Does the Explanatory Power of the OLI Approach Differ among Sectors and Business Functions?

Evidence from Firm-level Data

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Abstract

The relevance of services FDI strongly increased over the last two decades. As services and goods differ with respect to important characteristics, one may expect that the determinants of internationalisation are not identical in services and manufacturing. Surprisingly, there is practically no firm-level research contrasting the two sectors in this respect. In order to fill this gap, we aim at identifying for manufacturing and services, firstly, the determinants of a firm's propensity to engage in foreign activities (exports and/or FDI) and, secondly, the factors determining a firm's FDI strategy in terms of (combinations of) business functions located abroad. We find that an OLI-based model, in particular the OL-part, is well suited for explaining not only the propensity to go international but also the differences between two specific forms of FDI in terms of business functions (the one including, the other excluding R&D) both for manufacturing and services. In all models, the explanatory power of the OLI approach is stronger for manufacturing than service activities. The results are consistent with the stages view of internationalisation in particular in manufacturing, but to a lesser extent also in services where, however, the process of internationalisation is less continuous.

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1   Introduction

The long-term trend of an increasing share of service sector FDI has accelerated over the last twenty years (Dunning and Lundan 2008; Kundu and Merchant 2008). Nevertheless, empirical research on FDI is still concentrated on manufacturing. As the basic characteristics of services and goods differ – the main specifics of services are intangibility, inseparability of production and consumption, heterogeneity, perishability and restricted ownership (Buckley et al. 1992) – one would expect that the *determinants of internationalisation* are not the same (or not relevant to same extent) in the two sectors (see, e.g., Boddewyn et al. 1986; Dunning 1989; Contractor et al. 2003). This may hold true although the separation line between goods and services has become quite blurred (see, e.g., Grönroos 1999; Jack et al. 2008), reflecting the growing service content of manufacturing and a certain tendency towards an industrialisation of parts of the service sector (Miozzo and Miles 2002; Guerrieri and Meliciani 2005).

Against this background, it is surprising that firm-level econometric research dealing with the internationalisation of service firms by way of FDI is scarce and still dominated by the analysis of specific industries.[1] The few studies that cover the entire service sector, with only some exceptions (Li and Guisinger 1992, Kundu et al. 2008), are devoted to aspects of internationalisation that we do not analyse in the present contribution.[2]

Furthermore, and most importantly, there is hardly any empirical work *contrasting services and manufacturing* with respect to the *factors determining FDI*. In fact, we are aware of only three studies which systematically explore differences between these two sectors in this respect.[3] Firstly, Lejpras (2009) analyses for Germany, using firm-level survey data, a firm's choice between domestic activity and exporting (accompanied by FDI and, alternatively, without FDI) and between domestic activity and FDI (without exports). The explanatory variables mainly reflect a firm's capabilities (innovativeness, size, etc.) and its "environment" (competition; attractiveness of domestic locations). Secondly, Wagner (2014) investigates, based on German

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[1]   *Econometric* industry studies became available, with some exceptions, only in recent years. To mention are Lin (2010) and Narayanan and Bhat (2010) for ICT/software; Contractor and Kundu (1998), Brown et al. (2003), León-Darder et al. (2010) and Villar et al. (2012) for the hotel industry; Ursacki and Vertinsky (1992), Nachum and Wymbs (2005) and Mariscal et al. (2012) for financial services; Terpstra and Yu (1988); Rodriguez and Nieto (2012) for some knowledge-intensive service industries.

[2]   For example: foreign entry mode choice (Erramilli and Rao 1993); outsourcing (Murray and Kotabe 1999); impact of internationalisation on firm performance (Contractor et al. 2003); causal relationship between manufacturing FDI and FDI in business services (Nefussi and Schwellnus 2010).

[3]   Another two studies that deal with differences between the two sectors with respect to the direct foreign presence are Brouthers and Brouthers (2003) and Jaklic et al. (2012). The former refers to the entry mode choice (wholly owned subsidiaries vs. joint ventures), the latter to the impact of international outsourcing/offshoring on firm performance.

data, whether the well documented pecking order of *manufacturing* firms with respect to the way of going international (only the most productive firms are active in FDI, less productive ones are exporters, the least productive companies exclusively serve domestic markets) is also characteristic for the *service* sector. This study is based on the "heterogeneous firm approach" (Melitz 2003), which is quite often applied in recent years, but only for manufacturing. Finally, Py and Hatem (2009) analyse the *location* of foreign investment projects of French companies, with host country attributes serving as explanatory variables. This study is, to our knowledge, the only one that differentiates between investments involving specific business functions. In the present context, however, this paper is not effectively relevant as it focuses on the *location choice*, which is not the aim of our analysis that deals with the determinants of the choice of the *type of foreign activity*. All in all, we may conclude that the empirical knowledge with respect to the similarities and differences between manufacturing and services firms with respect to the *determinants* of the internationalisation of economic activities of firms is limited.

The present study aims at filling this research gap by identifying and comparing for the two sectors (a) the drivers of the internationalisation of firm activity in terms of exports and FDI, and (b) the determinants of the choice between specific forms of FDI in terms of business functions. In order to analyse these problems we formulate two empirical models. In *model I* (*"INT_propensity"),* we estimate the probability of a firm to belonging to one of the following (mutually exclusive) three categories: "selling on domestic markets only" (DOMESTIC), "serving, additionally, export markets (without any offshoring)" (EXPORT), and "offshoring" (FDI). In *Model II* ("*INT_function*"), we determine the likelihood of a firm to locating abroad specific (combinations of) business functions, that is (a) "offshoring distribution *and/or* production" (FDI_DP) and (b) "offshoring R&D activities, in addition to distribution *and/or* production" (FDI_RDP). The two groups of firms, which are subcategories of FDI, again are mutually exclusive.

Theoretical framework of the empirical analysis is the well-known OLI paradigm (Dunning 2000). We expect that the explanatory power of the OLI variables is lower in the case of the service sector than for manufacturing, primarily because of the larger heterogeneity of its activities, the particular importance of soft factors (as opposed to technology-related variables) as well as the significance of idiosyncratic and situation-specific factors. Moreover, we argue that the explanatory power of OLI variables is stronger for a complex strategy of FDI in terms of business functions than for a less complex one, because, the costs incurred by the first strategy are higher and may thus be overcome only in the presence of larger O-advantages. Finally, we mention already at this stage that the empirical tests of these hypotheses are

primarily based on the OL-part of the OLI paradigm, as the data at hand allow only a very rough measurement of I-advantages (see subsection 4.2).

The analysis is an extension of Hollenstein (2005), who estimated, using Swiss data for 1998, OLI-based models that are structurally similar to model I and II but did so only for the entire business sector. The research also goes beyond the already mentioned analysis of Lejpras (2009), who disaggregated the business sector in manufacturing and services and estimated a model comparable to our model I that distinguishes between "exporting only" and "direct foreign presence". This researcher, however, did not further differentiate *within* the category of firms with FDI as we do in model II (differences between two combinations of business functions). Similarly, our contribution goes beyond Wagner (2014) who also estimated model I only. By estimating model I and II we thus significantly add to previous evidence on the differences between manufacturing and service companies with respect to the determinants of international activities.

The paper is based on a unique firm-level dataset containing information from 1921 companies of the Swiss business sector that responded to a comprehensive survey we conducted in 2010 among a random sample drawn from the official enterprise census of 2008 (response rate: 42%). The available data allow a rich specification of the explanatory variables of the two models, in particularly with respect to the OL-part of the OLI model.[4] Using Swiss data may be of general interest as the process of internationalisation of the Swiss economy is particularly advanced (UNCTAD 2015).

In line with our hypotheses, we find, for both sectors, that an OLI-based model (in particular the OL-part) is well suited not only for explaining the propensity of firms to go international by means of exports and/or FDI (model I) but also to identify the differences between specific forms of FDI in terms of business functions (model II). In all models, the explanatory power of the OLI approach is stronger for manufacturing than for services. The results for manufacturing are in line with the stages view of internationalisation, this is only partly the case for the service sector.

The structure of the paper is as follows: In the next section, we present the conceptual framework and the related hypotheses. In Section 3, we describe the database and give some information on the incidence of international activities of Swiss companies. Section 4 is devoted

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[4]   The same data have been successfully used for explaining the *location* of the FDI of Swiss firms (Arvanitis et al. 2015) as well as their choice between equity-based and. non-equity foreign *entry modes* (Hollenstein and Berger 2015).

to model specification, and in Section 5 we present the empirical results and compare them with previous work. In the final section, we summarise and draw some conclusions.

2 Conceptual framework and related hypotheses

2.1 Theoretical background

Since Hymer (1976), the theory of international investment is based on the assumption of imperfect markets. Under these conditions, firm-specific capabilities yield a competitive edge independent of the economic attractiveness of different locations (see Caves (1982) and, more formalised, the "new trade theory" (see, e.g., Helpman 1984). Moreover, the "transaction cost theory" states that a firm engages in FDI whenever the costs of setting up and running a transnational organisation of activities are lower than those of external market transactions (Rugman 1981; Hennart 1982; Buckley and Casson 1985; Williamson 1985). In addition, there are many partial hypotheses explaining specific aspects of internationalisation that are rooted in different sub-disciplines of economics such as industrial organisation, management sciences, evolutionary economics (Dunning 2000).

As early as in the 1970s, Dunning argued that no single approach is able to explain a firm's international activities (Dunning 1977, 1979). He proposed an eclectic theory of international production, the well-known OLI paradigm, which he further developed over the years to account for changing features of the international economy and new theoretical approaches. In the most recent version (Dunning and Lundan 2008) the OLI model applies not only to international production but also to other business functions. In addition, it emphasises the strategic aspects of internationalisation more explicitly by drawing on the "resource-based" (Wernerfelt, 1984) or "dynamic capability" (Teece et al. 1997) view of the firm, or the concept of the "knowledge-based company" (Kogut and Zander 1993).

We postulate that the OLI paradigm is an appropriate theoretical framework for specifying the explanatory part of the two models we estimate in this paper that deals with the propensity of firms to internationalise their activities (model I: *INT_propensity*) and with the likelihood of firms to locating abroad specific (combinations of) business functions (model II: *INT_function*). As mentioned in Section 1, we expect that the explanatory power of the OLI variables is higher in the case of the manufacturing than the services sector (model I) and higher for complex strategies of FDI in terms of business functions than for less complex ones (model II).

The OLI model basically accounts for three groups of explanatory variables:

1)*"Ownership-specific (O) advantages"*, which arise mainly from the availability of firm-specific knowledge, human capital, managerial skills, property rights, marketing outlets, access to finance or international experience. Firms characterised by large O-advantages are more likely to go international by way of exporting and/or FDI.

2) *"Location-specific (L) advantages"*, which root in differences between foreign and domestic locations with respect to factor costs, political stability, the regulatory framework or distance. This type of advantages determines *why* a company chooses an FDI-based strategy of internationalisation rather than one that is (purely) export-oriented (L-advantages of foreign locations as a precondition of FDI). L-advantages, obviously, would also be relevant for explaining *where* a firm locates its FDI; however, this aspect is not relevant for our analysis as we do not aim at explaining location choices.

3)*"Internalisation (I) advantages"*, which allow firms to reduce risks and costs of transactions in imperfect market for technology or key intermediate products. I-advantages are relevant for choosing among several *modes* of foreign engagements (e.g., wholly-owned subsidiary vs. joint ventures vs. non-equity based co-operations vs. other relatively loose relationships including exports). In this paper, we only distinguish between two *modes* of foreign activity, that is a) FDI (i.e. equity-based foreign presence) and b) exports (which may (or may not) be complemented by non-equity based foreign co-operation). In the presence of significant I-advantages, FDI is the preferred mode of internationalisation. We note again (see Section 1) that, due to insufficient data, the empirical analysis is primarily based on the OL-part of the OLI model.

We use some other explanatory variables that complement the three key elements of the OLI model. First, depending on the *market environment* (degree of competition, market growth), it may be beneficial (or necessary) for a firm to extend its activities to foreign locations (e.g., "first mover" or "follow the leader" strategy). Second, we presume that *industry affiliation* is an important control variable as the relevance of O-, L- and I-advantages are likely to differ among industries, in particular in the (heterogeneous) service sector (Dunning 1989).

The "model of the heterogeneous firms" (see the seminal papers of Melitz 2003 and Helpman et al. 2004) would be another approach one could use for analysing internationalisation strategies of firms. Recent empirical research dealing with manufacturing largely supports the main proposition of this model, stating that only the most productive firms enter foreign markets by FDI, the less productive ones are exporters and the least productive companies exclusively serve domestic markets (for a review see, e.g., Greenaway and Kneller 2007 or Wagner 2011).

In the service sector, however, the "pecking order" with respect to productivity seems to be different. According to Wagner (2014) exporters of services are more productive than service companies that enter foreign markets by means of FDI. Notwithstanding the evidence for this widely used approach, we prefer the OLI model as framework of analysis as it provides a more detailed view of the drivers of internationalisation than the "productivity approach". In fact, the variable "*productivity*" is a kind of a *"black box"* representing a whole bundle of specific strengths (and weaknesses) of a firm which influence the choice between different internationalisation strategies. By using the OLI model we are able to identify the relevance of the *individual* variables included in the productivity black box. In doing so, we follow other researchers such as Castellani and Zanfei (2007) or Castellani and Giovannetti (2010) who emphasised the need to looking inside this black box. They find for the Italian manufacturing sector that using innovation and other knowledge-related variables significantly reduces the explanatory power of productivity. Falk and Hagsten (2015), using Swedish data, got the same result for computer and business services. Moreover, as will be shown in subsection 4.2, we do not use productivity as additional variable of our OLI model, as it is highly correlated with the O- and I-variables; including productivity would thus bias the estimates (multicollinearity).[5]

2.2 Hypotheses

In a first step, we seek to identify the determinants of the propensity of a firm to internationalise its activities (*model I: INT_propensity*) based on the *entire business sector*, although we primarily are interested in differences in this respect between manufacturing and services firms. In doing so, we are able to generally "validate" our OLI-based approach, which then may serve as reference for the subsequent analysis of differences/similarities between the manufacturing and the service sector.

As set out in the previous subsection, O-advantages of firms suffice to explain why they go international at all (by means of exports and/or FDI). Moreover, FDI is the preferred way of internationalisation if a company, additionally, benefits from L-advantages of foreign locations and is able to internalise (international) market relations (I-advantages).

We thus postulate (*model I: INT_propensity*):

H1:   The OLI model is well suited to explain (a) why firms internationalise their activities rather than they serve domestic markets only (existence of O-advantages) and (b) why

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[5]   Moreover, regression results, not presented here, show that the variable "labour productivity" is statistically not significant in an equation where it is added to the OI-part of the OLI model.

they do so by means of FDI rather than exports (existence of L- and I-advantages in addition to O-advantages).

Turning to potential *differences between manufacturing and services* with respect to the determinants of the propensity of a firm to internationalise its activities, we note that several scholars argue that the OLI approach is not only able to explain the internationalisation of manufacturing firms but, perhaps with some modifications, also the foreign activities of service companies (Boddewyn et al. 1986; Dunning 1989; Buckley et al. 1992).

However, many researchers (see Section 1) emphasise that service industries are (particularly) heterogeneous in terms of the specific characteristics of services, primarily with respect to intangibility, inseparability, heterogeneity, perishability and ownership restrictions. Therefore, each service industry may exhibit a distinct pattern in terms of OLI advantages, as it is shown, in some detail, by Dunning (1989) who provides a qualitative assessment of the specific types of OLI advantages that are relevant in different service trades. As a consequence of these heterogeneities, it may be more difficult to find evidence for a *general* explanatory model such as the OLI model in the case of services compared to manufacturing. To some extent these heterogeneities can accounted for by using industry affiliation as control variables.

The large heterogeneity of the service sector is a recurrent topic in the internationalisation literature. It is distinguished, for example, between capital-intensive and knowledge-intensive services (Contractor et al. 2003), equipment-based and people-based services (Thomas 1978), or between hard and soft services (Erramilli 1990). Taking up the last distinction, Ekeledo and Sivakumar (1998) suggest that "hard services" (where production and consumption mostly are separable) are quite similar to manufacturing in terms of internationalisation, while "soft services" (production and consumption are inseparable) differ in this respect. Quite in general it is maintained – in line with intuition – that "soft factors" are particularly important as drivers of foreign activities of services firms, whereas technology-related variables are more relevant for explaining internationalisation of manufacturing companies. Such divergences may pertain to specific O-advantages (e.g., human capital intensity in services vs. R&D intensity in manufacturing) or specific L-advantages (e.g., protection of intellectual property rights in host countries might be particularly relevant as a factor determining FDI of manufacturing firms).

Finally, some researchers point to the lower degree of standardisation of service products as compared to manufacturing goods (Lejpras 2009) and/or the importance of idiosyncratic and highly situation-specific determinants of the internationalisation of service provision (see, e.g., Bell 1995; Clark and Mallory 1997; Knight 1999). This property of the service sector, similar

to its heterogeneity, may render it difficult to empirically confirm a *general* model such as the OLI model.

We thus posit (*model I: INT_propensity by sector*):

H2: The effect of the variables of the OLI model on the propensity of a firm to internationalise its activities is lower for services than for manufacturing firms, and the two sectors differ with respect to the relative significance of specific OLI-variables.

Model II (*INT_function*) serves to determine whether, and to what extent, the OLI model can explain – in addition to why a firm chooses FDI (rather than exports) as a means of going international – why it locates abroad specific combinations of *business functions*. In this respect we distinguish (a) offshoring of "distribution *and/or* production" (FDI_DP), and (b) offshoring of "R&D activities, *in addition to* distribution *and/or* production" (FDI_RDP). We expect, in line with some other studies (see, e.g., Basile et al. 2003), that the relationship between the explanatory variables and the dependent variable becomes more stringent with increasing complexity of the FDI strategy (i.e. from offshoring *excluding* R&D (FDI_DP) to offshoring *including* R&D (FDI_RDP). This should be the case because the higher costs of a complex FDI strategy compared to a less demanding strategy can be compensated for only if a firm benefits from particularly large OLI advantages.

We thus hypothesise *(model II: INT_function)*:

H3: The effect of the variables of the OLI model on internationalisation is higher in the case of a complex FDI strategy (involving combinations of business functions that include R&D) compared to a more simple strategy (excluding R&D).

Finally, there is no reason to presume that the hypothesis H3 referring to the entire business sector should not be valid for the two subsectors. However, the literature we referred to in the lead up to hypothesis H2 provides some arguments (large heterogeneity of the service sector; high relevance of soft factors; particular importance of situation-specific determinants) for expecting that the relationship between the OLI variables and the choice of a specific FDI strategy in terms of business functions is weaker in services than in manufacturing.

Moreover, we expect that the (relative) importance of some of the explanatory variables differs between the two sectors. For example, as "science and technology" are a more important characteristic in the manufacturing than the services sector, we expect that technology-related factors (e.g., appropriability of knowledge) are relevant as determinants of the choice of FDI strategies particularly in manufacturing.

Against this background we postulate (*model II: INT_function by sector*):

H4:   The effect of the variables captured by the OLI paradigm on the internationalisation of different combinations of business functions is lower for services than for manufacturing firms, and, in this respect, the relative significance of the individual OLI variables differs between the two sectors.

3   Data and incidence of foreign activities

3.1   Data

The data we use in this study almost exclusively stem from the "Swiss Survey on Internationalisation" conducted by the KOF Swiss Economic Institute in 2010 with the reference year 2008 (for some variables the period is 2006/08).[6] The survey provides information on basic firm characteristics (sales, value added, exports, number and qualification of employees, firm age, industry affiliation); innovative activity (R&D, sales of innovative products); co-operation; obstacles to internationalisation; foreign activities differentiated by business functions (distribution, sourcing, production, R&D), target regions of foreign activities and foreign entry mode).

The survey was based on a random sample of 4533 firms (5 or more employees) drawn from the official enterprise census of 2008 which covers the entire business sector stratified by twenty nine industries and three industry-specific firm size classes (with full coverage of large firms). 1921 companies provided valid information. The response rate (42.4%) is satisfactory given the demanding questionnaire.[7] The size and sector composition of the final dataset is shown in Table A.1 in the Appendix. The number of observations is large enough to separately estimate model I and II for services (N=757) and manufacturing (N=1000). The construction and the energy sector (N=164) are only included in estimates for the entire business sector (N=1921).

3.2   Incidence of foreign activities

Table 1 provides some information on the extent of the internationalisation of firms for the whole sample and the three sectors. The rows 2 and 3 show that the majority of firms are internationalised (56%). Half of them pursue an (exclusively) export-based strategy of internationalisation (category 2), the other half is directly active abroad by locating there at least

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[6]   Only the indicators of market conditions (degree of competition, market growth) stem from another source (Swiss Innovation Survey 2008).

[7]   The questionnaire is available in German, French and Italian and can be downloaded from http://www. kof.ethz.ch/de/umfragen/strukturumfragen/andere-umfragen/internat2010/.

Table 1: Share of firms *by business functions* as a percentage of all firms differentiated by sector [a]

Business functions	Manufacturing			Services			Construction/	TOTAL
	Total	High-tech	Low-tech	Total	Knowledge-intensive	Other	Energy	
1. Domestic sales only	25.2	13.0	37.2	58.9	53.0	63.1	83.0	43.4
2. Domestic sales and exports only	36.3	34.8	37.7	21.8	22.4	21.4	8.5	28.2
3. Direct foreign presence	38.5	52.2	25.1	19.3	24.6	15.5	8.5	28.4
3a Foreign distribution/similar service activities [b]	*7.6*	*9.1*	*6.1*	*3.7*	*3.5*	*3.9*	*0.6*	*5.5*
3b Foreign production sourcing	*3.9*	*4.3*	*3.6*	*3.0*	*3.5*	*2.7*	*1.8*	*3.4*
3c Foreign distribution/similar service activities and production/sourcing	*13.7*	*17.3*	*10.1*	*9.3*	*11.6*	*7.5*	*4.3*	*11.1*
3d Foreign R&D and distribution/ similar services and/or production/ sourcing)	*13.3*	*21.5*	*5.3*	*3.3*	*6.0*	*1.4*	*1.8*	*8.4*
TOTAL (Number of observations)	100 (1000)	100 (494)	100 (506)	100 (757)	100 (317)	100 (440)	100 (164)	100 (1921)

[a] For the composition of the two subsectors of manufacturing and services respectively, see Table A.1.
[b] The category "similar service activities" includes franchising, licensing and (long-lasting) management/consulting contracts.

one business function. The share of internationalised companies is much higher in manufacturing (it is particularly large in the high-tech subsector) than in services (above-average share in the case of knowledge-intensive services), and it is much lower in the construction/energy sector. The *relative* importance of the two basic ways of internationalisation (exporting vs. offshoring; row 2 vs. 3) is the same in services and manufacturing. Information on the incidence of internationalisation by industry is presented in the appendix (Table A.2).

The rows 4 to 7 of Table 1 show for the firms with direct foreign presence (category 3) the share of firms having offshored specific combinations of business functions (subcategories 3a to 3d). It turns out that the category 3c ("distribution/other activities *and* production/sourcing") is the most prevalent one in the business sector as a whole and in the (sub)sectors, with the exception of high-tech manufacturing where the subcategory 3d ("R&D activities in addition to distribution/other activities *and* production/sourcing") is the preferred FDI strategy. In all subsectors the share of firms that are active abroad with *at least* two business functions (sum of 3c and 3d) is higher than the share of companies which are present in foreign locations with only one business function (sum of 3a and 3b).

4 Model specification and estimation procedure

4.1 Dependent variables and estimation procedure

Estimates of *model I* allow to evaluate the hypotheses H1 and H2. The model explains a firm's choice among the following strategies: "selling on domestic markets only" (DOMESTIC); "exporting goods/services (in addition to domestic sales) but no offshoring" (EXPORT); "being directly present abroad" (FDI). The three types of firms are *mutually exclusive unordered* categories which constitute the dependent variable "*INT_propensity*" with the values DOMESTIC, EXPORT and FDI (see Table 2, upper part).

Estimates of *model II* serve to assess the hypotheses H3 and H4. This model reflects a firm's choice among three alternative strategies of internationalisation (and the basic option of selling only on the domestic market (DOMESTIC)). The first one (EXPORT) is specified as in model I, whereas the category FDI of model I (direct presence in foreign locations) is replaced by two subgroups related to the offshoring of combinations of business functions, that is (a) "direct foreign presence in distribution *and/or* production" (FDI_DP) and (b) "direct foreign presence in distribution *and/or* production *and* R&D" (FDI_RDP). The different groups of firms again are *mutually exclusive unordered* categories representing the dependent variable "*INT_function*" with the values DOMESTIC, EXPORT, FDI_DP and FDI_RDP (see Table 2, lower part).

Table 2: **Specification of the dependent variables**

Dependent variable	Definition
Modell I *INT_propensity*	The firm belongs to one (*and only one*) of the following types of firms (yes/no): DOMESTIC: Firms with domestic sales EXPORT: Firms with domestic and export sales (but no offshoring) FDI: Firms with any kind of direct foreign presence (in addition to domestic and export sales) *EXPORT is used as reference category*
Modell II *INT_function*	The firm belongs to one (*and only one*) of the following types of firms (yes/no): DOMESTIC: Firms with domestic sales EXPORT: Firms with domestic and export sales (but no offshoring) FDI_DP: Firms having off-shored distribution *and/or* production FDI_RDP: Firms having off-shored research and development (R&D) in addition to distribution *and/or* production *FDI_DP is used as reference category*

The *multinomial logit model* is an appropriate procedure for estimating the two models as the dependent variables are nominal measures of mutually exclusive categories of firms. We estimate model I as well as model II for the entire business sector and separately for manufacturing and services. We use the same set of explanatory variables throughout, expecting that their impact differs depending on (a) the specific categories of firms taken into consideration in the dependent variable of model I and model II, respectively and (b) the sample underlying the estimates (entire business sector, manufacturing, services). [8]

The estimation of model I provides two parameter vectors, the first one referring to the category DOMESTIC, and the second one to FDI with EXPORT used as reference category (see Table 4). In the case of model II, we tabulate only the parameter vector for FDI_RDP as FDI_DP is used as reference category.

The econometric analysis is based on cross-section data. Consequently, all variables, in principle, could be endogenous, what would imply biased parameter estimates. The

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[8] Although we presume that the degree of internationalisation is positively related to the number of business functions located abroad (see subsection 2.2), the multinomial logit procedure is more adequate than the ordered probit model used, for example, by Basile et al. (2003). Only in the former case, we get for each explanatory variable specific coefficients for the the different strategies of internationalisation.

endogeneity problem, to some extent, is attenuated as a substantial number of the explanatory variables might be structural in nature, thus are only slightly changing over time (e.g., the share of employees with tertiary-level education or the existence of R&D activities). Nevertheless, we cannot evade the general endogeneity problem inherent in cross-section analyses. Therefore, rather than making causal claims we interpret the estimated coefficients as *conditional correlations* that, however, do not preclude an evaluation of our hypotheses.

4.2   Explanatory variables

The explanatory variables capture the most important aspects of O-, L- and I-advantages, the firms' market environment and control variables referring to some structural firm characteristics (industry affiliation, foreign ownership). In Table 3 we present the exact definition, measurement and sign expectation of the variables, and the Tables A.4 and A5 in the appendix show the related descriptive statistics and correlation matrix.

O-advantages

We expect that this category of variables representing firm-specific capabilities is positively related to international activity by means of exports and/or FDI. We consider, firstly, two indicators of the innovation capacity of firms, that is in-house R&D (*r&d*) and the sales share of new or significantly improved products (*inno_sales*). Moreover, we take into account the use of high-level human resources (*tertiary_academic*). We also insert a measure of the effectiveness of the protection of knowledge (*appropriability*), which covers patenting and other legal rights (brands, copyrights) as well as informal appropriability mechanisms (e.g., time lead or secrecy). Finally, we include two indicators of a firm's international experience, which is a core variable of the stages view of internationalisation (Johanson and Vahlne 1977), i.e. the age of a company (*firm_age*) and the relevance of experience-related obstacles to foreign activities (*obst_experience)*. Firm age should be positively related to internationalisation, whereas we expect a negative sign for the obstacle variable as it is inversely related to foreign experience.

L-advantages

In many studies L-advantages serve to explain *where* a firm locates its FDI projects. Accordingly, characteristics of potential target regions/countries (wage costs, factor endowment, etc.) are used as measures of L-advantages. In contrast, we aim at explaining *why* a firm uses the one or the other way of going international (i.e. offshoring vs. exporting). To this end, we insert as explanatory variables a *set of firm-level indicators* representing disadvantages of foreign countries *as a whole* (i.e. without differentiation among foreign

locations) as compared to Swiss locations. These variables reflect a firm's *assessment* of the relevance (high/low) of a number of location-related *obstacles to investing abroad* (e.g., "regulatory framework in host countries that is unfavourable to FDI"). Therefore, we expect a *negative* relationship between the obstacle variables and FDI.

More specifically, the L-part of the empirical model is made up of eight measures of obstacles, which according to an exploratory analysis are (statistically) the most pertinent ones. In accordance with the gravity model of international trade and investment the model contains variables representing the geographical and cultural distance between Switzerland and foreign locations (*obst_distance*, *obst_culture*). Furthermore, we consider high costs of investing abroad (*obst_cost*). We also insert some measures depicting a set of regulation-related L-disadvantages of host countries: restrictive regulatory framework in general (*obst_regulation*); obligation to generate locally a large share of value added (*obst_value*); forced technology transfer to local firms/institutions (*obst_tech_transfer*); insufficient enforcement of IPRs in host countries (*obst_IPR_protection*). Furthermore, we include a measure of the relevance of political instability in foreign locations as an impediment to international activity (*obst_instability*).[9]

As mentioned before, the "obstacle variables" are expected to be negatively related to FDI. However, in certain cases we would not be surprised to find a positive sign indicating that a firm perceives (or becomes aware of) a specific obstacle only when it is really confronted with such an impediment (e.g., "insufficient enforcement of IPRs in host countries"; see the discussion of the estimation results in Section 5). This interpretation of positive sign in case of "obstacles variables" is widely-used in innovation research (see, e.g., Galia and Legros 2004; Tourigny and Le 2004), and more recently also in the internationalisation literature (see, e.g., Rammer and Schmiele 2008; Arvanitis and Hollenstein 2011).

I-advantages, firm size

I-advantages, which are relevant for choosing between foreign entry modes (in our case between FDI and exports), should be positively related to FDI. However, it is difficult to find satisfactory indicators of this type of advantages. Firstly, from a theoretical point of view, I-

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[9] Based on an exploratory analysis of the obstacles to be present in foreign locations, we do not include some other potential impediments for which the "Swiss Internationalisation Survey 2010" provides data. To mention are high coordination costs, high financial risks, insufficient finance, restrictions to the transfer of profits, legal uncertainties, lack of qualified manpower. For some of these obstacles it is quite surprising that they apparently are not relevant. This is partly due to correlations with obstacles we include in the model (e.g., correlation of *obst_instability* with "legal uncertainty", or *obst_cost* with "high financial risks" and "insufficient finance").

advantages should be measured at the level of individual transactions (i.e. separately for each investment project located abroad) rather than at firm level, which is not feasible with the data at hand. Secondly, even at the firm level, we have to rely on proxy variables that are quite general. We use two indicators of I-advantages, i.e. firm size and co-operation experience, which we interpret as measures of a firm's "capacity to internalize market relations".

We assume that large firms are in a better position than small ones to reduce transaction costs by internalising market relationships: economies of scale in the governance of foreign affiliates or joint ventures, higher power to bargain with foreign units, advantages in monitoring quality-standards to be met by affiliates. Firm size may thus effectively be used as an overall indicator of I-advantages (although it also captures size-related O-advantages that are not explicitly specified in the empirical model). We measure firm size by the number of employees (*size*) and, to account for a possible nonlinear relationship, by its square (*size^2*). For the quadratic term we expect an insignificant or a negative coefficient, the latter meaning that firm size only matters up to a certain threshold. Moreover, we maintain that experience gained from co-operating with other companies (*cooperation*) can be used as an indicator of I-advantages as it may enhance a firm's capability to internalise market relationships.

All in all, as our specification of I-advantages is not very satisfactory, we interpret the empirical results of model I and II, in the first instance, by referring to the OL-part of the OLI model.

Market environment

We expect that intensive competition on a firm's markets (*competition*) enforces a company to become active in foreign locations or is an incentive to do so ("follow the leader" or "first mover" strategy). Furthermore, strongly growing world markets in the field of a firm's activities (*demand_trend*) is another incentive for international engagements. We thus expect for both variables a positive sign.

Control variables

We take account of the fact that some firms may report that they do not see any obstacle to FDI just because they never thought of doing business abroad. To this end, we insert a control variable indicating that a firm's "local/regional market at home is large enough" (*regional_market*), implying that it does not see any need to go international (negative relationship to internationalisation). By including this variable we make sure that the estimates of the "obstacle variables" (L-disadvantages) are not biased.

Table 3: **Specification of the explanatory variables of model I to II**

Explanatory variable	Description	Expected sign in explaining *INT_propensity* and *INT_function*
O-advantages		
r&d	R&D activities, 2006-2008 *(yes/no, dummy variable)*	+
inno_sales	Sales share of innovative products, logarithm, 2008	+
tertiary_academic	Share of employees with academic education, logarithm, 2008	+
appropriability	Effectiveness of knowledge protection	+
	Dummy variable (high/low effectiveness) based on the average of firm assessments on a 5-point Likert scale of four means of protection (patents, trademarks, copyrights, informal mechanisms)	
firm_age	Age of the firm (years), logarithm	+
O-related obstacle to internationalisation *(Dummy variables based on firm assessments of the relevance on a 5-point Likert scale: value 1 (high) for scores 4 or 5, otherwise 0 (low))*		
obst_experience	Lack of foreign experience	-
L-disadvantages of *host* locations: *L-related obstacles to internationalisation* *(dummy variables based on firm assessments of the relevance of specific obstacles on a 5-point Likert scale: value 1 (high) for scores 4 or 5, otherwise 0 (low))*		
obst_distance	Large geographical distance	-
obst_culture	Large cultural difference	-
obst_cost	High costs of internationalisation	-
obst_regulation	Restrictive regulations in foreign locations	-
obst_instability	Political instability in target countries	-
obst_local_value	Obligation to generate locally a high share of value added	-
obst_tech_transfer	Obligation to transfer technology to local actors	-
obst_IPR_protection	Insufficient protection of IPRs in host countries	-
I-advantages, firm size		
size, size^2	Number of employees (in 1000) and its square, 2008	+ / ?
cooperation	Co-operation with domestic firms *(yes/no; dummy variable)*	+
Market environment		
competition	Share of firms at the 3-digit industry level which are confronted with strong price competition, 2008 *(firms with an assessment of 4 or 5 on a five point Likert scale)*	+
demand_trend	Share of firms at the 3-digit industry level which benefit from strongly growing markets in the period 2006-2011 *(firms with an assessment of 4 or 5 on a five point Likert scale)*	+
Control variables		
foreign	The firm is a foreign-owned subsidiary with primarily local focus *(yes/no; dummy variable)*	-
regional_market	The local/regional market at home is sufficiently large *(dummy variable based on firm assessments on a five point Likert scale: value 1 (high) for scores 4 or 5, otherwise 0 (low))*	-
industry	Industry dummies (2-digit) in manufacturing (16) and services (9)	

Furthermore, we control for the fact that foreign-owned companies (*foreign*) often are primarily oriented towards the Swiss market; this variable should thus be negatively related to exporting as well as to FDI. Finally, we insert a large set of industry dummies (*industry*) representing, for example, macroeconomic conditions prevailing in the specific industries in the reference year 2010. In addition, industry dummies control for a (possible) "omitted variable bias". They also should make sure that the explicitly specified variables effectively capture *behavioural* differences among firms rather than industry-specific characteristics.

5   Results

5.1   Model I: *INT_propensity*

5.1.1   Business sector (H1)

Remember that we evaluate the coefficients of the variables explaining DOMESTIC and FDI against those of the firms that are internationally active solely through domestic and export sales (EXPORT). Therefore, a statistically significant negative sign for the coefficient of DOMESTIC in combination with a significant positive sign of the coefficient for FDI (denoted as DOMESTIC<EXPORT<FDI) for O- and I-variables indicates a *monotonically* increasing positive effect of a certain variable on a firm's internationalisation, thus extending activities from only domestic activities to exports and further to FDI (see, e.g., variable *r&d*). This can be the case also *partially,* namely if the coefficient only increases *either* from DOMESTIC to EXPORT (DOMESTIC<EXPORT≅FDI), e.g., variable *appropriability*, *or* from EXPORT to FDI (DOMESTIC≅EXPORT<FDI), e.g., *inno_sales*. In case of the O-related obstacle "lack of foreign experience" ("*obst_experience*") it is the other way round as this variable represents a *dis*advantage of a *firm*; in this case, we expect an increasing positive effect on international activity if DOMESTIC>EXPORT>FDI. Moreover, as the L-related obstacles reflect *dis*advantages of *host* countries, offshoring is preferred to exporting if EXPORT>FDI. Notice that L-disadvantages are irrelevant for explaining a shift from DOMESTIC to EXPORT; we thus expect that the coefficients of the L-variables are statistically insignificant in case of DOMESTIC.

The columns 1 and 2 of Table 4 show that *O-advantages* are very important drivers of internationalisation as all coefficients of the O-variables are significantly positive (and, as expected, negative in case of *obst_experience)*. Some coefficients monotonically increase (*r&d*, *tertiary_academic*), others increase partly (*inno_sales*, *appropriability*, *firm_age*), and the

coefficients of the O-related obstacle *obst_experience* monotonically decrease. The estimates thus strongly support the O-part of the model.

The results for the variables representing *L-disadvantages* of foreign locations confirm the hypothesis that they are relevant only for the shift from EXPORT to FDI; none of the coefficients for DOMESTIC is significant. In contrast, we find statistically significant effects for the transition from EXPORT to FDI for practically all L-related obstacles. Four of them show the postulated negative sign, meaning that they deter a firm from being directly active at foreign locations: (large) geographic distance (*obst_distance*), high costs of internationalisation (*obst_cost*), obligation to produce locally a substantial part of the value added (*obst_local_value*), and, finally, forced technology transfer (*obst_tech_transfer*). We do not find a significant effect for political instability in potential host countries (*obst_instability*).

Contrary to our expectations, we obtain for three L-related obstacle variables a *positive* sign: cultural difference (*obst_culture*), restrictive regulatory environment (*obst_regulation*) and insufficient protection of IPRs in host countries (*obst_IPR_protection*). In the case of these variables, we argue (see subsection 4.2) that a positive sign reflects the fact that firms perceive (or get aware of) the specific hindrance not until they have already engaged in direct foreign activities (FDI). Cultural differences that make international transactions more difficult may manifest themselves only as the company has become directly present abroad; for example, FDI may facilitate the adaptation of products to local tastes. Moreover, it often is difficult to enforce IPRs without knowledge of local conditions and without (personal) relationships to local actors; hence, if IPRs are important for penetrating foreign markets, a direct presence abroad is superior to exporting. Considerations along similar lines apply in the case of regulatory obstacles, as knowledge of local conditions usually is necessary to optimally adapt to regulatory restrictions or to circumvent them. The positive sign we got for these three L-variables seems thus quite plausible.

All in all, we conclude that the results for the variables reflecting L-disadvantages of host countries are largely line with the OLI model.

I-advantages, as expected, are only relevant for the choice between exporting and offshoring. The results for *size* and *cooperation* are consistent with the hypothesis postulating that firms that profit from I-advantages prefer a direct foreign presence over an export strategy (FDI>EXPORT). The size effect (which, as already mentioned, also stands for some O-advantages that we cannot explicitly specify in the empirical model given our database) is positive only up to a certain threshold as indicated by the negative sign of *size²*).

Table 4: **Results for model I: *INT_propensity***

Firms with "domestic sales only" (DOMESTIC) and those with "direct foreign activity" (FDI),
evaluated against the reference group of firms with "export and domestic sales only"
(EXPORT); *multinomial logit estimates* [a, b]

	Total business sector[c]		Manufacturing		Services	
Explanatory variable	DOMESTIC	FDI	DOMESTIC	FDI	DOMESTIC	FDI
O-advantages						
r&d	-.708***	.823***	-.707***	.883***	-.508	.868**
	(.19)	(.18)	(.26)	(.22)	(.35)	(.39)
inno_sales	.050	.177***	.022	.182**	.057	.167
	(.06)	(.06)	(.08)	(.08)	(.08)	(.11)
tertiary_academic	-.257***	.187***	-.286**	.125	-.274***	.195*
	(.06)	(.07)	(.11)	(.09)	(.08)	(.12)
appropriability	-.276***	.015	-.197*	-.004	-.248*	.072
	(.08)	(.09)	(.12)	(.11)	(.13)	(.17)
firm_age	.074	.350***	.139	.445***	-.043	.201
	(.09)	(.10)	(.14)	(.13)	(.13)	(.17)
O-related obstacles						
obst_experience	.449**	-.473**	.446	-.643**	.740**	.044
	(.20)	(.22)	(.28)	(.29)	(.31)	(.43)
L-(dis)advantages (L-related obstacles)						
obst_distance	.044	-.422**	-.252	-.351	.525*	-.501
	(.19)	(.22)	(.28)	(.27)	(.31)	(.46)
obst_culture	.138	.842***	.309	1.26***	-.176	.175
	(.24)	(.24)	(.37)	(.32)	(.34)	(.43)
obst_cost	-.279	-.565***	-.077	-.445*	-.858***	-.846**
	(.18)	(.19)	(.24)	(.24)	(.28)	(.38)
obst_regulation	.204	.684***	.087	.806***	.221	.563
	(.22)	(.22)	(.37)	(.29)	(.32)	(.41)
obst_instability	-.160	.345	-.393	.163	.009	.554
	(.25)	(.23)	(.38)	(.29)	(.39)	(.45)
obst_local_value	.024	-.506**	.070	-.476	.043	-.473
	(.27)	(.26)	(.38)	(.33)	(.41)	(.56)
obst_tech_transfer	-.180	-.575**	-.120	-.756**	.021	-.447
	(.37)	(.29)	(.50)	(.35)	(.61)	(.75)
obst_IPR_protection	.248	.510*	.176	.925***	-.247	-1.04
	(.34)	(.28)	(.46)	(.33)	(.51)	(.73)
I-advantages, fim size						
size	2E-05	6E-04***	-6E-04	1E-03***	6E-05	3E-04
	(2E-04)	(2E-04)	(9E-04)	(5E-04)	(3E-04))	(3E-04)
size²	-1E-07	-9E-06**	-7E-05	-1E-04**	2E-06	-1E-06
	(4E-06)	(4E-06)	(2E-04))	(5E-05))	(3E-05)	(3E-05))
cooperation	-.029	.262*	.162	.448**	-.315	-.061
	(.15)	(.15)	(.23)	(.19)	(.21)	(.28)

Table 4 continued

Market environment						
competition	-.294	1.25*	-.584	.989	-.020	2.15**
	(.61)	(.70)	(1.1)	(1.2)	(.74)	(.92)
demand_trend	-2.48***	1.20	-3.81***	1.43	-.862	3.08**
	(.65)	(.76)	(1.0)	(1.1)	(.91)	(1.3)
Control variables						
foreign	-.117	-2.08***	-.192	-2.18***	-.118	-2.06***
	(.20)	(.28)	(.32)	(.37)	(.29)	(.48)
regional_market	1.26***	-.979***	1.53***	-.704***	1.05***	-1.18***
	(.14)	(.18)	(.21)	(.25)	(.23)	(.30)
industry	Yes		Yes		Yes	
Statistics						
N	1'921		1'000		757	
Wald χ^2	3851.6***		1072.8***		1786***	
Pseudo R^2	.338		.332		.246	

[a] The multinomial logit model estimates for each explanatory variable two slope parameters what allows to evaluate whether the responses DOMESTIC and FDI respectively significantly differ from the reference level EXPORT.

[b] The estimates of the intercepts and the industry dummies have been throughout omitted. The significance of the parameters is indicated with ***, ** and * resp. representing the 1%, 5% and 10%-level with robust standard errors in brackets.

[c] The construction/energy sector (N=164) is included in the estimates for the total business sector (N=1921) but excluded in case of manufacturing (N=1000) and services (N=757).

The *market environment* also exerts a statistically significant influence on a firm's choice of type of internationalisation. Vigorous competition on (world) product markets (*competition*) induces or enforces a firm to be directly present at foreign locations rather than to serving foreign markets through exports (FDI>EXPORT). Rising product demand (*demand_trend*) also favours internationalisation over a home-market orientation but does not significantly discriminate between the two strategies of foreign activity (DOMESTIC<EXPORT≅FDI).

Finally, we get the expected negative sign for the control variables *foreign_subsidiary* and *regional_market*. Interestingly, the overall industry effect is small although the industry dummies (*industry*) are jointly significant. This finding implies that *behavioural differences among firms* as well as location factors are the dominant drivers of foreign activities, whereas the literature strongly emphasises the role of *industry*-specific factors (see subsection 2.2).

To sum up, the empirical findings for the *entire business sector* confirm the basic propositions of the OLI model as there is strong evidence for the expected influence of all constituent parts of the model (and for most individual variable). Given the weaknesses of the specification of I-advantages this holds in particular for the OL-part of the model. All in all, the estimates are in line with *hypothesis H1*.

5.1.2 Manufacturing vs. services (H2)

The columns 3 and 4 of Table 4 show that the OLI model is also confirmed for *manufacturing*. Model fit and pattern of explanation are similar to that of the entire business sector. We thus abstain from commenting in detail the findings for manufacturing.

The results for the *service sector* are less convincing than those for manufacturing as they are only partly in line with the OLI model (columns 5 and 6). Nevertheless, the explanatory power (measured by the adjusted R^2) is still satisfactory. We get significant effects of O-advantages but these are not as stringent as in the case of manufacturing. Diverging from manufacturing, the evidence for L-variables to influencing a service firm's choice between offshoring and exporting rests on only one variable (although an important one), namely the high costs of going abroad which strongly deter foreign engagements. Moreover, the results confirm the I-part of the model only in the case of manufacturing. Remarkably, firm size, has no effect on the internationalisation of service companies. In contrast, the market environment is an important driver of internationalisation in both sectors; in this respect, the positive effects are stronger in services than in manufacturing.

A more in-depth inspection of the results yields some explanation for the differences between manufacturing and services. *First*, the *O-advantages* of manufacturing companies rest to a higher extent than those of services on capabilities related to technology and innovation (*r&d, inno_sales*). In contrast, the firms' endowment with highly qualified personnel (*tertiary_academic*) plays a larger role for explaining the internationalisation of service companies. This difference may indicate that "soft" capabilities (for example, with respect to management and organisation) create competitive advantages more often in services than in manufacturing. We also notice that, in the case of manufacturing, international experience (*obst_experience, firm_age*) exclusively pertains to the shift from exporting to FDI, whereas for services experience is relevant only with respect to the transition from domestic to export activities. This difference might reflect the divergence between the two sectors with respect to the level of FDI which is much higher in manufacturing (see Table A.2 in the appendix).

Second, the differences between the two sectors with regard to the importance of *L-advantages* and *firm size* are not as surprising as it looks at first sight. They are partly due to the fact that several L-variables reflect technology-related problems, which obviously are more relevant in manufacturing. To mention are primarily the L-related obstacle variables "forced technology transfer to local actors" (*obst_tech_transfer*) and "insufficient protection of IPRs in host countries" (*obst_IPR_protection*). Other impediments presumably become relevant only if a

firm is active abroad by *production*-oriented activities, which, as shown in Table 1, are more prevalent in the manufacturing sector. An example is the variable *obst_culture* (positive sign in the case of manufacturing but not for services) which, to some extent, reflects the high costs of controlling foreign (production) activities in culturally different locations (see, e.g., Gassmann and von Zedtwitz 1999). The same argument may partly explain why *firm size* only matters for manufacturing companies; the higher monitoring and controlling costs in case of *production*-oriented foreign activities are easier to bear for large than for small firms.

All in all, the results for the two sectors are in line with the *hypothesis H2*: confirmation of the OLI model for both sectors but lower explanatory power of the OLI variables in the case of services, and plausible differences between the two sectors with respect to the relative importance of the individual variables.

To date, only Lejpras (2009) provides separate estimates for manufacturing and services dealing with the choice between exporting and FDI, respectively, and "selling on domestic market only". Based on an OLI-like model this author finds for *manufacturing* that innovativeness, firm size and intensity of competition are the main factors determining why firms, rather than solely serving domestic markets, also export goods/services. The same variables also explain, though to a lesser extent, why they are directly present at foreign locations rather than staying at home. In the *service* sector, the same three variables determine the firms' shift from domestic activities to exporting, but the model cannot explain why services firms engage in offshoring activities in addition to their presence on the home market. In contrast to our study, the author does not analyse the shift between an exporting and an FDI strategy.

We also compare our findings for the *service sector* (no estimates for manufacturing) with those of two papers whose approach may be interpreted, at least to some extent, in terms of the OLI model. First, Kundu et al. (2008), analysing FDI in Central/Eastern Europe, get some evidence only for L-advantages what partly may be due to the specific country coverage of the sample (low cost countries). Second, Li and Guisinger (1992), using data for MNEs based in developed countries, find that regulation in host countries (L-advantages), firm size and the market environment (demand prospects, competition) are the main drivers of outward FDI of service companies. The results with regard to the market environment are in line with our findings, and the same may apply with respect to L-advantages (in spite of a different specification). However, diverging from the results of the two authors we do not find a significant size effect in case of services. This difference may be due to the fact that their model does not account for O-advantages (which partly are captured by the size variable).

5.2 Model II: *INT_function*

5.2.1 Business sector (H3)

For the business sector as a whole (Table 5, column 1), we find some substantial divergences between the two forms of internationalisation we consider. The coefficients for FDI_RDP, evaluated against the less far-reaching strategy FDI_DP, are statistically significant for six out of the eighteen OLI-related variables.

The differences with respect to *O-advantages* refer to R&D activities (*r&d*), the share of innovative products (*inno_sales*) and *appropriability*, which are factors that are more important for FDI_RDP than for FDI_DP. The difference is primarily due to the fact that foreign investment in R&D, in addition to foreign distribution and/or production, is closely related to a high level of innovation activities and the need to seize the innovation-based revenues.

With respect to *L-advantages* there are differences only for the obstacles "insufficient protection of IPRs in host countries" (*obst_IPR_protection*) and "lack of political stability" (*obst_stability*), which obviously are more relevant for firms that invest abroad in R&D.

Firm size, which is used as a (rough) proxy for *I-advantages* (and also captures size-related O-advantages that are not explicitly specified in our model), is also more important for FDI_RDP than for FDI_DP. This result might reflect the superiority of large firms with regard to worldwide sourcing of knowledge that entails substantial co-ordination and monitoring costs. We do not find any differences for the variables representing the *market environment,* and the same is true for the control variables *foreign_subsidiary* and *regional_market*, which is not surprising as both variables primarily are relevant for the choice between exporting and FDI in general (see model I).

Taking account of the results for model I (shift from DOMESTIC to EXPORT and from EXPORT to FDI) according to which the two steps of internationalisation are substantial in terms of the explanatory variables, we interpret the findings as evidence for a gradual and continuous process of internationalisation (DOMESTIC<EXPORT<FDI_DP<FDI_RDP) as postulated by the stages view of internationalisation. The results shown in Table 5 do not much differ from those of a comparable OLI-based study for the Swiss business sector that used data for 1998 (Hollenstein 2005).

Table 5: **Results for model II:** *INT_function*

Firms with "direct foreign activity in R&D and distribution and/or production" (FDI_RDP), evaluated against the reference group of firms with "direct foreign distribution and/or production" (FDI_DP); *multinomial logit estimates* [a, b, c]

	Total business sector	Manufacturing	Services	Services
Explanatory variable	FDI_RDP	FDI_RDP	FDI_RDP	FDI_RDP
O-advantages				
r&d	2.02***	1.35**	3.77***	
	(.46)	(.52)	(1.1)	
inno_sales	.281***	.301**	.435	.444*
	(.11)	(.13)	(.36)	(.24)
tertiary_academic	.050	.238**	-.667***	-.280
	(.11)	(.12)	(.27)	(.26)
appropriability	.464***	.620***	.286	.288
	(.15)	(.17)	(.40)	(.34)
firm_age	.134	.178	-.304	.241
	(.16)	(.18)	(.48)	(.35)
O-related obstacles				
obst_experience	-.504	-.926*	1.44*	0.577
	(.42)	(.50)	(.81)	(.78)
L-(dis)advantages (L-related obstacles)				
obst_distance	-.493	-.266	-2.23**	-1.59*
	(.36)	(.38)	(1.0)	(.90)
obst_culture	.249	.213	1.19	0.564
	(.34)	(.37)	(0.81)	(.82)
obst_cost	-.243	-.534	1.04	1.49
	(.31)	(.34)	(.82)	(.88)
obst_regulation	.024	.224	.410	.080
	(.29)	(.31)	(.75)	(.66)
obst_instability	.918***	.964***	1.20	1.24*
	(.32)	(.35)	(.93)	(.66)
obst_local_value	-.420	-.287	-3.83***	-3.71***
	(.37)	(.40)	(1.4)	(1.5)
obst_tech_transfer	.024	-.219	.684	1.63
	(.37)	(.38)	(1.3)	(1.1)
obst_IPR_protection	.927***	1.12***	-.854	-.124
	(.33)	(.37)	(1.11)	(1.0)
I-advantages, fim size				
size	9E-04***	7E-04*	6E-04*	6E-04**
	(3E-04)	(4E-04)	(4-04))	(3E-04))
size^2	-8E-05**	-4E-05	-5E-05*	-4E-05*
	(3E-05)	(4E-05)	(3E-05)	(2E-05)
cooperation	.301	.162	1.69**	1.71**
	(.23)	(.27)	(0.82)	(.70)

Table 5 continued

Table 5 continued

Market environment				
competition	.094	.579	4.21	4.44
	(1.3)	(1.5)	(3.1)	(2.6)
demand_trend	.337	.418	-2.84	-3.27
	(1.1)	(1.2)	(3.3)	(2.7)
Control variables				
foreign	-.083	-.177	0.068	-.092
	(.55)	(.65)	(1.08)	(1.08)
regional_market	-.536	-.446	-1.00	-0.894
	(.43)	(.52)	(.77)	(.75)
industry dummies	yes	yes	yes	Yes
Statistics				
N	1921	1000	757	757
Wald χ^2	12879.2***	3043.4***	5005.7***	4666.8***
Pseudo R^2	0.336	0.323	0.276	0.252

[a] The multinomial logit model yields estimates for the categories DOMESTIC, EXPORT, FDI_DP and FDI_RDP, respectively. We present here only the estimates of the slope parameters for category FDI_RDP which are evaluated against the reference level FDI_DP.

[b] The estimates of the intercepts and the industry dummies have been throughout omitted. The significance of the parameters is indicated with ***, ** and * resp. representing the 1%, 5% and 10%-level with robust standard errors in brackets.

[c] The construction/energy sector (N=164) is included in the estimates for the total business sector (N=1921) but excluded in case of manufacturing (N=1000) and services (N=757).

All in all, the findings for the *entire business sector* are consistent with *hypothesis H3* maintaining that the explanatory power of the OLI model for the more far-reaching FDI strategy that includes R&D (FDI_RDP) is higher compared to the strategy that excludes the R&D function (FDI_DP). Moreover the differences with respect to the relative importance of the individual explanatory variables for the two FDI strategies are plausible.

5.2.3 Manufacturing vs. services (H4)

In *manufacturing* (Table 5, column 2), we find differences between the two strategies of internationalisation FDI_RDP and FDI_DP for eight out of eighteen variables. The pattern of these divergences is practically the same as in the entire business sector. In manufacturing, the relevance of O-advantages seems to be somewhat stronger as we find significant effects for some further O-related factors, i.e. the "share of employees with tertiary-level education" ("*tertiary_academic*") and "experience with foreign activities" ("*obst_experience*"). These additional effects are compatible with the specific character and the requirements of foreign R&D investments.

These findings, in combination with the results for model I (see Table 4), clearly indicate (similar to the results for the entire business sector) a gradual and continuous process of internationalisation of manufacturing firms as it is postulated by the stages view of

internationalisation (DOMESTIC<EXPORT<FDI_DP<FDI_RDP). The findings are largely consistent with those of a study dealing with the manufacturing sector of the Italian economy (Castellani and Zanfei 2007).

The estimates for the *service sector* (Table 5, columns 3 and 4) suffer from multicollinearity problems. Due to the collinearity between *r&d* and *tertiary_academic*, the coefficient for the latter variable becomes significantly negative in the presence of *r&d* (column 3). In estimates without *r&d*, the variable *tertiary_academic* is insignificant (column 4). Also because of multicollinearity, the coefficient of the variable *obst_experience* is significantly positive in column 3 and becomes insignificant in column 4. We consider the estimates in column 4 as more valid in econometric terms. Therefore, our comments refer to these results.

A comparison between column 4 and column 2 of the table shows that the explanatory power of the OLI model with respect to the choice between the two types of FDI strategy is *lower for services than for manufacturing* (what is also indicated by the adjusted R^2). Moreover, the pattern of explanation substantially diverges between the two sectors. In the case of services, we find statistically significant coefficients for FDI_RDP (representing deviations from the reference strategy FDI_DP) for six of the seventeen variables covering all parts of the OLI model (with the exception of the market environment), as against eight in the case of manufacturing. However, the pattern of explanation in terms of the significant variables quite strongly differs between the two sectors.

In the *service sector*, the coefficients of three *O-variables* (share of employees with tertiary-level education, appropriability, foreign experience) are no longer significant; at least the results for the innovation variable "sales share of innovative products" remain the same as for manufacturing. These divergences primarily reflect specific type of innovation-related characteristics of services such as the intensive use of non-technological know-how which does not need to be strongly protected from competition (tacit knowledge). Among the *L-(dis)advantages*, geographical distance (*obst_distance*) and the obligation to produce locally (*obst_local_value*) exert a significant influence on the choice of the two strategies only in services, whereas – what is plausible – the variable "insufficient enforcement of IPRs" (*obst_IPR_protection*) is relevant only in manufacturing (where R&D activities are more prevalent than in services). The differences between the two sectors with respect to *I-advantages* are probably not so relevant as they pertain only to "*cooperation*", whereas the firm size effect is practically identical. Finally, in accordance with manufacturing, the two strategies

of internationalisation do not differ with respect to the effect of the market environment (*competition*, *demand_trend*).

The "performance" of the OLI model is weaker for services not only with respect to model II (choice between the strategies FDI_RDP and FDI_DP) but, as shown in subsection 5.1, also for model I (in particular with respect to the shift from EXPORT to FDI; see Table 4). In services, the most relevant step of internationalisation that can be explained by the OLI approach is the shift from "exclusively domestic activities" to "foreign activities in general" (exports *and/or* FDI). The specific differences between exporting and FDI (with or without R&D), although they exist, are clearly less pronounced than in manufacturing. The pattern of internationalisation of services firms may thus be characterised by DOMESTIC<EXPORT≅FDI_DP<FDI_RDP. The process of internationalisation, though gradual in both sectors, seems to be less continuous in services than in manufacturing where it is DOMESTIC<EXPORT<FDI_DP<FDI_RDP).

To sum up, the findings (model II) for the two sectors are in line with *hypothesis H4*. The explanatory power of the OLI model we applied to explain the choice between two FDI strategies in terms of specific combination of business functions (the more far-reaching one *including R&D*, the other one pertaining *only* to distribution and/or production) is clearly lower in services than in manufacturing. Moreover, the differences between the two sectors with respect to the relative significance of the explanatory variables of model II is quite plausible.

Moreover, it turns out that the process of internationalisation, though gradual in manufacturing as well as in services, is less continuous in the service sector. This finding, which is based on estimates of model I and II, is not surprising in view of previous (mostly theoretical or interview-based) research, which shows that for some service companies exporting may be the best option for starting internationalisation whereas for others a direct presence abroad is optimal (see, e.g., Carman and Langeard 1980; Boddewyn et al. 1986; Bell 1995; Grönroos, 1999). Hence, there might be no strategy of internationalisation of services that is *generally* superior, what is consistent with our results which imply that X≅FDI. Econometric evidence provided by Wagner (2014) also supports the view of a less gradual and continuous process of internationalisation in services than in manufacturing. Applying the model of firm heterogeneity to the service sector, he even finds that, in services, exporters are more productive than firms with FDI (implying that internationalisation follows the path D<FDI<X).

6 Summary and conclusions

Econometric research dealing with the internationalisation of firms still focuses on manufacturing. As the characteristics of services and goods differ in several respects, one may expect that the determinants of the firms' international activities are not the same for the two sectors. However, there is hardly any empirical firm-level evidence on whether this proposition is correct. Therefore, we *first* aimed at identifying econometrically the factors determining why firms internationalise their activities and why they choose a specific strategy of internationalisation (exporting vs. FDI). We then asked (what is at the core of our interest) whether the determinants of these two ways of going international differ between manufacturing and services. *Second*, we analysed (possible) differences between specific forms of FDI in terms of combinations of business functions, again contrasting the two sectors. We used the well-known OLI model as theoretical background of the empirical analysis, which is based on a large firm-level dataset covering the Swiss business sector.

We specified two models which we estimated for the entire business sector and, separately, for manufacturing and services. The first one ("*INT_propensity*") determines the probability of a company to belonging to one of the following categories of firms: a) "selling on domestic markets only", b) "serving, additionally, export markets" and, c) "offshoring". The second model ("*INT_function*") focuses on internationalised companies and determines the probability of a firm to go international by means of a) "serving export markets", b) "offshoring of distribution *and/or* production", and c) "offshoring of R&D, in addition to distribution and/or production".

The estimates of the two models are largely in line with our hypotheses. *Firstly*, we find that the OLI model is well suited to explaining why firms internationalise their activities as exporters or, alternatively, by means of offshoring (*propensity* to internationalise). This holds true in particular for the business sector as a whole and for manufacturing, whereas, as hypothesised, the explanatory power of the OLI model is lower in the case of services. *Secondly*, the OLI model also allows to explaining differences between two specific forms of offshoring in terms of (combinations of) *business functions*, i.e. "offshoring of distribution and/or production" vs. "offshoring of R&D, in addition to distribution and/or production". This primarily holds true for manufacturing but tends to be the case also for the service sector. *Third*, the estimates contrasting the manufacturing and the service sector yield differences with respect to the *relative importance of the individual explanatory variables* that (mostly) are economically plausible; this is true for the model explaining the choice between exporting and FDI as well as

the choice of a specific FDI strategy in terms of business functions. *Fourth*, the estimates for both models seem to be consistent with the *stages view of internationalisation*, in particular in the manufacturing sector but, to a lesser extent, also in the service sector where the process of internationalisation, however, is less continuous than in manufacturing.

Considering the scope and findings of the analysis and given the lack of studies dealing with the topic of this paper, we substantially add to existing knowledge regarding the determinants of the internationalisation of firm activity. In particular, the paper yields new insights by systematically contrasting estimates for manufacturing and services firms, as well as by investigating the drivers of different forms of international activities in terms of (combinations of) business functions. The analysis shows that manufacturing and services companies substantially differ with respect to the factors determining the propensity of internationalisation as a whole as well as differentiated by business function. Although the explanatory power of the OLI model is lower for services than for manufacturing it remains an adequate framework of analysis for both sectors. Furthermore, it turns out that the drivers of internationalisation primarily reflect firm-specific behaviour whereas industry-specific factors (which are emphasised in previous work) are of minor importance.

The study has a number of limitations. A first one refers to the specification of the OLI model. The measurement of I-advantages (which is difficult anyway) is not very satisfactory, primarily due to deficiencies of the database. As a consequence, the empirical findings, in the first place, confirm the OL-part of the OLI model (although, in general, the I-variables also yielded the expected results). Further research could also help to improve other elements of the OLI model. For example, it would be beneficial to extend the O-part, for example by including financial variables. Secondly, due to the cross-section nature of the data, the findings have to be interpreted as conditional correlations rather than as causal relationships; nevertheless, it is still possible to assess whether the empirical results are consistent with the postulated hypotheses. As a consequence, econometric studies making use of longitudinal data would be highly welcome. Such work would be more adequate to analyse the dynamics of internationalisation (e.g., the stages view of internationalisation).

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APPENDIX

Table A.1: **Composition of the final sample by sector and firm size**

	Sector		Firm size (*number of employees*); (percentage of firms)			
	Number of observations	*Percentage* of firms	Small (5-49)	Medium (50-249)	Large (50 and more)	Total
Manufacturing	1000	52.0	37.4	42.0	20.6	100
- High-tech	494	25.7	35.4	42.9	21.7	100
- Low-tech	506	26.3	39.3	41.1	19.6	100
Energy, construction	164	8.5	21.3	54.3	24.4	100
Services	757	39.4	44.1	32.9	23.0	100
- Knowledge-intensive services	317	16.5	49.2	29.7	21.1	100
- Other services	440	22.9	40.5	35.2	24.3	100
Total business sector	1921	100	38.7	39.4	21.9	100

High-tech manufacturing: pharmaceuticals/chemicals, rubber/plastic products, non-electrical machinery, electrical machinery, electronics/instruments, vehicles; *Low-tech manufacturing*: food/beverages, textiles, clothing, wood products, paper, printing/publishing, non-metallic mineral products, metals, metal products, watches, other manufacturing; *Knowledge-intensive services*: banking/insurance, computer services/R&D, business services, telecommunication; *Other services*: wholesale trade, retail trade, hotels/restaurants, transport/logistics, real estate, personal services.

Table A.2: **Type and degree of internationalisation by *sector* and *industry***

Industry / sectors	Domestic sales only	Domestic sales and exports only	Direct foreign presence	
Manufacturing	25.2	36.3	38.5	100
High-tech manufacturing	*13.0*	*34.8*	*52.2*	100
- Pharmaceuticals, chemicals	13.4	37.8	48.8	100
- Rubber/plastics products	7.0	48.8	44.2	100
- Non-electrical machinery	12.5	30.7	56.8	100
- Electrical machinery	13.6	35.6	50.8	100
- Electronics/instruments	15.9	30.1	54.0	100
- Vehicles	9.5	52.4	38.1	100
Low-tech manufacturing	*37.2*	*37.7*	*25.1*	100
- Food/beverages/tobacco	44.4	31.5	24.1	100
- Textiles	17.9	35.7	46.4	100
- Clothing	42.9	42.9	14.2	100
- Wood products	35.3	41.2	23.5	100
- Paper	15.4	38.4	46.2	100
- Printing/publishing	64.4	28.9	6.7	100
- Non-metallic mineral products	53.9	33.3	12.8	100
- Metals	12.9	51.6	35.5	100
- Metal products	30.8	43.9	25.3	100
- Watches	32.4	47.0	20.6	100
- Other manufacturing	36.8	26.3	36.9	100
Energy, construction	83.0	8.5	8.5	100
- Energy/water/recycling	37.5	0	62.5	100
- Construction	85.3	8.9	5.8	100
Services	58.9	21.8	19.3	100
Knowledge-intensive services	*53.0*	*22.4*	*21.4*	100
- Banking/insurance	49.4	29.5	21.1	100
- Computer services/R&D	40.0	24.0	36.0	100
- Business services	58.7	17.5	23.8	100
- Telecommunication	58.3	25.0	16.7	100
Other services	*63.1*	*21.4*	*15.5*	100
- Wholesale trade	62.6	19.7	17.7	100
- Retail trade	71.1	8.9	20.0	100
- Hotels/restaurants	43.5	43.5	13.0	100
- Transport/logistics	61.8	25.5	12.7	100
- Real estate	100	0	0	100
- Personal services	100	0	0	100
TOTAL	43.4 *(N=834)*	28.2 *(N=542)*	28.4 *(N=545)*	100 *(N=1921)*

Table A.3: **Descriptive statistics**

Variable	N	Mean	Standard deviation	Minimum	Maximum
INT_propensity	1921	1.848	0.833	1	3
INT_intensity	1921	2.214	1.266	1	4
r&d	1921	0.346	0.476	0	1
inno_sales	1921	1.355	1.338	0	4.61
tertiary_academic	1921	1.112	1.239	0	4.61
appropriability	1921	2.207	0.934	1	5
firm_age	1921	3.835	0.793	0	5.86
obst_experience	1921	0.175	0.380	0	1
obst_distance	1921	0.196	0.397	0	1
obst_culture	1921	0.153	0.360	0	1
obst_cost	1921	0.232	0.422	0	1
obst_regulation	1921	0.181	0.385	0	1
obst_instability	1921	0.146	0.353	0	1
obst_local_value	1921	0.103	0.303	0	1
obst_tech_trans	1921	0.084	0.277	0	1
obst_protection	1921	0.100	0.301	0	1
size	1921	0.358	2.148	0.001	62.4
cooperation	1921	0.394	0.489	0	1
competition	1921	0.682	0.148	0	1
demand_trend	1921	0.610	0.146	0	0.910
foreign_subsidiary	1921	0.136	0.343	0	1
regional_market	1921	0.492	0.500	0	1

Table A.4: **Correlation matrix (N = 1921)**

_	r&d	inno_sales	tertiary_academic	appro-priability	firm_age	obst_experience	obst_distance	obst_culture	obst_cost	obst_regulation	obst_instability	obst_local_value
r&d	1											
inno_sales	0.437	1										
tertiary_academic	0.240	0.124	1									
appropriability	0.381	0.359	0.184	1								
firm_age	0.077	-0.034	-0.054	0.020	1							
obst_experience	-0.050	-0.023	-0.021	-0.018	0.007	1						
obst_distance	-0.005	0.001	-0.052	-0.010	0.058	0.245	1					
obst_culture	0.047	0.061	-0.000	0.062	0.009	0.283	0.454	1				
obst_cost	0.003	-0.029	-0.036	0.014	0.026	0.350	0.254	0.172	1			
obst_regulation	0.045	0.060	0.081	0.084	0.061	0.196	0.129	0.135	0.236	1		
obst_instability	0.126	0.121	0.071	0.156	-0.027	0.227	0.141	0.180	0.254	0.395	1	
obst_local_value	0.024	0.013	0.004	0.043	0.008	0.236	0.179	0.114	0.237	0.278	0.258	1
obst_tech_transfer	0.175	0.131	0.072	0.134	-0.000	0.166	0.082	0.117	0.199	0.277	0.422	0.269
obst_IPR_protection	0.179	0.118	0.043	0.146	0.037	0.187	0.066	0.099	0.210	0.297	0.415	0.304
size	0.076	0.035	0.051	0.068	0.045	0.032	-0.036	0.006	-0.019	0.074	0.065	0.022
size^2	0.040	0.015	0.004	0.037	0.014	0.049	-0.021	0.003	-0.005	0.027	0.032	0.009
cooperation	0.124	0.074	0.127	0.200	0.080	0.037	0.018	0.043	0.027	0.081	0.052	0.054
competition	-0.111	-0.070	-0.029	-0.067	0.096	0.017	0.039	0.016	0.035	-0.015	-0.036	0.036
demand_trend	0.194	0.143	0.136	0.149	-0.045	-0.035	-0.051	0.009	-0.008	0.012	0.062	-0.030
foreign	-0.027	0.023	0.077	0.099	-0.116	-0.083	-0.096	-0.084	-0.081	-0.032	-0.022	-0.044
regional_market	-0.382	-0.317	-0.178	-0.296	0.032	0.063	0.076	-0.029	-0.026	-0.072	-0.148	-0.010

Table A.4: Continued

	obst_ tech_transfer	obst_IPR_ protection	size	size^2	cooperation	competition	demand_ trend	foreign	regional_ market
obst_tech_transfer	1								
obst_IPR_protection	0.493	1							
size	0.000	0.006	1						
size^2	-0.011	-0.009	0.908	1					
cooperation	0.006	0.053	0.061	0.001	1				
competition	-0.025	-0.032	-0.051	-0.028	-0.031	1			
demand_trend	0.081	0.026	0.022	0.004	0.013	-0.305	1		
foreign	-0.027	-0.042	-0.006	-0.016	-0.007	0.065	0.024	1	
regional_market	-0.121	-0.124	-0.055	-0.030	-0.019	0.091	-0.205	-0.118	1

Data availability

The data used in this paper stem from the "Swiss Survey on Internationalisation" conducted by the KOF Swiss Economic Institute of the ETH Zurich in spring 2010. The survey was based on a random sample of 4533 companies (five or more employees) drawn from the official enterprise census of 2008. The sample covers the entire business sector stratified by twenty nine industries and three industry-specific firm size classes (with full coverage of large firms). 1921 companies provided valid information. The response rate (42.4%) is satisfactory given the demanding questionnaire. The definition and measurement of the variables used in model estimations are listed in Table 2 (dependent variables) and Table 3 (explanatory variables). Based on these tables it is easy to identify the correspondence between the variables used in model estimation and the underlying questions of the questionnaire.

The firm-level data are highly confidential (as we promised the firms participating in the survey). However, they can be made available upon request, though only under the following conditions:

1. The user of the data must be a PhD student or a staff member of a research institution.
2. The user has to provide a short description of the planned research.
3. The analysis of the data has to take place at the author's workplace, i.e. at the KOF Swiss Economic Institute, Zurich.

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