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Abstract

This paper shows the strategic aspects of international outsourcing in an oligopolistic market, if outsourcing is attractive because of fixed cost savings. We show that outsourcing decisions are strategic substitutes. Furthermore, we demonstrate that due to decreasing individual output, intensified competition increases the incentive to save fixed costs of integrated production and thus leads to more outsourcing. Additionally, we analyse how domestic costs and taxation affect the equilibrium level of outsourcing and employment. Here, we find that lower domestic costs decrease the proportion of outsourcing and therefore, increase employment. Concerning the impact of taxation, we find that a lower consumption tax on output decreases outsourcing. In case of a reversed outsourcing motivation, where outsourcing is associated with lower marginal costs but higher fixed costs than the domestic production, we show that the opposite effects concerning competition and taxation occur.

JEL classification: D20, L13, L22, L23, L24
Keywords: outsourcing, cost structure, Cournot-competition, taxation

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1. Introduction

It is without controversy that outsourcing has become a central topic in the political debate and in firms' management to reorganize the production mode. In addition, in the economic literature, especially in the theory of industrial organization, outsourcing has been discussed in depth. The analyses of outsourcing as a firm's organization decision started with Coase (1937). Focusing on the question, why a firm covers all steps of the production chain, although some could be realized by other manufactures, respectively the market, he developed a theory of vertical integration, which in fact, is a theory of outsourcing.[1] The driving force behind integration and less outsourcing are transaction costs, such as costs of quality control, information and communication. As pointed out by Harris (1993), these kinds of costs have been falling over recent decades due to technical developments, and thus favouring outsourcing.[2] The management of the firm compares the in-house production costs with the costs of external procurement, which includes price and transaction costs. If the costs of outsourcing are lower due to decreasing transactions costs, then the firm decides to outsource. However, the transaction cost thesis (see Williamson 1975, 1986) is just one way to explain outsourcing. The most frequently used argument for outsourcing is the reduction of marginal costs, such as wages, where transaction costs play only an inferior part. However, fixed costs or investment costs are also part of a firm's calculus and thus, also affect the choice of the organizational structure. Since outsourcing can be used to avoid fixed costs, the organizational choice can be interpreted as an investment decision, where outsourcing stands for a long-term externalization of certain production parts. Especially in the automobile industry and aircraft sector, which are characterized by high investment costs, this view takes on an important role. Sinn (2005) shows that 88% of the production volume of the Porsche Cayenne is procured externally. The study of the Fraunhofer-Institute and Mercer (2004) conclude that by the year 2015 up to 80% of the development and production in the automobile industry, i.e. the production stages with the highest fixed costs, will be sub-contracted. Thus, the input suppliers bear the major investment burden and compete directly with in-house input production of the car manufacturer.

In line with this view, outsourcing becomes an instrument for the firm to defend itself against competitive forces and to establish a strong market position. Porter (1985) argues that a strong market position can be achieved by being different than the competitors, in relation to structural characteristics, such as the production choice. One example for the production mode as a differentiation criteria is the well known label "Made in ….". This notice can be understood as a quality standard and also as a statement of social responsibility, which can lead to a better image of the firm. Since most markets are characterized by more than one firm, each entrepreneur has an incentive to differentiate and thus, the organization choice becomes an instrument of strategic interaction between the participants in an industry.

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1 For an overview of vertical integration, see Perry (1989) or Williamson (1996).

2 Empirical studies like Hummels et al. (1998, 2001) or Yeats (2001) show the increase of imported intermediate goods over the last 30 years.

In this paper we focus on two aims. First, we analyse the strategic interactions between companies in a Cournot-oligopoly, where the production of the output requires different components. Here, we characterize the optimal share of outsourced inputs depending on the production costs and the number of competitors. The second goal deals with the fear of reducing employment as a result of outsourcing.[3] Among other aims, governments and politicians are mostly interested in saving domestic jobs. Thus, they have to interact in the market and set some incentives to avoid outsourcing. In general, this can be done by subsidizing domestic production.

Since in our model, the relationship of fixed and marginal costs is decisive, we analyse in the first instance the effects of government interactions, which lower domestic production costs. Therefore, we look at the changes of investment and marginal costs. To make domestic production attractive due to lower investment costs, exploitation costs are taking over or public investments in the infrastructure are often implemented. Lowering marginal costs can be realized by lower social insurance contributions by the employer.

However, the government can also affect the organizational choice in another indirect way, i.e. the production costs are not influenced directly, but by changes in the demand for goods. These changes can occur through taxation. As a result of the tax, producer price decreases and consumer price increases, what reduces the total output. Since taxation influences the market outcome, it will generate an adaption of the production structure and thus the outsourcing decision. Therefore, tax policy is an instrument that can affect the production choice. Notice that the primary target of taxation is not to avoid outsourcing, but taxes can affect the production structure and therefore, it can be an instrument that favours external procurement or dampens the incentive for outsourcing. However, our central aim is to demonstrate only the impact of taxation on outsourcing.

In the first part of our analysis we see outsourcing as an investment, thus preventing capital intensive fixed costs. On the other hand, it entails higher marginal costs than in-house production and thus, the company faces a trade-off between investment costs and additional marginal cost payments. We show that the numbers of externally procured inputs are strategic substitutes. We also find that due to the fixed cost saving argument, higher competition in the market leads to more outsourcing. Regarding of the second goal, we demonstrate that decreasing marginal and fixed costs favours integrated production and thus leads to a higher employment level. Concerning taxation, we show that higher output taxation increases the equilibrium proportion of outsourcing and thus reduces the total amount of output and employment. We also analyse the strategic interactions, impact of competition and taxation for the reversed outsourcing motivation, where outsourcing is, on the one hand, attractive due to lower marginal costs, but on the other hand is associated with fixed costs. Here, we find that strategic interactions concerning outsourcing decisions are also strategic substitutes. Therefore, the strategic relationship does not depend on the motivation of outsourcing. However, this statement does not hold for the impact of competition and taxation. In both cases, there is a decreasing output. Since now outsourcing requires fixed costs, lower revenues are used for financing these

[3] For an overview concerning this debate, see Freeman (1995) and Bhagwati et al. (2004).

fixed costs and profit will decline. Thus, higher competition and taxation increases the incentive to produce more integrated. This result shows that the motivation of outsourcing is decisive in relation to the effects of changes in market characteristics.
Our analysis is organized as follows. Section 2 integrates the analysis with the existing literature. Section 3 presents the basic framework if outsourcing is attractive because of fixed cost savings. Following this, section 4 concentrates on the influence of government interactions. In section 5, we analyse the effect of competition and taxation in relation to reversed motivation, where outsourcing saves marginal costs. The last section concludes.

2. Related Literature

Although there is a growing literature relating to outsourcing and its effects on wages and employment[4], only few studies focus on the strategic aspects, where the price structure and thus the intensity of competition is affected by organizational choice. In a Cournot-duopoly, Nickerson and Vanden Bergh (1999) derive conditions for the production structure in the different possible Nash-Cournot-equilibria: i) both use outsourcing, ii) both have integrated production or iii) the firms use different strategies. In this framework, the resulting equilibrium depends on the trade-off between fixed cost saving against marginal cost increase due to outsourcing. In addition, Shy and Stenbacka (2003), in a Hotelling model, depict the organizational decision in imperfect output markets with the identical trade-off. Since in both analysis outsourcing leads to lower fixed costs but higher marginal production costs, in the case of relatively high (low) fixed cost and/or low (high) marginal cost differences, the firms will outsource (produce integrated). If the fixed cost level and/or the marginal cost difference have a medium level, a different production structure will result. Assuming the same trade-off as the above mentioned paper, also Buehler and Haucap (2006) analyse the strategic aspects of outsourcing. However, they differ in two ways. First they model a sequential decision process of the firms. Thus, the choice of the first firm influences the second participant's behaviour and the competition via the costs. The second difference is the outsourcing price reaction. In the first two papers, the price of external procurement is constant, but in Buehler and Haucap (2006), it rises with increased outsourcing. Since one firm can influence the behaviour of its competitor, it will soften the competition with its organizational choice. The authors identify the three known types of equilibria. However, in the case of different strategies, the first firm will produce integrated to increase the marginal costs of the second firm, which will produce via outsourcing. Eberfeld (2001) assumes the same trade-off and shows that due to a positive externality of the integration decision of one firm on other firms, different production modes can exist in equilibrium. This holds since integrated firms produce with lower marginal costs and thus the market price decreases. As a result, the demand grows and other firms lose the incentive to integrate. He also finds that higher fixed costs associated with integrated production decrease the advantage of

[4] For a survey of the empirical literature see Knabe and Koebel (2006), Geishecker (2008) or Geishecker and Görg (2008) and their references. Examples of theoretical analyses are Zhao (1995), Lommerud et al. (2009) or Koskela and Stenbacka (2009).

integration and thus, reduce the number of firms with integrated production. Also the effect of a higher degree of competition in the input market can be explained intuitively. Since stronger competition lowers the price for the input good, outsourcing becomes more attractive and the number of integrated firms in the final good market decreases. However, all of these papers concentrate on complete outsourcing, where the firm has only the choice of complete outsourcing or no outsourcing. Only partial outsourcing is the focus in Shy and Stenbacka (2005). In a Cournot-model, they find that higher competition stimulates outsourcing. In contrast to the studies above, in both papers, the trade-off is reversed, such that integrated production has higher marginal costs due to a lower degree of specialization or less efficiency. On the other hand, outsourcing is associated with fixed costs for search frictions, contractual imperfections and monitoring.

A direct influence on the competitor can also occur through horizontal outsourcing.[5] Here, using a Bertrand-duopoly with an auction approach, Kamien et al. (1989) analyse the strategic aspect of outsourcing on bids, output price and thus on the competition. Spiegel (1993) shows that in a Cournot-model with horizontal outsourcing, production can be efficiently divided among the companies. However, the effect on aggregate output and price is ambiguous, and thus, only in the case of growing market output will welfare definitively increase. Comparing the welfare in Bertrand- and Cournot-competition with horizontal outsourcing, Arya et al. (2008) find that the welfare level in Bertrand-competition is smaller than in Cournot- competition. The reason for this result is that the costs of the input producer increase and this firm will lose some of its aggressiveness on the Bertrand-market. Therefore, the output price is higher as in Cournot-competition.[6]

Although we adapt the framework by Shy and Stenbacka (2005), the differences should be emphasized. The first difference is that we have a reverse outsourcing motivation in the first part of our analysis. Here, we model the trade-off of fixed cost saving against higher marginal costs due to outsourcing, while they model a cost structure, where outsourcing is associated with a marginal cost advantage, but has a disadvantage in the form of transaction costs, which increase with the number of outsourced inputs. Secondly, we assume constant marginal costs, where Shy and Stenbacka (2005) model increasing marginal costs. This difference will also exist in the second part of our analysis, where we assume the same motivation of outsourcing as Shy and Stenbacka (2005). Therefore, we can answer the similar question to which Shy and Stenbacka (2005) responded, but we extend the analysis by showing the impact of taxation.

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[5] Vertical outsourcing is characterized by the fact that an input producer specializes on intermediate good production. In contrast, horizontal outsourcing describes the fact that firms compete in the output market, but produce also parts for the rival firm.

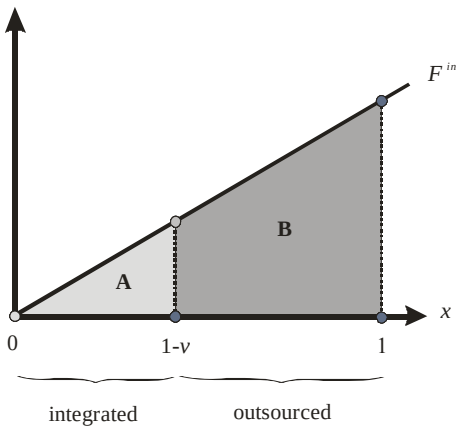
[6] Similar to horizontal subcontracting and the resulting welfare effects, the welfare effects of cross-supplies, where firms in an industry due to existing fixed costs, sell the final good to each other, is studied in the literature. Baake et al. (1999) show that cross-supplies always increase welfare compared to the normal Cournot-outcome.

3. Basic Model

Following Shy and Stenbacka (2005), we assume that the production of one unit of the final good y requires a continuum of inputs x indexed by $x \in [0;1]$. The firm faces a make-or-buy decision, since each input can be produced in-house at the firm's plant or can be outsourced to an independent supplier.

The firm can produce one unit of any input integrated at constant marginal costs m. Additionally there are fixed costs F associated with in-house production. These costs can be saved by outsourcing, in which case, any of the inputs can be bought at a constant price q.[7] For being simple, we abstract from any kind of fixed costs associated with outsourcing.[8] If $q < m$, outsourcing is a strictly dominant production mode, since it saves marginal and fixed costs. Therefore, we focus on the case, where the price of buying one input unit from a foreign supplier is bigger than the marginal costs of the integrated production, i.e. $q > m$[9], where the marginal cost disadvantage of outsourcing can be interpreted as an premium payment to the intermediate good supplier. For the fixed costs, we assume that they will vary with the type of the input x and increase over the interval $[0;1]$. Due to the indexation of the inputs and the assumption on linear increasing fixed costs, we can conclude that the final producer will only produce the cheapest inputs in an integrated way. Let $v \in (0;1)$ be the amount (respective share) of outsourced inputs, then the fixed costs for integrated produced inputs can be described by $F = \int_0^{1-v} x\,dx$. We can illustrate the fixed cost assumption in Figure 1.

Figure 1: fixed cost illustration



Starting from a fully integrated input production, the fixed costs are described by the light grey area A and the grey area B. If v inputs are outsourced, the firm will reduce its fixed

[7] This means that we assume linear pricing for any intermediate good.

[8] Following this, we abstract from costs like expenditure to find an appropriate external supplier, severance package or costs for supervising the quality of the intermediate good. We therefore assume that there is no hold-up problem in the relationship between the final good and the intermediate good producer.

[9] This is reasonable, if we assume that the domestic firms have technological advantages.

costs by B. This describes the fixed cost saving argument, since there are only fixed costs (area A) for the residual integrated production $1-v$.
By using our assumption for the fixed costs, we implicitly model quadratic fixed costs, i.e. $F=\frac{(1-v_i)^2}{2}$.[10]
In the basic framework, there are $i=1...N$ firms, where y_i captures the output of a single firm. We can use this notation to specify the total costs of firm i as

$$TC_i=\left[(1-v_i)\cdot m+v_i\cdot q\right]\cdot y_i+F. \tag{1}$$

The framework of the model can be described as a two-stage game with the following sequence of events:

(I) Each firm i $(i=1...N)$ chooses the inputs $v_i\in(0;1)$, which will be outsourced, i.e. will be bought from an independent input supplier, and decides the set of inputs $(1-v_i)$, which will be internally procured.

(II) Each firm takes the outsourcing and output decision of the other firms as given, and chooses its production level to maximize its profit.

These stages are analysed by using backward induction.

3.1 Stage II: Cournot-Equilibrium

In line with the former discussion, we assume that all firms engage in a Cournot-competition in homogeneous goods, where the linear market demand for the final good is described by $p=1-Y=1-\sum_{i=1}^{N}y_i$, with $i=1...N\geq 2$ as the index of firms and p as the market price.
At this stage, we characterize the production decision of the firm for a given output choice of the other firms. Each firm chooses the output level y_i to solve its maximization problem

$$\max_{y_i}\Pi_i=\left[1-m-y_i-Y_{-i}-v_i\cdot(q-m)\right]\cdot y_i-F, \tag{2}$$

with $Y_{-i}=\sum_{j\neq i}y_j$ as the output of all competitors except i. The first derivative of the profit function yields the reaction function $y_i=\frac{1}{2}\left[1-m-Y_{-i}-(q-m)\cdot v_i\right]$ of a single

[10] A detailed algebraic formulation is $F=\int_0^1 x\,dx-\int_{1-v}^1 x\,dx=\int_0^{1-v}x\,dx$. Notice, that a quadratic fixed cost function guarantees that the outsourcing advantage decrease with an increasing amount of external procurement, since the marginal cost difference is the same for all numbers, but the fixed cost saving will decrease. Additionally, this leads to the necessary condition of a negative second order condition of the profit function.

firm $i = 1,...,N$, which characterizes the best response function for the given output level of all the other firms. Since there are N firms in the market, we get a system of N reaction functions. The solution of these equation system yields the Cournot-equilibrium output level as a function of the outsourcing decisions. To solve this equation system, we have to use repeated substitutions. Here, we find that the output of one firm depends on its own share of external procurement and the outsourcing decision of all the other competitors. Formally, the individual output can be written as

$$y_i = \frac{1}{(N+1)}\left[1 - m + (q-m)\cdot\left(\left(\sum v_{-i}\right) - N \cdot v_i\right)\right], \tag{3}$$

with $\sum v_{-i}$ as the sum of the outsourced inputs of all firms except i. For the industry output and market price we obtain $Y = \frac{1}{(N+1)}\left[N(1-m) - (q-m)\cdot\sum_{i=1}^{N} v_i\right]$ and $p = \frac{1}{N+1} + \frac{N \cdot m}{N+1} + \frac{q-m}{N+1}\cdot\sum_{i=1}^{N} v_i$. Here, we see that the price is influenced by the outsourcing decision of all firms and thus by the marginal production costs.

Equation (3) shows that the output of a firm depends negatively on the amount of the firm's outsourced inputs v_i. Due to the marginal cost disadvantage of outsourcing, $q > m$, higher external procurement (higher v_i) increases the output price, and thus demand and production decrease.

The impact of the production mode decision of the other firms v_{-i} can be similarly described. If the number of outsourced inputs of all other firms increases, marginal costs of these firms increase and thus the demand will decrease. Due to the property of homogenous goods, this increases the demand of firm i.

Since the price has to be lower as consumer's maximal willingness to pay, the condition $p < 1$ has to be fulfilled. In connection with our assumption $q > m$, this is given for $1 > q > m$. The term q characterizes the unit production costs of one piece of output, if all components are externally procured and thus the term describes the maximal marginal production costs of one unit of the final good. To be sure that the market price exceeds the marginal production costs in any case of the production mode, we assume that maximum willingness to pay is bigger than the maximum unit of production costs for one piece of the final good.

Thus, we can formulate our assumption concerning the maximal willingness to pay.

Assumption 1: non-negative output

We assume that $1 > q > m > 0$ *holds.*

Assumption 1 secures that there is a positive market outcome for any organizational choice and thus we avoid a corner solution.

3.2 Stage I: Optimal Production Mode

Since we have characterized the results on stage II, we can look at stage I to determine the optimal amount of procured inputs of a firm as a function of the number of competitors, the domestic marginal costs and outsourcing price. If we use our former results and insert these into the profit function, we can specify the object function (2) on stage I for firm $i = 1,...,N$ as

$$\max_{v_i} \Pi_i = \frac{\left[(1-m)+(q-m)\cdot\left(\left(\sum v_{-i}\right)-N\cdot v_i\right)\right]^2}{(N+1)^2} - \frac{(1-v_i)^2}{2}. \tag{4}$$

Since the firm decides directly about the amount of externally procured inputs v_i there are only fixed costs for each of the residual integrated produced inputs, so that the firm has to pay fixed costs of $\frac{(1-v_i)^2}{2}$. Consequently, there is a fixed cost saving of $v_i\left(1-\frac{v_i}{2}\right)$ for the external procured inputs in comparison to a situation with no outsourcing.[11] As the first order condition of the maximizing problem (4) we obtain:

$$\frac{\partial \Pi_i}{\partial v_i} = \frac{-2\cdot N(q-m)}{(N+1)^2}\left[(1-m)+(q-m)\left(\left(\sum v_{-i}\right)-N\cdot v_i\right)\right]+(1-v_i)=0.$$

Solving the first order condition we obtain the reaction function of a firm, defined as the best response of i to the disintegration choice of all rival firms $\sum v_{-i}$:

$$v_i = \frac{(N+1)^2 - 2N\cdot(q-m)\cdot\left[(1-m)+(q-m)\cdot\sum v_{-i}\right]}{(N+1)^2 - 2N^2(q-m)^2}. \tag{5}$$

If we use the symmetry property $v_1 = ... = v_N = v$ we can simplify the individual reaction function and obtain the equilibrium proportion of outsourcing

$$v^* = \frac{(N+1)^2 - 2N\cdot(q-m)\cdot(1-m)}{(N+1)^2 - 2N\cdot(q-m)^2}. \tag{6}$$

Before we analyse the effects of intensified competition and domestic costs, we have to show that several conditions are fulfilled.

At first we have to ensure, that (6) describes a profit maximum. Therefore, the second order condition has to be negative. For an N-firm Cournot-oligopoly with homogenous goods, from (4) we obtain as the second order condition, $\frac{\partial^2 \Pi_i}{\partial v_i^2} = \frac{2N^2\cdot(q-m)^2}{(N+1)^2} - 1$. To

[11] This term correspondents to area B in Figure 1.

guarantee that (6) constitutes a profit maximizing equilibrium with positive profits, thus the condition $q - m < \frac{N+1}{N \cdot \sqrt{2}}$ has to be fulfilled.

In addition we have to guarantee that the individual and industry output in the equilibrium is positive, so that the output price is lower than consumer's maximal willingness to pay, i.e. $p < 1$. Inserting the optimal outsourcing proportion in the output equation, we find that a positive individual and industry output in the equilibrium is obtained, if $q - m < \frac{N+1}{\sqrt{2 \cdot N}}$. Therefore, we have the conditions that can be checked to identify, which of them is binding. Comparing the last expression with the second order condition, we find that $\frac{(N+1)}{N \cdot \sqrt{2}} < \frac{(N+1)}{\sqrt{2N}}$ for $N > 1$. Since we assume that at least two firms compete in the market, we have $p < 1$, if the second order condition holds.

However, $p > 0$ also has to be fulfilled. Here we find that a positive market price will result for $(q-m)^2 < \frac{(N+1)^2}{2N} - \frac{(1-q)(N+1)}{2}$. In addition, this expression has to be compared with the second order condition to derive the necessary condition. If $\frac{(N+1)^2}{2N^2} < \frac{(N+1)^2}{2N} - \frac{(1-q)(N+1)}{2}$ holds, the second order condition is the binding constraint. However, this is only given for $q > \frac{1}{N^2}$. Assuming that this is given, we can identify an interval for the marginal cost difference, in which the model leads to an internal solution.

Assumption 2: internal solution

For a given market size, the marginal cost difference fulfils $\frac{1}{N^2} - m < q - m < \frac{N+1}{N\sqrt{2}}$.

Since our interest is partial outsourcing we have to show, that $v^* \in]0;1[$ will be generated from profit maximization. For $v^* < 1$ we found that this will hold, if $q < 1$. Since this is our Assumption 1, $v^* < 1$ is given. For the absence of full outsourcing an intuitive explanation from our cost structure can be derived. Figure 1 shows the fixed costs for every needed input. It can be seen for the first marginal unit of input goods, there are no fixed costs. However, the domestic marginal costs m and the price for external procurement q, with $q > m$, are the same for all inputs. Therefore, for the first marginal unit, there is only a disadvantage of outsourcing, which means that this unit will not be outsourced. Thus, for this cost structure, we will never observe full outsourcing, since at least the first marginal unit of input goods will be produced in an integrated way.

Now we have to check that $v^* > 0$ holds. Under Assumption 2, the denominator of (6) is positive. A positive numerator is guaranteed by $q - m < \frac{(N+1)^2}{2N(1-m)}$. Comparing this

expression with Assumption 2, we find that $\frac{N+1}{N\cdot\sqrt{2}} < \frac{(N+1)^2}{2N(1-m)}$ holds, if $(N+1) > (1-m)\cdot\sqrt{2}$. Due to our assumptions $1 > m > 0$ and $N \geq 2$, this is always true and also the numerator is positive. Thus equation (6) is an internal solution, with $0 < v^* < 1$.

Assuming there is no difference in marginal costs, $q = m$, we can see from (6) that in this case the whole input production will be outsourced. This is intuitive, here, external procurement has no disadvantage, but does have the advantage of fixed cost saving.

After checking the necessary conditions, we look at the first derivative of (6) with respect to the number of competitors N and the domestic marginal costs, to analyse their impact on the production mode. For the impact of the intensity of competition we find

$$\frac{\partial v^*}{\partial N} = \frac{2\cdot(N^2-1)\cdot(q-m)\cdot(1-q)}{\left[(N+1)^2 - 2N\cdot(q-m)^2\right]^2} > 0\,. \tag{7}$$

Equation (7) shows that higher competition increases the amount of outsourced inputs, which can be explained as follows. If the number of competitors increases, then the market share and the output of a single firm fall. Since also mark-up on output price decreases, consequently, the profit of the firm declines. To react to this loss, the firm adjusts its number of externally procured components to influence its costs. However, the number of outsourced inputs affects the costs of a firm in two ways, due to the fixed costs and due to the marginal production costs. Since a more integrated production process increase the intensity of competition and the fixed costs, the firm has no incentive to produce in a more integrated way. On the other hand, the lower market share and resulting lower individual output increases the incentives to reduce the fixed costs and intensity of competition, since the realized revenues are too low for bearing the fixed costs for an unchanged production mode. In our framework, this can be done by reducing the number of integrated produced inputs respectively by increasing outsourcing activities.

Since, in the next section, we will analyse government interactions that affect the domestic production costs, we will now analyse the effect of the domestic marginal costs on production mode. Here we find

$$\frac{\partial v^*}{\partial m} = \frac{2N(1-q)\left[(N+1)^2 + 2N\cdot(q-m)^2\right]}{\left[(N+1)^2 - 2N\cdot(q-m)^2\right]^2} > 0\,. \tag{8}$$

This result is very intuitive. If domestic marginal costs are increasing, ceteris paribus, the marginal cost advantage of the integrated production decreases, and thus outsourcing will be more profitable. To make it more clear: the advantage of outsourcing due to the fixed cost saving will be unaffected and the marginal cost disadvantage of outsourcing will be smaller, which implies that buying the input becomes more attractive and the proportion of external procurement increases. We can sum in:

Proposition 1:

For homogenous final goods

a) increasing competition and

b) higher domestic marginal costs leads to more outsourcing.

To examine the strategic relationship of outsourcing choices, we restrict our model in the size of producing firms by focusing on the duopoly case. Therefore, the reaction function (5) can be rewritten as

$$v_i = \frac{9 - 4 \cdot (q - m) \cdot \left[(1 - m) + (q - m) \cdot v_j \right]}{9 - 8 \cdot (q - m)^2}, \tag{9}$$

where the indices i and j characterize the two firms. From equation (9) the strategic relationship $\frac{\partial v_i}{\partial v_j}$ respectively $\frac{\partial v_j}{\partial v_i}$ between the outsourcing decisions can be derived. The first derivative yields under the necessary Assumption 1

$$\frac{\partial v_i}{\partial v_j} = \frac{\partial v_j}{\partial v_i} = \frac{-4 \cdot (q - m)^2}{9 - 8 \cdot (q - m)^2} < 0. \tag{10}$$

Thus, we have downward sloping reaction curves for the outsourcing decision, where an increase of outsourced inputs in one firm decreases the number of outsourced inputs in the other firm, so that the numbers of externally procured inputs are strategic substitutes.[12] This means that each firm has an incentive to increase their own amount of externally procured inputs as a response to a reduction of the outsourcing activities by the other firm. Due to the assumption of higher marginal costs of outsourcing, lower outsourcing of firm j decreases the price of the output good. This, in turn, decreases the demand for the output of i. Therefore, the firm faces a disadvantage, since its output and profit decreases. This can also be seen from the first order condition $\frac{\partial \Pi_i}{\partial v_i}$. The first term characterizes the marginal revenue, including marginal costs and, the second term is the associated fixed costs. Due to lower outsourcing of firm j, the marginal revenue decreases, however, the fixed costs are unchanged. Therefore, firm i realizes a loss. To react to this loss, firm i has to adapt its production organization, which can be done by reducing or enlarging its outsourcing activities. As equation (10) pointed out, the firm will increase its share of outsourcing. Since the market share of firm i decreases, the output and revenue are too small for bearing the associated fixed costs. Therefore, there is an incentive to outsource and to avoid the fixed costs. Additionally, firm i will decrease the

[12] The term "strategic" describes the property of the production mode. Due to the choice of outsourcing proportion, the price, as well as the profit of the competitor is influenced. Thus, the market position is affected and the choice of the production organization has a strategic component.

intensity of competition, since the price is affected by the marginal costs of all firms. The firm can achieve lower fixed costs and less intensity of competition by increasing the share of components, which are bought by a higher price from outside the firm. Following this, the marginal cost disadvantage will be compensated by lower fixed costs and weaker competition associated with higher outsourcing.[13] We can summarize our finding as follows:

Proposition 2:

The numbers of externally procured inputs are strategic substitutes.

This finding can also be interpreted in line with Proposition 1, where the outsourcing proportion increases with the higher intensity of competition. The argument suggesting that the market share of a single firm is too low for bearing fixed costs and thus more outsourcing is observed. Additionally, due to the increased intensity of competition also the market price declines. However, adjusting the production mode in favour of outsourcing reduces the fixed costs and partly absorbs the reduction in market price, since the marginal costs of all firms affect the market price. The incentive to lower the intensity of competition also occurs when there is a decrease in outsourcing activities of firm j, since, in both cases, the price will decline. To react against this price decline, a single firm can increase its marginal production costs via outsourcing, to fight against this fall and lower the intensity of competition.

4. Government Interaction

Since high unemployment can be partly explained by higher outsourcing, policy instruments, which are helpful to increase the employment level, should favour domestic production. Before we analyse those instruments, we have to introduce labour as a production factor. To be simple, we assume that each integrated produced input requires one unit of labour. Thus $1-v$ describes the equilibrium employment proportion of a firm and $L=(1-v)\cdot Y$ describes the equilibrium employment level in the industry. As we showed, a lower proportion of outsourcing is achieved by a lower intensity of competition. Thus, the government can avoid an increase of competition by preventing new firms entering the market, which can be done by building up some entry barriers, such as bureaucratic restrictions. However, there are other channels that can influence a firm's decision, which are less bureaucratic and restrictive.

Subsidies are another instrument that lower production costs and therefore, affect a firm's choice in favour of integrated production. In our framework, two subsidies are possible. The first one is a subsidy relating to domestic marginal costs and the second is a fixed cost

[13] Also, Eberfeld (2001) finds that lower output due to a lower demand will lead to more outsourcing in order to avoid the associated fixed costs.

subsidy. However, in the EU the implementation of a subsidy is limited or partly forbidden by law[14], but there are some flaws in that policy and alternatives can be found.
To lower domestic marginal production costs, non-wage labour costs like the social insurance contribution for the employer have to decrease. A German example of a fixed cost subsidy is the payments made by the government of the German state Nordrhein-Westfalen to the mobile phone producer Nokia. These payments lower investment costs and make it easier to settle in Germany and create a certain number of jobs. This subsidy can be understood as investment assistance, such as developing real estate, or for the development of infrastructure, which can also include the provision of adequate production opportunities.
Also, with tax reforms, the government can influence the production mode, since changes in tax rates affect prices and therefore, affect the demand for output and input goods. To respond to this impact, firms adopt their production mode.
In this section we analyse these influences by separating government interactions into two categories. The first is the production cost effect and the second is the taxation effect. As mentioned above, under the production cost affect, we analyse changes in domestic marginal and fixed costs. This reflects the public debate, regarding the reduction of non-wage labour costs for the employer, which relates to the reduction of marginal costs and the implementation of investment assistance for reducing fixed costs. Paragraph 4.4.2 focuses on the tax system. Here, we analyse the effect of a consumption tax. Using comparative statics, we demonstrate the effects on outsourcing proportion and employment. By doing this we concentrate on a short-term perspective, where the number of firms is unaffected and thus equal in the different scenarios. Therefore, we exclude market entry and market exit.
Please note this is a positive analysis only, where we show the general impact of existing policies on outsourcing demand in oligopolistic markets. Thus, we ignore the financing of subsidies or lower social insurance contribution made by employers, by other taxes and the resulting impacts. Due to this partial framework, from our analysis it cannot be concluded that the different policies are adequate instruments to avoid outsourcing, however, we can demonstrate, in which way they affect the organizational choice.

4.1 Production Cost Effect

As mentioned above, domestic costs are influenced by marginal and fixed costs. Thus, there are two components that are affected by different government policies.

Marginal Cost Influence

By interpreting the marginal costs as gross labour costs, the government can lower them to decrease outsourcing and thus promote higher employment. This can be done by reducing indirect labour costs such as social insurance contributions, which are borne by

[14] For example, a subsidy that distorts the competition and trade between countries is forbidden. However, subsidies that assist the development of certain industries and regions get the acceptance of the commission of the EU and can be implemented, if they do not distort the competition (Europäische Gemeinschaft, 1997, § 87 EG-Vertrag).

the employer. To show this effect, we interpret the marginal costs m as gross labour costs. As usual in Germany, these costs consist of two parts, the gross wage $\tilde{m}$ and the social insurance contributions of the employer, i.e. $m = (1+t)\cdot\tilde{m}$, where t characterizes the social contribution rate for the employer. For simplicity, we assume that the gross wage is fixed by an administrative minimum wage or is given to the industry through a wage agreement between an employer federation and trade union.
From equation (6), we can derive the effect of the non-wage labour costs by taking the first derivative with respect to the social insurance contribution, i.e. $\frac{\partial v^*}{\partial t} = \underbrace{\frac{\partial v^*}{\partial m}}_{+} \cdot \underbrace{\frac{\partial m}{\partial t}}_{+} > 0$.

Therefore, a lower social insurance contribution for the employer reduces the equilibrium outsourcing proportion. This is intuitive, since domestic marginal costs are falling and thus, the advantage of integrated production increases, while the disadvantage is unchanged. Thus, a reduction of these costs leads to a more integrated production and consequently, reduces outsourcing.
Following the assumption concerning labour input, the equilibrium employment is

$$L = \frac{2N^2(1-q)^2(N+1)(q-m)}{\left[(N+1)^2 - 2N(q-m)^2\right]^2}. \tag{11}$$

It is easy to see that a lower social insurance contribution for the employer increases the employment level, i.e. $\frac{\partial L}{\partial t} = \underbrace{\frac{\partial L}{\partial m}}_{-} \cdot \underbrace{\frac{\partial m}{\partial t}}_{+} < 0$. Since every output unit will be produced with a higher share of domestic inputs, marginal production costs and therefore, the output price will decrease. This will stimulate the market demand, which will result in a higher amount of production. Since the integrated produced proportion and total produced output increases, the equilibrium employment level will be higher.
Thus, we show the well known postulation of lower non-wage labour costs by reducing the employer payment of social costs leading to less outsourcing and higher employment. Since, the gross wage $\tilde{m}$ affects the gross labour costs in the same way, we obtain the qualitative same results for changes in the gross wage.

Fixed Cost Influence
To incorporate lower fixed costs, one way would be to offer a subsidy payment, which is orientated on the production fixed costs. This means that, with investment assistance, the firm has to pay only a certain share of the fixed costs. We can interpret these payments as a provision of a better infrastructure or a takeover of industrial real estate development. Following this interpretation, we modify our model so that the firm will only bear the proportion $1-a$ on the associated fixed costs of integrated production, where the parameter a characterizes the proportion of fixed costs, which is now financed by a subsidy. Thus, the profit of a firm on stage I is given by

$$\max_{y_i} \Pi_i = \left[1 - m - y_i - Y_{-i} - v_i \cdot (q - m)\right] \cdot y_i - (1 - a) \cdot F .$$

Due to the property of the subsidy, we obtain in stage I the same results as in section 3.1. After using these outcomes, the problem in stage II becomes[15]

$$\max_{\hat{v}_i} \Pi_i = \frac{\left[(1 - m) + (q - m) \cdot \left(\left(\sum \hat{v}_{-i}\right) - N \cdot \hat{v}_i\right)\right]^2}{(N + 1)^2} - (1 - a)\frac{(1 - \hat{v}_i)^2}{2}.$$

Thus we derive by assuming symmetry

$$\hat{v}^* = \frac{(1 - a)(N + 1)^2 - 2N \cdot (q - m) \cdot (1 - m)}{(1 - a)(N + 1)^2 - 2N \cdot (q - m)^2}. \tag{12}$$

Notice, that now Assumption 2 has to be modified to $\frac{1}{N^2} - m < q - m < \frac{N + 1}{N\sqrt{2}}\sqrt{1 - a}$. This guarantees positive profits and an output price, which lies in the interval $(0;1)$. Since we know that there is no complete outsourcing, from (12), one can see that a fixed cost subsidy set too high can lead to complete integrated input production.

Comparing equations (6) and (12), we see that $\hat{v}^* < v^*$ and therefore, an investment subsidy, increases the integrated produced proportion of inputs. Similar to the explanation above, this results from the distortion of the costs. For every integrated production, the fixed costs borne by the firm are lower and, the disadvantage of the integrated production decreases at a constant marginal cost advantage. Therefore, saving fixed costs due to outsourcing falls and firms produce in a more integrated way.

Due to lower fixed costs and the change of production mode in favour of integration, the total production costs of one unit of output decreases. This in turn decreases the market price and increases the total output. Under the specification for the use of labour as a production input, the equilibrium employment level increases, since now, the industry output and the share of integrated input production is higher as in a scenario without an investment cost subsidy. This can also be seen from a comparison of the employment levels, $\hat{L} = \frac{2N^2(1-q)^2(N+1)(q-m)(1-a)}{\left[(N+1)^2(1-a) - 2N(q-m)^2\right]^2}$ and $L = \frac{2N^2(1-q)^2(N+1)(q-m)}{\left[(N+1)^2 - 2N(q-m)^2\right]^2}$.

The analysis shows that government interactions, which affect the domestic production costs in favour of integrated production, help to realize the aim of a higher employment level by reducing the outsourcing activities. To achieve this, the labour costs and/or the investment costs have to decrease. Therefore, the demands to reduce the non-wage labour costs for employers or gross wage and public subsidies, interpreted as investment assistance, are useful instruments to realize the employment target. So we have:

[15] For a better distinction, all variables in this scenario are characterized by a "^".

Proposition 3:

The reduction of gross labour costs by lower non-wage labour costs or gross wage and the implementation of an investment cost subsidy will favour domestic production and increase employment.

These results are intuitive, since both policies distort the trade-off for the firm in favour of integrated production. Thus, a firm has the incentive to produce more integrated. From this point of view (by ignoring the financing of these payments), subsidies are a useful instrument to prevent outsourcing in industries, which are important for the domestic economy. However, one has to notice that the implementation of a subsidy depends on the acceptance of the EU, and sets incentives for competition in the government budget, since every country will attract firms that are saving or creating jobs through financing some investments.

4.2 Taxation Effect

In the previous section, we showed the effect of government interactions that reduce domestic production costs. However, the government can also influence a firm's decision by the design of the tax system. Here, a government has the power to introduce a consumption tax or to decide, which goods are taxed.

Notice, that we analyse international outsourcing. Thus the firm first has to pay the foreign tax, if it buys an input. However, the EU implemented the country-of-destination principle, where this foreign tax will be repaid after the border is crossed, and thus the input good will be taxed with the domestic rate. Additionally, if the firm buys the input goods from outside the EU, there is a pre-tax allowance. In this case, the firm has to pay a purchases tax, which can be declared a pre-tax, if the firm sells it output. To keep the analysis simple, we exclude additional taxes or tariffs on such imported goods. This means that the import of an input good from outside the EU is equal to the import from within the EU.

To keep it simple, we model the consumption tax as a unit tax, which the producer has to pay to the tax office. As described in the paragraph above, the imported input and output good will be taxed with the domestic consumption tax rate. However, as is common in Germany, in this scenario, there exists a pre-tax allowance. This means that the tax payment on input goods is repaid to the producer and only the consumption of the final good is taxed. Therefore, the tax payment can be expressed as $T = (\tau + \tau \cdot v) \cdot y - \tau \cdot v \cdot y$, where τ denotes the domestic consumption tax rate. The pre-tax allowance is characterized by the second term. Thus, we answer the question, how does the implementation of a consumption tax on output influences the firm's choice of production mode.

Since we denote the output consumption tax with τ, the maximization problem of the firm at stage II can by written as[16]

[16] For a better distinction, all variables in case of a consumption tax are characterized by a "~".

$$\max_{\tilde{y}_i} \Pi_i = \left[1 - m - \tau - \tilde{y}_i - \tilde{Y}_{-i} - v_i \cdot (q - m)\right] \cdot \tilde{y}_i - F .$$

After solving this, we obtain the individual output $\tilde{y}_i = \frac{1}{(N+1)}\left[1 - m - \tau + (q - m) \cdot \left(\left(\sum \tilde{v}_{-i}\right) - N \cdot \tilde{v}_i\right)\right]$. From this equation we find the intuitive result that a tax reduces the output of a firm, since the tax increases the production costs. Similar to the former analysis, we can use this result and formulate the problem in stage II. By solving the resulting first order condition, and by using the symmetry property, we obtain

$$\tilde{v}^* = \frac{(N+1)^2 - 2N \cdot (q - m) \cdot (1 - m - \tau)}{(N+1)^2 - 2N \cdot (q - m)^2} . \tag{13}$$

Notice that Assumption 2 is unchanged. However, in Appendix A it is shown that the conditions $0 < \tilde{v}^* < 1$, $\tilde{Y} > 0$ and $0 < \tilde{p} < 1$ are fulfilled, if the tax is sufficiently low, i.e. we exclude any cases of a tax that lead to no production.

Assumption 3: positive outcome

The introduced consumption tax is sufficiently low, i.e. $1 > q + \tau$ *holds.*

If Assumption 3 does not hold, the industry output is zero and thus, there will be no production. To ensure a positive market outcome, consumer's maximal willingness to pay, which we normalize to one, has to be bigger than the maximum unit production costs. These are characterized by the outsourcing price plus the tax, i.e. $q + \tau$. Combing both, we obtain Assumption 3.

Similarly to the former section we can compare equation (13) with equation (6), to analyse the effect of the consumption tax.

Intuitively, we can argue that the tax forces a wedge between consumer and producer price by reducing the revenue per output unit, which leads to a decline in the aggregate output. In these circumstances, the individual output of an entrepreneur is lower, and so producing with the same proportion of integration leads to a loss because of the lower revenue, which finances the fixed costs. As argued in the former analysis, to react against this loss, every firm has to adapt its production mode to decrease its fixed costs. However, in our framework, a fixed cost reduction can only be achieved through less integrated production. So the implementation of a consumption tax increases the incentive for more outsourcing activities. Analytically, this can be shown by comparing $\tilde{v}^*$ and v^*, where we find that $\tilde{v}^* > v^*$ if $\tau > 0$.

From this argumentation, we can also derive the employment effect. Due to the lower proportion of integrated production, every output unit will be produced with a lower labour intensity. Since we also know that aggregate output will be reduced, the domestic employment level will be lower. This can also be seen easily from the employment level

$\tilde{L} = \frac{2N^2(1-q-\tau)^2(N+1)(q-m)}{\left[(N+1)^2 - 2N(q-m)^2\right]^2}$. For $\tau > 0$, the numerator is smaller as in (11) and thus, the implementation of a consumption tax decreases the equilibrium employment level. Therefore we can sum in:

Proposition 4:

The implementation of a consumption tax will favour outsourcing and reduce employment.

Using our findings, we can postulate a comment on the politics. If the political aim is to avoid or shorten the business practice of outsourcing in fixed cost intensive industries, we deduce that in industries with vertical production structures, the consumption tax rate should be lower than in other industries where there is no threat of outsourcing. So a differentiate consumption taxation for different goods or industries can be justified. Thus, due to the stimulation of demand, the disadvantage of integrated production can be partly absorbed, since, with higher output, it would be easier to bear the associated fixed costs of integrated production.

5. Reversed Motivation of Outsourcing

So far, we have studied the impact of competition, the strategic effects of outsourcing and the impact of taxation, if the outsourcing motivation is driven by saving fixed costs. However, as we mentioned earlier, outsourcing can also be used for reducing marginal costs. By allowing for this outsourcing motivation, we can also analyse the strategic effect, the impacts of competition and taxation and show if different outsourcing motives may lead to qualitatively similar or opposite results.

We will do this by using the same notation, but different assumptions. Due to the change in outsourcing motivation, we now assume that the costs of importing intermediate goods are smaller than costs of integrated production, i.e. $q < m$. In a similar way to the previous analysis, we also need to identify a disadvantage of outsourcing in order to avoid external procurement becoming a strictly dominant production mode. Therefore, we assume that there are some other costs associated with outsourcing. Those costs can include expenditures to find an appropriate external supplier, severance packaged or costs for supervising the quality of intermediate goods. Here, we model increasing fixed costs of outsourcing over the interval $x \in [0;1]$. Since the inputs with the cheapest fixed costs are now externally procured, we can write the fixed cost function as $\Omega = \int_0^{\bar{v}} x\, dx = \frac{1}{2}\bar{v}^2$.[17] To simplify, we abstract from any kind of fixed costs in case of in-house production. Since we have the same sequence of events and framework, we shorten the analysis of the reversed motivation.

[17] To distinguish the case of reversed motivation and the former analysis, the variables in the reversed motivation case are characterized by a "—".

Solving the maximization problem at stage I

$$\max_{\bar{y}_i} \Pi_i = \left[1 - m - \bar{y}_i - \overline{Y}_{-i} + \bar{v}_i \cdot (m - q)\right] \cdot \bar{y}_i - \Omega\,, \tag{14}$$

we obtain, as the individual output

$$\bar{y}_i = \frac{1}{(N+1)}\left[1 - m - (m - q) \cdot \left(\left(\sum \bar{v}_{-i}\right) - N \cdot \bar{v}_i\right)\right]. \tag{15}$$

For industry output and market price we obtain $\overline{Y} = \frac{1}{(N+1)}\left[N(1-m) + (m-q) \cdot \sum_{i=1}^{N} \bar{v}_i\right]$ and $p = \frac{1}{N+1} + \frac{N \cdot m}{N+1} - \frac{m-q}{N+1} \cdot \sum_{i=1}^{N} \bar{v}_i$.

Similar to Assumption 1, we have to secure a positive market outcome. Therefore, the price has to be lower than the maximal willingness to pay. In relation to our assumption $q < m$, this is given for $1 > m > q$.

Assumption 1a: non-negative output

We assume that $1 > m > q > 0$ *holds.*

If we use our results and insert these into the profit function, we can specify the object function on stage I for firm $i = 1,\ldots,N$ as

$$\max_{\bar{v}_i} \Pi_i = \frac{\left[(1-m) - (m-q) \cdot \left(\left(\sum \bar{v}_{-i}\right) - N \cdot \bar{v}_i\right)\right]^2}{(N+1)^2} - \frac{1}{2} \cdot \bar{v}_i^{\,2}. \tag{16}$$

From the first order condition, we can derive the optimal choice of externally procured inputs of firm i as a function of the decisions of all rival firms $\sum \bar{v}_{-i}$:

$$\bar{v}_i = \frac{(N+1)^2 - 2N \cdot (q-m) \cdot \left[(1-m) + (q-m) \cdot \sum \bar{v}_{-i}\right]}{(N+1)^2 - 2N^2 (q-m)^2}. \tag{17}$$

Using the symmetry property, we obtain the optimal level of outsourcing

$$\bar{v}^* = \frac{2N \cdot (m-q)(1-m)}{(N+1)^2 - 2N \cdot (m-q)^2}\,. \tag{18}$$

From (18) we can see that for $m = q$, which corresponds with the case, that outsourcing has no marginal cost advantage, all firms will desist from outsourcing. This result is not surprising, since outsourcing loses its marginal cost advantage, but there are fixed costs associated with external procurement.

Since we reversed the motivation, we can easily rewrite the assumption for the profit maximization.

Assumption 2a: internal solution

For a given market size, the marginal cost difference fulfils $\frac{1}{N^2} - q < m - q < \frac{N+1}{N\sqrt{2}}$.

Assumptions 1a and 2a ensure that $\bar{v}^* \in]0;1[$ will be generated from profit maximization and thus, an internal solution is obtained.[18]
Consequently, we can look on the first derivative of equation (18) with respect to the number of competitors N to analyse the impact of the market size on production mode. Here we find

$$\frac{\partial \bar{v}^*}{\partial N} = -\frac{2 \cdot \left(N^2 - 1\right) \cdot (m-q) \cdot (1-m)}{\left[(N+1)^2 - 2N \cdot (m-q)^2\right]^2} < 0 . \tag{19}$$

Equation (19) shows the effect of competition on the amount of externally procured inputs. We know that with increasing numbers of competitors the market share and the output of a single firm falls. Therefore, it becomes more difficult to bear the fixed costs and the production mode has to be adopted. However, avoiding fixed costs is now associated with less outsourcing.
As we mentioned earlier, analysing outsourcing, motivated as marginal cost saving is also done by Shy and Stenbacka (2005). However, despite the same motivation for outsourcing, they derive an opposing result compared to equation (19). In contrast with our analysis, they assume increasing marginal costs of outsourcing and domestic production. Combing this result with the previous findings, we can conclude that for the same marginal cost structure, the impact of competition depends on the outsourcing motive, but for the same motivation, the marginal cost structure seems to be decisive in terms of the influence of competition.

Corollary 1:

For an equal cost structure, the effect of competition on outsourcing depends on motivation for outsourcing, respectively for an equal motivation the effect depends on the structure of the production costs.

From the analysis above, we can also derive the strategic link of outsourcing decisions. For this, we restrict the model on a duopoly with $N = 2$ firms. Therefore, we can rewrite equation (17) as

[18] For a detailed discussion see Appendix B.

$$\bar{v}_i = \frac{4 \cdot (m-q)(1-m) - 4 \cdot (m-q)^2 \cdot \bar{v}_j}{9 - 8 \cdot (m-q)^2}.$$

This reaction function shows the strategic relationship $\partial \bar{v}_i / \partial \bar{v}_j$ respectively $\partial \bar{v}_j / \partial \bar{v}_i$ between the outsourcing decisions. Solving the first derivative yields

$$\frac{\partial \bar{v}_i}{\partial \bar{v}_j} = \frac{\partial \bar{v}_j}{\partial \bar{v}_i} = \frac{-4 \cdot (m-q)^2}{9 - 8 \cdot (m-q)^2} < 0.$$

Therefore, in the case of a reversed motivation of outsourcing, we have also downward sloping reaction curves for the outsourcing decision. If the final goods are substitutes, each firm has an incentive to decrease their own amount of externally procured inputs as a response to an extension of outsourcing activities by the other firm. Due to the assumption of lower marginal costs of outsourcing, more outsourcing by firm j decreases the price of the output good. This in turn, decreases the market share of firm i and the firm faces a disadvantage. However, at this point, the best response from firm i is not to lower its marginal costs, since a rising degree of outsourcing leads to higher fixed costs and more intensive competition due to the induced price reduction. The firm can avoid both, by lowering the share of components that are bought at a lower price from outside the firm. Following this, the marginal cost disadvantage of integration will be compensated by weaker competition and lower fixed costs associated with higher in-house production.
In line with Shy and Stenbacka (2005), we show that the numbers of outsourced inputs are strategic substitutes, even for the marginal cost advantage motive or for the fixed cost saving argument. This suggests that different outsourcing motives may lead to qualitatively similar results.

Corollary 2:

> *The strategic link of outsourced inputs does not depend on the motivation for outsourcing or the structure of the production costs.*

Additionally, the effect of the consumption case can be illustrated. Using the same notation, where τ characterizes the tax and $\bar{z} = \bar{p} - \tau = 1 - \bar{Y} - \tau$ the inverse market demand, we obtain as the optimal outsourcing proportion, if outsourcing is attractive because of marginal cost savings[19]

$$\bar{v}_\tau = \frac{2N \cdot (m-q)(1-m-\tau)}{(N+1)^2 - 2N \cdot (m-q)^2}. \tag{20}$$

[19] For a detailed illustration and the underlying assumptions, see Appendix C.

As we can see, outsourcing decreases with higher taxation, i.e. $\frac{\partial \overline{v}_\tau}{\partial \tau} < 0$. This result can be explained by the former arguments. Since a tax reduces demand, in equilibrium there is a lower amount of output. The lower output connected with the lower producer price leads to a decrease in revenues. If the proportion of outsourcing is unchanged, profit decreases, since lower revenues finance fixed costs. To respond to this loss, every firm has to adopt its production mode in favour of integrated production to avoid the associated fixed costs of outsourcing.
In addition, the effect on equilibrium employment can be derived. Using the previous findings, we obtain

$$\overline{L}_\tau = \frac{(N+1)^2 - 2N(1-q-\tau)(m-q)}{\left[(N+1)^2 - 2N(m-q)^2\right]^2} \cdot (N+1)(1-m-\tau) \cdot N \,. \tag{21}$$

There are two opposite effects of taxation. The first one is a labour enhancing effect, since every output unit will be produced with less outsourcing. However, the second is a labour decreasing effect, since taxation reduces the amount of output. In what follows, the employment effect is a priori ambiguous, i.e. $\frac{\partial \overline{L}_\tau}{\partial \tau} = ?$. Thus we can conclude in

Corollary 3:

> *The impact of consumption taxation on outsourcing depends on the motivation for outsourcing, while the employment effect is ambiguous.*

With this result, we can specify our formerly presented policy recommendation. If the policy aims for a high employment level and thus tries to favour integrated production in a certain industry, it can set incentives through its taxation policy. Since we showed, that the impact of taxation depends on the motivation of outsourcing, the motivation is decisive for the differentiation of consumption taxation between a sector with no vertical production and an industry with the opportunity of outsourcing.
As shown, if outsourcing is used for saving fixed costs, the tax in an industry with vertical production should be lower compared to an industry where it is difficult to outsource domestic production parts. The reason for this is that due to a lower tax rate the distortion on the final good market is lower and thus the output is higher, which allows the firms to bear the fixed costs associated with integrated production. If outsourcing is used for realizing a marginal cost advantage, there are fixed costs associated with external procurement. In the case of higher distortion due to higher tax rates, this leads to a lower market outcome and makes outsourcing less attractive, since it becomes more difficult to bear the fixed costs. Therefore, the tax rate should be higher than in an industry without a vertical production structure.
As the previous paragraph shows, the government can affect the outsourcing decision. To use consumption taxes as an instrument that lowers the incentive of external

procurement, the taxation has to account for the motivation of outsourcing. Since there are two different motives, the taxation has to differentiate to lower outsourcing.

6. Concluding Remarks

The paper's aim was to demonstrate the equilibrium proportion of outsourcing and the effect of different policies in an oligopoly with homogeneous goods. Outsourcing was interpreted as a long-term investment decision, whereby fixed costs could be reduced. On the other hand, the external procurement costs are higher than the costs of in-house production. Consequently, the trade-off between fixed cost savings and a rise in marginal costs influences the company's production choice. It was shown that the share of outsourcing is influenced by marginal cost differences, fixed costs and the number of competitors, whereas domestic marginal costs, fixed costs and the number of firms affects the outsourcing proportion positively. Lower marginal costs increase the advantage of integrated production, while the fixed costs as the disadvantage, are unaffected. Therefore, the firm's production choice changes in favour of integrated production. Similarly holds for lower fixed costs. Since here, the disadvantage of domestic production decreases, while the advantage is unaffected, lower outsourcing will occur. If the number of competitors increases, there is a more intensive competition. As a firm's market power decreases, its production outcome declines. However, with a lower output, the same proportion of integrated production, due to the associated fixed costs, cannot be borne by the firm. Thus, the share of outsourcing increases to reduce the fixed costs. Additional, this lowers the intensity of competition because more outsourcing increases the output price. The incentive for a lower intensity of competition characterizes also the strategic effect of the outsourcing decision. In the special case of a duopoly, we showed that outsourcing choices are strategic substitutes.

We also demonstrated how policy interactions affect equilibrium outsourcing proportion and thus industrial employment level. Here we showed that interaction, which lowers the domestic costs favours integrated production and increases employment. As a second government instrument, we focus on taxation, where we find that lower consumption tax lowers outsourcing and increases employment due to a smaller reduction in output.

To extend the argument, we also looked at the strategic interaction of outsourcing decisions, if the motivation for external procurement is the reduction of marginal costs. In this case, we showed that, despite reversed motivation, the outsourcing decisions are strategic substitutes. Although the strategic relationship is unchanged, we obtained an opposing result in relation to the impact of competition. In the case of marginal cost saving as the motivation for outsourcing, increasing the number of firms leads to less outsourcing. In addition, for the effect of consumption tax, we find an opposite result. Therefore, to use taxation as an instrument to increase incentives for integrated production, the motivation for outsourcing is decisive.

Appendices

Appendix A: Taxation Effect

I. $0 < \tilde{v}^* < 1$

Looking separately at the numerator and denominator, it can be shown that $\tilde{v}^* > 0$. From equation (13) we derive a positive denominator for

$$\frac{(N+1)}{\sqrt{2N}} > (q-m) \tag{A.1}$$

and a positive numerator for

$$\frac{(N+1)}{2N(1-m-\tau)} > (q-m). \tag{A.2}$$

Under the second order condition $\frac{N+1}{N\sqrt{2}} > (q-m)$, condition (A.1) is fulfilled because $\frac{N+1}{\sqrt{2N}} > \frac{N+1}{N\sqrt{2}}$. Since the denominator is positive, for $\tilde{v}^* > 0$ also the numerator has to be bigger than zero. Comparing the second order condition and equation (A.2) we find that $\frac{N+1}{2N(1-m-\tau)} > \frac{N+1}{N\sqrt{2}}$ if

$$N+1 > (1-m-\tau)\cdot\sqrt{2}. \tag{A.3}$$

Due to our assumptions, $N \geq 2$, $1-q > \tau$ and $q > m$, the left hand side is bigger than two and the right side is lower than two. From this we can conclude that $\frac{N+1}{2N(1-m-\tau)} > \frac{N+1}{N\sqrt{2}}$. Therefore, under the second order condition $\frac{N+1}{N\sqrt{2}} > (q-m)$ equation (A.2) is also fulfilled, which results in a positive numerator. Since numerator and denominator are positive, $\tilde{v}^* > 0$ follows.

Using equation (13) we can conclude that $\tilde{v}^* < 1$ if $\tau < 1-q$. Since this is an essential assumption for a positive output, $\tilde{v}^* < 1$ is fulfilled, if Assumption 3 holds.

II. $\tilde{Y} > 0$

For the industry output level, we have $\tilde{Y} = \frac{N}{N+1}\left[1-m-\tau-(q-m)\cdot\tilde{v}^*\right]$. Inserting equation (13) leads to $\tilde{Y} = \frac{N(N+1)(1-q-\tau)}{(N+1)^2 - 2N(q-m)^2}$. Due to the second order condition, the denominator is positive. Therefore, a positive industry output is achieved, if $1-q > \tau$, which is our Assumption 3.

III. $0 < \tilde{z} < \tilde{p} < 1$

Since we know that $\tilde{Y} > 0$ and $\tilde{p} = 1 - \tilde{Y}$, it is straightforward to see that the consumer price is below one, i.e. $\tilde{p} < 1$ holds.

For a positive producer price, $\tilde{z} = \tilde{p} - \tau > 0$, we derive the condition $\tilde{p} > \tau$. Inserting $\tilde{p} = \frac{N}{N+1} \cdot (m + \tau) + \frac{1}{N+1} + \frac{N \cdot (q - m)}{N+1} \cdot \tilde{v}^*$ we can simplify this condition to

$$1 - \tau > -N \cdot \left[m + (q - m) \cdot \tilde{v}^* \right]. \tag{A.4}$$

Since $1 - q > \tau$ and $0 < q < 1$, we can conclude that $0 < \tau < 1$. Using this, the left-hand side of (A.4) is positive and the right-hand side is negative. Thus, (A.4) is true and we have a positive producer price $\tilde{z} > 0$. By combining all this, we obtain $0 < \tilde{z} < \tilde{p} < 1$.

Appendix B: Reversed Motivation

I. $0 < \bar{v}^* < 1$

Assumption 2a guarantees a concave profit function concerning the production mode. Under this assumption, the denominator of (18) is positive. A positive numerator is guaranteed, if $m < 1$ holds. Since this is our assumption for a positive market outcome, $\bar{v}^* > 0$ is given.

From equation (18) we find that $\bar{v}^* < 1$, if $m - q < \frac{(N+1)^2}{2N(1-q)}$. We can compare this expression with the second order condition. From the comparison we find $\frac{(N+1)^2}{2N(1-q)} > \frac{N+1}{N\sqrt{2}}$ if

$$N + 1 > (1 - q) \cdot \sqrt{2}. \tag{B.1}$$

Due to our assumptions $N \geq 2$ and $1 > q$, the left-hand side is bigger than two and the right-hand side is lower than two. Therefore, $\frac{(N+1)^2}{2N(1-q)} > \frac{N+1}{N\sqrt{2}} > m - q$ is fulfilled, which results in $\bar{v}^* < 1$.

II. $\bar{Y} > 0$

The industry output level is characterized by $\bar{Y} = \frac{N}{N+1}\left[1 - m + (m - q) \cdot \bar{v}\right]$. Inserting equation (18) leads to $\bar{Y} = \frac{N(N+1)(1-m)}{(N+1)^2 - 2N(m-q)^2}$. As we know from the second order condition, the denominator is positive. Therefore, a positive industry output is achieved, if $1 > m$ assumed.

III. $0 < \bar{p} < 1$

As a result of $\bar{Y} > 0$ and $\bar{p} = 1 - \bar{Y}$, it is straightforward to see that the consumer price is below one, i.e. $\bar{p} < 1$ holds.

A positive consumer price $\bar{p} > 0$, is obtained for $\bar{Y} < 1$, which leads to

$$(m - q)^2 < \frac{(N+1)^2}{2N} - \frac{(N+1)(1-m)}{2}. \tag{B.2}$$

This expression can be compared with the second order condition, where we find that $\frac{(N+1)^2}{2N^2} < \frac{(N+1)^2}{2N} - \frac{(N+1)(1-m)}{2}$, if $\frac{1}{N^2} < m$. If this condition is fulfilled the second order condition becomes binding and we can solve for Assumption 2a, which ensures an internal solution.

Appendix C: Reversed Motivation and Taxation

I. Derivation of the optimal outsourcing share

Solving $\max_{\bar{y}_i} \Pi_i = \left[1 - m - \tau - \bar{y}_i - \bar{Y}_{-i} + \bar{v}_i \cdot (m-q)\right] \cdot \bar{y}_i - \Omega$ on stage I we obtain, as the individual output $\bar{y}_i = \frac{1}{(N+1)}\left[1 - m - \tau - (m-q) \cdot \left(\left(\sum \bar{v}_{-i}\right) - N \cdot \bar{v}_i\right)\right]$. The industry is $\bar{Y}_\tau = \frac{1}{(N+1)}\left[N(1-m-\tau) + (m-q) \cdot \sum_{i=1}^{N} \bar{v}_i\right]$. Using this, the problem on stage II is $\max_{\bar{v}_i} \Pi_i = \frac{\left[(1-m-\tau) - (m-q) \cdot \left(\left(\sum \bar{v}_{-i}\right) - N \cdot \bar{v}_i\right)\right]^2}{(N+1)^2} - \frac{1}{2} \cdot \bar{v}_i^{\,2}$. Solving this equation and using the symmetry property, we obtain the optimal level of outsourcing (20).

II. $0 < \bar{v}_\tau < 1$,

Assumption 2a guarantees a concave profit function concerning the production mode and a positive denominator of (20). A positive numerator is guaranteed, if $1 > m + \tau$ holds. This is the complement to Assumption 3, where the maximal willingness to pay exceeds the maximal production costs. Since we focus on an internal solution, $\bar{v}_\tau > 0$ is given. From equation (20) we find that $\bar{v}_\tau < 1$, if $m - q < \frac{(N+1)^2}{2N(1-q-\tau)}$. We can compare this expression with the second order condition. From the comparison we find $\frac{(N+1)^2}{2N(1-q-\tau)} > \frac{N+1}{N\sqrt{2}}$ if

$$N + 1 > (1 - q - \tau) \cdot \sqrt{2}\,. \qquad \text{(C.1)}$$

Due to our assumptions $N \geq 2$ and $1 > q$, the left-hand side is bigger than two and the right-hand side is lower than two. Therefore, $\frac{(N+1)^2}{2N(1-q-\tau)} > \frac{N+1}{N\sqrt{2}} > m - q$ is fulfilled, which results in $\bar{v}_\tau < 1$.

III. $\bar{Y}_\tau > 0$

The industry output level is characterized by $\bar{Y}_\tau = \frac{N}{N+1}\left[1 - m - \tau + (m-q) \cdot \bar{v}_\tau\right]$. Inserting equation (20) leads to $\bar{Y}_\tau = \frac{N(N+1)(1-m-\tau)}{(N+1)^2 - 2N(m-q)^2}$. Since we know from the second order condition that the denominator is positive, the sign of the numerator is

decisive. A positive industry output is achieved, if $1 > m + \tau$, which is assumed for an internal solution (see above).

IV. $0 < \bar{z}_\tau < \bar{p}_\tau < 1$

Since $\bar{Y}_\tau > 0$ and $\bar{p}_\tau = 1 - \bar{Y}_\tau$, we know that the consumer price is below one, i.e. $\bar{p}_\tau < 1$. A positive producer price, $\bar{z}_\tau = \bar{p}_\tau - \tau > 0$, implies $\bar{p}_\tau > \tau$. Using $\bar{p}_\tau = \frac{N}{N+1} + \frac{N \cdot (m+\tau)}{N+1} - \frac{m-q}{N+1} \cdot N$, we obtain

$$1 - \tau > -N \cdot [m - (m-q) \cdot \bar{v}_\tau]. \qquad \text{(C.2)}$$

Since $1 - m > \tau$ and $0 < m < 1$, we can conclude that $0 < \tau < 1$. Using this, the left-hand side of (C.2) is positive. To determine the sign of the right-hand side, we have to analyse the sign of the term in brackets. The expression $m - (m-q) \cdot \bar{v}_\tau > 0$ can be simplified to $1 > \left(1 - \frac{m}{q}\right) \cdot \bar{v}_\tau$. Since $m > q$ and $0 < \bar{v}_\tau < 1$ we know that this relation is fulfilled and therefore, the term in brackets is positive. Thus, the right-hand side in (C.2) is negative and therefore, (C.2) is true. Thus, we have a positive producer price $\bar{z}_\tau > 0$. By combining all of this, we obtain $0 < \bar{z}_\tau < \bar{p}_\tau < 1$.

Thus, for reversed motivation with a consumption taxation Assumption 2a has to be fulfilled. In addition, for a positive outcome the condition $1 > m + \tau$ has to hold. The intuition behind this condition equates the intuition behind Assumption 3.

References

Arya, A., B. Mittendorf and D. E. M. Sappington (2008): Outsourcing, Vertical Integration, and Price vs. Quantity Competition, *International Journal of Industrial Organization* 26, 1-16.

Baake, P., J. Oechssler and S. Schenk (1999): Explaining Cross-Supplies, *Journal of Economics* 1, 37-60.

Bhagwati, J., A. Panagariya and T. N. Srinivasan (2004): The Muddles over Outsourcing, *Journal of Economic Perspectives* 18, 93-114.

Buehler, S. and J. Haucap (2006): Strategic Outsourcing Revisited, *Journal of Economic Behavior & Organization* 61, 325-338.

Coase, R. H. (1937): The Nature of the Firm, *Economica* 4, 386-405.

Eberfeld, W. (2001): Explaining Intraindustry Differences in the Extent of Vertical Integration, *Journal of Institutional and Theoretical Economics* 157, 465-477.

Europäische Gemeinschaft (1997): EG-Vertrag – Vertrag zur Gründung der Europäischen Gemeinschaft, Fassung vom 02.10.1997.

Fraunhofer-Institut and Mercer Management Consulting (2004): *Future Automotive Industry Structure (FAST) 2015 - Die neue Arbeitsteilung in der Automobilindustrie*, VDA, Frankfurt.

Freeman, R. B. (1995): Are Your Wages Set in Beijing?, *Journal of Economic Perspectives* 9, 15-32.

Geishecker, I. (2008): The Impact of International Outsourcing on Individual Employment Security: A Micro-Level Analysis, *Labour Economics* 15, 291-314.

Geischecker, I. and H. Görg (2008): Winners and Losers: A Micro-Level Analysis of International Outsourcing and Wages, *Canadian Journal of Economics* 41, 243-270.

Harris, R. G. (1993): Globalization, Trade, and Income, *Canadian Journal of Economics* 26, 755-776.

Hummels, D., D. Rapoport and K.-M. Yi (1998): Vertical Specialization and the Changing Nature of World Trade, *Economic Policy Review* 4, 79-99.

Hummels, D., J. Ishii and K.-M. Yi (2001): The Nature and Growth of Vertical Specialization in World Trade, *Journal of International Economics* 54, 75-96.

Kamien, M., L. Li and D. Samet (1989): Bertrand Competition with Subcontracting, *RAND Journal of Economics* 20, 553-567.

Knabe, A. and B. Koebel (2006): The Economic Rationale and Labour Market Effects of Outsourcing: a Survey, in P. Barrar and R. Gervais (eds.): *Global Outsourcing Strategies: An International Reference on Effective Outsourcing Relationships*, Gower Publishing: Aldershot, 167-182.

Koskela, E. and R. Stenbacka (2009): Equilibrium Unemployment with Outsourcing under Labour Market Imperfections, *Labour Economics* 16, 284-290.

Lommerud, K. E., F. Meland and O. R. Straume (2009): Can Deunionization Lead to International Outsourcing?, *Journal of International Economics* 77, 109-119.

Nickerson, J. A. and R. Vanden Bergh (1999): Economizing in a Context of Strategizing: Governance Mode Choice in Cournot Competition, *Journal of Economic Behavior and Organization* 40, 1-15.

Perry, M. K. (1989): Vertical Integration: Determinants and Effects, in R. Schmalensee and R. Willig (eds.): *Handbook of Industrial Organization*, Volume 1, 183-255.

Porter, M. E. (1985): *Competitive Advantage – Creating and Sustaining Superior Performance*, Free Press, New York.

Shy, O. and R. Stenbacka (2003): Strategic Outsourcing, *Journal of Economic Behavior & Organization* 50, 203-224.

Shy, O. and R. Stenbacka (2005): Partial Outsourcing, Monitoring Cost, and Market Structure, *Canadian Journal of Economics* 38, 1173-1190.

Sinn, H.-W. (2005): *Die Basar-Ökonomie – Deutschland: Exportweltmeister oder Schlusslicht?*, Econ, 2. Auflage, Berlin.

Spiegel, Y. (1993): Horizontal Subcontracting, *RAND Journal of Economics* 24, 570-590.

Williamson, O. E. (1975): *Markets and Hierarchies*, Free Press, New York.

Williamson, O. E. (1986): *Economic Organization*, New York University Press, New York.

Williamson, O. E. (1996): Vertical Integration, in J. Eatwell and R. Palgrave (eds.): *The New Palgrave: A Dictionary of Economics* 4, London, Mac-Millan, 802-812.

Yeats, A. (2001): Just how big is Global Production Sharing?, in S. W. Arndt and H. Kierzkowski (eds.): *Fragmentation: New Production Patterns in the World Economy*, Oxford University Press, New York, 108-143.

Zhao, L. (1995): Gross-hauling Direct Foreign Investment and Unionized Oligopoly, *European Economic Review* 39, 1237-1253.

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