Competitive Pressure and Technology Licensing: Empirical Evidence from Latin America

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Abstract

This paper inquires into the question of whether firms' decisions to purchase a technological license are affected by competitive pressure from other firms. In particular, it analyzes 2006 cross-sectional data from the Latin American wave of the World Bank's Enterprise Survey, which includes fourteen countries in the sample. Consistent with the findings in Aghion et al. (2005) regarding the relationship between competitive pressure and innovation, we find evidence consistent with the existence of an inverted-U-shaped relationship between competitive pressure and licensing. We discuss potential implications of the empirical findings for the design of policies and business strategies.

Keywords: Licensing; competitive pressure; Latin America.

1   Introduction

Among the different channels for technology transfer, licensing plays a prominent role. The existence of a market for disembodied technology (Arora et al., 2004) permits the efficient diffusion of technology both within and across national borders, which ultimately has an impact on total factor productivity and growth. On the one hand, licensing allows licensees to have access to technology developed by other firms. On the other hand, licensing allows licensors to profit from technology that they have previously developed, which is an additional incentive for investing in innovation. Therefore, the understanding of the factors that affect the process of technology licensing is relevant in order to properly design economic policies, as well as business strategies, and more so in a context of emerging economies, such as those in Latin America.

In this paper, we analyze data from the 2006 wave of the World Bank's Enterprise Survey, which includes a number of questions on innovation activities, to study whether a number of factors are associated with licensing. Among these, we focus on competitive pressure from other firms in the industry. We find evidence that is consistent with the existence of an inverted-U relationship between competitive pressure and licensing activities among firms in fourteen Latin American countries. This finding is consistent with previous findings on the relationship between competitive pressure and innovation activities, and suggests that in industries where there is too little competition firms have low incentives to engage in quality upgrading.

The previous literature in Economics and Management has addressed a number of features of licensing contracts. A basic reference is Kamien (1992), which constitutes an excellent survey of the early literature on licensing. Sen and Tauman (2007) propose a general theoretical framework to analyze licensing. Regarding the empirical evidence, the type of payments included in licensing contracts, whether fixed or variable, has given rise to a number of contributions, such as Mendi (2005) or Vishwasrao (2007). However, not much evidence has been presented on the factors driving licensing.

In this paper we focus on one contextual factor, namely competitive pressure from other firms in the industry. We analyze whether there is a monotonic relationship between competitive pressure and licensing, or whether the pattern exhibits an inverted-U shape, as in Aghion et al. (2005). In order to do so, we study firm-level survey data from the World Bank's Enterprise Survey, which includes a question on licensing activities. Regarding competitive pressure, the survey includes a question on the number of competitors the firm faces, which gives rise to four different categories, depending on the number of competitors. We find that there is indeed an inverted-U relationship between competitive pressure and licensing activities.

The tradition in the research on determinants of innovation is founded on seminal contributions such as Schumpeter (1942) or Arrow (1962), relating innovation to firm size and market structure. Regarding the specific issue of competitive pressure and innovation, theoretical predictions are quite sensitive to modelling assumptions, see surveys in De Bondt and Vandekerckhove (2012), Gilbert (2006), or Vives (2008). An influential analysis is Aghion et al. (2005), who find an inverted-U relationship between competition and innovation: innovation is

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lowest among monopolistic firms and among those that face intense competition in the industry. We thus contribute to the literature by focusing on a particular innovation strategy, namely the licensing of disembodied technology, and how it is affected by competitive pressure.

The rest of the paper is organized as follows: Section 2 discusses the different hypotheses tested in the empirical section. Section 3 describes the data used in this paper. Section 4 presents the econometric analysis of the data. Finally, Section 5 presents some concluding comments.

2 Hypotheses

The main hypothesis being tested in this paper is the shape of the relationship between licensing and competitive pressure. Some studies suggest that competition among producers decreases incentives to innovate (Aghion and Howitt, 1992; Grossman and Helpman, 1993; Spulber, 2013). In contrast, other studies find a positive effect of competition on innovation and productivity (Blundell et al., 1999; Symeonidis, 2002; Galdón-Sánchez and Schmitz, 2002). This disparity of results is not surprising, since on the one hand, competitive pressure induces the firm to further differentiate, what we can refer to as escape competition effect. However, on the other hand, it reduces the return from innovation, or rent-dissipation effect. Vives (2008) organizes the theoretical discussion by analyzing different behavioral assumptions and industry structures, and the results are very sensitive to the modeling assumptions. Aghion et al. (2005) find empirical evidence consistent with the existence of an inverted-U relationship between competitive pressure and innovation activities. Therefore, for low levels of competitive pressure, increases in competitive pressure cause an increase in innovation activity. This is the escape competition effect. In contrast, when competition is too intense, incentives to innovate are dampened, or rent-dissipation effect.

Our hypothesis is that the competitive pressure a given firm faces affects non-linearly its incentive to make use of technology licensing. In particular, we hypothesize that the relationship will have an inverted-U shape. This means that for very low levels of competitive pressure, that is, for monopolistic industries, increasing competitive pressure increases the probability of licensing. In contrast, when competition in the industry is very intense, an increase in the

intensity of competitive pressure reduces the likelihood of licensing. The formulation of the hypothesis is therefore as follows:

Hypothesis 1 *The effect of competitive pressure on the licensing activities of firms is positive for low levels of competitive pressure and decrease with the level of competitive pressure.*

2.1 Moderating factors

We expect some variables to play a moderating role on the relationship between competitive pressure and licensing. In this paper, we focus on belonging to a group of firms, firm age, and beginning operations as an informal firm. The moderating role of some of these variables on the effect of competitive pressure from informal producers was analyzed in Mendi and Costamagna (2016).

2.1.1 Belonging to a group of firms

The established literature has argued that the pool of resources firms that are part of a group of firms have access to is broader than in the case of independent firms. (Un and Cuervo-Cazurra, 2008) precisely provide empirical evidence of this difference. This preferential access may constitute a significant competitive edge, especially in the context of an emerging economy. For this reason, we expect firms that belong to a group of firms to be somewhat shielded from competitive pressure, and therefore their licensing activities to have a less intense response to a more competitive environment. This is reflected in the following hypothesis:

Hypothesis 2 *Licensing activities by firms that belong to a group of firms is less intensely affected by competitive pressure.*

2.1.2 Firm age

As argued in Mendi and Costamagna (2016), the fact that younger firms are typically more dynamic than older firms, and probably less prone to organizational inefficiencies associated with excessive bureaucratization that their older counterparts makes them more flexible in dealing with competitors (Audretsch et al., 2014; Balasubramanian and Lee, 2008; Cincera and

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Veugelers, 2014; Coad et al., 2016; Czarnitzki and Delanote, 2013; Garcia-Quevedo et al., 2014; Huergo and Jaumandreu, 2004). In contrast, older firms are more likely to have easier access to credit, given that they have longer credit histories, and thus less potential for asymmetric information. Access to credit is found to be a crucial factor in innovation in general and licensing in particular, see Aghion et al. (2012). We expect older firms to be less affected by competitive pressure in their licensing decisions. This leads to the following hypothesis:

Hypothesis 3 *The licensing activities of younger firms are more intensely affected by competitive pressure than those of older firms.*

2.1.3 Beginning as informal firm

According to McGahan (2012), the managerial implications informality constitutes a relatively unexplored question. Mendi and Costamagna (2016) tried to shed light on the interaction between formal and informal firms, and more precisely whether the latter affected the former's innovation activities. However, an interesting and related question is whether informality status has long-lasting effects on the way firms operate. That is, are firms that begin operations as informal firms different than those that begin operations as formal firms? These long-lasting differences may be driven by the persistence of managers that are essentially different than those that ran firms that started up formal. We expect informally-started firms to behave differently as to their vision, strategies, and other aspects such as access to qualified labor and to finance, and for this reason their licensing activities to be more affected by competitive pressure than formally-started firms.

Hypothesis 4 *The licensing activities of firms that began operations as informal firms are more intensely affected by competitive pressure than those of firms that began operations as formal firms.*

3 The data

This paper makes use of the World Bank's Enterprise Survey data. The Enterprise Survey makes use of an extensive questionnaire that is administered in a number of different countries,

mostly developing countries. While the core questionnaire typically does not include questions on innovation activities, for a number of Latin American countries, the manufacturing module of the Enterprise Survey included in 2006 some questions directly related with innovation outcomes (see Mendi and Costamagna (2016) for a recent contribution that uses the same database). The questionnaire also included questions providing information on up to what degree practices of firms in the informal sector represented an important obstacle to firm activities. Our sample of Latin American Countries for which data on licensing activities are available is: Argentina, Bolivia, Chile, Colombia, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, and Uruguay. In all cases, the survey year was 2006, and the total number of firms surveyed is 5474. However, due to the existence of missing values in some of the variables, the final number of observations may vary in some of the specifications whose estimated coefficients are reported below.

In addition to the questions on innovation outcomes, that is, the introduction of new products and/or processes that were the object of study in Mendi and Costamagna (2016), the survey includes a question on the use of licensed technology within the three years prior to the survey. Regarding competitive pressure from other firms, as explained in Mendi and Costamagna (2016), the firm is asked to report how many competitors it faces in the market for its product or service, and the options are none, one, two to five, and more than five. In Mendi and Costamagna (2016) we also made use of competitive pressure from informal producers, where the firm is requested to rank in a 0 to 4 scale how much of an obstacle are the informal sector competitors to the firm's operations. This variable was found to have a non-linear effect on product and process innovations. As a way of comparison, we will check if that is also the case regarding licensing.

Table 1 displays the variable definitions, distinguishing between dependent, independent, moderators, and control variables. In a similar way as in Mendi and Costamagna (2016), and following the established literature, we include as controls a number of variables that account for observable firm characteristics, such as size, belonging to a group of firms, firm age, the proportion of the firm's revenues coming from foreign markets, or beginning operations as an informal firm. Additionally, in all specification we have included a full set of country dummies,

Table 1: Variable definitions

Dependent variables	
licensing	Dummy that takes value 1 if the firm used technology licensed by a third party, 0 otherwise
Independent variables	
competpres	Number of competitors that the firm faces
obst_region	Regional average of informal firms as obstacle to firm's operations
Moderators	
young5	Dummy that takes value 1 if the firm is at most 5 years old, 0 otherwise
young10	Dummy that takes value 1 if the firm is at most 10 years old, 0 otherwise
group	Dummy that takes value 1 if the firm belongs to a group of firms, 0 otherwise
begin_informal	Dummy that takes value 1 if the firm began operations as an informal firm, 0 otherwise
Controls	
lnemp	Logarithm of the number of employees
age	Firm age, in years
exportint	Percentage of the firm's sales that are exported
manager_exp	Manager's experience, in years
downstream	Dummy that takes value 1 if the main buyers for the firm's product are final consumers, 0 otherwise

as well as sector dummies, following the classification of firms into the following manufacturing sectors: Textiles, Garments, Food, Metals and Machinery, Electronics, Chemicals and Pharmaceuticals, Non-metallic and Plastic Materials, and Other Manufacturing.

The dependent variable, *licensing* is a binary variable. Regarding the independent variables, *competpres* is normalized to be between zero and one, with the measure being increasing in the number of competitors. The measure of the importance of the presence of informal firms as an obstacle for the firm's normal activities is subjective, and is reported in a 4-point Likert scale, and being normalized to be between zero and one. While *competpres* is an objective measure, based on the number of competitors a firm faces, the competitive pressure from informal producers is a subjective measure. The main problem is that it may be endogenous if unobserved firm-specific characteristics are simultaneously determining the firm's perceptions of the intensity of competition and the innovation outcome, for instance managerial ability. Following Arnold et al. (2008), we try to mitigate endogeneity concerns by making use regional averages of these subjective measures instead of the firm-level observations. As in Mendi and Costamagna (2016), we assume that firms located in the same region within a country face similar intensity of competition from informal firms. This way, *obst_region* is defined as the regional average of the individual perceptions of the importance of informal firms as an obstacle to formal firms' operations.

In the empirical analysis, we include as moderators belonging to a group of firms, firm age, and the status of beginning operations as an informal firm. All these are binary variables, which will be interacted with *competpres* and the square of *competpres*. Belonging to a group of firms is captured by the binary variable *group*. The moderating role of firm age is done by two binary variables: *young*5 and *young*10. These are indicator variables of the firm being at most 5 and 10 years of age, respectively. Finally, firms must declare whether they began operations as informal firms, which allows us to construct the binary variable *begin_infor*, which is also used as a moderator.

As control variables, we include in all our specifications a full set of country and industry dummies, to account for unobserved country- or industry-specific factors. Additionally, we include *group*, a binary variable that takes value one if the firm belongs to a group of firms,

zero otherwise. Notice that this variable was also considered to be a moderator of the effect of competitive pressure. Firm size is controlled for by the inclusion of *lnemp*, the logarithm of the number of employees of the firm. The variable *age* is firm age, in years. Export intensity is measured by *exportint*, which is the firm's exports as a percentage of its revenues. Manager's ability is measured by *manager_exp*, which is the manager's experience, in years. We also control for whether the firm is located upstream or downstream in the value chain. This way, *downstream* is a binary variable that takes value one if final consumers constitute the main buyer group for the firm's products, as opposed of other firms. Finally, we also include *begin_infor* as a control in the specifications.

Table 2: Summary Statistics

	mean	sd	min	max
Licensing	.1152722	.3193793	0	1
Competpres	.8084277	.2644197	0	1
Obst_region	.5268435	.0989848	.29	.75
Group	.1033979	.3045057	0	1
Ln(Emp)	3.23284	1.23051	0	9.818747
Ln(Age)	2.845366	.8448329	0	5.278115
Expinten	4.988126	13.07247	0	100
Manexper	2.880254	.7002933	0	4.304065
Downstream	.221593	.4153565	0	1
Beginning informal	.1086957	.3112854	0	1

Table 2 presents summary statistics of the variables used in the analysis below. For each variable, we report the average, standard deviation, minimum, and maximum. Notice that some of the variables are binary, and in particular, the dependent variable of interest is binary, which conditions the econometric technique to be used.

4   Empirical analysis

The empirical analysis makes use of the World Bank's Enterprise Survey data, which was implemented in a number of Latin American (and African) countries in 2006. As pointed out before, the peculiarity of this cross-section is that it includes a number of questions on innovation and technology licensing. Since the dependent variable in our analysis is binary,

that is, it only takes values zero or one, we estimate Probit models in all cases. Since we find a non-linear effect of competitive pressure, we plot marginal effects as a function of the realizations of the competitive pressure variable. The following two subsections discuss the empirical findings regarding the effect of competitive pressure, and of variables that are believed to act as moderators of the relationship between competitive pressure and licensing, respectively.

4.1 Main effects

Table 3 reports estimated coefficients of different specifications where the dependent variable is, in all cases, the indicator of the firm purchasing a technology licensed by another firm. In the first column, we use the full sample of Latin American countries to find that the coefficient on *competpres* is positive, whereas that of this variable squared is negative. This suggests the existence of an inverted-U relationship between competitive pressure and innovation. We will later illustrate this by plotting the marginal effects of *competpres* on *licensing*, see Figure 4.1. In the second column, we include in the specification *obst_region*, the measure of competitive pressure from informal firms that was found in Mendi and Costamagna (2016) to have a negative impact on product and process innovations. In this case, we do not find this variable to have a statistically significant effect on licensing, whereas the coefficients on *competpres* and this variable squared are fairly robust to the inclusion of this variable. Columns (3) and (4) split the sample into downstream (3) and upstream (4) firms, and we observe that the effect of *competpres* is heterogeneous, and that the overall effect is driven by upstream firms. Regarding the effect of controls, belonging to a group of firms makes a firm more likely to purchase licensed technology, whereas downstream firms and those firms that began as informal firms are less likely to use licensed technology. All these findings are consistent with the existent literature.

Figure 4.1 plot the estimated marginal effects of *competpres* on the probability of the firm making use of licensing. We have plotted these effects against the range of observed values of *competpres*. As it may be observed, for low values of *competpres*, increasing the level of competitive pressure induces firms to be more active in the licensing market. This is consistent with a more innovative behavior in response to an increase in competition found in Mendi and Costamagna (2016). Notice that as *competpres* increases, the effect becomes smaller in

Table 3: Effect of competitive pressure on licensing

	(1) Licensing	(2) Licensing	(3) Licensing	(4) Licensing
Competpres	0.666*	0.655*	0.315	0.691*
	(0.393)	(0.394)	(1.042)	(0.408)
Competpres × Competpres	-0.505*	-0.501*	-0.257	-0.530*
	(0.292)	(0.292)	(0.876)	(0.298)
Obst_region		1.488		
		(3.564)		
Obst_region × Obst_region		-0.481		
		(3.589)		
Group	0.233***	0.239***	-0.422	0.310***
	(0.086)	(0.087)	(0.360)	(0.085)
Ln(Emp)	0.311***	0.310***	0.467***	0.284***
	(0.031)	(0.031)	(0.053)	(0.033)
Ln(Age)	-0.005	-0.008	0.054	-0.003
	(0.028)	(0.028)	(0.091)	(0.030)
Expinten	0.003	0.003	0.012	0.004
	(0.002)	(0.002)	(0.008)	(0.002)
Manexper	-0.020	-0.021	-0.150**	0.005
	(0.037)	(0.037)	(0.070)	(0.042)
Downstream	-0.184***	-0.182***	0.000	0.000
	(0.069)	(0.069)	(.)	(.)
Beginning informal	-0.253***	-0.249***	-0.964***	-0.112
	(0.071)	(0.072)	(0.244)	(0.072)
Constant	-2.560***	-3.256***	-2.761***	-2.581***
	(0.253)	(0.923)	(0.556)	(0.291)
Number of obs.	5474.000	5474.000	1071.000	4261.000
Log likel.	-1692.548	-1691.039	-209.086	-1454.015

Standard errors in parenthesis are clustered at the regional level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

absolute value, an it eventually becomes negative (although not statistically significant at the 95% level).

Figure 1: Marginal effects of *competpres* on technology licensing
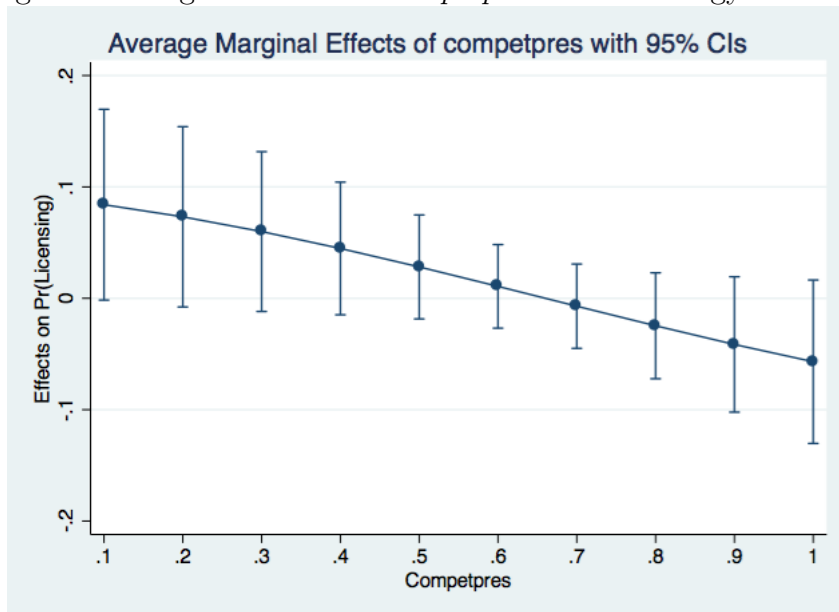
Finally, Table 4 reports estimated coefficients using moderating factors, specifically belonging to a group, firm age, and beginning operations as an informal firm. In all cases, these indicator variables are interacted with both *competpres* and this variable squared. Specifically, in column (1) the moderator is *group*, in columns (2) and (3) the moderators are *young*5 and *young*10, respectively, whereas in column (4) the moderator is *begin_infor*. As it may be readily observed, we do not find evidence of these variables acting as moderators of the relationship between licensing and competitive pressure.

5   Conclusions

The purpose of this paper is to shed light on the relationship between licensing and competitive pressure. In order to do so, we analyze the Latin American subsample 2006 wave of the World Bank Enterprise Survey. The particularity of this cross-section is the fact that the questionnaire includes some questions on firms' innovation activities. In a previous contribution, we studied this same database to search for the existence of a relationship between competitive pressure from informal producers and product and process innovation, see Mendi and Costam-

Table 4: Moderating effect of selected factors on licensing

	(1) Licensing	(2) Licensing	(3) Licensing	(4) Licensing
Competpres	0.558	0.728*	0.924*	0.681*
	(0.410)	(0.442)	(0.502)	(0.391)
Competpres × Competpres	-0.486	-0.526	-0.680*	-0.539*
	(0.308)	(0.337)	(0.378)	(0.284)
Group	-0.514	0.232***	0.234***	0.234***
	(0.374)	(0.086)	(0.086)	(0.086)
Age 5 years or less=1		0.380		
		(0.467)		
Age 10 years or less=1			0.350	
			(0.290)	
Beginning informal	-0.253***	-0.254***	-0.254***	-0.475
	(0.071)	(0.071)	(0.071)	(0.343)
Group=1 × Competpres	1.400			
	(1.051)			
Age 5 years or less=1 × Competpres		-0.660		
		(1.583)		
Age 10 years or less=1 × Competpres			-0.968	
			(0.855)	
Beginning informal=1 × Competpres				-0.174
				(1.525)
Group=1 × Competpres × Competpres	-0.539			
	(0.707)			
Age 5 years or less=1 × Competpres × Competpres		0.197		
		(1.204)		
Age 10 years or less=1 × Competpres × Competpres			0.666	
			(0.656)	
Beginning informal=1 × Competpres × Competpres				0.481
				(1.297)
Constant	-2.484***	-2.600***	-2.716***	-2.549***
	(0.259)	(0.274)	(0.318)	(0.254)
Number of obs.	5474.000	5474.000	5474.000	5474.000
Log likel.	-1689.720	-1691.805	-1691.631	-1691.825

Standard errors in parenthesis are clustered at the regional level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

agna (2016). In this paper, we focus on a particular input to innovation, namely licensing. We find that there is an inverted-U relationship between competitive pressure and licensing. We do not find evidence of belonging to a group, firm age, or beginning operations as an informal firm acting as moderators in this relationship.

We believe our findings have potential policy implications. The inverted-U relationship found between licensing and competitive pressure suggests that in concentrated industries, increasing the degree of competition increases the participation of incumbents in the market for technology. As long as trade in disembodied technology is a powerful channel for technological diffusion, increasing competition in industries where the number of incumbents is low has a potential positive impact on total factor productivity. This is an important outcome, especially for emerging economies such as those in Latin America.

References

Aghion, P., P. Askenazy, N. Berman, G. Cette, and L. Eymard (2012). Credit constraints and the cyclicality of r&d investment: Evidence from france. *Journal of the European Economic Association 10*(5), 1001–1024.

Aghion, P., N. Bloom, R. Blundell, R. Griffith, and P. Howitt (2005). Competition and innovation: An inverted-u relationship. *Quarterly Journal of Economics 120*(2), 701 – 728.

Aghion, P. and P. Howitt (1992). A model of growth through creative destruction. *Econometrica 60*(2), 323 – 351.

Arnold, J. M., A. Mattoo, and G. Narciso (2008). Services inputs and firm productivity in sub-suharan africa: Evidence from firm-level data. *Journal of African Economies 17*(4), 578 – 599.

Arora, A., A. Fosfuri, and A. Gambardella (2004). *Markets for Technology: The Economics of Innovation and Corporate Strategy.* MIT Press.

Arrow, K. (1962). Economic welfare and the allocation of resources for invention. In *The*

Rate and Direction of Inventive Activity: Economic and Social Factors, NBER Chapters, pp. 609–626. National Bureau of Economic Research, Inc.

Audretsch, D. B., A. Segarra, and M. Teruel (2014). Why don't all young firms invest in r&d? *Small Business Economics 43*(4), 751–766.

Balasubramanian, N. and J. Lee (2008). Firm age and innovation. *Industrial and Corporate Change 17*(5), 1019–1047.

Blundell, R., R. Griffith, and J. van Reenen (1999). Market share, market value and innovation in a panel of british manufacturing firms. *Review of Economic Studies 66*(3), 529 – 554.

Cincera, M. and R. Veugelers (2014). Differences in the rates of return to r&d for european and us young leading r&d firms. *Research Policy 43*(8), 1413–1421.

Coad, A., A. Segarra, and M. Teruel (2016). Innovation and firm growth: Does firm age play a role? *Research Policy 45*(2), 387–400.

Czarnitzki, D. and J. Delanote (2013). Young innovative companies: the new high-growth firms? *Industrial and Corporate Change 22*(5), 1315–1340.

De Bondt, R. and J. Vandekerckhove (2012). Reflections on the relation between competition and innovation. *Journal of Industry, Competition and Trade 12*(1), 7 – 19.

Galdón-Sánchez, J. E. and J. A. Schmitz (2002). Competitive pressure and labor productivity: World iron-ore markets in the 1980's. *American Economic Review 92*(4), 1222 – 1235.

Garcia-Quevedo, J., G. Pellegrino, and M. Vivarelli (2014). R&d drivers and age: Are young firms different? *Research Policy 43*(9), 1544–1556.

Gilbert, R. (2006). *Looking for Mr. Schumpeter: Where Are We in the Competition-Innovation Debate?.* U CA, Berkeley: Cambridge and London: MIT Press; Cambridge, Mass.: National Bureau of Economic Research.

Grossman, G. and E. Helpman (1993). *Innovation and Growth in the Global Economy.* MIT Press.

Huergo, E. and J. Jaumandreu (2004). How does probability of innovation change with firm age? *Small Business Economics 22*(3-4), 193–207.

Kamien, M. I. (1992). Patent licensing. In R. Aumann and S. Hart (Eds.), *Handbook of Game Theory with Economic Applications* (1 ed.), Volume 1, Chapter 11, pp. 331–354. Elsevier.

McGahan, A. M. (2012). Challenges of the informal economy for the field of management. *Academy of Management Perspectives 26*(3), 12 – 21.

Mendi, P. (2005). The structure of payments in technology transfer contracts: Evidence from spain. *Journal of Economics & Management Strategy 14*(2), 403–429.

Mendi, P. and R. Costamagna (2016). Managing innovation under competitive pressure from informal producers. *Technological Forecasting & Social Change Forthcoming*.

Schumpeter, J. (1942). *Capitalism, Socialism and Democracy*. Harper & Row, New York.

Sen, D. and Y. Tauman (2007). General licensing schemes for a cost-reducing innovation. *Games and Economic Behavior 59*(1), 163 – 186.

Spulber, D. F. (2013). How do competitive pressures affect incentives to innovate when there is a market for inventions?. *Journal of Political Economy 121*(6), 1007 – 1054.

Symeonidis, G. (2002). *The Effects of Competition: Cartel Policy and the Evolution of Strategy and Structure in British Industry*. MIT Press.

Un, C. A. and A. Cuervo-Cazurra (2008). Do subsidiaries of foreign mnes invest more in r&d than domestic firms? *Research Policy 37*(10), 1812 – 1828.

Vishwasrao, S. (2007). Royalties vs. fees: How do firms pay for foreign technology? *International Journal of Industrial Organization 25*(4), 741–759.

Vives, X. (2008). Innovation and competitive pressure. *Journal of Industrial Economics 56*(3), 419 – 469.