The Spanish Labor Market: Temporary Employment, Immigration and the Construction Boom

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Abstract

This thesis deals with different aspects of the Spanish Labor Market. The first chapter explores the impact of product market competition on job instability. Empirical results show that job instability rises with competition. The second chapter addresses the existence of network effects on immigrants' remitting behavior. Using a unique data base, I find positive network effects on the probability of remitting as well as on quantity remitted. The final chapter studies the role of the recent construction boom in explaining decisions to drop out of high-school. The construction boom is shown to increase the likelihood of dropping out of high-school.

Resumen

Esta tesis trata diferentes aspectos del mercado laboral español. El primer capítulo explora el impacto de la competencia en el mercado de productos sobre la inestabilidad del empleo. Los resultados empíricos muestran que la inestabilidad en el empleo crece con el nivel de competencia. El segundo capítulo plantea la existencia de efectos de las redes sociales de inmigrantes sobre el envío de remesas. Mediante el uso de una base de datos exclusiva, he encontrado efectos positivos de las redes sociales sobre la probabilidad de enviar remesas así como sobre la cantidad enviada. El último capítulo estudia el papel del reciente boom de la construcción en el abandono escolar durante la educación secundaria. Se demuestra que el boom de la construcción ha incrementado la probabilidad de abandono escolar durante la educación secundaria.

Foreword

This thesis is divided into three separate chapters that explore different issues of policy interest regarding the Spanish Labor Market. Spain is characterized by (i) the highest incidence of temporary employment in Europe, (ii) the 6th position in the ranking of top remittance sender countries, and (iii) the highest incidence of high-school dropouts in the OECD. These regularities motivate the use of Spain as a framework to study the issues of temporary employment, remittances and high-school dropouts. This thesis addresses the determinants of those three variables.

The first chapter studies whether product market competition affects job instability as proxied by the use of temporary labor contracts. The effect of of competition on labor contracts is identified by means of exogenous shifts in competition within sectors brought about by changes in legislation. Using both worker data from the Spanish Labor Force Survey and firm data from the Spanish Business Strategies Survey, I show that job instability rises with competition. In particular, a one standard deviation increase in the level of competition decreases the probability that a temporary worker is made permanent in a given year by more than 40%. This highlights the necessity of taking into account the changes in the level of competition when designing policies to influence labor contracts in the economy.

The second chapter explores the existence of network effects in remittance behavior. Networks are defined as groups of immigrants from the same country that live in the same locality. Using the National Immigrant Survey, a unique database for Spain, immigrants in networks are found to be more likely to remit and to remit more money if they belong to high remitting country groups. This finding sheds more light into the determinants of the decision to remit as well as on the scope of immigrant networks. Remittances constitute an important source of income for families in developing economies. Therefore, the improvement of the capacity to understand the determinants of these mon-

ey flows is interesting for international organizations and institutions fighting poverty. Additionally, the significance of social networks when explaining remittance behavior emphasizes that the scope of networks may be broader than what we know nowadays.

The final chapter addresses the implications of transitory changes in labor market conditions for low versus high educated workers on the decision to acquire education. To identify this effect, I use the improvement in the labor market prospects of low educated workers motivated by the increases in employment and wages in the construction sector during the recent housing boom. The estimation strategy is based on the fact that changes in the labor market driven by the construction sector affect only men. Increases in construction activity are found to increase men's propensity to drop out of high-school, relative to women. According to this finding, policies promoting education should strengthen when in the presence of transitory shocks in the labor market that make dropping out more attractive.

In summary, this thesis improves our understanding of the determinants of labor market variables of essential policy interest. These studies contain policy recommendations for improving the efficiency of labor contract policies, measures enhancing the acquisition of education and development programs accounting for financial flows to poor countries.

Contents

Chapter 1

The Effect of Product Market Competition on Job Instability

1.1 Introduction

Product markets in Europe have become more competitive in recent years. The increase in competition is explained by several economic changes including globalization, market integration and privatization. According to the Eurobarometer, a European Union opinion survey, 52% of EU-15 citizens believe that globalization has a negative effect on employment in their countries, and 56% of them consider that the EU accession of 10 Central and Eastern European countries has contributed to job losses in their countries. Additionally, the privatization of traditionally protected firms has been associated with strikes in almost all countries[1].

In the economics literature, product market competition has been shown to increase employment and wages[2]. If that is the case, why do citizens and

[1] See the reports from the European Industrial Relations Observatory which are available online at: http://www.eurofound.europa.eu/eiro/index.htm

[2] See for instance Nicoletti and Scarpetta (2005), Griffith, Harrison, and Macartney (2007) and Fiori, Nicoletti, Scarpetta, and Schiantarelli (2007) for empirical country-level analysis

trade unions so strongly oppose globalization, market integration and privatization? I propose an explanation based on the possibility that higher product market competition induces higher job instability. In particular, under more competition, workers are hired under less secure labor contracts that lead to more job instability.

In most European countries, labor contracts are either temporary (fixed-term) or permanent (open-ended). Fixed-term contracts are characterized by having a pre-determined duration, negligible firing costs and a maximum for the amount of time a worker can be sequentially hired under that type of contract. After that period expires, the firm has to discard the worker or offer her a permanent position. In contrast, permanent contracts have unlimited duration and higher firing costs. Then, the use of fixed-term contracts is a key indicator of job instability because they are not only associated with the actual probability of becoming unemployed, but also with a worker's perception of instability while employed which connects it directly to workers' welfare. Throughout this paper, I focus on type of labor contract as an observable measure of job instability and complement the analysis with the study of transitions to unemployment.

The use of fixed-term contracts in Spain is the highest in Europe. Moreover, having a fixed-term contract is the main determinant of losing a job in Spain during the current economic crisis. In fact, this type of labor contract is found to be much more relevant than educational attainment, age, gender or nationality[3]. Additionally, De la Rica and Iza (2005) show that holding a fixed-term contract leads to a delay in marriage and parenthood. Thus, the quantitative and qualitative importance of type of labor contract in Spain justifies its use as a benchmark case.

on the incidence of product market competition on employment and wages. For theoretical studies on the interactions between product market competition, employment and wages, see Blanchard and Giavazzi (2003) and Ebell and Haefke (2009).

[3]These conclusions are reflected in the quarterly bulletins of the Spanish Labor Observatory of the Crisis (Observatorio Laboral de la Crisis): http://www.fedea.es/observatorio/

After the creation of fixed-term contracts in 1984, there was a rapid increase in the proportion of fixed-term workers over total salaried workers in Spain. This proportion stabilized around 1992. Since then, the incidence of fixed-term contracts has remained relatively stable at around one third of salaried workers[4] (see figure 1), despite the fact that the Spanish government has promoted several laws to reduce their use. Only under the recent economic crisis, the incidence of fixed-term contracts has decreased as a consequence of the overall reduction in employment, which has affected mainly temporary workers. Hence, the understanding of the determinants of the use of fixed-term contracts is of essential policy interest.

The apparent stability of the overall proportion of fixed-term contracts does not hold, however, when disaggregating the proportion of fixed-term contracts across sectors. Figure 2 displays the evolution of the proportion of fixed-term contracts over time for five different sectors, corresponding to the key percentiles of the distribution of the proportion of fixed-term contracts by industry. The sectors with the lowest and highest proportion of fixed-term over total workers are mining (10%) and agriculture (60%). Moreover, not only is there considerable variation in the average across sectors, there is also great variation in their time trends. For instance, between 1996 and 1997, while the recycling and medical equipment sectors experience a rise, the electronic material sector suffers a decrease in the proportion of temporary workers. This indicates that there is likely to be some factor varying across sectors and over time that affects the use of fixed-term contracts.

In this paper, I show that product market competition is an important factor behind the observed variation across sectors because product market competition has a causal impact on job instability as measured by the incidence of fixed-term contracts. The results show that a one standard deviation increase in the level of competition reduces the probability that a temporary worker becomes permanent in a given year by more than 40%, and it increases

[4]The average proportion of fixed term workers over total number of contracted workers in the European Union is 15%, according to data from Eurostat.

the probability of becoming unemployed by more than 3%. Additionally, I find that the elimination of barriers to entry such that one market transitions from legal monopoly to free entry induces a decrease of 17.8% in the probability of becoming permanent for workers hired under temporary contracts. These results are robust to the use of different individual databases as well as firm level data. They are also consistent across different measures of competition.

This paper is related to the literature on the impact of product market competition on labor market outcomes. It has been shown that product market competition induces certain improvements in the functioning of the labor market, mainly in outcomes related with efficiency. In particular, product market competition[5] boosts productivity (Griffith (2001)), increases employment (Bertrand and Kramarz (2002)), increases executive incentives (Cuñat and Guadalupe (2009)), reduces gender discrimination (Heyman et al., 2008) and lowers race discrimination (Levine et al., 2008). In contrast, product market competition is thought to have negative effects on labor market outcomes related to workers' welfare and inequality. Specifically, competition has been found to decrease wage insurance against the business cycle provided to workers by firms (Bertrand, 2004) and increase wage inequality (Guadalupe, 2007). The closest paper to this one is Goldberg, Tracy, and Aaronson (1999). They study whether exchange-rate movements as inductors of changes in the competitiveness of US firms have an impact on job turnover as measured by the probability of job switching and the probability of industry switching. Their findings suggest no significant effect of dollar movements on job turnover. This

[5]Here I refer to product market competition. However, one must acknowledge that the concepts of product market competition differ greatly across studies. Griffith (2001) uses the implementation of the European Union Single Market Program as a quasi-experiment. Bertrand and Kramarz (2002) make use of changes in entry regulation as a source of increase in competition. Cuñat and Guadalupe (2009) study the effect of foreign competition as measured by import penetration. Levine, Levkov, and Rubinstein (2008) take advantage of bank deregulation to identify an exogenous intensification of competition. Heyman, Svaleryd, and Vlachos (2008) use firms' takeovers as a determinant of increases in competition. Bertrand (2004) makes use of changes in exchange-rate movements to generate exogenous variation in import competition. Guadalupe (2007) applies two quasi-experiments based on an exogenous and sudden appreciation and the implementation of the European Union Single Market Program.

paper is, to the best of my knowledge, the first to empirically address the effect of product market competition on job instability as measured by the type of labor contract as well as the first to study the interactions of type of labor contracts and product market competition in the context of a theoretical model.

In order to illustrate the importance of the question addressed here, I first propose a theoretical model that sheds light on the channels through which product market competition may affect transitions from fixed-term to permanent employment. When deciding on which workers to make permanent and which ones to keep as temporary, firms face a trade off between higher productivity and higher firing costs (permanent contracts allow the firm to keep the most productive workers but makes separation more costly)[6]. The degree to which firms are willing to pay more aggregate severance pay in exchange for higher productivity depends on the prevailing level of competition. This explains why competition may have an impact on the type of contract used by a firm. This model is, to the best of my knowledge, the first one to combine product market competition and type of labor contract. It takes into account the different dimensions of product market competition, namely, market size, product differentiation and entry cost, and includes important aspects of fixed-term contracts like: (i) their usefulness as screening device, (ii) the fact that fixed-term workers face a higher probability of separation from the firm, and (iii) the difference in dismissal costs with respect to permanent contracts. The model predicts that in equilibrium, when the number of transitions to permanent contracts is low (high), more competition induces more (less) transitions. This can be interpreted as product market competition moving the transition rate towards some intermediate efficient value. Thus, empirical analysis is needed to clarify which is the direction of the impact of product market competition on the use of fixed-term and open-ended contracts in a specific setting.

[6]This trade off has been studied by Blanchard and Landier (2002). They claim that the difference in firing costs between permanent and temporary contracts is the reason why firms may be willing to sacrifice gains in productivity learned through screening.

The empirical estimation focuses on three related outcomes. Firstly, transitions from fixed-term to permanent contracts, which are particularly relevant because the vast majority of permanent contracts are acquired only after a period under a fixed-term contract in the same firm. Guell and Petrongolo (2007) find that more than 90% of new labor contracts registered in the Spanish National Employment Office are fixed-term contracts and Bover and Gómez (2004) report that exit rates from unemployment into temporary employment are ten times larger than exit rates into permanent employment. Secondly, the estimation of transitions from fixed-term to permanent contracts is complemented by an specification where the dependent variable is the proportion of fixed-term workers in the firm. Thirdly, transitions to unemployment constitute a complementary object of interest.

The causal impact of product market competition on job instability is identified by means of exogenous changes in legislation. In particular, I apply an instrumental variable strategy based on the impact of changes in anti-competitive legislation in key input sectors. Additionally, I also propose a quasi-natural experiment based on the implementation of the European Union Directives enhancing competition in Spain.

The remainder of the paper proceeds as follows. Section 2 presents the theoretical model that relates product market competition and transitions from fixed-term to permanent employment and which provides a framework for the empirical analysis. Section 3 presents the empirical methodology used, i.e., the instrumental variable approach and the quasi-experiment. Section 4 describes the databases in use, the construction of the variables and the sample included in the analysis. Section 5 summarizes the empirical results and includes some robustness checks and extensions. Section 6 concludes.

1.2 Theoretical model

1.2.1 Setup

I propose a model that illustrates how the type of labor contract may be affected by product market competition. I focus on the use of temporary contracts as workers' screening devices. The possibility of using temporary contracts as a mechanism to screen the worker induces interactions of competition and type of contracts different from the ones between competition and employment.

This model interacts the product and labor markets through the cost function of the firm in the spirit of Raith (2003). There are two periods. In the first period, workers are hired under a fixed-term contract, production takes place, the firm learns the productivity of its matches with workers, firms compete in prices and profit realizes. In the second period, the firm decides which workers to make permanent and which ones to keep as fixed-term, exogenous separations occur, production takes place, firms compete in prices and second period profit realizes.

Product market

Labor is the only production input. The product market is modeled à la Salop. Firms are positioned symmetrically around a circle of circumference one. The circle is populated by consumers with a mass of m. Each consumer buys one unit of the good. Consumers prefer the variety closer to them and they incur in a transportation cost which is a proportion d of the distance between them and the firm they buy from. This transportation cost represents product differentiation. Firms enter the market freely up to the payment of a fixed cost, F. The unit cost is defined as $c_t = \overline{c} - a_t$ for each firm, where t reflects the period. This implies that in both periods there is a fixed unit cost $\overline{c}$ that is reduced according to a_t, the average productivity of workers employed in the

firm in that period.

The model is solved by backward induction. Firstly, the profit function is optimized to get the optimal prices as in the ordinary Salop model. Secondly, the profit function conditional on choosing the optimal price is maximized with respect to the proportion of permanent contracts in the second period, to obtain the optimal contracting rule. The focus is on the decision on the type of labor contract that occurs in the second period. After computing the optimal prices and plugging them into the profit function, it results in:

$$\Pi = \pi_1 + \beta\pi_2 - F$$

where F is the entry cost, and first period profits, π_1, are given by:

$$\pi_1 = \frac{md}{n}\left\{\frac{1}{n} + \frac{n}{2d}(E(c) - \overline{c} + a_1)\right\}^2$$

where m stands for market size as defined above, d denotes product differentiation, n is the number of firms, $E(c)$ represents the expected value of other firms' costs, $\overline{c}$ is a fixed unit cost, and a_1 denote the average labor productivity in period 1.

Similarly, second period profits, π_2, are given by:

$$\pi_2 = \frac{md}{n}\left\{\frac{1}{n} + \frac{n}{2d}(E(c) - \overline{c} + a_2)\right\}^2 - P$$

where a_2 denote the average productivity in period 2 and, P represents severance pay which is defined in the next subsection.

Note that profit increases with the difference between the expected value of other firms' costs and firm's unit costs. The extent to which this happens depends on the parameters of competition.

The level of competition in this framework is defined according to the value of market size, m, product differentiation, d, and entry cost, F. In particular, an increase in the level of competition occurs if market size, m, increases, product differentiation, d, decreases or the fixed cost, F, is reduced. The number of firms, n, is endogenous to the level of competition.

Labor market

There are two types of employer-employee matches, high productivity and low productivity ones. Each of them induces a unit cost of $\overline{c} - \alpha_1$ or $\overline{c} - \alpha_2$, respectively, where $\alpha_1 > \alpha_2$. Actual unit cost is a linear combination of the unit cost induced by each type of worker with weights equal to the proportion of each type of worker in the firm. Each worker's productivity is unknown a priori. Workers are drawn from a discrete distribution of types such that the employer-employee match has productivity α_1 with probability p and productivity α_2 with probability $1 - p$.

There are two types of labor contracts, namely, temporary and permanent contracts. In the first period all workers have temporary contracts and in the second period, both types of contracts coexist. Workers leave the firm according to the exogenous separation rates l and s, for temporary and permanent workers, respectively, where $l > s$. This assumption tries to capture that permanent contracted workers are less likely to leave the firm, and hence firms can use permanent contracts to keep the most productive workers.

When a permanent worker leaves the firm, the firm has to provide her a severance pay. Let S stand for total severance pay if all workers were hired permanently and then replaced. Actual severance pay, P, is a proportion of S that depends on the proportion of high productivity matches, p, the proportion of high productivity matches which are offered a permanent contract, τ, and the separation rate for high productivity workers, s. In the event of a separation, a new worker is drawn from the same distribution of types as in

the first period.

1.2.2 Finding the optimal contract rule

Which workers will be kept under a fixed-term contract and which ones will be offered an open-ended contract in the second period?. There are two potential optimal strategies for the firm:

1. Selection on high productivity matches: All low productivity workers are kept under temporary contracts and the firm decides on the proportion of high productivity workers to offer permanent contracts.

2. Selection on low productivity matches: All high productivity workers are offered permanent contracts and the firm decides on the proportion of low productivity workers to keep under permanent contracts.

Any case between those two would be suboptimal for the firm[7]. Hiring a high productivity worker using a temporary contract while hiring a low productivity worker under a permanent contract implies that expected productivity decreases while expected severance pay stays constant, with respect to the case where the high productivity worker is hired using a permanent contract and the low productivity worker is hired using a temporary contract.

Selection on high productivity matches is more profitable than selection on low productivity matches. In this case, more permanent contracts imply higher productivity but also higher expected severance pay. Some papers have addressed the existence of a causal link between productivity and fixed-term contracts. For the case of Spain, Dolado and Stucchi (2008) find that high conversion rates from temporary to permanent contracts increase a firm's productivity, while high shares of temporary contracts decrease it. Similar con-

[7]Cipollone and Guelfi (2003) show that permanent workers are selected to be the most productive ones. This assumption has been also used in Caggese and Cuñat (2008).

clusions are reached by Boeri and Garibaldi (2007) for Italy and Engellandt and Riphahn (2005) for the Swiss case. Thus, we focus on case 1.

Solving the model

The proportion of high productivity matches employed under permanent contracts in period 2, τ, is our object of interest. When this proportion gets higher, productivity increases and so does severance pay. In particular, productivity and severance pay depend on τ according to the following expressions:

$$E(a_2) = p\alpha_1 + (1-p)\alpha_2 + p(1-p)(l-s)(\alpha_1 - \alpha_2)\tau$$

$$P = p\tau sS$$

In this case, more high productivity workers with permanent contracts induces higher productivity because less high productivity matches will be replaced but it also induces higher total severance pay because more workers will be entitled to severance pay.

Substituting these expressions in the profit function, deriving with respect to τ and solving for τ, we obtain the value for the optimal proportion of permanent over total high productivity workers:

$$\tau = \frac{\left(\frac{1}{2} - p\right)(\alpha_1 - \alpha_2) + \frac{2d}{n^2}\left(1 - \frac{psS}{\frac{m}{n}p(1-p)(l-s)(\alpha_1-\alpha_2)}\right)}{p(1-p)(l-s)(\alpha_1 - \alpha_2)}$$

Under perfect competition, d goes to zero and n goes to infinity. Hence, the efficient proportion of permanent high productivity workers is defined as:

$$\tau^e = \frac{\left(\frac{1}{2} - p\right)(\alpha_1 - \alpha_2)}{p(1-p)(l-s)(\alpha_1 - \alpha_2)}$$

Let A denote the ratio between the expected severance pay for a high productivity worker and the relative expected gain in productivity derived from hiring a high productivity worker under a permanent instead of a temporary contract. Analytically, this can be written as: $A = \frac{sS}{\frac{m}{n}(1-p)(l-s)(\alpha_1-\alpha_2)}$. Note that, under perfect competition, the equilibrium proportion of permanent high productivity workers, τ, does not depend on A. However, when the market is not perfectly competitive, A bigger than one is associated with values of the proportion of permanent high productivity workers, τ, that are lower than the efficient value, τ^e, and A smaller than one is associated with values of the proportion of permanent high productivity workers, τ, that are higher than the efficient value, τ^e.

How do changes in product market competition affect the proportion of permanent high productivity workers, τ, when the market is not perfectly competitive?. Comparative statics with endogenous number of firms show that the impact of competition on the proportion of high productivity workers hired under a permanent contract depends on the value of A according to the following table:

	$\frac{d\tau}{dC_d}$	$\frac{d\tau}{dC_m}$	$\frac{d\tau}{dC_F}$
$A < \frac{1}{2}$	-	-	-
$\frac{1}{2} \leqslant A < 2$	+	+	-
$A \geqslant 2$	+	+	+

where C_d, C_m and C_F represent the different aspects of competition as defined by d, m and F, respectively[8].

To sum up, comparative statics show that product market competition increases the proportion of high productivity workers with permanent contracts, τ, if one of the following two conditions is satisfied: (i) $A < \frac{1}{2}$, i.e., severance

[8]This notation is introduced to ease interpretation. One can assume $C_d = -d$, $C_m = m$ and $C_F = -F$. And then, $\frac{d\tau}{dC_d}$, $\frac{d\tau}{dC_m}$ and $\frac{d\tau}{dC_F}$ represent the change in the proportion of permanent over total high productivity workers as a consequence of a marginal change in competition induced by d, m and F, respectively.

pay is very low compared to the gain from retaining high quality workers or (ii) $\frac{1}{2} \leqslant A < 2$, i.e., severance pay is relatively low, and the increase in competition is driven by a reduction in entry costs. In all other cases, i.e., either if severance pay is very high, or if it is relatively high and the increase in competition is driven by a decrease in product differentiation or an increase in market size, more competition decreases job instability.

Therefore, low values of A imply high values of the proportion of permanent high productivity workers, τ, and are associated to more competition inducing a rise in the proportion of permanent high productivity workers, τ. In contrast, high values of A imply low values of the proportion of permanent high productivity workers, τ, and are associated to more competition inducing a fall in the proportion of permanent high productivity workers, τ. Intermediate values of A are associated to more ambiguous prediction. However, note that changes in competition also influence the value of A. In particular, A decreases with competition if it is induced by d or m, and increases with competition if it is induced by F. This implies that A low and high are the only stable values.

1.2.3 Implications

The theoretical framework makes explicit the trade off between productivity and severance pay that firms face when deciding whether to hire workers using fixed-term or open-ended contracts under heterogeneity in the quality of the employer-employee matches. In particular, all low productivity workers are kept under fixed-term contracts, while the firm decides on which high productivity workers to make permanent. Then, more permanent contracts induce more productivity and higher severance pay.

This model not only illustrates the channels through which product market competition may impact the use of labor contracts, it also provides some insights that help to interpret empirical facts. If in estimation, competition

is found to reduce the proportion of high productivity workers that transition from fixed-term to open-ended contracts, this would be consistent with the case where $A < \frac{1}{2}$. In this case, the expected cost of having a permanent vs. a temporary worker is below half the relative expected loss in productivity of hiring a high productivity worker under a temporary instead of a permanent contract. Under this condition τ is relatively high. On the contrary, when $A \geqslant 2$, the equilibrium τ is relatively high and more competition induces more permanent contracts.

In general, the analysis of how the proportion of fixed-term workers that transition to open-ended contracts changes according to the parameters of competition, shows that competition is moving the transition rate τ towards some intermediate efficient value[9]. This is consistent with the general consensus on the existence of some steady-state composition of employment in terms of temporary and permanent employees as argued in Dolado, Garcia-Serrano, and Jimeno (2002). Empirical analysis is needed to disentangle which is the situation that applies in practice.

1.3 Empirical strategy

The aim of the empirical analysis is to address the direction and magnitude of the causal relationship between product market competition and job instability. In the main specification, transitions of individuals from temporary to permanent contracts are estimated as a function of variables measuring competition and a set of individual-level controls using the Spanish Labor Force Survey. This specification is complemented by another in which the proportion of permanent contracts in a firm is estimated as a function of variables measuring competition and a set of firm-level controls using the Business Strategies

[9]In particular, as competition goes to infinity, i.e., market size goes to infinity, unit transportation costs go to zero and entry costs go to zero, and then, the proportion of permanent high productivity workers approaches the value: $\tau^{opt} = \frac{\left(\frac{1}{2}-p\right)}{p(1-p)(l-s)}$

Survey.

1.3.1 Individual level analysis of transitions from temporary to permanent contracts

For the analysis performed at the individual level, the effect of competition on transitions from temporary to permanent contracts is estimated by means of a linear duration model where the equation of interest can be written as follows:

$$P(y_{ijt} = 1) = \beta_0 + \beta_1 C_{jt} + \beta_2 X_{ijt} + \beta_3 W_{jt} + \beta_4 V_j + \beta_5 Z_t + \varepsilon_{ijt} \qquad (1.3.1)$$

where y_{ijt} is equal to one if individual i working in sector j transitions from fixed-term to permanent contract at year t, $P()$ represents the probability of the event in brackets happening, and C_{jt} is a measure of competition (see section 3.3 for details). With respect to controls, X_{ijt} includes individual characteristics, namely, age, a married indicator, a household head binary variable, a high school graduate and a university graduate dummy, number of coworkers, and fixed-term contract duration dummies (in years), W_{jt} stands for the sector-time average difference in wages between permanent and temporary workers, V_j represents a set of sector dummies, Z_t includes year and quarter dummies. Finally, ε_{ijt} is the residual.

The dependent variable varies at the individual, sector and time levels, while the measure of competition varies only by sector and time. This could lead to misleading standard errors due to the fact that the identifying variation is lower than the variation existing at the individual level. To avoid this, standard errors are clustered at the sector-time level. In section 5.4, two-dimensional clustering is alternatively applied.

A shock in the level of product market competition may induce some indirect

effects in addition to the direct impact of competition on job instability. In particular, competition may induce indirect effects by affecting the composition of the pool of workers in the industry, the degree to which workers switch between sectors and the sector composition of the economy.

Product market competition may induce changes in the composition of the sector's labor force in terms of observable as well as unobservable characteristics, and firms may then decide on the type of labor contract accordingly. In order to remove this indirect effect, several individual controls account for changes in workers' observed characteristics. Moreover, individual fixed effects are added in some specifications in order to average out the effect of individual unobserved time invariant traits. Individuals with "good" unobserved characteristics tend to transition to permanent employment first. Hence, the pool of workers that at each point in time are observed holding a fixed-term contract are the "worse" ones in terms of unobserved characteristics. This implies that stronger shocks to competition would be needed in order to alter their labor contracts and thus, ignoring this fact would result in weaker estimates.

Additionally, changes in product market competition may induce workers to switch across sectors, and sector switching may induce changes in type of labor contract. In particular, sector switching is often associated with a new fixed-term contract. In order to avoid this confounding effect on the results, the sample is restricted to individuals that do not switch sectors during the observation period. However, in section 5.4 I also report one specification that illustrates the differential impact of competition on switcher versus non-switchers.

Finally, competition may induce some general equilibrium effects that may ultimately have an impact on type of labor contract. Workers may move across sectors as a result of competition shocks and therefore, the relative importance of each sector in the economy may change with the degree of competition. If the sectors that provide less permanent jobs expand (shrink), this leads to a decrease (increase) in the average transition rate. To prevent this from

affecting my results, I weigh each observation using the ratio between the number of workers in the sector during the same quarter of the previous year and the number of workers at the time of the interview, in fact keeping the size of this sector unchanged[10].

1.3.2 Firm level analysis of the proportion of permanent contracts

For the analysis performed at the firm level, the equation of interest is the following:

$$P_{fjt} = \beta_0 + \beta_1 C_{jt} + \beta_2 X_{fjt} + \beta_3 V_j + \beta_4 Z_t + U_f + \varepsilon_{fjt} \tag{1.3.2}$$

where P_{fjt} is the proportion of permanent over total contracted workers in firm f operating in sector j at year t, C_{jt} stands for a measure of competition. Regarding controls, X_{fjt} includes a set of firm controls, namely, number of workers, percentage of engineers and college graduates (separating long and short degrees), percentage of part-time permanent workers, ratio between blue and white collar workers, wages over production, workers training expenditures over production, severance pays over production, a dummy for merged firm, a dummy for split firm, a dummy for individual entrepreneur, R&D over production and percentage of public capital, V_j represents sector dummies, Z_t stands for year dummies, U_f includes firm fixed effects. Finally, ε_{fjt} is the residual.

Again the measure of competition varies at a higher level of aggregation than the dependent variable, hence estimated standard errors are clustered at the sector and time levels.

Product market competition may have an impact on the characteristics of

[10]Theoretically the average of the weights should be close to one. In my sample, it is 0.985.

the pool of firms that operate in a sector at each point in time. Hence, together with several firm characteristics, firm fixed effects are added to account for firm-specific time invariant features.

Analogously to the individual level regression, each observation is weighted according to the ratio between the number of workers in the sector during the previous year and the number of workers in the sector in the year of the interview and thus, the size of each sector remains constant.

1.3.3 Measuring competition

The measure of competition used in the main specification is the price-cost margin or Lerner Index. This is a standard measure of competition defined as the difference between price and marginal cost as a fraction of price. A higher magnitude of the price-cost margin is associated with lower product market competition.

The price-cost margin was shown by Boone (2000) to perform relatively well as a reflection of the level of product market competition under a variety of theoretical setups. In fact, this measure of competition fits well the theoretical characterization of competition used in this paper. In particular, in the context of the model, the price cost margin is decreasing in market size and increasing in product differentiation and entry costs. Moreover, this measure is found by Boone (2001) to be preferable to most other commonly used measures of competition like the concentration ratio or the inverse of the number of firms.

However, the price-cost margin presents one drawback. It implicitly assumes the existence of constant returns to scale in production. In particular, the measure is biased downward (upward) in the presence of increasing (decreasing) returns to scale. The inclusion of sector dummies in the empirical analysis mitigates the consequences of different levels of returns to scale between sectors since it is unlikely that the sector structure changes very quickly over time. Additionally, the year dummies would account for the existence of

such changes at the economy level. In section 5.4, I provide evidence that the main results still hold when using the concentration index as an alternative measure of competition.

1.3.4 Identification strategies

One of the main challenges that arise when estimating the impact of product market competition on the use of permanent contracts is the potential endogeneity of the competition measure. Endogeneity may be present for two reasons. Firstly, the use of permanent contracts in a sector may influence the entry of other firms, which modifies the level of competition in the sector (this would be endogeneity induced by reverse causality). Secondly, unobserved variables like technology may influence both the use of permanent contracts and the extent of competition in the sector (in this case, endogeneity would be motivated by omitted variables). To address endogeneity concerns I propose two different strategies, an instrumental variable approach and a quasi-experiment. Both are based on changes in legislation that induce arguably exogenous changes in competition.

Instrumental variables: The Regulatory Impact measure

As argued above, using the price-cost margin as a measure of competition is subject to a potential endogeneity problem. I propose the Regulatory Impact indicator provided by the OECD as an instrument for the price-cost margin in a sector.

The Regulatory Impact indicator measures the extent to which anti-competitive legislation in some intermediate goods sectors (namely, energy, transport, communications, retail distribution, business services and finance), impacts man-

[10]The data on the Regulatory Impact indicator is publicly available at the Indicators of Product Market Regulation Homepage: http://www.oecd.org/document/1/0,3343,en_2649_34323_2367297_1_1_1_1,00.html

ufacturing final products sectors. The effect on each final products sector depends on the extent to which it uses the output produced by the intermediate goods sectors as inputs. The construction of this index is done in two steps: Firstly, information on barriers to entry, public ownership, vertical integration, market structure and price controls is collected for the energy, transport, communications, retail distribution, business services and finance sectors. Then, the information is aggregated at the manufacturing sector level by using the intensity of use of each of those sectors as weights. The list of sectors for which this information is available is displayed in Table 1. A more detailed description of this indicator can be found in Conway and Nicoletti (2006). See Table 2 for descriptive statistics on the Regulatory Impact measure.

The idea underlying the use of this instrument is that the decrease in the costs associated with making the product available to more consumers (transportation, communication, etc.) has a key role in the increase in competition in recent years. Moreover, the decrease in those costs may have affected each of the final products sectors differently depending on the relative importance of these types of inputs in its production process. This is the source of the cross-sector variation of the instrument.

The decline in anti-competitive regulation in the above-mentioned intermediate goods sectors had a positive impact on competition as measured by the price-cost margin in the final products sectors[11]. This goes in line with the previous argument. Still, this may seem contradictory because less regulation in an intermediate goods sector induces a fall in the price of output in that sector and therefore decreases the final products sectors' costs which will lead to higher price-cost margin, looking like less competition. However, firms adjust prices to changes in costs, and the extent of the adjustment of price-cost margin to changes in costs would capture precisely the intensity of competition.

Overall, changes in anti-competitive regulation have a substantial impact

[11]This will be shown in the first stage regression displayed in Table 5.

on the sectors to which the regulation applies. However, changes in regulation in a sector may still be endogenous when explaining the use of the different types of labor contracts within that sector if the government targets both the labor and product markets in one sector simultaneously. In contrast, changes in regulation in a sector are more likely to be exogenous with respect to the use of the different types of labor contracts in other sectors.

Additionally, changes in legislation in the intermediate goods sectors were motivated by a worldwide trend towards economic liberalization of traditionally protected sectors and it is unlikely that the number of fixed-term vs. permanent contracts by final products sector and time in Spain was somehow correlated with these changes.

Moreover, the intensity of use of the outputs of the intermediate goods sectors as inputs by final products sectors is kept fixed over time at the initial level. Hence, we rule out that endogenous changes in the use of transport, communication, distribution services, etc. across sectors may be driving the results.

Quasi-experiment: The application of EU Directives in Spain

At the end of the 1990's, the Spanish government, following the indications of the European Union, promoted several laws to liberalize economic activity in sectors such as energy, post, telecommunications, road and rail transport, ports, and tobacco. The aim was to apply structural reforms to promote competition as well as to improve the quality of regulation. In practice, these reforms implied important reductions in the legal barriers to entry in the affected sectors.

The energy sector experienced very important legislative changes in 1997. A new law takes into account EU rules on the electricity single market and lays the foundations for a free market for electric power generation. Additionally, new laws in the gas sector eliminated some regulations concerning distribution

at the retail level. Specifically, the percentage of the retail market open to consumer choice goes from 0 to 20 from 1996 to 1997.

The road and rail sector went through an increase in the level of competition from 1997 to 1998. The rail sector continues to be fully owned by public capital. However, the administration is divided into two different entities that compete in the same rail district in the passenger and freight transports markets and that are required to be more profitable because the EU Directive forces the government to reduce subsidies.

The post and telecom sector was subject to big competition legislation changes between 1998 and 1999. In 1997 a law was promoted intending the full liberalization of the telecommunications sector in December 1998. However, it was not until January 1999 that the new law was enforced. The 1997 EU Directive on the liberalization of the postal services sector translated into the 1998 Spanish Law that liberalized some postal services starting in 1999. The OECD entry regulation indicator shows that the telephone markets became fully competitive in terms of entry regulation starting in 1999.

The total magnitude of the change in competition in these sectors can be approximated by the OECD indicator on barriers to entry[12]. The barriers to entry decreased by 96.2% in the energy sector from 1996 to 1997, by 53.3% in the rail and road sector from 1997 to 1998 and by 85.9% in the post and telecom sector from 1998 to 1999. On the other hand, the airlines and retail distribution are reported to experience absolutely no change in their barriers to entry during the period of study. Therefore, they are chosen as control sectors[13].

Then, using the changes in barriers to entry in the energy, rail and road and

[12]The data on the barriers to entry by sector is publicly available at the Indicators of Product Market Regulation Homepage: http://www.oecd.org/document/1/0,3343,en_2649_34323_2367297_1_1_1_1,00.html

[13]There is no information on barriers to entry for the rest of sectors of the economy. As it is not possible to be sure whether each other sector belongs to the treatment or the control group, they are excluded from the sample.

post and telecom sectors as exogenous measures of changes in product market competition, the resulting specification is equivalent to the one described in equation (1) where the vector denoted C_{jt} has three components, i.e., C_{jt}^1, a dummy equal to one if an individual is employed in the energy sector in 1997 or after, C_{jt}^2, a dummy equal to one if the individual is employed in the rail and road sector in 1998 or after and C_{jt}^3, a dummy equal to one if the individual is employed in the post and telecom sector in 1999 or after. Positive coefficients associated to these three variables are interpreted as more competition inducing a higher probability of transition to a permanent contract. Additionally, the quasi-experiment specification allows me to control for individual fixed effects[14].

As argued in section 3.1, the change in competition in the treated sectors indirectly affected other sectors in the economy, including the airlines and retail distribution sectors. Thus, the magnitude of the estimated impact is a lower bound for the total actual impact.

The timing of these reforms was unexpected. For instance, the OECD Annual Report (2001) asserts that "full liberalization in this sector [telecommunications] came in December 1998, eleven months after the EU target date but in advance of the extended deadline that Spain had negotiated". Additionally, incumbents in some sectors were unaware of the real extent of their application. "In early 1999, the Tribunal assessed substantial fines against the previous public monopoly, Telefónica – 580 million and 750 million Pesetas [8 million euros] – for abuse of dominance in basic and mobile telephony", OECD (2001). However, in the robustness checks section, I perform some placebo tests to illustrate that the effect of the reforms was not anticipated.

The exogenous nature of this quasi-experiment is originated in the Spanish government's resistance to the application of the EU anti-competitive Directives. The argument used by the Spanish government was that the Spanish

[14]It is not possible to control for individual fixed effects in the instrumental variables approach due to lack of variation in the instrument.

economic structure was not ready for this sudden liberalization. However, external political pressures forced the government to promote the corresponding competition-enhancing laws ahead of schedule.

1.4 Data and descriptive statistics

1.4.1 Databases

Given the nature of the empirical question, it is necessary to combine information at the individual or firm level, at which the decisions on type of labor contracts are taken, with information at the sector level, at which product market competition operates.

i) The Spanish Labor Force Survey

The Spanish Labor Force Survey (Encuesta de la Población Activa) provides information on individual labor market status, type of labor contract, duration of current labor market status, duration of labor contract and many other personal and job characteristics (excluding wage). This survey is collected on a quarterly frequency. It intends to be representative of the whole Spanish population. The initial sample size is 65000 families by quarter. In practice, this is reduced to 60000 effectively interviewed families that include approximately 180000 people.

Since 1987, the survey has a rotating panel structure where each family is interviewed a maximum of six consecutive quarters. The panel structure of the data is of key interest for the study of transitions. However, the panel version of the survey does not include information on industry at the 2-digits level. Therefore, I use the panel data resulting from the match of the cross-sections by means of the algorithm described in Jiménez-Martín and Peracchi (2002). This algorithm matches the cross-sections of the Spanish Labor Force

Survey from 1993 to the second quarter of 2001. This matching procedure replicates the panel version of the Spanish Labor Force Survey perfectly and allows the researchers to have information on variables that are included in the cross-section but not in the panel.

The main drawback of the Labor Force Survey is that it does not include wages. To address this issue, average wages from the Continuous Sample of Working Histories are assigned to the individuals in the Spanish Labor Force Survey, as described next.

ii) Continuous Sample of Working Histories

The Continuous Sample of Working Histories (Muestra Continua de Vidas Laborales) includes register data for almost 1.1 million individuals that were in contact with the Social Security Administration at the time of the survey. In this paper, I use the 2004 wave, which includes individuals that were working, receiving benefits or pensions in 2004. It provides information on the entire working life histories of the selected individuals back to 1967. Information refers to individual, job and employer characteristics, including wages, which I use to construct average wage by sector, time and type of labor contract. These are then matched to the individuals in the Spanish Labor Force Survey. For a more detailed description of this data base and its application to transition analysis see García-Pérez (2008).

iii) Business Strategies Survey

The Business Strategies Survey (Encuesta sobre Estrategias Empresariales) is an annual survey on a representative sample of Spanish manufacturing firms. The reference population are firms with 10 or more workers operating in the Spanish territory. It has a panel structure that covers the period from 1990 to 2006. In the base year, firms were chosen according to a sampling procedure that assigned weights depending on size. The composition of the sample has

been maintained in all the subsequent years. Newly created firms have been added each year with the same sampling criteria as in the base year. Firms are followed even if they split or merge to another firm. The Business Strategies Survey includes information on 4355 firms with an average number of years in the sample of 12. It provides data on average characteristics of workers in the firm, firm characteristics, accounting data, economic sector and some competition measures.

This dataset allows me to complement the analysis at the individual level with an analysis at the firm level, as well as to compare the results using different measures of competition.

iv) Industrial Enterprise Survey

The Industrial Enterprise Survey (Encuesta de Empresas Industriales) is available since 1993. It includes information on firms whose main activity has an industrial nature and which are located in the Spanish territory. Its purpose is to collect information on structural and productive characteristics of the manufacturing sectors. The firms included in the sample are representative of the corresponding sector and size cell. It includes information on employment, revenues, costs, investment and other features at the sector level.

The accounting information provided in this survey is used to construct the price-cost margin by sector and year which is used as the main measure of competition in the empirical analysis.

v) OECD database

The OECD has developed a wide range of indicators that measure product market regulation by sector. They cover the period 1975-2003 and summarize the status of product market regulation for 36 different sectors in 21 OECD countries. The indicators collect information on several aspects of

anti-competitive regulation. As Conway and Nicoletti (2006) state it, "these indicators measure the extent to which policy settings promote or inhibit competition in areas of the product market where competition is viable". In particular, they include information on barriers to entry, public ownership, vertical integration, market structure and price controls as well as the impact of anti-competitive regulation in some sectors on other sectors.

This information is used to identify changes in legislation that generate exogenous variation in the level of competition, which is essential for the empirical strategy.

1.4.2 Construction of variables

Transitions

The analysis focuses on workers' probability of transitioning from a fixed-term to an open-ended contract. The dependent variable is constructed using the Spanish Labor Force Survey and is equal to one if the worker transitions from a fixed-term to an open-ended contract during a given year and zero if the worker remains with a fixed-term contract. There is no contract identifier hence, it is not known whether two subsequent contracts are held in the same firm or not. For this reason, transitions are defined within sector instead of within firms. Additionally, there appears to be some measurement error because some contracts exceed the maximum legal duration of three years. I treat those observations as censored at the legal limit. This solution was also adopted by Guell and Petrongolo (2007).

Price-cost margin

The price-cost margin is defined as price over marginal cost divided by price. However, in practice there is no data on marginal costs. The standard solution is to proxy the marginal cost using unit cost. In particular, the price-cost margin is computed as production revenue (price by quantity) minus production

costs (unit cost by quantity) divided by production revenue. As quantity appears as common factor in the numerator and denominator, this is equivalent to price minus unit cost divided by price. I use the accounting data aggregated by sector and year provided in the Industrial Enterprise Survey to compute this variable.

Wages

In Spain, the majority of wages are set by collective bargaining and temporary contracts allow the employer to pay lower wages. Hence, it is important to control for average wage by year, sector and type of labor contract to avoid confounding lower wages and lower job security.

The Continuous Sample of Working Histories does not include actual wages but a top and bottom-coded version of wages. The limits correspond to the minimum and maximum wages subject to taxes each year. I use the algorithm described in Boldrin, Jimenez-Martin, and Peracchi (2004) to recover actual wages. The estimation of actual wages relies on the assumption that the true distribution of the logarithm of earnings is a normal distribution where the mean is a linear function of observed individual and job characteristics[15]. The censored values are replaced by the estimated conditional mean of wages.

1.4.3 Sample definition and descriptive statistics

The sample obtained from the Spanish Labor Force Survey includes men aged 16 to 64. For each individual, only the first and fifth interviews are kept in order to match the frequency of the data on product market competition, i.e., each individual is included at the time when she is first interviewed and in the same quarter of the following year.

For the specification estimating transitions from temporary to permanent

[15]I include as individual characteristics age, and dummies for male, nationality, sector, temporary contract, region and year.

employment, I keep only those workers observed having a fixed-term contract at some point in time. Additionally, I select only those individuals that do not switch sectors since switching may be endogenous to competition.

For the specification estimating transitions to unemployment, I keep only those individuals observed having a job at some point in time.

Table 1 displays the descriptive statistics of the sample from the Spanish Labor Force Survey used in the instrumental variable estimation. It shows that 7% of total observations are transitions from fixed-term to open-ended contracts. The average price-cost margin is 0.067 with a standard deviation of 0.031. The average Regulatory Impact is 0.16 with a standard deviation of 0.45. Table 2 represents the analogous descriptive statistics for the sample used in the quasi-experiment analysis. It shows that 6% of total observations are transitions from fixed-term to open-ended contracts and that 18.6% of total observations are treated.

The sample extracted from the Business Strategies Survey includes all firms whose degree of diversification does not exceed the two-digit level of sector aggregation which represent 91.63% of the sample. This is done for purely practical reasons in order to be able to assign each firm exclusively to one sector.

Table 3 displays the descriptive statistics of the sample from the Business Strategies Survey. The average proportion of salaried workers having a permanent contracts is 78.6%. The average price-cost margin is 0.366 with a standard deviation of 0.059. The average Regulatory Impact is 0.147 with a standard deviation of 0.059.

1.5 Empirical results

The theoretical model shows that there is an efficient value of the transition from fixed-term to open-ended contracts and that product market competition

will induce more (less) transitions if the actual transition rate is lower (higher) than the efficient value. The objective of the empirical exercise is to provide an estimate for the causal impact of product market competition on the use of temporary versus permanent labor contracts. Two different estimation strategies are proposed in order to overcome endogeneity, an instrumental variable strategy and a quasi-experiment. The instrumental variables analysis is performed using individual data from the Spanish Labor Force Survey as well as with firm level data from the Business Strategies Survey, while the quasi-experiment is performed only using individual data from the Spanish Labor Force Survey[16]. Additionally, some robustness checks are provided, and some extensions give further insights on the nature of the impact of competition on job instability.

1.5.1 Instrumental variables results

I estimate equation (1), by both OLS and IV using the Regulatory Impact as instrument for the price-cost margin. The dependent variable is equal to one if the individual transitions from a fixed-term to a permanent contract in a given year and zero otherwise.

The standard OLS results are displayed in Table 4. The price-cost margin is the variable used to measure the level of product market competition. When included in the regression, the price-cost margin is multiplied by minus one to ease interpretation in terms of competition. Results point at a positive but statistically insignificant relationship between competition and transitions from temporary to permanent employment.

The instrumental variable specification uses the price-cost margin as measure of competition and the Regulatory Impact indicator as instrument. The first stage (Table 5) reflects a negative correlation between regulation in the

[16]The quasi-experiment is not performed using the Business Strategies Survey because the sectors affected in the quasi-experiment are not covered by the Business Strategies Survey.

input-producing sectors and competition in the industries making use of those inputs[17]. Table 6 includes the second stage results.

Comparison of Table 4 and Table 6 evidences the necessity of accounting for endogeneity in this set up. OLS induced a positive bias in the coefficient that is coherent with the two potential sources of endogeneity. Firstly, industries where transitions from fixed-term to permanent employment often occur may be targeted by potential entrants that plan to compete by using cheaper labor contracts. Secondly, the introduction of technology that standardizes the production process may induce less transitions to permanent employment as well as less competition because the necessary investment in technology acts as a barrier to entry of new firms.

Comparing the columns in Table 6, the sequential introduction of time dummies and sector dummies highly modifies the coefficient towards more negative values. This gives us some intuition on the importance of accounting for common time trends as well as time invariant industry characteristics in this context. The application of the weights has only a small impact on the magnitude of the coefficient. If anything, the estimation using weights reflects a slightly weaker negative impact. This happens because the industries where the identifying variation occurs expand[18].

The coefficient from the most complete specification including time dummies, sector dummies and weights (column 4) indicates that a one standard deviation increase in the level of product market competition decreases the probability of becoming permanent for a fixed-term worker by more than 40% [19].

[17] All regressions fulfill the criterium that the F-statistic of the excluded instruments is bigger than ten so the instrument is not weak.

[18] This is coherent with the results obtained in the previous literature that shows that competition induces higher employment.

[19] The standard deviation of the price-cost margin is 0.031. Multiplied by the coefficient, -0.944, this gives the average absolute change in the proportion of permanent workers, which is -0.029. This is equivalent to a decrease of 42.029% in the average probability of transition.

This is a lower bound for the true effect because we expect that the estimated effect becomes stronger once we include individual fixed effects. This occurs because the omission

In the estimation performed using the Business Strategies Survey, the OLS results displayed in the first panel of Table 7 point at a negative impact of competition on the proportion of fixed-term contracts. When comparing those results with those from the instrumental variable estimation (second panel), one observes that the OLS results induce a bias towards zero. The magnitude of the effect becomes stronger when time and sector dummies are included. Therefore, the magnitude of the coefficient and the direction of the different biases are coherent with the specification using the Labor Force Survey. When firm fixed effects are included (column 5), the magnitude of the impact gets weaker although it is still negative and very significant[20].

The coefficient for the most complete estimation including time dummies, sector dummies, weights and firm fixed effects (column 5) indicates that a one standard deviation increase in the level of product market competition decreases the proportion of permanent workers in the firm by more than 18%[21].

The effects of individual controls on the probability of transitioning from fixed-term to open-ended contracts are shown in Appendix B. They are fairly standard, and consistent with previous studies using logit estimates (see Alba-Ramírez (1998)) as well as competing risks duration model (see Guell and Petrongolo (2007)). Likewise Guell and Petrongolo (2007), results show two pronounced spikes at one and three years duration, coinciding with the legal limit for fixed-term contracts.

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of individual time invariant unobserved characteristics in the group of controls biases the coefficients for the other controls towards zero. Some evidence on this fact is discussed in section 5.2. Note that it is not possible to include individual fixed effects in the instrumental variable specification because the instrument weakens significantly once individual fixed effects are included.

[20]However, the most complete specification (column 5) is the only one for which the instrument is not weak according to the Stock and Yogo test. In this case, the first stage is showing a positive correlation between the price-cost margin and the Regulatory Impact. This is coherent with the results obtained with individual data.

[21]The standard deviation of the price-cost margin is 0.059. Multiplied by the coefficient, -2.464, this gives the average absolute change in the proportion of permanent workers, which is 0.145. This is equivalent to a decrease of 18.45% in the average proportion of permanent workers.

1.5.2 Quasi-experiment results

The results obtained by taking advantage of the quasi-experiment based on the application of competition-enhancing EU Directives are displayed in Table 8. The estimated coefficients for the impact of a rise in competition motivated by a decrease in legal barriers to entry on the probability of transiting from temporary to permanent employment are consistent across the three different treated sectors as well as with the instrumental variable specification. The introduction of time and sector dummies move the coefficients towards a stronger negative impact. However, the sign of the changes when weighting the observations is mixed.

As predicted, the estimation including individual fixed effects increases the magnitude of the coefficients substantially. This happens because individuals with "negative" unobserved characteristics would not become permanent even if the level of competition was very low. Moreover, individuals with very good unobserved characteristics would not stay under a fixed-term contract even if the level of competition was very high. Hence, controlling for individual specific characteristics results in a stronger estimate for the negative impact of product market competition on the probability of the transition from temporary to permanent employment. This suggests that the final coefficient obtained in the instrumental variables specification is a lower bound of the true effect.

In order to interpret the magnitude of the results, I also estimate an equation in which the competition measure is the interaction of a dummy for working in a treated sector in the post-treatment period with the proportion of removed legal barriers to entry in each sector according to the OECD[22]. This leads to a coefficient of -0.178, which indicates that the elimination of legal barriers to entry (the change from legal monopoly to free entry) induced a decrease of 17.8% in the probability of becoming permanent for workers hired under

[22]Barriers to entry decrease by 96% in the energy sector, by 86% in the post and telecom sector and by 53% in the rail and road sector, according to the OECD indicator on barriers to entry.

temporary contracts.

1.5.3 Unemployment results

The probability that a worker becomes unemployed is another dimension of job instability. It is also very related to the type of labor contract because fixed-term contracts are associated with a higher probability of job separation. However, keeping a worker under a fixed-term contract and discarding the worker could potentially be substitute strategies for the firm. Therefore, the impact of product market competition on unemployment is unknown a priori. The specification of interest is very similar to the one described by equation (1) where the outcome of interest, y_{ijt}, is now equal to one if individual i working in sector j at time t becomes unemployed in a given year. The set of individual characteristics, X_{ijt}, includes, in addition to the controls in equation (1), a dummy for fixed-term contract and, in substitution of fixed-term contract duration dummies, job duration dummies in years. W_{jt} stands for sector-year average wages (instead of the difference in average wage between permanent and temporary labor contracts) in order to reflect the opportunity cost of keeping the worker.

The results obtained from the instrumental variable specification are shown in table 9[23]. More product market competition induces a rise in the probability of becoming unemployed. An increase of competition in one standard deviation provokes a rise in the probability of becoming unemployed over 44% [24].

This conclusion is in line with the theoretical model proposed by Amable and Gatti (2004) in which an increase in product market competition boosts

[23]When estimating the probability of job separation, there is no specification using the weights because job separation is one channel through which the sector composition of the economy changes. Hence, we are already addressing sector composition changes explicitly.

[24]The standard deviation of the price-cost margin is 0.04. Multiplied by the coefficient, -0.211, this gives the average absolute change in the proportion of permanent workers, which is 0.008. This is equivalent to an increase of 44.44% in the average probability of job separation.

the separation rate, thus inducing a rise in unemployment.

1.5.4 Robustness checks and additional specifications

This section gives further evidence on the validity of the previous results as well as further insights on the nature of the effect of product market competition on the use of each type of labor contract[25].

Using the Continuous Sample of Working Histories instead of the Labor Force Survey

I perform a separate analysis of the transitions from fixed-term to open-ended contracts using the Continuous Sample of Working Histories. This specification improves on the one using the Spanish Labor Force Survey in that it is possible to study transitions within the same firm instead of only within the same sector. However, information on type of labor contract is missing for a large proportion of individuals in the early years of the sample and this reduces the reliability of the estimates[26]. Nevertheless, point estimates are very similar to the ones obtained using the Spanish Labor Force Survey[27].

Using alternative measures of competition

The price-cost margin has been chosen as the reference measure of competition because it has been shown to perform well under a variety of theoretical settings and moreover, it goes in line with the characterization of competition in the model. However, this measure presents two main drawbacks. First-

[25]In addition to the specifications that are shown in this section, I have explored the existence of heterogeneity in the effect of product market competition on transitions to permanent employment across levels of education. The results point at a stronger effect of competition on the highest level of education. However, the difference in the impact of competition between education levels is not statistically significant.

[26]The F of the excluded instruments in the first stage is 8.7. Hence it does not reach the threshold of 10 which considered as a minimum requirement to reject the existence of weak instruments.

[27]Results are available from the author upon request.

ly, it is very difficult to compute the marginal cost that enters the formula of the price-cost margin and it needs to be approximated by the unit cost. And secondly, it assumes constant returns to scale. Hence, in order to assure that measurement error in the price-cost margin is not driving the results, an alternative measure of competition is used.

The level of product market competition has traditionally been measured using concentration indices. Those are defined as the proportion of the market served by the biggest firms. A higher magnitude of the index is associated with less competition. However, one should be careful when interpreting this measure. Although it is true that when markets differ in size or entry costs, higher concentration is associated to less competition, when markets differ in product differentiation, higher concentration indicates more competition. Some evidence on this fact can be found in Sutton (1991) and Symeonidis (2000).

The Business Strategies Survey includes information on a concentration index defined as the proportion of the market served by the four biggest firms in the sector[28]. Table 10 displays the results from a regression of the proportion of permanent contracts in a firm on the concentration ratio and the same set of controls as specified in equation (2). Estimation results are analogous to the ones obtained using the price-cost margin as measure of competition (shown in Table 7).

Two dimensional cluster

Bertrand, Duflo, and Mullainathan (2004) state that, in the presence of serial correlation in the outcome of study, difference-in-differences standard errors may understate the standard deviation of the estimated treatment effects. The transitions studied in this paper are very likely to be correlated across time because, for each individual, they are defined depending on the

[28]Unfortunately, the sector definitions are different for the Business Strategies survey and the Labor Force Survey. Hence, it is not possible to use the concentration index measure in the estimations using the individual data from the Labor Force Survey.

state of the individual in the previous period. A widely used alternative is to cluster the standard errors at the sector level instead of at the sector and time levels. However, in many cases, like this one, it is not feasible due to the small number of sectors. I propose instead two-dimensional cluster where one dimension is sector-time cells and the other one is the individual. This takes into account the correlation of errors within individuals over time as well as the correlation within sector-time cells which is the level of aggregation of the competition measures. Results are reflected in Table 11. They show that there is essentially no change in the level of significance of the estimates.

Validity of the quasi-experiment

As Imbens (2004) suggests, in the context of the difference-in-differences approach it is essential to provide some support for the validity of two assumptions: (i) overlap in the covariate distributions and (ii) exogeneity or unconfoundedness assumptions. The overlap in the covariate distribution assumption is checked by comparing the distributions of the covariates for the subgroups of treated and non-treated individuals. The unconfoudness assumption states that the trend in the treated and control groups would have been the same in the absence of the treatment.

To address (i), Table 2 shows that the values of the covariates are not statistically different for workers employed in the treated and untreated sectors. With respect to (ii), Graph 3 presents some evidence that the pre-treatment trend was quite similar between treated and untreated sectors. The unconfoundedness assumption is usually tested by estimating regressions for alternative treatments that should result in a null effect. Thus, I estimate the treatment effect on a pre-treatment variable. In particular, the regressions address the impact of the treatment on transitions from fixed-term to permanent contract a year before the treatment actually took place. The results of this placebo test are displayed in Table 12. The "placebo" effect is not significant on average.

Impact of competition on type of labor contract of individuals switching sector

I find that the level of product market competition increases the proportion of fixed-term contracts that are not converted into open-ended ones for workers that stay in the same sector. This is the closest we can set to a "pure" competition effect. However, competition may have an indirect impact on type of labor contract by inducing some individuals to move between sectors. As moving to a new sector is usually associated with a new fixed-term contract, this effect can be attributed to the change in competition in the sector of origin. I thus present an additional specification in which each individual is assigned to the sector where they are initially hired under a fixed-term contract, irrespective of whether they later switch sector or not. This allows to shed some light on the relative importance of the direct effect with respect to the indirect effect through sector switching. A dummy for switchers and an interaction of switcher and the competition measure are added to the original specification.

As shown in Table 13, the impact of competition is not statistically different between the group of switchers and non-switchers. If anything, the impact of competition is stronger in the group of switchers. Switching sectors reduces the probability of getting a permanent contract in the period immediately after the switch. Hence, in general, the probability of getting a permanent contract after a fixed-term contract is lower for switchers.

1.6 Conclusion

There is a very active literature on the impact of product market competition on labor market outcomes. This paper contributes to this literature by estimating the impact of competition on job instability as measured by the probability of holding a permanent contract.

I propose a theoretical model that is, to the best of my knowledge, the first one to shed light on the relationship between competition and type of labor contract. In the context of the model, competition is characterized by market size, product differentiation and the cost of entry. Permanent con-

tracts differ from fixed-term contracts in the probability of separation and the cost of dismissal. The model has a number of predictions that are consistent with the data: (i) Fixed-term and permanent contracts coexist in all sectors, (ii) Permanent workers are more productive than fixed-term workers, and (iii) Product market competition alters the degree of use of fixed-term and permanent contracts. In particular, when the transition rate to permanent contracts is low (high), more competition induces a rise (decrease) in the proportion of fixed-term contracts.

The empirical analysis focuses on Spain, which is the country with the highest incidence of fixed-term contracts in Europe. Combining data from the Spanish Labor Force Survey, the Continuous Sample of Working Histories, the Business Strategies Survey and the Industrial Enterprise Survey, job instability is shown to rise with competition. The result is robust to the use of different estimation strategies, databases, and measures of competition.

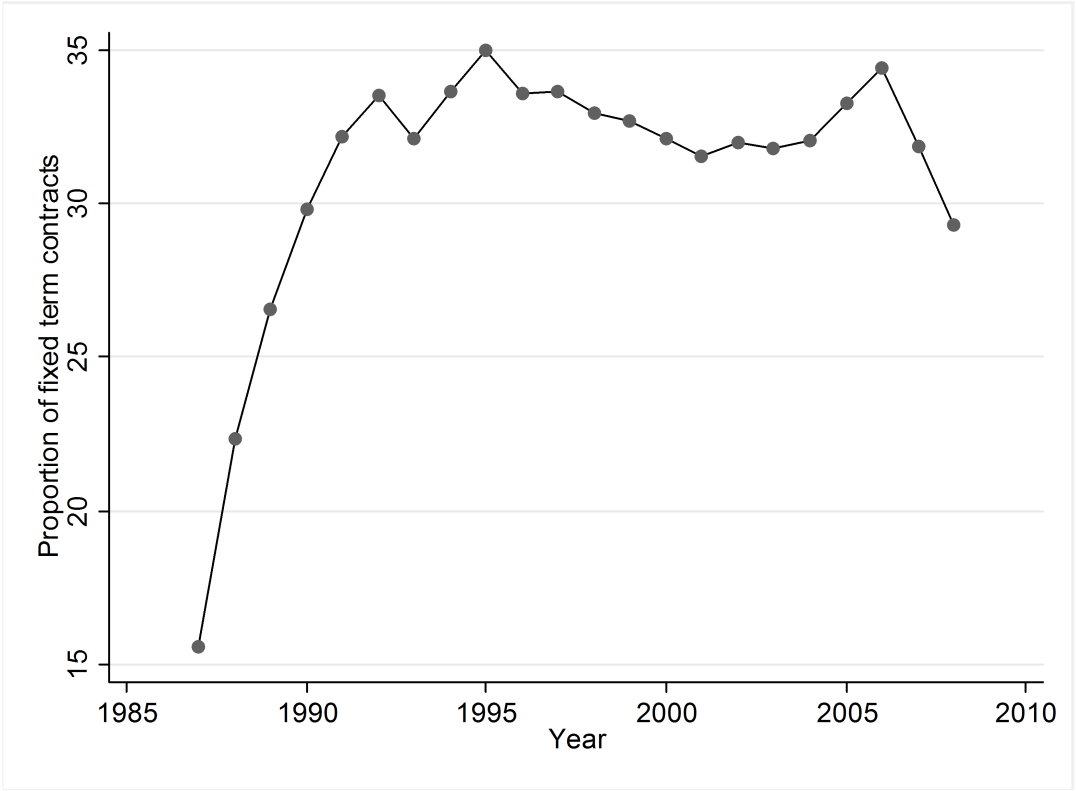
The empirical strategy makes use of changes in legislation as a source of exogenous variation in the level of product market competition in order to overcome endogeneity concerns. Exogeneity originates in (i) The impact of deregulation in some key sectors on the rest of the economy, and (ii) The enforcement of the EU Directives enhancing competition in Spain.

Overall, the results show that product market competition has a significant impact on job instability. In particular, one standard deviation increase in product market competition as measured by the price-cost margin induces a fall in the probability of a worker transiting from a fixed-term to a permanent contract in a given year over 40%, and an increase in the probability of a worker becoming unemployed of over 3%. The estimated impact of competition on the type of labor contract is likely a lower bound on the true total effect. This happens because competition can also lead to changes in the type of labor contract for individuals who are induced to switch sector. As switching induces a lower probability of transiting to a permanent contract, the total effect would be higher.

Thus, the evidence is consistent with a direct contemporaneous causal effect of product market competition on job instability. However, the long run effects of changes in competition may be different from the ones found for the short run. For instance, if higher job instability induced by increases in competition allows firms to better screen the most productive workers, those may enjoy more stable positions in the long run. This question is left for future research.

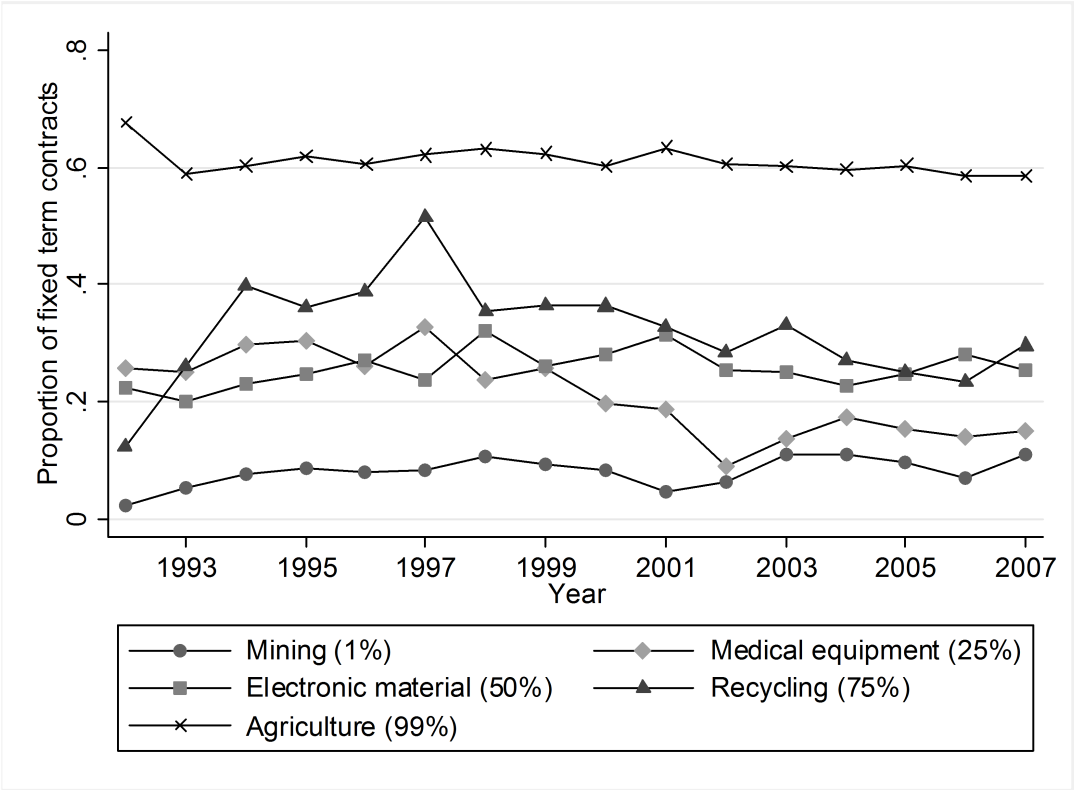
Figures

Figure 1: Proportion of fixed-term contracts over time in Spain



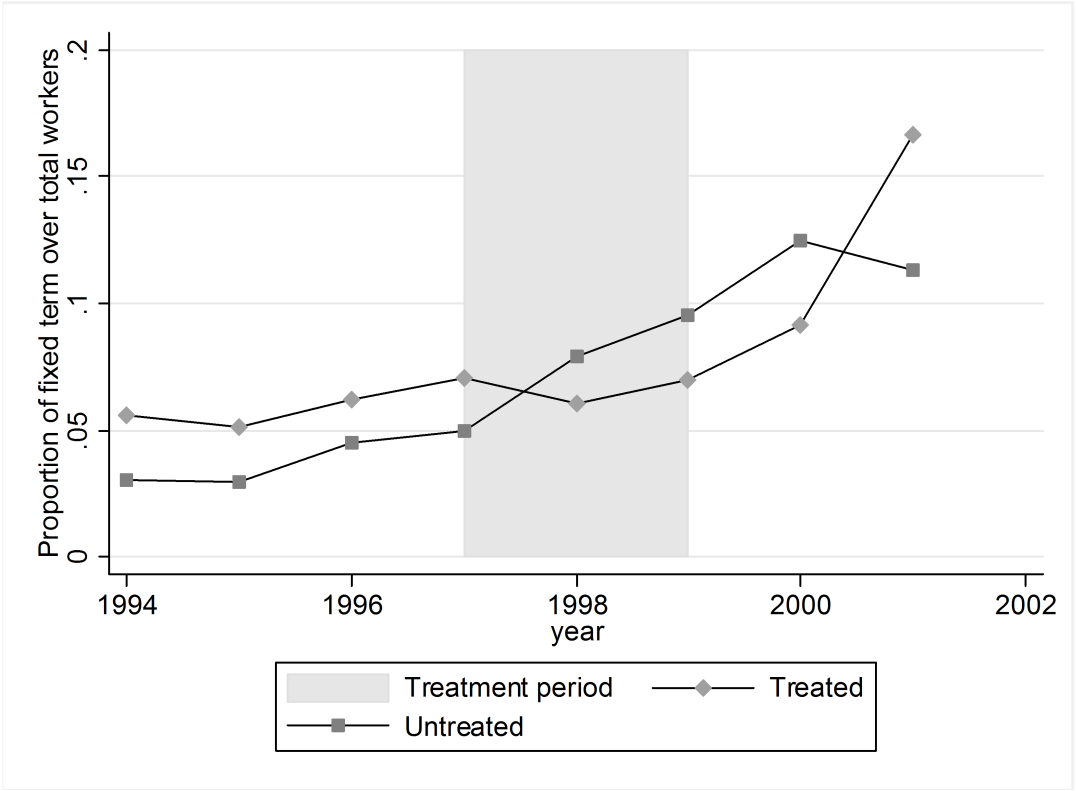
This graph plots average proportion of fixed term contracts over total number of labor contracts by year in Spain. Data is draw from the Eurostat. The period included is 1987-2007.

Figure 2: Proportion of fixed-term contracts over time by industry in Spain



This graph displays the evolution of the average proportion of fixed term contracts over time in five sectors. These five sectors represent the key percentiles of the distribution of average proportion of fixed term contracts by sector. Data is drawn from the Spanish Labor Force Survey. The sample includes contracted workers in the mining, medical equipment, electronic material, recycling and agriculture sectors from 1992 to 2007.

Figure 3: Time trends in the proportion of fixed-term over total employment for the treated and untreated sectors in the quasi-experiment using the Spanish Labor Force Survey



This graph displays the time trends for the average proportion of fixed term contracts over total number of labor contracts in the treated and the untreated sectors in the quasi-experiment estimation using the Spanish Labor Force Survey. The treated sectors are energy, rail&road and post&telecom and the untreated sectors are airlines and retail distribution. Data is drawn from the Spanish Labor Force Survey. The sample includes men aged 16 to 64 with a fixed term contract, who do not switch sector of employment and who have no seasonal jobs (the sample sample that is used in the quasi-experiment estimation).

Tables

Table 1: Descriptive statistics for the instrumental variables estimation (Labor Force Survey)

	Mean	Sd	Min	Max
Transition to permanent contract	0.069	0.253	0	1
- Price-cost margin	-0.067	0.031	-0.269	0.045
- Regulatory Impact	-0.16	0.045	-0.546	-0.106
Age	29.102	9.734	16	64
Married	0.342	0.474	0	1
Household head	0.325	0.469	0	1
High school grad	0.7	0.458	0	1
University grad	0.06	0.238	0	1
Number of coworkers	53.039	35.995	1	100
One year fixed-term contract duration	0.329	0.47	0	1
Two years fixed-term contract duration	0.085	0.279	0	1
Three years fixed-term contract duration	0.022	0.147	0	1
Permanent vs. fixed-term wage difference	48506.77	16759.17	112.1641	129953.3
Region	6.571	4.363	1	18
Quarter	2.46	1.118	1	4
Year	1996.934	2.177	1993	2001
Sector	25.981	6.976	1	25

The sample is drawn from the Spanish Labor Force Survey and includes men aged 16 to 64 with a fixed term contract, who do not switch sector of employment and who have no seasonal jobs. It comprises the period from 1993 to the second quarter of 2001. The industries included are listed in table B.1.

Table 2: Descriptive statistics for the quasi-experiment (Labor Force Survey)

	Full sample		Treated sectors		Control sectors	
	Mean	Sd	Mean	Sd	Mean	Sd
Transition to permanent contract	0.062	0.242	0.067	0.249	0.059	0.236
Energy after 1997	0.019	0.138	0.044	0.204	0	0
Rail&road after 1998	0.032	0.175	0.071	0.258	0	0
Post&telecom after 1999	0.135	0.342	0.305	0.461	0	0
Age	29.491	9.434	33.072	9.848	26.643	8.022
Married	0.357	0.479	0.518	0.5	0.228	0.42
Household head	0.332	0.471	0.489	0.5	0.207	0.405
High school grad	0.715	0.451	0.643	0.479	0.773	0.419
University grad	0.061	0.239	0.056	0.231	0 .064	0.245
Number of coworkers	39.048	36.682	42.749	34.39	36.104	38.156
One year fixed-term contract duration	0.305	0.46	0.326	0.469	0.289	0.453
Two years fixed-term contract duration	0.088	0.283	0.092	0.29	0.085	0.279
Three years fixed-term contract duration	0.018	0.131	0.019	0.137	0.016	0.127
Permanent vs. fixed-term wage difference	49490.97	21557.95	58653.57	25745.05	42201.81	13687.55
Region	7.443	4.639	7.144	4.505	7.68	4.729
Quarter	2.454	1.112	2.48	1.117	2.434	1.108
Year	1996.826	2.222	1996.96	2.253	1996.719	2.191
Sector	55.316	5.247	59.17	5.692	52.251	1.564

There are 7798 in total, 4359 observations in the untreated sectors and 3467 in the treated sectors. The sample is drawn from the Spanish Labor Force Survey and includes men aged 16 to 64 with a fixed term contract, who do not switch sector of employment and who have no seasonal jobs over the period 1993 to the second quarter of 2001. The industries included are energy, rail&road, post&telecom, airline and retail. The airline and retail industries serve as controls.

Table 3: Descriptive statistics for the instrumental variables estimation (Survey of Business Strategies)

	Mean	Sd	Min	Max
Proportion of permanent workers	0.786	0.247	0	1
- Price cost margin	-0.366	0.059	-0.504	-0.179
- Regulatory Impact	-0.147	0.021	-0.2	-0.099
Number of workers	225.885	546.304	1	14390
Percentage of university grads (long degree)	3.82	6.358	0	88
Percentage of university grads (short degree)	5.096	7.945	0	100
Percentage of part-time workers	1.602	6.75	0	100
Blue over white collar workers	0.37	2.823	0	216
Wages over production	0.287	0.239	0.013	12.569
Training expenditures per worker	17.593	100.917	0	3838.965
Worker compensations over production	0.287	0.239	0.013	12.569
Merged firm	0.016	0.126	0	1
Split firm	0.011	0.103	0	1
Individual entrepreneur	0.393	0.488	0	1
R&D over production	0.007	0.023	0	0.637
Public capital over total capital	1.588	11.463	0	100
Year	1997.542	3.341	1992	2003
Sector	9.661	5.371	1	19

The number of observations is 18370. The sample is drawn from the Survey of Business Strategies and includes firms whose level of diversification does not exceed one industry as defined by the 2-digit classification over the period 1992 to 2006. The industries included are listed in table C.1.

Table 4: Estimation by ordinary least squares (Labor Force Survey)

	baseline	year	sector	weights
Dep var: Transition to permanent	(1)	(2)	(3)	(4)
- Price-cost margin	-.049	0.034	0.026	0.039
	(0.079)	(0.064)	(0.139)	(0.139)
Number of observations	17156	17156	17156	17156
R^2	0.126	0.135	0.137	0.137

The dependent variable is equal to one if the individual transits from a fixed term to permanent employment in a given year, and zero otherwise. The measure of competition is the price-cost margin multiplied by minus one. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. The baseline regression includes controls on individual and job characteristics (age, married, household head, dummies for region of residence, high school graduate, university graduate, number of coworkers, dummies for duration of the fixed term contract in years and quarter dummies) The second column adds year dummies to the baseline regression. The third column includes, in addition to the variables in column 2, dummies for industry of employment. Finally, column 4 displays the results when individuals are weighted according to the ratio between the number of workers in their industry one year before the date of the interview and the number of workers in their industry at the time of the interview. The sample is drawn from the Spanish Labor Force Survey and includes men aged 16 to 64 with a fixed term contract, who do not switch sector of employment and who have no seasonal jobs over the period 1993 to the second quarter of 2001. The industries included are listed in table B.1. The price-cost margin is obtained from the Industrial Enterprise Survey. Errors are clustered by sector-year.

Table 5: First stage (Labor Force Survey)

	baseline	year	sector	weights
Dep var: - Price-cost margin	(1)	(2)	(3)	(4)
- Regulatory Impact	0.396	0.452	0.255	0.26
	(0.061)***	(0.065)***	(0.072)***	(0.072)***
Number of observations	17156	17156	17156	17156
R^2	0.369	0.473	0.892	0.892
F test of excluded instruments	42.08	48.43	12.57	12.91

The dependent variable is minus the price-cost margin. The instrument for which the coefficient is displayed is minus the Regulatory Impact Indicator. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. The baseline regression includes controls on individual and job characteristics (age, married, household head, dummies for region of residence, high school graduate, university graduate, number of coworkers, dummies for duration of the fixed term contract in years and quarter dummies. The second column adds year dummies to the baseline regression. The third column includes, in addition to the variables in column 2, dummies for industry of employment. Finally, column 4 displays the results when individuals are weighted according to the ratio between the number of workers in their industry one year before the date of the interview and the number of workers in their industry at the time of the interview. The sample is drawn from the Spanish Labor Force Survey and includes men aged 16 to 64 with a fixed term contract, who do not switch sector of employment and who have no seasonal jobs over the period 1993 to the second quarter of 2001. The price-cost margin is obtained from the Industrial Enterprise Survey. The Regulatory Impact Indicator is obtained from the OECD database. The industries included are listed in table B.1. Errors are clustered by sector-year. According to the standard interpretation of the Stock and Yogo (2005) criteria, a value of the F test of excluded instruments over ten indicates that the instrument is not weak.

Table 6: Estimation by instrumental variables (Labor Force Survey)

	baseline	year	sector	weights
Dep var: Transition to permanent	(1)	(2)	(3)	(4)
- Price-cost margin	0.404	0.078	-.989	-.944
	(0.13)***	(0.077)	(0.494)**	(0.472)**
Number of observations	17156	17156	17156	17156
R^2	0.123	0.135	0.135	0.135

The dependent variable is equal to one if the individual transits from fixed term to permanent employment in a given year, and zero otherwise. The measure of competition is the price-cost margin multiplied by minus one. This is instrumented using the Regulatory Impact. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. The baseline regression includes controls on individual and job characteristics (age, married, household head, dummies for region of residence, high school graduate, university graduate, number of coworkers, dummies for duration of the fixed term contract in years and quarter dummies). The second column adds year dummies to the baseline regression. The third column includes, in addition to the variables in column 2, dummies for industry of employment. Finally, column 4 displays the results when individuals are weighted according to the ratio between the number of workers in their industry one year before the date of the interview and the number of workers in their industry at the time of the interview. The sample is drawn from the Spanish Labor Force Survey and includes men aged 16 to 64 with a fixed term contract, who do not switch sector of employment and who have no seasonal jobs over the period 1993 to the second quarter of 2001. The price-cost margin is obtained from the Industrial Enterprise Survey. The Regulatory Impact is obtained from the OECD database. The industries included are listed in table B.1. Errors are clustered by sector-year.

Table 7: Business Strategies Survey results

Estimation by Ordinary Least Squares

	baseline	year	sector	weights	firm fe
Dep var: Proportion of permanent	(1)	(2)	(3)	(4)	(5)
- Price-cost margin	-0.205	-0.252	-0.377	-0.371	-0.366
	(0.062)***	(0.058)***	(0.118)***	(0.119)***	(0.104)***
Number of observations	17705	17705	17705	17705	17705

Estimation by Instrumental Variables

	baseline	year	sector	weights	firm fe
Dep var: Proportion of permanent	(1)	(2)	(3)	(4)	(5)
- Price-cost margin	3.623	1.322	-5.098	-5.999	-2.464
	(17.341)	(0.881)	(3.567)	(4.884)	(1.199)**
Number of observations	17705	17705	17705	17705	17417

The dependent variable is equal to proportion of permanent over total contracted workers. The measure of competition is average the price-cost margin in the industry multiplied by minus one. This is instrumented using the Regulatory Impact. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. The baseline regression includes controls on workers and firm characteristics (number of workers, percentage of engineers and college graduates, percentage of workers with intermediate education, percentage of partial time permanent workers, ratio of blue over white collar workers, wages over production, workers training expenditures over production, workers compensations over production, a dummy for merger, a dummy for separation, a dummy for individual entrepreneur, R&D over production and percentage of public capital). The second column adds year dummies to the baseline regression. The third column includes, in addition to the variables in column 2, dummies for industry of employment. Column 4 displays the results when firms are weighted according to the ratio between the number of workers in their industry one year before the date of the interview and the number of workers in their industry at the time of the interview. Finally, column 5 is estimated using

firm fixed effects. The sample is drawn from the Survey of Business Strategies and includes firms whose level of diversification does not exceed one industry as defined by the 2-digit classification over the period 1992 to 2006. The industries included are listed in table C.1. The price-cost margin is obtained from the Survey of Business Strategies. The Regulatory Impact is obtaineded from the OECD database. Errors are clustered by sector-year. The F of the excluded instrument in the first stage corresponding to the last column estimation is 25.38.

Table 8: Quasi-experiment (Labor Force Survey)

	baseline	year	sector	weights	individual fe
Dep var: Transition to permanent	(1)	(2)	(3)	(4)	(5)
energy after 1997	0.007	-.037	-.060	-.064	-.142
	(0.015)	(0.013)***	(0.024)**	(0.023)***	(0.065)**
rail&road after 1998	0.005	-.026	-.036	-.036	-.056
	(0.011)	(0.006)***	(0.005)***	(0.005)***	(0.013)***
post&telecom after 1999	0.041	-.022	-.016	-.018	-.123
	(0.024)*	(0.018)	(0.02)	(0.019)	(0.06)**
Number of observations	7798	7798	7798	7798	5881
R^2	0.14	0.146	0.146	0.147	0.241

The dependent variable is equal to one if the individual transits from fixed term to permanent employment in a given year, and zero otherwise. The measures of competition are a dummy for working in the energy sector in 1997 or after, a dummy for working in the rail&road sector in 1998 or after and a dummy for working in the post&telecom sector in 1999 or after. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. The baseline regression includes controls on individual and job characteristics (age, married, household head, dummies for region of residence, high school graduate, university graduate, number of coworkers, dummies for duration of the fixed term contract in years and quarter dummies). The second column adds year dummies to the baseline regression. The third column includes, in addition to the variables in column 2, dummies for industry of employment. Column 4 displays the results when individuals are weighted according to the ratio between the number of workers in their industry one year before the date of the interview and the number of workers in their industry at the time of the interview. Finally, column 5 adds individual fixed effects. The sample is drawn from the Spanish Labor Force Survey and includes men aged 16 to 64 with a fixed term contract, who do not switch sector of employment and who have no seasonal jobs over the period 1993 to the second quarter of 2001. The industries included are energy, rail&road, post&telecom, airline and retail. The airline and retail industries serve as controls. Errors are clustered by sector-year.

Table 9: Probability of becoming unemployed (Labor Force Survey)

Estimation by ordinary least squares

	baseline	year	sector
Dep var: Transition to unemployment	(1)	(2)	(3)
- Price-cost margin	-.008	0.003	0.081
	(0.011)	(0.009)	(0.031)***
Number of observations	75168	75168	75168
R^2	0.122	0.124	0.125

Estimation by instrumental variables

	baseline	year	sector
Dep var: Transition to unemployment	(1)	(2)	(3)
- Price-cost margin	-.053	-.002	0.211
	(0.013)***	(0.012)	(0.1)**
Number of observations	75168	75168	75168
R^2	0.122	0.124	0.125

The dependent variable is equal to one if the individual becomes unemployed in a given year, and zero otherwise. The measure of competition is the price-cost margin multiplied by minus one. This is instrumented using the Regulatory Impact. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. The baseline regression includes controls on individual and job characteristics (age, married, household head, dummies for region of residence, high school graduate, university graduate, number of coworkers, dummies for duration of the job, a dummy for having a fixed term contract, average wage by sector-year and quarter dummies) The second column adds year dummies to the baseline regression. Finally, the third column includes, in addition to the variables

in column 2, dummies for industry of employment. The sample is drawn from the Spanish Labor Force Survey and includes men aged 16 to 64 with a job, who do not switch across industries and who have no seasonal jobs over the period 1993 to the second quarter of 2001. The price-cost margin is obtained from the Industrial Enterprise Survey. The Regulatory Impact is obtainedd from the OECD database. The industries included are listed in table B.1. Errors are clustered by sector-year. The F of the excluded instrument in the first stage corresponding to the last column estimation is 19.31.

Table 10: Business Strategies Survey results measuring competition with the Concentration Index

Estimation by ordinary least squares

	baseline	year	sector	weights	firm fe
Dep var: Proportion of permanent	(1)	(2)	(3)	(4)	(5)
- Concentration ratio	-.098	-.113	-.018	-.012	0.002
	(0.03)***	(0.029)***	(0.03)	(0.03)	(0.027)
Obs.	17705	17705	17705	17705	17705

Estimation by instrumental variables

	baseline	year	sector	weights	firm fe
Dep var: Proportion of permanent	(1)	(2)	(3)	(4)	(5)
- Concentration ratio	0.137	-.476	-1.733	-2.520	-.761
	(0.153)	(0.222)**	(0.978)*	(2.078)	(0.458)*
Number of observations	17705	17705	17705	17705	17417

The dependent variable is equal to proportion of permanent over total contracted workers. The measure of competition is the average concentration ratio in the industry multiplied by minus one. This is instrumented using the Regulatory Impact. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. The baseline regression includes controls on workers and firm characteristics (number of workers, percentage of engineers and college graduates, percentage of workers with intermediate education, percentage of partial time permanent workers, ratio of blue over white collar workers, wages over production, workers training expenditures over production, workers compensations over production, a dummy for merger, a dummy for separation, a dummy for individual entrepreneur, R&D over production and percentage of public capital) The second column adds year dummies to the baseline regression. The third column includes, in addition to the variables in column 2, dummies for industry of employment. Column

4 displays the results when firms are weighted according to the ratio between the number of workers in their industry one year before the date of the interview and the number of workers in their industry at the time of the interview. Finally, column 5 is estimated using firm fixed effects. The sample is drawn from the Survey of Business Strategies and includes firms whose level of diversification does not exceed one industry as defined by the 2-digit classification over the period 1992 to 2006. The industries included are listed in table C.1. The concentration ratio is obtained from the Survey of Business Strategies. The Regulatory Impact is obtained from the OECD database. Errors are clustered by sector-year. The F of the excluded instrument in the first stage corresponding to the last column estimation is 20.87.

Table 11: Estimation by instrumental variables and quasi-experiment with two dimensional cluster (Labor Force Survey)

Estimation by instrumental variables

	baseline	year	sector	weights
Dep var. Transition to permanent	(1)	(2)	(3)	(4)
- Price-cost margin	0.404	0.078	-.989	-.944
	(0.124)***	(0.067)	(0.434)**	(0.461)**
Number of observations	17156	17156	17156	17156
R^2	0.123	0.135	0.135	0.135

Quasi-experiment

	baseline	year	sector	weighted	individual fe
Dep var: Transition to permanent	(1)	(2)	(3)	(4)	(5)
energy after 1997	0.007	-.037	-.060	-.064	-.142
	(0.012)	(0.007)***	(0.014)***	(0.022)***	(0.065)**
rail&road after 1998	0.005	-.026	-.036	-.036	-.056
	(0.011)	(0.008)***	(0.006)***	(0.005)***	(0.013)***
post&telecom after 1999	0.041	-.022	-.016	-.018	-.123
	(0.024)*	(0.016)	(0.015)	(0.019)	(0.06)**
Number of observations	7798	7798	7798	7798	5881
R^2	0.14	0.146	0.146	0.147	0.241

The dependent variable is equal to one if the individual transits from fixed term to permanent employment in a given year, and zero otherwise. The measure of competition is the price-cost margin multiplied by minus one. This is instrumented using the Regulatory Impact. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. The baseline regression includes controls on individual and job characteristics (age, married, household head, dummies for region of residence, high school graduate, university graduate, number of coworkers, dummies for duration of the fixed term contract in years

and quarter dummies). The second column adds year dummies to the baseline regression. The third column includes, in addition to the variables in column 2, dummies for industry of employment. Finally, column 4 displays the results when individuals are weighted according to the ratio between the number of workers in their industry one year before the date of the interview and the number of workers in their industry at the time of the interview. The sample is drawn from the Spanish Labor Force Survey and includes men aged 16 to 64 with a fixed term contract, who do not switch sector of employment and who have no seasonal jobs over the period 1993 to the second quarter of 2001. The price-cost margin is obtained from the Industrial Enterprise Survey. The Regulatory Impact is obtained from the OECD database. The industries included are listed in table B.1. Errors are clustered in the sector-year and individual dimensions.

Table 12: Placebo quasi-experiment (Labor Force Survey)

	baseline	year	sector	weighted	individual fe
Dep var: Transition to permanent	(1)	(2)	(3)	(4)	(5)
energy after 1996	0.009	-.026	-.054	-.054	0.022
	(0.013)	(0.012)**	(0.022)**	(0.022)**	(0.049)
rail&road after 1997	0.007	-.013	-.021	-.021	0.052
	(0.011)	(0.01)	(0.009)**	(0.009)**	(0.015)***
post&telecom fater 1998	0.042	-.010	-.0003	-.0002	-.025
	(0.02)**	(0.016)	(0.015)	(0.015)	(0.035)
Number of observations	7798	7798	7798	7798	5881
R^2	0.14	0.145	0.146	0.146	0.24

The dependent variable is equal to one if the individual transits from a fixed term to permanent employment in a given year, and zero otherwise. The measures of competition are dummies for working in a treated sector one year before the treatment actually takes place. That is, a dummy for working in the energy sector in 1996 or after, a dummy for working in the rail&road sector in 1997 or after and a dummy for working in the post&telecom sector in 1998 or after. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. The baseline regression includes controls on individual and job characteristics (age, married, household head, dummies for region of residence, high school graduate, university graduate, number of coworkers, dummies for duration of the fixed term contract in years and quarter dummies. The second column adds to the baseline regression dummies for year. The third column includes, in addition to the variables in column 2, dummies for industry of employment. Finally, column 4 displays the results when individuals are weighted according to the ratio between the number of workers in their industry one year before the date of the interview and the number of workers in their industry at the time of the interview. The sample is drawn from the Spanish Labor Force Survey and includes men aged 16 to 64 with a fixed term contract, who do not switch sector of employment and who have no seasonal jobs over the period 1993 to the second quarter of 2001. The industries included are energy, rail&road, post&telecom, airline and retail. The airline and retail industries serve as controls. Errors are clustered by sector-year.

Table 13: Estimation by instrumental variables including switchers (Labor Force Survey)

	baseline	year	sector	weighted
Dep var: Transition to permanent	(1)	(2)	(3)	(4)
- Price-cost margin	0.404	0.097	-.943	-.893
	(0.131)***	(0.078)	(0.473)**	(0.454)**
- Price-cost margin by switcher	0.021	-.029	-.078	-.105
	(0.258)	(0.235)	(0.232)	(0.238)
Switcher	-.024	-.033	-.037	-.040
	(0.02)	(0.019)*	(0.019)**	(0.019)**
Number of observations	19176	19176	19176	19176
R^2	0.117	0.127	0.127	0.127

The dependent variable is equal to one if the individual transits from fixed term to permanent employment in a given year, and zero otherwise. The measure of competition is the price-cost margin multiplied by minus one. This is interacted with a dummy indicating if the individual is a industry switcher. The variable in the third row is a dummy equal to one if the individual is an industry switcher. The instrument used is the Regulatory Impact. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. The baseline regression includes controls on individual and job characteristics (age, married, household head, dummies for region of residence, high school graduate, university graduate, number of coworkers, dummies for duration of the fixed term contract in years and quarter dummies). The second column adds year dummies to the baseline regression. The third column includes, in addition to the variables in column 2, dummies for industry of employment. Finally, column 4 displays the results when individuals are weighted according to the ratio between the number of workers in their industry one year before the date of the interview and the number of workers in their industry at the time of the interview. The sample is drawn from the Spanish Labor Force Survey and includes men aged 16 to 64 with a fixed term contract, who do not switch sector of employment and who have no seasonal jobs over the period 1993 to the second quarter of 2001. The price-cost margin is obtained from the Industrial Enterprise Survey. The Regulatory Impact is obtained from the OECD database. The industries included are listed in table B.1. Errors are clustered by sector-year. The F statistic of the excluded instruments in the equation in which the dependent

variable is - Price-cost margin is 6.51 and in the equation in which the dependent variable is - Price-cost margin by switcher is 15.33. These numbers refer to the last equation. The overall effect of - Price-cost margin for industry switchers is statistically significant (p-value is 0.059).

Chapter 2

Networks and Remittances

2.1 Introduction

The World Bank estimates that remittances totaled $420 billion in 2009, of which $317 billion went to developing countries. The absolute amount of remittances has increased sharply in the last decade with the exception of the most recent years of economic crisis. The evolution of the total quantity remitted over time can be seen in Figure 1. The money received is an important source of income in many developing economies, representing in some cases a very relevant percentage of the GDP of the receiving country[1]. From the microeconomic perspective, remittance sending constitutes an indicator of return migration intentions. Remittances are also an input into household decision-making in the money receiving country, affecting labor supply, self-employment, and even fertility. See, for instance, Maimbo and Ratha (2005).

This paper addresses whether there are network effects in remittance sending. In particular, I test whether remittance sending increases as a consequence of living in the same locality as countrymen from high remitting cultures.

[1] In the top 10 remittance recipients in 2006 the proportion of remittances over total GDP ranges from more than one third (36.2% for Tajikistan) to one fifth (20.3% for Jordan).

Remittances may be sent due to altruism or self-interest. Self-interest includes investment as well as saving motives. See Rapoport and Docquier (2006) for a deep analysis of remittance motives. Social networks may increase remittances sent for altruistic reasons because high remitting networks may exert social pressure towards remitting more, as well as reinforce the links of immigrants with the home country. On the other hand, social networks may reduce remittances sent for self-interest reasons because networks may act as a safety net, and also because individuals may enjoy consumption in the host country more if they are surrounded by conationals. On the other hand, social networks may simply facilitate remittance sending by informing network members about means of transferring money.

Social networks have been shown to influence many aspects of individuals' behavior. Case and Katz (1991) find that disadvantaged youths are influenced by others in their decisions to get involved in criminal activity, drug and alcohol use, child bearing out of wedlock, schooling and even church attendance. Glaeser, Sacerdote, and Scheinkman (1996) finds that the results regarding crime and schooling hold for all individuals. Particular attention has been devoted to social networks' influence on labor market outcomes. In a recent contribution, Bayer, Ross, and Topa (2008) provide evidence on how social networks affect the job finding process.

One prolific branch of the literature on social networks focuses on their effects on immigrants. Immigrants' behavior has been shown to significantly depend on the quantity and quality of their social links. The seminal contributions in Borjas (1992) and Borjas (1995) find positive network effects on the human capital accumulation of immigrants. Bertrand, Luttmer, and Mullainathan (2000) show that immigrants with more contacts use welfare more if they belong to high welfare using groups. Åslund and Fredriksson (2005) support these results using quasi-experimental evidence.

Many studies are devoted to analyzing how social networks alter the employment opportunities of their members. The early contributions of O'Regan

and Quigley (1993) and Bauer, Gang, and Epstein (2000) find positive impacts of networks on employment. However, these results should be taken with caution given that the estimations do not account for the potential endogeneity of network characteristics. After accounting for the self-selection of immigrants into ethnic enclaves, Damm (2009) finds that networks have an overall positive effect on employment probabilities. According to Beaman (2006), the effect depends on the time of residence of the social network in the host location in the sense that relatively old networks have a positive influence while relatively young networks have a negative effect on employment. Andersson, Burgess, and Lane (2009) find that immigrants belonging to social networks are more likely to be employed as well as to work in the same firm than other members of the network. Additionally, social networks have been shown to affect wages and the occupational choice of immigrants. According to Patel and Vella (2007), immigrants are more likely to choose the most popular occupations among their countrymen and, as a consequence of that, they experience increases in wages. In the same line, Munshi (2003) finds that immigrants have a higher probability of holding a preferred non-agricultural job when their network is exogenously larger.

The impact of social networks on immigrants remitting behavior has only been marginally addressed. Amuedo-Dorantes and Pozo (2006) argue that immigrants with social networks as defined by the existence of friends and family members in the location, are expected to remit less because they have lower incentives to remit for insurance motives. According to this argument, they only allow social networks to have an impact on remitting behavior through the probability of being employed. In doing that, they do not account for the endogeneity of the network variable. In this paper, I allow social networks to affect both the altruistic and insurance related motives to remit, and the empirical results are consistent with the existence of social pressure from high remitting groups that induce more immigrants to remit. This is consistent with the findings by Osili (2007) regarding the importance of altruistic reasons for remitting.

Funkhouser (1995) provides some evidence in favor of cultural differences determining remittance behavior. Motivated by the great differences in remittance sending between El Salvador and Nicaragua, Funkhouser compares the determinants of remitting in those countries. He finds that the differences in remitting behavior between these two countries can not be explained by differences in observed characteristics, but by differences in the behavioral coefficients as well as by differences in the impact of self-selection. These findings are in line with the main result of this paper in that cultural factors are important. The contribution of this paper is to show that cultural differences affect more the remitting behavior of those immigrants surrounded by individuals from their same country.

According to the World Bank, Spain ranks sixth in the list of top remittance-sending countries in recent years. The amount of money remitted from Spain rose sharply since 2000, and it reached its maximum in 2008, when the amount was over 15 million dollars. Spain is also the 10th country with the highest absolute number of immigrants as reported by the World Bank. Given its geographical situation and the cultural links with former colonies, Spain has received immigrant inflows from many different countries. This will prove to be particularly useful in this analysis because it will provide the necessary variation in remitting cultures.

The importance of cultural factors when explaining remitting behavior in Spain is evidenced by the great dispersion existing in the proportion of remitters as well as in the average quantity remitted across country groups. Figure 3.1 shows that the average proportion of remitters by country takes many different values covering all the spectrum between zero and one. According to the data displayed in Figure 3.2, the ranking of continents by proportion of remitters is led by Asia with more than one half of immigrants sending remittances. Americans rank second with less than 5 percentage points under the proportion of remitters from Asia. Africans follow with almost 40% of their immigrants sending remittances. Finally, Europeans are found to include relatively few remitters (less than one fourth of them remit).

Figure 4.1 exhibits the distribution of average quantity remitted during the previous year by country of birth. The variable takes many different values reflecting the great variation existing across cultures. Classifying immigrants by continent of birth, the ranking of average quantity remitted is displayed in Figure 4.2. This ranking is very similar to the one found for the proportion of remitters within continent groups. However, we observe that Africans depart much more from the remitting behavior of Asians and Americans. In fact, Africans remit less than half the average of Asians. This can of course be due to differences in income.

In order to provide a first insight into how the correlation between remitting behavior and number of individuals in the network changes according to the remitting culture of the country group, Figures 5.1 and 5.2 display some correlations. Individuals from countries with a low proportion of remitters display a positive but much lower correlation between remittance sending and number of individuals in the network relative to individuals from countries with a high proportion of remitters. Similarly, individuals from countries with a low average quantity remitted show a positive but much lower correlation between quantity remitted and number of individuals in the network relative to individuals from countries with a high average quantity remitted. This is in agreement with the results of the main specifications, that reflect that individuals in social networks are more likely to remit and remit more if they belong to high remitting cultures.

The remainder of the paper proceeds as follows. Section 2 provides the conceptual framework that relates remittances and immigrant networks. Section 3 presents the empirical strategy. Section 4 describes the databases, the construction of the variables and the sample included in the analysis. In section 5 the empirical results are discussed and some robustness checks and extensions are included. Section 6 concludes.

2.2 Conceptual framework

Researchers have emphasized the role of networks in explaining immigrants' individual behavior. Social networks have been shown to have significant influence on education attainment (Borjas 1992 and 1995), welfare use (Bertrand et al., 2000), employment (Munshi, 2003), and wages (Beaman, 2007), among others.

Immigrants are likely to change their remitting behavior as a consequence of being part of social networks. The reasons for this are varied and operate in different directions. According to Amuedo-Dorantes and Pozo (2006), social networks may reduce remittances sent for insurance purposes. They argue that immigrants with social networks are expected to remit less since they are subject to less income risk given the capacity of networks to help their members to find an employment. Therefore, they consider that the presence social networks have no direct effect on remittances but only an indirect effect through affecting individual employment probability. However, social networks may affect remitting behavior by providing information on money sending means, by changing the willingness to consume in the host country and/or by imposing cultural norms. Those social norms may operate via social pressure and/or via reinforcement of tights with the home country.

The information mechanism operates such that immigrants learn about the cheapest company to send money to their relatives through other conationals and decide to remit and/or to remit more. Additionally, an immigrant may feel obligated to send money to the home country if cultural norms dictate so and she is surrounded by co-nationals. Finally, having more co-nationals around may reinforce the cultural tights with the home country and induce immigrants to remit or to remit more. On the other hand, having more co-nationals around may increase immigrants utility of consumption in the host country, which leaves less scope for remitting.

If social networks operate through transmitting information and enforcing

cultural norms, remittance sending increases for those immigrants surrounded by co-nationals from high remittance sending groups. In contrasts, if networks provide insurance or increase the utility of consumption in the host country, remittance sending decreases for individuals surrounded by co-nationals. The purpose of this paper is precisely to test which mechanism is more important.

2.3 Methodology

The purpose of the empirical exercise is to test whether immigrants exposed to other immigrants from the same country remit more for immigrants from high remitting country groups. First, the probability of remitting is estimated as a function of the size of the network, its interaction with quality as measured by the proportion of remitters from the same country, and a set of controls. Second, the quantity remitted is estimated using as explanatory variables size of the network, its interaction with quality as measured by the average quantity remitted by immigrants from the same country, and several controls.

The individual probability of remitting is modelled using an specification such that the probability of remitting can be written as a linear function as follows:

$$P(y_{ilc} = 1) = \beta_0 + \beta_1 size_{ilc} * quality_{ic} + \beta_2 size_{ilc} + \beta_3 X_{ilc} + \beta_4 V_l + W_c + \varepsilon_{ilc}$$

where y_{ilc} equals one if individual i living in location l and born in country c remits and zero otherwise. The variable $size$ reflects the relative number of individuals in the network, $quality$ stands for the proportion of remitting individuals from i's country, X contains individual characteristics, family characteristics and economic conditions, V represents a set of location dummies, W denotes a vector of country binary indicators. Finally, ε is the error term.

The set of individual characteristics includes a male dummy, age, age squared,

indicators for time of residence, a nationality binary variable, a documented dummy, indicators for the level of education (primary, secondary and tertiary), and a dichotomous variable for being educated in Spain.

The vector of family characteristics is composed by a married dummy, the number of household members, a dichotomous variable for intending to bring some family members to Spain, an indicator for spouse abroad, a binary variable for brother abroad, a dummy for children abroad, an indicator for father abroad and a dummy for mother abroad.

The variables reflecting economic conditions are an employed dummy, income, an indicator for permanent labor contract, dummies for sector of employment (industry, construction and services), and a binary variable for owning a house in the sending country[2].

Missing covariates are dummied out in order not to reduce the sample.

The standard errors are clustered at the location by country level because the variable size varies along those dimensions.

The previous estimations are complemented by the analysis of quantity remitted. This is done by means of a linear model of the form:

$$y_{ilc} = \beta_0 + \beta_1 size_{ilc} * quality_{ic} + \beta_2 size_{ilc} + \beta_3 X_{ilc} + \beta_4 V_l + W_c + \varepsilon_{ilc}$$

where y_{ilc} is the quantity remitted by individual i during the previous year which takes the value zero when the individual does not remit. Quality reflects the average quantity remitted by immigrants born in the same country.

Similarly to the estimation for the probability of remitting, missing covariates are dummied out and standard errors are allowed to be correlated within

[2]The list of included controls is extremely similar to the ones used in recent studies of the determinants of remittances like Sinning (2007) for immigrants in Germany.

the cells defined by location and country of birth.

Network studies are potentially subject to what Manski (1993) calls the 'reflection problem'. This refers to omitted variables causing artificial correlation in the outcomes between individuals from the same country or between individuals in the same location. Therefore, in the analysis of network effects, it is important to account for the existence of unobservable characteristics that are common to co-nationals and people living in the same location. The inclusion of location as well as country of birth dummies accounts for many of the omitted variable biases that arise in this setup. Location fixed effects control for local labor market features as well as any location characteristic that affects the likelihood of remitting for all individuals living there. For instance, the existence of a money transfer agency in one location may increase the incentives to remit. Additionally, country of birth dummies take into account the existence of cultural factors that affect remitting behavior of immigrants independently of whether they are surrounded by other immigrants from the same country or not.

Another source of concern that arises when studying network effects is self-selection. This would affect the results if individuals with high propensity to remit tend to choose locations with a high (or low) number of immigrants from their country. This potential source of bias is taken into account by means of an instrumental variable estimation. The interaction of size (at the location level) with quality is instrumented by the interaction of size computed at the province level with quality. Then, the coefficients resulting from the OLS estimation are potentially biased due to selection between as well as within regions while the IV coefficients are only potentially biased because of selection between regions. The comparison of the OLS and IV estimation results allows me to draw conclusions on the average network effect in the absence of self-selection.

Data and descriptive statistics

2.3.1 Databases

The main database used in the empirical analysis is the National Immigrant Survey of Spain. This is complemented by the Spanish Town Hall Census.

The National Immigrant Survey of Spain (Encuesta Nacional de Inmigrantes) is a unique database containing detailed information on international migration to Spain. It provides information on a wide variety of aspects regarding the migratory experience. Information is structured in 7 modules that refer to: the corresident domestic group, socio-demographic characteristics, conditions upon departure, conditions upon arrival, labor market activity, housing, and contacts with Spanish civil society and with society of origin.

Regarding remittances, surveyed individuals are asked whether they remit, how much they remitted in the last year and to whom they sent their transfer. Among the family questions, there are some regarding the presence of family members abroad as well as the intention to bring some family member to Spain. These serve as proxies of individuals' willingness to remit. Additionally, the labor market module includes working status, income and type of labor contract which are determinants of the capacity to remit.

The targeted population is formed by foreign born citizens, 16 years old or older, living in a dwelling in Spain at the time of the interview, and who have been in Spain for at least one year. If the duration of their stay was less than one year, they needed to state their intention to stay for at least one year to be included in the sample.

The reference period is January 2007. At that time, the stock of migrants in Spain was very high and then, it is possible to find representatives of many ethnic groups in the sample. This gives enough variation to study the effect of culture on immigrants' decisions.

The total number of households included in the sample is 15465. They were selected taking as the reference population immigrants included in the Town Hall Census data.

For further information on the survey design and other methodological issues see Reher and Requena (2009) or the website of the Spanish National Statistics Institute (INE)[3].

The National Immigrant Survey has key advantages for the study of the effect of social networks on remittances. It allows us to define social networks at a very disaggregated level because it provides information on municipality of residence as well as country of birth. Additionally, it allows us to control for many factors influencing remitting behavior.

The main drawback of the National Migration Survey is that it is not representative at the location level. This issue has been addressed by matching the locations with the Spanish Town Hall Census. The information from the Town Hall Census is then used to compute the number of individuals from a certain country in each location.

The Town Hall Census is an administrative register that contains information on all the individuals residing in the municipality. All individuals living in Spain are obliged to register, regardless of whether they are documented or undocumented.

The main advantage of the Town Hall Census for the study of immigrants is its accuracy regarding the number of immigrants that live in a location. The reason is that immigrants have powerful incentives to register on those location listings. First, they can be certain that there will be no negative legal consequences of registering even if they are undocumented. Second, registering give them automatic right to basic medical care for themselves and their families, access to the education system for their children and many other social

[3]A document containing all methodological details can be fount at: http://www.ine.es/en/daco/daco42/inmigrantes/ inmigra_meto_en.pdf

services. Additionally, it is compulsory for non-EU immigrants to re-register in the Town Hall Census every two years. Hence, we should not expect our figures to be artificially inflated due to return migration.

2.3.2 Construction of network variables

Size of the network

The variable size measures the availability of contacts for each immigrant according to her country of birth and location of residence. In this context, networks are defined as groups of immigrants born in the same country and living in the same location. However, interaction among individuals from the same country is influenced by total population in the location. Hence, network members in small locations are expected to interact more than those in big locations. To account for this, I compute size as the actual number of network members divided by total population in the location. Then, in order to avoid underweighting groups that are small in the overall country, we measure concentration in the locality relative to other localities. In particular, I divide the previously defined variable by the ratio of number of immigrants from the corresponding country in Spain and total population in Spain. To summarize, the variable size can be expressed as follows:

$$size_{cl} = \log \frac{N_{cl}/N_l}{N_c/N}$$

where N represents number of individuals at the level of aggregation determined by the subindexes, with c denoting country of birth and l standing for location.

This definition has been first adopted by Bertrand, Luttmer, and Mullainathan (2000).

All the variables involved in the computation of size are obtained from the

Town Hall Census.

Quality of the network

The variable quality refers to the average value of the variable in the left hand side of each regression. The average is computed by country of birth in order to proxy remitting cultures. Therefore, in the regressions for the probability of remitting, quality corresponds to the proportion of remitters among immigrants from the corresponding country. In the equation for quantity remitted, quality refers to the average quantity remitted by individuals from the corresponding country. When computing the average quantity remitted, a value of zero is assigned to no remitters.

In all regressions the variable quality is included in differences with respect to the average quality for all immigrants. This is done to ease interpretation of the coefficient associated to the variable size. In summary, the expression for the variable quality can be written as:

$$quality_c = \overline{y}_c - \overline{y}$$

where y represents the left hand side variable in the regressions, $\overline{y}$ stands for its mean and the subindex c denotes that the variable is averaged by country of birth.

The information involved in the calculations for the variable quality is obtained by averaging the remit dummy and the variable quantity remitted from the National Migration Survey.

2.3.3 Sample definition and descriptive statistics

The sample used to estimate the probability of remitting is drawn from the National Migration Survey. It is therefore composed by individuals aged 16 or more, born abroad and that are in Spain for at least one year or intend

to stay that long. From that set of individuals, I have removed those born in countries with less than 5000 immigrants in Spain. This selection is done to avoid measurement error in the quality variable and leaves individuals from 58 different countries of birth.

The final sample includes 14329 foreign born individuals and is described in Tables 2.1 to 2.4. We observe that more than one third of total individuals remit, the average proportion of network members in the locality is 2.06% and networks are distributed along 796 locations.

Regarding individual characteristics, sampled immigrants are predominantly female. They are relatively old with an average age of 40. The majority of immigrants have arrived recently. In fact, more than one half of them have been in Spain 10 years or less. The level of regularization of immigrants is low. Slightly more than one fourth have Spanish nationality and less than one half of them are documented migrants. In contrast, sampled individuals are relatively educated. More than one half of them have secondary education and more than one fifth hold a tertiary education degree. These education levels have only been obtained in Spain for around 20% of sampled individuals.

With respect to family characteristics, more than one half of sampled immigrants declare to be married. The average number of cohabiting individuals is 3. The important role of family in the migrating decision is highlighted by the fact that one fourth of interviewed individuals declare to have the intention to bring some family member to Spain. Relatively few individuals have their immediate family (spouse and children) abroad. In contrast, more than one half have at least a brother or sister abroad and around one third have one parent abroad.

Regarding the economic conditions of immigrants in the sample, we observe that almost two third of them are employed although their average income per month is relatively low. Immigrants' jobs have low quality on average. Only slightly more than one fourth have a permanent contract and the majority of workers concentrate in services. Finally, more than one half of sampled

individuals declare to own a house in the sending country.

In the regression for quantity remitted the sample selection criteria is the same. Only individuals from countries with more than 5000 individuals in Spain are included. This leaves 13237 individuals. These are slightly less than the sample size in the regression for probability of remitting because the number of missing observations in the variable quantity remitted is greater than for the variable remit.

The average remitted quantity in the last year is around 600 euros. The network variables as well as the controls are extremely similar to the ones in the regression for probability of remitting. This provides some evidence on that the additional missing observations relative to the ones included in the probability of remitting estimation do not induce sample selection issues.

2.4 Empirical results

When drawing conclusions on the existence of network effects on remitting behavior, one needs to focus on the coefficient associated with the interaction of size and quality. A positive coefficient is interpreted as individuals from high remitting groups remitting more as a consequence of being surrounded by more individuals from their country. This is coherent with the existence of social pressure towards remittance sending when this is a cultural norm in the country group. Additionally, a positive coefficient could indicate the influence of information on money sending channels provided by the network. Whereas a negative coefficient would be consistent with the provision of insurance by the network or an increase in consumption motivated by individuals enjoying more consumption in the context of networks.

2.4.1 Difference-in-Differences

As a first approximation to the impact of networks for immigrants from high remitting cultures, a difference-in-differences estimator is computed. Tables 1.1. and 1.2 display the results for probability of remitting and quantity remitted, respectively.

Individuals are divided in four groups according to whether they come from high or low remitting countries and whether they belong to big or small size networks. The threshold for being considered a high or low remitted country is the average value of the remitting variable in the country of birth. Additionally, a network is considered to be big if the value of size for that network is higher than the median size in the sample.

The first row contains the average values and standard deviation of the remitting variable for individuals from low remitting country groups. The second row displays the corresponding values for individuals from high remitting country groups. The third row presents the differences between the values in the two first rows.

The first column displays the average values and standard deviation of the remitting variable for individuals in small networks. The second column contains the corresponding values for individuals in big networks. The third column presents the differences between the values in the first two columns.

Therefore, the final result of the difference-in-differences estimation can be found in the cell corresponding to the third row and third column.

Table 1.1. shows that immigrants in big networks are more likely to remit if they are born in high remitting countries. Similarly, the figures in Table 1.2 indicate that immigrants in big networks tend to remit more money if they belong to high remitting country groups. However, those differences are not statistically significant.

2.4.2 Probability of remitting

The OLS estimation displayed in Table 4.1 produces a coefficient associated with the interaction of size and quality that is positive and statistically different from zero. The estimated effect is positive even in the absence of controls. However, the magnitude of the effect decreases as we add more controls. The biggest drops occur when controlling for individual characteristics and when including country of birth dummies. The IV estimation also gives a positive and significant coefficient, as shown in Table 4.3. The magnitude of the coefficient is reduced by more than eight times when all the controls are included. The coefficient is significantly reduced when individual characteristics are taken into account and when location and country dummies are included in the list of controls. The reliability of the IV results is given by the power of the first stage presented in Table 4.2[4].

The OLS coefficient that quantifies network effects is lower than the corresponding IV coefficient. Hence, the magnitude of the estimated within region bias is negative. This implies that immigrants with a high propensity to remit tend to live in locations with a small number of co-nationals. Accordingly, selection between regions is expected to be negative because the mechanisms driving immigrants selection are similar independently of the level of geographical disaggregation. Additionally, selection between regions must be weaker than selection within regions because it is easier to move within regions and then the absolute magnitude of the bias induced by selection between regions should be smaller in absolute terms. Therefore, the network effect net of self-selection biases must be positive and bigger in magnitude than the IV coefficient but not bigger than the difference between the OLS and IV coefficients.

Following this reasoning, one can conclude that the coefficient for the variable size interacted with quality in the absence of self-selection biases is between 0.045 and 0.09. This can be interpreted as any factor that increases

[4]The first stage is also considered valid under the Stock and Yogo (2002) criteria.

remittance sending by one percentage point in the absence of networks actually increases average remittance sending due to the presence of networks between 0.292 and 0.061 points[5].

The estimated network effect is coherent with the findings obtained when computing the size variable instead of logs as well as when computed as the log of the ratio of network members overt total population in the location. The result is also robust to assuming other functional forms for the probability of remitting like the Probit.

The actual network effect on remittances is potentially stronger than the estimated one because social networks could be affecting remittances through some of the controls. For instance, social networks could have an influence on remitting behavior through intentions to bring family members to Spain, employment status, or income. The estimated network effect is conditional on all those variables and hence, the total impact of network on remittances is likely to be stronger.

Regarding the controls, the direction of the estimated effects are consistent with the findings by Bollard, McKenzie, and Morten (2010) in their study of the remitting behavior of African migrants. The estimated coefficients for the controls are displayed in Appendix A. I find that being older, having lived shorter in Spain after 3 years of residence, having Spanish nationality, being documented, being single, having family members abroad, and being employed have positive impacts on the likelihood of remitting as well as the quantity remitted. Surprisingly, education does not play a significant role when the variable having terminated the studies in the host country is included. This last feature of the estimation is coherent with the findings by Sinning (2007).

[5]These formula to obtain this figures is derived in Bertrand, Luttmer, and Mullainathan (2000). They correspond to the weighted average of a variable defined as:

$$\left(\frac{1}{1-\beta_1 * \overline{size}_c}\right) - 1$$

where $\overline{size}_c$ is the average size by country of birth and the weights are proportional to the number of individuals form each country in the sample.

2.4.3 Quantity remitted

The OLS estimation for quantity remitted displayed in Table 5.1 results in a positive and significant coefficient the variable size interacted with average remitted quantity in the country group. In agreement with the findings for the probability of remitting, the magnitude of the estimated impact is reduced progressively as further controls are added. The IV results produce a coefficient that is slightly less than 50% higher than the OLS coefficient. The IV estimation results can be found in Table 5.3. The comparison of the coefficients estimated under different sets of controls show that the presence of location and country common effects are the main factors affecting the estimation of network effects. The reliability of the IV regression relies on the power of the first stage in Table 5.2[6].

The comparison of the OLS and IV estimates shows that the bias induced by self-selection of immigrants within regions is negative. Given that selection between regions is thought to be smaller than selection within regions, one can conclude that network effects as quantified by the coefficient associated to the variable size by quality rank between 0.096 and 0.125.

The magnitude of the estimated network effect is such that an exogenous increase in the quantity remitted by one percentage point induces an increase in quantity remitted due to the influence of networks from 0.065 to 0.087. This effect is higher in magnitude relative to the effect for the probability of remitting. This can be explained because networks influence, in addition to the likelihood of remitting (the change from zero to a positive value for quantity remitted), the quantity remitted when the individual decides to remit and both effects go in the same direction.

The estimated coefficients for the controls are shown in Appendix B. The impact of the controls on quantity remitted is similar to their effect on the probability of remitting. Some exceptions are that being documented displays

[6]The first stage is also considered valid under the Stock and Yogo (2002) criteria.

now a negligible effect while the coefficient for having a secondary education degree turns significantly positive. Additionally, being married appears not to be correlated with quantity remitted while the coefficient for number of individuals becomes significantly positive.

2.4.4 Additional specifications

Remittances destination

In the previous section, I have analyzed the probability of sending remittances. In this section, that variable is replaced by the probability of sending remittances to specific family members or institutions. In particular, I study the probability of sending money to the spouse, parents, children, brothers or sisters, other family members and non-family members (including institutions) separately. These specifications present the drawback that sample sizes are almost three times smaller than the original ones because many individuals do not report information on whether they send remittances to specific collectives. Table 6 collects the results of those estimations.

The estimated network effect for the probability of sending to a spouse, parents or children is no significantly different from zero. As it was mentioned in the descriptive statistics section, very few individuals have spouse, parents or children abroad what results in imprecise estimations. The estimate for the probability of sending money to brothers or sisters is positive and close to being significant at the 10%. The only IV regression that presents a significant estimate is the one for the probability of sending remittances to family members excluding spouse, parents, children, and brothers or sisters. The estimated coefficient is almost twice the estimated coefficient for the overall probability of sending remittances. The reason for this may be that remittances to close family members may be more inelastic to external conditions, i.e., they are sent or not independently of network effects and any other conditions in the host country. In contrast, remittances to other family members may be con-

sidered as optional by the immigrant and the decision to send them is easier influenced. The estimate for remittance sending is negative in line with our expectations in that those remittances are sent for saving and investing motives. However, we can not make inference on this coefficient because it is not statistically distinguishable from zero.

Different subsamples

In this section, I explore with types of individuals are more influenced by networks when deciding on remittance sending and quantity remitted. Individuals are divided into different subsamples according to their gender, length of their stay in Spain and undeveloped versus developed country origin. Separated regressions are then run for each of those groups.

Women's behavior is thought to be more influenced by networks. Additionally, individuals that have lived shorter in Spain are expected to be more affected by networks because they are less integrated in the host society on average. Finally, those individuals coming from undeveloped economies tend to rely more on co-nationals and are generally more influenced by networks.

The results of the regressions for the probability of remitting are displayed in Table 7.1 and the corresponding regressions for quantity remitted are shown in Table 7.2. The findings for the probability of remitting are perfectly coherent with the expectations regarding network effects in the different subsamples. However, the estimations for quantity remitted differ in that the effect is found to be stronger for men and individuals that live longer. Men display higher variation in the quantity remitted when they remit. So, they may be more easily influenced in quantity remitted than in the likelihood of remitting. Similarly, individuals residing longer in Spain present greater dispersion in their quantity remitted when they remit. Hence, some sending individuals tend to reduce the quantity remitted drastically while others do not, networks may prevent them from significantly reducing their remittances.

Mechanisms

In the main specifications, a positive and significant network effect is found when the estimation is done conditioning on a number of controls that help to explain remitting behavior. However, networks are likely to influence remittances indirectly through their impact on some of the controls. As mentioned before, Amuedo-Dorantes and Pozo (2006) argue that network effects on remittances operate through employment but there could be other indirect effects.

In this section, I analyze the potential impact of immigrant networks on intentions to bring family members to Spain, employment and income.

If social networks are correlated with immigrants' intentions to bring family members to Spain, employment or income positively (negatively), the unconditional network effect would be stronger (weaker).

The results displayed in Table 8.1 correspond to the estimations measuring the proportion of remitters from the corresponding country while Table 8.2 contains the results when quality is measured by average quantity remitted. In both cases, networks are found to have an effect only on income. This finding implies that the effect for quantity remitted is stronger than the conditional effect[7].

2.5 Conclusion

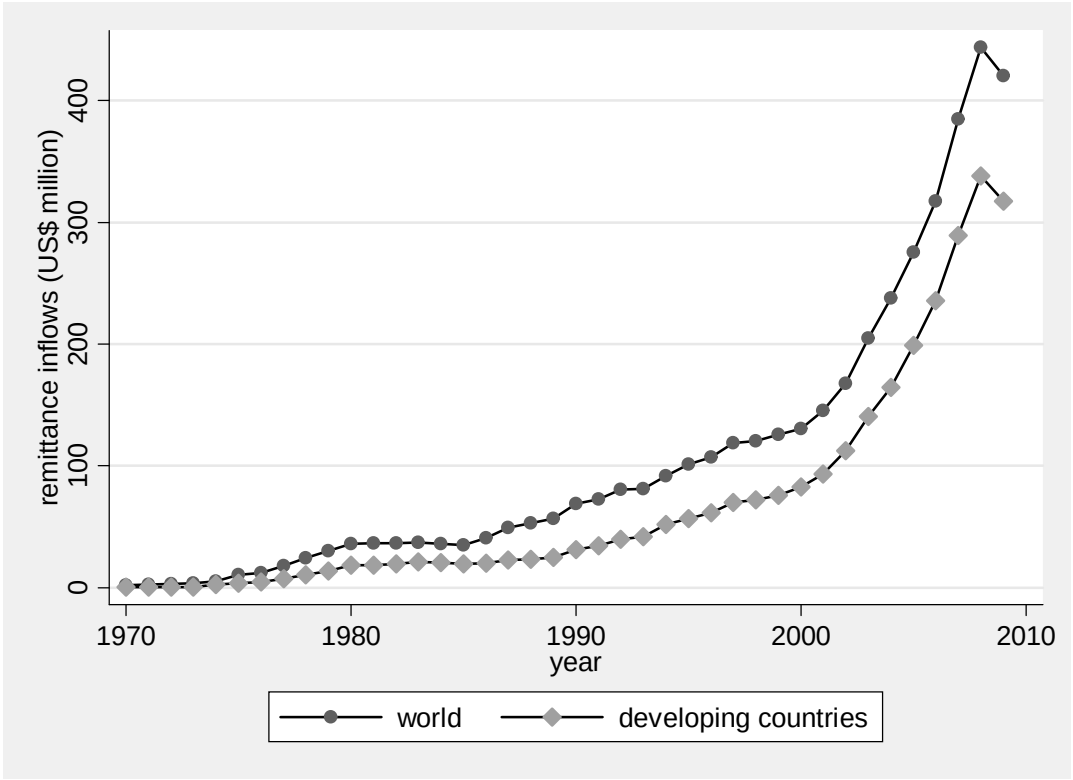
This paper explores the existence of network effects on remitting behavior. Networks are defined as groups of immigrants from the same country of birth living in the same location. They are considered to influence individuals remitting behavior if individuals are found to be more likely to remit or to remit more as a consequence of being part of social networks formed by individuals from high remitting country groups.

[7]In principle, the network effect on the probability of remitting is the same as the conditional one because no correlation was found between income and the individual probability of remitting.

Using a unique database for Spain, networks are shown to have a positive impact on the probability of remitting as well as on the quantity remitted. This is consistent with the predominance of the encouraging effects of networks on remitting like social pressure and information on money sending channels over other potential mechanisms like insurance provided by the network or increase in consumption induced by the network that reduce the willingness to remit.

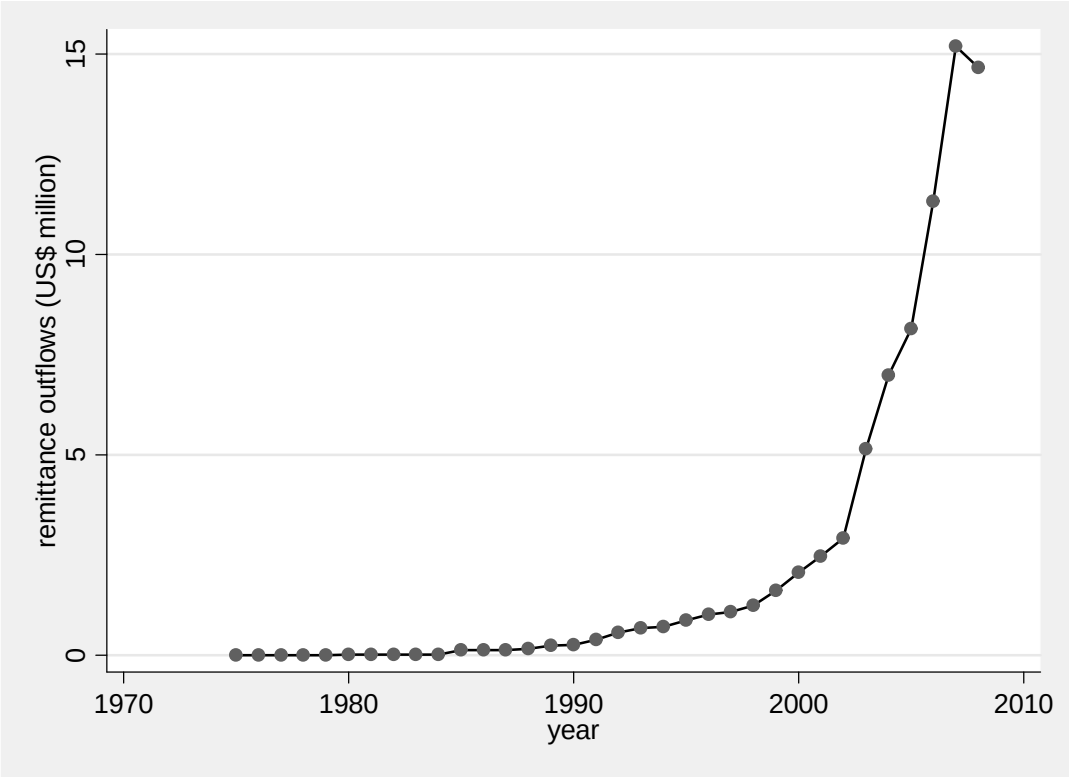
Figures

Figure 1: Evolution of remittances inflows over time



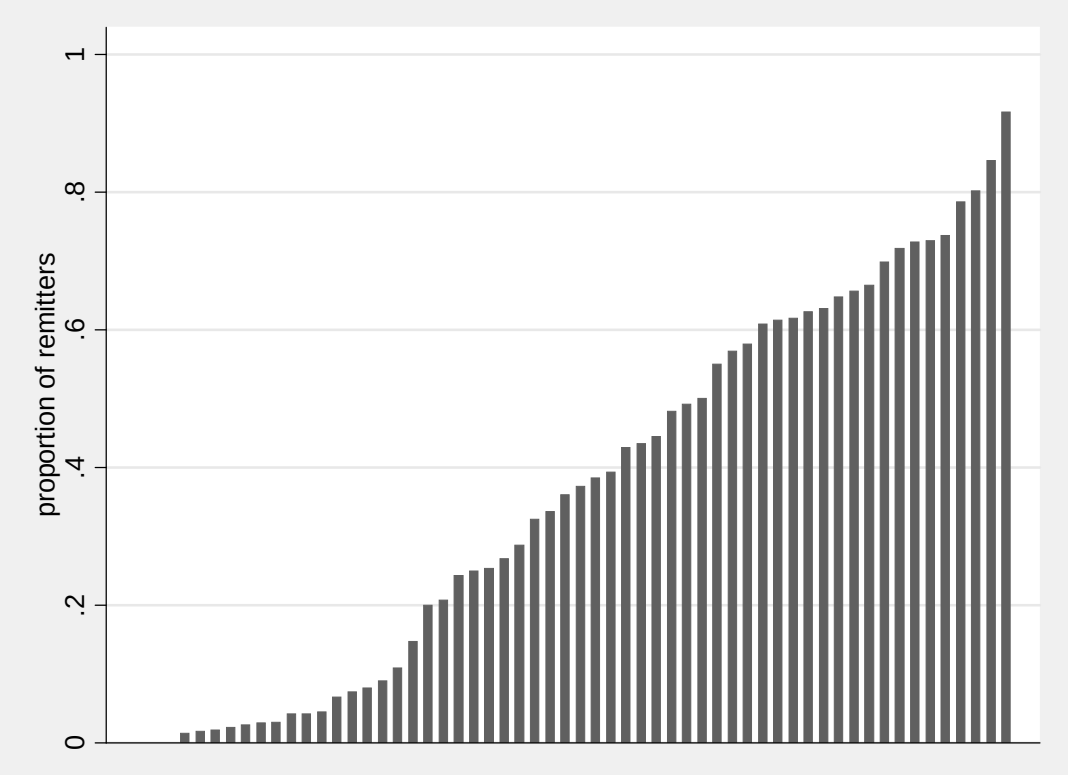
This data can be found in the website of the World Bank, http://econ.worldbank.org/. The graph displays yearly data on remittances received by the whole world as well as remittances sent to developing countries.

Figure 2: Evolution of remittances outflows in Spain over time



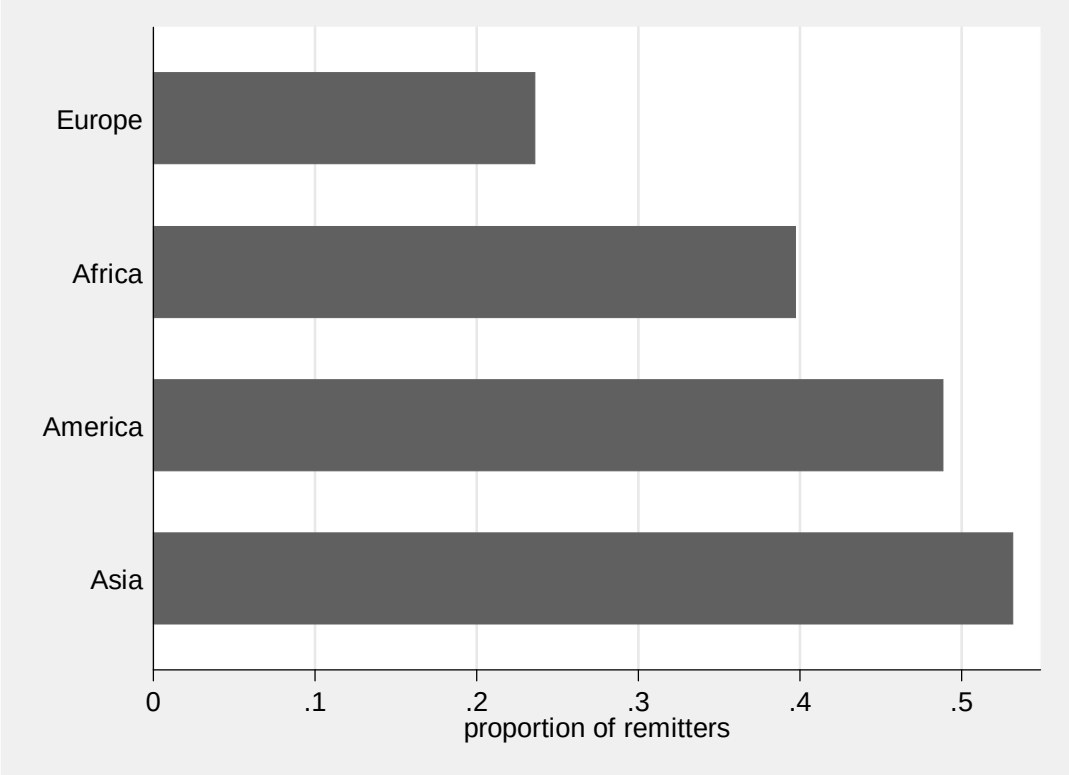
This data can be found in the website of the World Bank, http://econ.worldbank.org/. The graph displays yearly data on remittances sent from Spain.

Figure 3.1: Remittance sending by country of birth



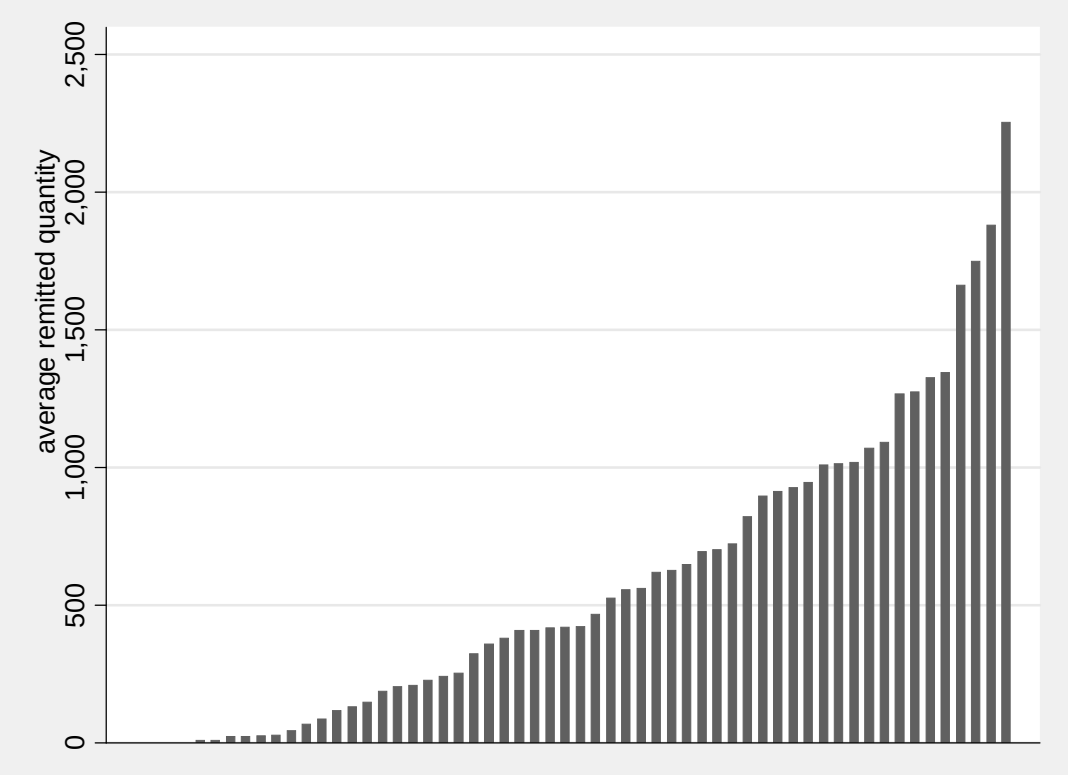
This data is obtained from the National Migration Survey. Each bar represents the proportion of remitters from one country. Only countries with more than 5000 individuals living in Spain are represented.

Figure 3.2: Remittance sending by continent of birth



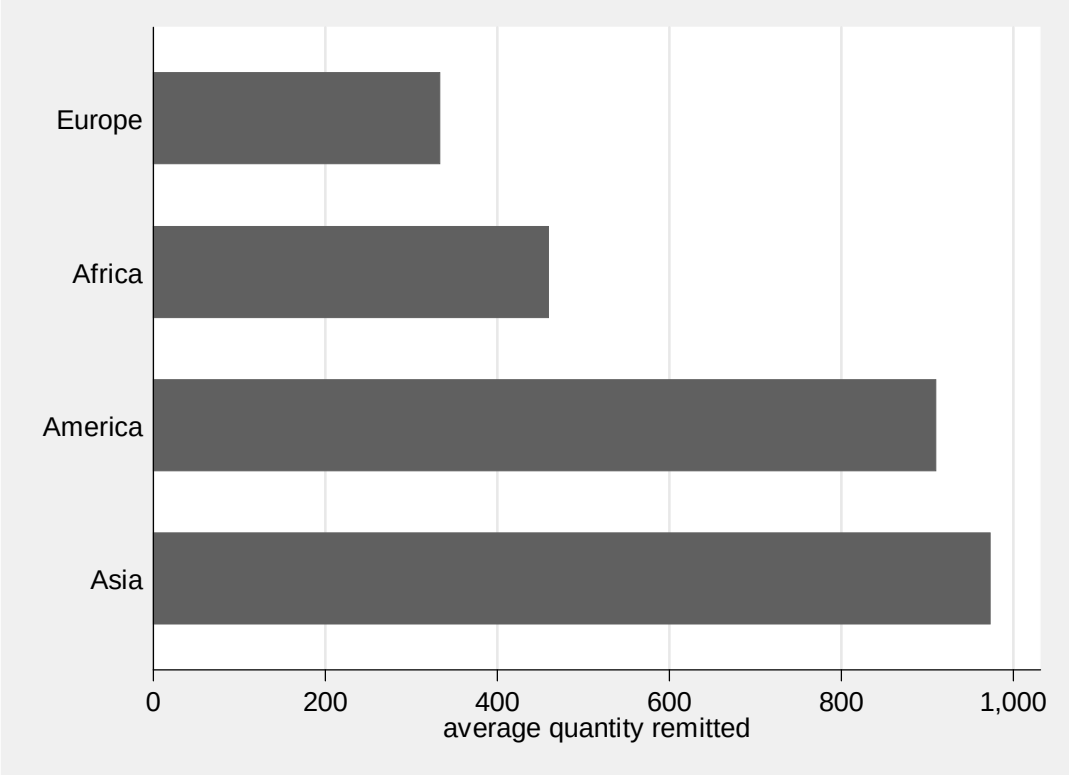
This data is obtained from the National Migration Survey. Each bar represents the proportion of remitters from one continent. Oceania is not displayed because immigrants from that continent are not representative in the sample.

Figure 4.1: Quantity remitted by country of birth



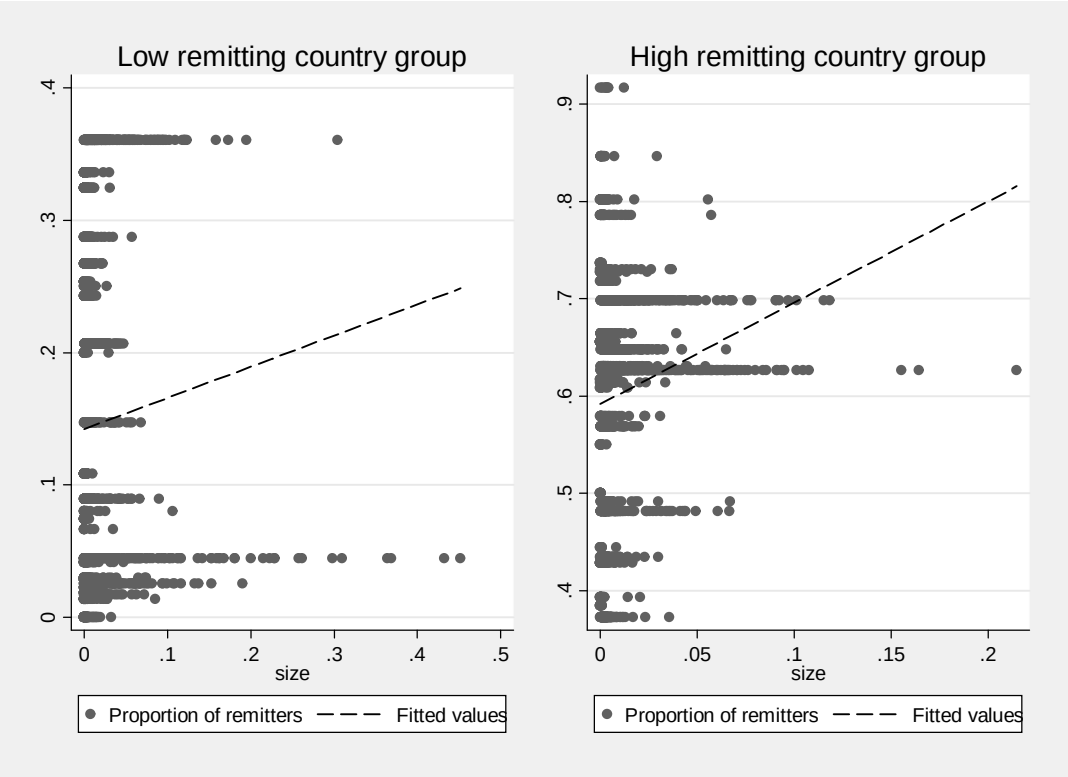
This data is obtained from the National Migration Survey. Each bar represents the average quantity remitted from one country. Only countries with more than 5000 individuals living in Spain are represented.

Figure 4.2: Quantity remitted by continent of birth



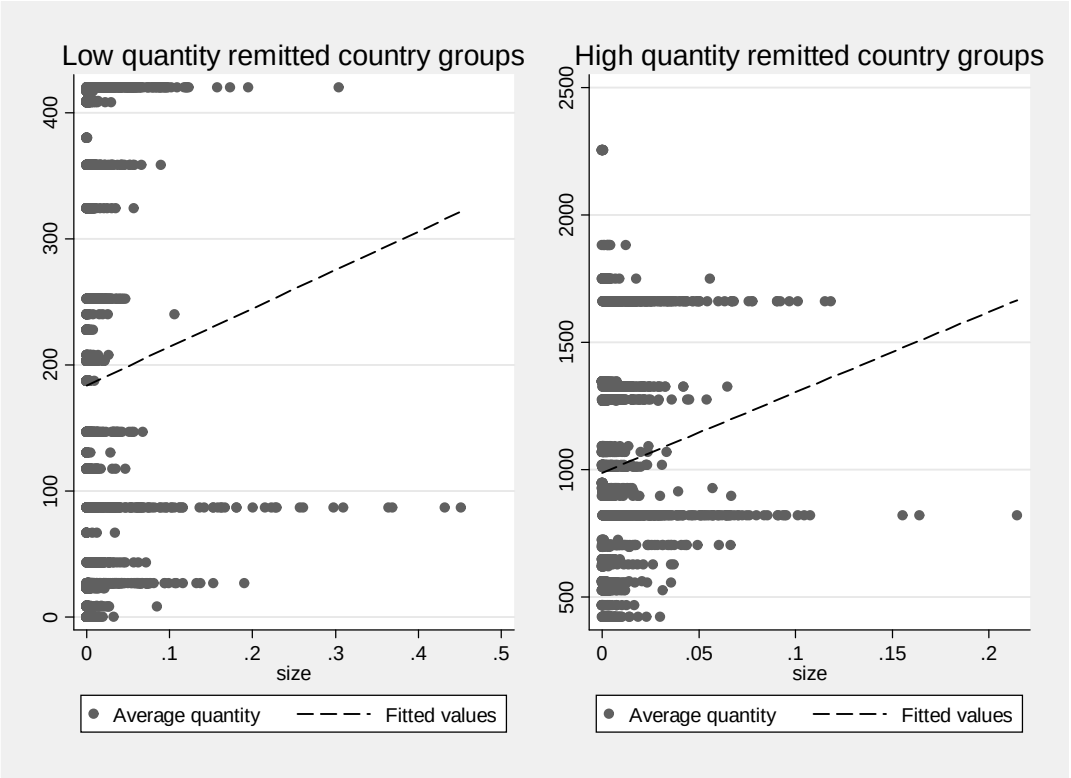
This data is obtained from the National Migration Survey. Each bar represents the average quantity from one continent. Oceania is not displayed because immigrants from that continent are not representative in the sample.

Figure 5.1: Correlation between remittance sending and size by country of origin



These correlations are computed using data from the National Migration Survey. The variable size is computed as number of immigrants from the same country living in the locality divided by total population in the locality. The coefficient associated with the slope is 0.235 for the low remitting country groups and 1.043 for the high remitting country groups. Both are statistically significant at the 1% level.

Figure 5.2: Correlation between quantity remitted and size by country of origin



These correlations are computed using data from the National Migration Survey. The variable size is computed as number of immigrants from the same country living in the locality divided by total population in the locality. Average quantity is the average quantity sent by immigrants in the network including a zero for non-remitters. The coefficient associated with the slope is 305.177 for the low quantity country groups and 3158.802 for the high quantity country groups. Both of them are statistically significant at the 1% level.

Tables

Table 1.1: Probability of remitting. Difference-in-differences

	low size	high size	Δ size
low remit	0.152 (0.359)	0.179 (0.384)	0.028 (0.525)
high remit	0.594 (0.491)	0.634 (0.482)	0.04 (0.688)
Δ remit	0.442 (0.608)	0.455 (0.616)	0.012 (0.866)

The first two rows and columns display the average values and standard deviations of a remit dummy for individuals of small and big size groups as well as low and high remitting groups. The third column and rows present the crossed differences between the remit dummy averages. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. The sample is composed by individuals from countries with more than 5000 individuals living in Spain. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census.

Table 1.2: Quantity remitted. Difference-in-differences

	low size	high size	Δ size
low quantity	203.347 (1293.082)	213.264 (957.261)	9.917 (1608.853)
high quantity	1020.59 (1924.053)	1147.339 (2195.683)	126.749 (2919.406)
Δ quantity	817.243 (2318.198)	934.075 (2395.281)	116.832 (3333.368)

The first two rows and columns display the average values and standard deviations of quantity remitted for individuals of small and big size groups as well as low and high quantity country groups. The third column and rows present the crossed differences between the remit dummy averages. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. The sample is composed by individuals from countries with more than 5000 individuals living in Spain. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census.

Table 2.1: Descriptive statistics for the probability of remitting estimation. Remitances and networks

	Mean	Standard Deviation	Minimum	Maximum
Remit	0.37	0.483	0	1
Size by quality	0.007	0.363	-1.692	2.021
Province size by quality	0.004	0.251	-1.075	1.185
Size	0.624	1.218	-4.317	5.824
Locality			1	796
Country of birth			1	58

The table displays the descriptive statistics for the variables measuring the remitting behaviour and network characteristics of the immigrant. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The sample is composed by individuals from countries with more than 5000 individuals living in Spain. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the proportion of remitters from the country of birth in Spain minus the average proportion of remitters in Spain.

Table 2.2: Descriptive statistics for the probability of remitting estimation. Individual characteristics

	Mean	Standard Deviation	Minimum	Maximum
Male	0.446	0.497	0	1
Age	39.197	14.306	16	98
Age squared	1741.03	1351.993	256	9604
3 to 5 years in Spain	0.246	0.431	0	1
6 to 10 years in Spain	0.286	0.452	0	1
11 to 20 years in Spain	0.126	0.332	0	1
21 to 30 years in Spain	0.074	0.262	0	1
More than 30 years in Spain	0.139	0.346	0	1
Spanish nationality	0.283	0.45	0	1
Documented	0.449	0.497	0	1
Primary education	0.157	0.364	0	1
Secondary education	0.521	0.5	0	1
Terciary education	0.207	0.405	0	1
Educated in Spain	0.204	0.403	0	1

The table displays the descriptive statistics for the variables measuring the individual characteristics of the immigrant. The individual data is obtained from the Spanish Town Hall Census. The information used to compute the size variable comes from the Spanish Municipal Register. The sample is composed by individuals from countries with more than 5000 individuals living in Spain. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the proportion of remitters from the country of birth in Spain minus the average proportion of remitters in Spain.

Table 2.3: Descriptive statistics for the probability of remitting estimation. Family characteristics

	Mean	Standard Deviation	Minimum	Maximum
Married	0.536	0.499	0	1
Household members	3.356	1.576	1	18
Intentions to bring family	0.246	0.431	0	1
Spouse abroad	0.046	0.21	0	1
Brother abroad	0.485	0.5	0	1
Children abroad	0.129	0.336	0	1
Father abroad	0.283	0.451	0	1
Mother abroad	0.356	0.479	0	1

The table displays the descriptive statistics for the variables measuring the family characteristics of the immigrant. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The sample is composed by individuals from countries with more than 5000 individuals living in Spain. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the proportion of remitters from the country of birth in Spain minus the average proportion of remitters in Spain.

Table 2.4: Descriptive statistics. Economic conditions

	Mean	Standard Deviation	Minimum	Maximum
Employed	0.638	0.48	0	1
Income	530.367	679.312	0	9000
Permanent contract	0.279	0.449	0	1
Industry	0.075	0.264	0	1
Construction	0.112	0.315	0	1
Services	0.415	0.493	0	1
House owned in sending country	0.288	0.453	0	1

The table displays the descriptive statistics for the variables measuring the economic conditions of the immigrant. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The sample is composed by individuals from countries with more than 5000 individuals living in Spain. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the proportion of remitters from the country of birth in Spain minus the average proportion of remitters in Spain.

Table 3.1: Descriptive statistics for the quantity remitted estimation. Remitances and networks

	Mean	Standard Deviation	Minimum	Maximum
Remit	601.894	1696.466	0	60000
Size by quality	14.548	693.122	-3921.243	5039.739
Province size by quality	9.403	489.402	-3225.222	3119.999
Size	0.626	1.23	-4.317	5.824
Locality			1	796
Country of birth			1	58

The table displays the descriptive statistics for the variables measuring the remitting behavior and network characteristics of the immigrant. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The sample is composed by individuals from countries with more than 5000 individuals living in Spain. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the average quantity remitted in the last year by individuals from the country of birth in Spain minus the average quantity remitted in Spain.

Table 3.2: Descriptive statistics for the quantity remitted estimation. Individual characteristics

	Mean	Standard Deviation	Minimum	Maximum
Male	0.444	0.497	0	1
Age	39.5	14.579	16	98
Age squared	1772.799	1383.51	256	9604
3 to 5 years in Spain	0.238	0.426	0	1
6 to 10 years in Spain	0.277	0.448	0	1
11 to 20 years in Spain	0.128	0.334	0	1
21 to 30 years in Spain	0.079	0.27	0	1
More than 30 years in Spain	0.15	0.357	0	1
Spanish nationality	0.297	0.457	0	1
Documented	0.429	0.495	0	1
Primary education	0.156	0.362	0	1
Secondary education	0.52	0.5	0	1
Terciary education	0.212	0.409	0	1
Educated in Spain	0.216	0.412	0	1

The table displays the descriptive statistics for the variables measuring the individual characteristics of the immigrant. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The sample is composed by individuals from countries with more than 5000 individuals living in Spain. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the average quantity remitted in the last year by individuals from the country of birth in Spain minus the average quantity remitted in Spain.

Table 3.3: Descriptive statistics for the quantity remitted estimation. Family characteristics

	Mean	Standard Deviation	Minimum	Maximum
Married	0.538	0.499	0	1
Household members	3.336	1.563	1	18
Intentions to bring family	0.227	0.419	0	1
Spouse abroad	0.041	0.199	0	1
Brother abroad	0.476	0.499	0	1
Children abroad	0.121	0.326	0	1
Father abroad	0.272	0.445	0	1
Mother abroad	0.34	0.474	0	1

The table displays the descriptive statistics for the variables measuring the family characteristics of the immigrant. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The sample is composed by individuals from countries with more than 5000 individuals living in Spain. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the average quantity remitted in the last year by individuals from the country of birth in Spain minus the average quantity remitted in Spain.

Table 3.4: Descriptive statistics for the quantity remitted estimation. Economic conditions

	Mean	Standard Deviation	Minimum	Maximum
Employed	0.629	0.483	0	1
Income	531.911	688.464	0	9000
Permanent contract	0.282	0.45	0	1
Industry	0.075	0.263	0	1
Construction	0.109	0.311	0	1
Services	0.411	0.492	0	1
House owned in sending country	0.285	0.451	0	1

The table displays the descriptive statistics for the variables measuring the economic conditions of the immigrant. The individual data is obtained from the Spanish Town Hall Census. The information used to compute the size variable comes from the Spanish Municipal Register. The sample is composed by individuals from countries with more than 5000 individuals living in Spain. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the average quantity remitted in the last year by individuals from the country of birth in Spain minus the average quantity remitted in Spain.

Table 4.1: Probability of remitting. Ordinary least squares

	basic	indiv	family	economic	locality	country
Dep var: Remit	(1)	(2)	(3)	(4)	(5)	(6)
size by quality	0.346	0.144	0.126	0.11	0.099	0.026
	(0.017)***	(0.014)***	(0.012)***	(0.012)***	(0.013)***	(0.012)**
size	0.025	0.004	0.007	0.006	0.01	0.006
	(0.007)***	(0.004)	(0.004)*	(0.004)	(0.004)***	(0.003)*
Obs.	14902	14831	14396	14329	14329	14329
R^2	0.066	0.29	0.389	0.401	0.447	0.478

The dependent variable is equal to one if the individual remits and zero otherwise. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the proportion of remitters from the country of birth in Spain minus the average proportion of remitters in Spain. The coefficients are market with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5%, and *** if the level of significance is less than 1%. The basic regression includes size interacted by quality and size. The second column adds individual characteristics to the basic specification including a male dummy, age, age squared, indicators for time of residence, a nationality binary variable, a documented dummy, indicators for the level of education (primary, secondary and tertiary), and a dichotomous variable for being educated in Spain. The third column includes, in addition to the controls in column 2, a married dummy, the number of household members, a dichotomous variable for intending to bring some family members to Spain, an indicator for spouse abroad, a binary variable for brother abroad, a dummy for children abroad, an indicator for father abroad and a dummy for mother abroad. The fourth column contains all the already mentioned controls plus a set of variables for economic conditions including an employed dummy, income, an indicator for permanent labor contract, dummies for sector of employment (industry, construction and services), and a binary variable for owning a house in the sending country. The fifth column adds municipality dummies. Finally, the sixth column includes all previously mentioned controls plus country of birth indicators. When included, dummy variables account for missing observations in the following variables: Documented, educated in Spain, brother abroad, children abroad, father abroad, mother abroad, income and permanent contract.

The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The sample is composed by individuals from countries with more than 5000 individuals living in Spain. The standard errors are clustered by municipality and country of birth groups.

Table 4.2: Probability of remitting. First stage

	basic	individual	family	economic	locality	country
Dep var: Size by quality	(1)	(2)	(3)	(4)	(5)	(6)
province size by quality	1.125	1.033	1.024	1.020	0.988	0.938
	(0.022)***	(0.02)***	(0.02)***	(0.02)***	(0.018)***	(0.018)***
size	-.012	-.012	-.013	-.013	-.003	-.008
	(0.006)**	(0.005)**	(0.005)**	(0.005)**	(0.004)	(0.004)**
Obs.	14902	14831	14396	14329	14329	14329
R^2	0.618	0.653	0.656	0.658	0.761	0.782

The dependent variable is size (at the municipality level) by quality. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the proportion of remitters from the country of birth in Spain minus the average proportion of remitters in Spain. The coefficients are market with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5%, and *** if the level of significance is less than 1%. The basic regression includes size at the province level interacted by quality and size. The second column adds individual characteristics to the basic specification including a male dummy, age, age squared, indicators for time of residence, a nationality binary variable, a documented dummy, indicators for the level of education (primary, secondary and tertiary), and a dichotomous variable for being educated in Spain. The third column includes, in addition to the controls in column 2, a married dummy, the number of household members, a dichotomous variable for intending to bring some family members to Spain, an indicator for spouse abroad, a binary variable for brother abroad, a dummy for children abroad, an indicator for father abroad and a dummy for mother abroad. The fourth column contains all the already mentioned controls plus a set of variables for economic conditions including an employed dummy, income, an indicator for permanent labor contract, dummies for sector of employment (industry, construction and services), and a binary variable for owning a house in the sending country. The fifth column adds municipality dummies. Finally, the sixth column includes all previously mentioned controls plus country of birth indicators. When included, dummy variables account for missing observations in the following variables: Documented, educated in Spain, brother abroad, children abroad, father abroad, mother abroad, income and permanent contract. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The sample is composed by individuals from countries with

more than 5000 individuals living in Spain. The standard errors are clustered by municipality and country of birth groups.

Table 4.3: Probability of remitting. Instrumental variables

	basic	indiv	family	economic	locality	country
Dep var: Remit	(1)	(2)	(3)	(4)	(5)	(6)
size by quality	0.323	0.146	0.135	0.12	0.087	0.038
	(0.024)***	(0.018)***	(0.016)***	(0.015)***	(0.017)***	(0.016)**
size	0.024	0.004	0.007	0.007	0.01	0.006
	(0.007)***	(0.004)	(0.004)*	(0.004)*	(0.004)***	(0.003)*
Obs.	14902	14831	14396	14329	14329	14329
R^2	0.066	0.29	0.389	0.401	0.447	0.478

The dependent variable is equal to one if the individual remits and zero otherwise. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the proportion of remitters from the country of birth in Spain minus the average proportion of remitters in Spain. The variable size (at the municipality level) by quality is instrumented using size at the province level by quality. The coefficients are market with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5%, and *** if the level of significance is less than 1%. The basic regression includes size interacted by quality and size. The second column adds individual characteristics to the basic specification including a male dummy, age, age squared, indicators for time of residence, a nationality binary variable, a documented dummy, indicators for the level of education (primary, secondary and tertiary), and a dichotomous variable for being educated in Spain. The third column includes, in addition to the controls in column 2, a married dummy, the number of household members, a dichotomous variable for intending to bring some family members to Spain, an indicator for spouse abroad, a binary variable for brother abroad, a dummy for children abroad, an indicator for father abroad and a dummy for mother abroad. The fourth column contains all the already mentioned controls plus a set of variables for economic conditions including an employed dummy, income, an indicator for permanent labor contract, dummies for sector of employment (industry, construction and services), and a binary variable for owning a house in the sending country. The fifth column adds municipality dummies. Finally, the sixth column includes all previously mentioned controls plus country of birth indicators.

When included, dummy variables account for missing observations in the following variables: Documented, educated in Spain, brother abroad, children abroad, father abroad, mother abroad, income and permanent contract. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The sample is composed by individuals from countries with more than 5000 individuals living in Spain. The standard errors are clustered by municipality and country of birth groups.

Table 5.1: Quantity remitted. Ordinary least squares

	basic	indiv	family	economic	locality	country
Dep var: Quantity	(1)	(2)	(3)	(4)	(5)	(6)
size by quality	0.435	0.295	0.264	0.244	0.204	0.067
	(0.043)***	(0.041)***	(0.038)***	(0.038)***	(0.033)***	(0.029)**
size	66.920	24.927	22.168	20.564	5.815	-2.595
	(17.533)***	(15.764)	(15.142)	(14.956)	(17.513)	(18.843)
Obs.	13740	13681	13301	13237	13237	13237
R^2	0.031	0.089	0.159	0.166	0.21	0.229

The dependent variable is remittances quantity sent in the last year. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the average quantity remitted in the last year by individuals from the country of birth in Spain minus the average quantity remitted in Spain. The coefficients are market with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5%, and *** if the level of significance is less than 1%. The basic regression includes size interacted by quality and size. The second column adds individual characteristics to the basic specification including a male dummy, age, age squared, indicators for time of residence, a nationality binary variable, a documented dummy, indicators for the level of education (primary, secondary and tertiary), and a dichotomous variable for being educated in Spain. The third column includes, in addition to the controls in column 2, a married dummy, the number of household members, a dichotomous variable for intending to bring some family members to Spain, an indicator for spouse abroad, a binary variable for brother abroad, a dummy for children abroad, an indicator for father abroad and a dummy for mother abroad. The fourth column contains all the already mentioned controls plus a set of variables for economic conditions including an employed dummy, income, an indicator for permanent labor contract, dummies for sector of employment (industry, construction and services), and a binary variable for owning a house in the sending country. The fifth column adds municipality dummies. Finally, the sixth column includes all previously mentioned controls plus country of birth indicators. When included, dummy variables account for missing observations in the following variables: Documented, educated in Spain, brother abroad, children abroad, father abroad, mother abroad, income and permanent contract. The individual data is obtained from the Spanish

National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The sample is composed by individuals from countries with more than 5000 individuals living in Spain. The standard errors are clustered by municipality and country of birth groups.

Table 5.2: Quantity remitted. First stage

	basic	individual	family	economic	locality	country
Dep var: Size by quality	(1)	(2)	(3)	(4)	(5)	(6)
province size by quality	1.092	1.026	1.018	1.014	0.989	0.915
	(0.034)***	(0.032)***	(0.032)***	(0.031)***	(0.028)***	(0.025)***
size	-17.621	-16.163	-17.422	-17.121	-.979	-7.260
	(11.296)	(10.346)	(10.367)*	(10.309)*	(7.746)	(7.659)
Obs.	14902	14831	14396	14329	14329	14329
R^2	0.604	0.63	0.634	0.636	0.743	0.772

The dependent variable is remittances quantity sent in the last year. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the average quantity remitted in the last year by individuals from the country of birth in Spain minus the average quantity remitted in Spain. The coefficients are market with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5%, and *** if the level of significance is less than 1%. The basic regression includes size at the province level interacted by quality and size. The second column adds individual characteristics to the basic specification including a male dummy, age, age squared, indicators for time of residence, a nationality binary variable, a documented dummy, indicators for the level of education (primary, secondary and tertiary), and a dichotomous variable for being educated in Spain. The third column includes, in addition to the controls in column 2, a married dummy, the number of household members, a dichotomous variable for intending to bring some family members to Spain, an indicator for spouse abroad, a binary variable for brother abroad, a dummy for children abroad, an indicator for father abroad and a dummy for mother abroad. The fourth column contains all the already mentioned controls plus a set of variables for economic conditions including an employed dummy, income, an indicator for permanent labor contract, dummies for sector of employment (industry, construction and services), and a binary variable for owning a house in the sending country. The fifth column adds municipality dummies. Finally, the sixth column includes all previously mentioned controls plus country of birth indicators. When included, dummy variables account for missing observations in the following variables: Documented, educated in Spain, brother abroad, children abroad, father abroad, mother abroad, income and permanent contract. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The sample is composed by individuals from countries with

more than 5000 individuals living in Spain. The standard errors are clustered by municipality and country of birth groups.

Table 5.3: Quantity remitted. Instrumental variables

	basic	indiv	family	economic	locality	country
Dep var: Quantity	(1)	(2)	(3)	(4)	(5)	(6)
size by quality	0.441	0.312	0.285	0.265	0.202	0.096
	(0.049)***	(0.046)***	(0.043)***	(0.043)***	(0.043)***	(0.037)***
size	67.475	26.318	23.898	22.259	5.761	-1.363
	(17.350)***	(15.677)*	(15.104)	(14.929)	(17.495)	(18.627)
Obs.	13740	13681	13301	13237	13237	13237
R^2	0.031	0.089	0.158	0.165	0.21	0.229

The dependent variable is remittances quantity sent in the last year. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the average quantity remitted in the last year by individuals from the country of birth in Spain minus the average quantity remitted in Spain. The variable size (at the municipality level) by quality is instrumented using size at the province level by quality. The coefficients are market with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5%, and *** if the level of significance is less than 1%. The basic regression includes size interacted by quality and size. The second column adds individual characteristics to the basic specification including a male dummy, age, age squared, indicators for time of residence, a nationality binary variable, a documented dummy, indicators for the level of education (primary, secondary and tertiary), and a dichotomous variable for being educated in Spain. The third column includes, in addition to the controls in column 2, a married dummy, the number of household members, a dichotomous variable for intending to bring some family members to Spain, an indicator for spouse abroad, a binary variable for brother abroad, a dummy for children abroad, an indicator for father abroad and a dummy for mother abroad. The fourth column contains all the already mentioned controls plus a set of variables for economic conditions including an employed dummy, income, an indicator for permanent labor contract, dummies for sector of employment (industry, construction and services), and a binary variable for owning a house in the sending country. The fifth column adds municipality dummies. Finally, the sixth column includes all previously mentioned controls plus country of birth indicators. When included, dummy variables account for missing observations in the following variables: Documented, educated in Spain, brother abroad, children abroad, father abroad, mother

abroad, income and permanent contract. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The sample is composed by individuals from countries with more than 5000 individuals living in Spain. The standard errors are clustered by municipality and country of birth groups.

Table 6: Remittances destination. Instrumental variables

	spouse	parents	children	brother	other	institutions
Dep var: Remit	(1)	(2)	(3)	(4)	(5)	(6)
size by quality	-.011	-.074	-.019	0.088	0.072	-.027
	(0.021)	(0.055)	(0.04)	(0.054)	(0.042)*	(0.028)
size	-.001	-.001	0.013	-.018	-.016	0.004
	(0.005)	(0.012)	(0.008)	(0.011)	(0.009)*	(0.006)
Obs.	5306	5306	5306	5306	5306	5306
R^2	0.669	0.39	0.606	0.232	0.239	0.216

The dependent variable is remit to spouse in the first column, remit to parents in the second, remit to children in the third, remit to brothers or sisters in the fourth, remit to other family members in the fifth and remit to no family members or institutions in the sixth. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the proportion of remitters from the country of birth in Spain minus the average proportion of remitters in Spain. The variable size (at the municipality level) by quality is instrumented using size at the province level by quality. The coefficients are market with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5%, and *** if the level of significance is less than 1%. All regressions include size interacted by quality as well as size, individual characteristics involving a male dummy, age, age squared, indicators for time of residence, a nationality binary variable, a documented dummy, indicators for the level of education (primary, secondary and tertiary), and a dichotomous variable for being educated in Spain, family characteristics entailing a married dummy, the number of household members, a dichotomous variable for intending to bring some family members to Spain, an indicator for spouse abroad, a binary variable for brother abroad, a dummy for children abroad, an indicator for father abroad and a dummy for mother abroad, economic conditions including an employed dummy, income, an indicator for permanent labor contract, dummies for sector of employment (industry, construction and services), and a binary variable for owning a house in the sending country, municipality dummies and country of birth indicators. Additionally, dummy variables account for missing observations in the following variables: Documented,

educated in Spain, brother abroad, children abroad, father abroad, mother abroad, income and permanent contract. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The sample is composed by individuals from countries with more than 5000 individuals living in Spain. The standard errors are clustered by municipality and country of birth groups.

Table 7.1: Probability of remitting. Different subsamples

	women	men	short	long	unde	deve
Dep var: Remit	(1)	(2)	(3)	(4)	(5)	(6)
size by quality	0.047	0.039	0.05	0.035	0.057	5.243
	(0.022)**	(0.024)	(0.026)*	(0.024)	(0.029)*	(65.273)
size	0.009	0.002	0.002	0.01	0.002	1.719
	(0.005)**	(0.005)	(0.005)	(0.006)*	(0.005)	(21.421)
Obs.	7942	6387	7840	6489	10955	3374
R^2	0.498	0.529	0.435	0.52	0.418	.

The dependent variable is remittances quantity sent in the last year. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the proportion of remitters from the country of birth in Spain minus the average proportion of remitters in Spain. The variable size (at the municipality level) by quality is instrumented using size at the province level by quality. The coefficients are market with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5%, and *** if the level of significance is less than 1%. All regressions include size interacted by quality as well as size, individual characteristics involving a male dummy, age, age squared, indicators for time of residence, a nationality binary variable, a documented dummy, indicators for the level of education (primary, secondary and tertiary), and a dichotomous variable for being educated in Spain, family characteristics entailing a married dummy, the number of household members, a dichotomous variable for intending to bring some family members to Spain, an indicator for spouse abroad, a binary variable for brother abroad, a dummy for children abroad, an indicator for father abroad and a dummy for mother abroad, economic conditions including an employed dummy, income, an indicator for permanent labor contract, dummies for sector of employment (industry, construction and services), and a binary variable for owning a house in the sending country, municipality dummies and country of birth indicators. Additionally, dummy variables account for missing observations in the following variables: Documented, educated in Spain, brother abroad, children abroad, father abroad, mother abroad, income and permanent contract. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish

Town Hall Census. The sample in the first column is composed by women, in the second by men, in the third by early immigrants, in the fourth by long stayers, in the fifth by immigrants from undeveloped countries and in the sixth by immigrants from developed countries. The standard errors are clustered by municipality and country of birth groups.

Table 7.2: Remitted quantity. Different subsamples

	women	men	short	long	undev	dev
Dep var: Quantity	(1)	(2)	(3)	(4)	(5)	(6)
size by quality	0.026	0.192	0.076	0.104	0.121	1.687
	(0.051)	(0.058)***	(0.057)	(0.063)*	(0.059)**	(1.390)
size	-13.877	16.712	-4.333	2.689	-20.816	871.683
	(28.666)	(24.136)	(21.330)	(34.451)	(29.740)	(714.450)
Obs.	7362	5875	7051	6186	9883	3354
R^2	0.242	0.296	0.282	0.189	0.227	0.184

The dependent variable is remittances quantity sent in the last year. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the average quantity remitted in the last year by individuals from the country of birth in Spain minus the average quantity remitted in Spain. The variable size (at the municipality level) by quality is instrumented using size at the province level by quality. The coefficients are market with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5%, and *** if the level of significance is less than 1%. All regressions include size interacted by quality as well as size, individual characteristics involving a male dummy, age, age squared, indicators for time of residence, a nationality binary variable, a documented dummy, indicators for the level of education (primary, secondary and tertiary), and a dichotomous variable for being educated in Spain, family characteristics entailing a married dummy, the number of household members, a dichotomous variable for intending to bring some family members to Spain, an indicator for spouse abroad, a binary variable for brother abroad, a dummy for children abroad, an indicator for father abroad and a dummy for mother abroad, economic conditions including an employed dummy, income, an indicator for permanent labor contract, dummies for sector of employment (industry, construction and services), and a binary variable for owning a house in the sending country, municipality dummies and country of birth indicators. Additionally, dummy variables account for missing observations in the following variables: Documented, educated in Spain, brother abroad, children abroad, father abroad, mother abroad, income and permanent contract. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size

variable comes from the Spanish Town Hall Census. The sample in the first column is composed by women, in the second by men, in the third by early immigrants, in the fourth by long stayers, in the fifth by immigrants from undeveloped countries and in the sixth by immigrants from developed countries. The standard errors are clustered by municipality and country of birth groups.

Table 8.1: Probability of remitting. Mechanisms

	intend	employed	income
Dep var: Remit	(1)	(2)	(3)
size by quality	-.005	0.004	46.370
	(0.016)	(0.007)	(25.921)*
size	-.004	0.004	-8.552
	(0.003)	(0.002)***	(4.710)*
Obs.	14329	14329	14329
R^2	0.326	0.909	0.48

The dependent variable is a dichotomous variable for intending to bring some family members to Spain in the first column, an employed dummy in the second column and income in the third column. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the average quantity remitted in the last year by individuals from the country of birth in Spain minus the average quantity remitted in Spain. The variable size (at the municipality level) by quality is instrumented using size at the province level by quality. The coefficients are market with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5%, and *** if the level of significance is less than 1%. All regressions include size interacted by quality as well as size, individual characteristics involving a male dummy, age, age squared, indicators for time of residence, a nationality binary variable, a documented dummy, indicators for the level of education (primary, secondary and tertiary), and a dichotomous variable for being educated in Spain, family characteristics entailing a married dummy, the number of household members, a dichotomous variable for intending to bring some family members to Spain, an indicator for spouse abroad, a binary variable for brother abroad, a dummy for children abroad, an indicator for father abroad and a dummy for mother abroad, economic conditions including an employed dummy, income, an indicator for permanent labor contract, dummies for sector of employment (industry, construction and services), and a binary variable for owning a house in the sending country, municipality dummies and country of birth indicators. Additionally, dummy variables account for missing observations in the following variables: Documented, educated in Spain, brother abroad, children abroad, father abroad, mother abroad, income and permanent contract. The in-

dividual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The sample is composed by individuals from countries with more than 5000 individuals living in Spain. The standard errors are clustered by municipality and country of birth groups.

Table 8.2: Remitted quantity. Mechanisms

	intend	employed	income
Dep var: Quantity	(1)	(2)	(3)
size by quality	-1.00e-05	-2.28e-06	0.027
	(8.94e-06)	(4.06e-06)	(0.012)**
size	-.004	0.004	-8.945
	(0.003)	(0.002)***	(4.742)*
Obs.	14329	14329	14329
R^2	0.326	0.909	0.48

The dependent variable is a dichotomous variable for intending to bring some family members to Spain in the first column, an employed dummy in the second column and income in the third column. Size is computed as the logarithm of the ratio of two variables. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the average quantity remitted in the last year by individuals from the country of birth in Spain minus the average quantity remitted in Spain. The variable size (at the municipality level) by quality is instrumented using size at the province level by quality. The coefficients are market with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5%, and *** if the level of significance is less than 1%. All regressions include size interacted by quality as well as size, individual characteristics involving a male dummy, age, age squared, indicators for time of residence, a nationality binary variable, a documented dummy, indicators for the level of education (primary, secondary and tertiary), and a dichotomous variable for being educated in Spain, family characteristics entailing a married dummy, the number of household members, a dichotomous variable for intending to bring some family members to Spain, an indicator for spouse abroad, a binary variable for brother abroad, a dummy for children abroad, an indicator for father abroad and a dummy for mother abroad, economic conditions including an employed dummy, income, an indicator for permanent labor contract, dummies for sector of employment (industry, construction and services), and a binary variable for owning a house in the sending country, municipality dummies and country of birth indicators. Additionally, dummy variables account for missing observations in the following variables: Documented, educated in Spain, brother abroad, children abroad, father

abroad, mother abroad, income and permanent contract. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The sample is composed by individuals from countries with more than 5000 individuals living in Spain. The standard errors are clustered by municipality and country of birth groups.

Chapter 3

High-School Dropouts and Transitory Labor Market Shocks

3.1 Introduction

The 2006 European Commission Progress Report on Education Policies states that "the high number of [high-school dropouts] is an obstacle to securing access to the knowledge-based society and greater social cohesion in the European Union"[1]. The European Union established an objective for 2010 of a 10% rate of high-school dropouts, as defined by persons aged 18 to 24 who have attained at most lower secondary education and who declare not having received any education or training in the previous four weeks. This objective was still unfulfilled in 2009, when the proportion of early school leavers in the EU-27 was more than 15%. In this paper, I show that changes in labor market conditions in recent years have prevented the achievement of a lower high-school dropout rate, specially for males.

The desire to enter the labor market is one important motivation for drop-

[1] Along this paper we will use the notion of early school leavers as defined by the European Union, but we will refer to early school leavers under the more common denomination of high-school dropouts.

ping out of high-school. The recent housing boom has altered the labor market opportunities faced by youngsters and is therefore likely to be responsible for changes in high-school dropout trends.

Having a high-school diploma has been shown to reduce unemployment and increase wages. These differences are unrelated to individual characteristics as argued by Stern, Paik, Catterali, and Nakata (1989). I show that, by reducing the negative consequences of not obtaining a high-school diploma, the recent housing boom has induced more youngsters to drop out of the educational system before getting a high-school diploma. From a policy perspective, this finding implies that creating the right incentives to get educated even in the presence of temporary labor market shocks can help to avoid high unemployment rates at the end of the economic upturn.

The construction sector presents two features that make it appropriate to estimate the effect of improvements in employment prospects for low educated individuals on the decision to drop out of school. First, it employs mainly men and second, the proportion of low educated workers is higher than in the rest of the economy. This implies that the upturn in construction activity will predominantly affect low educated men, and this will allow us to estimate the impact of better employment opportunities for low educated workers by comparing male to female high-school dropout probabilities. Additionally, the magnitude of the increase in construction activity and the differences in the incidence of the housing boom across regions provides the necessary variation to correctly identify the effect.

The implications of the housing boom for high-school dropouts are tested using Spanish data. The case of Spain is of special interest because of the situation of its educational system as well as the magnitude of the recent housing boom. Spain is the country with the highest incidence of high-school dropouts in the OECD (see Graph 1). This incidence has been rising in recent years, reaching 30% in 2009. Additionally, while in the US house prices increased by 104% between 1997 and 2007, prices in Spain increased by more than 190%

in that same period (see Graph 2). Regarding the intensity of construction activity in the period, the ratio of construction value added over GDP and the number of new dwellings experienced a boost of 66% and 90%, respectively (see Graphs 3 and 4).

In 2005, more than 29% of high-school students abandoned their studies to enter the workforce in Spain. Out of all individuals that left high-school to work, more than 23% of them worked in the construction sector. Disaggregating by gender, 32.61% of all males that leave high-school to work, do it in the construction sector, while the corresponding figure for females is negligible[2].

Some earlier papers have devoted their attention to the role of labor market conditions in explaining student drop out decisions. The vast majority of previous studies have addressed this question by including macroeconomic indicators in the equation modelling the probability of dropping out.

For the Spanish case, the early paper by Peraita and Pastor (2000) explores the determinants of primary school dropouts focusing on the role played by family background and economic conditions. They find that the unemployment rate negatively affects the probability of dropping out of primary school. Also using Spanish data, the influence of labor market conditions on the demand for post-compulsory education (ages 16 to 18) is studied by Petrongolo and San Segundo (2002). They find that the youth unemployment rate has a positive influence on the probability of staying-on while the general unemployment rate has a negative impact on that probability.

The previous two papers estimate the effect of labor market conditions on dropout behavior using cross-sectional data. Closer to this paper in terms of methodology is the study by Rees and Mocan (1997). They use a panel of districts in New York State and conclude that there is a negative relationship between the overall unemployment rate and the proportion of high-school students who drop out of school in a given year. Controlling for unobserved

[2]These data are obtained from the 2005 Spanish Education and Labor Transitions Survey (Encuesta de Transición Educativo-Formativa e Inserción Laboral (2005)).

district characteristics is essential to reach this conclusion.

Although many papers argue that labor market conditions are important in education decisions, this is not a closed question. Using US Census data, Waren and Lee (2003) find no effect of labor market conditions for individuals aged 16 to 19 years old on high-school leaving. This is coherent with the conclusion reached by Schady (2004) for the impact of the 1988-1992 macroeconomic crisis on attendance rates of children in Peru. In contrast, this paper also finds a high and significant impact of the crisis on educational attainment.

The recent Spanish housing boom was caused by the confluence of financial as well as demand factors (see Gonzalez and Ortega (2009)) and had a great influence on local labor markets. It improved the labor market prospects of high-school dropouts with respect to those of more educated workers. Theoretically, the gains from leaving the school system are represented by the discounted sum of the interactions of probability of employment and expected wage in each period if one is low educated, minus the discounted sum of the interactions of probability of employment and expected wage in each period if one is highly educated[3]. In the last decade, both employment opportunities and wages have increased sharply in the construction sector. This raises the gains from leaving the school system for men. Graph 5 shows the huge increase in employment in the construction sector. Graph 6 makes apparent that construction wages have risen more than the average wage in the economy. Given that construction employs less educated workers intensively as compared with the overall economy, agents in labor markets where the housing boom was more pronounced are expected to leave school earlier[4].

The previous hypothesis is tested using individual data from the Spanish Labor Force Survey in combination with data from the Spanish Regional Ac-

[3]This argument is made assuming a binary decision of whether to complete high-school. This is a plausible assumption in our case because Spanish high-school students rarely work.

[4]According to the data obtained from the Spanish Labor Force Survey, the average share of high-school dropouts working in construction for the period 1995-2007 is 73.4%. In contrast, the average share of high-school dropouts working in the overall economy for that same period is only 52.6%.

counts and the Spanish Ministry of Housing. The sample is composed by individuals aged 18 to 24, out of which 34% are high-school dropouts. Men represent 61% of total high-school dropouts. There is notable variation across regions within Spain. The maximum is found in some Mediterranean regions like Alicante and Almeria, where the ratio reaches more than 42%, and the minimum in the Northern regions, i.e., Navarra and Pais Vasco, with ratios under 20%. Regarding the evolution over time, the high-school dropout rate has continuously decreased since 1995 when the high-school dropout rate was around 40%, until it reached a minimum of 28% in 2000. Since then, it has remained more or less stable until 2007, when it reached 30%.

The empirical correlation between the proportion of high-school dropouts and the intensity of the housing boom as measured by the ratio between construction and total value added in each province is positive for both males and females. This is represented in Graph 7. The line that approximates the relation between high-school dropouts and construction activity is however steeper for males (0.55 versus 0.25 of females) and, moreover, the slope is not significantly different from zero for females. This illustrates the findings in the main econometric specification, where a differential positive effect of construction activity on high-school dropouts is found for males relative to females, while the average effect on all individuals is positive but insignificant.

The causal relationship between construction activity in a regional labor market and high-school dropouts is estimated by using the fact that changes in construction activity change employment prospects of men while it leaves those of women practically unaffected. The evolution of male and female employment in construction is displayed in Graph 8. Women have always represented a negligible fraction of construction workers.

The results show that variations in construction activity as measured by changes in construction over total value added in a region make men more likely to drop out of high-school, while women remain unaffected. This effect is consistent with the estimations using number of new dwellings as an alternative

measure of construction activity. In addition to this contemporaneous effect, we also find a significant positive effect of construction activity at the age of 17, i.e., at the time when the decision to drop out of high-school is more likely to be taken.

I conclude that changes in labor market prospects for uneducated relative to educated workers, even if they are transitory in nature, can have significant effects on schooling decisions.

The remainder of the paper proceeds as follows. Section 2 presents the methodology used to estimate the effect of the changes in labor market conditions as a result of the housing boom on high-school dropout rates. Section 3 describes the databases, the variables and the sample used in the analysis. Section 4 discusses the empirical results and includes some robustness checks and extensions. Finally, section 5 concludes.

3.2 Methodology

The aim of the empirical exercise is to test whether changes in labor market conditions for less educated workers change individual decisions to drop out of high-school.

The construction sector is characterized by employing mostly men. In fact, the average proportion of Spanish women employed in construction was only 5% from 1980 to 2008. We take advantage of this feature of the construction sector and identify the effect of variations in labor market prospects on high-school dropout by exploring the differential effect of variations in construction activity on males with respect to females. Thus, the explanatory variable of interest is defined as the interaction between construction activity and a male dummy.

The probability of high-school dropout is assumed to have a logistic form

and is then estimated by means of the following equation:

$$y_{ijt} = \frac{\exp(\beta Z_{ijt})}{1 + \exp(\beta Z_{ijt})} \tag{3.2.1}$$

with

$$\beta Z_{ijt} = \beta_0 + \beta_1 C_{jt} \cdot male_{ijt} + \beta_2 C_{jt} + \beta_3 male_{ijt} + \beta_4 X_{ijt} + \beta_5 W_{jt} + \beta_6 \eta_j + \beta_7 \xi_t + \varepsilon_{ijt}$$

where y is an indicator variable equal to one if individual i living in province j at year t is a high-school dropout and zero otherwise, C measures the intensity of construction activity, *male* is a dummy taking value 1 if the individual is a man and 0 if a woman, X is a vector of individual and family characteristics including age, a dummy for living with one's father, a binary variable for living on one's own, an indicator for living with one's mother, a dummy for father working, a binary variable for mother working, an indicator for cohabiting father, a dummy for cohabiting mother, and an indicator for living without any of the parents, W represents three regional variables, namely, total value added, youth unemployment rate, and overall unemployment rate, η is a vector of province dummies, and ξ includes year dummies[5]. Finally, ε is the residual.

The high-school dropout rate in a province is likely to exhibit time dependence. To account for Bertrand, Duflo, and Mullainathan (2004)'s critique, standard errors are clustered at the province level[6].

Taking equation 1 as a base, we estimate the contemporaneous effect of construction activity on high-school dropouts. For those individuals that dropped out of high-school at an earlier time, the coefficient β_1 is reflecting the influence of construction activity on the probability of reinsertion to the education

[5]The information on parents' education and employment status is only available for cohabiting fathers and mothers. Hence, the dummies for cohabiting father and cohabiting mother serve to account for the missing observations.

[6]The paper by Bertrand, Duflo, and Mullainathan (2004) calls our attention to the fact that standard errors are inconsistent when outcomes are serially correlated and the estimation is done employing difference-in-differences techniques.

system. However, many individuals may have actually taken their decisions to drop out of high-school at the average age at which students are in high-school. To include this possibility, we estimate the differential effect of construction activity when the individual was 17 years old for males with respect to females. Therefore, the key explanatory variable in this specification is the interaction of construction activity at the age of 17 and a male dummy. The estimated equation remains as follows:

$$y_{ijt} = \frac{\exp(\beta Z_{ijt})}{1 + \exp(\beta Z_{ijt})} \tag{3.2.2}$$

with

$$\beta Z_{ijt} = \beta_0 + \beta_1 CI^{17}_{ijt} \cdot male_{ijt} + \beta_2 CI^{17}_{ijt} + \beta_3 CI_{ijr} + \beta_4 male_{ijt} + \beta_5 X_{ijt} + \beta_6 W^{17}_{jt} + \beta_7 \eta_j + \beta_8 \xi_t + \varepsilon_{ijt}$$

where CI^{17} reflects the construction activity measure when the individual i was 17 years old, W^{17}contains total value added in the province at the age of 17, and the rest of variables are as defined above[7].

As in equation 1, standard errors are clustered at the province level.

3.3 Data and descriptive statistics

3.3.1 Data sources and sample definition

The data used in the estimations contains individual data from the Spanish Labor Force Survey as well as province level data from the Spanish Regional

[7]Initially, we planned to include contemporaneous total value added in the equation but it has proven to be highly collinear with total value added at 17 and hence, we have excluded it. This should not be a concern because the high correlation existing between total value added and total value added at 17 assures that we are controlling adequately for the impact of economic activity on high-school dropout.

Accounts and the Spanish Ministry of Housing.

The Spanish Labor Force Survey has been collected quarterly since 1976. In practice, more than 60000 households containing around 180000 individuals are surveyed in each wave. The information contained in the survey includes individual characteristics such as age, gender and level of education, working status and family characteristics. The population of interest is formed by working age individuals, i.e., individuals aged 16 to 65 years old.

The sample selected for the analysis is formed by individuals aged 18 to 24 years old. These individuals constitute the set of potential high-school dropouts as defined by the European Union. Only the waves corresponding to the fourth quarter of each years are included. We have chosen the fourth quarter because the decision to drop out of high-school will be observed at the beginning of the academic year which starts in September and then new dropouts will only be observable in the fourth quarter of the year. The time period covered comprises the years from 1995 to 2007. This is determined by the availability of the data on construction.

The Spanish Regional Accounting data follows the methodology established by the 1995 European System of National and Regional Accounts. The data contains information on GDP decomposed by economic sectors defined as agriculture, energy, industry, construction and services. The information is geographically disaggregated up to the province level. The data has yearly frequency and is available for the period including the years 1995 to 2007.

The Ministry of Housing collects administrative data on dwelling acquisition, sole prices and dwelling construction. In the analysis, the number of new dwellings will be used[8]. This data is obtained from the registry on architect's construction permissions. Hence, the reported information is very accurate and comprises the whole universe of dwellings in Spain. The data is

[8]The number of new dwellings is a good proxy of expectations on employment in the construction sector. In fact, Graph 4 shows that the number of new dwellings measure captures better the end of the housing boom than the number of constructed dwellings measure.

aggregated at the province and year level and covers the period 1991 to 2008.

3.3.2 Variable definition and descriptive statistics

The variable high-school dropout is defined according the European Union criteria and is a binary indicator equal to one if an individual fulfills the following two conditions: (i) her level of education is inferior to high-school graduate and (ii) declared not to have followed any official education in the preceding four weeks.

The explanatory variable of interest is the intensity of the construction activity. This is measured as construction over total value added in the province of residence during the year of the individual is surveyed. This measure is interacted with a male dummy in order to address the differential effect of construction activity on males as compared to females.

When exploring the effect of construction activity at the age of 17 on high-school dropouts, the value assigned to each individual corresponds to the measure of construction activity at the time she was 17 years old. This restricts the time period included in the sample because the information on construction activity at 17 is not available for all individuals in the years 1995 to 2001. To avoid sample selectivity issues, only the years for which this information is available for all individuals (2002 to 2007) are included in the analysis.

The descriptive statistics for the variables included in the main regression are displayed in Table 1. The final sample is composed by 230634 individuals. One third of them are high-school dropouts and around one half of the sampled individuals are male. They are 21 years old on average.

Regarding family characteristics, 12% of sampled individuals have a cohabiting father with high-school education and the proportion of individuals who have a cohabiting mother with high-school education is only one percentage point lower. Only 9% of sampled individuals have a university graduated

cohabiting father and the same proportion applies for university graduated cohabiting mothers. Additionally, 60% of individuals have a cohabiting father who is working while only 30% of them have a cohabiting mother who is working. Finally, 18% of sampled individuals do not live with their fathers. This proportion is reduced to 13% for individuals not living with their mothers and is even smaller (5%) for individuals not living with any of their parents.

Average construction over total value added assigned to individuals in the sample is around 10% and the average number of constructed dwellings per one thousand province inhabitants aged 18 to 24 is 0.3.

The reported figures are similar to the ones for the sample included in the regression estimating the effect of construction activity at age 17. These are reported in Table 2. The number of individuals is reduced to 86953. The only remarkable differences in terms of descriptive statistics are that the high-school rate is slightly lower, cohabiting parents are more educated on average, the proportion of sampled individuals with working cohabiting father is hardly reduced while the proportion of individuals with working cohabiting mother is a little higher as compared to the descriptive statistics for the sample included when estimating the contemporaneous effect. These differences are intuitive because the period is restricted to recent years and educational attainment and women participation in the labor market have been continuously increasing in time.

Table 3 contains the descriptive statistics for the sample included in the regressions where construction activity at 17 is measured using number of new dwellings at 17. The period included is shorter and more recent on average than the period in the contemporaneous effect regressions but longer and less recent on average than the period in the regression where construction activity is measured using construction value added at 17. Therefore, the mean values for high-school dropout rate, parents' education attainment and mother's working status are between those in the two tables described above.

3.4 Empirical results

The objective of the empirical exercise is to test whether changes in labor market conditions that improve labor market perspectives for the low educated workers make more likely that individuals dropout of high-school.

The identification strategy makes use of the fact that men experience better employment opportunities as result of an increase in construction activity while women do not.

In practice, we focus on the sign of the coefficient associated to the interaction of the measure of construction activity and a male dummy in the equation for the probability of being a high-school dropout. A positive and significant value of this coefficient is interpreted as temporary improvements in labor market prospects for less educated workers inducing a rise in the probability of high-school dropout.

3.4.1 Contemporaneous effect

In this section, we discuss the estimated differential effect of changes in regional construction activity over time on high-school dropout probability for males versus females.

Table 4 displays the results for the estimation in which the probability of dropping out of high-school is assumed to have a logistic functional form.

The impact of the construction activity on male versus female high-school dropout probability is positive and significant. In contrast, the average effect of construction activity is positive but statistically indistinguishable from zero. This corroborates the hypothesis that labor market shocks that improve employment prospects for less educated workers significantly increases the likelihood that individuals dropout of high-school. The estimated coefficient associated to the variable construction activity interacted with male in

the logistic equation is 2.937. This is interpreted as a one unit increase in construction activity as measured by the share of total value added that is produced by the construction sector inducing an increment in the probability of high-school dropout for the average individual of 0.57.

One could argue that the intensity of construction activity may affect the high-school dropout rate not through labor market conditions but through affordability of housing. The latter channel could operate such that when construction activity increases, housing prices decrease and more individuals dropout of high-school to start working and buy a house. However, in our data, construction activity is positively correlated with housing prices. Hence, if the previous critique was applicable, more intense construction activity together with higher prices would induce less dropouts. However, the estimation results show that men dropout more in the presence of higher housing prices. This is counterintuitive given that it is male working status what usually determines household formation. Hence, our identification strategy is assuring that the estimated effect is not a consequence of changes in affordability of housing.

Another source of concern could be that the recent housing boom is contemporaneous to an important economic upturn and, therefore, the estimated effect could be a consequence of men being differently affected by the economic cycle. The results reached by Yamashita (2008) when exploring the effects of the Great Depression on educational attainment suggest that the average effect of the economic cycle is negligible. However, we still address the possibility that the general level of economic activity has an effect on high-school dropouts by including regional total value added as a control in the estimated equations. Any persisting bias is expected to be negative because women's labor supply is more affected by the economic cycle[9]. This indicates that, if the economic cycle was influencing our results, the actual effect would be higher in magnitude than the estimated one.

[9]In unreported regressions, we have included the interaction of total value added and a male dummy as an additional control variable. The associated coefficient is negative and insignificant. This constitutes additional evidence that the effect of the economic cycle, if there is any, is stronger on women.

Additionally, we discuss the potential existence of reverse causality, i.e., variations in high-school dropouts causing changes in construction activity. Our results could be explained by reverse causality if increments in the high-school rate in the province reduce construction wages and therefore increase construction activity by increasing its profitability. However, as it was previously noted, construction wages rose more than wages in other sectors during the period of study and therefore if the labor supply of high-school dropouts has some influence on construction activity through wages, our coefficient of interest would be downward biased. However, the literature on the causes of the housing boom (see Glaeser et al., 2009 for a recent example) indicates that labor supply does not play a role in explaining the expansion of the construction sector in recent years and then, we expect no impact of reverse causality in the estimations.

In the empirical analysis we define the relevant labor market for an individual at the province level. Given the low geographical mobility of the Spanish population, this is considered a reasonable assumption[10]. However, if some individuals dropout of high-school to become construction workers in a different province where the demand of construction workers is higher, the actual impact of the housing boom on high-school dropouts is more pronounced than the estimated by defining the labor market at the province level.

Additionally, one could argue that the estimated effect is a consequence of changes in the composition of the pool of individuals in each province. To address this, I have repeated the analysis over individuals that live in the same province where they were born. The results are almost invariant with respect to those obtained using the full sample.

Regarding the rest of covariates in the logistic regression, males are more likely to drop out of high-school. The influence of age could be represented using an inverted U-shape with a maximum in 21 years old. Immigrants are

[10]The low mobility of the sampled individuals is illustrated by the fact that more than 87.6% of sampled individuals live in their province of birth.

significantly more likely to drop out. Individuals are less likely to drop out if their parents are more educated and if they are working. This is coherent with the findings of Maani and Kalb (2007) that economic resources play a significant role in school leaving decisions. Finally, those living with only one parent are less likely to drop out of high-school while living on one's own is associated to a higher probability of being a high-school dropout. The positive coefficient associated to the youth unemployment rate and the negative coefficient for the general unemployment rate are coherent with the findings of Petrongolo and San Segundo (2002). However, in our regressions the coefficients are not significant. This can be due to the correlation between the unemployment rate and total value added.

3.4.2 Effect of construction activity at the age of 17

The estimation results for the impact of construction activity at age 17 on the probability of high-school dropout are displayed in Table 5. The differential impact of construction activity at 17 on males with respect to females is positive and significant. The point estimate is 1.986 which is equivalent to a marginal effect of 0.352 when the covariates are evaluated at their average values. This is consistent with the sign of the contemporaneous but is smaller in magnitude. In consonance with the contemporaneous effect results, the average effect of construction activity at 17 on both males and females is statistically indistinguishable from zero while total value added at 17 has a positive and significant impact. In contrast, contemporaneous construction activity is positive and significant. This differs from the result obtained for the coefficient associated to this variable in the regression for the contemporaneous effect. The reason is that it contains the average and the differential contemporaneous effect and the latter is significant.

The estimated coefficients for the rest of controls are extremely similar to the ones obtained in the contemporaneous regression.

3.4.3 Construction activity measured by the number of new dwellings

In order to test the consistency of the results under different measures of construction activity, the analysis is repeated substituting construction over total value added by number of new dwellings over population aged 18-24 in the province. The estimation results are displayed in Table 6 for the contemporaneous effect. The point estimate for the differential effect of construction activity as measured by number of new dwellings over population aged 18 to 24 on males versus females is 0.38. This can be interpreted as the derivative of the probability of high-school dropout with respect to construction activity interacted with male and evaluated at the mean values of the covariates being 0.74. Similarly to the results when construction activity is measured by value added, the average effect of construction activity as measured by number of new dwellings is negligible. Total value added is also positive but the estimate becomes insignificant. The rest of coefficients have extremely similar magnitudes and significance levels to the ones reported for the contemporaneous effect of construction activity as measured by construction value added.

The results for the estimation of the effect of construction activity at 17 as measured by number of new dwellings can be found in Table 7. The point estimate for the differential effect of construction activity at 17 on males versus females is 0.17 which is equivalent to a marginal effect evaluated at the mean values of the covariates of 0.3. The rest of coefficients are very similar to the ones displayed in Table 5.

In general, the contemporaneous and construction activity at age 17 effects estimated under different measures of construction activity are very similar.

3.4.4 Robustness checks and additional specifications

Effects of changes in other economic sectors

The Spanish housing boom was contemporaneous to an important economic upturn. Production was increased and employment was generated also in the rest of economic sectors. Hence, other sectors may have played a role in explaining education decisions. This is partly taken into account in the previous estimations by including total value added, youth unemployment rate and unemployment rate as controls in the specifications. However, as all other sectors affect differently males and low educated workers, if some other sector's share in total value added is correlated with the construction share this could explain our results.

The empirical exercise is repeated for each of the other economic sectors including each sector' share in total value added instead of the construction share. Given the correlations between sector shares in total value added displayed in Table 8, other sector's level of activity could explain the results found for the construction sector in the following cases: (i) agriculture activity has a positive impact on high-school dropouts for males versus females, (ii) industry activity has a negative effect on male with respect to female dropout, (iii) energy activity increases the likelihood of dropout for males versus females and, (iv) services activity has a positive and strong impact on male relative to female high-school dropouts.

Graph 9 represents, for each economic sector, the share of male workers as well as the proportions of male and female workers that are high-school dropouts. The agriculture, energy and industry sectors are characterized by the prevalence of male workers while the service sector employs the majority of working women. Regarding male high-school dropouts, agriculture and industry have relatively high incidence of male high-school dropouts while energy and services have relatively low male high-school dropout rates. Female dropouts rates are high in agriculture, medium in services and low in energy and construction.

Given the employment composition described above, other sectors' effect in the probability of high-school dropout are supportive of our main hypothesis

and, therefore, consistent with the results found for the construction sector in the following cases: (i) the agriculture and industry sector have a positive impact on high-school dropouts for males versus females (an increase in agriculture or industry activity constitutes and improvement in labor conditions for low educated men), (ii) the energy sector have a negative impact on high-school dropouts for males versus females (an increment in energy activity enhances employment opportunities for highly educated men), or (iii) the service sector has a negative impact on high-school dropouts for males versus females (services growth is associated with better labor market prospects for highly educated men and better employment opportunities for all low and highly educated women).

Table 9 displays the results of the estimations using other sectors' level of activity and their interaction with male as alternative explanatory variables. We find that the coefficients for agriculture, industry and energy are insignificant while the service sector has a negative influence on high-school dropouts. Hence, the alternative explanation in which other sectors are leading the effect found for construction does not apply in this context. However, the results found for the service sector support the hypothesis that improvements in labor market perspectives for low educated workers induce more dropouts while increases in expected gains of education cause less dropouts.

Moreover, the regression simultaneously including estimates for the differential effect of construction and services activities on males versus females gives almost indistinguishable estimates from the ones found when studying the construction and services effects separately. This can be explained by the low correlation between the construction and service share in value added. This constitutes additional evidence that changes in the service sector are unlikely to have any impact in our results for construction but have their own effect instead.

Sample composed by different age groups

The sample used in the previous regressions is composed by individuals

aged 18 to 24 years old. This has been chosen in order to be coherent with the European Union definition of high-school dropouts. Additionally, 18 years old is the minimum age to have finished high-school. However, the group of individuals aged 18 to 24 years old is relatively broad and the effects of labor market conditions may be different for younger relative to older individuals. The effect of construction activity on males versus females is estimated on different four subsamples composed by individuals aged (i) 18 to 20, (ii) 21 to 24, (iii) 18 to 22 and (iv) 23 to 24. As it can be seen in Table 10, the results are significant and consistent with the existence of a positive impact of better employment prospects for low educated individuals on high-school dropouts in all cases. The estimated magnitudes are slightly larger for older samples, indicating that those are the ones more affected by labor market conditions when taking their decisions on education.

Effects of construction activity at the age of 18

In our previous analysis we have taken into account the possibility that individuals take their decisions to drop out of high-school influenced by labor market conditions at 17, the average age in high-school. However, grade retention is severe in Spain. This means that individuals could have taken their decision to drop out of high-school influenced by labor market conditions later, at 18. This is the age at which they are legally allowed to start working in construction[11]. To account for this possibility, the equation for the probability of high-school dropout is estimated including the interaction of construction activity at the age of 18 and male as key explanatory variable.

The results displayed in Table 11 are consistent with the findings for the impact of construction activity at age 17. However, they are slightly smaller in magnitude.

[11]The Spanish legislation states that workers under 18 are not allowed to perform certain tasks. Those tasks comprise almost all the tasks that are required in building. However, data shows that more than 20% of total number of 16-17 aged individuals that work do it in the construction sector. This figure almost doubles the average ratio of construction over total of workers (11.5%).

Placebo test

Gender is assigned randomly to each individual by nature in a way such that the population is expected to be composed 50% by males. In this section, we randomly assign a fictitious gender to sampled individuals and repeat the analysis by assuming that fictitious males are affected by the housing boom while fictitious females do not. This exercise is repeated several times and the coefficients are close to zero and mainly insignificant. This shows that it would have been extremely difficult to have found the positive relationship if males were not differently affected by construction with respect to females.

3.5 Conclusion

The European Commission in its 2010 Report on Education Policies states that "targeted measures for preventing [high-school dropout] should be further mainstreamed". To guarantee the efficiency of education policies to reduce the incidence of high-school dropout is important to understand the determinants of the decision to drop out.

This paper shows that labor market shocks that improve prospects for low educated relative to highly educated workers increase the probability of dropping out from high-school.

The effect is identified by means of the increase in employment opportunities for low educated male workers provoked by the housing boom in Spain. The housing boom constituted a worldwide phenomenon caused by financial and demand factors that affected local labor markets. The Spanish housing boom is a great opportunity to identify labor market changes due to the big magnitude of the boom and its heterogenous incidence across regions.

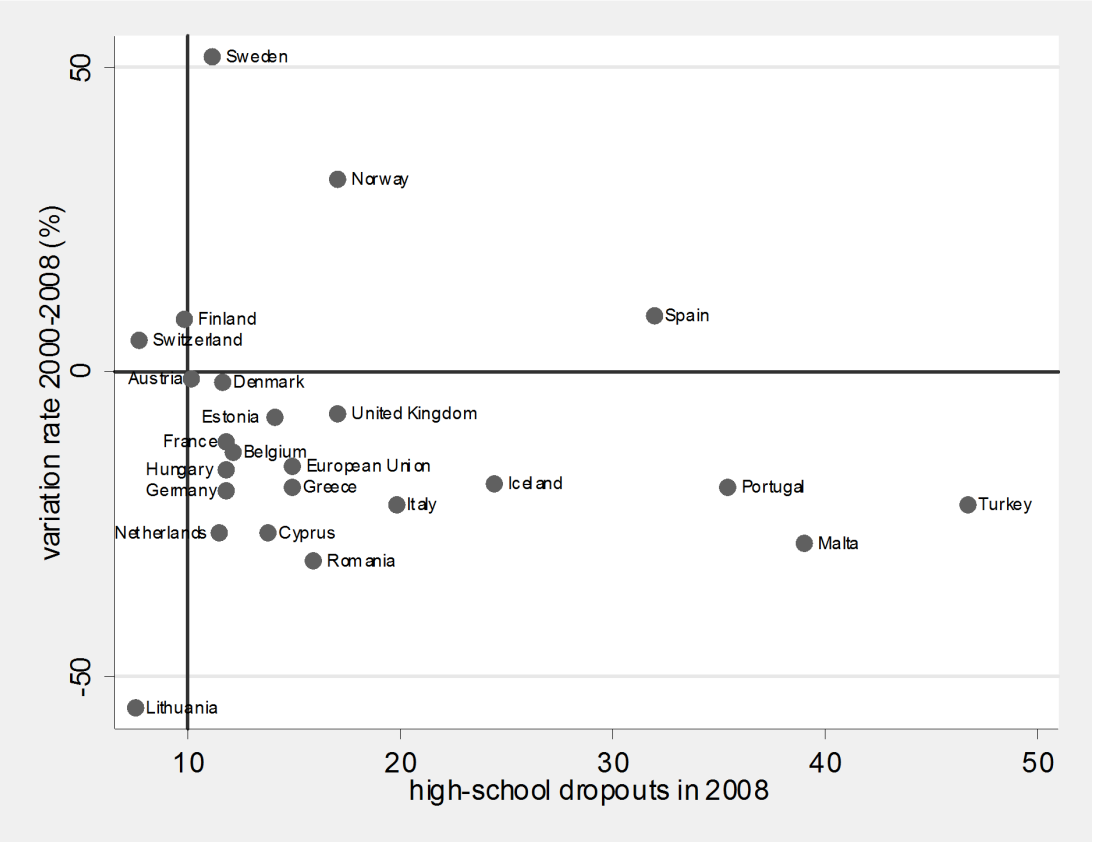
The estimated effect is such that a one percentage point increase in the construction share in total value added increases the probability of high-school dropout for males by 1.74% while it leaves the probability of high-school

dropout for females unaffected. Additionally, a one percentage point increase in construction activity at the age of 17, i.e., when the individual was more likely to be in high-school, increases the probability of high-school dropout for males from 18 to 24 years old by 1.2% while it leaves the probability of high-school dropout for females unchanged. These findings are consistent with the estimations obtained using number of new dwellings to measure construction activity. We have ruled out the possibility that they are the estimated results are the reflection of changes in other economic sectors. Additional results for the impact of services activity on male versus female probability of high-school dropout provide additional support to our hypothesis.

These conclusions suggest that individual schooling decisions largely respond to labor market conditions even when they are temporary. Hence, policy designers should strengthen their efforts to incentivate individuals to get more education in the presence of booms in economic sectors that use low educated workers intensively.

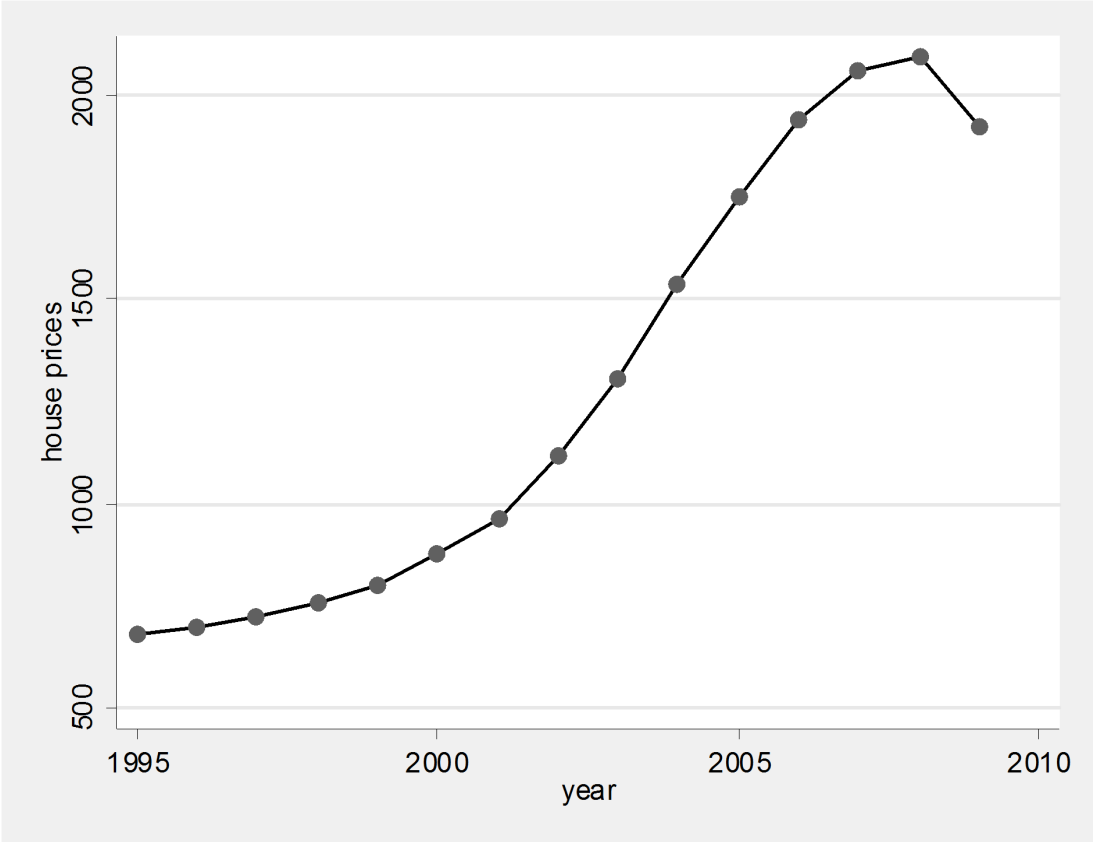
Figures

Figure 1: High-school dropouts across countries



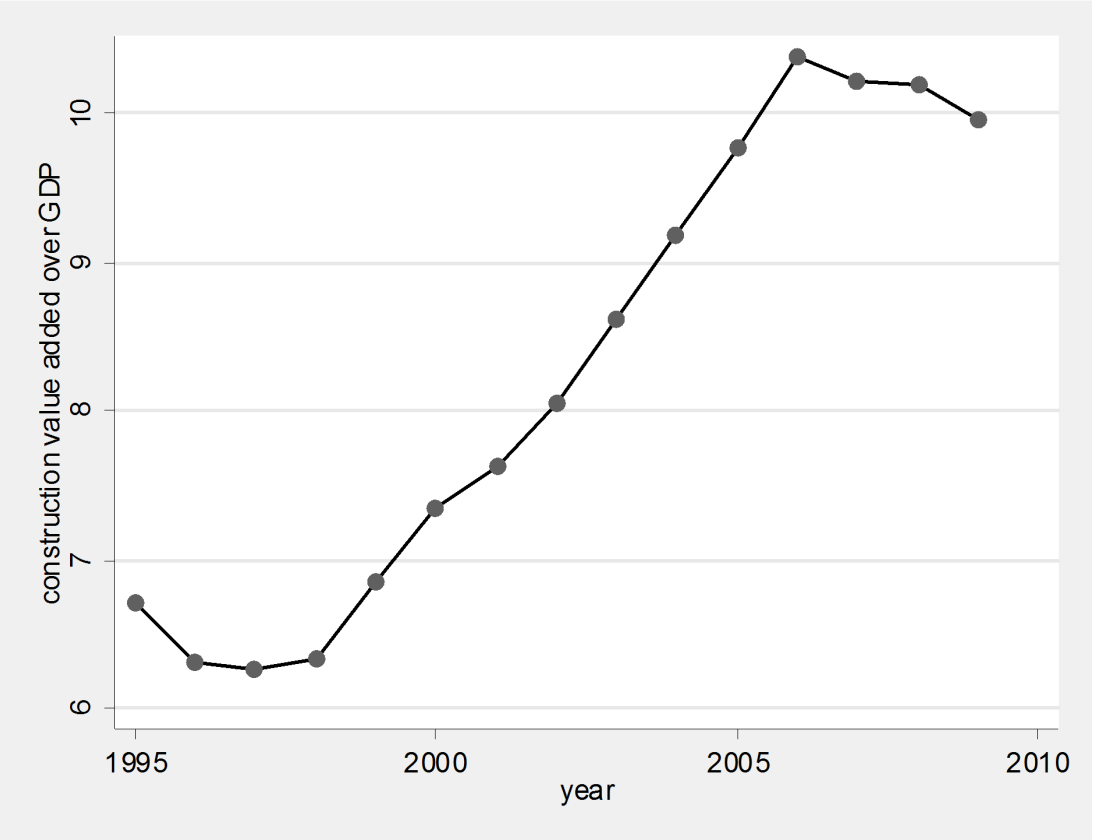
Data source: Eurostat. Information available at http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tsisc060. The primary source is the EU Labour Force Survey. The y-axis refers to the variation rate in the proportion of high-school dropouts from 2000 to 2008 and the x-axis represents the value of the high-school dropout rate in 2008. The vertical line depicts the EU objective stablished for 2010.

Figure 2: House prices over time



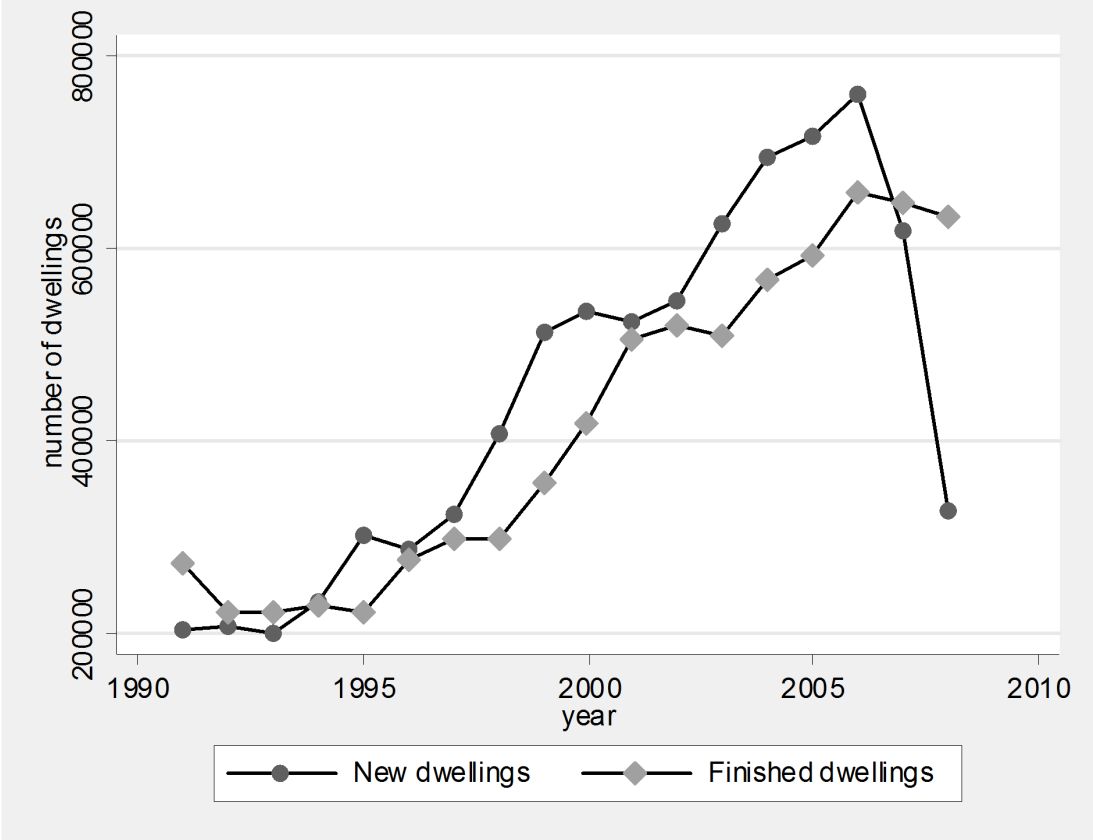
Data source: Ministry of Housing. Each data point corresponds to average house prices in the second quarter of the year for the period 1995 to 2009.

Figure 3: Ratio of construction value added and GDP over time



Data source: Spanish National Accountings. This information can be found at the National Statistics Institute webpage at the address http://www.ine.es/jaxiBD/tabla.do?per=03&type=db&divi=CNTR
Each data point corresponds to the second quarter of each year for the period 1995 to 2009.

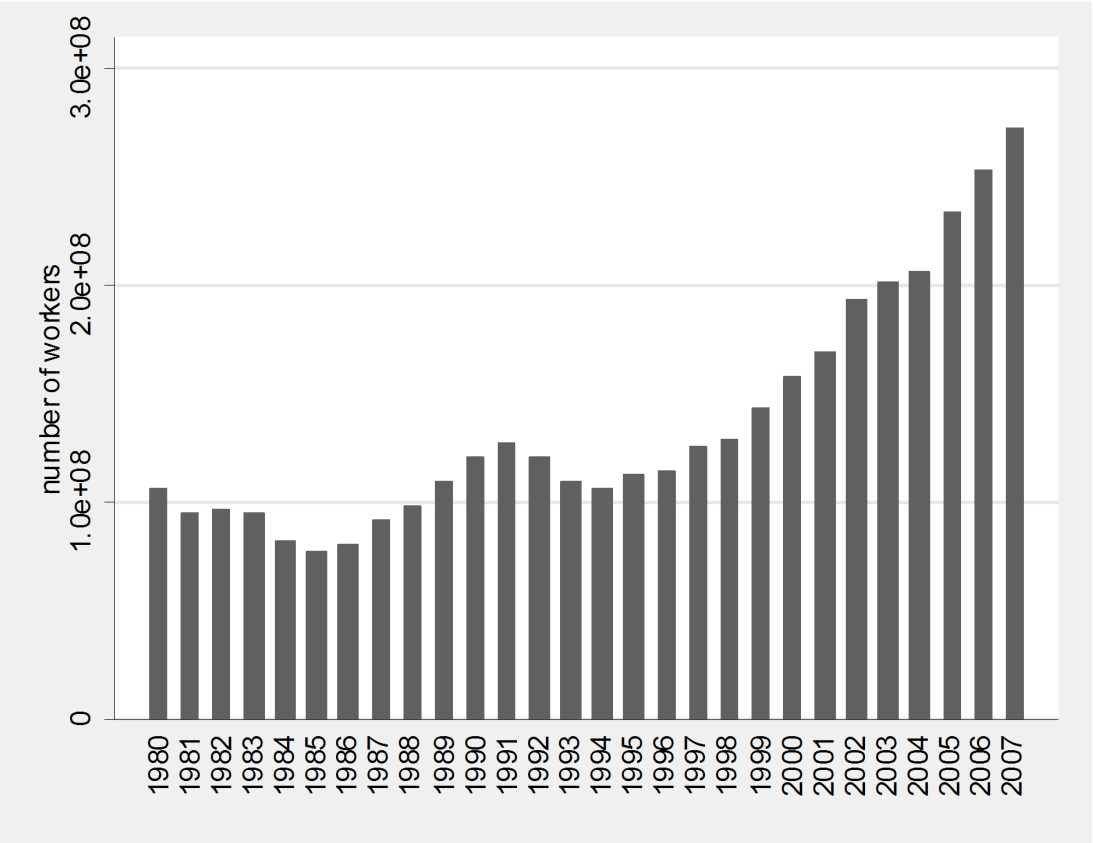
Figure 4: Number of constructed dwellings over time



Data source: Spanish Ministry of Housing. The data points are the result of adding up non-subsidized and subsidized dwellings. Information on non-subsidized dwellings is accessible online from http://www.mviv.es/es/index.php?option=com_content&task=view&id=379&Itemid=434 and data on subsidized can be found at http://www.mviv.es/es/index.php?option=com_content&task=view&id=

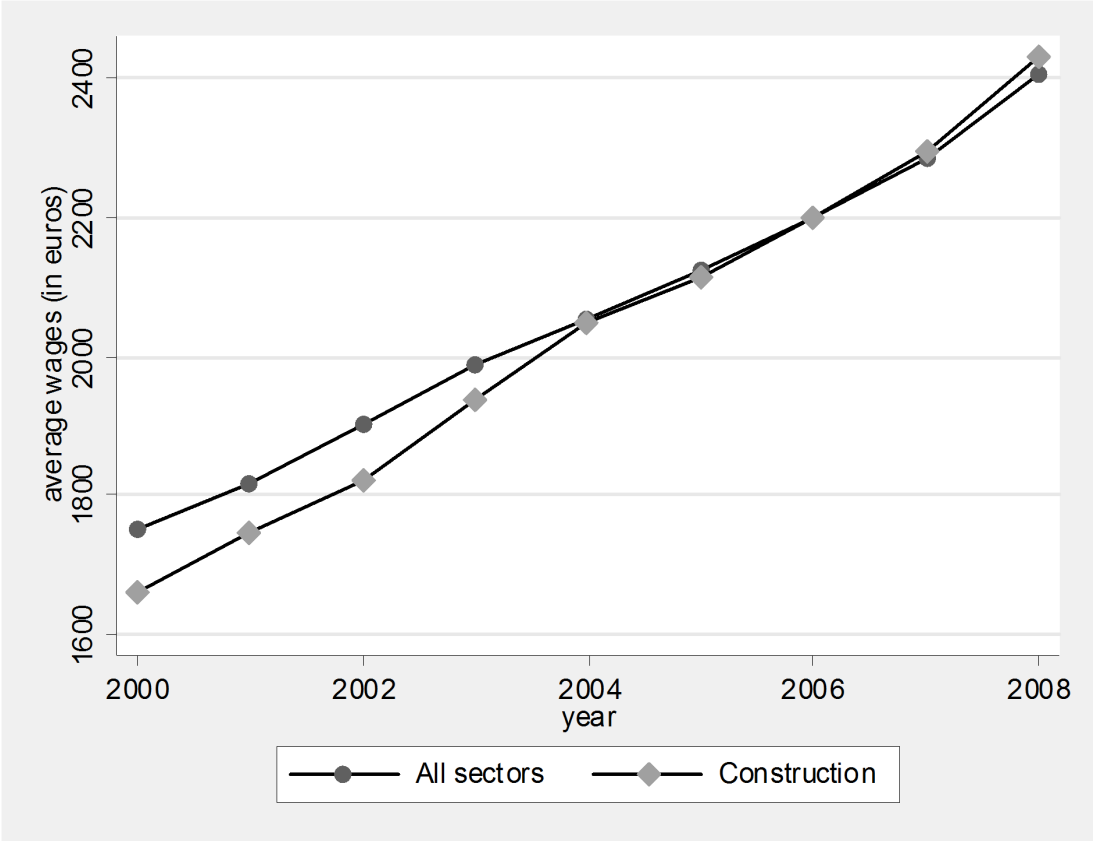
&Itemid=431. This data covers the period 1991-2008.

Figure 5: Number of workers in the construction sector over time



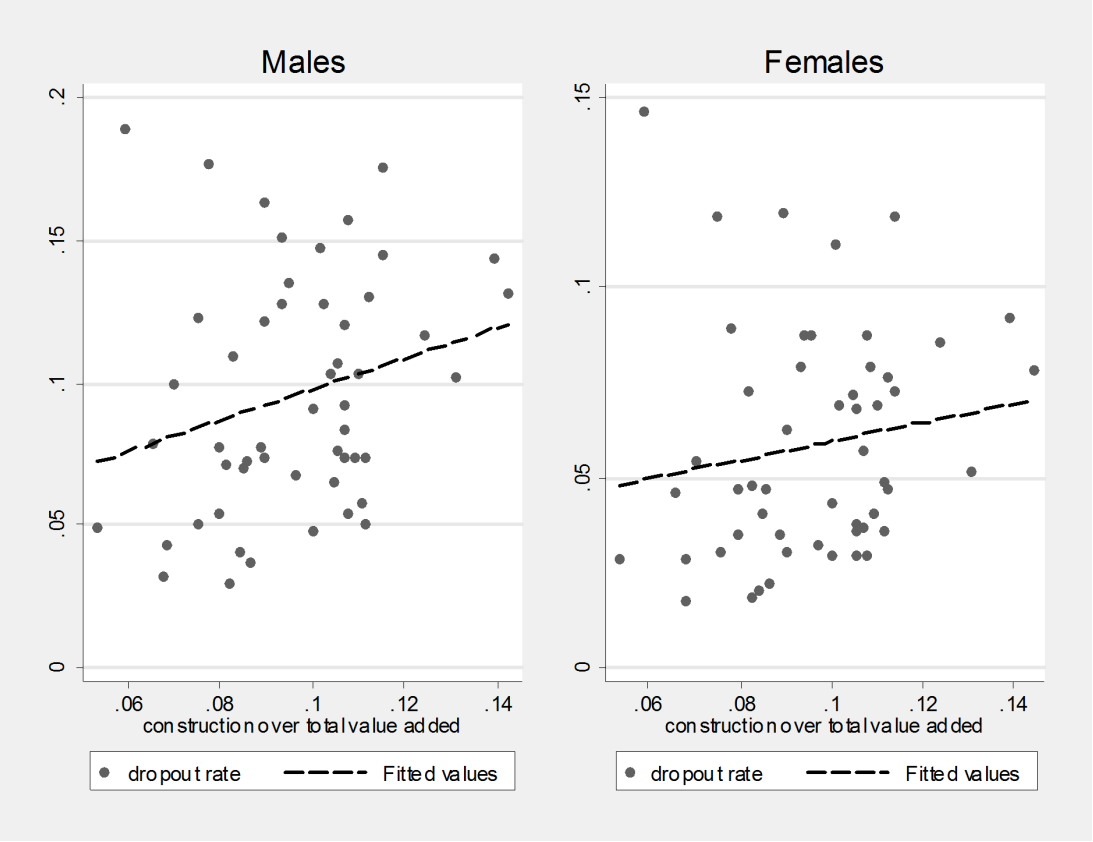
Data source: Spanish Labor Force Survey. Each data point corresponds to the second quarter of each year.

Figure 6: Average wages over time



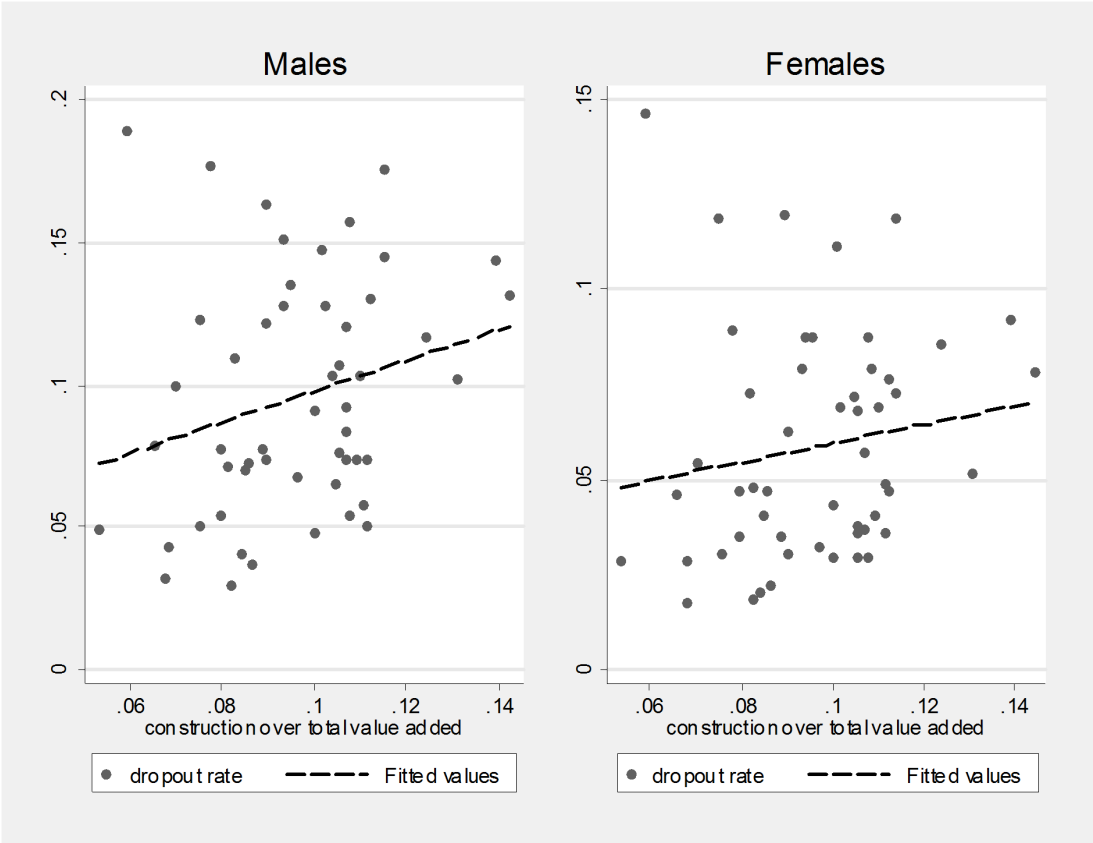
Data source: Labor Costs Quarterly Survey (Encuesta Trimestral de Coste Laboral). Each data point corresponds to the second quarter of each year for the period 2000 to 2008.

Figure 7: Correlation between dropout rate and construction activity averaged by province



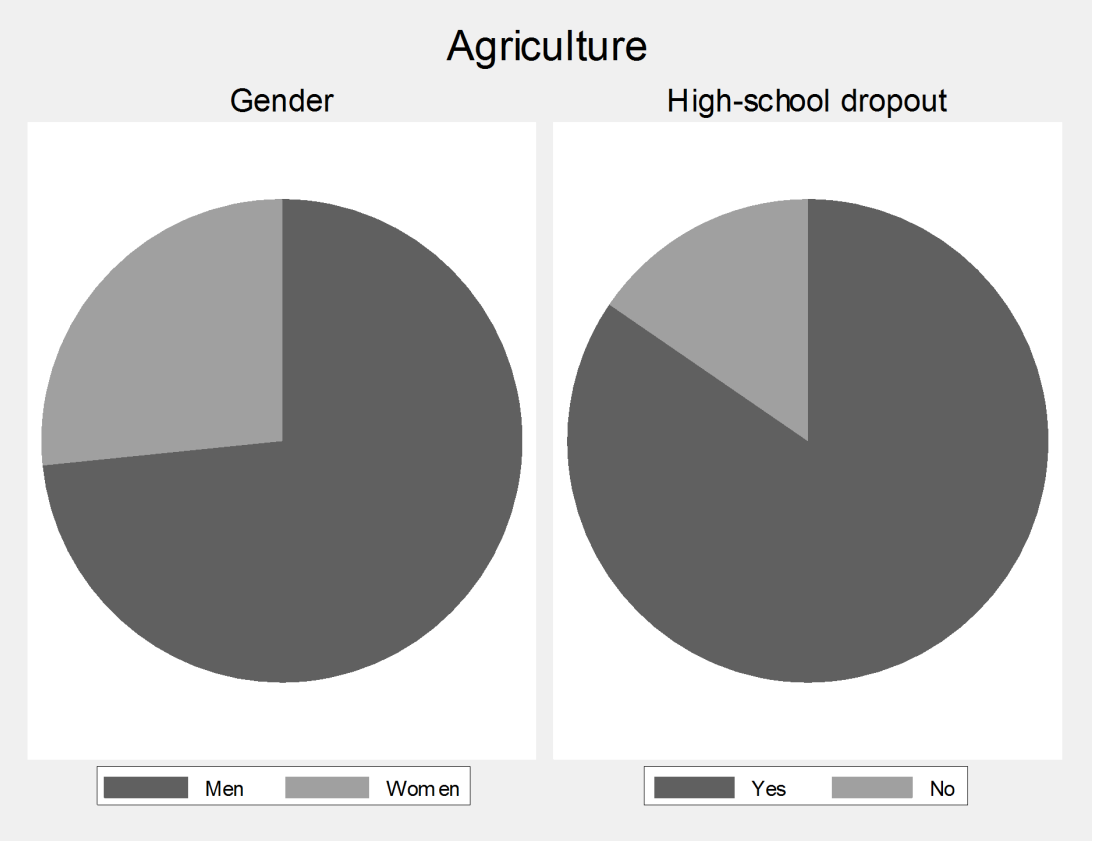
The estimated slope for men is 0.55 and is significant at the 10% level while the estimated slope for women is 0.25 which is statistically indistinguishable from zero. The data on dropout rate is computed using the Spanish Labor Force Survey. The data on construction over total value added is obtained from the Spanish Regional Accounts. Averages by province are computed over the period 1995 to 2007.

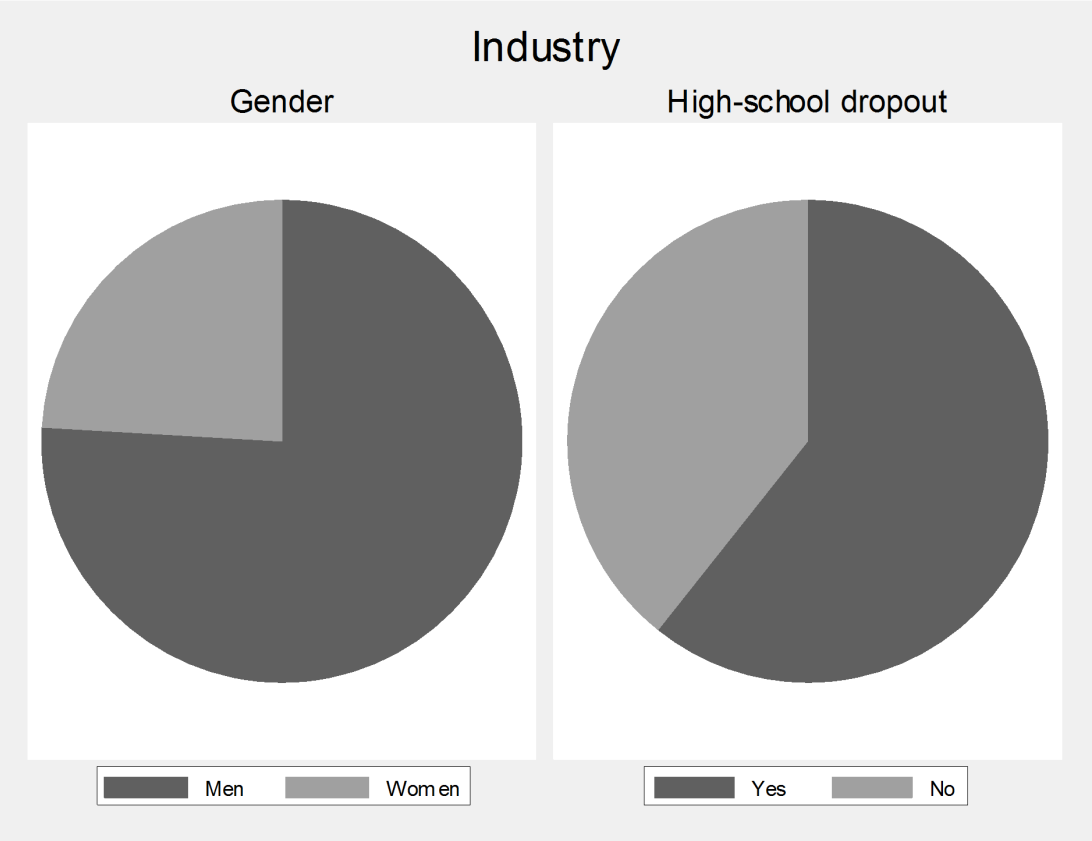
Figure 8: Number of male and female construction workers over time

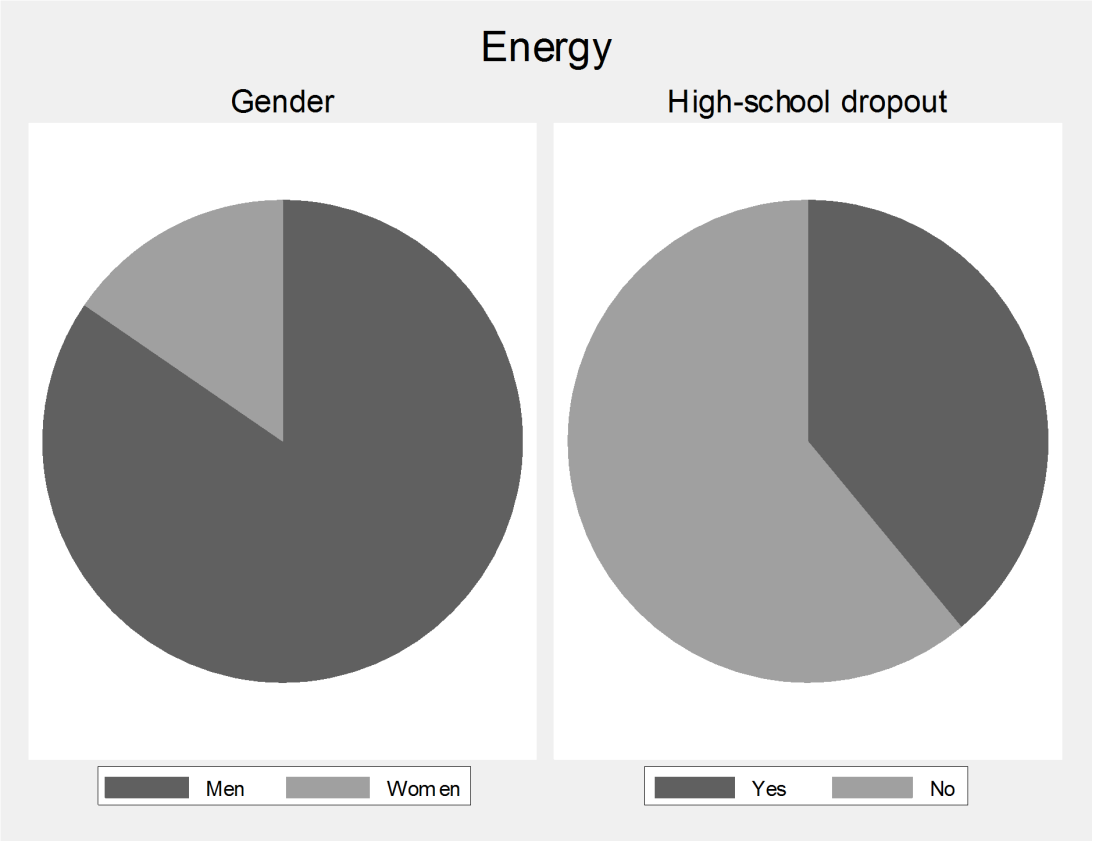


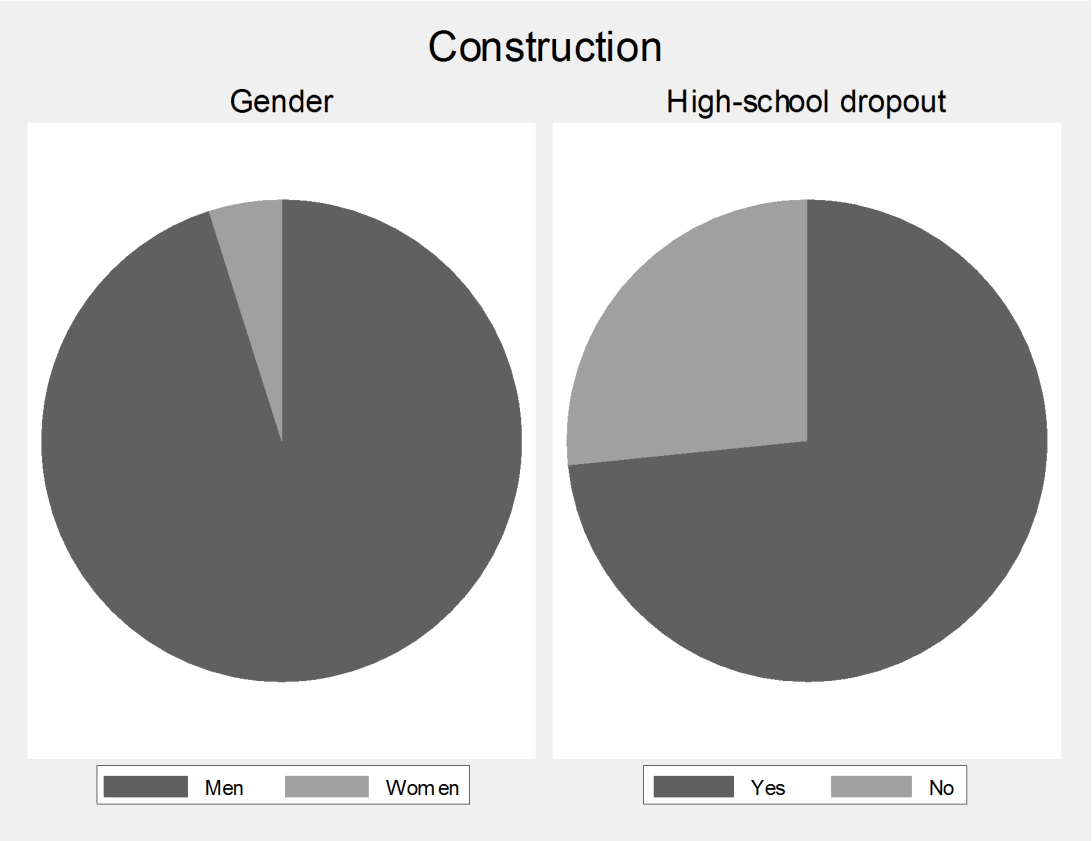
Data source: Spanish Labor Force Survey. Each data point corresponds to the second quarter of each year for the period 1980 to 2007.

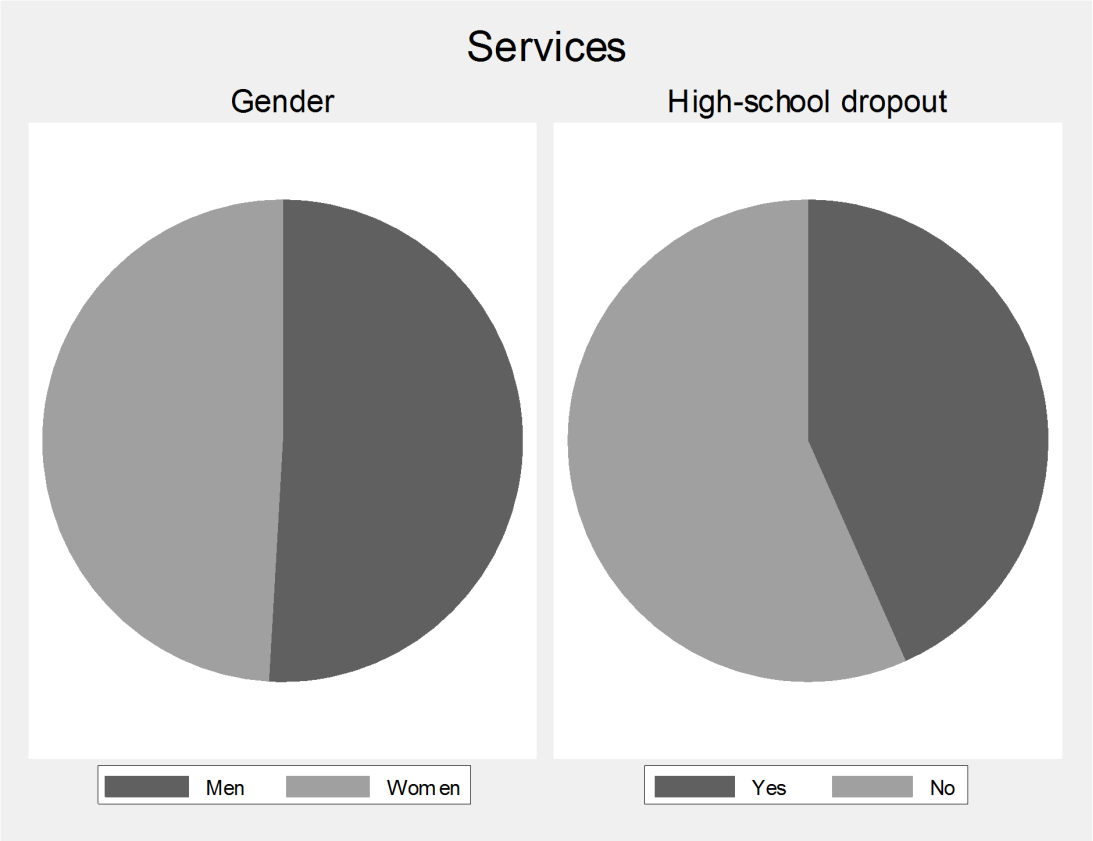
Figure 9: Gender and high-school dropout rates across sectors




Industry
Gender
High-school dropout
Men
Women
Yes
No

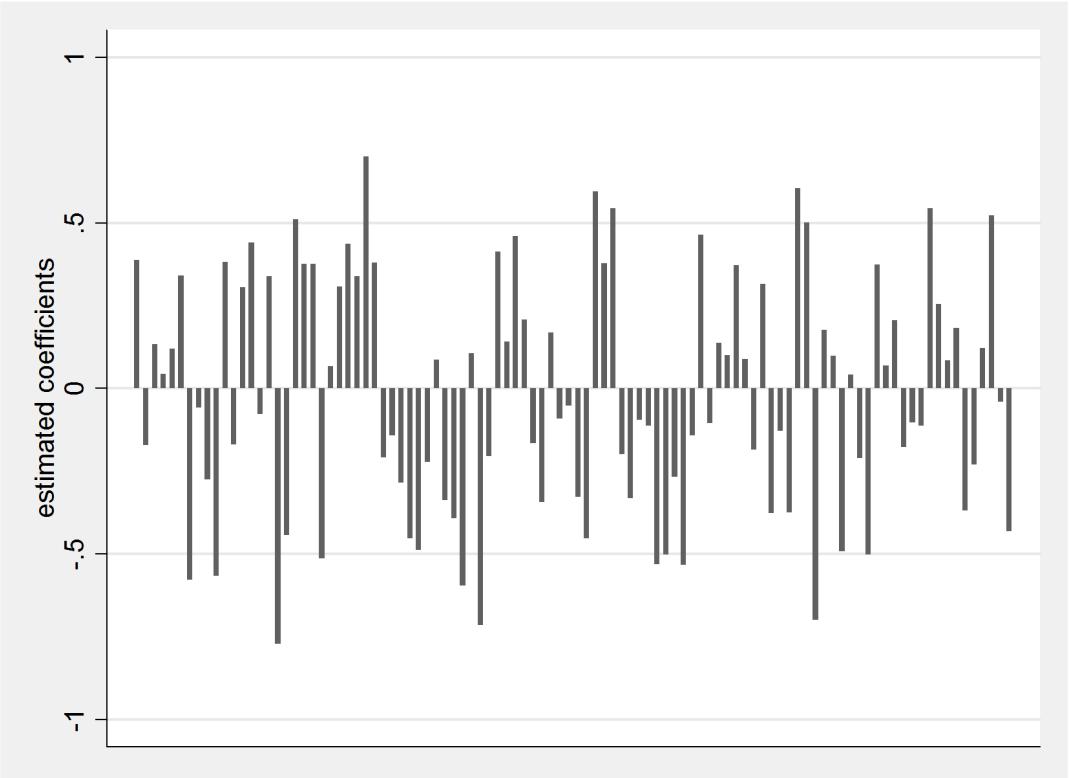

Energy
Gender
High-school dropout
Men
Women
Yes
No


Construction
Gender
High-school dropout
Men
Women
Yes
No



Data source: Spanish Labor Force Survey. Each data point corresponds to the second quarter of each year for the period 1995-2007. The share of dropouts id computed as the proportion of working individuals that do not have a high-school degree and declare not to have received any education or training in the previous four weeks.

Figure 10: Placebo test



Each bar corresponds to the point estimate coefficient associated with the interaction of construction value added and male where male is a random variable equal to one with probability 0.5 and equal to 0 with probability 1 which is different in each of the 100 draws. In each regression, the dependent variable is equal to one if the individual is a high-school dropout and 0 otherwise. Construction value added is measured relative to total value added in the province. All estimations include the same controls, namely, construction value added, total value added, a male dummy, age binary indicators, an immigrant dummy, parent characteristics including father and mother high-school graduate dummies, father and mother university graduate indicators, father and mother working dummies, binary variables equal to one if the parent is present in the household as well as an independent dummy, youth and total unemployment rates, year dummies as well as province binary indicators. The individual data is obtained from the Spanish Labor Force Survey. The information on value added is part of the Spanish National Accounting data and can be found in the webpage of the Instituto Nacional de Estadística. The sample contains individuals aged 18 to 22 years old surveyed in the fourth quarter of each year. The time period comprises the

years from 1995 to 2007. Standard errors are clustered at the province level.

Tables

Table 1: Descriptive statistics for the contemporaneous effect estimations

	Mean	Sd	Min	Max
high-school dropout	0.33	0.47	0	1
construction over total VA by male	0.048	0.051	0	0.202
construction over total VA	0.095	0.027	0.04	0.202
new dwellings by male	0.0002	0.0002	0	0.0015
new dwellings	0.0003	0.0002	0.00002	0.0015
total value added	1.95e+07	2.82e+07	570919	1.67e+08
youth unemployment rate	0.15	0.059	0.028	0.363
unemployment rate	0.066	0.028	0.015	0.164
male	0.511	0.5	0	1
age	21.054	1.983	18	24
immigrant	0.028	0.165	0	1
father high-school grad	0.121	0.326	0	1
mother high-school grad	0.106	0.308	0	1
father university grad	0.094	0.292	0	1
mother university grad	0.073	0.26	0	1
father working	0.588	0.492	0	1
mother working	0.296	0.457	0	1
absent father	0.176	0.381	0	1
absent mother	0.126	0.332	0	1
on one's own	0.053	0.224	0	1
province	26.341	14.328	1	52
year	2000.283	3.655	1995	2007
weights	22210.2	14599.69	1038	414671

The number of included observations is 230634. The individual data is obtained from the Spanish Labor Force Survey. The information on value added is obtained from the Spanish Regional Accounts and the data on number of new dwellings can be found in the webpage of the Spanish Ministry of Housing.

Table 2: Descriptive statistics for the effect of construction activity at age 17 estimations. Construction activity measured by value added

	Mean	Sd	Min	Max
high-school dropout	0.294	0.456	0	1
construction over				
total VA at 17 by male	0.047	0.049	0	0.189
construction over total VA at 17	0.093	0.023	0.04	0.189
total value added	2.47e+07	3.48e+07	887071	1.67e+08
male	0.509	0.5	0	1
age	21.103	1.994	18	24
immigrant	0.045	0.208	0	1
father high-school grad	0.153	0.36	0	1
mother high-school grad	0.166	0.372	0	1
father university grad	0.095	0.293	0	1
mother university grad	0.094	0.292	0	1
father working	0.523	0.499	0	1
mother working	0.362	0.481	0	1
father absent	0.263	0.441	0	1
mother absent	0.142	0.349	0	1
on one's own	0.069	0.253	0	1
youth unemployment rate	0.111	0.035	0.028	0.259
unemployment rate	0.048	0.018	0.015	0.119
province	26.277	14.308	1	52
year	2004.31	1.719	2002	2007
weights	24197.04	16812.11	1038	414671

The number of included observations is 86953. The individual data is from the Spanish Labor Force Survey. The information on value added is obtained from the Spanish Regional Accounts.

Table 3: Descriptive statistics for the effect of construction activity at age 17 estimations. Construction activity measured by number of new dwellings

	Mean	Sd	Min	Max
high-school dropout	0.297	0.457	0	1
new dwellings at 17 by male	0.0001	0.0002	0	0.0015
new dwellings at 17	0.0003	0.0002	0.00002	0.0015
total value added	2.23e+07	3.18e+07	724208	1.67e+08
male	0.509	0.5	0	1
age	21.103	1.987	18	24
immigrant	0.035	0.183	0	1
father high-school grad	0.142	0.349	0	1
mother high-school grad	0.139	0.346	0	1
father university grad	0.096	0.295	0	1
mother university grad	0.084	0.277	0	1
father working	0.561	0.496	0	1
mother working	0.324	0.468	0	1
absent father	0.211	0.408	0	1
absent mother	0.133	0.339	0	1
on one's own	0.06	0.237	0	1
youth unemployment rate	0.122	0.044	0.028	0.341
unemployment rate	0.054	0.022	0.015	0.13
province	26.332	14.324	1	52
year	2002.59	2.57	1999	2007
weights	23186.12	15571.18	1038	414671

The number of included observations is 143440. The individual data is obtained from the Spanish Labor Force Survey. The information on number of new dwellings can be found in the webpage of the Spanish Ministry of Housing.

Table 4: Contemporaneous effect. Construction activity measured by value added

	basic	unemployment	parents	year	province
Dep var: High-school dropout	(1)	(2)	(3)	(4)	(5)
construction VA by male	2.151	2.038	3.091	3.045	2.937
	(0.473)***	(0.468)***	(0.583)***	(0.572)***	(0.593)***
contruction VA	-2.581	0.866	1.039	2.567	1.231
	(1.524)*	(1.455)	(1.313)	(1.908)	(0.943)
total value added	-4.22e-09	-2.45e-09	-4.68e-10	5.01e-11	2.23e-09
	(9.82e-10)***	(1.12e-09)**	(9.13e-10)	(1.21e-09)	(1.40e-09)
male	0.434	0.455	0.508	0.512	0.531
	(0.052)***	(0.051)***	(0.062)***	(0.061)***	(0.063)***
19 years old	0.221	0.223	0.219	0.221	0.228
	(0.015)***	(0.014)***	(0.015)***	(0.015)***	(0.015)***
20 years old	0.333	0.339	0.306	0.308	0.322
	(0.02)***	(0.02)***	(0.021)***	(0.021)***	(0.021)***
21 years old	0.393	0.401	0.325	0.329	0.347
	(0.02)***	(0.02)***	(0.021)***	(0.021)***	(0.021)***
22 years old	0.399	0.411	0.289	0.296	0.317
	(0.021)***	(0.021)***	(0.024)***	(0.023)***	(0.024)***
23 years old	0.435	0.449	0.26	0.268	0.291
	(0.023)***	(0.023)***	(0.025)***	(0.025)***	(0.026)***
24 years old	0.47	0.489	0.232	0.24	0.266
	(0.026)***	(0.027)***	(0.029)***	(0.029)***	(0.03)***
immigrant	0.47	0.524	0.263	0.248	0.243
	(0.089)***	(0.09)***	(0.087)***	(0.089)***	(0.083)***
father high-school grad			-1.340	-1.327	-1.296
			(0.037)***	(0.036)***	(0.036)***
mother high-school grad			-1.320	-1.304	-1.275
			(0.042)***	(0.041)***	(0.041)***
father university grad			-2.053	-2.056	-2.045
			(0.058)***	(0.059)***	(0.059)***
mother university grad			-2.007	-2.006	-1.990
			(0.066)***	(0.067)***	(0.067)***
father working			-.390	-.400	-.408
			(0.017)***	(0.017)***	(0.016)***
mother working			-.064	-.076	-.078
			(0.021)***	(0.021)***	(0.02)***
absent father			-.381	-.406	-.383
			(0.033)***	(0.028)***	(0.024)***
absent mother			-.110	-.096	-.104
			(0.033)***	(0.032)***	(0.032)***
independent			1.539	1.533	1.485
			(0.05)***	(0.049)***	(0.05)***
youth unemployment rate		2.528	2.123	1.200	0.627
		(0.835)***	(0.727)***	(0.752)	(0.271)**
employment rate		3.411	2.094	2.183	-1.465
		(1.958)*	(1.661)	(1.808)	(1.018)

The dependent variable is equal to one if the individual is a high-school dropout and 0 otherwise. Construction value added is measured relative to total value added in the province. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance

is less than 1%. The basic regression includes construction value added interacted by male, construction value added, total value added, a male dummy , age binary indicators and an immigrant dummy. The second column adds parent characteristics to the basic specification including father and mother high-school graduate dummies, father and mother university graduate indicators, father and mother working dummies, binary variables equal to one if the parent is present in the household as well as an independent dummy. The third column includes, in addition to the controls in column 2, youth and total unemployment rates. The fourth column adds year dummies. Finally, the fifth column includes all previously mentioned controls plus province binary indicators. The individual data is obtained from the Spanish Labor Force Survey. The information on value added is part of the Spanish National Accounting data and can be found in the webpage of the Instituto Nacional de Estadística. The sample contains individuals aged 18 to 24 years old surveyed in the fourth quarter of each year. The time period comprises the years from 1995 to 2007. Standard errors are clustered at the province level. The number of included observations is 230634.

Table 5: Effect of construction activity at age 17. Construction activity measured by value added

	basic	unemployment	parents	year	province
Dep var: High-school dropout	(1)	(2)	(3)	(4)	(5)
construction VA at 17 by male	2.428	2.336	2.173	2.167	1.986
	(0.888)***	(0.874)***	(1.025)**	(1.033)**	(1.019)*
construction VA at 17	-4.515	-3.448	-3.862	-4.138	-.818
	(2.082)**	(2.142)	(1.927)**	(2.013)**	(1.628)
tva17	-9.50e-10	-2.25e-10	1.60e-09	1.14e-09	5.23e-09
	(1.33e-09)	(1.12e-09)	(9.65e-10)*	(9.94e-10)	(1.47e-09)***
contruction VA	8.075	7.403	7.720	6.683	2.816
	(1.792)***	(1.546)***	(1.384)***	(1.638)***	(1.239)**
male	0.473	0.489	0.658	0.658	0.685
	(0.094)***	(0.091)***	(0.107)***	(0.108)***	(0.108)***
19 years old	0.249	0.257	0.255	0.253	0.286
	(0.027)***	(0.027)***	(0.028)***	(0.028)***	(0.028)***
20 years old	0.345	0.36	0.337	0.333	0.405
	(0.031)***	(0.034)***	(0.033)***	(0.033)***	(0.031)***
21 years old	0.38	0.405	0.312	0.307	0.401
	(0.046)***	(0.051)***	(0.045)***	(0.047)***	(0.039)***
22 years old	0.355	0.385	0.25	0.243	0.362
	(0.058)***	(0.063)***	(0.057)***	(0.06)***	(0.05)***
23 years old	0.321	0.355	0.154	0.146	0.285
	(0.056)***	(0.06)***	(0.054)***	(0.057)**	(0.055)***
24 years old	0.297	0.337	0.072	0.063	0.213
	(0.061)***	(0.067)***	(0.058)	(0.061)	(0.051)***
immigrant	0.671	0.715	0.457	0.45	0.425
	(0.08)***	(0.082)***	(0.074)***	(0.075)***	(0.075)***
father high-school grad			-1.174	-1.183	-1.166
			(0.037)***	(0.036)***	(0.034)***
mother high-school grad			-1.222	-1.227	-1.201
			(0.043)***	(0.043)***	(0.044)***
father university grad			-1.858	-1.864	-1.854
			(0.077)***	(0.077)***	(0.08)***
mother university grad			-2.027	-2.032	-2.018
			(0.075)***	(0.075)***	(0.076)***
father working			-.216	-.211	-.221
			(0.03)***	(0.03)***	(0.029)***
mother working			-.148	-.154	-.144
			(0.026)***	(0.026)***	(0.022)***
absent father			-.318	-.350	-.334
			(0.036)***	(0.035)***	(0.034)***
absent mother			-.274	-.259	-.256
			(0.042)***	(0.044)***	(0.045)***
independent			1.291	1.286	1.270
			(0.055)***	(0.055)***	(0.056)***
youth unemployment rate		1.963	1.956	1.588	0.721
		(0.767)**	(0.669)***	(0.647)**	(0.413)*
unemployment rate		4.902	1.632	3.036	-1.175
		(2.511)*	(2.182)	(2.050)	(1.459)

The dependent variable is equal to one if the individual is a high-school dropout and 0 otherwise. Construction value added is measured relative to total value added in the

province. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. The basic regression includes construction value added at 17 interacted by male, construction value added at 17, construction value added, total value added, a male dummy, age binary indicators and an immigrant dummy. The second column adds parent characteristics to the basic specification including father and mother high-school graduate dummies, father and mother university graduate indicators, father and mother working dummies, binary variables equal to one if the parent is present in the household as well as an independent dummy. The third column includes, in addition to the controls in column 2, youth and total unemployment rates. The fourth column adds year dummies. Finally, the fifth column includes all previously mentioned controls plus province binary indicators. The individual data is obtained from the Spanish Labor Force Survey. The information on value added is part of the Spanish National Accounting data and can be found in the webpage of the Instituto Nacional de Estadística. The sample contains individuals aged 18 to 24 years old surveyed in the fourth quarter of each year. The time period comprises the years from 2002 to 2007. Standard errors are clustered at the province level. The number of included observations is 86953.

Table 6: Contemporaneous effect. Construction activity measured by number of new dwellings

	basic	unemployment	parents	year	province
Dep var: High-school dropout	(1)	(2)	(3)	(4)	(5)
new dwellings by male	267.412	247.255	387.053	380.900	380.245
	(64.014)***	(57.440)***	(81.030)***	(80.895)***	(86.687)***
new dwellings	-427.547	193.266	199.908	294.109	-82.722
	(174.342)**	(134.019)	(122.505)	(139.058)**	(65.185)
total value added	-4.18e-09	-2.47e-09	-5.67e-10	-3.68e-10	1.71e-09
	(1.03e-09)***	(9.86e-10)**	(7.38e-10)	(8.33e-10)	(1.42e-09)
male	0.549	0.565	0.671	0.673	0.682
	(0.028)***	(0.027)***	(0.033)***	(0.033)***	(0.035)***
19 years old	0.221	0.223	0.218	0.22	0.228
	(0.015)***	(0.014)***	(0.015)***	(0.015)***	(0.015)***
20 years old	0.333	0.338	0.304	0.307	0.322
	(0.02)***	(0.02)***	(0.021)***	(0.021)***	(0.021)***
21 years old	0.394	0.401	0.324	0.328	0.347
	(0.02)***	(0.02)***	(0.021)***	(0.021)***	(0.021)***
22 years old	0.401	0.41	0.288	0.294	0.316
	(0.021)***	(0.021)***	(0.023)***	(0.023)***	(0.024)***
23 years old	0.437	0.447	0.258	0.266	0.291
	(0.022)***	(0.023)***	(0.025)***	(0.025)***	(0.026)***
24 years old	0.472	0.487	0.229	0.237	0.266
	(0.026)***	(0.027)***	(0.029)***	(0.029)***	(0.03)***
immigrant	0.485	0.52	0.262	0.243	0.244
	(0.093)***	(0.09)***	(0.086)***	(0.087)***	(0.083)***
father high-school grad			-1.341	-1.334	-1.297
			(0.038)***	(0.036)***	(0.036)***
mother high-school grad			-1.318	-1.308	-1.276
			(0.042)***	(0.041)***	(0.041)***
father university grad			-2.055	-2.060	-2.045
			(0.059)***	(0.059)***	(0.06)***
mother university grad			-2.005	-2.007	-1.991
			(0.067)***	(0.067)***	(0.067)***
father working			-.393	-.401	-.408
			(0.017)***	(0.017)***	(0.016)***
mother working			-.066	-.079	-.078
			(0.021)***	(0.022)***	(0.02)***
absent father			-.371	-.407	-.383
			(0.029)***	(0.03)***	(0.024)***
absent mother			-.118	-.098	-.104
			(0.031)***	(0.033)***	(0.032)***
independent			1.537	1.528	1.485
			(0.05)***	(0.05)***	(0.05)***
youth unemployment rate		2.463	2.022	1.046	0.579
		(0.791)***	(0.69)***	(0.76)	(0.279)**
unemployment rate		4.229	3.078	3.702	-1.854
		(2.136)**	(1.821)*	(1.906)*	(1.086)*

The dependent variable is equal to one if the individual is a high-school dropout and 0 otherwise. Number of new dwellings is measured relative to population aged 18 to 24 in the province. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance

is less than 1%. The basic regression includes number of new dwellings interacted by male, number of new dwellings, total value added, a male dummy, age binary indicators and an immigrant dummy. The second column adds parent characteristics to the basic specification including father and mother high-school graduate dummies, father and mother university graduate indicators, father and mother working dummies, binary variables equal to one if the parent is present in the household as well as an independent dummy. The third column includes, in addition to the controls in column 2, youth and total unemployment rates. The fourth column adds year dummies. Finally, the fifth column includes all previously mentioned controls plus province binary indicators. The individual data is obtained from the Spanish Labor Force Survey. The information on number of new dwellings can be found in the webpage of the Spanish Ministry of Housing. The sample contains individuals aged 18 to 24 years old surveyed in the fourth quarter of each year. The time period comprises the years from 1995 to 2007. Standard errors are clustered at the province level. The number of included observations is 230634.

Table 7: Effect of construction activity at age 17. Construction activity measured by number of new dwellings

	basic	unemployment	parents	year	province
Dep var: High-school dropout	(1)	(2)	(3)	(4)	(5)
new dwellings at 17 by male	146.473	141.904	193.718	186.254	172.657
	(78.404)*	(74.178)*	(88.407)**	(90.041)**	(95.097)*
new dwellings at 17	84.622	283.826	365.378	205.664	77.949
	(197.063)	(149.565)*	(126.284)***	(143.393)	(145.740)
tva17	-2.59e-09	-7.80e-10	1.28e-09	8.63e-10	4.19e-09
	(1.14e-09)**	(1.06e-09)	(8.42e-10)	(8.25e-10)	(1.52e-09)***
new dwellings	171.921	384.424	368.243	353.924	105.198
	(134.571)	(147.619)***	(153.352)**	(147.805)**	(74.888)
male	0.661	0.673	0.81	0.812	0.825
	(0.036)***	(0.034)***	(0.039)***	(0.04)***	(0.042)***
19 years old	0.258	0.269	0.269	0.264	0.266
	(0.022)***	(0.021)***	(0.021)***	(0.021)***	(0.02)***
20 years old	0.376	0.4	0.379	0.366	0.376
	(0.029)***	(0.028)***	(0.026)***	(0.027)***	(0.025)***
21 years old	0.412	0.447	0.377	0.359	0.373
	(0.035)***	(0.033)***	(0.029)***	(0.029)***	(0.028)***
22 years old	0.37	0.428	0.327	0.31	0.324
	(0.043)***	(0.041)***	(0.038)***	(0.04)***	(0.039)***
23 years old	0.367	0.441	0.284	0.235	0.25
	(0.041)***	(0.041)***	(0.037)***	(0.038)***	(0.042)***
24 years old	0.361	0.452	0.245	0.17	0.188
	(0.046)***	(0.048)***	(0.043)***	(0.043)***	(0.045)***
immigrant	0.607	0.641	0.385	0.372	0.371
	(0.089)***	(0.088)***	(0.081)***	(0.082)***	(0.08)***
father high-school grad			-1.230	-1.242	-1.214
			(0.037)***	(0.037)***	(0.036)***
mother high-school grad			-1.229	-1.238	-1.204
			(0.041)***	(0.041)***	(0.041)***
father university grad			-1.977	-1.984	-1.971
			(0.068)***	(0.068)***	(0.07)***
mother university grad			-2.009	-2.020	-2.002
			(0.063)***	(0.063)***	(0.064)***
father working			-.268	-.260	-.271
			(0.023)***	(0.023)***	(0.023)***
mother working			-.126	-.134	-.120
			(0.023)***	(0.023)***	(0.02)***
absent father			-.301	-.356	-.339
			(0.03)***	(0.032)***	(0.028)***
absent mother			-.248	-.220	-.209
			(0.037)***	(0.037)***	(0.038)***
independent			1.385	1.381	1.361
			(0.056)***	(0.056)***	(0.057)***
youth unemployment rate		0.998	0.78	0.719	0.328
		(0.81)	(0.708)	(0.72)	(0.376)
unemployment rate		7.756	5.606	6.292	-1.913
		(2.500)***	(2.163)***	(2.190)***	(0.987)*

The dependent variable is equal to one if the individual is a high-school dropout and 0 otherwise. Number of new dwellings is measured relative to population aged 18 to 24 in the

province. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. The basic regression includes number of new dwellings at 17 interacted by male, number of new dwellings at 17, number of new dwellings, total value added, a male dummy, age binary indicators and an immigrant dummy. The second column adds parent characteristics to the basic specification including father and mother high-school graduate dummies, father and mother university graduate indicators, father and mother working dummies, binary variables equal to one if the parent is present in the household as well as an independent dummy. The third column includes, in addition to the controls in column 2, youth and total unemployment rates. The fourth column adds year dummies. Finally, the fifth column includes all previously mentioned controls plus province binary indicators. The individual data is obtained from the Spanish Labor Force Survey. The information on number of new dwellings can be found in the webpage of the Spanish Ministry of Housing. The sample contains individuals aged 18 to 24 years old surveyed in the fourth quarter of each year. The time period comprises the years from 1999 to 2007. Standard errors are clustered at the province level. The number of included observations is 143440.

Table 8: Correlations between value added shares of economic sectors

	Agriculture	Industry	Energy	Construction	Services
Agriculture	1				
Industry	-0.174	1			
Energy	0.011	-0.162	1		
Construction	*0.103*	*-0.439*	*0.054*	1	
Services	-0.484	-0.649	-0.233	*0.009*	1

Data source: Spanish Regional Accounts. The correlation is computed for the sample included in the regression for the contemporaneous effect.

Table 9: Contemporaneous effect. Other sectors activity measured by value added

	agriculture	industry	energy	services
Dep var: High-school dropout	(1)	(2)	(3)	(4)
Agriculture VA by male	0.507			
	(0.449)			
Agriculture VA	-.709			
	(0.581)			
Industry VA by male		0.127		
		(0.283)		
Industry VA		1.094		
		(0.789)		
Energy VA by male			0.761	
			(0.617)	
Energy VA			-1.552	
			(1.152)	
Services VA by male				-.719
				(0.298)**
Services VA				-.369
				(0.554)

The dependent variable is equal to one if the individual is a high-school dropout and 0 otherwise. Each sector value added is measured relative to total value added in the province. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. All equations include the same controls, namely, total value added, a male dummy, age binary indicators, an immigrant dummy, parent characteristics including father and mother high-school graduate dummies, father and mother university graduate indicators, father and mother working dummies, and binary variables equal to one if the parent is present in the household as well as an independent dummy, youth and total unemployment rates, year dummies as well as province binary indicators. The individual data is obtained from the Spanish Labor Force Survey. The information on value added is part of the Spanish National Accounting data and can be found in the webpage of the Instituto Nacional de Estadística. The sample contains individuals aged 18 to 24 years old surveyed in the fourth quarter of each year. The time period comprises the years from 1995 to 2007. Standard errors are clustered at the province level. The number of included observations is 230634.

Table 10: Contemporaneous effect. Construction activity measured by value added. Sample composed by different age groups

	18-20	21-24	18-22	23-24
Dep var: High-school dropout	(1)	(2)	(3)	(4)
construction VA by male	2.322	3.337	2.583	3.803
	(0.555)***	(0.8)***	(0.685)***	(0.69)***
contruction VA	0.487	1.731	1.081	1.541
	(1.198)	(1.224)	(1.067)	(1.286)
Obs.	95667	134967	163413	67221

The dependent variable is equal to one if the individual is a high-school dropout and 0 otherwise. Construction value added is measured relative to total value added in the province. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. The displayed coefficients are associated to the variables construction value added by male and construction value added. In the first column the sample is composed by individuals aged 18 to 20, in the second by individuals aged 21 to 24, in the third by individuals 18 to 22 and in the fourth by individuals 23 to 24. All equations include the same controls, namely, total value added, a male dummy, age binary indicators, an immigrant dummy, parent characteristics including father and mother high-school graduate dummies, father and mother university graduate indicators, father and mother working dummies, binary variables equal to one if the parent is present in the household as well as an independent dummy, youth and total unemployment rates, year dummies as well as province binary indicators. The individual data is obtained from the Spanish Labor Force Survey. The information on value added is part of the Spanish National Accounting data and can be found in the webpage of the Instituto Nacional de Estadística. The sample contains individuals aged 18 to 22 years old surveyed in the fourth quarter of each year. The time period comprises the years from 1995 to 2007. Standard errors are clustered at the province level.

Table 11: Effect of construction activity at age 18. Construction activity measured by value added

	basic	unemployment	parents	year	province
Dep var: High-school dropout	(1)	(2)	(3)	(4)	(5)
construction VA at 18 by male	1.917	1.838	1.724	1.711	1.610
	(0.708)***	(0.706)***	(0.811)**	(0.818)**	(0.804)**
construction VA at 18	-4.670	-3.930	-4.224	-4.466	-2.269
	(1.950)**	(2.064)*	(1.898)**	(1.919)**	(1.599)
contruction VA	8.369	8.189	8.681	7.239	2.849
	(1.654)***	(1.491)***	(1.409)***	(1.584)***	(1.068)***

The dependent variable is equal to one if the individual is a high-school dropout and 0 otherwise. Construction value added is measured relative to total value added in the province. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. The basic regression includes construction value added at 18 interacted by male, construction value added at 18, construction value added, total value added, a male dummy, age binary indicators and an immigrant dummy. The second column adds parent characteristics to the basic specification including father and mother high-school graduate dummies, father and mother university graduate indicators, father and mother working dummies, binary variables equal to one if the parent is present in the household as well as an independent dummy. The third column includes, in addition to the controls in column 2, youth and total unemployment rates. The fourth column adds year dummies. Finally, the fifth column includes all previously mentioned controls plus province binary indicators. The individual data is obtained from the Spanish Labor Force Survey. The information on value added is part of the Spanish National Accounting data and can be found in the webpage of the Instituto Nacional de Estadística. The sample contains individuals aged 18 to 24 years old surveyed in the fourth quarter of each year. The time period comprises the years from 2001 to 2007. Standard errors are clustered at the province level. The number of included observations is 104299

Appendix

Appendices to chapter 1

Appendix A: The theoretical model

This section is devoted to show some intermediate derivations of the results of the theoretical model addressed in section 2.

Each firm maximizes expected profits with respect to the proportion of permanent out of high productivity workers, τ. The formula for the expected profits is:

$$\begin{aligned} E(\Pi) &= E(\pi_1) + \beta E(\pi_2) = \\ &= E(\pi_1) + \beta \left[\begin{array}{c} \frac{md}{n} \left\{ \frac{1}{n} + \frac{n}{2d}(E(c) - \overline{c}) \right\}^2 + \left\{ \frac{m}{n} + \frac{mn}{2d}(E(c) - \overline{c}) \right\} E(a_2) \\ + \frac{mn}{4d} E(a_2^2) - p\tau sS \end{array} \right] \end{aligned}$$

where τ is implicitly included in the expressions for $E(a_2)$ and $E(a_2^2)$ which are:

$$\begin{aligned} E(a_2) &= p\alpha_1 + (1-p)\alpha_2 + p(1-p)(l-s)(\alpha_1 - \alpha_2)\tau \\ E(a_2^2) &= p\alpha_1^2 + (1-p)\alpha_2^2 + p(1-p)(l-s)(\alpha_1^2 - \alpha_2^2)\tau \end{aligned}$$

Maximizing expected profits with respect to τ, one obtains the following

first order condition:

$$\left\{\frac{m}{n}+\frac{mn}{2d}(E(c)-\overline{c})\right\}[-p(1-p)(l-s)(\alpha_1-\alpha_2)] \\ +\frac{mn}{4d}[-p(1-p)(l-s)(\alpha_1^2-\alpha_2^2)]+psS=0$$

where:

$$E(c)-\overline{c}=-E(a_2)=-p\alpha_1-(1-p)\alpha_2-p(1-p)(l-s)(\alpha_1-\alpha_2)\tau$$

Solving for τ, we get the expression for the optimal proportion of fixed-term out of high productivity workers:

$$\tau^*=\frac{\frac{2d}{n^2}+\left(\frac{1}{2}-p\right)(\alpha_1-\alpha_2)-\frac{2d}{mn}\frac{psS}{p(1-p)(l-s)(\alpha_1-\alpha_2)}}{p(1-p)(l-s)(\alpha_1-\alpha_2)}$$

I do not consider the case where all high productivity matches get permanent contracts while the firm decides on the proportion of low productivity matches to give permanent contracts. The reason is that the optimal profits in that case are lower than the profits obtained when all low productivity matches are kept under temporary workers and the firm applies the previous conversion rate, τ^*, to permanent matches.

The comparative statics analysis assumes that the number of firms is endogenous. In order to know how the optimal proportion of permanent over total high productivity workers changes according to the level of product differentiation, d, one needs to expand the following expression:

$$\frac{d\tau^*}{dd}=\frac{\partial\tau^*}{\partial d}+\frac{\partial\tau^*}{\partial n}\frac{\partial n}{\partial d}=\frac{\partial\tau^*}{\partial d}+\frac{\partial\tau^*}{\partial n}\left(-\frac{\frac{\partial\Pi}{\partial d}}{\frac{\partial\Pi}{\partial n}}\right)$$

where the first equality holds because of the chain rule of derivation and the second holds because of the implicit function theorem and the fact that

$\Pi = 0$ because of free entry.

Computing the relevant derivatives and substituting its value on the previous expression, one reaches the following conclusion:

$$sign\left(\frac{d\tau^*}{dd}\right) = sign\left(\frac{m}{n} - 2\frac{psS}{p(1-p)(l-s)(\alpha_1-\alpha_2)}\right) \qquad (.0.1)$$

This implies that an increase in competition through a decrease in product differentiation would decrease the proportion of permanent workers if and only if the above function is positive and the reverse is true.

The same reasoning as for the incidence of changes in product differentiation, d, applies for the incidence of market size, m, on τ.And we learn the sign of the total derivative is the opposite for both parameters. That is,

$$sign\left(\frac{d\tau^*}{dm}\right) = sign\left(2\frac{psS}{p(1-p)(l-s)(\alpha_1-\alpha_2)} - \frac{m}{n}\right)$$

This shows that an increase in competition through a rise market size would reduce the proportion of permanent workers if and only if the above function is negative and the reverse is true. Note that when the expression above is positive equation (3) is negative and vice versa.

Finally, the expression for the total change in the optimal proportion of fixed-term over total high productivity workers caused by changes in entry costs is:

$$\frac{d\tau^*}{dF} = \frac{\partial\tau^*}{\partial n}\frac{\partial n}{\partial F} = \frac{\partial\tau^*}{\partial n}\left(-\frac{\frac{\partial\Pi}{\partial F}}{\frac{\partial\Pi}{\partial n}}\right)$$

where the sign of the derivative above depends on the parameters of the model according to:

$$sign\left(\frac{d\tau^*}{dF}\right) = sign\left(\frac{m}{n} - \frac{1}{2}\frac{psS}{p(1-p)(l-s)(\alpha_1-\alpha_2)}\right) \qquad (.0.2)$$

This means that an increase in competition through a decrease in entry costs reduces the proportion of permanent contracts if and only if expression (4) is positive. When this happens, an increase in competition always leads to a reduction in the proportion of permanent contracts. On the contrary, an increase in competition through a decrease in entry cost rises the proportion of permanent contracts if an only if expression (4) is negative. However in this case, an increase in competition always leads to a rise in the proportion of permanent contracts if expression (3) is negative.

Appendix B: The instrumental variable estimation using the Spanish Labor Force Survey

Table B.1: List of industries included in the sample

	Industries included in the instrumental variables specification
1	Food products and beveradges
2	Tobacco
3	Textile
4	Textile elaborated products and leather
5	Leather elaborated products and footwear
6	Wood except furniture
7	Pulp, paper and paper elaborated products
8	Printing and publishing
9	Coke, refined petroleum products
10	Chemicals
11	Rubber and plastics products
12	Other non-metallic mineral products
13	Basic metals
14	Fabricated metal products, except machinery and equipment
15	Machinery and equipment
16	Office, accounting and computing machinery
17	Electrical machinery and apparatus
18	Radio, television and communication equipment
19	Medical, precision & optical instruments, watches and clocks
20	Motor vehicles
21	Other transport equipment
22	Furniture
23	Recycling
24	Electricity and gas
25	Water supply

This is the list of industries for which there is information on the price cost margin and on the Regulatory Impact so that they can be included in the instrumental variables estimation.

Table B.2: Estimation by instrumental variables displaying controls (Spanish Labor Force Survey)

	baseline	year	sector	weights
	(1)	(2)	(3)	(4)
Age	0.0002	-.00003	0.00002	1.00e-05
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Married	0.0006	0.006	0.005	0.005
	(0.009)	(0.009)	(0.009)	(0.009)
Household head	0.01	0.011	0.012	0.011
	(0.008)	(0.008)	(0.008)	(0.008)
High School Graduate	0.011	0.005	0.005	0.004
	(0.004)***	(0.004)	(0.004)	(0.004)
University Graduate	0.033	0.02	0.019	0.019
	(0.009)***	(0.009)**	(0.009)**	(0.009)**
Number of coworkers	0.0002	0.0002	0.0002	0.0002
	(0.00006)***	(0.00006)***	(0.00006)***	(0.00006)***
One year				
fixed-term contract duration	0.178	0.171	0.171	0.171
	(0.009)***	(0.008)***	(0.008)***	(0.008)***
Two years				
fixed-term contract duration	0.049	0.036	0.037	0.038
	(0.008)***	(0.01)***	(0.01)***	(0.01)***
Three years				
fixed-term contract duration	0.289	0.266	0.267	0.265
	(0.024)***	(0.023)***	(0.023)***	(0.022)***
Permanent vs.				
fixed-term wage difference	9.86e-09	3.25e-07	-1.25e-07	-1.51e-07
	(1.62e-07)	(1.55e-07)**	(3.46e-07)	(3.38e-07)

The dependent variable is equal to one if the individual transits from fixed term to permanent employment in a given year, and zero otherwise. The measure of competition is the price-cost margin multiplied by minus one. This is instrumented using the Regulatory Impact. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. The baseline regression includes controls on individual and job characteristics (age, married, household head, dummies for region of residence, high school graduate, university graduate, number of coworkers, dummies for duration of the fixed term contract in years and quarter dummies). The second column adds year dummies to the baseline regression. The third column includes, in addition to the variables in column 2, dummies for industry of

employment. Finally, column 4 displays the results when individuals are weighted according to the ratio between the number of workers in their industry one year before the date of the interview and the number of workers in their industry at the time of the interview. The sample is drawn from the Spanish Labor Force Survey and includes men aged 16 to 64 with a fixed term contract, who do not switch sector of employment and who have no seasonal jobs over the period 1993 to the second quarter of 2001. The price-cost margin is obtained from the Industrial Enterprise Survey. The Regulatory Impact is obtained from the OECD database. The industries included are listed in table B.1. Errors are clustered by sector-year.

Appendix C: The instrumental variable estimation using Business Strategies Survey

Table C.1: List of industries included in the sample

	Industries included in the instrumental variables specification
1	Meat products
2	Food products and tobacco
3	Beveradges
4	Textile and textile elaborated products
5	Leather, leather elaborated products and footwear
6	Wood except furniture
7	Pulp, paper and paper elaborated products
8	Printing and publishing
9	Chemicals
10	Rubber and plastics products
11	Other non-metallic mineral products
12	Basic metals
13	Fabricated metal products, except machinery and equipment
14	Machinery and equipment
15	Office, accounting and computing machinery
16	Electrical machinery and apparatus
17	Motor vehicles
18	Other transport equipment
19	Furniture

This is the list of industries for which there is information in the Business Strategies Survey

Table C.2: Estimation by instrumental variables displaying controls (Survey of Business Strategies)

	baseline	year	sector	weights	firm fe
	(1)	(2)	(3)	(4)	(5)
Number of workers	0.00002	0.00002	0.00002	0.00002	-.00002
	(2.99e-06)***	(2.94e-06)***	(2.81e-06)***	(2.93e-06)***	(8.99e-06)*
Percentage of university grads	0.004	0.004	0.002	0.002	-.001
	(0.0005)***	(0.0005)***	(0.0005)***	(0.0005)***	(0.0005)**
Percentage of high school grads	0.001	0.001	0.0006	0.0006	0.0002
	(0.0002)***	(0.0002)***	(0.0002)***	(0.0002)**	(0.0003)
Percentage of part-time workers	0.0005	0.0005	0.0007	0.0006	0.003
	(0.0004)	(0.0004)	(0.0004)*	(0.0004)*	(0.0005)***
Blue over white collar workers	0.001	0.001	0.0006	0.0006	0.0007
	(0.0002)***	(0.0002)***	(0.0003)**	(0.0003)**	(0.0006)
Wages over production	0.031	0.039	0.021	0.021	0.037
	(0.016)*	(0.015)***	(0.014)	(0.014)	(0.01)***
Training expenditures per worker	0.00005	0.00002	8.80e-06	9.43e-06	-.00004
	(1.00e-05)***	(1.00e-05)	(1.00e-05)	(1.00e-05)	(1.00e-05)***
Worker compensations over production	0.552	0.588	0.549	0.55	0.118
	(0.039)***	(0.04)***	(0.039)***	(0.038)***	(0.033)***
Merged firm	0.024	0.024	0.023	0.022	0.002
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.008)
Split firm	0.059	0.064	0.062	0.052	0.018
	(0.013)***	(0.014)***	(0.013)***	(0.015)***	(0.01)*
R&D over production	0.115	0.174	0.065	0.101	-.101
	(0.07)*	(0.066)***	(0.063)	(0.067)	(0.078)
Public capital over total capital	0.0007	0.0008	0.001	0.0009	0.0007
	(0.00009)***	(0.0001)***	(0.0001)***	(0.0001)***	(0.0002)***

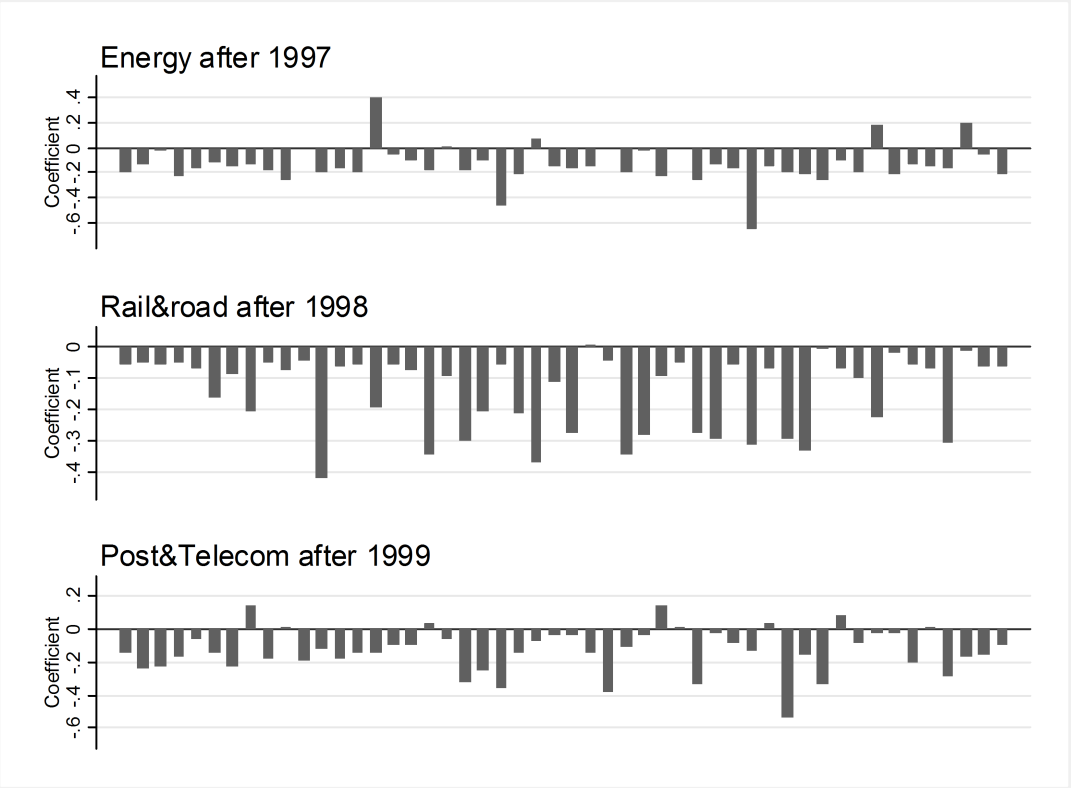
The dependent variable is equal to proportion of permanent over total contracted workers. The measure of competition is average the price-cost margin in the industry multiplied by minus one. This is instrumented using the Regulatory Impact. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. The baseline regression includes controls on workers and firm characteristics (number of workers, percentage of engineers and college graduates, percentage of workers with intermediate education, percentage of partial time permanent workers, ratio of blue over white collar workers, wages over production, workers training expenditures over production, workers compensations over production, a dummy for merger, a dummy for separation, a dummy for individual entrepreneur, R&D over production and percentage of public capital). The second column adds year dummies to the baseline regression. The third column includes,

in addition to the variables in column 2, dummies for industry of employment. Column 4 displays the results when firms are weighted according to the ratio between the number of workers in their industry one year before the date of the interview and the number of workers in their industry at the time of the interview. Finally, column 5 is estimated using firm fixed effects. The sample is drawn from the Survey of Business Strategies and includes firms whose level of diversification does not exceed one industry as defined by the 2-digit classification over the period 1992 to 2006. The industries included are listed in table C.1. The price-cost margin is obtained from the Survey of Business Strategies. The Regulatory Impact is obtaineded from the OECD database. Errors are clustered by sector-year. The F of the excluded instrument in the first stage corresponding to the last column estimation is 28.45.

Appendix D: The quasi-experiment

The number of degrees of freedom in the quasi-experimental regressions is 44 but for the panel regression in which is 39. This could raise some concerns about whether the number of clusters is small to provide reliable estimates. To address perform bootstrap over clusters and show the coefficients arising from each iteration in figure D.1. The estimates are consistently negative and their magnitudes are very similar. This assures that no particular observations are leading the results.

Figure D.1: Bootstrap estimated coefficients for the quasi-experiment using the Spanish Labor Force Survey



This graph represents the estimated coefficients resulting from 50 random draws from the sample of clusters in the quasi-experiment estimation. The dependent variable is equal to one if the individual transits from fixed term to permanent employment in a given year, and zero otherwise. The measures of competition are a dummy for working in the energy sector in 1997 or after, a dummy for working in the rail&road sector in 1998 or after and a dummy for working in the post&telecom sector in 1999 or after. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. The baseline regression includes controls on individual and job characteristics (age, married, household head, dummies for region of residence, high school graduate, university graduate, number of coworkers, dummies for duration of the fixed term contract in years and quarter dummies). The second column adds year dummies to the baseline regression. The third column includes, in addition to the variables in column 2, dummies for industry of employment. Column 4 displays the results when individuals are weighted according to the ratio between the number of workers in their industry one year before the date of the interview and the number of workers in their industry at the time of the interview. Finally, column 5 adds individual fixed effects. The sample is drawn from the Spanish Labor Force Survey and includes men aged 16 to 64 with a fixed term contract, who do not switch sector of employment and who have no seasonal jobs. The industries included are energy, rail&road, post&telecom, airline and retail. The airline and retail industries serve as controls. Errors are clustered by sector-year.

Appendices to chapter 2

Appendix A: Probability of sending remittances

Table A.1 Probability of sending remittances displaying individual characteristics

	basic	individual	family	economic	locality	country
Dep var: Remit	(1)	(2)	(3)	(4)	(5)	(6)
male		0.015	0.012	-.018	-.016	-.002
		(0.007)**	(0.007)*	(0.007)**	(0.007)**	(0.007)
age		0.02	0.01	0.006	0.006	0.008
		(0.001)***	(0.001)***	(0.001)***	(0.001)***	(0.001)***
age squared		-.0002	-.0001	-.00005	-.00006	-.00008
		(1.00e-05)***	(1.00e-05)***	(1.00e-05)***	(1.00e-05)***	(1.00e-05)***
3 - 5 years in Spain		0.06	0.077	0.07	0.067	0.064
		(0.014)***	(0.013)***	(0.013)***	(0.013)***	(0.013)***
6 - 10 years in Spain		0.079	0.106	0.096	0.1	0.083
		(0.015)***	(0.013)***	(0.013)***	(0.013)***	(0.013)***
11 - 20 years in Spain		-.057	0.018	0.014	0.021	0.038
		(0.017)***	(0.015)	(0.015)	(0.015)	(0.015)**
21 - 30 years in Spain		-.155	-.045	-.052	-.040	0.009
		(0.02)***	(0.018)**	(0.018)***	(0.017)**	(0.016)
$\geqslant$ 31 years in Spain		-.198	-.072	-.075	-.066	-.012
		(0.019)***	(0.017)***	(0.017)***	(0.017)***	(0.016)
Spanish nationality		0.155	0.167	0.158	0.158	0.07
		(0.013)***	(0.012)***	(0.012)***	(0.012)***	(0.012)***
documented		0.016	0.015	0.01	0.019	0.033
		(0.017)	(0.015)	(0.015)	(0.015)	(0.015)**
primary education		0.018	0.035	0.03	0.027	0.009
		(0.023)	(0.023)	(0.022)	(0.022)	(0.022)
secondary education		0.019	0.052	0.045	0.037	0.02
		(0.023)	(0.022)**	(0.021)**	(0.021)*	(0.021)
terciary education		-.045	1.00e-05	-.005	-.010	-.013
		(0.023)*	(0.023)	(0.022)	(0.022)	(0.022)
educated in Spain		-.141	-.083	-.080	-.085	-.061
		(0.011)***	(0.01)***	(0.01)***	(0.011)***	(0.01)***
Obs.	14902	14831	14396	14329	14329	14329
R^2	0.066	0.29	0.389	0.401	0.447	0.478

The dependent variable is equal to one if the individual remits and zero otherwise. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the proportion of remitters from the country of birth in Spain minus the average proportion of remitters in Spain. The variable size (at the municipality level) by quality is instrumented using size at the province level by quality. The coefficients are market with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5%, and *** if the level of significance is less than 1%. The basic regression includes size interacted by quality and size. The second column adds individual characteristics to the basic specification including a male dummy, age, age squared, indicators for time of residence, a nationality binary variable, a documented dummy, indicators for the level of education (primary, secondary and terciary), and a dichotomous variable for being educated in Spain. The third column includes, in addition to the controls in column 2, a married dummy, the number of household members, a dichotomous variable for intending to bring some family members to Spain, an indicator for spouse abroad, a binary variable for brother abroad, a dummy for children abroad, an indicator for father abroad and a dummy for mother abroad. The fourth column contains all the already mentioned controls plus a set of variables for economic conditions including an employed dummy, income, an indicator for permanent labor contract, dummies for sector of employment (industry, construction and services), and a binary variable for owning a house in the sending country. The fifth column adds municipality dummies. Finally, the sixth column includes all previously mentioned controls plus country of birth indicators. When included, dummy variables account for missing observations in the following variables: Documented, educated in Spain, brother abroad, children abroad, father abroad, mother abroad, income and permanent contract. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The standard errors are clustered by municipality and country of birth groups.

Table A.2 Probability of sending remittances displaying family characteristics

	basic	individual	family	economic	locality	country
Dep var: Remit	(1)	(2)	(3)	(4)	(5)	(6)
married			-.041	-.028	-.029	-.016
			(0.008)***	(0.008)***	(0.008)***	(0.008)**
household						
members			0.007	0.007	0.006	0.002
			(0.003)***	(0.003)***	(0.003)**	(0.003)
intentions						
to bring family			0.259	0.256	0.248	0.22
			(0.01)***	(0.01)***	(0.01)***	(0.01)***
spouse abroad			0.091	0.072	0.067	0.068
			(0.018)***	(0.018)***	(0.018)***	(0.018)***
brother abroad			0.031	0.035	0.034	0.035
			(0.009)***	(0.008)***	(0.008)***	(0.008)***
children abroad			0.144	0.144	0.144	0.118
			(0.011)***	(0.011)***	(0.012)***	(0.012)***
father abroad			0.048	0.042	0.044	0.039
			(0.009)***	(0.009)***	(0.009)***	(0.009)***
mother abroad			0.103	0.099	0.095	0.094
			(0.009)***	(0.009)***	(0.009)***	(0.009)***
Obs.	14902	14831	14396	14329	14329	14329
R^2	0.066	0.29	0.389	0.401	0.447	0.478

The dependent variable is equal to one if the individual remits and zero otherwise. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the proportion of remitters from the country of birth in Spain minus the average proportion of remitters in Spain. The variable size (at the municipality level) by quality is instrumented using size at the province level by quality. The coefficients are market with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5%, and *** if the level of significance is less than 1%. The basic regression includes size interacted by quality and size. The second column adds individual characteristics to the basic specification including a male dummy, age, age squared, indicators for time of residence, a nationality binary variable, a

documented dummy, indicators for the level of education (primary, secondary and terciary), and a dichotomous variable for being educated in Spain. The third column includes, in addition to the controls in column 2, a married dummy, the number of household members, a dichotomous variable for intending to bring some family members to Spain, an indicator for spouse abroad, a binary variable for brother abroad, a dummy for children abroad, an indicator for father abroad and a dummy for mother abroad. The fourth column contains all the already mentioned controls plus a set of variables for economic conditions including an employed dummy, income, an indicator for permanent labor contract, dummies for sector of employment (industry, construction and services), and a binary variable for owning a house in the sending country. The fifth column adds municipality dummies. Finally, the sixth column includes all previously mentioned controls plus country of birth indicators. When included, dummy variables account for missing observations in the following variables: Documented, educated in Spain, brother abroad, children abroad, father abroad, mother abroad, income and permanent contract. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The standard errors are clustered by municipality and country of birth groups.

Table A.3 Probability of sending remittances displaying economic conditions

	basic	individual	family	economic	locality	country
Dep var: Remit	(1)	(2)	(3)	(4)	(5)	(6)
employed				0.16	0.158	0.136
				(0.022)***	(0.022)***	(0.022)***
income				-.00002	-.00002	-1.00e-05
				(7.99e-06)**	(8.04e-06)***	(7.90e-06)
permanent labor contract				-.009	-.009	-.008
				(0.01)	(0.01)	(0.01)
industry				-.011	-.011	-.008
				(0.022)	(0.022)	(0.022)
construction				0.039	0.045	0.03
				(0.021)*	(0.022)**	(0.022)
services				-.025	-.025	-.029
				(0.02)	(0.021)	(0.021)
house in sending country				0.005	0.002	-.003
				(0.009)	(0.009)	(0.009)
Obs.	14902	14831	14396	14329	14329	14329
R^2	0.066	0.29	0.389	0.401	0.447	0.478

The dependent variable is equal to one if the individual remits and zero otherwise. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the proportion of remitters from the country of birth in the municipality minus the average proportion of remitters in Spain. The variable size (at the municipality level) by quality is instrumented using size at the province level by quality. The coefficients are market with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5%, and *** if the level of significance is less than 1%. The basic regression includes size interacted by quality and size. The second column adds individual characteristics to the basic specification including a male dummy, age, age squared, indicators for time of residence, a nationality binary variable, a documented dummy, indicators for the level of education (primary, secondary and terciary), and a dichotomous variable for being educated in Spain. The third column includes, in

addition to the controls in column 2, a married dummy, the number of household members, a dichotomous variable for intending to bring some family members to Spain, an indicator for spouse abroad, a binary variable for brother abroad, a dummy for children abroad, an indicator for father abroad and a dummy for mother abroad. The fourth column contains all the already mentioned controls plus a set of variables for economic conditions including an employed dummy, income, an indicator for permanent labor contract, dummies for sector of employment (industry, construction and services), and a binary variable for owning a house in the sending country. The fifth column adds municipality dummies. Finally, the sixth column includes all previously mentioned controls plus country of birth indicators. When included, dummy variables account for missing observations in the following variables: Documented, educated in Spain, brother abroad, children abroad, father abroad, mother abroad, income and permanent contract. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The standard errors are clustered by municipality and country of birth groups.

Appendix B: Quantity remitted

Table B.1 Quantity remitted displaying individual characteristics

	basic	individual	family	economic	locality	country
Dep var: Quantity	(1)	(2)	(3)	(4)	(5)	(6)
male		115.983	91.043	-11.719	-1.887	40.403
		(27.568)***	(27.247)***	(30.534)	(33.949)	(32.915)
age		50.448	26.283	13.338	12.750	17.826
		(4.260)***	(4.662)***	(4.477)***	(4.645)***	(4.676)***
age squared		-.476	-.257	-.107	-.107	-.162
		(0.041)***	(0.043)***	(0.041)***	(0.043)**	(0.044)***
3 - 5 years in Spain		165.189	218.280	196.929	194.320	206.791
		(49.003)***	(47.808)***	(47.785)***	(48.524)***	(48.574)***
6 - 10 years in Spain		190.908	278.033	253.058	257.466	192.068
		(55.618)***	(53.811)***	(54.231)***	(56.029)***	(55.608)***
11 - 20 years in Spain		-153.179	67.683	59.177	50.397	96.507
		(53.132)***	(50.851)	(51.529)	(53.581)	(53.799)*
21 - 30 years in Spain		-289.378	47.348	38.583	48.708	110.288
		(55.985)***	(54.924)	(55.116)	(58.576)	(56.186)**
$\geqslant$ 31 years in Spain		-289.149	125.709	137.270	146.284	216.803
		(87.093)***	(89.104)	(89.597)	(96.268)	(90.551)**
Spanish nationality		139.442	215.114	196.298	208.827	120.841
		(61.695)**	(61.847)***	(59.944)***	(67.381)***	(60.772)**
documented		48.275	62.462	37.876	33.324	34.183
		(69.839)	(67.772)	(65.592)	(69.629)	(69.832)
primary education		187.398	205.892	191.320	201.382	103.686
		(86.430)**	(86.058)**	(85.818)**	(87.271)**	(88.099)
secondary education		179.346	230.106	200.120	196.489	134.724
		(80.596)**	(80.448)***	(80.022)**	(82.520)**	(81.050)*
terciary education		72.065	157.995	110.446	121.839	91.527
		(84.663)	(84.918)*	(85.806)	(87.604)	(85.213)
educated in Spain		-207.207	-112.370	-111.740	-120.320	-76.950
		(39.356)***	(36.490)***	(36.599)***	(40.844)***	(38.538)**
Obs.	13740	13681	13301	13237	13237	13237
R^2	0.031	0.089	0.158	0.165	0.21	0.229

The dependent variable is remittances quantity sent in the last year. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the average quantity remitted in the last year by individuals from the country of birth in the municipality minus the average quantity remitted in Spain. The variable size (at the municipality level) by quality is instrumented using size at the province level by quality. The coefficients are market with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5%, and *** if the level of significance is less than 1%. The basic regression includes size interacted by quality and size. The second column adds individual characteristics to the basic specification including a

male dummy, age, age squared, indicators for time of residence, a nationality binary variable, a documented dummy, indicators for the level of education (primary, secondary and terciary), and a dichotomous variable for being educated in Spain. The third column includes, in addition to the controls in column 2, a married dummy, the number of household members, a dichotomous variable for intending to bring some family members to Spain, an indicator for spouse abroad, a binary variable for brother abroad, a dummy for children abroad, an indicator for father abroad and a dummy for mother abroad. The fourth column contains all the already mentioned controls plus a set of variables for economic conditions including an employed dummy, income, an indicator for permanent labor contract, dummies for sector of employment (industry, construction and services), and a binary variable for owning a house in the sending country. The fifth column adds municipality dummies. Finally, the sixth column includes all previously mentioned controls plus country of birth indicators. When included, dummy variables account for missing observations in the following variables: Documented, educated in Spain, brother abroad, children abroad, father abroad, mother abroad, income and permanent contract. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The standard errors are clustered by municipality and country of birth groups.

Table B.2 Quantity remitted sending remittances displaying family characteristics

	basic	individual	family	economic	locality	country
Dep var: Quantity	(1)	(2)	(3)	(4)	(5)	(6)
married			-119.886	-94.796	-89.165	-42.946
			(27.319)***	(27.518)***	(28.963)***	(28.566)
household						
members			-5.319	-3.662	-8.900	-24.137
			(9.839)	(9.822)	(10.687)	(10.842)**
intentions						
to bring family			608.403	604.748	582.752	511.052
			(51.855)***	(51.261)***	(53.978)***	(54.865)***
spouse abroad			634.374	584.264	561.415	599.281
			(119.415)***	(118.440)***	(120.497)***	(119.965)***
brother abroad			37.551	46.986	35.434	24.980
			(34.999)	(35.077)	(35.798)	(35.154)
children abroad			747.713	742.488	749.859	671.423
			(64.466)***	(64.626)***	(67.408)***	(66.906)***
father abroad			230.573	218.086	198.835	181.673
			(50.516)***	(50.217)***	(51.434)***	(50.599)***
mother abroad			240.600	235.390	228.642	240.326
			(38.146)***	(37.781)***	(37.919)***	(37.314)***
Obs.	13740	13681	13301	13237	13237	13237
R^2	0.031	0.089	0.158	0.165	0.21	0.229

The dependent variable is remittances quantity sent in the last year. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the average quantity remitted in the last year by individuals from the country of birth in the municipality minus the average quantity remitted in Spain. The variable size (at the municipality level) by quality is instrumented using size at the province level by quality. The coefficients are market with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5%, and *** if the level of significance is less than 1%. The basic regression includes size interacted by quality and size. The second column adds individual characteristics to the basic specification including a male dummy, age, age squared, indicators for time of residence, a nationality binary variable, a documented dummy, indicators for the level of education (primary, secondary and terciary), and a dichotomous variable for being educated in Spain. The third column includes, in addition to the controls in column 2, a married dummy, the number of household members, a dichotomous variable for intending to bring some family members to Spain, an indicator for spouse abroad, a binary variable for brother abroad, a dummy for children abroad, an indicator for father abroad and a dummy for mother abroad. The fourth column contains all the already mentioned controls plus a set of variables for economic conditions including an

employed dummy, income, an indicator for permanent labor contract, dummies for sector of employment (industry, construction and services), and a binary variable for owning a house in the sending country. The fifth column adds municipality dummies. Finally, the sixth column includes all previously mentioned controls plus country of birth indicators. When included, dummy variables account for missing observations in the following variables: Documented, educated in Spain, brother abroad, children abroad, father abroad, mother abroad, income and permanent contract. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The standard errors are clustered by municipality and country of birth groups.

Table B.3 Quantity remitted sending remittances displaying economic conditions

	basic	individual	family	economic	locality	country
Dep var: Quantity	(1)	(2)	(3)	(4)	(5)	(6)
employed				209.249	248.757	198.076
				(94.717)**	(91.827)***	(90.420)**
income				0.09	0.078	0.101
				(0.036)**	(0.038)**	(0.039)***
permanent labor contract				13.615	-3.523	-9.951
				(43.552)	(44.189)	(43.898)
industry				-1.070	-42.910	-50.507
				(101.618)	(92.465)	(91.630)
construction				132.252	116.280	83.101
				(93.195)	(89.661)	(88.462)
services				-34.243	-64.720	-81.376
				(88.540)	(80.929)	(79.400)
house in sending country				87.649	68.147	75.325
				(36.697)**	(38.640)*	(38.497)*
Obs.	13740	13681	13301	13237	13237	13237
R^2	0.031	0.089	0.158	0.165	0.21	0.229

The dependent variable is remittances quantity sent in the last year. Size is computed as the logarithm of the ratio of two variables. The variable in the numerator is the ratio between number of immigrants from the corresponding country of birth in the municipality and the number of individuals in the municipality. The variable in the denominator is the ratio between number of immigrants from the corresponding country of birth in Spain and total population in Spain. Quality is the average quantity remitted in the last year by individuals from the country of birth in the municipality minus the average quantity remitted in Spain. The variable size (at the municipality level) by quality is instrumented using size at the province level by quality. The coefficients are market with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5%, and *** if the level of significance is less than 1%. The basic regression includes size interacted by quality and size. The second column adds individual characteristics to the basic specification including a male dummy, age, age squared, indicators for time of residence, a nationality binary variable, a documented dummy, indicators for the level of education (primary, secondary and terciary), and a dichotomous variable for being educated in Spain. The third column includes, in addition to the controls in column 2, a married dummy, the number of household members,

a dichotomous variable for intending to bring some family members to Spain, an indicator for spouse abroad, a binary variable for brother abroad, a dummy for children abroad, an indicator for father abroad and a dummy for mother abroad. The fourth column contains all the already mentioned controls plus a set of variables for economic conditions including an employed dummy, income, an indicator for permanent labor contract, dummies for sector of employment (industry, construction and services), and a binary variable for owning a house in the sending country. The fifth column adds municipality dummies. Finally, the sixth column includes all previously mentioned controls plus country of birth indicators. When included, dummy variables account for missing observations in the following variables: Documented, educated in Spain, brother abroad, children abroad, father abroad, mother abroad, income and permanent contract. The individual data is obtained from the Spanish National Immigrant Survey. The information used to compute the size variable comes from the Spanish Town Hall Census. The standard errors are clustered by municipality and country of birth groups.

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