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# GLOBAL SOURCING OF FAMILY FIRMS

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## GLOBAL SOURCING OF FAMILY FIRMS

DANIEL HORGOS

### Zusammenfassung/ Abstract

In Europe, a huge share of firms is family owned. Since family firms are known to be more risk averse concerning international transactions, an interesting question emerges: Do family firms adopt a different international sourcing pattern. Altering the Global Sourcing model of Antràs and Helpman, this theoretical contribution adopts a family firm's perspective. The model shows that family firms tend to decrease international procurement. In the headquarter intensive sector, where FDI coexists with international outsourcing, family firms unambiguously decrease FDI, whereas the effect on international outsourcing is ambiguous: A substitution process may work towards an increase in international outsourcing activities.

**JEL-Klassifikation / JEL-Classification:** F10, D23, L23

**Schlagworte / Keywords:** Global Sourcing, Family Firms, Outsourcing, Offshoring, FDI

# 1 Motivation

With the beginning of the 1980s, international trade literature started to consider different forms of heterogeneity within industries. The aim of the early contributions was to explain large volumes of trade between countries with similar factor endowments. As possible explanations, these models accounted e.g. for product differentiation and monopolistic competition (see Dixit and Stiglitz, 1977; Krugman, 1979, 1980). Differences in the productivity of firms within an industry, however, were not considered to be important at these early stages (see e.g. Helpman and Krugman, 1985).

More recently, literature started to investigate the impact of firm heterogeneity on trade patterns. In this respect, differences in productivity play a key role. Having access to newly emerging firm level data, empirical contributions found that not all firms export, nor are firms that export a random sample. Several contributions concluded that exporters are not only more productive, but also bigger in firm size (cf. Helpman et al., 2004; Eaton et al., 2004). In view of these findings, Melitz (2003) developed a theoretical framework of monopolistic competition with heterogeneous firms. Interacting productivity differences with fixed costs of exporting, the model predicts that exporters are more productive and, since they sell more products in the domestic as well as in the foreign market, also bigger in firm size.<sup>1</sup> Helpman et al. (2004) extended the model of Melitz to show that most productive firms serve the foreign market via horizontal foreign direct investment (FDI), firms within a medium range of productivity export, whereas least productive firms serve only the domestic market.<sup>2</sup>

Parallel to the emerging literature on the importance of firm level heterogeneity, a huge amount of trade literature examined the processes of international outsourcing and vertical integration.<sup>3</sup> Until recently, however, these phenomena have been investigated at more aggregated industry levels and not at the level of the firm. Motivated by the work around Melitz (2003), Antràs and Helpman (2004) integrated differences in firm productivity into the incomplete contracts approach (see Grossman and Hart, 1986; Hart, 1995) in order to combine these two areas of literature. Formally based on the model of Antràs (2003), they investigated the way how firms internationally organize

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<sup>1</sup>While there emerged also other models integrating heterogeneous firms into international trade frameworks, see e.g. Montagna (2001), Jean (2002) or Eaton et al. (2004), the Melitz model has proved to be very adaptable to different applications and emerged thus to the cornerstone for a huge amount of further research.

<sup>2</sup>See also Head and Ries (2003), Girma et al. (2004), and Girma et al. (2005) for empirical evidence on Japan, Ireland and the U.K. For an excellent overview of this area of literature, see Helpman (2006).

<sup>3</sup>Since these terms are not standardized yet, they are used here as in most recent publications in this area of research. While outsourcing refers to the acquisition of intermediate inputs from an unaffiliated supplier, integration means to produce the intermediate input within the boundary of the firm. Both processes can be carried out at home (domestic outsourcing or vertical integration) or abroad (international outsourcing or FDI).

their production process; How firm productivity and sectoral headquarter intensity affect the sourcing mode of the firm. Their theoretical findings show that in sectors with relative low headquarter intensity, the least productive firms exit the market. With increasing productivity, the firms decide to outsource at the domestic market, whereas the most productive firms engage in international outsourcing activities. While vertical integration is no option in this sector, it has to be taken into account by firms in the relative high headquarter intensive sector. There, least productive firms again exit the market. With increasing productivity, firms (i) outsource at the domestic market, (ii) vertically integrate at home, (iii) go international by outsourcing in the foreign market, and finally (iv) engage in FDI abroad.<sup>4</sup>

Since firm characteristics (esp. productivity) are in the core of the actual Global Sourcing discussion, it seems to be interesting to examine the structure of firms in greater detail: How are firms organized? Which ownership structure do they have? What do we know about their international activities? Especially in Europe, family control is the dominant form of ownership. In France, two third of firms are listed as family owned. In Austria 45% of firms are characterized by family control, in Germany the share of family firms is 32%. Also in the US, large companies as e.g. Ford or Wal-Mart are family owned (see e.g. Barba Navaretti et al., 2008; Sraer and Thesmar, 2007; Becht and Mayer, 2001; Perez-Gonzalez, 2006). One of the key characteristics of family firms is that, compared to widely held firms, shareholders of family firms have a larger share of their wealth concentrated in the firm and thus, are more averse to risk firm operations. Since foreign sourcing transactions are assumed to have several additional risks as e.g. sunk costs of entering the foreign market, a higher volatility of revenues, limited knowledge of the foreign market and the behavior of employees or customers abroad, it is of interest to examine how family firms are going to organize their global sourcing activities: How would the engagement in FDI activities or in international outsourcing activities change relative to widely held firms? With respect to foreign transactions or the procurement of inputs from an “unknown” supplier, family firms are assumed to differ in the form of how intermediates are procured from abroad.

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<sup>4</sup>Efforts in testing the “Global Sourcing” model of Antràs and Helpman (2004) empirically are rare and, due to limited data availability, emerge only very recently. Nunn and Trefler (2008) e.g. empirically investigate the intra-firm share of imports for the US (covering the years 2000 and 2005). Dividing their analysis in three parts, they test the models of Antràs (2003), Antràs and Helpman (2004), and Antràs and Helpman (2007) and strongly support all three theoretical frameworks. Kohler and Smolka (2009) use Spanish firm-level data to investigate the impact of productivity on the sourcing strategies and strongly support the predictions of the Antràs and Helpman (2004) model. Defever and Toubal (2007) empirically examine the sourcing pattern of firms in France. However, their analysis does not directly support the Antràs and Helpman (2004) framework. They rearrange the theoretical model by assuming higher fixed costs under outsourcing (compared to those of FDI) and show that firms with a high level of total factor productivity source their inputs from independent suppliers abroad.

The emerging alterations are in the focus of the theoretical model presented in this contribution.

The remainder of the paper is structured as follows. Section 2 summarizes the Global Sourcing model of Antràs and Helpman (2004). It first describes the assumptions of the model and introduces the mechanics and the main results afterwards. Section 3 alters the model with respect to family firms. Therefore, a risk-parameter  $\rho$  is introduced that alters the model at specific parts. The family firm's risk-parameter captures distance as well as other risks as e.g. cultural differences, uncertainties or delays in payment. Afterwards, the section discusses how the results of the "Global Sourcing" model are assumed to change if the respective firm is family owned. In low headquarter intensive sectors, where vertical integration is no option, a smaller share of firms engage in international outsourcing in the South, whereas the share of firms that outsource domestically in the North increases. In the relative headquarter intensive sector, the share of firms doing business abroad decreases. This decrease in international activities is mainly driven by an unambiguous decrease in FDI. The effects on international outsourcing, however, are ambiguous. Depending on a substitution process, it is possible that, due to a strong decrease in FDI activities, international outsourcing increases. The share of firms that integrate domestically unambiguously increases. Section 4 concludes by summarizing the major findings and discusses possible lines of future research.

## 2 Global Sourcing

In order to extend the Global Sourcing decision with respect to a family firm's perspective in Section 3, this section summarizes the basic framework of Antràs and Helpman (2004). Thereby, the focus is set on the results that change when focusing on family firms afterwards.

### Assumptions

Assume two economies, one in the North (N) and one in the South (S). Both economies produce with the use of one factor labor (L). Consumers share identical preferences and try to maximize utility

$$U = x_0 + \frac{1}{\mu} \sum_{j=1}^J X_j^\mu \quad (1)$$

with  $x_0$  as consumption of a homogeneous good,  $X_j$  as an index of aggregate consumption in sector  $j$  and parameter  $\mu$  with  $0 < \mu < 1$ . Therefore, aggregate consumption of different varieties  $x_j(i)$  in sector  $j$  is described by the CES function

$$X_j = \left[ \int x_j(i)^\alpha di \right]^{1/\alpha} \quad (2)$$

with  $0 < \alpha < 1$  and  $i$  determined endogenously. The elasticity of substitution between any two varieties within one sector is  $1/(1 - \alpha)$ , with varieties being more substitutable within than between sectors ( $\alpha > \mu$ ) and the same  $\alpha$  as well as  $\mu$  for each industry. These assumptions lead to the inverse demand function for each variety in sector  $j$

$$p_j(i) = X_j^{\mu-\alpha} x_j(i)^{\alpha-1}. \quad (3)$$

The producers face perfect elastic supply of labor with  $w^N > w^S$ . Final goods are only produced in the North. To produce final goods, producers need to pay fix costs to enter the market ( $f_E$ ). After paying these fixed entry costs, they draw a productivity level  $\theta$  from a known distribution  $G(\theta)$ . When knowing the own productivity, a producer decides whether to start production or to exit the market. When starting production, additional fix costs for organizing production, as a function of ownership and the location of production, need to be incurred.

## Production of final good variety

Production of the final good requires the combination of two variety specific inputs  $h_j(i)$  (the headquarter component) and  $m_j(i)$  (the manufacturing component). Output of each variety is obtained with the sector specific Cobb Douglas function

$$x_j(i) = \theta \left[ \frac{h_j(i)}{\eta_j} \right]^{\eta_j} \left[ \frac{m_j(i)}{1 - \eta_j} \right]^{1-\eta_j} \quad (4)$$

with  $\theta$  as the firm specific productivity parameter and  $\eta_j$  as a sector specific headquarter intensity parameter ( $0 < \eta_j < 1$ ). Since headquarter services  $h_j(i)$  can only be produced in the North, using one unit of labor per unit of output, and intermediate inputs  $m_j(i)$  can be produced in the North or the South, also with one unit of labor in each one of the economies, there exist two types of agents: (i) final good producers providing headquarter services ( $H$ ) and (ii) operators of manufacturing plants ( $M$ ). For production, final good producers  $H$  (all located in the North) need to contract with manufacturing good producers ( $M$ ) (either located in the North or in the South). Final good producers need to pay entry costs  $w^N f_E$ . Afterwards they observe their level of productivity  $\theta$ . When deciding to start production, they search for a supplier of  $m_j$ , either in the North or the South, and simultaneously decide to insource ( $V$ ) or to outsource ( $O$ ) the manufacturing component.



The joint costs of production depend on the fixed organizational costs  $w^N f_k^l$ , with  $k$  as an index of ownership structure ( $k = V, O$ ) and  $l$  as an index of location of  $M$  ( $l = N, S$ ). When assuming that organizational costs increase if  $M$  is located in  $S$ , regardless of  $k$ , fixed costs in the South are bigger than fixed costs in the North ( $f_k^S > f_k^N$ ). Furthermore, with given location  $l$ , fixed costs of  $V$  are bigger than those with  $O$  ( $f_V^l > f_O^l$ ). Thus, we can describe the order of fixed costs as

$$f_V^S > f_O^S > f_V^N > f_O^N. \quad (5)$$

One of the novelties in Antràs and Helpman (2004) is that they additionally assume incomplete contracts in a form that ex ante parties can not sign enforceable contracts. Thus, the parties bargain over the surplus after the inputs have been produced. Within a Nash bargaining game, the final good producer obtains the fraction  $\beta \in (0, 1)$  of the ex post gains. The distribution of the surplus depends on the organization of the firm's production process. When considering the case of vertical integration, the final good producer buys the right to ex post fire  $M$ . Therefore, it is necessary to impose firing costs  $(1 - \delta^l)$ . Otherwise,  $M$  would produce  $m_j(i) = 0$  since  $H$  would always have an incentive to fire  $M$  ex post. It is assumed, that the loss of firing  $M$  is bigger if  $M$  is located in the South ( $\delta^N > \delta^S$ ). This outside option does not exist in the case of outsourcing. Without a contract, there is no income for both if they fail to reach an agreement on the distribution of the surplus. The inputs are tailored specifically to the other party.

Since the location and the form of ownership are chosen ex ante by  $H$  in order to maximize profits,  $M$  needs to pay an ex ante fee to participate. The fee can either be positive or negative. With infinite elasticity of supply,  $M$ 's outside option equals  $M$ 's profit of the relationship net the participation fee. For reasons of simplicity, Antràs and Helpman (2004) set  $M$ 's outside option equal to zero.

## Equilibrium

To examine equilibrium we consider only one sector. If the parties agree to produce the commodity, the potential revenue is  $R = p_i \cdot x_i$ . Considering (3) and (4), we obtain

$$R = X^{\mu-\alpha} \theta^\alpha \left( \frac{h(i)}{\eta} \right)^{\alpha\eta} \left( \frac{m(i)}{1-\eta} \right)^{\alpha(1-\eta)}. \quad (6)$$

If they fail to agree, the outside option of  $M$  is zero, whereas that of  $H$  varies with the ownership structure. With outsourcing, the outside option of  $H$  is also zero, regardless of the localization of  $M$ . In this case,  $H$  gets  $\beta R(i)$  and  $M$  gets  $(1 - \beta)R(i)$ . With vertical integration,  $H$  has more leverage and thus, even when failing to reach an agreement, can sell  $\delta^l x_i$  in order to receive at least revenue  $(\delta^l)^\alpha R(i)$ . Therefore, the ex post gains of trade

are  $[1 - (\delta^l)^\alpha]R(i)$ . If bargaining leads to an agreement,  $H$  receives  $(\delta^l)^\alpha R(i) + \beta[1 - (\delta^l)^\alpha]R(i)$  as the outside option plus fraction  $(\beta)$  of the quasi rents.  $M$  gets  $(1 - \beta)[1 - (\delta^l)^\alpha]R(i)$ .

The payoffs in the bargaining game, depending on the location and the ownership structure, are proportional to the revenue. Due to the assumption  $\delta^N \geq \delta^S$ , we obtain the ordering

$$\begin{aligned}\beta_V^N &= (\delta^N)^\alpha + \beta[1 - (\delta^N)^\alpha] > \beta_V^S \\ &= (\delta^S)^\alpha + \beta[1 - (\delta^S)^\alpha] > \beta_O^N = \beta_O^S = \beta\end{aligned}\quad (7)$$

Due to the ex ante non contractibility, the parties chose quantities non cooperatively. Therefore,  $H$  maximizes  $\beta_k^l R(i) - w^N h(i)$  whereas  $M$  maximizes  $(1 - \beta_k^l)R(i) - w^l m(i)$ . Combining the first order conditions of these two decisions using (6) yields

$$\pi_k^l(\theta, X, \eta) = X^{(\mu-\alpha)(1-\alpha)} \theta^{\alpha(1-\alpha)} \Psi_k^l(\eta) - w^N f_k^l \quad (8)$$

as the total value of the relationship, with

$$\Psi_k^l(\eta) = \frac{1 - \alpha[\beta_k^l \eta + (1 - \beta_k^l)(1 - \eta)]}{\{(1/\alpha)(w^N / \beta_k^l)^\eta [w^l / (1 - \beta_k^l)]^{1-\eta}\}^{\alpha/(1-\alpha)}}. \quad (9)$$

While the first argument of the profit function  $\pi_k^l(\theta, X, \eta)$  is firm specific, the others are industry specific. While parameter  $\eta$  measures the intensity of headquarter services,  $X$  is a consumption index endogenous to the industry but exogenous to the final good producer. The final good producer chooses the organizational form to maximize  $\pi_k^l(\cdot)$ . Final good producers with a productivity level below  $\underline{\theta}$  exit the industry. At the threshold level  $\underline{\theta}$ , operating profits

$$\pi(\underline{\theta}, X, \eta) = \max_{k \in (V, O), l \in (N, S)} \pi_k^l(\underline{\theta}, X, \eta) \quad (10)$$

equal zero. Thus,  $\underline{\theta}$  depending on the industry's consumption index  $X$  is implicitly defined by

$$\pi(\underline{\theta}, X, \eta) = 0. \quad (11)$$

In order to maximize profit (8),  $H$  searches for the optimal triplet  $\beta_k^l, w^l, f_k^l$ . If  $H$  would be able to freely choose his fraction of revenue  $\beta$ , he could maximize  $\Psi_k^l(\eta)$  and notice that  $\beta$  increases in  $\eta$ . As in Antràs and Helpman (2004), however, we assume that  $\beta \in (\beta_V^N, \beta_O^N, \beta_V^S, \beta_O^S)$  is exogenous: The sourcing and location mode restrict the final good producer to one specific  $\beta$ . With free entry, operating profits equal fix costs

$$\int_{\underline{\theta}(X)}^{\infty} \pi(\theta, X, \eta) dG(\theta) = w^N f_E. \quad (12)$$

If  $\theta < \underline{\theta}$  the firm would not enter the market.

## Organizational Mode

When analyzing the firm's organizational mode, the interplay between the different cost components is important. With respect to the localization of  $M$ ,  $H$  needs to consider that fixed costs are higher but variable costs lower in the South. Concerning the sourcing strategy,  $H$  faces higher fixed costs with insourcing but a larger fraction of revenue. However, the revenue may also be smaller since  $M$  has an incentive to reduce the inputs. In order to examine the internationalization strategy of the firm, this section differs between two different sectors with respect to  $\eta$ : a component intensive sector (with a low fraction of headquarter intensity) and a headquarter intensive sector (with a high fraction of headquarter intensity).

First, consider the component intensive sector with low  $\eta$  (there,  $\beta^*(\eta) < \beta_O^N = \beta_O^S = \beta$ ). Because outsourcing is related to lower fix costs and a smaller share of revenue, a final good producer  $H$  prefers outsourcing as internationalization strategy in this sector. For these firms, vertical integration is no feasible option. In terms of location,  $H$  needs to decide between the lower variable costs if  $M$  is located in the South or the lower fixed organizational costs if  $M$  is located in the North.

Depending on the cross country difference in the wage rate ( $w^N/w^S$ ) relative to the cross country differences in fixed costs ( $(f_O^S/f_O^N)^{(1-\alpha)/\alpha(1-\eta)}$ ), there are two possible equilibria: outsourcing in both countries (if the wage differential is small relative to the fixed cost differential; as depicted in Figure 1) or only one equilibrium, outsourcing in the South only, if the fix costs differential is relatively small to the wage differential.

From (8) we know that the  $\pi$ -lines are linear in  $\theta^{\alpha/(1-\alpha)}$  with intercepts  $-w_N f_K^l$  and the slopes proportional to  $\Psi_k^l(\eta)$ . Thus,  $\pi_O^S$  is steeper than  $\pi_O^N$  because wages are lower in the South than in the North ( $\Psi_O^S > \Psi_O^N$ ). The intercepts can be calculated easily with (i) setting  $\pi_O^N(\theta, X, \eta)$  equal zero and (ii) equalizing  $\pi_O^N(\theta, X, \eta)$  with  $\pi_O^S(\theta, X, \eta)$ . Thus, we achieve

$$\underline{\theta}_M = X^{(\alpha-\mu)/\alpha} \left( \frac{w^N f_O^N}{\Psi_O^N(\eta)} \right)^{(1-\alpha)/\alpha} \quad (13)$$

$$\theta_{MO}^N = X^{(\alpha-\mu)/\alpha} \left( \frac{w^N (f_O^S - f_O^N)}{\Psi_O^S(\eta) - \Psi_O^N(\eta)} \right)^{(1-\alpha)/\alpha} \quad (14)$$

As can be seen from the figure, firms with productivity below  $\underline{\theta}_M$  exit the market since profits are negative. Firms with productivity levels between  $\underline{\theta}_M$  and  $\theta_{MO}^N$  prefer

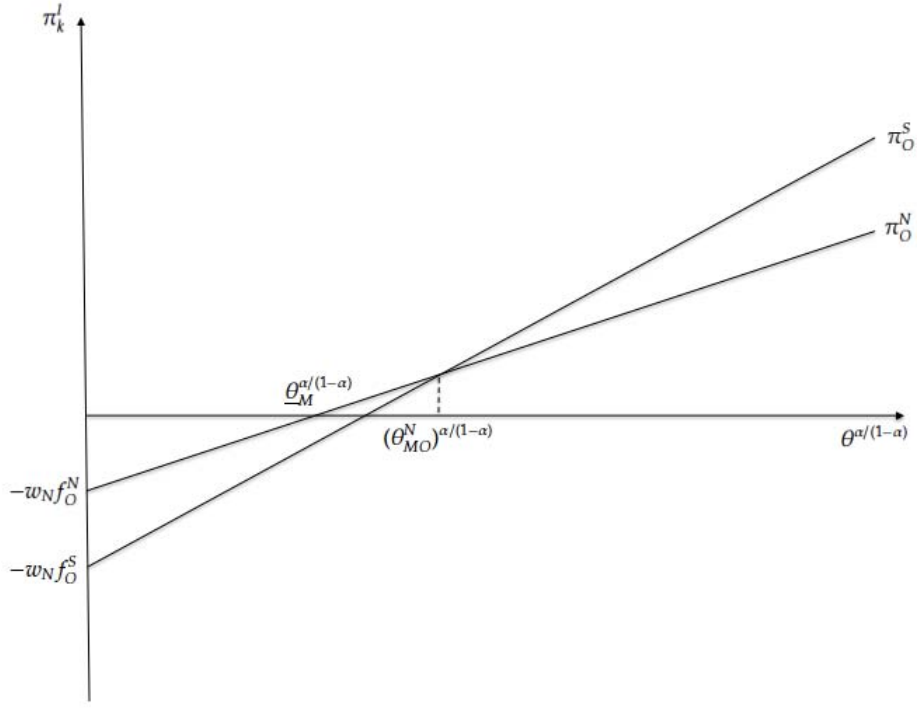


Figure 1: Global Sourcing in the component-intensive sector

outsourcing in the North (the home market), whereas only very productive firms (with a productivity level exceeding  $\theta_{MO}^N$ ) would venture to outsource in the South.

As a second case, consider the headquarter intensive sector, where  $\beta^*(\eta) > \beta_V^N$ . In this sector, the marginal product of headquarter services is relatively high, therefore, underinvestment in  $H$  is costly and consequently, integration especially attractive. In this sector, vertical integration gets a possible option. Figure 2 depicts the equilibrium in this sector.

Since  $\Psi_V^l(\eta) > \Psi_O^l(\eta)$ , the slopes of  $\pi_V^l$  are steeper than those of  $\pi_O^l$ . Special attention needs to be paid on the two lines  $\pi_O^S$  and  $\pi_V^N$ . Due to the larger fraction of revenue with integration,  $\pi_V^N$  should be steeper than  $\pi_O^S$ , however, since  $w^S < w^N$ ,  $\pi_O^S$  could also be steeper than  $\pi_V^N$ . Overall,  $\pi_V^N$  could be steeper or flatter than  $\pi_O^S$  ( $\Psi_O^S(\eta) \leq \Psi_V^N(\eta)$ ). An internal solution can be achieved with

$$\Psi_O^S(\eta) > \Psi_V^N \text{ iff } \left(\frac{w^N}{w^S}\right)^{1-\eta} > \frac{\phi(\beta_V^N, \eta)}{\phi(\beta, \eta)}. \quad (15)$$

Thus, there exist two distinguishable scenarios.<sup>5</sup>

First, if the wage difference is large relative to the difference between  $\beta$  and  $\beta_V^N$ , the slope of  $\pi_O^S$  is steeper than the one of  $\pi_V^N$  ( $\Psi_O^S(\eta) > \Psi_V^N(\eta)$ ). Therefore,

$$\Psi_V^S(\eta) > \Psi_O^S(\eta) > \Psi_V^N(\eta) > \Psi_O^N(\eta). \quad (16)$$

<sup>5</sup>For a deeper discussion on equation 15 see Antràs and Helpman (2004).

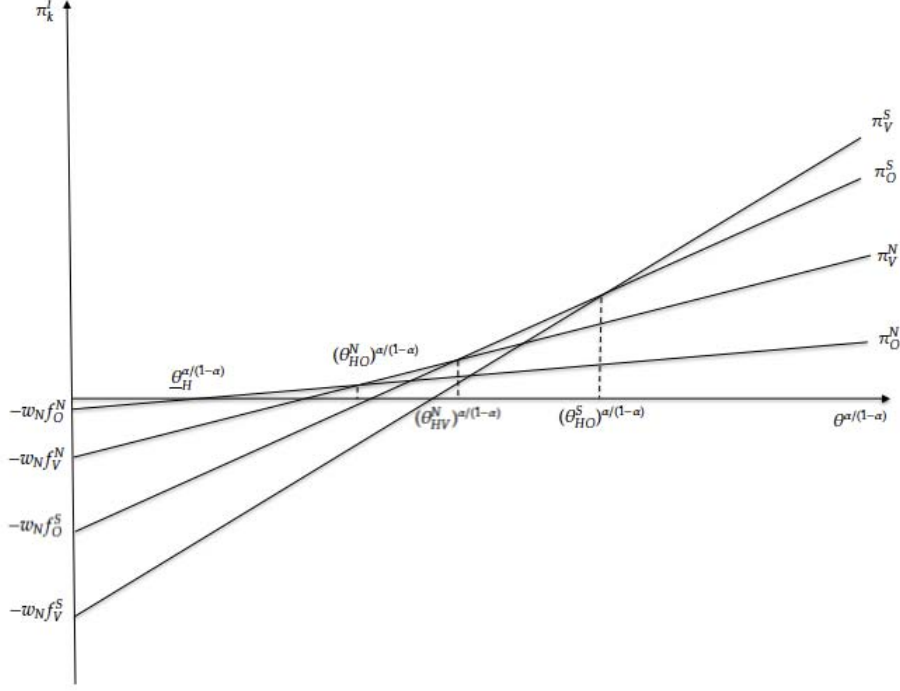


Figure 2: Global Sourcing in the headquarter-intensive sector

In this situation, as depicted in Figure 2, all four internationalization modes exist in equilibrium. Again, firms with a productivity level beneath  $\underline{\theta}_H$  exit the market. With increasing productivity, firms first start to outsource in the North, then to vertical integrate in the North. If productivity is even higher, firms enter the foreign market with outsourcing  $M$ . The most productive firms integrate in the South. Since there is no upper bound, FDI always exists in equilibrium.

The cutoff points can easily be calculated with

$$\underline{\theta}_H = \left( \frac{w^N f_O^N}{\Psi_O^N(\eta)} \right)^{(1-\alpha)/\alpha} X^{(\alpha-\mu)/\alpha} \quad (17)$$

$$\theta_{HO}^N = \left( \frac{w^N (f_V^N - f_O^N)}{\Psi_V^N(\eta) - \Psi_O^N(\eta)} \right)^{(1-\alpha)/\alpha} X^{(\alpha-\mu)/\alpha} \quad (18)$$

$$\theta_{HV}^N = \left( \frac{w^N (f_O^S - f_V^N)}{\Psi_O^S(\eta) - \Psi_V^N(\eta)} \right)^{(1-\alpha)/\alpha} X^{(\alpha-\mu)/\alpha} \quad (19)$$

$$\theta_{HO}^S = \left( \frac{w^N (f_V^S - f_O^S)}{\Psi_V^S(\eta) - \Psi_O^S(\eta)} \right)^{(1-\alpha)/\alpha} X^{(\alpha-\mu)/\alpha} \quad (20)$$

As second case, consider that the wage differential is relative small  $\left(\frac{w^N}{w^S}\right)^{1-\eta} < \frac{\phi(\beta_V^N \eta)}{\phi(\beta \eta)}$ . In this situation, the slope of  $\pi_V^N$  is steeper than the one of  $\pi_V^S$ . Thus, the ordering would be  $\Psi_V^S > \Psi_V^N > \Psi_O^S > \Psi_O^N$ : low-productive firms would outsource in the North, medium productive ones would integrate in the North, and the most productive ones would

investigate in FDI. However, a second possible situation would be that integration in the North even dominates integration in the South, leading to the ordering  $\Psi_V^N > \Psi_V^S > \Psi_O^S > \Psi_O^N$ . There, low-productive firms would again outsource in the North and productive ones would integrate in the North, with international activities not taking place.

### 3 Global Sourcing of Family Firms

After summarizing the main mechanics of the Antràs and Helpman (2004) framework, this section alters the model and puts a focus on family firms. Since family firms are assumed to be risk averse, an additional dimension occurs affecting the decision on which internationalization mode to adopt.

In order to examine global sourcing decisions of family firms, we extend the basic framework with a risk-parameter  $\rho_k^l \equiv 1 + \delta_k^l + \kappa_k^l$ . The component  $\delta$  ( $0 < \delta < 1$ ) captures the distance between the final good producer  $H$  and the supplier of the intermediate product  $M$  (that is the distance between  $N$  and  $S$  if  $M$  is located in the South). If  $M$  is located in the North, the component is zero ( $\delta_k^S > \delta_k^N = 0$ ). The component  $\kappa$  ( $0 < \kappa < 1$ ) captures additional risks when contracting with an unknown partner in a different cultural area. Parameter  $\kappa_k^l$  is assumed to be bigger if  $H$  vertically integrates  $M$  in the South ( $\kappa_V^S > \kappa_O^S > \kappa_k^N = 0$ ).

The risk-parameter  $\rho_k^l$  drops into the model in three different ways.

- i) Let's first examine the cost side of the model. We assume that family firms face the same Cobb Douglas production function as the average firm in the basic framework (4). Again, all final good producers locate in the North and need to contract with  $M$  for production, located either in the South or in the North. Concerning fix organizational costs  $f_k^l$ , we keep the ordering as presented in (5) but weight them with the risk-parameter  $\rho_k^l$ . If  $M$  is located in the northern home country, firms are assumed to face no additional risks ( $\rho_k^N = 1$ ). The risk-parameter increases when  $H$  makes transactions with  $M$  located in the South. Additionally,  $\rho$  is bigger when  $H$  decides to vertically integrate  $M$ . Thus, the fix cost ordering condition changes to

$$\rho_V^S f_V^S > \rho_O^S f_O^S > \rho_V^N f_V^N > \rho_O^N f_O^N \quad (21)$$

with  $\rho_V^S > \rho_O^S > \rho_V^N = \rho_O^N = 1$ .

- ii) Beside the fix costs, also variable costs need to be weighted with the risk-parameter. However, by contrast to the fix organizational costs, wages do not depend on the

sourcing mode but only on the location. Thus, the sourcing index  $k$  is dropped for the parameter weighting the wages. Considering wages in the North, the risk parameter  $\rho^N = 0$ . Since family firms put a higher weight on wages that firms face in the South ( $\rho^S > \rho^N$ ), it is possible that southern wages, adjusted with the risk parameter, get bigger than northern wages. Therefore, the wage ordering for family firms can be described as

$$\rho^S w^S \leq \rho^N w^N. \quad (22)$$

iii) Additionally to the effects on fix and variable costs, family firms also put a different weight on the profit shares  $\beta$ . Depending on the acceptance in foreign networks (also capturing corruption, etc.), family firms are assumed to expect lower profit shares of vertically integrating production in the South. By contrast to the weight on costs, that increase when focusing on family firms, the profit shares need to be discounted. Since there are different local contracts needed when integrating a foreign subsidiary, the additional discount factor only affects vertical integration, but not outsourcing (where we assume that the necessity for local contracts is minimized). Thus, family firms discount  $\beta_V^S$  by  $\frac{1}{\rho_V^S}$ , with  $\rho_V^S > \rho_O^S = \rho_k^N = 1$ .

## Profit Maximization

Due to the ex ante non contractability, parties again chose quantities non cooperatively. Thus,  $H$  max  $\frac{1}{\rho_k^l} \beta_k^l R(i) - \rho^N w^N h(i)$  and  $M$  max  $(1 - \frac{1}{\rho_k^l} \beta_k^l) R(i) - \rho^l w^l m(i)$ . In order to investigate the sourcing modes in equilibrium, combine again the first order conditions of the two decisions using (6). This yields total profits of family firms

$$\pi_k^l(\theta, X, \eta) = X^{(\mu-\alpha)(1-\alpha)} \theta^{\alpha(1-\alpha)} \Psi_k^l(\eta) - \rho^N w^N \rho_k^l f_k^l \quad (23)$$

with

$$\Psi_k^l(\eta) = \frac{1 - \alpha \left[ \frac{1}{\rho_k^l} \beta_k^l \eta + \left(1 - \frac{1}{\rho_k^l} \beta_k^l\right) (1 - \eta) \right]}{\left\{ (1/\alpha) \left( (\rho^N w^N) / \frac{1}{\rho_k^l} \beta_k^l \right)^\eta \left[ (\rho^l w^l) / \left(1 - \frac{1}{\rho_k^l} \beta_k^l\right) \right]^{1-\eta} \right\}^{\alpha/(1-\alpha)}} \quad (24)$$

As optimization strategy,  $H$  searches the triplet  $\frac{1}{\rho_k^l} \beta_k^l, \rho^l w^l, \rho_k^l f_k^l$  that maximizes (23).

## Organizational Mode

In order to discuss the firm's decision on how to organize production, we again investigate the two different sectors separately.

## The Component Intensive Sector

First, consider the component intensive sector with low  $\eta$ . As in the basic model, only outsourcing is an option in this industry. The alterations concerning the sourcing pattern for risk averse family firms are presented in Figure (3).

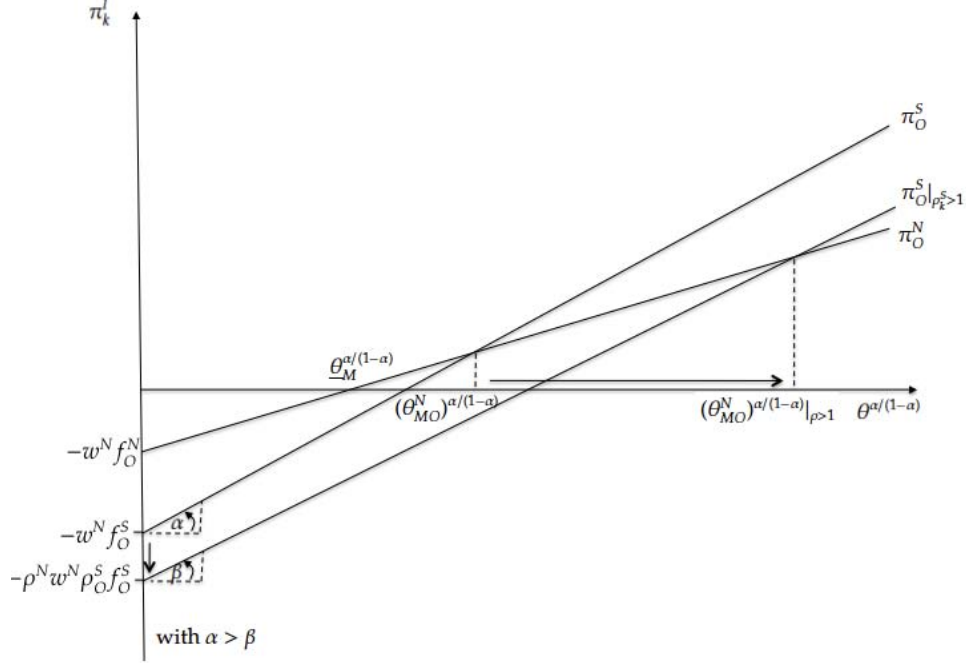


Figure 3: Global Sourcing of Family Firms in the component-intensive sector

As shown in the figure, the fix cost differential gets bigger since the risk-parameter increases fix costs of outsourcing in the South ( $w^N f_O^N < w^N f_O^S < \rho^N w^N \rho_O^S f_O^S$ ). Additionally, the slope of the profit line  $\pi_O^S$  decreases since family firms put a higher weight on wages in the South ( $\Psi_O^S > \Psi_O^S|_{\rho_O^S>1} > \Psi_O^N$ ). Both forces shift the second threshold level  $(\theta_{MO}^N)^{\alpha/(1-\alpha)}$  to the right. Thus, relative to the basic model presented in Section 2, the same share of firms exit the market ( $\underline{\theta}_M^{\alpha/(1-\alpha)} = \underline{\theta}_M^{\alpha/(1-\alpha)}|_{\rho_O^S>1}$ ), however, the share of firms engaged in international outsourcing decreases. Family firms outsource to the southern market only if they have a relative high level of productivity ( $(\theta_{MO}^N)^{\alpha/(1-\alpha)} < (\theta_{MO}^N)^{\alpha/(1-\alpha)}|_{\rho_O^S>1}$ ).

The threshold levels  $\theta$  can be calculated with

$$\underline{\theta}_M^{\alpha/(1-\alpha)} = \underline{\theta}_M^{\alpha/(1-\alpha)}|_{\rho_O^S>1} = X^{(\alpha-\mu)/\alpha} \left( \frac{w^N f_O^N}{\Psi_O^N(\eta)} \right)^{(1-\alpha)/\alpha} \quad (25)$$

$$(\theta_{MO}^N)^{\alpha/(1-\alpha)} < (\theta_{MO}^N)^{\alpha/(1-\alpha)}|_{\rho_O^S>1} = X^{(\alpha-\mu)/\alpha} \left( \frac{w^N(\rho_O^S f_O^S - f_O^N)}{\Psi_O^S(\eta)|_{\rho_O^S>1} - \Psi_O^N(\eta)} \right)^{(1-\alpha)/\alpha} \quad (26)$$

While presenting the basic model we discussed the situation where the fix cost differential is relative small as compared to the wage differential, enabling an equi-



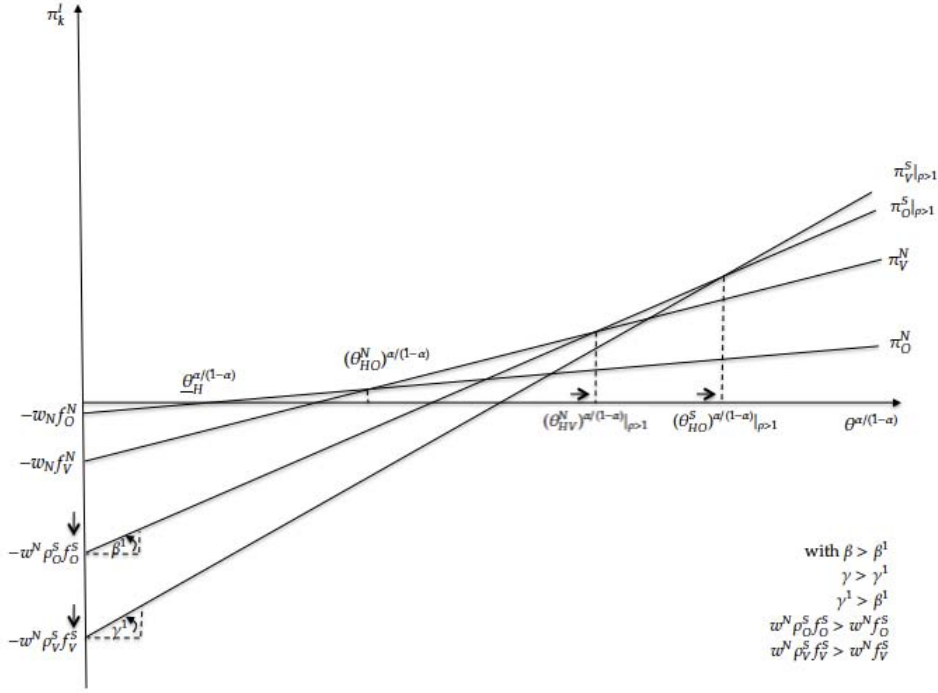


Figure 4: Global Sourcing of family firms in the headquarter-intensive sector

librium where outsourcing in the South would be the only possible sourcing strategy (with positive profit). Moving the focus on family firms, this situation gets far less realistic since the family firms' risk-parameter increases the fix cost differential ( $w^N f_O^N < w^N f_O^S < \rho^N w^N \rho_O^S f_O^S$ ) but decreases the wage differential ( $w^N > \rho^S w^S > w^S$ ). Furthermore, the possibility arises that the weight for risk aversion turns the southern wage to a level higher than the wage in the North ( $\rho^S w^S > w^N > w^S$  and consequently  $\Psi_O^S > \Psi_O^N > \Psi_O^S|_{\rho^S > 1}$ ). In such a situation, the opposite situation as shown in the Antràs and Helpman framework gets possible: The two profit-lines would not cross (for positive  $\theta$ ), leading to an equilibrium where outsourcing to the South is not an option anymore. The threshold level corresponding to (26) would turn negative since  $\rho_O^S f_O^S > f_O^S$  but  $\Psi_O^S(\eta)|_{\rho^S > 1} < \Psi_O^N(\eta) < \Psi_O^S(\eta)$ . This result changes the original Antràs and Helpman (2004) model even qualitatively since there, due to the missing of an upper bound, outsourcing in the South is the situation always taking place in equilibrium.<sup>6</sup>

### The Headquarter Intensive Sector

Now, consider the internationalization decision in the headquarter intensive sector. Since vertical integration is an option in this sector, the differences occurring for family firms get more complex. How the sourcing decisions change for family firms is presented in Figure 4.

<sup>6</sup>For a graphical examination of this situation see Figure 5 in the Appendix.

First, family firms face a higher share of fix costs in the South, for vertical integration as well as for outsourcing activities. Additionally, also wages in the South get a higher weight, decreasing the slopes of the two provit lines  $\pi_O^S|_{\rho_O^S > 1}$  and  $\pi_V^S|_{\rho_V^S > 1}$ . Both of these effects shift the second and the third threshold levels ( $\theta_{HV}^N|_{\rho > 1}$  and  $\theta_{HO}^N|_{\rho > 1}$ ) to the right. Thus, considering family firms, the same amount of firms (those with the lowest level of productivity) exit the market. More productive firms decide to outsource in the North. This fraction is also not affected. If productivity increases, firms decide to vertical integrate M in the North, then to outsource to the South, and the most productive firms to integrate M in the South. However, when we focus on family firms, the share of firms doing business in the South decreases. Thus, family firms are more often vertically integrating in the North. The share of firms vertically integrating in the South unambiguously decreases, whereas the number of firms outsourcing to the South may decrease or increase. Since southern activities get more rare, outsourcing in the South is expected to decrease. However, it may happen that relative more firms deny to vertically integrate in the South, inducing a kind of substitution process that increases the share of firms outsourcing in the South.

In the basic model presented in Section 2, the slopes of the profit lines with vertical integration are unambiguously higher than the slopes of the profit lines with outsourcing (since  $\beta_V^l > \beta_O^l$ ). With respect to family firms, however, this holds only for the North. When contracting with M in the South, it is even possible that the slope for the profit line with vertical integration decreases beneath the slope of outsourcing in the South ( $\frac{1}{\rho_V^S}\beta_V^S \leq \beta_O^S$ ). Thus, it may be possible that vertical integration in the South is not an option for family firms.<sup>7</sup>

Additionally, as in the component intensive industry, the risk-parameter of family firms increases wages in the South. Thus, it may happen that the relative difference in wages is small compared to the relative difference in fix costs. Since southern wages are additionally weighted by the risk-parameter, the decrease in relative wages may lead to a bigger slope for vertical integration in the North as for outsourcing in the South. In this case, even outsourcing in the South would not be an option for family firms. Then, however, no international trade would take place.<sup>8</sup>

Therefore, the final number and the ordering of equilibria in the headquarter intensive sector can be described as follows. (i) All four sourcing modes may be adopted. The least productive firms exit the market. With increasing productivity firms first outsource in the North, then vertical integrate in the North, then outsource to the South and finally, vertically integrate in the South. (ii) It may be that FDI is not an option for family firms. Then, with only three possible sourcing modes, most productive firms would decide to outsource to the South. (iii) It even may be that international

<sup>7</sup>This kind of equilibrium is presented in Figure 6 in the Appendix.

<sup>8</sup>For a graphical examination of this equilibrium, see Figure 7 in the Appendix

trade would not take place and the most productive firms would decide to vertically integrate in the North. The cutoff points can be calculated with

$$\underline{\theta}_H = \left( \frac{w^N f_O^N}{\Psi_O^N(\eta)} \right)^{(1-\alpha)/\alpha} X^{(\alpha-\mu)/\alpha} \quad (27)$$

$$\theta_{HO}^N = \left( \frac{w^N (f_V^N - f_O^N)}{\Psi_V^N(\eta) - \Psi_O^N(\eta)} \right)^{(1-\alpha)/\alpha} X^{(\alpha-\mu)/\alpha} \quad (28)$$

$$\theta_{HV}^N|_{\rho>1} = \left( \frac{w^N (\rho_O^S f_O^S - f_V^N)}{\Psi_O^S(\eta)|_{\rho>1} - \Psi_V^N(\eta)} \right)^{(1-\alpha)/\alpha} X^{(\alpha-\mu)/\alpha} \quad (29)$$

$$\theta_{HO}^N|_{\rho>1} = \left( \frac{w^N \rho^S (f_V^S - f_O^S)}{\Psi_V^S(\eta)|_{\rho>1} - \Psi_O^S(\eta)|_{\rho>1}} \right)^{(1-\alpha)/\alpha} X^{(\alpha-\mu)/\alpha} \quad (30)$$

With respect to family firms, interactions points (27) and (28) do not change. However, (29) and (30) increase ( $\theta_{HV}^N|_{\rho>1} > \theta_{HV}^N$  and  $\theta_{HO}^N|_{\rho>1} > \theta_{HO}^N$ ). It is likely that  $\rho_V^S \beta_V^S < \beta_O^S$  and thus (30) to be negative with vertical integration in the South no realistic option for family firms ( $\Psi_V^S(\eta)|_{\rho>1} < \Psi_O^S(\eta)|_{\rho>1}$ ).

## 4 Conclusions

Since family firms are widespread across Europe and since family firms are assumed to be relative risk averse with respect to foreign transactions, an interesting question emerges concerning international transactions of family firms: Does the international sourcing process of family firms differ from those of widely held firms? Do family firms engage in FDI? Do they engage in international outsourcing activities? How does the well known Global Sourcing pattern of Antràs and Helpman (2004) change if we put the focus on family firms. This contribution alters the Global Sourcing framework with parameters capturing the firms' risk-aversion and thus, characterizing family firms.

The main results can be summarized as follows. In the component intensive sector, where vertical integration is no option for firms, family firms engage relative more in domestic outsourcing activities, whereas the share of firms outsourcing to the South decreases. In the headquarter intensive sector, the alterations get more complex since vertical integration gets an additional option. Considering family firms, the share of firms doing business in the South decreases. The number of firms that exit the market as well as the number of firms that outsource in the northern home country stay the same whereas the share of firms vertically integrating at home increases. The number of firms vertically integrating in the South unambiguously decreases, whereas the change of the share of firms outsourcing to the South is ambiguous. On the one hand, due to the general decrease in southern activities, also the share of firms outsourcing in the South decreases. However, if vertical integration in the South decreases strong enough,

a substitution process may occur that increases the share of family firms outsourcing in the South. Additionally, the possibility that family firms do not engage in FDI gets possible.

Since firm level data observing international organizational activities get more and more accessible, an examination if the international sourcing pattern would change in the described way when focusing on family firms would be of great interest for future research. Especially for economies in central Europe, as e.g. Italy, France or Germany, where a huge share of firms are family owned, these theoretical findings combined with significant empirical evidence would be of high interest for policy makers as well.

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# Appendix

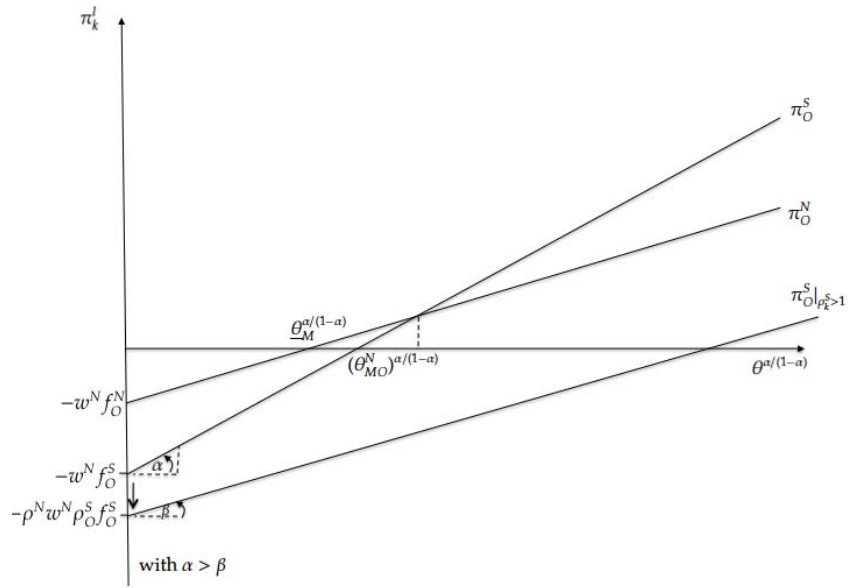


Figure 5: Global Sourcing of family firms in the component-intensive sector, variant b

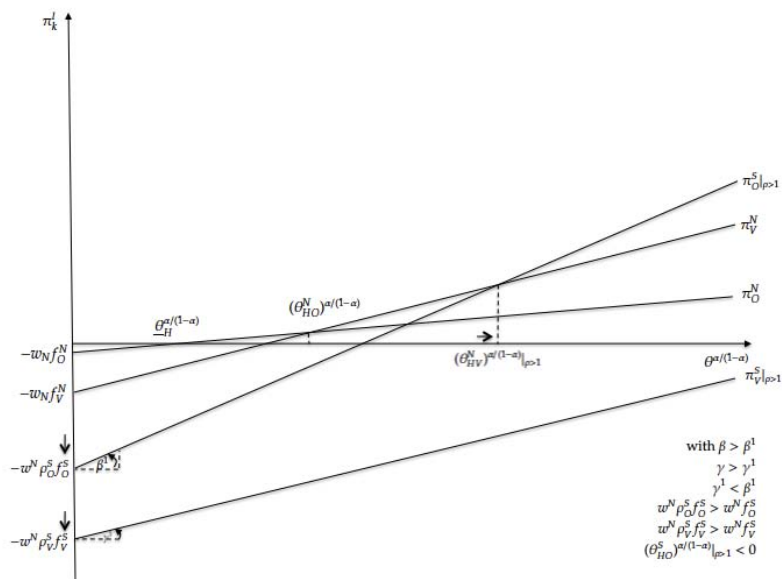


Figure 6: Global Sourcing of family firms in the headquarter-intensive sector, variant b

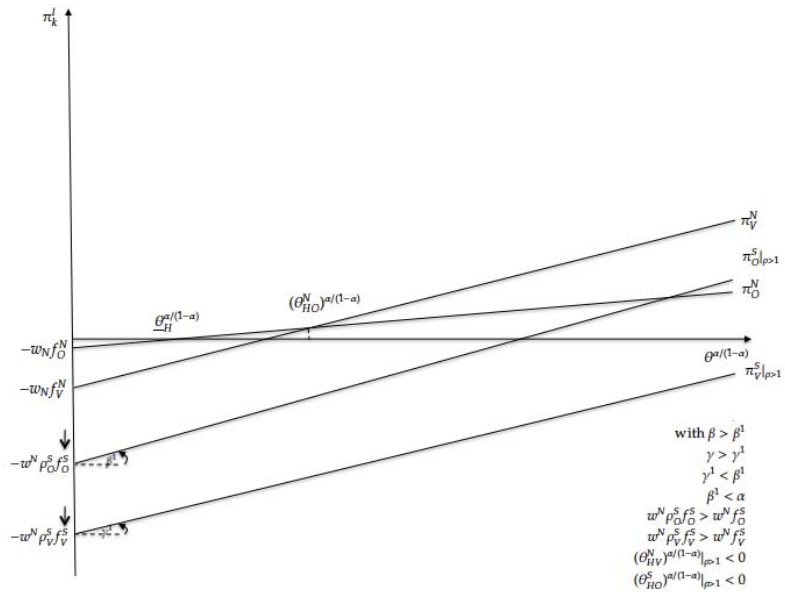


Figure 7: Global Sourcing of family firms in the headquarter-intensive sector, variant c

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