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Impact of VAT Exemptions in the Postal Sector on Competition and Welfare

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1 Introduction

In most member states of the European Union (EU), universal postal services provided by the incumbent operator are exempt from value added taxes (VAT) on the grounds that they are the "public postal service." Other postal service providers have to charge VAT at the standard rate. In the United Kingdom (UK), TNT legally challenged this interpretation of the VAT Directive[1] and Royal Mail's VAT exemption as not being in accordance with EU law. TNT argued that where the market is liberalized, VAT should be charged on all services to avoid market distortion. This position had already been taken by some European governments, including those of Finland, Sweden and Switzerland.

The European Court of Justice (ECJ) ruled that Royal Mail, as the operator providing the public postal service, was the only postal service provider in the UK that was eligible for the VAT exemption. However, this exemption does not apply to contracts that had been individually negotiated by businesses with Royal Mail, as such an exemption would distort competition. The ECJ's decision is binding on all member states.

The significance of VAT exemptions to the emergence of competition in liberalized postal markets has not been explicitly analyzed and discussed: while De Donder et al. (2009) focus on the pricing and welfare implications of changing a postal operator's VAT status, Dieke and Elixmann (2005) try to quantify the effect of VAT exemptions for postal operators on government tax revenue. Crew et al. (2009) discuss the importance of VAT exemptions in the framework of the prospective study by PwC (2006).

The focus of our paper is on the competitive effects of the proposed VAT regime relative to selected alternatives. We also highlight the welfare effects of various VAT scenarios. *A priori*, the size of these two effects is not clear; while an exempt operator cannot reclaim VAT paid on inputs (relevant for non-labor inputs only) and therefore faces higher costs *ceteris paribus*, an important fraction of customers of non-exempt operators will not be able to deduct VAT themselves. Hence, the exempt incumbent operator has on the one hand a cost disadvantage, and on the other, a price advantage. The net effect will depend on the fraction of non-labor inputs relative to the fraction of non-rated customers. Figure 1 below illustrates the trade-off. The circles represent the relevant market distortions raised by the asymmetric VAT exemption.

We base our analysis on the model developed in Dietl et al. (2010) and quantify the effects of selected VAT regimes. We report market shares, optimum prices, tax revenue and welfare in a liberalized postal market. The various scenarios differ by the operators' VAT status. We also take into account the fraction of non-rated customers that cannot deduct VAT themselves.

The paper sheds light on the main competitive impact of VAT policies while showing the consequences on overall welfare. Relative to the work of De Donder et al. (2009), who assume that entrants act as a competitive fringe, we model profits of both the incumbent and new market entrants. This allows us to provide a more comprehensive treatment of competitive effects of VAT policies. We also provide the relevant sensitivity analysis with regards to the fraction of labor inputs and the fraction of VAT exempt customers. We show that the results are very sensitive to the operators' labor policies. Consequently, VAT exemptions have a different impact in countries with different labor regulations. Secondly, the sensitivity analysis highlights that the competitive effects will vary strongly between different customer segments. Hence there is a second important regulatory link between VAT exemptions and uniform pricing constraints. The comprehensive treatment of competition and welfare enables us to provide guidance on how to resolve the policy trade-off between consumer surplus, government tax revenue, and a level playing field in liberalized postal markets.

The structure of the paper is as follows. Section 2 summarizes the model framework as presented in a companion paper (Dietl et al. 2010) and outlines the formal results. Section 3 describes the calibration of the model for a stylized postal market. Section 4 reports the simulation results. Section 5 provides conclusions.

2   Model Framework

In this section, we outline the model framework and summarize the main results.[2] Two postal operators, an incumbent operator I and an entrant operator E offer differentiated mail services in the same market. The before-tax price of mail at operator i is denoted by p_i, whereas $(1+t_i)p_i$ denotes the after-tax price of mail at operator i, with $t_i \in [0,1]$ being the individual VAT rate of operator $i \in \{E, I\}$. Moreover, each operator pays VAT denoted by $t \in [0,1]$ on non-labor inputs. Depending on their VAT status, operators are able to deduct the input VAT from their output VAT billed to the customers.

In the model, there are two types of customers: $\gamma \in [0,1]$ denotes the fraction of VAT exempt, "non-rated" customers, while $(1-\gamma)$ is the proportion of customers that are VAT rated. The latter type of customers can reclaim the VAT they paid on their postal products because these products are an input into their own production processes. Reclaiming VAT is not possible for VAT exempt customers. Thus, for VAT rated customers, the before-tax price p_i is relevant, while for VAT exempt customers, the after-tax price $p_i(1+t_i)$ of the mail service from operator i is relevant. The model specification presumes that the fraction of non-exempt letters is the same for the incumbent and the entrant.

The model further assumes a quadratic, quasi-linear utility specification that yields linear demand curves with equal slope for both operators. Demand of operator i decreases in its own prices p_i, while it increases in the price p_j of the other

operator j. Demand is also positively related to a higher degree of product differentiation.

If operator i is VAT exempt, i.e., $t_i = 0$, it does not charge VAT to its customers. On the other hand, it does charge VAT to its customers if it is VAT rated, i.e., $t_i > 0$. Figure 1 shows a situation where the incumbent I is exempt ($t_I = 0$), whereas entrant E is fully rated ($t_E = t$). This will be Scenario A later on.

Figure 1: VAT Flows in the Postal Sector
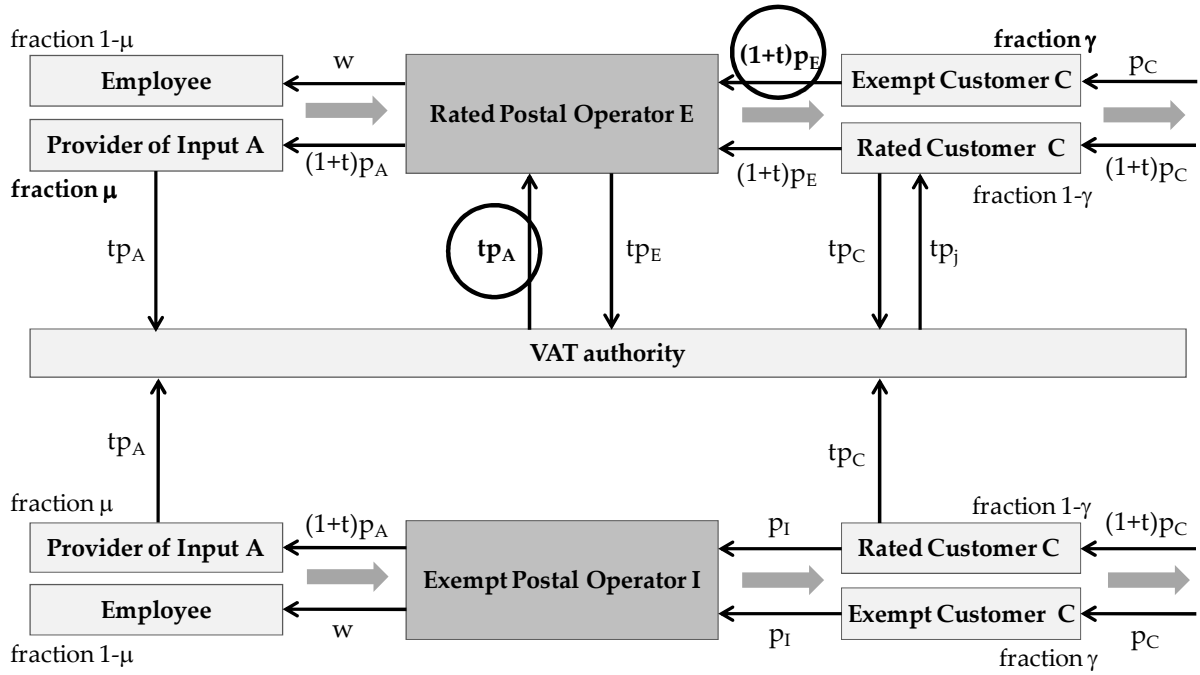
On the cost side, operator i faces two types of costs: (i) fixed costs F_i and (ii) constant marginal costs c_i. The fraction of the fixed costs that is non-labor costs is denoted by $\mu_i^F \in (0,1)$, where $\mu_i \in (0,1)$ stands for the fraction of marginal costs that is non-labor. Note that operator i has to pay VAT on the fraction of non-labor costs derived from fixed costs, upstream and delivery costs independent of its VAT status. Hence, the VAT status will crucially determine the costs faced by operator i. If operator i is VAT rated with $t_i = t$, it can reclaim the VAT it has paid on inputs. Conversely, if operator i is VAT exempt with $t_i = 0$, it cannot reclaim the VAT it has paid on inputs.

The model analyzes two scenarios. In Scenario A, the incumbent operator I is VAT exempt, i.e., $t_I = 0$, while the entrant operator E is VAT rated, i.e., $t_E = t > 0$ (cf. Figure 1). In Scenario B, the incumbent and the entrant are VAT rated, i.e., $t_I = t_E \equiv t > 0$.

Scenario A: VAT exemption for incumbent only

In Scenario A, the demand functions for the incumbent I and the entrant E are given by:

$$x_I = \frac{1}{\beta(1-\varepsilon^2)}\left[\alpha_I - \varepsilon\alpha_E - p_I + \varepsilon p_E(1+\gamma t)\right],$$

$$x_E = \frac{1}{\beta(1-\varepsilon^2)}\left[\alpha_E - \varepsilon\alpha_I - p_E(1+\gamma t) + \varepsilon p_I\right]. \tag{1}$$

To derive the optimal pricing formula, both operators maximize their profits

$$\pi_I = \left(p_I - (1+\mu_I t)c_I\right)x_I - \left(1+\mu_I^F t\right)F_I,$$

$$\pi_E = \left(p_E - c_E\right)x_E - F_E,$$

yielding reaction functions where prices are strategic complements. Solving the system of reaction functions produces the before-tax prices (p_I^A, p_E^A) of the incumbent I and the entrant E in Scenario A. Substituting (p_I^A, p_E^A) in the demand functions (1) produces equilibrium demands (x_I^A, x_E^A) in Scenario A.

The formal results for Scenario A illustrate the trade-off that we have discussed in Section 1 (cost disadvantage vs. price advantage). With symmetric cost and demand, the incumbent will have a larger market share whenever $\gamma > \mu_I$. Note that μ_I depends on the incumbent's labor policy. *Ceteris paribus*, being VAT exempt, will make it more profitable for the incumbent to employ workers directly rather than using subcontracting than would be the case were the incumbent to be VAT rated.

In Scenario A, the following holds true:

(i) A higher tax rate t always yields an increase in the before-tax price p_I^A of the incumbent, while the before-tax price p_E^A of the entrant decreases for a reasonable range of parameters.

(ii) A higher tax rate t induces a decrease in the equilibrium demands (x_I^A, x_E^A) of the incumbent and the entrant for a reasonable range of parameters.

Hence, the before-tax price of the incumbent always increases in the tax rate. If the model parameters are within a reasonable range, then the before-tax price of the entrant decreases in the tax rate. This result can be explained by two effects. (1) As the incumbent cannot deduct VAT, higher taxes will directly lead to higher production costs. (2) A higher tax rate will increase the incumbent's output tax advantage, as the increased VAT rate is directly price relevant for the entrant's non-rated customers. Under reasonable calibration assumptions (minimal amount of non-rated customers relative to the size of μ_E), the entrant will be forced to reduce prices to offset the increase in taxes without gaining market share in return. Marginally, the incumbent is able to increase prices. Hence, the two effects always have the same direction for the incumbent while they are ambiguous for the entrant.

Both effects will, under reasonable calibration assumptions, negatively affect demand.

Scenario B: Both operators equally VAT rated

In Scenario B, both the incumbent and the entrant are VAT rated, i.e., $t_I = t_E \equiv t > 0$. It follows that both operators can reclaim the VAT they have paid on inputs. The two demand functions are now of the same form and independent of the fraction of VAT rated inputs:

$$x_i = \frac{1}{\beta(1-\varepsilon^2)} \Big[\alpha_i - \varepsilon\alpha_j - p_i(1+\gamma t) + \varepsilon p_j(1+\gamma t) \Big], \tag{2}$$

with $i \in \{I, E\}$. Hence, the VAT regime does not distort competition between the two operators; consequently, Scenario B can be seen as the benchmark case for Scenario A's market distortions driven by the incumbent's VAT exemption.

In Scenario B, the profit functions are given by

$$\pi_i = (p_i - c_i) x_i - F_i,$$

with $i \in \{I, E\}$. Similar to above, the before-tax prices (p_I^B, p_E^B) of the incumbent I and the entrant E in Scenario B are computed by solving the system of reaction functions derived from the profit maximization problem. Equilibrium demands (x_I^B, x_E^B) are obtained by substituting (p_I^B, p_E^B) in the demand function (2).

In Scenario B, the following holds true:

(i) A higher tax rate t yields a decrease in the before-tax prices (p_I^B, p_E^B) of the incumbent and the entrant if the ratio of market sizes α_I / α_E is within a reasonable range of parameters.
(ii) A higher tax rate t yields a decrease in the equilibrium demands (x_I^B, x_E^B) of the incumbent and the entrant if the ratio of cost parameters c_I / c_E is within a reasonable range of parameters.

As expected, a higher VAT tax rate will increase prices under reasonable market conditions. While μ_I is no longer relevant, as the incumbent can now deduct input taxes too, a tax increase will lead to higher prices for the non-rated customer segment. To offset some of the resulting volume reductions, the operators will be forced to reduce their pre-tax prices, *ceteris paribus*. Pre-tax prices will decrease while after-tax prices will increase.

In equilibrium, demand will decrease as the increase in VAT introduces a new cost for non-rated customers.

A higher γ reinforces the negative effect of t on the equilibrium demands for both operators. Note that if $\gamma = 0$, then the tax rate t has no effect on the equilibrium demand.

Comparison of Scenarios A and B

A comparison of A and B yields the following result:

(i) The before-tax price of the entrant is lower in Scenario A than in Scenario B if and only if the proportion γ of VAT exempt customers is lower than the fraction μ_I of upstream and delivery costs that is non-labor.

(ii) The before-tax price of the incumbent is higher in Scenario A than in Scenario B for a reasonable range of parameters.

The relation between the fraction of non-labor upstream and delivery costs and the proportion of VAT exempt consumers crucially determines whether the before-tax price of the entrant is higher in Scenario A or B. Hence, if γ is smaller than μ_I, the incumbent's VAT exemption will translate into a disadvantage from the entrant's point of view and force the entrant to reduce prices, *ceteris paribus*. Note that in most of today's postal markets, this is the likely scenario, as incumbents often have a high percentage of labor costs (i.e., $\mu_I > 0.5$) while the fraction of non-rated customers does not exceed 50% (i.e., $\gamma \leq 0.5$).

While the entrant will be forced to decrease prices, *ceteris paribus*, the incumbent will be able to increase its price under reasonable calibration assumptions. Hence, VAT exemptions are likely to increase the competitive position of the incumbent.

3 Calibration

In order to predict competitive and welfare effects more precisely, we simulate the model using stylized data for the b-to-c bulk mail market. This is the segment where competition is most likely to occur after full market opening.

We use stylized market data and assume that the incumbent *I* as a single operator in the market would deliver 1 billion items of bulk mail at an average price of 0.35 units of money with a point-price-elasticity of -0.5.

Effects like customer inertia, reputation effects, or switching costs in favor of the USP are considered by an assumed asymmetry in the calibration of demand. We assume that the entrant would receive 20% of the market if it were to offer the very same services as the incumbent.

Parameter *γ* represents the fraction of VAT rated customers. The value varies across mail segments. For example, in the c-to-c segment, *γ* is close to zero as private customers cannot reclaim VAT. We report the result for the bulk mail segment of the letters market and set *γ* = 0.5. The value is in line with the current situation in the German letters market, where DPWN recently reported a 50% fraction of non-rated customers.

On the supply side, we need to differentiate cost in the three dimensions: variable/fixed, upstream/downstream and labor/non-labor costs. The latter is relevant for the deduction of input VAT (non-labor costs are VAT rated). In the monopolistic benchmark, we assume costs of 250 million currency units excluding input taxes. In line with demand calibration, the cost structure of the incumbent is

calibrated for a hypothetical monopoly situation. Thereby, we assume a reasonable rate of return such that the initial price of 0.35 represents a rate-of-return regulated monopoly.

Table 1 shows the major cost assumptions. With these assumptions, we are able to compute the necessary parameters to calibrate the two cost functions as introduced in (2).

Table 1: Major Cost Assumptions for Base Case

	Incumbent	Entrant
Fraction of fixed costs	40%	20%
μ^F	30%	80%
μ	30%	80%
Efficiency premium upstream	-	10%
Efficiency premium downstream	-	30%
Wage premium	-	-

We assume that the entrant pursues a different business model in the Base Case with less fixed costs because it makes use of subcontracting in delivery, making the cost structure more flexible (variable) and yielding a larger fraction of VAT rated inputs. We also assume that the entrant is more efficient upstream (by more strongly incentivizing digital sorting) and downstream (with a reduced delivery frequency). The lead example of such a business model is the Dutch company Sandd. Similar models can be found in other liberalized postal markets. For illustration purposes, we assume that both players pay equal wage rates.

The quasi-linear model framework allows for a computation of overall welfare by adding up consumer surplus, operator's profits and governmental tax revenues. The effect of changing postal VAT regimes on governmental tax revenues can be computed as follows. In the case that the USP is VAT exempt, the total VAT tax base is the value of the USP's input goods plus the product value of the USP's customers' output that is VAT rated. If the USP is VAT rated, the tax base is the value of the USP's output to VAT exempt customers in addition to the product value of the USP's customers' output that is VAT rated. Whether the difference in the two cases is positive thus depends on the USP's value added and the fraction of VAT rated customers. It is positive if the fraction of VAT exempt customers is larger than the inverse of the USP's relative value added. In the simulation section, we will compute the relevant overall welfare measures.

4 Numerical Results

With the calibrated model, we are now able to provide some insight into the overall competitive and welfare consequences of various tax regimes. In addition, we perform sensitivity analysis and derive recommendations for regulators, market players, and VAT authorities. Note that the quantitative results presented in this section serve as rough guidelines only.

We report simulation results for the two Scenarios A (incumbent is VAT exempt, $t_I = 0$) and B (both operators fully rated at $t_i = t = 20\%$). We are interested in (i) competitive effects measured by market shares, prices, and profits; (ii) welfare effects; and (iii) changes in collected VAT. We compute the latter against a benchmark scenario where both operators are VAT exempt ($t_I = t_E = 0$).

4.1 Base Case

Table 2 reports the results for the Base Case as introduced in Section 3. Furthermore, we show the figures for a "symmetric case", wherein the entrant is assumed to have the very same cost structure as the incumbent and consumers do not prefer one operator over the other ($\varphi = 0.5$). The results that illustrate the competitive effects are shown in the upper part of the table, while those that show the welfare effects are reported in the lower part.

Table 2: Simulation Results for Base Case and Symmetric case

Simulation Results Base Case (µI=0.3; µE=0.8)	Scenario A	Scenario B
Competitive Effects		
Incumbent Market Share	60%	59%
Price Ratio (I/E) excl. VAT	137%	125%
Price Ratio (I/E) incl. VAT	114%	125%
Profit Ratio (I/E)	275%	178%
Profit Difference I		-9'663'789
Profit Difference E		1'156'247
Welfare Effects		
Overall Price Level excl. VAT	0.34	0.32
Overall Price Level incl. VAT	0.36	0.38
Operator Profits	45'270'430	36'762'889
Consumer Surplus	352'656'946	349'511'937
Incremental Government Tax Revenue	-5'142'466	5'078'133
Overall Welfare	392'784'910	391'352'958

Simulation Results Symmetric Case (all parameter even)	Scenario A	Scenario B
Competitive Effects		
Incumbent Market Share	51%	50%
Price Ratio (I/E) excl. VAT	109%	100%
Price Ratio (I/E) incl. VAT	91%	100%
Profit Ratio (I/E)	9%	100%
Profit Difference I		-6'220'750
Profit Difference E		1'370'551
Welfare Effects		
Overall Price Level excl. VAT	0.32	0.31
Overall Price Level incl. VAT	0.35	0.37
Operator Profits	-9'152'028	-14'002'226
Consumer Surplus	411'980'809	409'195'102
Incremental Government Tax Revenue	6'604'941	13'535'288
Overall Welfare	409'433'722	408'728'163

In the Base Case, Scenario A (incumbent's VAT exemption) is more favorable for the incumbent. Compared to Scenario B (both operators fully rated), the incumbent's profit increases substantially while the entrant's profit decreases slightly. Both price and profit ratios are substantially higher for the incumbent in Scenario A, meaning that the incumbent can charge higher prices in Scenario A in relative terms and earn a higher profit at the same time. Despite its higher price level in Scenario A, the incumbent achieves a higher market share in the scenario. The figures show that the tax exemption is distorting competition significantly.[3]

Nevertheless, Scenario A exhibits slightly higher overall welfare than Scenario B.[4] There are two opposite welfare effects at work: as a result of the incumbent's VAT rating, the marginal tax rate increases on average. This lowers welfare. However, the market distortion between operators in Scenario A is abolished, and this increases welfare. While incremental profits are roughly compensated by opposite incremental tax effects (the profit decrease of the incumbent in Scenario B equals roughly the tax

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increase of the tax authority), consumers are slightly better off in Scenario A. The positive effect comes from the 50% non-rated customers who face lower net prices than in Scenario B.[5]

To sum up, abolishing the incumbent's VAT exemption levels the playing field while it slightly decreases overall welfare in the Base Case. The same basic results hold true in the symmetric case.

4.2 Effect of Different Cost Structures μ_I and μ_E

The formal results have indicated that the effects crucially depend upon the relative magnitude of parameters μ_I and γ. While γ is exogenously given, the cost structure μ_I can be chosen by the operators. Table 3 reports the simulation results for four different combinations of μ_I and μ_E (low/low; low/high, high/low; high/high). A high fraction of non-labor input indicates a business model with subcontractors in delivery while a low number represents the use of employees.

Recall from the analytical results in Section 2 that only μ_I was relevant for the competitive outcome.

As expected, μ_E is competitively neutral and only matters with respect to tax revenue. The fraction of rated inputs for the entrant, μ_E, is not relevant for the entrant's decisions making; a higher value of μ_E means larger VAT expenses that can be deducted 1:1 from the VAT billed to the consumers. For the tax authority, however, the net effect matters, as we report the difference in a scenario with both operators being VAT exempt. Hence, a higher μ_E increases the input tax deduction that the entrant can reclaim.

Table 3: Simulation Results for Different Combinations of μ_I and μ_E

Simulation Results Case 1 "Labour Intense" (μ_I=0.2; μ_E=0.2)

	Scenario A	Scenario B
Competitive Effects		
Incumbent Market Share	60%	59%
Price Ratio (I/E) excl. VAT	136%	125%
Price Ratio (I/E) incl. VAT	113%	125%
Profit Ratio (I/E)	321%	178%
Profit Difference I		-13'332'617
Profit Difference E		1'729'516
Welfare Effects		
Overall Price Level excl. VAT	0.33	0.32
Overall Price Level incl. VAT	0.36	0.38
Operator Profits	48'365'990	36'762'889
Consumer Surplus	354'240'427	349'511'937
Incremental Government Tax Revenue	7'474'462	21'762'910
Overall Welfare	410'080'879	408'037'735

Simulation Results Case 2 "Outsourcing Entrant (μ_I=0.2; μ_E=0.8)

	Scenario A	Scenario B
Competitive Effects		
Incumbent Market Share	60%	59%
Price Ratio (I/E) excl. VAT	136%	125%
Price Ratio (I/E) incl. VAT	113%	125%
Profit Ratio (I/E)	321%	178%
Profit Difference I		-13'332'617
Profit Difference E		1'729'516
Welfare Effects		
Overall Price Level excl. VAT	0.33	0.32
Overall Price Level incl. VAT	0.36	0.38
Operator Profits	48'365'990	36'762'889
Consumer Surplus	354'240'427	349'511'937
Incremental Government Tax Revenue	-5'177'227	8'975'826
Overall Welfare	397'429'189	395'250'651

Simulation Results Case 3 "Outsourcing Incumbent" (μI=0.8; μE=0.2)			Simulation Results Case 4 "Outsourcing" (μI=0.8; μE=0.8)		
	Scenario A	Scenario B		Scenario A	Scenario B
Competitive Effects			**Competitive Effects**		
Incumbent Market Share	58%	59%	Incumbent Market Share	58%	59%
Price Ratio (I/E) excl. VAT	138%	125%	Price Ratio (I/E) excl. VAT	138%	125%
Price Ratio (I/E) incl. VAT	115%	125%	Price Ratio (I/E) incl. VAT	115%	125%
Profit Ratio (I/E)	100%	178%	Profit Ratio (I/E)	100%	178%
Profit Difference I		8'537'414	Profit Difference I		8'537'414
Profit Difference E		-1'758'643	Profit Difference E		-1'758'643
Welfare Effects			**Welfare Effects**		
Overall Price Level excl. VAT	0.34	0.32	Overall Price Level excl. VAT	0.34	0.32
Overall Price Level incl. VAT	0.36	0.38	Overall Price Level incl. VAT	0.36	0.38
Operator Profits	29'984'118	36'762'889	Operator Profits	29'984'118	36'762'889
Consumer Surplus	344'849'307	349'511'937	Consumer Surplus	344'849'307	349'511'937
Incremental Government Tax Revenue	7'958'672	-1'623'248	Incremental Government Tax Revenue	-4'963'805	-14'410'332
Overall Welfare	382'792'097	384'651'577	Overall Welfare	369'869'619	371'864'493

In contrast to μ_E, changes in μ_I are of great importance for the market equilibrium in Scenario A, where the incumbent is VAT exempt. Here, changes in μ_I will be directly cost-relevant; outsourcing to equally efficient partners will increase costs by the VAT rate times the amount of the outsourced input goods. Comparing Scenarios B in Table 3, μ_I is irrelevant for the market equilibrium (in analogy to μ_E above). However, larger differences can be seen when comparing Scenarios A. While the relative prices remain about the same in equilibrium when comparing Cases 1 and 2 against Cases 3 and 4, the incumbent's profits in Scenario A decrease substantially. In other words, the incumbent's pricing is mainly driven by demand[6], and increases in costs are only changing its pricing decision to a minor extent. The results show that the incumbent's VAT exemption is an advantage in Cases 1 and 2 only, while it is a disadvantage in Cases 3 and 4, where incumbent profits are lower in Scenario A. The results are in line with our analytical findings. Note that in Cases 1 and 2, $\mu_I < \gamma$, while we have $\mu_I > \gamma$ in Cases 3 and 4. We conclude that the net competitive effect of an asymmetric VAT exemption crucially depends of the fraction of VAT rated inputs versus the fraction of non-rated customers. In the Base Case, the latter effect is outweighing the former and the exempt incumbent has a competitive advantage.

In terms of overall welfare, a higher μ_I decreases overall welfare in Scenario A, as the higher perceived cost of the incumbent reduces its profits and increases average prices in the market slightly (lower consumer surplus). In Scenario B, operator and consumer surplus remain unaffected. Abolishing the incumbent's VAT exemption decreases welfare in Cases 1 and 2 ($\mu_I < \gamma$), whereas it increases welfare in Cases 3 and 4 ($\mu_I > \gamma$). Hence, from a public policy point of view, the incumbent's VAT exemption makes sense, where the incumbent's fraction of non-labor costs is low. If it is high, the VAT exemption is welfare-reducing because it induces higher prices. This differentiation is not captured in the simulation results reported by De Donder et al. (2009).

In most European countries, incumbent operators predominantly do not make use of outsourced labor (μ_I is rather low). Hence, VAT exemptions for bulk mail can be justified from a welfare perspective in countries with a substantial fraction of non-

rated customers, even though such exemptions distort competition clearly in the incumbent's favor.

## 4.3 Effect of Different Combinations of γ and μ_I

The competitive effects of the Base Case are illustrated in Figure 2. The upper bar represents the incumbents increased profit in Scenario A in the Base Case, while the lower bar shows the profit decrease of the entrant (cf. Table 2). The Figure shows that the competitive effect of the exemption crucially depends on the incumbent's share of VAT rated inputs.

Figure 2: Illustration of Competitive Effects in Base Case
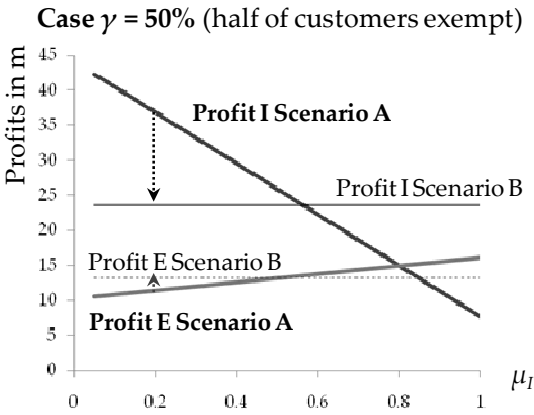
However, a VAT exempt incumbent will always be worse off when γ is very low (Figure 3, left side), and it will be always better off when γ is very high (Figure 3, right side). The first case represents a market segment where only industrial customers can deduct VAT, while the second case represents market segments with exempt customers such as banks. Private customers cannot deduct VAT, and hence, Figure 3, right side, also depicts the situation in the single piece mail market where incumbent operators remain exempt.

Figure 3: Competitive Effects in Individual Customer Segments
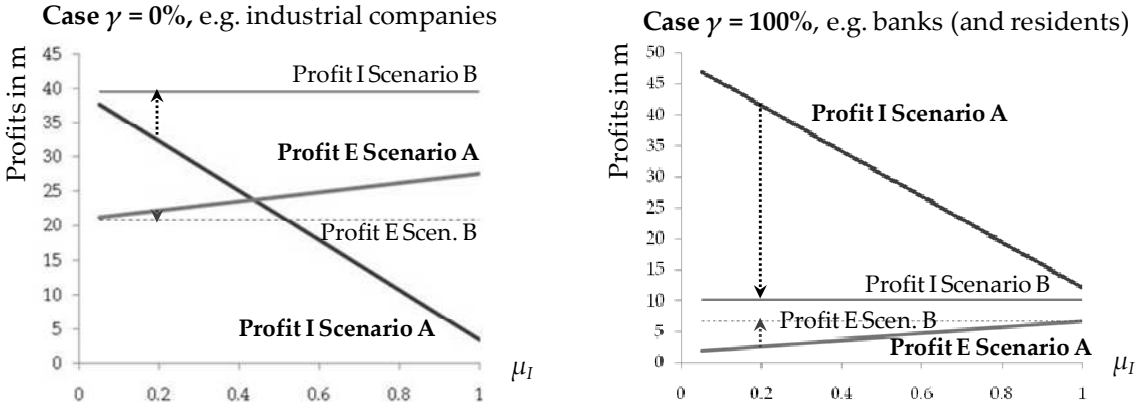
5 Conclusions

This paper sheds light on the main competitive impact of VAT policies while showing the consequences on overall welfare by presenting simulation results based on a calibrated quantitative model of the postal sector. This enables us to provide guidance on how to resolve the policy trade-off between a level playing field in the liberalized postal sector, consumer surplus and government tax revenues.

With a reasonable model calibration, the USP's VAT exemption positively affects the USP's profit and reduces the entrant's profit. Hence, it strengthens the incumbent's relative competitive position and results in an unlevel playing field. However, it has a positive effect on consumer surplus. Compared to no VAT exemption, it has a small but positive welfare effect in that the marginal tax rate is lower on average.

The VAT regimes in the postal sector also have an effect on the make-or-buy decisions of operators. VAT exempt operators have a higher incentive to employ their own workers instead of subcontractors and may therefore help maintain high-standard labor conditions in the postal sector.

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[1] Council Directive 77/388/EEC of 17 May 1977 on the harmonization of the laws of the EU member states relating to turnover taxes.

[2] More detailed formal results and complete proofs can be found in Dietl et al. (2010), available from the authors upon request.

[3] With one exception, the results are in line with recent decisions of Deutsche Post DHL to reduce its letter prices for business customers significantly in light of the new VAT regime in Germany as of July 1, 2010. However, Deutsche Post announced (for its change into Scenario B) net price decreases equal to the VAT rate itself, which is significantly more than we predict in our simulation.

[4] Our welfare results are different than those reported by De Donder et al. (2009), which yield higher welfare in Scenario B. While the authors report higher consumer surplus in Scenario A too, they multiply government tax revenues by 1.3 to reflect the shadow cost of public funds and therefore find higher overall welfare in Scenario B. As we are interested in the relative effects for the postal sector, we weigh all three constituents of welfare equally and generally do not account for second order effects in other parts of the economy.

[5] Note that this effect stems from the fact that we do not allow price differentiation between customer segments. Hence, the operators are forced to balance over the two customer segments yielding lower net prices for the rated customers. While we could extend the model to capture the relevant effects, regulations in many countries (e.g., Germany) will not allow differentiated prices for the incumbent.

[6] Note the oligopolistic situation in the market. The incumbent's market power is stemming from its incumbent advantage and differentiated services.