# Determinants of international sourcing: captive offshoring vs. offshore outsourcing

## Abstract

The aim of the paper is to analyze empirically the vertical fragmentation strategies of Slovene firms. The growing significance of international sourcing has been well documented and has spurred the emergence of extensive body of theoretical literature analyzing the organization of firms' activities on a global scale. Recent literature on integration strategies and global production sharing combines elements from international trade and industrial organization with the theory of the firm in order to explain endogenously the variety of organizational forms. Using the propositions of various theoretical models, we examine the role of different factors as a determinant of the fragmentation strategy on the data from the recently conducted Eurostat survey of international sourcing. We evaluate how firm-level, industry-level and country-level characteristics influence the choice of sourcing mode (domestic sourcing, offshore outsourcing and captive offshoring). We study the fragmentation strategies by applying discrete choice models, like probit and nested logit models. On the firm level, we mainly focus on firm heterogeneity as a determinant of the offshoring strategy. The determinants in this group include firm productivity, size, capital intensity, financial dependence, and ownership status. At the industry level, our aim is to examine the role of product characteristics and industrial structure on the choice of offshoring strategy. The determinants are product complexity, technological intensity, headquarter intensity, and the presence of scale economies. We also emphasize the role of country characteristics, such as factor differentials, institutional quality, financial development, skilled labour endowment, distance, ICT infrastructure, and transport costs. The main contribution of the paper is to present empirical evidence of the assumptions presented by the theoretical literature and examine the significance and interplay of various factors that determine the mode of the international sourcing.

**Key words: sourcing strategies, internationalization, offshoring, outsourcing, Slovenia**

1. **Introduction**

The continuous globalization of the economy has pushed many enterprises to adopt international sourcing as a business model in order to retain competitive edge. Certain business functions that were previously performed in-house or sourced domestically to the resident subcontractor nowadays increasingly move to either non-affiliated or affiliated suppliers located abroad. These changes represent a challenge for traditional theoretical frameworks and measuring the intensity and scope of all new forms of international businesses involvement. Although international sourcing is increasingly performed as well as studied, firm-level analyses are still scarce (Mol, 2007; Quintens, 2006) and the lack of comparable studies keeps the assessment of determinants, magnitude and the impact of international sourcing difficult.

International sourcing is treated as complex foreign operation mode and existing empirical evidence show large differences in magnitude among countries (Eurostat, 2009; OECD, 2008). However, the use and varieties of foreign operation modes is increasing even in less developed economies, and complements the diversification in internationalization strategies. Various firm-level, industry-level and country-level characteristics make international sourcing decision context-dependent, "existing" simple universal rules (like "outsourcing non-core activities") doubtful or false, and require integrated research in space and time. It is likely that the optimal degree of international sourcing vary much more than the optimal degree of domestic outsourcing, since the international sourcing depends more heavily on firm-specific factors like the level of

internationalization, outward FDI presence, internal organization structure and other industry and country (institutional) factors. Understanding complexity, determinants and patterns of international sourcing thus remains a challenge for shaping international business strategies and creating the incentives by policymakers.

The aim of this study is to explore the determinants of international sourcing on the case of Slovene firms in the context of the complex process of business process fragmentation that spans along various dimensions such as nationality, type of the relationship, and the choice of location. Rapid internationalization in the last fifteen years, transition towards a market economy, restructuring of "traditional" manufacturing corporate sector and integration of Slovenia into EU offer opportunity to test the relevance of determinants in the initial stages and trace the development of international sourcing strategies in rapidly changing international environment. Unique data set is constructed for this purpose, linking the Eurostat survey of outsourcing, national detailed firm-level data, and several international data sources allows exploring firm-level heterogeneity and the relationship between firm characteristics, outside business environment and sourcing strategies.

## 2. Literature review: What are the major determinants of international sourcing?

International sourcing has become recognized as an important subject of research in the theoretical and empirical literature in the last years (Feenstra, 1998; Campa and Goldberg, 1997; Hummels, Ishii and Yi, 2001; Yeats, 1998, Mol, 2007). Although

international sourcing is not a new subject of research, definitions of international sourcing (Eurostat, 2007, Hijzen, Görg and Hine, 2004) or offshoring (Antras, 2007; OECD, 2007; Biemans and Van Leeuwen, 2006) still differ in most of the existing literature. In our study international sourcing refers to relocation or movement of (core or support) business functions currently conducted in-house to either unaffiliated (external suppliers) or affiliated enterprises located abroad and is in line with the definition used by Eurostat (2007), Helpman (2006) and others. In our study we distinguish between domestic and international sourcing, between international sourcing of core and support activities, between different types of international sourcing (captive and arm's length) and between the locations of international sourcing activities. Making a distinction between alternative modes of international sourcing enables a better insight in the complexity of the phenomenon and the understanding of various determinants of firms' international sourcing activities.

The evidence on international sourcing can be mostly found on the industry level and only few studies have used microeconomic or plant level data to analyze this issue, where they have mostly focused on the manufacturing sector. This study is one of the first to use firm level data for both manufacturing and services sectors in Slovenia in order to analyze the determinants of offshoring and its relationship with firms' heterogeneity, industry characteristics and country-specific factors.

The theoretical background of international sourcing can be found already in international trade theories of Smith and Ricardo, theories of international production,

multinational firms and FDI, as well as in the theory of the firm. Firms' boundaries have been explored in vast theoretical literature that can be applied to international sourcing: the Transaction Cost Theory by Coase (1937) and Williamson (1975, 1985), the Hold-up problem by Klein, Crawford and Alchian (1978) and Grout (1984), Property rights theory of the firm by Grossman and Hart (1986), Hart and Moore (1990) and Hart (1995) and Theory of incentive system by Holmstrom and Milgrom (1991, 1994) and Holmstrom (1999) and other theories, such as Agency theory (Ross 1973, Jensen and Meckling, 1976), Team theory (Alchian and Demsetz, 1972) and the Resource-based Theory (Penrose, 1959; Wernerfelt, 1984, 1995). Although we focus on the determinants of international sourcing, the mentioned theories can give us an important understanding of these determinants and their relationship with the firm's decision to relocate its production of inputs and services outside of its national and firm boundaries.

In our study we focus on firm heterogeneity as a determinant of the international sourcing strategy. Literature suggests a number of determinants of international sourcing at the firm level, with the size, productivity and ownership status as one of the most evident. Other determinants in this group include firm capital intensity, average wages (proxy for skill and capital intensity), export status, financial dependence and profitability. It has been recognized that the decision to engage in international trade and organization of production, as well as the decision to source internationally is determined by the size of the firm (Görg and Hanley, 2004; UNCTAD and Roland Berger, 2004; Tomiura, 2004), since larger firms tend to relocate part of their production process or service abroad more often that smaller firms.

Recent extended empirical studies that focus on the role of productivity in international sourcing strategies emphasize the growing importance of the role of offshoring for enhanced productivity, achieved through rationalization of the production process, restructuring of firms' activities or through external knowledge spillovers from foreign affiliates or external suppliers to firms in the domestic market. In the empirical literature, positive impacts on productivity from international sourcing of materials (Görzig and Stephan, 2002; Görg and Hanley, 2005; Girma and Görg, 2002) and services (Görg and Hanley, 2003; Criscuolo and Leaver, 2005; Girma and Görg, 2002) on the firm level are well documented. In the literature we can also find positive impacts of international sourcing at the industry level, where Amiti and Wei (2005, 2006) find positive impacts on productivity from material and services sourcing, while Egger and Egger (2001) find positive impact on productivity from international sourcing materials only in the long term and Egger et al. (2001) in general.

The impacts of international sourcing on productivity can differ considering the ownership status of the firm (Görg, Hanley and Strobl, 2005). Firms that belong to international groups enjoy greater productivity gains from international sourcing than exporting firms (the first enjoy productivity gains at international sourcing of materials and services, while the latter enjoy productivity gains only at international sourcing of materials). Heterogeneity of firms therefore affects the impact of international sourcing on productivity as well as other determinants of international sourcing. Ownership status influences not only the impacts of international sourcing on productivity but also the

decision to source itself, since firms that are part of larger groups tend to source internationally more often than firms, that are not part of enterprise groups (Heshmati and Pietola, 2007).

In the recent literature we can find various determinants of international sourcing, whether it is taking place inside or outside of enterprise groups. Ge, Konan and Tanriverdi (2004) support the decision to source inside or outside of enterprise groups according to the stage in the business cycle of the production process and claim that firms tend to source outside of enterprise groups when the production process is already at the mature level in its business cycle, when small asset specificity and rich firm experiences are present and in the environment of low risk, low strategic vulnerability and greater competitive pressures. Antras (2005) also focuses on the level of maturity of technical products when deciding to source internationally outside of enterprise groups and finds that a firm should source new and non-standardized products inside of enterprise groups because that provides more control over incomplete contracts, while sourcing of mature products should take place outside of enterprise groups. High R&D intensity as well has been identified as incentive for integrated (internal) vertical integration (Teece 1986, Williamson, 1985).

The interaction of firms characteristics and its decision on the mode of international sourcing of activities is being explored also by Antràs in Helpman (2003, 2007), claiming that in the presence of incomplete contracts the decision on sourcing inside or outside of enterprise groups is determined by interaction between firms productivity, intensity of its

production factors and contract environment on foreign markets. Firms that are dependent on intermediate products will opt for internalization when cooperation with independent firm in the locations of weak contract environment presents high hold-up costs. Also Grossman and Helpman (2002) claim that the decision to source outside of enterprise groups will take place in highly competitive markets due to cost advantages.

The entry mode decisions of multinational firms to foreign markets have been studied by Eicher and Kang (2005) who found that the decision is influenced by the size of the market, fixed costs of FDI, trade tariffs and transport costs. They found acquisition of firms to be present in greater extent in larger markets, the middle-size markets were dominated by exports (even when high trade tariffs are present), while FDI were mostly present in small markets.

In the theoretical and empirical literature we can find diverse evidence on certain determinants of international sourcing, such as firm-level average domestic wages and employment as well as profitability. Empirical evidence on the effects of international sourcing on increased average domestic wages and employment are found in Sethupathy (2008), while Falk and Wolfmayr (2005) find support for the decreased average wages and employment. Evidence on increased profitability (Kotabe and Swan, 1994; NAPA, 2006; Sethupathy, 2008), where impacts of international sourcing of materials on profitability are positive (Görzig and Stephan, 2002; Görg and Hanley, 2004) and negative (Marjit in Mukherjee, 2005) are available, while impacts of international sourcing of services on profitability were found negative in the study by Görg and Hanley

(2004). Other explanatory variables of firm's sourcing strategy such as export status or the level of internationalization of the firm are identified in Ge, Konan and Tanriverdi (2004). Kotabe and Murray (2003) also find that service firms tend to decide to source inside of enterprise groups according to firms' sensibility to tacit knowledge.

In this paper we focus also on the determinants of international sourcing at the industry level, where our aim is to examine the role of product characteristics and industrial structure on the choice of international sourcing strategy as well as other determinants, such as headquarter intensity, R&D intensity, technological intensity, and the presence of scale economies.

An important determinant of international sourcing at the industry level are product or service characteristics, especially the standardization or personalization of products and services and the complexity of production processes (Karmarkar, 2004), complexity of the product and services (Tadelis, 2002), the level of the cycle (Abraham and Taylor, 1996) and specialization of business activity (Carr et al., 2001). Karmakar (2004) finds that only standardized services in simple production process should be sourced internationally outside of enterprise groups mostly to cut costs, while personalized services and standardized services in complex production processes should be sourced inside enterprise groups and only certain non-profitable activities should be sourced to independent firm. According to Trefler (2005), routine and well defined activities should be sourced to independent firms, while activities that are more difficult to define should be sourced inside the firm boundaries. Similarly Tadelis (2002) claims that complex

products should be sourced inside the firms' boundaries, while simple products should be sourced on the market.

The decision on the mode of international sourcing depends on the position of the firm in the value chain and the characteristics of the industry (Oberoi and Khamba, 2005). An important determinant of international sourcing on the firm level is also the main activity of firms, which is demonstrated by the focus of the empirical literature on the firms in the manufacturing sector (Görzig and Stephan, 2002; Amiti and Wei, 2005, 2006; Biemans and van Leeuwen, 2004; Tomiura, 2004).

Studies of determinants of international sourcing at the country level, may include factors, such as market size (Grossman, Helpman, Szeidl, 2006, Eicher and Kang, 2005), factor differentials (Grossman and Helpman, 2003, 2005, 2006), capital endowment and skilled-labour endowment, GDP p.c., rule of law, IP rights (Datar, 2005; A.T. Kearney, CAPS Research, 2005; OECD, 2007), FDI restrictions, amount of credit to the private sector/GDP, net interest margin, transport costs (Eicher and Kang, 2005), distance to provider (Lacity et al., 1996; Dritna, 1994; Feenstra and Spencer, 2005; OECD, 2007), ICT infrastructure development (Amiti and Wei, 2004), the development and usage of broadband access (Bartel, Lach and Sicherman, 2005; Click and Duening, 2004), market thickness (Grossman and Helpman, 2005), institutional quality, financial development and other location characteristics.

Location characteristics, such as tax and other financial incentives (Deardorff, 1998), trade barriers, especially tariffs (Deardorff, 1998; Eicher and Kang, 2005), legal and administrative characteristics (Helpman, 2006; Ge, Konan and Tanriverdi, 2004), linguistic and cultural differences (OECD, 2007; Ge, Konan and Tanriverdi, 2004) and other characteristics are also found as important determinant of firms' international sourcing decision.

## 3. Data and methodology

**The Sample**

The dataset used in this analysis combines two sources of firm level data: survey on international sourcing and financial statements collected by Agency of the Republic of Slovenia for Public records and Related Services (AJPES) that also serve as source for calculating some of the industry indicators. Country-level and industry-level variables taken from various different sources are described in detail in the Appendix.

The pilot survey on the reasons, extent and consequences of international sourcing[1] was conducted by the Statistical Office of the Republic of Slovenia from March to July 2007 as part of the Eurostat surveys and is one of the first attempts to estimate the extent of international sourcing in the EU. Twelve countries have launched an ad-hoc survey to establish statistical evidence of the phenomena. The survey results reveal that

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[1] International sourcing (offshoring) is defined as a total or partial movement of business functions (core or support business functions) currently performed in-house or currently domestically sourced by the resident enterprise to enterprises located abroad.

international sourcing is most common among Irish, UK, Danish, Finnish and Slovenian enterprises (Eurostat, 2009).

The stratified sample in Slovenia includes 962 medium-sized and large enterprises[2] and 856 enterprises responded (Table 1). Small enterprises (below 50 employees) were excluded from the survey as preliminary research showed very poor sourcing activity. Such methodological framework enables international comparisons with other countries included in the Eurostat survey.

**Table 1: Sample enterprises by activities**

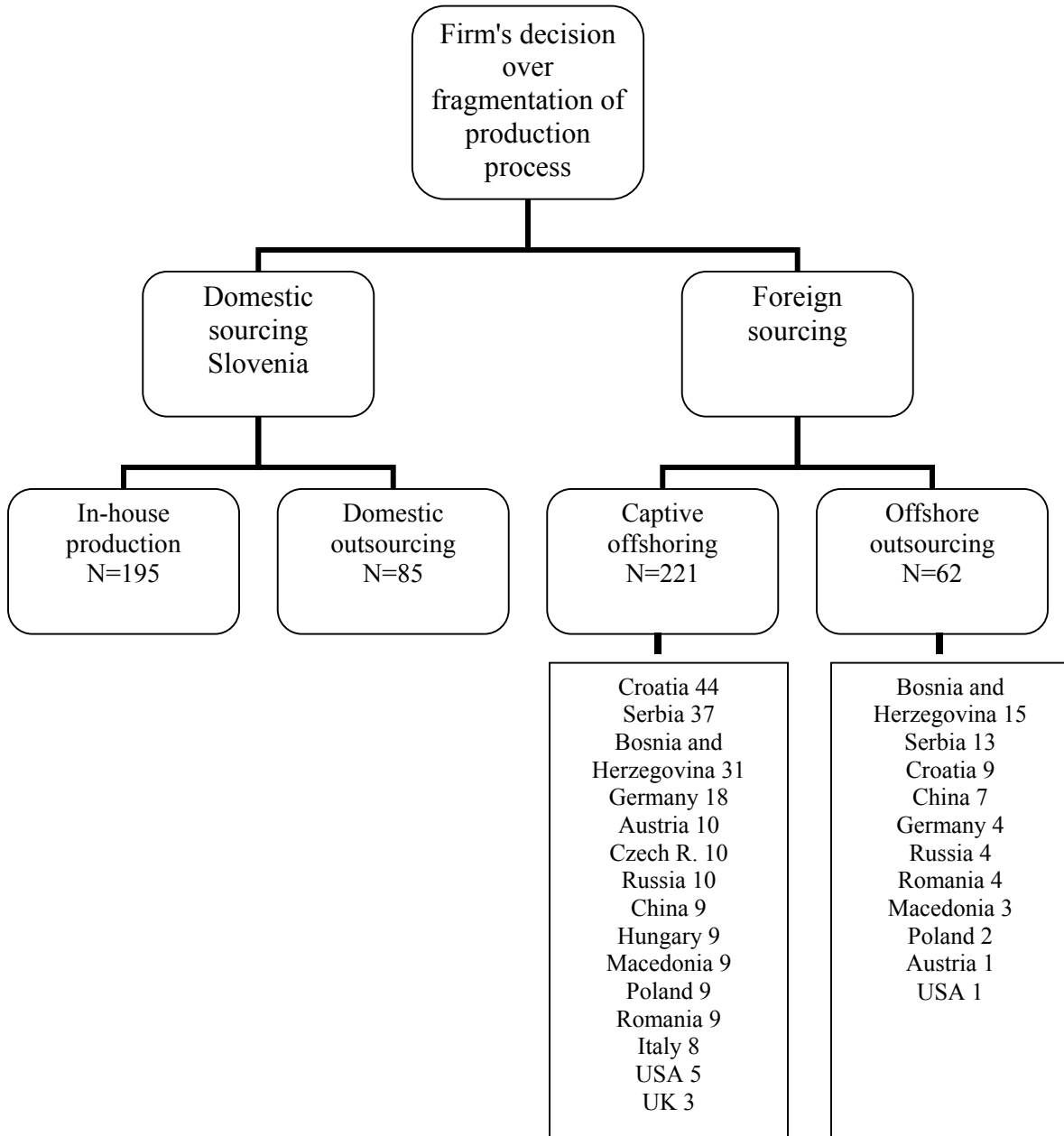| NACE rev 1.1 | Sample framework | | Sample | | Respondents | |
|---|---|---|---|---|---|---|
| | No. of enterprises (over 50 employees) | No. of employees | No. of enterprises (over 50 employees) | No. of employees | No. of enterprises (over 50 employees) | No. of employees |
| C | 7 | 3031 | 5 | 2.891 | 4 | 2.797 |
| D | 732 | 169.925 | 488 | 142.600 | 440 | 136.619 |
| E | 53 | 9.878 | 34 | 7.856 | 32 | 7.315 |
| F | 178 | 25.070 | 105 | 18.270 | 86 | 16.625 |
| G | 217 | 46.089 | 141 | 39.270 | 127 | 36.150 |
| H | 56 | 8.982 | 37 | 7.198 | 33 | 6.616 |
| I | 87 | 32.396 | 72 | 30.996 | 67 | 30.439 |
| K | 148 | 24.791 | 80 | 18.055 | 67 | 16.016 |
| **Total** | **1.478** | **320.162** | **962** | **267.136** | **856** | **252.577** |

Source: Statistical Office of the republic of Slovenia

The sample used in probit and nested logit analysis is restricted to around 350 units due to incomplete responses. At this stage, only 15 most frequently used host countries were only used in analysis.[3] Figure 1 illustrates the structure of the sample by location and mode of international sourcing. Number of sample enterprises using particular sourcing mode and location is reported.

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[2] All large enterprises (250 or more employees) and 57% of medium sized enterprises (50-249 employees) were included in the sample.
[3] Austria, Bosnia and Hercegovina; Czech Repuvblic, Croatia, Italy, China, Hungary, Macedonia, Germany, Poland, Romania, Russia, Serbia, USA and UK were included in detailed analysis.

**Figure 1: The sample enterprises by location and mode of international sourcing**

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                    ┌─────────────────────┐
                    │   Firm's decision   │
                    │        over         │
                    │  fragmentation of   │
                    │     production      │
                    │      process        │
                    └─────────────────────┘
                              │
              ┌───────────────┴────────────────┐
     ┌─────────────────┐              ┌─────────────────┐
     │    Domestic     │              │    Foreign      │
     │    sourcing     │              │    sourcing     │
     │    Slovenia     │              │                 │
     └─────────────────┘              └─────────────────┘
          │                                  │
    ┌─────┴─────┐                      ┌─────┴─────┐
┌──────────┐ ┌──────────┐        ┌──────────┐ ┌──────────┐
│ In-house │ │ Domestic │        │ Captive  │ │ Offshore │
│production│ │outsourcing│       │offshoring│ │outsourcing│
│  N=195   │ │  N=85    │        │  N=221   │ │  N=62    │
└──────────┘ └──────────┘        └──────────┘ └──────────┘
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| Captive offshoring | Offshore outsourcing |
|---|---|
| Croatia 44 | Bosnia and |
| Serbia 37 | Herzegovina 15 |
| Bosnia and | Serbia 13 |
| Herzegovina 31 | Croatia 9 |
| Germany 18 | China 7 |
| Austria 10 | Germany 4 |
| Czech R. 10 | Russia 4 |
| Russia 10 | Romania 4 |
| China 9 | Macedonia 3 |
| Hungary 9 | Poland 2 |
| Macedonia 9 | Austria 1 |
| Poland 9 | USA 1 |
| Romania 9 | |
| Italy 8 | |
| USA 5 | |
| UK 3 | |

Note: Only fifteen most frequently reported host countries were included in the analysis.
Source:  Statistical office of the Republic of Slovenia, own calculations.
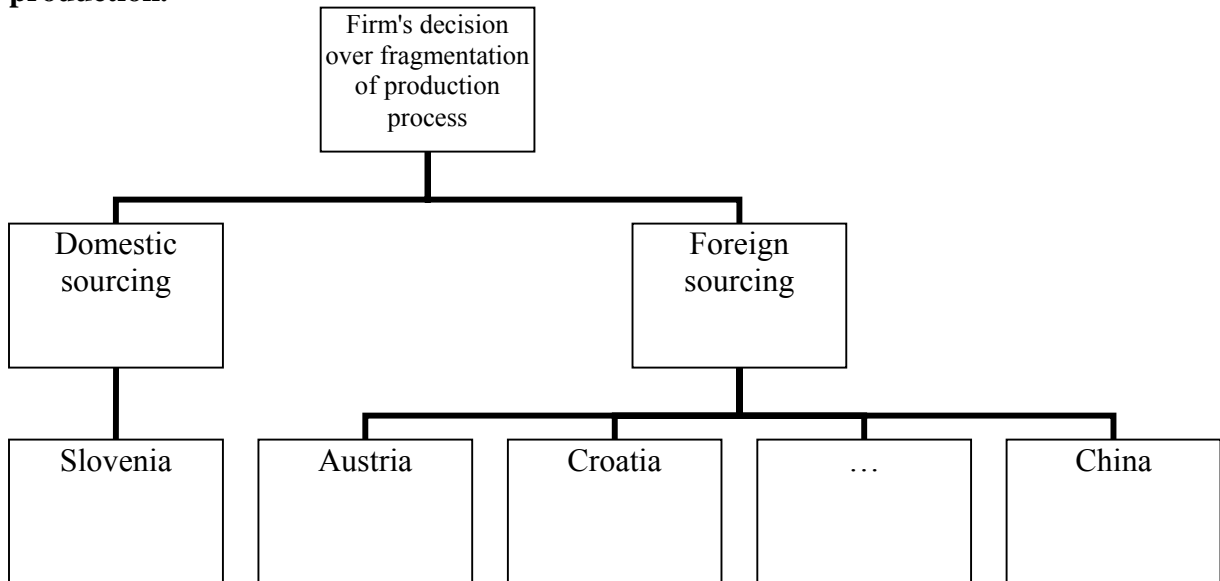

**Methodology**

To model the choice of sourcing mode of Slovene firms with respect to type of sourcing

and location, a discrete choice analysis is implemented here. A two-level nested logit

framework is adopted since it enables us to relax strong assumptions of the multinominal or conditional logit model. The assumptions concerned are the ones of independently distributed errors and the independence of irrelevant alternatives inherent in the alternatives to the nested logit models. The basic idea of nested multinominal logit models is to extend the conditional logit model in order to allow groups of alternatives (nests) to be similar to each other in an unobserved way, in other words, to have correlated error terms.

In the upper level, firms are considering two modal choices: domestic sourcing and foreign sourcing (offshoring). In the bottom level, offshoring mode is further broken into 15 locational choices, where the countries chosen were the 15 most attractive locations in the survey. Assuming inappropriately that the random errors are independent would result in forcing the odds ratio of any two alternatives (for example domestic sourcing and sourcing to Austria) to be independent of the other alternatives (for example sourcing to Italy), a property known as the independence of irrelevant alternatives (IIA). Suppose that when a firm is considering an optimization of the value added chain, its sector suddenly gets pressed by low import prices. The unobserved shock (being squeezed from the market due to foreign competition) would raise the likelihood that the firm chooses to fragment part of its production process to one of the foreign locations, so the choice between two alternative foreign lower-cost locations would be much more relevant than the choice between a Slovenian subcontractor or in-house production. Nested logit model thus relaxes the IIA and allow us to group alternatives for which unobserved shocks may have concomitant effects. The structure of the nested logit model is shown below. It

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should be pointed that the classification of alternatives regarding their similarities into nests and the resulting tree structure does not have anything in common with a stochastic valuation of alternatives as the nested logit models do not define the process of decision making. We perform the utility maximization nested logit (UMNL) instead of the non-normalized nested logit (NNNL) because the former was shown to be consistent with random utility maximization as shown by McFadden (1977, 1981) and confirmed on the simulated data by Silberhorn, Boztug and Hildebrandt (2007).

**Figure 2: Nested logit tree structure of firm's decision about fragmentation of production.**

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                      ┌─────────────────────┐
                      │   Firm's decision   │
                      │ over fragmentation  │
                      │   of production     │
                      │      process        │
                      └─────────────────────┘
                  ┌───────────────┴────────────────┐
          ┌───────────────┐              ┌───────────────┐
          │   Domestic    │              │    Foreign    │
          │   sourcing    │              │   sourcing    │
          └───────────────┘              └───────────────┘
                  │              ┌────────┬──────┼────────┬────────┐
          ┌───────────┐    ┌─────────┐ ┌────────┐ ┌──────┐ ┌────────┐
          │  Slovenia │    │ Austria │ │ Croatia│ │  …   │ │ China  │
          │           │    │         │ │        │ │      │ │        │
          └───────────┘    └─────────┘ └────────┘ └──────┘ └────────┘
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As can be seen from the comparison of Figures 1 and 2, the structure of the decision tree in the nested logit is more simple than the one in Figure 1 because the method precludes identical bottom-level alternatives (for example Croatia under captive offshoring and Croatia under offshore outsourcing mode). Hence, we had to restrict our decision tree in a way that we bundled together arm's length and vertical integration strategies under the foreign sourcing choice. Nevertheless, to explore the choice between the location

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(domestic vs. foreign sourcing) and type of sourcing (outsourcing vs. captive sourcing), we also performed the probit analysis of the two decisions.

**The explanatory variables**

Explanatory variables comprise firm characteristics, industry variables, and country variables. In the upper level, firm's decision about domestic vs. foreign sourcing is modelled as a function of eight variables. Five of them are firm-specific and include: productivity in terms of value added per employee relative to the corresponding 3-digit industry average (rval), capital intensity relative to the corresponding 3-digit industry average (rkl), size as measured by the number of employees (emp), export dummy (ex_dummy), and financial liabilities in total assets (finliab_assets). The remaining three explanatory variables are industry-specific ad include: dummy indicating high-tech and medium-high-tech industries (hi_medhi_tech), industry R&D intensity relative to sales (rdind_med), and 75'th percentile employment in the corresponding 3-digit industry (pct75emp), a measure for the economies of scale.

At the bottom level, the decision over specific location is modelled as a function of 13 country attributes, measuring the attractiveness of the location. These include gross national income per capita (gnipc), distance from Ljubljana to foreign capital (distance), dummy for common land border (border), dummy for overseas location (overseas), common historical and cultural links (links), dummy for EU membership (EU), time required to start a business (timebusiness), roads paved as % of total roads (roadspaved), market capitalization of listed companies as % of GDP (marketcapit), Index of economic

freedom (econfreedom), private credit by deposit money banks and other financial institutions as % of gdp (privatecredit), the share of postsecondary educated in working-age population (highereduc), and the number of internet users per 100 people (internet). Unless stated otherwise in the Appendix, all the country data is for the year 2006.


## 4. Empirical findings

In the period 2001-2006, 21 % of Slovenian medium-sized and large enterprises sourced or were planning to source their business activities to foreign markets. The dynamics of international sourcing has increased from 2001-03 to 2004-06, both in number of enterprises and activities involved. Most of the enterprises that sourced their activities to foreign markets were from the manufacturing sector (that also has longer tradition of exporting and investments abroad) while enterprises from services sector sourced less internationally.

The analysis of international sourcing revealed the pattern of sequential internationalization that has been identified also in other studies of Slovenian outward internationalization process (Jaklič and Svetličič, 2003; Burger et al., 2006). International sourcing frequently follows other less demanding entry modes like export and foreign direct investment (FDI) and serves as a tool for further diversification of foreign operation modes. International sourcing is more frequently used among exporters and enterprises with FDI. Sourcing within enterprises is also more common within than outside enterprise groups. As many as 75% of all the enterprises, that sourced their activities internationally, sourced them within the enterprise group. Exploring the differences between in determinants of captive offshoring versus offshore outsourcing is

thus particularly relevant. Enterprises sourced mainly the production of goods and services, as well as marketing, sales and similar services, distribution and logistics (Figure 3).

**Figure 3: International sourcing, within and outside of enterprise groups (captive offshoring versus offshore outsourcing) (in %), Slovenia, 2001-2009**
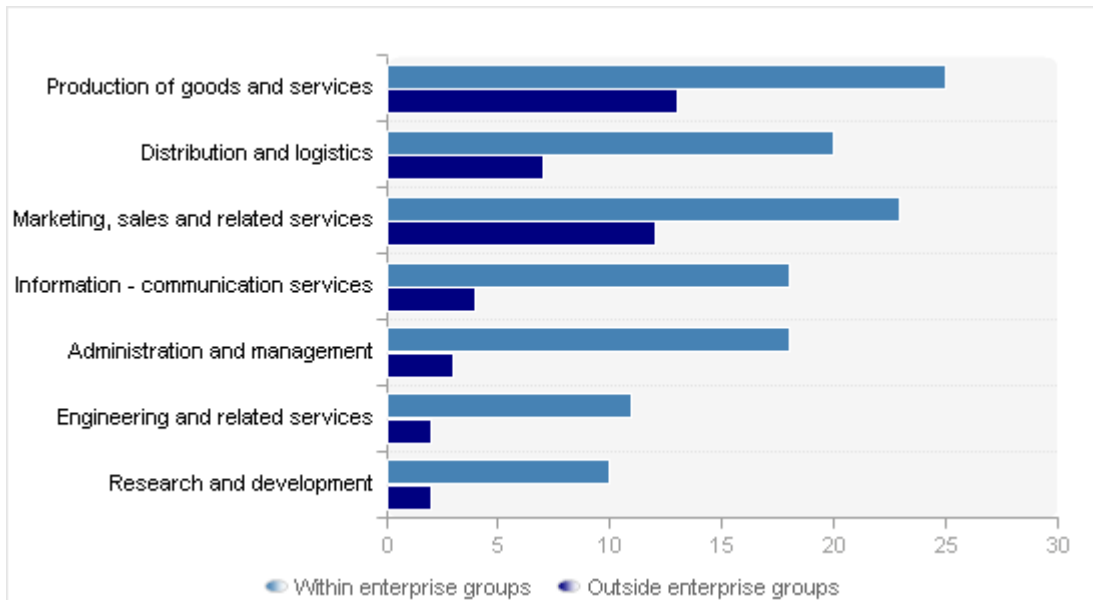


Source: Statistical Office of the Republic of Slovenia.

Sequential pattern may be also found in geographical distribution since the proximity (cultural and physical) and historical ties seem important. The most frequently used host destinations were Serbia and Croatia, followed by Bosnia and Herzegovina, Germany and Austria.

The main motivation factor for the decision to carry out international sourcing was improved competitiveness, access to new markets, position on the market and reduction of costs.[4] Motivation for international sourcing differs especially according to the level of

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[4] 19 different motives were evaluated with 1-5 grade scale.

internationalization. Motives of exporters significantly differ from motives of non-exporters. Exporters were significantly more motivated by reducing labour costs, and other costs, by concentrating on core competences, by lack of skilled employees, lack of knowledge, more flexible foreign environment, and strategic reasons. MNEs are significantly more motivated by access to new markets, following the competitors, concentrating on core activities, improving logistics and competitiveness, more flexible business environment, value chain, market position, and strategic decisions. Motivations also differ by location and mode of sourcing. Improving logistics, better market position, more flexible business environment and tax optimization are significantly more important motives for sourcing on foreign markets (compared to domestic sourcing). Less significant are differences in motives between captive offshoring and arm's length sourcing (offshore outsourcing). Arm's length international sourcing is significantly more driven by increasing competitiveness and reducing other costs compared to captive offshoring (within enterprise group).

Slovenian firms estimated that international sourcing had a positive impact on their enterprise and contributed to their competitive advantages. More than half of Slovenian companies estimated, that international sourcing had no impact on the employment in their enterprise. The main barriers were overall concerns that the sourcing operation would exceed the expected benefits, the high risk of sourcing internationally and a lack of management resources and know-how.

The results of the nested logit estimation are presented in Table 2. Interestingly, none of the determinants came out significant. The insignificance of the country-specific variables in the bottom-level choice level probably occurs due to the restricted group of selected countries that include only 15 most frequent choices of the firms in our sample. Had we included a broader set of countries, some of the variables would probably become significant.[5] For example, distance does not appear to influence the choice of the host country since the most frequent country choices are situated in the medium range from Slovenia (Serbia, Bosnia and Herzegovina, and Germany) whereas less frequent choices are neighbouring countries as well as more distant ones. Insignificance of determinants may also be the result of sample structure. Firms that responded to the survey on international sourcing are above average in terms of productivity, size, export intensity and R&D intensity (see Burger, 2009) and thus limit variation in the studied variables. As a rule, the response of less productive, smaller and less internationalized enterprises is lower[6], while more successful and more internationalized enterprises are more diligent respondents. If firm productivity affects the probability of choosing foreign sourcing to domestic production with a decreasing intensity, then the sample attrition in favour of more productive firms puts a negative bias on the coefficient. To alleviate this sample bias problem, we intend to experiment with weights that will put more weight on underrepresented cohorts of firms in terms of productivity, size or value added.

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[5] We will include the rest of the EU and European countries to the bottom-level choice set. Due to the delay by the Statistical Office in providing the database, we were not able to expand our data by now.
[6] It would be useful to consider this fact in sampling when repeating the survey on internationa sourcing in the next years.

## Table 2: Results from the nested logit model.

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tree structure specified for the nested logit model

 y_where           N        y_country       N    k
 Domestic sourc  346 --- Slovenia         346  154
 Foreign sourc   5190 --- Austria         346    8
                        |- Bosnia and H   346   33
                        |- Czech R.       346    4
                        |- Croatia        346   37
                        |- Italy          346    3
                        |- China          346   14
                        |- Hungary        346    3
                        |- Macedonia      346   11
                        |- Germany        346   15
                        |- Poland         346    7
                        |- Romania        346    8
                        |- Russia         346   11
                        |- Serbia         346   30
                        |- USA            346    6
                        |- UK             346    2
                              total     5536  346

k = number of times alternative is chosen
N = number of observations at each level
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| | | | | |
|---|---|---|---|---|
| RUM-consistent nested logit regression | | Number of obs | = | 5536 |
| Case variable: id | | Number of cases | = | 346 |
| | | | | |
| Alternative variable: y_country | | Alts per case: min = | | 16 |
| | | avg = | | 16.0 |
| | | max = | | 16 |
| | | | | |
| | | Wald chi2(21) | = | 12.00 |
| Log pseudolikelihood = -688.14246 | | Prob > chi2 | = | 0.9396 |

(Std. Err. adjusted for clustering on id)

| chosen_r | Coef. | Robust Std. Err. | z | P>\|z\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| **y_country:** | | | | | | |
| gnipc | .0017918 | .0026052 | 0.69 | 0.492 | -.0033143 | .0068979 |
| distance | .0067996 | .0098218 | 0.69 | 0.489 | -.0124507 | .02605 |
| border | .6287637 | 1.361921 | 0.46 | 0.644 | -2.040553 | 3.298081 |
| overseas | -11.19465 | 17.21373 | -0.65 | 0.515 | -44.93293 | 22.54364 |
| links | 19.44921 | 28.37055 | 0.69 | 0.493 | -36.15604 | 75.05446 |
| eu | -1.296347 | 4.979835 | -0.26 | 0.795 | -11.05664 | 8.463951 |
| timebusiness | .0206258 | .0716061 | 0.29 | 0.773 | -.1197196 | .1609711 |
| roadspaved | -.2539541 | .3647117 | -0.70 | 0.486 | -.968776 | .4608677 |
| marketcapit | .2604851 | .3751628 | 0.69 | 0.487 | -.4748205 | .9957906 |
| econfreedom | -.0973998 | .1584219 | -0.61 | 0.539 | -.4079011 | .2131015 |
| privatecredit | -35.24506 | 51.52451 | -0.68 | 0.494 | -136.2312 | 65.74112 |
| internet | .4507691 | .6427789 | 0.70 | 0.483 | -.8090545 | 1.710593 |
| highereduc | -1.779301 | 2.555708 | -0.70 | 0.486 | -6.788397 | 3.229795 |
| **y_where equations:** | | | | | | |
| y_where[domestic] (base) | | | | | | |
| y_where[foreign] | | | | | | |
| rval | -.1621658 | .0977622 | -1.66 | 0.097 | -.3537762 | .0294446 |
| rkl | .0094398 | .0155538 | 0.61 | 0.544 | -.0210452 | .0399247 |
| emp | -.0001971 | .0002309 | -0.85 | 0.393 | -.0006497 | .0002555 |
| ex_dummy | -.3111199 | .2567665 | -1.21 | 0.226 | -.814373 | .1921333 |
| finliab_asset | -.0983938 | .1425239 | -0.69 | 0.490 | -.3777355 | .1809479 |
| hi_medhi_tech | .1840812 | .4725531 | 0.39 | 0.697 | -.7421058 | 1.110268 |
| rdind_med | -6.617291 | 12.66769 | -0.52 | 0.601 | -31.4455 | 18.21092 |
| pct75emp | -.0015148 | .0015134 | -1.00 | 0.317 | -.004481 | .0014514 |
| dissimilarity parameters | | | | | | |
| y_kje | | | | | | |
| /y_kje1_tau | 1 | . | | | . | . |
| /y_kje2_tau | 3.707073 | 5.250073 | | | -6.582881 | 13.99703 |

Source: own calculations.

To delve deeper in the analysis of sourcing choice, we also perform two separate probit regressions that focus on the choice between domestic and foreign sourcing on one hand and the choice between captive and arm's length arrangements on the other hand. Table 3 shows the results of the probit regression on the determinants of choosing domestic sourcing vs. offshoring. Only the variable financial liabilities relative to total revenues is statistically significant at the conventional 5% risk. Firms with higher debt-revenue ratio are on average more likely to choose offshoring. It must be noted, however that this variable is not an ideal indicator of firm's financial constrain since it rather shows the outcome. Highly leveraged firms are obviously not financially constrained, yet for the low-leverage firms one cannot say whether this is an outcome of deliberate choice or financial constraints. Apart from indebtedness, only the headquarter intensity variable (median firm's value added over sales in the corresponding 3-digit industry) turns out significant, yet only marginally.

**Table 3: The determinants of firm's choice about the location of sourcing (domestic vs. foreign sourcing).**

| Probit regression | | | | Number of obs | = | 340 |
|---|---|---|---|---|---|---|
| | | | | Wald chi2(11) | = | 48.66 |
| | | | | Prob > chi2 | = | 0.0000 |
| Log pseudolikelihood = -223.01655 | | | | Pseudo R2 | = | 0.0468 |

**Dep. var.: y_where (0=domestic, 1=foreign)**

| | Coef. | Robust Std. Err. | z | P>z | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| rval | -1E-05 | 1.1E-05 | -1.11 | 0.266 | -3E-05 | 8.86E-06 |
| rkl | 0.00576 | 0.00637 | 0.90 | 0.366 | -0.0067 | 0.018236 |
| emp | -0.0002 | 0.00015 | -1.09 | 0.274 | -0.0004 | 0.000128 |
| ex_sales | 0.14317 | 0.26953 | 0.53 | 0.595 | -0.3851 | 0.671444 |
| finliab_sales | 0.00867 | 0.00165 | 5.27 | 0.000 | 0.00544 | 0.011894 |
| pct75emp | -0.0014 | 0.00106 | -1.33 | 0.182 | -0.0035 | 0.000666 |
| med va/sales | 1.23402 | 0.69031 | 1.79 | 0.074 | -0.119 | 2.586998 |

| | Coef. | Std. Err. | z | P>z | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| hitech | -0.1086 | 0.63148 | -0.17 | 0.863 | -1.3462 | 1.129098 |
| medhitech | 0.18903 | 0.31101 | 0.61 | 0.543 | -0.4205 | 0.79859 |
| rdind_med | -5.2247 | 8.88678 | -0.59 | 0.557 | -22.642 | 12.19307 |
| f_ownership | 0.02825 | 0.13811 | 0.20 | 0.838 | -0.2424 | 0.298931 |
| constant | -0.2196 | 0.29055 | -0.76 | 0.45 | -0.789 | 0.349901 |

Source: own calculations.

The choice between captive and arms' length arrangements appears to be correlated only with the economies of scale variable (pct75emp). Industries with more pronounced economies of scale tend to be more inclined towards outsourcing arrangements. Higher industry R&D intensity also tends to favour arms' length transactions, although this is contrary to theoretical predictions (e.g. Antràs and Helpman, 2004). Finally, more capital intensive firms relative to industry average are more inclined to choose independent subcontractors for their foreign sourcing operations, although the coefficient is significant only at 6%.

**Table 4: The determinants of firm's choice about the type of sourcing (captive vs. arm's length sourcing).**

| Probit regression | | | | Number of obs | = | 184 |
|---|---|---|---|---|---|---|
| | | | | Wald chi2(10) | = | 16.93 |
| | | | | Prob > chi2 | = | 0.0760 |
| Log pseudolikelihood = -102.62049 | | | | Pseudo R2 | = | 0.0711 |

**Dep. var.: y_how (0=captive, 1=arm's length)**

| | Coef. | Robust Std. Err. | z | P>z | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| rval | 1.51E-06 | 1.7E-05 | 0.09 | 0.928 | -3E-05 | 3.4E-05 |
| rkl | 0.010807 | 0.00578 | 1.87 | 0.061 | -0.0005 | 0.02213 |
| emp | -0.00023 | 0.00081 | -0.29 | 0.775 | -0.0018 | 0.00136 |
| ex_dummy | 0.28847 | 0.29534 | 0.98 | 0.329 | -0.2904 | 0.86733 |
| finliab_sales | 0.001007 | 0.00253 | 0.40 | 0.691 | -0.004 | 0.00597 |
| pct75emp | 0.013307 | 0.00599 | 2.22 | 0.026 | 0.00157 | 0.02505 |
| med va/sales | -1.30665 | 1.41396 | -0.92 | 0.355 | -4.078 | 1.46465 |
| medhitech | -0.13458 | 0.43192 | -0.31 | 0.755 | -0.9811 | 0.71195 |
| rdind_med | 25.44893 | 13.3414 | 1.91 | 0.056 | -0.6998 | 51.5976 |

| | | | | | | |
|---|---|---|---|---|---|---|
| f_ownership | -0.37965 | 0.25714 | -1.48 | 0.140 | -0.8836 | 0.12433 |
| cons | -0.3613 | 0.55474 | -0.65 | 0.515 | -1.4486 | 0.72598 |

**Conclusions**

The analysis of international sourcing among Slovene firms shows increasing dynamics of this operation mode from 2001 to 2009 both in number of enterprises and host countries involved as well as activities sourced. Still the survey revealed sequential pattern and the importance of previous internationalization experience, like export and/or FDI. Vast majority (75%) of international sourcing takes place within the enterprise group.

Motivations for international sourcing differ especially according to the level of internationalization. Exporters (compared to non-exporters) are significantly more motivated by motives that determine access to resources and labour-cost and other cost reduction. MNEs, on the other hand, are (compared to non-MNEs) significantly more motivated by improving logistics, competitiveness, and a number of strategic positions (defending market share, value chain optimization, and following competitors). Motivations also differ by location and mode of sourcing. Improving logistics, better market position, more flexible business environment and tax optimization are significantly more important motives for sourcing on foreign markets (compared to domestic sourcing). Less significant are differences in motives between captive offshoring and arm's length sourcing (offshore outsourcing). Arm's length international

sourcing is significantly more driven by increasing competitiveness and reducing other costs compared to captive offshoring (within enterprise group).

Most of firm-level characteristic were however found insignificant in determining the international sourcing decisions in the nested logit model. This may be due to the restricted size of the sample of host countries included and sample bias towards better performing firms. Both issues will be dealt in order to obtain more reliable results in the near future. When deciding between domestic sourcing and offshoring, the only significant determinant found was the indebtedness where financially unconstrained firms opt for foreign sourcing much more frequently than firm with lower debt ratio. The decision about the second dimension of sourcing strategy, the type of sourcing relationship, appeared to be driven by three factors: economies of scale, relative capital intensity, and R&D intensity. All three factors seem to be positively correlated with the odds of firms choosing arm's length sourcing arrangements.

Outsourcing processes are complex and decision makers attempt to consider multiple rationalities and determinants simultaneously. Current analysis leaves many questions open, however, it establishes the base for future research. The data set that has been created from the detailed survey and financial accounts information enable in-depth further analyses on reasons and determinants as well as impacts and effects of international sourcing in Slovenian firms.

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**Appendix**

*Country variables and sources:*

Gross national income per capita is provided by World Bank's World Development Indicators (WDI) Online Database and is expressed in PPP current international dollars. This variable proxies for wage differences across countries and partially also for the relative abundance of capital. Lower wages encourage production relocation so we would expect the negative sign on this variable.

Roads paved variable comes from WDI Online Database and is expressed as a percentage of paved roads in total roads. This variable represents the quality of transport infrastructure that has an expected positive influence on choosing the country as an offshoring destination.

Time required to start business is from WDI database and is an indicator of administrative barriers and general business environment in a country. The expected sign of the coefficient is negative as the administrative burden averts foreign business endeavours.

Another World Bank's country variable is market capitalization of listed companies, expressed as a percentage of GDP. It shows country's state of financial market, whose development is expected to increase the odds for the entry of foreign firms. Similarly, private credit by deposit money banks and other financial institutions as % of GDP describes a country's financial market maturity and functionality. It is taken from Beck , Demirguc-Kunt and Levine (2000) at the address

Variable distance measures the road distance between Ljubljana, Slovenia's capital city around which the majority of firms are concentrated, and a potential target country's capital. The distance for European countries was obtained with ViaMichelin Route Planner (http://www.viamichelin.com/) whereas for China and the USA "as the crow flies" distance using Google Maps Distance Calculator was used instead.

Apart from the distance, other classical gravity equations variables included in the empirical model are the common border dummy (Italy, Austria, Hungary, and Croatia are Slovenia's direct neighbours), dummy for overseas locations (China, USA and UK), common historical and cultural links (ex-Yugoslavian republics), and the EU members dummy. Distance and overseas country dummy are expected to negatively affect the propensity to enter a country, while for the common border, common history and EU dummies negative associations are anticipated.

Internet users per 100 people was taken from the WDI database and reveals the development of the telecommunication infrastructure that is very important for undertaking international business operations efficiently.

Skill structure of a country's population is measured by the educational attainment of the total population aged 15 and over provided by Barro and Lee (2000) where the figures for the share of post-secondary education attained in 2000 was taken. In addition to lower wages, highly skilled workforce is another appeal for production relocation, so we expect a positive correlation with the firm's offshoring choice.

*Industry variables and sources:*

Our measure of product complexity is the variable that measures the intensity of R&D in the corresponding industry. Values are constructed using The OECD Research and Development Expenditure in Industry Database for the year 2004 or the lates year available. We used all the available countries' data and made the industry-by-industry averages of R&D intensity across countries. We also calculated the median country's R&D intensity by industries and after the comparison of both indicators decided for the latter because it is less sensitive to measurement errors. We checked, however, that both measures yield similar results. We also included a dummy variable indicating high-tech and medium-high-tech industries according to the Lall (2000) classification.

We use annual firm-level accounting data from Statistical Office of Slovenia to calculate for each industry the median and $75^{th}$ percentile of firm size in terms of employment to capture the presence of economies of scale. By examining the data and comparing across industries, the third quartile seemed a better measure than the second quartile since a lot of micro and small firms in certain industries distract the measure.

*Firm variables and sources:*

To control for firm productivity we construct a relative measure of productivity in order to deal with the industry heterogeneity. Therefore, we calculate value-added per employee for each firm in 2006 and then express it relative to the corresponding 3-digit

average productivity in the same year. The same procedure is performed for relative capital intensity.

To capture the effect of firm size, we use the number of employees. We also include the dummy variable for exporting and ratio of financial liabilities to total assets in order to control for possible financial constraints in the internationalization process. Categorical variable f_ownership indicates the foreign ownership of a firm. The data for all firm variables comes from the financial statements collected by Agency of the Republic of Slovenia for Public records and Related Services (AJPES).