Wall Covering” (WZ 2008: 43.33.0).

Note that the German classification of economic activities WZ has changed twice in the time period of the panel, once in 2003 (WZ 2003), and once in 2008 (WZ 2008). In order to assign treatment correctly, we have to use the industry descriptions under both classifications. Table 1 gives an example why WZ 2003 and WZ 2008 should be considered jointly. The table shows that four different industries according to the 2003 classification are merged into a single industry in 2008. Therefore, if we assign treatment based on the WZ 2008 title of the industry activity, we will incorporate manufacturers of portable hand-held tools and other special purpose machinery as well as maintenance of agricultural and forestry machinery, activities which are unlikely to be related to the §35a EStG “Repair and maintenance of household items.” Thus, treatment is assigned conditional on the firm’s industry code being 52.72.1 in the period 2003-2008 *and* 95.22.0 in 2009-2011. Identical problem occurs when a single WZ 2003 industry code is mapped into several WZ 2008 industries, so that the 2003 title alone cannot be used for treatment assignment either. Table 9 in the appendix summarizes the full list of services subject to tax incentives, their assigned industry, and the five digit industry code.

We use two different approaches to select an appropriate control group. First, we look at the economic characteristics, based on which the German government justified the introduction of a policy targeting precisely household services and craftsmen – these are high level of illegal employment and high level of tax evasion – and select non-treated sectors with similar characteristics. This is done in two ways: Directly, via a government publication explicitly identifying such sectors based on the experience of control authorities in the respective sectors (Deutscher Bundestag, 2009); and by

ranking industries using the total number of fines for illegal employment and others breaches (Alle Bußgeldentscheidungen gemäß §149 Abs. 2 Satz 1 Nr. 3 li. A GewO) imposed between 2005 to 2016 based on the Commercial Central Register Data Set on Illegal Employment (GZR-Daten zur Schwarzarbeit). Both methods yield the same group of industries, namely meat industry, repair of motor vehicles, passenger and cargo transport, hairdressing, and hotel and catering industry, which we use as a first control group. The second approach focuses exclusively on the construction sector, to which most of craftsmen services belong, and simply selects all non-treated industries on the fifth digit from the construction sector as controls.

5 Estimation Methodology

The empirical analysis employs differences in differences estimations to ascertain how the subsidy affects different performance indicators of firms. To this end, we distinguish firms that produce services that can be deducted from the input taxes and other firms that are comparable but not subject to the tax subsidy.

The basic estimation approach can be summarized by the following equation:

$$\text{VAT performance}_{it} = \alpha \text{TREAT}_{n(5)t} + \beta_i + \gamma_t + \delta_{st} + \rho_{n(1,2)t} + \psi_{lt} + u_{it}, \quad (9)$$

where the dependent variable is a measure of VAT performance, *i.e.* the logarithm of taxable sales or the logarithm of the ratio of VAT collected on the selling price of taxable goods and services provided by firm i in year t (output tax) and the deductible input VAT reclaimed by firm i in year t (input tax). TREAT is an indicator variable for treatment, which varies by a 5-digit industry classification n and year t . In particular, TREAT = 1 for all industries falling within the personal and household related service classification as per Table 9 starting from 2003, as well as for all crafts-related industries from 2006 onwards. β_i , γ_t , δ_{st} , $\rho_{n(1,2)t}$, ψ_{lt} are firm-, year-, federal state (s)-year-, industry (one, or two digit classification)-year, and legal form (l)-year fixed effects, respectively.

6 Results

Table 2 provides results for firms in the construction sector. Columns (1) and (2) consider the VAT performance in all firms of the treated industries relative all other industries in this sector. Column (1) reports the treatment effect for taxable sales. It shows an increase by 9%, which is consistent with the view that the subsidy boosts taxable sales. Column (2) refers to the amount of taxable sales relative to input taxes. As noted above, under the assumption of a fixed input coefficient, a positive effect indicates that firms engage in tax evasion. The effect is quite strong and significant. Columns (3) and (4) narrow down on very small partnerships, *i.e.* on partnerships with less than 250,000 Euro of annual sales. For these small firms, there are no formal auditing requirements and, hence, VAT evasion may be associated with little cost of concealment. While the effect on sales is similar, the ratio of taxes on sales relative to input taxes shows a slightly stronger increase. In the light of the above theory, since the ratio of taxes on sales relative to input taxes shows a strong response, we can infer that firms respond at the margin between formal and informal sales.

Table 3 provides results from an alternative identification strategy which uses industries with high level of tax evasion to determine the counterfactual development. Again, columns (1) to (2) consider the VAT performance in all firms of the treated industries. Column (1) reports the treatment effect for taxable sales. It shows a strong increase by 19%. Column (2) refers to the amount of taxable sales relative to input taxes. Since the empirical response is much weaker than that for taxable sales, the increase in the later is likely driven by an expansion of output rather than by a shift from the informal to the formal sector. Columns (3) and (4) narrow down on very small partnerships. The volume of sales shows a similar response, the ratio of taxes on sales relative to input taxes shows a stronger increase. This suggests that, if there is a decline in informal sales, it is more likely to matter for smaller firms.

7 Conclusions

[*We currently revise the empirical analysis and work on robustness checks. When this will be finalized; we add some conclusions.*]

Table 2
Results: Construction Sector

	Full sample		Very small partnerships	
	LogSales (1)	LogRatio (2)	LogSales (3)	LogRatio (4)
<i>Treat</i>	0.087 *** (0.015)	0.135 *** (0.013)	0.088 *** (0.022)	0.143 *** (0.023)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE ^{1,2}	Yes	Yes	Yes	Yes
Legal form FE ²	Yes	Yes	Yes	Yes
Federal state FE ²	Yes	Yes	Yes	Yes
<i>R</i> ²	0.053	0.029	0.049	0.028
Obs.	598,457	594,290	257,705	254,202
Nr. of firms	59,370	59,036	35,930	35,554

The results in columns 1-3 refer to our full sample of treated and non-treated firms; columns 4-6 show results for a subsample of very small partnerships. * P-Values in parentheses. *** Denotes statistical significance at the 1% level; ** at the 5% level; * at the 10% level. Heteroscedasticity robust standard errors, clustered at industry level. ¹ Industry fixed effects are run on the second digit level of WZ 03 and WZ 08 classification. ² Industry, legal form and federal state fixed effects are also interacted with time fixed effects.

Table 3*Results: Industries with High Level of Evasion*

	Full sample		Very small partnerships	
	LogSales	LogRatio	LogSales	LogRatio
	(1)	(2)	(3)	(4)
<i>Treat</i>	0.192 *** (0.027)	0.040 * (0.022)	0.152 *** (0.029)	0.058 ** (0.027)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE ^{1,2}	Yes	Yes	Yes	Yes
Legal form FE ²	Yes	Yes	Yes	Yes
Federal state FE ²	Yes	Yes	Yes	Yes
R^2	0.038	0.016	0.034	0.016
Obs.	1,329,487	1,314,809	837,191	823,290
Nr. of firms	140,860	140,084	108,007	107,109

The results in columns 1-3 refer to our full sample of treated and non-treated firms; columns 4-6 show results for a subsample of very small partnerships. P-Values in parentheses. *** Denotes statistical significance at the 1% level; ** at the 5% level; * at the 10% level. Heteroscedasticity robust standard errors, clustered at industry level. ¹ Industry fixed effects are run on the second digit level of WZ 03 and WZ 08 classification. ² Industry, legal form and federal state fixed effects are also interacted with time fixed effects.

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Figure 2

The §35a EStG: number of tax payers and deducted volumes (2003 to 2013)

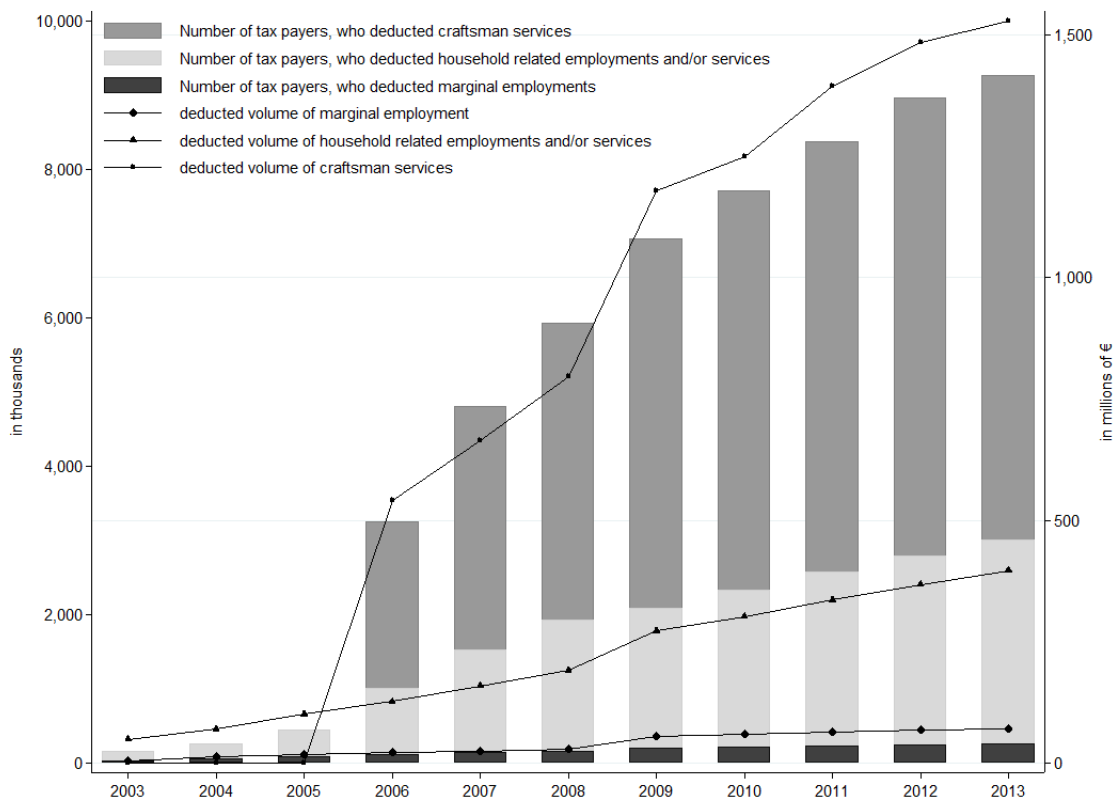


Table 4
The §35a EStG since 2003

Definitions based on §35a EStG	01.01.2003	01.01.2006 ¹	29.12.2007 ²	30.12.2008	01.01.2009 ³	14.12.2010 ⁴	01.01.2012
Household-related employment, that is marginal employment as defined by §8a Volume IV of the Social Insurance Code	10% (max. 510€)	10% (max. 510€)	10% (max. 510€)	10% (max. 510€)	20% (max. 510€)	20% (max. 510€)	20% (max. 510€)
i) Household-related employment, other than those listed in paragraph above	12% (max. 2.400€)	12% (max. 2.400€)	12% (max. 2.400€)	12% (max. 2.400€)	20% (max. 4.000€)	20% (max. 4.000€)	20% (max. 4.000€)
ii) Household-related services, that are not marginal employments	20% (max. 600€)	20% (max. 600€)	20% (max. 600€)	20% (max. 600€)	20% (max. 600€)	20% (max. 600€)	20% (max. 600€)
Care and support services as well as expenses for placement in a home or permanent care*	-	20% (max. 1.200€)	20% (max. 1.200€)	20% (max. 1.200€)	20% (max. 4.000€)	20% (max. 4.000€)	20% (max. 4.000€)
Craftman services for measures of renovation, maintenance or modernisation	-	20% (max. 600€)	20% (max. 600€)	20% (max. 1.200€)	20% (max. 1.200€)	20% (max. 1.200€)	20% (max. 1.200€)

Notes: *Care and support services have been in favor under household related services since its implementation in 2003, but with the "Gesetz zur steuerlichen Förderung von Wachstum und Beschäftigung (WachstBeschStFördG k.a.Abb.)" an own section in the act was implemented, also with higher amounts.

¹Exception for supported services of the KfW-Bank. (Version § 35a EStG a.F. until 2006.05.06)

²Not only domestic but also EU and EEA households can have tax reductions. (Version § 35a EStG a.F. until 2007.12.29)

³No reduction of maximum amount if taxpayer can not provide supporting documents (Version § 35a EStG a.F. until 2009.01.01)

⁴Exclusion of tax-deductibility if expenses are publicly supported.(Version § 35a EStG a.F. until 2010.12.14)

Table 5*The §35a EStG: number of taxpayers and claimed deductions (2003 to 2013)*

Year	Number of taxpayers (in 1000)			Claimed deductions (in mio.)		
	Marginal Employment	Insurable Employment	Craftsmen services	Marginal Employment	Insurable Employment	Craftsmen services
2003	28.97	158.08	–	4.85	49.18	–
2004	68.57	257.27	–	13.69	70.22	–
2005	90.90	447.10	–	18.39	101.08	–
2006	123.41	1,017.90	3,260.26	22.09	127.06	542.06
2007	144.93	1,525.43	4,808.13	25.30	159.55	663.73
2008	166.28	1,928.00	5,936.49	28.59	191.07	797.01
2009	201.26	2,083.10	7,065.18	54.71	272.99	1,178.36
2010	219.37	2,329.22	7,715.01	60.45	302.51	1,248.46
2011	234.01	2,577.42	8,379.63	65.42	336.81	1,394.42
2012	245.24	2,801.90	8,969.22	69.24	368.28	1,483.83
2013	258.07	3,005.99	9,275.13	72.06	396.76	1,527.93

Table 6*Description of variables*

Description	Variable
1. Total sales of goods and services	total-sales
1.1 Taxable sales of goods and services	taxable-sales
– Taxable sales of goods and services at standard rate	taxable-sales-19
– Taxable sales of goods and services at reduced rate	taxable-sales-7
1.2 Tax-free sales of goods and services	taxfree-sales
1.2.1 Tax-free sales of goods and services with credit for VAT on inputs (zero-rated goods and services)	taxfree-sales-zero
– Zero-rated intra-community sales of goods and services (within the EU)	taxfree-sales-zero-intacomm
– Zero-rated other sales of goods and services	taxfree-sales-zero-other
1.2.2 Tax-free sales of goods and services without credit for VAT on inputs (exempt goods and services)	taxfree-sales-exempt
2. Output tax charged on the selling price of taxable goods or services	output-tax
2.1 Output tax on goods and services	output-tax-sales
2.2 Output tax on intra-community sales of goods and services (within the EU)	output-tax-intracomm
3. Deductible VAT on inputs	input-tax
3.1 Deductible input VAT on the sales of goods and services	input-tax-sales
– From invoices of other firms	input-tax-invoice
– From customs, VAT levied at the border from extra-community sales of goods and services	import-vat
3.2 Deductible input VAT on intra-community sales of goods and services (within the EU)	input-tax-intracomm

Notes: In addition to the variables above, the data contains information on the federal state (Baden-Württemberg, Bavaria, Berlin, Brandenburg, Bremen, Hamburg, Hesse, Lower Saxony, Mecklenburg-Vorpommern, North Rhine-Westphalia, Rhineland-Palatinate, Saarland, Saxony, Saxony-Anhalt, Schleswig-Holstein, Thuringia) in which a firm is located, the legal form (), five-digit industry classification (Wirtschaftszweig (GKZ)), number of employees. On 01.01.2007, Germany increased the standard VAT rate from 16% to 19%, with the reduced rate remaining 7% since 1983.

Table 7*Descriptive statistics (without adjustments)*

	Mean (Euro)	S.D.	Median	N
Full dataset				
total-sales	1,572,861	90,163,906	105,362	33,699,769
taxable-sales	1,224,193	59,116,323	99,061	33,538,967
taxable-sales-19	1,081,411	55,606,565	82,674	32,998,977
taxable-sales-7	656,901	26,646,312	29,052	7,964,466
taxfree-sales	2,059,688	112,066,495	16,663	5,558,799
taxfree-sales-zero	2,530,288	122,584,133	19,414	3,802,002
intacomm	2,216,669	78,775,259	27,528	2,323,848
other	1,627,911	77,818,803	13,063	2,745,395
taxfree-sales-exempt	821,921	46,301,389	9,245	2,225,194
output-tax	228,336	13,299,646	15,936	33,563,725
output-tax-sales	206,854	12,124,985	15,779	33,554,068
output-tax-intracomm	157,688	5,591,465	1,333	4,418,971
input-tax	198,649	13,280,692	8,520	31,878,767
input-tax-sales	165,760	9,866,756	8,253	31,851,909
input-tax-invoice	152,758	8,749,510	8,206	31,806,032
import-vat	285,952	8,725,397	2,502	1,471,664
input-tax-intracomm	162,461	5,672,551	1,290	4,268,622
employee	13	288	2	14,504,025
Treated firms				
total-sales	691,149		129,591	4,790,518
taxable-sales	563,518	7,904,092	119,751	4,751,428
taxable-sales-19	551,182	7,817,607	115,775	4,738,508
taxable-sales-7	126,734	2,702,402	3,352	238,752
taxfree-sales	965,989		9,971	436,573
taxfree-sales-zero	1,127,263		9,885	284,639
intacomm	1,030,075		20,620	157,355
other	791,302	8,458,196	7,002	200,661
taxfree-sales-exempt	566,308	8,905,127	8,060	178,090
output-tax	109,828	1,733,758	20,812	4,758,623
output-tax-sales	105,051	1,609,118	20,709	4,758,031
output-tax-intracomm	43,018	775,186	724	459,715
input-tax	75,834	1,415,711	10,072	4,710,987
input-tax-sales	62,469	1,098,600	9,537	4,704,040
input-tax-invoice	60,814	1,050,430	9,534	4,701,438
import-vat	84,570	860,592	1,301	94,467
input-tax-intracomm	44,071	787,937	685	445,118
employee	8	53	3	2,846,544

Table 8*Descriptive statistics (after adjustments)*

	Mean (Euro)	Median	S.D.	N
Treatment group 1:				
Construction sector				
total-sales	294,102	161,364	503,192	550,476
taxable-sales	269,026	147,564	459,493	549,114
taxable-sales-19	264,490	145,347	450,443	548,895
output-tax	48,567	25,928	90,998	549,478
input-tax	27,055	13,429	56,416	547,285
employee	4	3	6	380,588
Treatment group 2:				
All treated industries				
total-sales	306,148	157,784	600,433	629,161
taxable-sales	283,417	145,231	568,764	627,736
taxable-sales-19	279,164	143,148	561,100	627,503
output-tax	50,897	25,475	107,899	628,112
input-tax	26,154	12,543	56,164	625,068
employee	5	3	17	431,311
Control group 1:				
Construction sector				
total-sales	666,317	191,613	2,269,802	50,971
taxable-sales	543,325	152,987	1,624,244	49,813
taxable-sales-19	524,218	147,326	1,473,558	49,676
output-tax	116,270	28,195	358,225	50,237
input-tax	82,494	17,249	334,271	49,907
employee	7	3	23	28,315
Control group 2:				
High illegal employ. sectors				
total-sales	117,583	67,999	523,608	702,106
taxable-sales	117,394	67,958	522,195	702,083
taxable-sales-19	117,279	67,910	521,599	702,060
output-tax	20,728	11,896	92,362	702,081
input-tax	9,145	4,277	38,968	691,238
employee	3	2	22	414,621

Table 9
SERVICE-INDUSTRY MATCHING

Services under §35a EStG	Corresponding Industries	First Year	WZ 2008	WZ 2003	WZ 1993
Meal preparation, child care, ancillary home help obligation (e.g., childcare), home care, housework (everyday activities such as cleaning, cleaning windows, ironing, dusting, washing dishes, cooking etc.	Activities of households as employers of domestic personnel	2003	97000	95002	95002
		2003	97000	95003	95003
Wastebaskets (delivery and installation), janitor, elevator maintenance, modernization measures (within the property)	Combined facilities support activities	2003	81100	70320	70320
		2003	81100	75140	75140
Broadband cable network (installation / maintenance within the property), electrical systems (maintenance and repair), modernization measures (within the property), house connections (power cable, television, internet etc.), working on interior and exterior walls	Electrical installation	2006	43210	45310	45310
Carport, patio covering, modernization measures (within the property), working on the roof, working on garages, gutter cleaning	Erection of roofs, roof covering & related plumbing work	2006	43911	45221	45221
	Erection of frames & constructional timber works	2006 2006	43912 43912	45223 20301	45223 20301
Chimney sweep, asbestos removal, fire extinguisher (maintenance), pollutant cleanup	Chimney-sweeping	2006	81221	74702	74702
	Other building and industrial cleaning activities n.e.c.	2006	81229	74701	74701
Pigeon defense, pest and vermin control	Disinfecting & pest control	2006*	81292	74704	74704
Draining the masonry, modernization measures (within the property), basement shaft cover, dry rot removal, masonry renovation (** Change **)	Construction of residential and non-residential buildings (except prefabricated constructions)	2006	41201	45211	45211
		2006	41201	45212	45212
		2006	41201	45231	45231
Dry ice cleaning	General cleaning of buildings	2006*	81210	74701	74701
Fire damage restoration (if no insurance benefit)	Erection of roofs, roof covering & related plumbing work	2006	43911	45221	45221
	Erection of frames & constructional timber works	2006	43912	45223	45223
		2006	43912	20301	20301
	Construction of residential and non-residential buildings (except prefabricated constructions)	2006	41201	45211	45211
		2006	41201	45212	45212
		2006	41201	45231	45231
	Assembly and erection of prefabricated constructions	2006	41202	20302	20302
		2006	41202	25230	25230
		2006	41202	28111	28111
		2006	41202	45211	45211
		2006	41202	45213	45213
		2006	41202	45214	45214
	Joinery installation	2006	41202	45215	45215
		2006	43320	20301	20301
2006		43320	25230	25230	
2006		43320	28120	28120	
2006		43320	45420	45420	
Painting & lacquering		2006	43341	45441	45441
Glazing		2006	43342	45442	45442
Fungus control	Painting and lacquering	2006	43341	45441	45441

Table A-3: SERVICE-INDUSTRY MATCHING (Cont.)

Services under §35a EStG	Corresponding Industries	First Year	WZ 2008	WZ 2003	WZ 1993
Gardener (inside the property), foliage removal (on private property), Laubentfernung	Laying out, planting & maintenance of gardens, parks and green areas	2003 2003	81301 81301	01412 01412	01412 45113
Paving (inside the property)	Other landscape and garden service activities	2003	81309	01413	01413
	Activities of households as employers of domestic personnel	2003 2003	97000 97000	95002 95003	95002 95003
Graffiti removal, modernization measures (within the property)	General cleaning of buildings	2006*	81210	74701	74701
	Painting & lacquering	2006	43341	45441	45441
	Glazing	2006	43342	45442	45442
House cleaning	General cleaning of buildings	2006*	81210	74701	74701
	Activities of households as employers of domestic personnel	2003 2003	97000 97000	95002 95003	95002 95003
Community machines with tenants (repair and maintenance), repair and maintenance of household items	Repair of household appliances and home and garden equipment	2006	95220	29322	29322
		2006	95220	29410	29405
		2006	95220	29410	29407
		2006	95220	29564	29562
Maintenance heating and oil tank facilities, underfloor heating (maintenance, flushing, repair etc.), maintenance CO2 warning devices, maintenance pumps, maintenance of wastewater back-up protection, water supply (repair and maintenance), repair and maintenance of heating systems, electric, gas and water installation, work on inlets and outlets, water damage restoration, drainpipe cleaning (within the property), disposal of waste water (maintenance and cleaning), heating costs (maintenance and repair, replacement meter), modernization measures (within the property)	Plumbing, heat and air-conditioning installation	2006	43220	45310	45310
		2006	43220	45330	45331
		2006	43220	45330	45332
Modernization measures (within the property), water damage restoration	Plastering	2006	43310	45410	45410
	Floor and wall covering	2006	43330	45431	45431
		2006	43330	45432	45432
		2006	43330	45433	45433
		2006	43330	45434	45434
		2006	43330	45435	45435
		2006	43330	45436	45436
	Erection of chimneys & industrial ovens	2006	43992	45253	45253
	Construction activities n.e.c.	2006	43999	28111	28111
		2006	43999	45211	45211
		2006	43999	45222	45222
		2006	43999	45240	45240
		2006	43999	45252	45252
2006		43999	45255	45255	
2006		43999	45256	45256	
2006		43999	45451	45451	
2006	43999	45501	45500		
2006	43999	45502	45500		

Table A-3: SERVICE-INDUSTRY MATCHING (Cont.)

Services under §35a EStG	Corresponding Industries	First Year	WZ 2008	WZ 2003	WZ 1993	
Removal service	Removal services	2006	49420	60245	60241	
		2006	49420	60245	60242	
		2006	49420	60245	60243	
		2006	49420	60246	60244	
Piano tuner	Repair of consumer electronics	2006	95210	52722	52722	
Repair and maintenance of floor coverings, replacement / modernization of floor coverings, working on floor coverings	Floor and wall covering	2006	43330	45431	45431	
		2006	43330	45432	45432	
		2006	43330	45433	45433	
		2006	43330	45434	45434	
		2006	43330	45435	45435	
Repair and maintenance of windows and doors, assembly services (acquisition of new furniture), repair of closets, replacement / modernization of windows and doors, modernization measures (within the property)	Joinery installation	2006	43320	20301	20301	
		2006	43320	25230	25230	
		2006	43320	28120	28120	
		2006	43320	45420	45420	
Setting up scaffolding	Scaffolds and work platforms erecting and dismantling	2006	43991	45254	45254	
	Construction activities n.e.c.	2006	43999	28111	28111	
		2006	43999	45211	45211	
		2006	43999	45222	45222	
		2006	43999	45240	45240	
		2006	43999	45252	45252	
		2006	43999	45255	45255	
		2006	43999	45256	45256	
		2006	43999	45451	45451	
2006	43999	45501	45500			
2006	43999	45502	45500			
Street cleaning	Other cleaning activities n.e.c.	2006	81299	90030	90008	
Winter service	Other cleaning activities n.e.c.	2006	81299	90030	90009	
Working on the facade, working on garages, working on interior and exterior walls, water damage restoration	Construction of residential and non-residential buildings (except prefabricated constructions)	2006	41201	45211	45211	
		2006	41201	45212	45212	
		2006	41201	45231	45231	
	Plastering		2006	43310	45410	45410
	Painting & lacquering		2006	43341	45441	45441
Glazing		2006	43342	45442	45442	
Home care	Other own-account activities pertaining to human health	2003	86909	85144	85144	
		2003	86909	85145	85145	
		2003	86909	85146	85146	
Thermal insulation measures (** Change **)	Insulation work activities	2006	43291	45320	45320	