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Abstract:

Land regulations have a major impact on economic development, especially in agrarian societies, and they continue to affect the efficiency of the rural economy when economies further develop. This paper aims to give an overview of the regulations that are present in the land market in the EU member states and builds a land regulatory index to quantify the extent of regulations of agricultural land sales and rental markets.

Keywords: Institutions, regulation, land markets, Europe

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Land Market Regulations in Europe

1. Introduction

There is a large literature on the importance of well-functioning land markets as a key determinant for agricultural development and – even more broader - its essential role in economic growth and development (Feder and Deininger, 1999). In the agricultural sector, land is not only a mean to generate a livelihood but it is also used to accumulate wealth and transfer wealth between generations. Further, land property rights and exchange affect the emergence and efficiency of financial markets (Deininger and Feder, 2002). Therefore, well-functioning land markets play an essential role for economic growth and development.

Land issues are widely discussed and recommendations on land use and ownership have known important evolutions. Much attention was focused on the individualization of common lands, the desirability for owner-operated family farms on both efficiency and equity grounds, the importance of secure property rights to land in eliciting effort and investment and in providing the basis for land transactions; and the need for a policy and regulatory environment that promotes transfers to more efficient land uses.

Private land ownership and land (sales) markets were promoted and stimulated because (a) land sales transfer full rights to the new user, (b) they increase access to credit as owned land can be used for collateral purposes, and (c) they provide optimal incentives for investment by providing permanent security of rights (Binswanger et al., 1995; Deininger and Jin, 2003). However, the sceptical view of land rental markets has given away to a recognition of their critical role as a means for providing the poor with

access to land (Deininger and Biswanger, 1999). Efficiency-enhancing effects are assigned to land rental markets since the rental market is more likely to allow land transfers from less to more productive users than the sales market (Sadoulet et al., 2001). Rental contracts can directly improve efficiency by compensating for market failures to which tenants are subjected. In the short-run, land rental markets have welfare effects because access to land enables better use of indivisible assets and allows households to use idle assets that can only be valorized through access to land, such as captive family labour and unused managerial and supervisory skills. Land policies and regulations will affect the functioning of land sales and rental markets and therefore have important efficiency and equity consequences. However, while some land market imperfections and restrictions are rather well documented, comparative country wide data on existing land regulations are missing.

A good understanding of the functioning of agricultural land markets – and thus of the ruling regulations - is also relevant from a policy point of view. First, land regulations are expected to interact with agricultural policies. Several authors have already analyzed the capitalization of agricultural subsidies on land prices in the EU (e.g. Patton et al., 2008; Ciaian et al., 2010, Ciaian and Kancs, 2012; Van Herck et al., 2013). In general, these studies show that while agricultural subsidies are part of a community wide agricultural policy, their redistributive impact varies strongly between member states. One potential explanation is that capitalization of agricultural subsidies depends on the specific land market regulations which differ among member state. Therefore, comparative country wide information on land regulations will be crucial to assess to what extent community wide policies, such as agricultural subsidies, have a different redistributive impacts among EU Member States.

Second, land regulations may affect sustainable land management and biodiversity. For example in Czech Republic, land ownership is highly fragmented. While land sales are thin and land consolidation through sales is rare, land rental occurs frequently so that large production blocks are created. This results in a “homogenization” of agricultural land use through the rental market with negative consequences for sustainable land use (e.g. soil erosion, flooding) and biodiversity (Sklenicka et al. 2014). Land market imperfections (e.g. transaction costs) as well as regulations might have contributed and/or sustained this land use homogenization. Hence, understanding how regulations affect the functioning of land sales and rental markets can help to design informed policies to promote sustainable land management. Another study showed that the implementation of a specific land regulation in Bulgaria, namely the implementation of a minimum plot size, led to co-ownership of parcels (Vranken et al., 2011). Land in co-ownership is related to significant welfare losses and is more likely to be used by less efficient farm organizations or to be left abandoned. Even though land abandonment can have a positive influence on biodiversity (rewilding), it may also threaten farmland biodiversity in general as well as functional diversity associated with anthropogenic landscapes of high nature values (Sirami et al., 2008; Plieninger et al., 2014; Zakkak et al., 2014, Peco et al., 2012). Hence, land regulations that affect land allocation and use can have important environmental consequences.

This paper is an attempt to bring together comparative data on land regulations for several EU member states. We give an overview of the regulations that are present in the different land markets (both sales and rental markets) in the EU Member States and develop several regulatory indices in order to get a quantitative measure for the extent of regulations of agricultural sales and rental markets in the EU.¹

¹ In a related paper by Swinnen et al. (2014), we provide explanations and hypotheses for the observed differences in land regulations across the EU member states.

The paper is structured as follows. In section 2 we document the differences in land regulations in the EU member states. In section 3, we construct a set of regulation indices to quantify the information on land regulations and discuss the differences in the indicators between the different EU member states. Section 4 concludes.

2. Measures of Land Regulations

To assess the importance of land regulations and to indicate the differences between countries, we have collected data on land regulations using 15 different variables. We classify the variables in four sub-categories of land market regulations: (1) measures to protect the tenant; (2) measures to protect the small owner-cultivator; (3) measures to protect the non-farm owner; and (4) measures to prevent fragmentation. The variables and the classification are summarized in Table 1. The information on regulations (variables) was obtained from (structured) interviews with local land experts in each of the countries, which includes an update of information of country studies of land markets reported in the comparative study of Ciaian et al. (2010). All information refers to the regulations that were in place in 2011.

2.1 Measures to protect the tenant

Land market regulations aiming to protect the tenant include regulations that impose maximum rental prices, minimum rental contract duration, automatic rental contract renewal, conditions for rental contract termination and pre-emptive buying right of the tenant. Table 2 gives an overview of the relevant variables with respect to land market regulations that aim to protect the tenant.

Maximum Rental Price refers to the existence of a regulation that determines a maximum rental price. Maximum rental prices are stipulated in agricultural land

legislation in Belgium, France and the Netherlands.² In all three countries, maximum rental prices depend on the agronomic quality (expected marginal productivity) of a plot. For example, in Belgium, rental prices are determined by multiplying the cadastral value of the plot and a regional ‘tenancy coefficient’. These ‘tenancy coefficients’ are determined by a commission composed of members of the regional governments and the professional organizations based on the evolution of the regional agricultural profitability in the past six years (Ciaian et al., 2010). A similar pricing mechanism based on agricultural productivity to determine rental prices exists in France. In addition to this strict form of price regulation, there exist in some other countries also a more moderate form of price regulation. For example, in Austria rental contracts need to be approved by a local public authority, the “*Grundverkehrsbehörde*”, which can disapprove a rental transaction when the rental price determined in the contract is 50% higher than the average price in the region.

Minimum Rental Contract Duration refers to the existence of a minimum duration for a rental contract. In several countries, the national legislation stipulates a minimum duration for a rental contract. This is the case in Austria, Belgium, France, Italy, the Netherlands, Portugal, Spain, Slovakia and Slovenia.

Automatic Rental Contract Renewal captures whether a rental contract is automatically renewed at the end of the original contract with the initial duration of the contract, or not. In many EU countries, rental contracts are automatically renewed, but

² In the Netherlands, there exist three types of rental contracts since 2007 (Ministerie van Economische Zaken, Landbouw en Innovatie, 2012). First, there are the traditional or regular rental contracts, which have a minimum duration of at least six years. These contracts are subjected to price restrictions. Second, there are the so-called “liberalized rental contracts”, which can have a duration of less than six years or more than six years. In case the duration is less than six years there are no price restrictions. However, in case that the duration is more than six years, the same price restrictions as for regular rental contracts apply. Finally, there are seasonal rental contracts, which are solely used for the purpose of crop rotation and for which there are no price restrictions. Since the majority (approximately 70%) of the rented land is still captured in long-term regular rental contracts, we take in account the regulations that apply for regular rental contracts to construct the regulatory indicator of the Netherlands.

the extent of the automatic renewal differs. Land rental contracts in Belgium, France, Italy, the Netherlands, Portugal, Spain, Sweden, Slovakia and Slovenia are automatically renewed by the length of the initial contract period in case neither the owner nor the tenant wants to end the contract. In Austria, Germany, the UK and the Czech Republic, rental contracts are prolonged with a duration of one season.

Conditions for Rental Contract Termination captures the conditions under which a rental contract can be ended by the owner. In Belgium, France and the Netherlands, the (automatic) extension of a rental contract can only be prevented by the owner under certain specific conditions (e.g. when the owner or a (close) relative decides to cultivate the plot him/herself). Otherwise the rental contract is automatically renewed with the previous tenant. Note that in most countries the contract can be also cancelled before the end date of contract, but in this is mainly in case the tenant does not fulfil his contractual obligations (e.g. not paying the rent,...).

Pre-emptive Right of the Tenant refers the existence of a pre-emptive right for the tenant. Tenants have a pre-emptive right to buy land in Belgium, France, Italy, Portugal, Sweden, Hungary, Latvia, Lithuania, the Netherlands, Romania and Slovenia. However, there are differences between countries in the implementation of the pre-emptive right. For example, in the Netherlands the pre-emptive right is only valid for regular rental contracts in case the land is not purchased by a so-called “safe buyer”, which provides the tenant a written declaration that he can continue to rent the land under the same conditions as before the sale. For liberalized rental contracts or seasonal rents, the pre-emptive right is no longer valid in the Netherlands.

2.2 Measures to protect the (local) owner-cultivator

Land market regulations which aim to protect the owner-cultivator include restrictive conditions on the owner (such as nationality), maximum sales prices, a pre-emptive right- for neighboring farmers and a maximum on the transacted area. Table 3 gives an overview of the variables related to land market regulations that aim to protect the (local) owner-cultivator.

Nationality of the Owner for Natural Persons or Legal Entities refers to regulations that prohibit that foreigners can buy agricultural land. Restrictions on foreigners to buy land are especially important in the EU new member states (Swinnen and Vranken, 2009). Local farmers feared that foreigners (West European farmers and real estate investors) would acquire large parts of their land. Foreign investors were attracted by low land prices while local farmers had much lower incomes, lower farm subsidies and higher capital costs with poor functioning rural capital markets. While there exist restrictions on foreign ownership in all EU new member states (with the exception of Slovenia and Czech Republic), the precise nature differs among EU member states.³ In Hungary, Latvia, Poland and Slovakia, regulation is the most stringent and foreign natural persons are only allowed after renting and farming a plot for at least three years to buy this particular plot. In Lithuania, foreign natural persons are allowed to buy any plot of agricultural land in case they have been staying and farming in the country for at least three years or when they are married to a national citizen. In Bulgaria and Romania, regulation on foreign ownership is the least stringent among all new member states and foreign natural persons who wish to settle and farm in the country are

³ Originally, restrictions on foreign ownership of land were allowed for a transitional period of seven years (Bulgaria, Czech Republic, Latvia, Lithuania, Hungary, Slovakia and Romania) or twelve years (Poland) after the year of accession. This implies that for the Czech Republic, Latvia, Lithuania Hungary and Slovakia, the transitional period expired in 2011. However, except for the Czech Republic, all countries applied for an extension of the transitional period and they were granted an extension until 2014.

allowed to buy agricultural land.⁴ In general, there are less restrictions on foreign ownership for legal entities, except for Hungary, Latvia and Poland. In Hungary the government prohibits sales of agricultural land to all legal entities, including foreign legal entities. Latvia and Poland allow sales of agricultural land to legal entities, but only in case a minority of the shares is owned by foreigners. In addition, also in the old member states there are some restrictions on foreign ownership of agricultural land. In Greece, foreigners (legal entities and natural persons) are only allowed to buy or rent agricultural land in border regions in case they received approval by the (local) authorities. In Finland, there are restrictions to buy land in the region, Aland.

Requirements (other than nationality) for land owners captures whether there are other conditions (than nationality) that needs to be fulfilled by a new owner. Such restrictions exist in Austria, Denmark, Spain, Hungary and Poland. In Austria, new owners of agricultural land should have their residence relatively close to the plot and have a proof of competence in the agricultural sector (through experience or education). Also in Poland, farmers should have a proof of competence in the agricultural sector (through experience or education). In Hungary, there is a legal obligation for the new owner to ensure that the land is cultivated.

Maximum Sales Price captures whether there is maximum price for agricultural land. In none of the countries, there exists a well-defined maximum sales price, but in Austria, France and Poland, the government can interfere in the sales market of agricultural land in case the sales price of agricultural land is considered too high. In Austria, sales transactions need to be approved by the *Grundverkehrsbehörde* which may block the transaction when the price is considered to be too high and where there is suspicion of "speculation". Similarly in France, all sales transactions of agricultural land

⁴ In Romania, foreign natural persons need a prove of their ability to farm.

need to be authorized by the SAFERs (Sociétés pour l'aménagement foncier et l'établissement rural) (Latruffe and Le Mouel, 2006). The SAFERs can disapprove a transaction when there is suspicion of "speculation". In Poland, sales prices of agricultural land are in principle free, but when the sales price of an agricultural plot is "extremely high", a party with a pre-emptive right may ask for a downward correction of the sales price to the local authorities.

Pre-emptive Right of Neighboring Farmer refers to the existence of a pre-emptive right for a neighboring farmer. In France, Italy, Portugal, Hungary, Latvia and Slovenia, neighboring farmers have a pre-emptive right to buy in the case a plot of agricultural land is sold.

Maximum Transacted/ Owned Area captures whether there is a maximum area that a farmer is allowed to transact or to own. There exist size limitations on the amount owned or transacted land in Denmark, France, Hungary and Lithuania. In France, the SAFER can refuse a transaction if it considers the amount of land that is sold too high. In Hungary, an individual farmer can own and cultivate up to 300ha, while a legal entity (farming company) is not allowed to own any agricultural land and can only cultivate up to 2500ha of (leased) land. In Lithuania, there is an upper limit on the amount of land that can be owned by a natural person or a legal entity (up to 500 ha).

2.3 Measures to protect the land owner

Regulations to protect the land owner include the maximum duration of a contract and minimum rental prices. Table 4 gives an overview of the variables related to land market regulations that aim to protect the land owner.

Minimum Rental Price captures whether there is a minimum rental price. Austria, Czech Republic, France and the Netherlands regulate the minimum rental price. In

Austria, rental contracts need to be approved by the "*Grundverkehrsbehörde*" and this authority can disapprove the rental transaction when the rental price determined in the contract is 50% lower than the average price in the region. In France, there is a legal minimum rental price for all land transactions, which depends on soil quality and location of the plot. In the Czech Republic, there is no legal minimum price for agricultural land, but in case of disputes between the owner and the tenant the government can decide to set the rent at one percent of the administrative price of the plot.

Maximum Rental Contract Duration refers to regulations on the maximum duration of rental contracts. Countries with a maximum duration on rental contracts are Denmark, Finland, Sweden, Hungary and Poland.⁵

2.4 Measures to prevent fragmentation⁶

Regulations to prevent land fragmentation include regulations on pre-emptive buying rights of the co-owner and minimum plot size. Table 4 gives an overview of the variables related to land market regulations that aim to prevent fragmentation of land.

Minimum Plot Size captures whether there is a minimum plot size below which a plot cannot be subdivided for a transaction. There exists a legal minimal plot size in five countries: Germany, Bulgaria, Estonia, Lithuania and Slovakia. In Germany, when a landowner wants to split a plot of one ha, he/she will need to have permission from the

⁵ In some countries there are restrictions on the maximum duration of very long rental contracts, but we did not consider these as a measure to protect the owner. For example, in Bulgaria, there exist "Arenda" contracts with maximum duration up to 50 years and in Belgium, there exists "erfpacht" contracts which can have a maximum duration of 99 years.

⁶ Note that also other institutions have emerged in response to concerns on land fragmentation. Rules on how land and other assets are passed from one generation to the next in farming families have a significant impact on land markets and land fragmentation (particularly in civil code countries). The inheritance rules differ significantly in Western Europe (Blanc and Perrier Cornet, 1993). In countries under Common Law, such as England and Wales, the land (and the farm) is typically passed to the oldest son, contributing to the preservation of the farm. In countries where inheritance rules are based on the Napoleonic Code / Civil Code, there was traditionally a division of the land among the heirs.

local authority, which can prevent this transaction. In Bulgaria, the minimum plot size for agricultural land is 0.3 ha. Vineyards and pastures have a minimum plot size of respectively 0.1 ha and 0.2 ha. In Lithuania, the legal minimum plot size is 0.01 ha.

Pre-emptive Right of the Co-owner refers to the existence of a pre-emptive right of the co-owner. Pre-emptive rights for the co-owner to buy land exist in Italy, Portugal, Czech Republic, Hungary, Lithuania, Poland, Slovakia and Slovenia.

3. Land Regulation Indices

3.1. Approach

To enhance the overall comparison between countries, we attempt to quantify the information we collected by constructing a set of regulation indices. More specifically we create a “Tenant Protection Index” (TPI), a “Owner Protection Index” (OPI) and a (total) “Land Regulation Index” (LRI).

Table 1 summarizes how the qualitative information for each of the variables is used to create quantitative indicators. For most of the variables this is a simple 0-1 quantification. This applies especially when it concerns the existence of a specific law/regulation or not. More specifically this 0-1 quantification applies to all variables except three:

For the variables *Automatic Rental Contract Renewal*, *Nationality of the Owner for Natural Persons* and *Nationality of the Owner for Legal Entities* more options are possible. We used our judgement based on our interviews and the qualitative analysis to impose a quantification. *Automatic Rental Contract Renewal* takes a value of one when a rental contract is automatically renewed at the end of the original contract with the initial duration of the contract (or at least a duration of more than one season); a value of a half when a rental contract is automatically renewed at the end of the original

contract with a duration of only one season; and a value of zero when there is no automatic renewal of the contract. *Nationality of the Owner for Natural Persons* takes a value of one when foreign natural persons are allowed to buy a particular plot of agricultural land if they have been staying and farming in the country for at least three years and they rented the particular plot before, or when they are married to a national citizen; a value of three quarter when foreign natural persons are allowed to buy any plot of agricultural land in case they have been staying and farming in the country for at least three years, or when they are married to a national citizen; a value of a half when foreign natural persons are allowed to buy any plot of agricultural land in case they want to stay and farm in the country; a value of a quarter when foreign natural persons are allowed to buy any plot of agricultural land, except land in specific regions (e.g. border regions), where they need to have approval by the authorities; and a value of zero when there are no restrictions on ownership by foreign natural persons and. *Nationality of the Owner for Legal Entities*, which takes a value of one when legal entities with shares owned by foreigners are prohibited to buy agricultural land; a value of a half when legal entities with a majority of the shares owned by foreigners are prohibited to buy land, but legal entities with a minority of the shares owned by foreigners are allowed to buy land; a value of a quarter when legal entities with shares owned by foreigners are only allowed to buy land in some specific regions (e.g. border region) after approval by the local authorities and a value of zero when there are no restrictions on ownership by foreign owned legal entities.

Finally, we constructed the aggregation variables TPI, OPI and LRI by first simply adding the various variables. The TPI captures the measures to protect the tenant, the OPI captures the measures to protect the small owner-cultivator and the LRI captures

all measures listed in table 1. Afterwards we used different weights in the aggregation to see how sensitive the results are to our aggregation approach.

3.2. Indices

Figure 1 and Table 5 presents the TPI, the OPI and the total LRI. The indices reflect the large differences among the EU countries in land market regulations (Figure 1 and Table 5). They also illustrate clearly that the variation in interventions is not a simple East-West divide. Both among the new and among the old member states there are strongly regulated and very liberal approaches in land governance.

For the 24 EU member states for which we have data, the most regulated land “markets” are in France (LRI = 9) and Hungary (LRI = 8). In France, regional organizations – the so-called SAFERs – determine a minimum and maximum price bracket within which the tenant and the owner can agree a contract price. These organisations effectively control the local land markets through their powers to buy, sell and rent out agricultural land. Effectively, they ensure that land is only owned by working farmers. The SAFERs also control the level of farm restructuring and growth by requiring farmers to get authorisation from them for farm expansion (Latruffe et al., 2013). In Hungary, land can only be owned by individuals or families (“natural persons”) – not by farming companies which operate a large share of the land. Ownership is restricted to Hungarian nationals and owners have an obligation to ensure that the land is farmed. The most liberal regulations exist in Ireland (LRI = 0), Greece (LRI = 0.25), and the UK (LRI = 0.5) among the old member states and in Romania (LRI = 1.5) and Czech Republic (LRI = 2.5) among the new member states.

The aggregate LRI may bias to some extent the conclusions, in particular for countries with medium levels of the LRI. For example, Belgium has a LRI of 5 but all the

regulations are in the rental market, which is very important in Belgium (approximately 70% of the land is rented) and which is highly regulated: the tenant protection index (TPI) is 5 which is the highest of all countries (together with France). However, they have no other regulations (the other indices are all 0). The Netherlands is similar to Belgium in that it has quite significant regulations in the rental markets to protect the tenants (TPI = 5) but almost no other land regulations. This contrasts with France which has extensive regulations both in the rental and in the sales markets.

Another example is Poland. Poland's LRI is 6.5, but there is a large difference between the sales and rental market regulations. In Poland, where most of the land is owned and operated by (small) family farms (only 20% is rented), there is very little protection for tenants (TPI = 1) but significant regulations protect (family) farms who operate on land they own: their owner protection index (OPI) is 3.5. Together with Hungary, where the OPI = 5, this is the highest of all countries.

Figure 2 illustrates this. France has a high regulatory index for both rental and sales markets. Belgium and the Netherlands have a high regulation index for rental markets but not sales markets; and Poland and Hungary vice versa. Then there is a group of countries (including Ireland, Greece, the UK, Finland, Germany and the Czech Republic) with very little regulations in either land rental or sales markets.

Finally, as indicated we aggregated the underlying variables in an alternative way to test for the robustness of our findings. The results are shown in Table 6. Table 7 compares the ranking of the countries based on the different aggregation methods that are used. Overall, there are no significant changes in the ranking of the different countries between the two aggregation methods, which is evidence of the robustness of our results.

4. Conclusion

In this paper we give an overview of the regulations that are present in the land market in the EU Member States. We considered four categories of land market regulations: (1) measures to protect the tenant; (2) measures to protect the owner-cultivator; (3) measures to protect the landowner; and (4) measures to prevent fragmentation. There is a large variation in land regulations among EU countries and the differences are not closely aligned with simple regional or institutional macro-clusters.

We tried to quantify the extent and differences in regulation by constructing indices for the extent of regulations affecting the functioning of agricultural land sales and rental markets in the EU. The strongest regulations are not in the former Communist Eastern member states of the EU but in some of the Western (long term capitalist) countries.

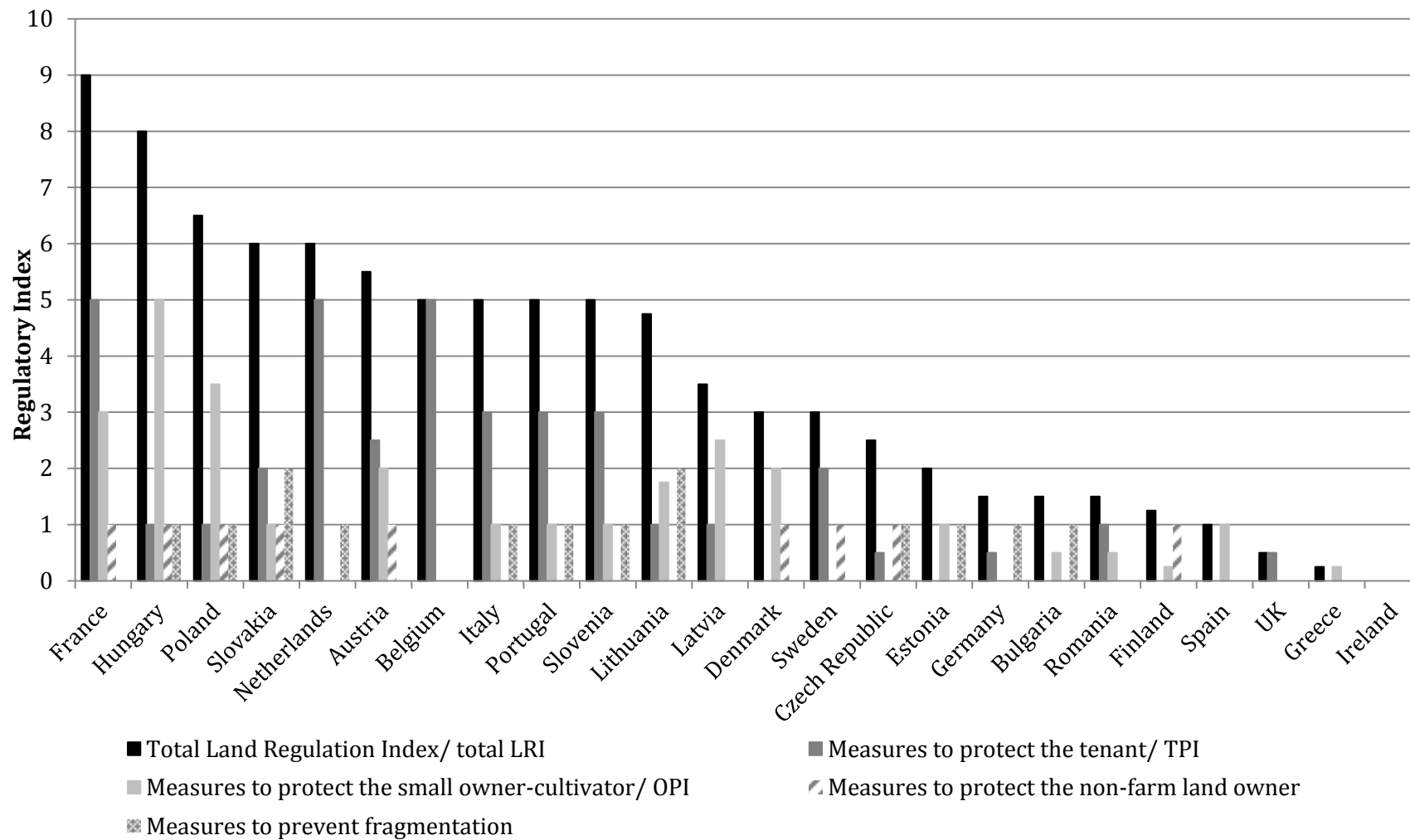
We observe different groups of countries in land regulatory patterns. First, there are governments that strongly regulate both sales and rental markets, such as France and Hungary. Second, there are countries with more moderate regulated land markets, such as Belgium, the Netherlands and Poland. Usually, in these countries one type of regulation dominates. For example, Belgium, where approximately 70% of the land is rented, has an aggregate land regulation index of 5 but all the regulations are in the rental market. Another example is Poland, where most of the land is owned and operated by (small) family farms, there is very little protection for tenants but significant regulations protect (family) farms who operate on land they own. Third, there are countries with less regulated land markets, such as Sweden, the Czech Republic, Germany, Romania, Finland, the UK, Greece and Ireland.

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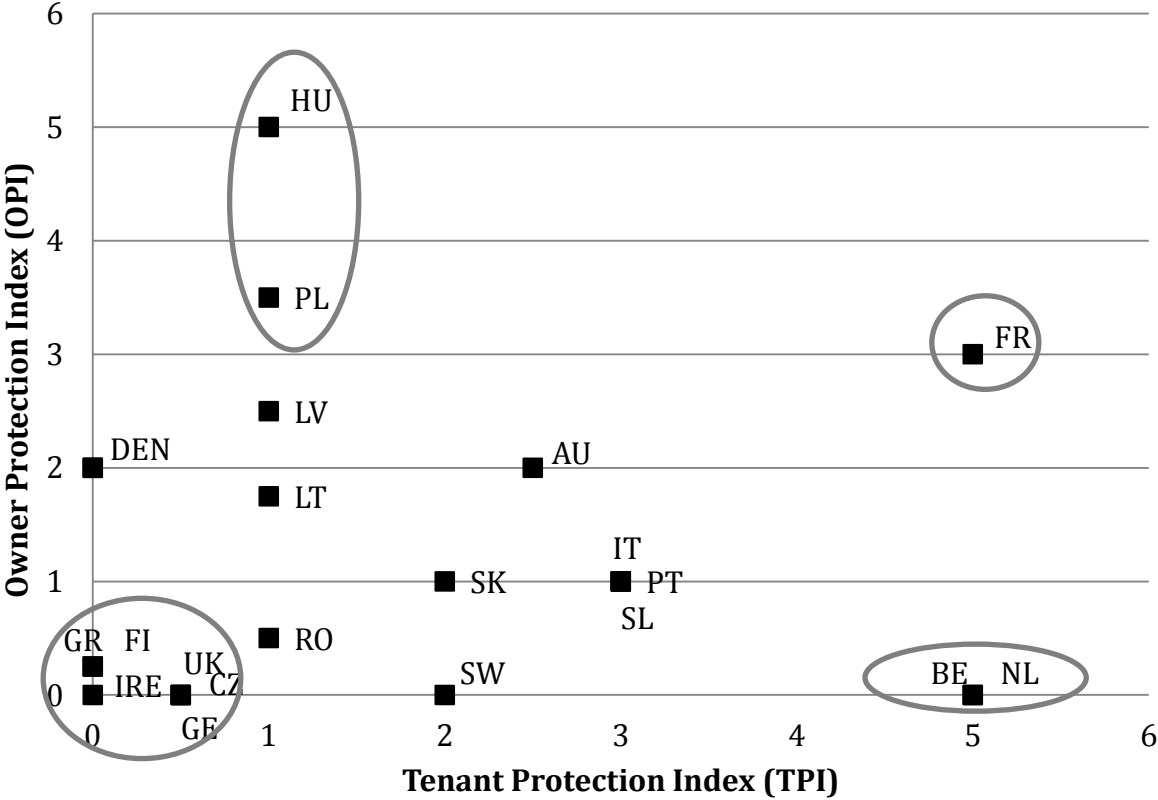
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Figure 1: Land regulation indicators



Source: Own calculations based on expert interviews and Ciaian et al. (2010)

Figure 2: Correlation between the Tenant Protection Index (TPI) and the Owner Protection Index (OPI)



Source: Own calculations based on expert interviews and Ciaian et al. (2010)

Table 1: Land regulation indicators

Indicator	Variable	Variable description	Variable categories
Measures to protect the tenant/ Tenant Protection Index (TPI)	Maximum rental price	Maximum price per hectare that is rented	1 = Existence of a maximum price 0 = No maximum price
	Minimum rental contract duration	Minimum duration of a rental contract	1= Existence of a minimum rental contract duration 0= No restrictions
	Automatic rental contract renewal	Regulations in terms of automatic renewal of the rental contract at the end of the duration of the contract	1= Existence of automatic renewal with the duration of the initial contract 0.5 = Existence of automatic renewal with a limited duration 0= No automatic renewal
	Conditions for rental contract termination	Regulations in terms of rental contract termination	1 = Termination is possible at the end of the contract and if some specific conditions are fulfilled 0 = Termination is possible at the end of the contract
	Pre-emptive right tenant	Pre-emptive right by the tenant	1= Existence of a pre-emptive right by the tenant 0= No pre-emptive right by the tenant

Table 1: Land regulation indicators (continued)

Indicator	Variable	Variable description	Variable categories
Measures to protect the owner cultivator/ Owner Protection Index (OPI)	Nationality buyer in case of legal entities	Restrictions on sales transactions by foreign legal entities	1= Prohibition that legal entities with shares owned by foreigners buy land 0.5=Prohibition that legal entities with a majority of the shares hold by foreigners buy land, but no restrictions when only minority of the shares is foreign owned 0.125= A foreign legal entity is allowed to buy or rent any plot of agricultural land, except in specific regions 0= No restrictions
	Nationality buyer in case of natural persons	Restrictions on transactions by foreign natural persons	1= Prohibition of a foreign natural person to buy a particular plot of agricultural land unless they have been staying and farming in the country for at least three years and they rented the particular plot before 0.75= Prohibition of a foreign natural person to buy a plot of agricultural land unless they have been staying and farming in the country for at least three years and they rented agricultural land before 0.5= A foreign natural person is allowed to buy or rent any plot of agricultural land in case he wants to stay and farm in the country 0.125= A foreign natural person is allowed to buy or rent any plot of agricultural land, except land in specific regions 0= No restrictions

Table 1: Land regulation indicators (continued)

Indicator	Variable	Variable description	Variable categories
Measures to protect the owner cultivator/ Owner Protection Index (OPI) (continued)	Requirements on the new owner	Restrictions (other than nationality of the new user) that need to be fulfilled by the new owner (e.g. competences)	1= Existence of restrictions on the new owner 0= No restrictions
	Maximum sales price	Minimum sales price per hectare that is sold	1= Existence of a maximum sales price 0= No maximum sales price
	Pre-emptive right neighboring farmer	Pre-emptive right by the neighboring farmer	1= Existence of a pre-emptive right by a neighboring farmer 0= No pre-emptive right by a neighboring farmer
	Maximum transacted/owned area	Limitations to the maximum transacted agricultural area	1 = Existence of regulations on the maximum agricultural area that is transacted 0 = No regulations
Measures to protect the non-farm owner	Minimum rental price	Minimum rental price per hectare that is rented	1 = Existence of a minimum rental price 0 = No minimum rental price
	Maximum rental contract duration	Maximum duration of a rental contract	1= Existence of a maximum rental contract duration 0= No restrictions
Measures to prevent fragmentation	Minimum plot size	A minimum plot size below which a plot cannot be subdivided for a transaction	1 = Existence of a minimum plot size 0 = No minimum plot size
	Pre-emptive right co-owner	Pre-emptive right by the co-owner	1= Existence of a pre-emptive right by the co-owner 0= No pre-emptive right by the co-owner

Table 2: Legal aspects included in the Indicator “Measures to protect the tenant”/ Tenant Protection Index (TPI)

Measures to protect the tenant/ Tenant Protection Index (TPI)					
	Minimum rental contract duration	Maximum rental price	Automatic rental contract renewal	Conditions for rental contract termination	Pre-emptive right for tenant
Austria	Yes	Yes	Yes, by 1 year	No	No
Belgium	Yes	Yes	Yes, by initial duration contract	Yes	Yes
Denmark	No	No	No	No	No
Finland	No	No	No	No	No
France	Yes	Yes	Yes, by initial duration contract	Yes	Yes
Germany	No	No	Yes, by 1 year	No	No
Greece	No	No	No	No	No
Ireland	No	No	No	No	No
Italy	Yes	No	Yes, by initial duration contract	No	Yes
Netherlands	Yes	Yes	Yes, by initial duration contract	Yes	Yes
Portugal	Yes	No	Yes, by initial duration contract	No	Yes
Sweden	No	No	Yes, by initial duration contract	No	Yes
UK	No	No	Yes, by 1 year	No	No
Czech Republic	No	No	Yes, by 1 year	No	No
Hungary	No	No	No	No	Yes
Latvia	No	No	No	No	Yes
Lithuania	No	No	No	No	Yes
Poland	No	No	No	No	Yes
Romania	No	No	No	No	Yes
Slovakia	Yes	No	Yes, by initial duration contract	No	No
Slovenia	Yes	No	Yes, by initial duration contract	No	Yes

Source: Own calculations based on expert interviews and Ciaian et al. (2010)

Table 3: Legal aspects included in the Indicator “Measures to protect the small owner-cultivators”/ Owner Protection Index (OPI)

Measures to protect the small owner-cultivators/ Owner Protection Index (OPI)						
	Restrictions nationality buyer for legal entities	Restrictions nationality buyer for natural persons	Other restrictions for the new owner	Maximum sales price	Pre-emptive right neighboring farmer	Maximum transacted/ owned area
Austria	No	No	Yes	Yes	No	No
Belgium	No	No	No	No	No	No
Denmark	No	No	Yes	No	No	Yes
Finland	Yes, but only in very specific regions	Yes, but only in very specific regions	No	No	No	No
France	No	No	No	Yes	Yes	Yes
Germany	No	No	No	No	No	No
Greece	Yes, but only in very specific regions	Yes, but only in very specific regions	No	No	No	No
Ireland	No	No	No	No	No	No
Italy	No	No	No	No	Yes	No
Netherlands	No	No	No	No	No	No
Portugal	No	No	No	No	Yes	No
Sweden	No	No	No	No	No	No
UK	No	No	No	No	No	No
Czech Republic	No	No	No	No	No	No
Hungary	Yes, prohibition	Yes, only allowed if *	Yes	No	Yes	Yes
Latvia	Yes, when majority shares is foreign owned	Yes, only allowed if *	No	No	Yes	No
Lithuania	No	Yes, only allowed if **	No	No	No	Yes
Poland	Yes, when majority shares is foreign owned	Yes, only allowed if *	Yes	Yes	No	No
Romania	No	Yes, only allowed if ***	No	No	No	No
Slovakia	No	Yes, only allowed if *	No	No	No	No
Slovenia	No	No	No	No	Yes	No

Note: * Prohibition of a foreign natural person to buy a particular plot of agricultural land unless they have been staying and farming in the country for at least three years and they rented the particular plot before; ** Prohibition of a foreign natural person to buy a plot of agricultural land unless they have been staying and farming in the country for at least three years and they rented agricultural land before; *** A foreign natural person is allowed to buy or rent any plot of agricultural land in case he wants to stay and farm in the country

Source: Own calculations based on expert interviews and Ciaian et al. (2010)

Table 4: Legal aspects included in the indicators “Measures to protect the non-farm owner” and “Measures to prevent fragmentation”

Measures to protect the non-farm owner			Measures to prevent fragmentation	
	Minimum rental price	Maximum rental contract duration	Minimum plot size	Pre-emptive right co-owner
Austria	Yes	No	No	No
Belgium	No	No	No	No
Denmark	No	Yes	No	No
Finland	No	Yes	No	No
France	Yes	No	No	No
Germany	No	No	Yes	No
Greece	No	No	No	No
Ireland	No	No	No	No
Italy	No	No	No	Yes
Netherlands	Yes	No	No	No
Portugal	No	No	No	Yes
Sweden	No	Yes	No	No
UK	No	No	No	No
Czech Republic	Yes	No	No	Yes
Hungary	No	Yes	No	Yes
Latvia	No	No	No	No
Lithuania	No	No	Yes	Yes
Poland	No	Yes	No	Yes
Romania	No	No	No	No
Slovakia	No	Yes	Yes	Yes
Slovenia	No	No	No	Yes

Source: Own calculations based on expert interviews and Ciaian et al. (2010)

Table 5: Land regulation indicators

	Measures to protect the tenant/ Tenant Protection Index (TPI)	Measures to protect the small owner-cultivator/ Owner Protection Index (OPI)	Measures to protect the non-farm owner	Measures to prevent fragmentation	Total Land Regulation Index (LRI)
France	5	3	1	0	9
Hungary	1	5	1	1	8
Poland	1	3.5	1	1	6.5
Slovakia	2	1	1	2	6
Netherlands	5	0	0	1	6
Austria	2.5	2	1	0	5.5
Belgium	5	0	0	0	5
Italy	3	1	0	1	5
Portugal		1	0	1	5
Slovenia	3	1	0	1	5
Lithuania	1	1.75	0	2	4.75
Latvia	1	2.5	0	0	3.5
Sweden	2	0	1	0	3
Denmark	0	2	1	0	3
Czech Republic	0.5	0	1	1	2.5
Germany	0.5	0	0	1	1.5
Romania	1	0.5	0	0	1.5
Finland	0	0.25	1	0	1.25
UK	0.5	0	0	0	0.5
Greece	0	0.25	0	0	0.25
Ireland	0	0	0	0	0

Note that each sub-indicator is the sum of the underlying variables and the total LRI is the sum of the four sub-indicators. Hence the total LRI is a simple aggregation of all underlying variables.

Source: Own calculations based on expert interviews and Ciaian et al. (2010)

Table 6: Robustness check: Land regulation indicators based on a different aggregation method*

	Measures to protect the tenant/ Tenant Protection Index (TPI)	Measures to protect the small owner- cultivator/ Owner Protection Index (OPI)	Measures to protect the non- farm land owner	Measures to prevent fragmentation	Total Land Regulation Index (LRI)
Slovakia	0.4	0.17	0.5	1	2.07
Hungary	0.2	0.83	0.5	0.5	2.03
France	1	0.5	0.5	0	2
Poland	0.2	0.58	0.5	0.5	1.78
Netherlands	1	0	0	0.5	1.49
Lithuania	0.2	0.29	0	1	1.33
Austria	0.5	0.33	0.5	0	1.27
Italy	0.6	0.17	0	0.5	1.27
Portugal	0.6	0.17	0	0.5	1.27
Slovenia	0.6	0.17	0	0.5	1.1
Czech Republic	0.1	0	0.5	0.5	1
Belgium	1	0	0	0	0.9
Sweden	0.4	0	0.5	0	0.8
Denmark	0	0.33	0.5	0	0.62
Latvia	0.2	0.42	0	0	0.6
Germany	0.1	0	0	0.5	0.54
Finland	0	0.04	0.5	0	0.28
Romania	0.2	0.08	0	0	0.1
UK	0.1	0	0	0	0.04
Greece	0	0.04	0	0	0
Ireland	0	0	0	0	0

* Each sub-indicator is a weighted sum of the underlying variables and ranges between 0 and 1. The total LRI is the sum of the four sub-indicators.

Source: Own calculations based on expert interviews and Ciaian et al. (2010)

Table 7: Robustness check: ranking of the countries according to the different types of aggregation

	Aggregation of the underlying variables	Aggregation of the sub-indicators, weighted by the number of underlying variables
1	France	Slovakia
2	Hungary	Hungary
3	Poland	France
4	Slovakia	Poland
5	Netherlands	Netherlands
6	Austria	Lithuania
7	Belgium	Austria
8	Italy	Italy
9	Portugal	Portugal
10	Slovenia	Slovenia
11	Lithuania	Czech Republic
12	Latvia	Belgium
13	Sweden	Sweden
14	Denmark	Denmark
15	Czech Republic	Latvia
16	Germany	Germany
17	Romania	Finland
18	Finland	Romania
19	UK	UK
20	Greece	Greece
21	Ireland	Ireland

Source: Own calculations based on expert interviews and Ciaian et al. (2010)