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ROLE OF INNOVATION CAPABILITY AND APPROPRIABILITY REGIME IN INTERNATIONALIZATION: EMPIRICAL EVIDENCE FROM TURKISH FIRMS

This study aims to explain the role of the firms' innovative capabilities and the appropriability regime level (ability to profit from innovations) as potential antecedents of the firms' internationalization. For this purpose, we employ panel least squares with group dummy variables method using a sample which includes 154 firms in 8 manufacturing sectors traded at the Istanbul Stock Exchange (ISE). The research findings show that innovative capability of the firms has major impact on internationalization while appropriability regime is insignificant.

Keywords: *innovation; appropriability regime; internationalization.*

JEL: M3, F23, G30.

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ЗДАТНІСТЬ ФІРМИ СТВОРЮВАТИ ТА ЗАХИЩАТИ ІННОВАЦІЇ ПРИ ВИХОДІ НА МІЖНАРОДНІ РИНКИ (ЗА ДАНИМИ ТУРЕЦЬКИХ ФІРМ)

У статті зроблено спробу пояснити роль здатності фірми створювати, захищати інновацію та отримувати від неї прибуток при виході на міжнародні ринки. Для цього застосовано метод найменших квадрантів, за яким проаналізовано панельні дані по 154 фірмах з 8 виробничих галузей, усі фірми мають котирування на Стамбульській фондовій біржі. Результати аналізу показали, що інноваційна здатність фірм суттєво впливає на процес їх виходу на міжнародні ринки, в той час як режим захисту власних інновацій не є суттєвим чинником.

Ключові слова: *інновація; захист інновацій; вихід на міжнародні ринки.*

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СПОСОБНОСТЬ ФИРМЫ СОЗДАВАТЬ И ЗАЩИЩАТЬ ИННОВАЦИИ ПРИ ВЫХОДЕ НА МЕЖДУНАРОДНЫЕ РЫНКИ (ПО ДАННЫМ ТУРЕЦКИХ ФИРМ)

В статье сделана попытка объяснить роль способности фирмы создавать, защищать инновацию и получать от нее прибыль при выходе на международные рынки. Для этого применен метод наименьших квадрантов, по которому проанализированы панельные данные по 154 фирмам 8 производственных отраслей, все фирмы котируются на Стамбульской фондовой бирже. Результаты анализа показали, что инновационная способность фирм имеет существенное влияние на процесс их выхода на международные рынки, в то время как режим защиты собственных инноваций не является значимым.

Ключевые слова: *инновация; защита инноваций; выход на международные рынки.*

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1. Introduction. In recent years, globalization, openness to foreign direct investments and regional trade agreements have expanded both opportunities and challenges for the firms that want to diversify and grow internationally (Buckley, 2009). Internationalization can be regarded as a strategy enabling a firm to exploit new profitable opportunities at foreign markets.

Many scholars emphasize the role of innovations as a determinant of promoting a firm's internationalization (Hansen and Lovas, 2004; Brock and Jaffe, 2008; Tsang et al., 2008; Kafouros et al., 2008). Nowadays, the firms which view internationalization as a major strategy for recouping heavy investments in R&D want to internationalize their operations in order to increase the returns on their innovations, reduce the risk of selling a product at a single market (Hitt, Hoskinson and Ireland, 1994).

On the other hand, possession of new products/services may not encourage to take the risks from internationalization. Rugman and Verbeke (2007) argue that many innovative activities can be optimally exploited at the firms' domestic markets. Foreign markets are generally characterized by much higher transaction costs and considerable foreignness liabilities which make it difficult for the firms to compete as effectively as they can do at their domestic markets. The other problem which makes difficult for a firm to compete effectively at foreign markets is "appropriability problem". Arrow (1962) was the first to address this issue, calling it "the appropriability problem". "Appropriability problem" refers to the difficulty of protecting profits from innovations under circumstances in which the knowledge is non-rival and non-excludable (i.e., codified) in nature. The firm's appropriability regime determines the firm's ability to profit from its innovation. The nature of appropriability regime also means how effectively new pieces of technological knowledge can be protected by means of intellectual property rights (Kylaheiko et. al., 2010). Teece (2007) clearly shows, the answer lies in strengthening the appropriability regime, either by strengthening the intellectual property rights by means of patents, trademarks, copyrights and trade secrets, or by increasing the tacit nature of the knowledge assets (Hurmelinna et al., 2007). Possessing such capabilities may help the firms enter foreign markets more easily and be able to profit from their innovation.

This study focuses on the role of the firms' innovative capabilities and the appropriability regime level (strong or weak) as potential antecedents of the firms' internationalization. We explain innovation, appropriability regime and internationalization. This could be a meaningful contribution to examination of the complex innovation-internationalization relationship. Additionally, we explain the innovation-internationalization relationship across the sectors because this relationship varies according to sector-specific characteristics and the argument that some new technologies are more easily transferable across countries than others can not be generalized regardless the industry. The study may also make meaningful contribution to this discussion.

First we give a theoretical overview of the relationship between innovation capabilities and the firms' internationalization. We then derive our theoretical hypotheses that relate the firms' innovative capabilities and internationalization. We also take into account the nature of appropriability regime and how it affects the internationalization. All these hypotheses are empirically analyzed using panel data (2003-2009) on Turkish firms operating in various sectors.

2. Literature Review. It is recognized in the literature that technological resources could significantly influence the internationalization of the firms.

Empirically this has been investigated by Hansen and Lovas (2004), Tsang et al. (2008), Zahra et al. (2003), and Tseng et al. (2007). Global firms and international new ventures are typical examples of the firms that achieve rapid growth with new innovative products (Pearse and Papanastassioou, 2006). On the other hand, Kafouros et al. (2008) claim that a higher degree of internationalization promotes the firm's ability to improve performance through innovations.

Other scholars emphasize the role of innovation and technological capabilities in facilitating the creation of unique products (Oviatt and McDougall, 1994). Both innovativeness and internationalization influence positively the growth rate and profitability of a firm (Brock and Jaffe, 2008; Tsang et al., 2008).

Montobbio et al. (2005) state there is an association between technological performance and export growth at country level. There is a dramatic increase of both international trade and innovative activities in the sectors related to electronics, physics, and pharmaceuticals. Sectors like electronics, computing and data processing, drugs and biochemistry, communication and networking show above average growth rates in terms of patenting activity and export. In their study which explores the relationship between technological activity and export performance during 1985-1998 for 9 large developing countries and 25 primary and secondary sectors, the research results support the idea that there are different ways in which technological activity can enhance or constrain export performance.

3. Theoretical Background, Conceptual Model and Hypotheses. The relationships between innovative capability, appropriability regime and internationalization are shown in the conceptual model (Figure 1), rationality of hypotheses is explained in subsequent part.

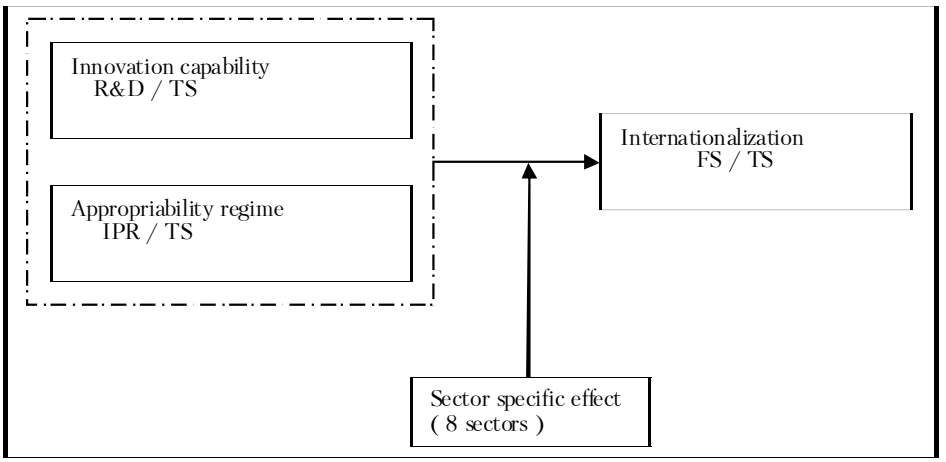

Figure. 1. **Conceptual Model: Effects of Innovation and Appropriability Regime Level on Internationalization**

3.1. Relationship between Innovation Capability and Firms' Internationalization. Internationalization theory (Buckley and Casson, 1976; Hennart, 1982) and the resource-based view emphasize the firm-specific advantages (technology, know-how

and brands) as drivers of the firms' internationalization. Firm-specific advantages include upstream strengths such as technological superiority and downstream strengths such as brand and marketing capabilities (Cerrato, 2009). Technological superiority can be an alternative to advertising and other sales efforts as a device to differentiate products. Technological superiority can generate cost-based competitive advantages as a result of the development of more efficient production process as well as competitive advantages based on differentiation due to product innovation (Roudriguez and Roudriguez, 2005). Because technological assets are more easily transferable, it can be argued that the greater the innovation capabilities of a firm, the greater its capability for global expansion and economy of scale. Global firms are also typically characterized by economies of scale and high level of R&D activity. Therefore, we proposed the following hypothesis:

Hypothesis 1: The firms with higher level of innovative capability (R&D intensity) are characterized by greater internationalization.

3.2. Relationship between Appropriability Regime and Internationalization. The extent to which a firm can exploit its R&D-based firm specific advantage may depend on the firm's appropriability regime. Appropriability regime can be graded as strong or weak according to the relative easiness of technology protection from imitators. Under strong regime technological knowledge is either difficult to imitate or there is legal appropriability regime protection against imitations. Thus, the firm value-creating assets can employ without fear of imitating actions of competitors. Under a weak regime, profits of an innovative firm are easily lost due to imitating competitors. A stronger regime normally gives a firm more time to turn its technological innovation into a successful product and profit. An innovative firm which has strong appropriability regime may access new foreign markets more easily and receive higher internationalization degree. Consequently, these arguments suggest the following hypothesis:

Hypothesis 2: The firms with strong appropriability regime (intellectual property rights) are characterized by greater internationalization.

On the other hand, interaction effect of innovation capabilities and appropriability regime on internationalization may be important. The more codified the knowledge is the more capabilities used, the easier it is to transfer knowledge assets and replicate the respective routines and capabilities within product/service sphere. One can expect that under conditions in which knowledge is codified and capabilities are common in nature there are no great difficulties in expanding the firm's activities to foreign markets (Buckley and Casson, 1976). These arguments bring us the following hypothesis:

Hypothesis 3: The firms which could combine innovative capability and strong appropriability regime are characterized by greater internationalization.

3.3. The Impact of Sector-Level Innovation Capability on Internationalization. The extent of globalization may vary across sectors. Even though technology is commonly considered a non-location bound firm specific advantage, the extent to which the firm can leverage on it in order to achieve internationalization is likely to vary across sectors.

Technology intensive sectors are generally formulated at a more global level. In technology-intensive sectors, a broad geographical scope is a more relevant imperative as the firms need to reach a "critical mass" in order to recoup their R&D costs. The firms in these sectors are under constant pressure to develop new products. The

firms need to make large investments in technology and R&D and exploit technological advantages on a wide basis in order to keep their competitive positions. The firms in high-technology sectors are therefore more likely to operate globally. Rugman and Verbeke (2004) and Cerrato (2009) also provide strong evidence support for this argument. The firms characterized by low-technology intensity such as food, fashion and consumer goods are more likely to need to fit local demand for their products to different international markets. It's therefore anticipated that the higher the level of the technology-intensity of sectors, the greater its effects on a firm's foreign sales. These arguments suggest the following hypothesis:

Hypothesis 4: The higher the technology intensity of an industry, the greater the internationalization of the firms in that industry.

4. Model Specification and Data Description. Following the conceptual model and hypotheses, we investigate the relationships between internationalization (foreign sales ratio), innovation capability (R&D ratio), and appropriability regime (intellectual property rights ratio) with two control variables, firm's age and size. For this we employ panel least squares with group dummy variables method using a sample which includes 154 firms in 8 manufacturing sectors traded at the Istanbul Stock Exchange (ISE) to estimate the following equations:

$$SALES_{it} = \sum_{k=1}^{8} \beta_j Sk + \beta_9 (RD)_{it} + \beta_{10} (RIGHTS)_{it} + \beta_{11} (RD * RIGHTS)_{it} + \\ + \beta_{12} (SIZE)_{it} + \beta_{13} (AGE)_{it} + \varepsilon_{it} \quad (1)$$

$$SALES_{it} = \sum_{k=1}^{8} \alpha_k Sk + \sum_{k=1}^{8} \sum_{l=1}^{5} \gamma_{kl} S_k I_{lit} + \nu_{it} \quad (2)$$

where $i = 1, 2, \ldots N$ is a firm's number, $t = 1, 2, \ldots T$ is time, k_i = individual effects of sectors, ε_{it} and ν_{it} are error terms. In the analysis for more efficient benefit from set of variables is used general model included all variables (Equation 1) and then is tested by panel data analysis method expanded with sector-specific effects for research whether there are differences among subsectors of manufacturing sector or not (Equation 2). The panel data analysis is used to test hypotheses 1, 2, 3 and 4 concerning the relationships between both innovation, appropriability regime at sector and firm level, and the firms' internationalization.

All data are taken from ISE's Public Disclosure Platform (http://www.kap.gov.tr/yay/ek/index.aspx). The sample includes 154 firms in 8 sectors for the 2003-2009 period. Although these firms are selected according to data availability, the data structure is a form of the balanced panel data. Table 1 presents sector names and the firm's number, Table 2 shows the dependent, independent and control variables and measures included in the equations.

In the analysis, the dependent variable is the internationalization indicator. The foreign sales/total sales ratio (SALES) is considered as the dependent variable as it is the most frequently used measure of a firm's internationalization in international business research (Geringer et al., 1989; Li, 2005; Tallman and Li, 1996; Cerrato, 2009). Innovation capability and appropriability regime are the main independent variables of the analysis at both firm and sector level. R&D expenditure intensity is generally considered a proxy of a firm's technological resources and innovation. R&D

intensity is measured as the ratio between R&D expenditure and sales at the firm's level and is widely used in international business research as a measure for knowledge-based assets (Cerrato, 2009).

Table 1. **Sectors and Firm Numbers in Analysis**

	Sector Name	Firm Number	%(1)
S1	Food, beverages and tobacco	23	14.94
S2	Textile, wearing apparel and leather	34	22.08
S3	Wood and woods products including furniture	2	1.30
S4	Paper and paper products, printing and publishing	12	7.79
S5	Chemicals, petroleum, coal, rubber and plastic products	24	15.58
S6	Non-metallic mineral products, expect products of petroleum and coal	25	16.23
S7	Basic metal sector	11	7.14
S8	Fabricated metal products, machinery and equipment, transport equipment, professional and scientific and measuring and controlling equipment	23	14.94
Total		154	100.00

Note: (1) Firm numbers in sample to firm numbers in sector ratio.

Table 2. **Variables and Measures**

Variables	Description
SALES	Ratio between foreign sales and total sales
RD	Ratio between R&D expenditure and total sales
RIGHTS	Ratio between intellectual property rights and total sales
RD*RIGHTS	Common effect of R&D expenditure and intellectual property rights
AGE	2009 (year of the analysis) minus year of establishment (log-transformed)
SIZE	Number of employees (log-transformed)
S1	1 if firm operates in "food, beverages and tobacco" sector; 0 otherwise
S2	1 if firm operates in "textile, wearing apparel and leather" sector; 0 otherwise
S3	1 if firm operates in "wood and woods products including furniture" sector; 0 otherwise
S4	1 if firm operates in "paper and paper products, printing and publishing" sector; 0 otherwise
S5	1 if firm operates in "chemicals and petroleum, coal, rubber and plastic products" sector; 0 otherwise
S6	1 if firm operates in "non-metallic mineral products, expect products of petroleum and coal" sector; 0 otherwise
S7	1 if firm operates in "basic metal sector" sector; 0 otherwise
S8	1 if firm operates in "fabricated metal products, machinery and equipment, transport equipment, professional and scientific and measuring and controlling equipment" sector; 0 otherwise

The strength of an appropriability regime is measured in terms of the value of different means of appropriability regime for a firm. Appropriability regime includes patents, copyrights, trademark protection, protection of utility models and design, trade secrets and brand protection. Intellectual property intensity is measured as the ratio between rights and sales at the firm's level. The sectors are divided into 8 groups in order to take into account innovation capability and appropriability regime at sector level. In the analysis there are therefore 8 dummy variables to control for sector effects. Finally, in the analysis there are also two control variables to measure the effects of the firms' size and age. These variables are generally the controlled mast in internationalization research (Qian et al., 2008).

5. Methodology and Empirical Results. Panel data are increasingly used in economic research. There are several advantages in using panel data. First, they increase the sample size. Second, by studying the repeated cross-section observations, panel data are better suited to study the dynamics of change. Third, panel data enable to study more complicated behavioral models (Gujarati, 2003, p.652). Tables 3 and 4 show the descriptive statistics and correlations for the variables used in the study.

Table 3. **Descriptive Statistics**

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
SALES	26.29	20.56	100.72	0.00	24.06	0.89	2.94
RD	0.30	0.00	7.19	0.00	0.72	5.05	37.32
RIGHTS	2.12	0.30	863.78	0.00	24.92	33.65	1.162.91
RD*RIGHTS	0.54	0.00	49.21	0.00	2.52	10.49	154.90
SIZE	6.30	6.33	9.83	0.00	1.37	-0.23	4.31
AGE	3.60	3.64	4.58	2.30	0.37	-1.01	5.15

Table 4. **Correlations**

	SALES	RD	RIGHTS	RD* RIGHTS	SIZE	AGE
SALES	1.00					
RD	0.10	1.00				
RIGHTS	-0.05	-0.01	1.00			
RD* RIGHTS	-0.06	0.44	0.05	1.00		
SIZE	0.24	0.15	-0.05	0.07	1.00	
AGE	0.03	0.09	-0.04	0.01	0.24	1.00

The empirical results for Equation 1 are shown in Table 5. By using this equation, 4 hypotheses are tested:

(i) Hypothesis 1 predicts that the firms with higher level of innovative capability (R&D intensity) have greater internationalization. The positive and significant coefficient estimates corroborate this hypothesis. Innovative capability (R&D intensity) has positive and statistically significant impact on foreign sales variable at 5% level. The empirical result supports the theoretical argument that more innovative firms are more likely to be globally oriented. R&D intensity has a high explanatory power of international expansion.

(ii) Hypothesis 2 predicts that the firms with strong appropriability regime (intellectual property rights) have greater internationalization. The positive and significant coefficient estimates corroborate this hypothesis. The empirical result doesn't support this hypothesis. Appropriability regime has negative impact on foreign sales. But, this impact is not statistically significant in Equation 1.

(iii) Hypothesis 3 predicts that the firms which could combine innovative capability and appropriability regime have greater internationalization. The positive and significant coefficient estimates corroborate this hypothesis. The empirical result doesn't support this hypothesis. The independent variable which could combine R&D intensity and intellectual property rights has negative and statistically significant impact on foreign sales at 5% level.

(iv) Hypothesis 4 predicts that the higher the technology intensity of a sector, the greater the internationalization of the firms in that sector. The analysis doesn't support this hypothesis. All of the sector dummies are insignificant in Equation 1, show-

ing that there is no statistically significant relationship between sector dummies and internationalization (sales variable).

(v) In addition, the number of employees (the firm's size) is significant in Equation 1. The larger firm size, the greater the internationalization of the firms. But, the firm's age is not significant in explaining the degree of internationalization. Studies on international new ventures (Mcdougall et al, 1994; Cerrato, 2009) indicate that the age of a firm is irrelevant to its international development and that young firms can also be strongly oriented towards internationalization.

Table 5. **Results of Panel Least Squares with Group Dummy Variables Method (Equation 1)**

Dependent Variable		SALES		
Method		Panel Least Squares		
Sample (adjusted)		2003-2009		
Periods included		7		
Cross-sections included		154		
Total panel (balanced) observations		1078		
Variables		Coefficient	t-Statistic	Prob.
S1		-18.6692	-0.5173	0.6050
S2		-13.2684	-0.3644	0.7157
S3		-17.4402	-0.5056	0.6132
S4		2.5173	0.0647	0.9484
S5		-23.7069	-0.7466	0.4555
S6		-13.9843	-0.4001	0.6891
S7		13.1629	0.3919	0.6952
S8		-6.1514	-0.2343	0.8148
RD		1.5336	2.4260	0.0154
RIGHTS		-0.0008	-1.0746	0.2828
(RD)* (RIGHTS)		-0.2725	-2.1718	0.0301
AGE		7.6768	0.8239	0.4102
SIZE		0.9828	2.0184	0.0438
Rho		0.9108	62.4677	0.0000
R-squared	0.8570	Mean dependent var.		26.0093
Adjusted R-squared	0.8553	S.D. dependent var.		23.9111
S.E. of regression	9.0971	Akaike info criterion		7.2667
Sum squared resid	88054.3500	Schwarz criterion		7.3314
Log likelihood	-3902.7500	Durbin-Watson stat.		2.0547

Notes: Autocorrelation problem is solved by applying a Marquardt nonlinear least squares algorithm (For details of this method see, Eviews 5, 2004, p. 456, 484, 934). Standard errors are robust.

Equation 1 is expanded with sector-specific effects dummy variables for research whether there are differences among subsectors in manufacturing or not. Each dummy variable is multiplied with independent variables. The empirical results for Equation 2 are shown in Table 6. The main results are as follows:

(i) Innovative capability (R&D intensity) is significant for only 2 sectors at levels 5% and 1%: basic metal sector (S7) and fabricated metal products, machinery and equipment, transport equipment, professional and scientific and measuring and controlling equipment (S8). R&D effects negatively on internationalization of the firms in sector 7. But R&D is positive for sector 8.

(ii) Appropriability regime is negatively significant for only sector 6 (S6) at level 1%: non-metallic mineral products, expect products of petroleum.

(iii) The independent variable which could combine R&D intensity and intellectual property rights level is significant for 2 sectors at levels 5%: wood and woods

products including furniture (S3) and fabricated metal products, machinery and equipment, transport equipment, professional and scientific and measuring and controlling equipment (S8). This variable affects positively on internationalization of the firms in sector 3, but it is negative for sector 8.

(iv) Finally, employees number and age of a firm are positively significant for sectors 4 and 7 in Equation 2. However, firm size is negatively significant for sector 4: paper and paper products, printing and publishing (S4) and basic metal sector (S7).

Table 6. **Results of Panel Least Squares Expanded With Sector-Specific Effects (Equation 2)**

Variables	Coefficient	t-stat.	Prob.	Variables	Coefficient	t-stat.	Prob.
S1	16.9827	0.2042	0.8382	**S1*RD*RIGHTS**	0.7626	0.2128	0.8315
S2	19.0982	0.2634	0.7923	**S2*RD*RIGHTS**	0.4160	0.9051	0.3656
S3	12.6487	0.0374	0.9702	**S3*RD*RIGHTS**	6.4210	2.3584	0.0185
S4	-116.9328	-2.8769	0.0041	**S4*RD*RIGHTS**	2.5422	1.2866	0.1985
S5	30.6301	1.0761	0.2821	**S5*RD*RIGHTS**	-0.0481	-0.3982	0.6906
S6	56.3893	1.2985	0.1944	**S6*RD*RIGHTS**	-0.2453	-0.2501	0.8025
S7	-42.8289	-0.9184	0.3586	**S7*RD*RIGHTS**	6.6051	0.6241	0.5327
S8	-34.3802	-0.2875	0.7738	**S8*RD*RIGHTS**	-0.6392	-2.4155	0.0159
S1*RD	-2.8656	-0.2707	0.7866	**S1*SIZE**	-0.7311	-0.9795	0.3275
S2*RD	-0.0346	-0.0421	0.9664	**S2*SIZE**	0.7703	0.6836	0.4944
S3*RD	9.9530	0.4631	0.6434	**S3*SIZE**	6.7213	0.5124	0.6085
S4*RD	-1.1990	-0.3080	0.7581	**S4*SIZE**	10.7269	2.2500	0.0247
S5*RD	0.4520	0.3336	0.7387	**S5*SIZE**	1.0774	1.2092	0.2269
S6*RD	-1.1120	-0.2659	0.7904	**S6*SIZE**	1.2742	0.7372	0.4611
S7*RD	-20.1167	-2.4206	0.0157	**S7*SIZE**	-4.2697	-1.9760	0.0484
S8*RD	2.8206	3.1751	0.0015	**S8*SIZE**	3.0918	0.7043	0.4814
S1*RIGHTS	1.1946	1.3129	0.1895	**S1*AGE**	-0.1013	-0.0043	0.9965
S2*RIGHTS	-1.1370	-1.2846	0.1992	**S2*AGE**	-0.1481	-0.0071	0.9943
S3*RIGHTS	-3.3491	-1.4800	0.1392	**S3*AGE**	-5.6044	-0.0708	0.9436
S4*RIGHTS	-0.5391	-0.7435	0.4574	**S4*AGE**	24.5809	2.5884	0.0098
S5*RIGHTS	-0.0004	-0.3788	0.7049	**S5*AGE**	-7.1152	-0.9804	0.3271
S6*RIGHTS	-1.2777	-2.7717	0.0057	**S6*AGE**	-10.0618	-0.9695	0.3325
S7*RIGHTS	-2.3666	-0.7637	0.4452	**S7*AGE**	33.8530	2.7495	0.0061
S8*RIGHTS	0.0548	0.2139	0.8307	**S8*AGE**	11.0808	0.4205	0.6742
				Rho	0.9076	63.0144	0.0000
R-squared			0.8622	Mean dependent var.			26.0093
Adjusted R-squared			0.8557	S.D. dependent var.			23.9111
S.E. of regression			9.0823	Akaike info criterion			7.2949
Sum squared resid			84880.14	Schwarz criterion			7.5214
Log likelihood			-3882.961	Durbin-Watson stat.			2.0572

Notes: Autocorrelation problem is solved by applying a Marquardt nonlinear least squares algorithm

6. The Conclusion. This study provides some evidence about the role of a firm's innovative capabilities and its appropriability regime level (strong or weak) in a firm's internationalization. The research findings show that innovative capability has major impact on internationalization. This finding is also supported by Cerrato (2009) and Kylaheiko (2010). Therefore, marketing managers seeking expansion to global markets should allocate significant resources to R&D activities. The results have also important implications for policy makers. Increasing R&D investment should be one of the cornerstones of Turkish exporting policy. Public incentives encouraging R&D activity can be effective in enhancing a firm's international expansion.

Another finding of the study is that the firm's strong appropriability regime does not impact the internationalization degree and the firms which can combine innovative capability and appropriability regime don't have greater internationalization. Although this finding is interesting, it may be interpreted that Turkish firms don't have ability to produce new technological products which are difficult to be imitated by competitors. On the other hand, one can expect that under conditions in which knowledge codified and capabilities are common in nature there are no great difficulties in expanding a firm's activities outside a country (Buckley and Casson, 1976). However, if knowledge (especially technology-related) and technological capabilities become more tacit in nature there are clear limits for transferring knowledge assets and replicating capabilities. There are many reasons why intangible and tacit knowledge transfer is difficult. For instance, tacit knowledge may be strongly idiosyncratic and path dependent, which means that it can be transferred only by using lots of unused but scarce managerial competences and entrepreneurial efforts (Teece, 2007).

From the perspective of sector specific effect, in specialized supplier sector – in manufacture of fabricated metal products, machinery and equipment, transport equipment, professional and scientific and measuring and controlling equipment, innovation has significant effect on internationalization. The firms which operate in this sector should attempt to create new products for global markets. Additionally, The firms which operate in another sector – wood and woods products including furniture, have either innovative capability or strong appropriability regime. They can combine both competences and as a result, provide higher internationalization degree. These findings show that the effect of innovation capability on internationalization varies across sectors. The target of public policy in term of sectors deserves much attention in the design of the incentives for R&D investments. Rather than focusing on undifferentiated public interventions, policy makers should take into account sector differences when designing public incentives aimed at enhancing the firm's international competitiveness.

The present study provides better understanding of internationalization. It may lead to better resource allocation decision for managers. Future research can consider other organizational capabilities as antecedents of internationalization.

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