Housing in portugal (1992-2008)A multidimensional perspective on the behaviour of economic agents

Moradia em portugal (1992-2008)Uma perspectiva multidimensional do comportamento dos agentes econômicos

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ABSTRACT

Since the nation joined the European Union, the process that regulates housing policy in Portugal has been subject to specificities that are proper of the Portuguese situation. In a State which has a considerable housing deficit, it was the quantifier elements that judged the various governments regarding this matter. Almost all of the housing production depended on mortgage loans in which soft loans played an important part, together with tax benefits. The negative effects produced by lease blocking were increasingly felt throughout the analyzed period of time. The changes in context due to the decrease of tax rates and the legislative alterations on soft loans, conditioned the agents behavior and, necessarily, the rhythm of Portugal's housing market. Using the STATIS (Structuration of Tableaux A Trois Indices de la Statistique) methodology and through the analysis of the housing policy instruments, it was possible to identify the trajectories and changes in performance of the State, Owners and Families during the period between 1992 and 2008, as well as the most significant variables for understanding the problematic of housing in Portugal.

Keywords: Housing, Policy Instruments, STATIS.

RESUMO

Desde a adesão do país à União Europeia, o processo que regula a política de habitação em Portugal tem estado sujeito a especificidades próprias da situação portuguesa. Em um Estado com um déficit habitacional considerável, foram os elementos quantificadores que julgaram os diversos governos quanto a esta questão. Quase toda a produção habitacional dependia de empréstimos hipotecários, nos quais os empréstimos em condições favoráveis desempenhavam um papel importante, juntamente com os benefícios fiscais. Os efeitos negativos produzidos pelo bloqueio do arrendamento foram cada vez mais sentidos ao longo do período de tempo analisado. As alterações de contexto decorrentes da diminuição das taxas de imposto e das alterações legislativas sobre o crédito bonificado, condicionaram o comportamento dos agentes e, necessariamente, o ritmo do mercado imobiliário português. Utilizando a metodologia STATIS (Estruturação de Tableaux A Trois Indices de la Statistique) e por meio da análise dos instrumentos de política habitacional, foi possível identificar as trajetórias e mudanças de atuação do Estado, Proprietários e Famílias durante o período de 1992 a 2008 , bem como as variáveis mais significativas para a compreensão da problemática da habitação em Portugal.

Palavras-chave: Habitação, Instrumentos de política, STATIS.

1 INTRODUCTION AND OBJECTIVES

After Portugal joined the European Union came into existence until the beginning of the mortgage crisis of high risk in 2008, a growing concern about the issue of housing. This concern was centered in the framework of the process of public policy, whose changes, adaptations and specific characteristics prior to the behaviour of the demand for housing, given the residential deficit. It became therefore essential to recognize the institutional intervention of economic operators in this particular market in particular, the state, the owners and families.

In the period 1992-2008, the State played an active role in the housing sector, legislating promotion to purchase and own housing construction. Indeed, from the early years of the nineties, and by 2008, further compounded these guidelines housing policy concerns social, having been created rehousing programs in urban areas, supporting the leasing incentives particularly for young people and stimulating himself to restoring degraded properties. The purchase of homes by families, the lease on the open market and that for young people, catapulted the state as stimulating element of housing and urban regeneration, theoretically through a redistribution of income from households based on equity.

However, the problem of housing cannot be reduced only from the perspective of supply and demand. In fact, the specific characteristics of this and led to the creation of inefficiencies in the market, in particular by the inadequacy of market argument as resolution mechanism housing of lower income families. The strengthening of housing programs of the most insolvent populations took effect in resolving the housing needs, but it was not enough. In the Portuguese case, the construction of housing was mainly directed to the sale, given the low expression of the rental market, while providing a housing solution only to solvent families. Consequently, the housing credit supply grew significantly and interest rates have a significant downward trend, resulting in greater accessibility of Portuguese families to credit.

On the other hand, the expansion of housing credit in the nineties and the beginning of the new century was a rational response of economic agents to favourable changes in financing conditions. In fact, the dynamics of the rental market was another objective of housing policies of this period.

We understand relevant building the objectives of this work according to a socio-economic support and technical support. In fact, the socio-economic component refers to connections between the formulation of public policies on housing and its implementation, which are measured by results. Regarding the technical side, we will use the STATIS method (Structuration of Tableaux A Trois Indices de la Statistique), first introduced by Escoufier (1973) and L'Hermier des Plantes (1976) and later developed by Lavit (1988).
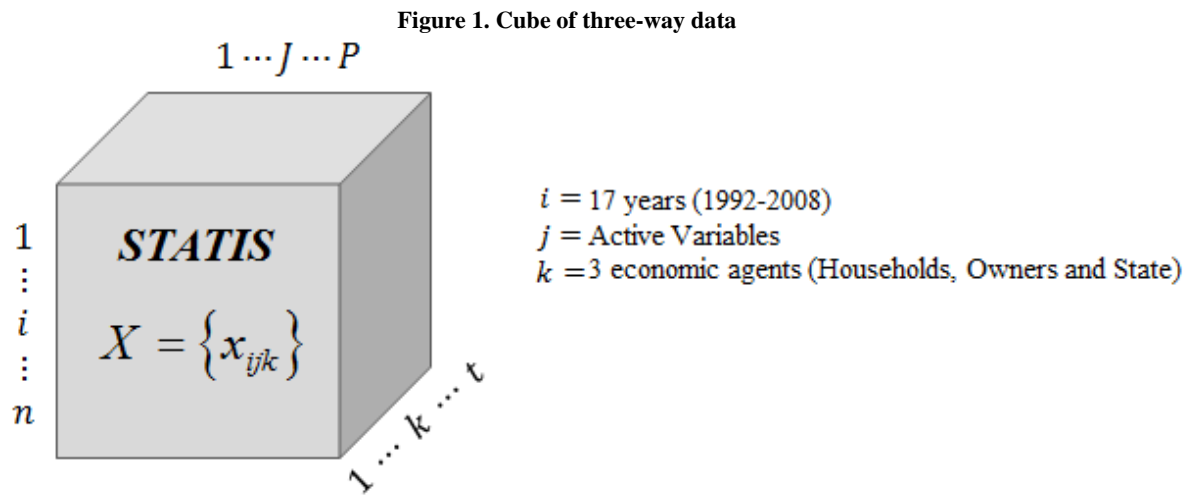
Thus, we highlight six objectives:

(1) - Identify the position of the three economic agents, in relation to the variables under study;

(2) - To analyze the relationship between the state, owners and households;

(3) - To characterize the behavior of the variables analyzed in the perspective of the three agents;

(4) - Verify the state contribution, owners and households for the definition of housing policies;

(5) - Check the relationship between the variables and their contribution in identifying the similarities / dissimilarities between the state, owners and households;

(6) - To recognize the agents of economic which cause divergences and/or convergences in the housing sector.

2 THE METHODOLOGICAL PROCEDURE

The measuring of a variable over a set of individuals, which from a statistical viewpoint corresponds to the simplest situation, allows us to build a vector of observations with one entry or way: individuals. If, besides this, we consider a set with more than one variable, the information can be structured as a data matrix and we obtain two ways: individuals and variables. If, for each previous matrix we carry out a repetition of measurements, on different occasions, we will be before a three-dimension setting, or in other words, three ways: individuals, variables and occasions. With a view to the explanation of data, for the one entry or way, we normally modelise the distribution of data. For the two entries or ways, explicative models or models of co-variance are built and, for the three ways we build models that are designated as three-way models. The main aim is to analyze multiple data tables where the observations are, for example, objects or individuals on which various measurements (variables) were carried out on various occasions. The term 'occasion' can refer to different moments in time or to different situations of measurements, in other words, to distinguish experimental situations. In these models the set of data is usually associated to a graphic representation, for a better recognition and illustration of the essential trends of the phenomena under study.

The data accommodated in a tridimensional configuration is presented in figure 1.

Figure 1. Cube of three-way data

$$i = 17 \text{ years } (1992\text{-}2008)$$
$$j = \text{Active Variables}$$
$$k = 3 \text{ economic agents (Households, Owners and State)}$$

Source: own elaboration

Over the last decades, the methods of Multivariate Data Analysis (*MVA*) have proven their efficacy. In the 1970s and 1980s, Escoufier (1973), Bouroche (1975), L'Hermier des Plantes (1976), Robert & Escoufier (1976), Jaffrenou (1978), Foucart (1981) and Escofier & Pagès (1985), amongst others, began developing their studies on methods for analysis of multidimensional tables, giving rise to one of the fundamental strands in this type of *MVA* techniques – the French school of analysis.

In this sense the elected method for this research is STATIS (*Structuration de Tableaux À Trois Índices de la Statistique*) that was first introduced by Escoufier (1973) and L'Hermier des Plantes (1976) in Probability and Statistics Laboratory of the University of Montpellier II, and later developed by Lavit (1988). This method is not restricted to the analysis of a data frame such as the Principal Component Analysis (PCA), but allows the simultaneous operation of multiple frames of quantitative data. It is an exploratory method for analyzing multivariate data which aims to compare configurations of the same individuals, in different conditions in order to find a common structure, stable and representative of all tables. It comprises the following four fundamental steps:

1. Interstructure analysis, which accounts for a comprehensive comparison of data tables;

2. Compromise analysis, which describes the common structure of several data tables;

3. Analysis of the Intrastructure, which allows highlighting of the individuals responsible for similarities (or differences) between tables;

4. Finally, the trajectories that describe the evolutionary behavior of each individual or variable are traced from the Compromise of the image.

In short, the STATIS method allows us not only to capture the trajectories of individuals and variables over time or conditions, but also to identify the variables and individuals that contribute to stability.

The general principle of classification used for clustering in this research is based on the construction of a framework of similarities between the arrays of approximations. The method used was Ward (Ward, 1963) which considers the Euclidean distance. In the Ward method, the total variance is equal to the sum of the internal variance of class and inter-class variance. It is therefore necessary to find a uniformity within each class (thus minimizing the variation of inter-class variance), and a heterogeneity between classes. Lastly the group of subjects is performed in order to maximize the similarity within the groups and differences between groups.

To identify the significant active variables for each cluster we used the test to the differences of the averages of the samples where the null hypothesis means that there is no difference between the mean of a sample and the population mean, and no difference between the means of two samples.

The data used in this research is of secondary databases provided by INE (National Statistical Institute of Portugal), IGAPHE (Institute of Management and Alienation of the Patrimony Housing of State), INH (National Housing Institute), Bank of Portugal, IHRU (Institute for Housing and Urban Rehabilitation), IMOESTATÍSTICA (real estate private index), Finance Ministry of Portugal and AECOPS (Association of Construction, Public Works and Services) are presented in Table 1.

Table 1. Observations, Variables and Entities

i=OBSERVATIONS:	Portugal for years (1992-2008)
k=ENTITIES	**j=VARIABLES**
HOUSEHOLDS	**(F1) General Credit Scheme (€ million):** monetary value of the credit agreements for housing without direct financial state support;
	(F2) Subsidised Credit (€ million): Monetary amount of interest on credit contracts for housing under the subsidized credit scheme with state support for the acquisition, construction and works in permanent housing;
	(F3) Credit Subsidised for the young (€ million): idem, since the buyers had until age 30;
	(F4) (F1 + F2 + F3) / GDP: relative weight of the sum of these variables in GDP.
OWNERS	**(P1) REHABITA (€ thousands):** value resulting from the conclusion of agreements between the IGAPHE (IHRU) and the municipalities, the two bodies responsible for the financial coverage of the works of urban renewal to be undertaken; these collaboration agreements were also endorsed by INH (IHRU) or other credit institutions;
	(P2) RECRIPH (€ thousands): financial contribution for carrying out maintenance and improvement works on units by joint owners of old buildings, via administration of condominiums;
	(P3) Real Estate Confidential Index: Index that measures since 1988, the oldest series on the evolution of the value of residential real estate;
	(P4) (P1 + P2) / GDP: Group of the relative weight of these active variables in GDP.
STATE	**(E1) Subsidized General Interests (€ million):** amount payable by the resulting state of the differential between the interest rate indexed to EURIBOR (the reference rate of the interbank market) and the contracted rate on loans;
	(E2) Controlled Cost Housing by cooperatives, municipalities and private companies (€ million): it is the State financial support in order to allow the rental or home ownership to low household resources, promoted by Cooperatives, by local councils and private companies;
	(E3) Incentive to rent for the young (€ million): Financial support specific state for the tenants young (30 years old);
	(E4) Special Re-housing Plan (established in 1993) (million €): co-repayable via IGAPHE (IHRU), up to 50% of the cost of construction of the projects, and the municipalities could also use, for the remaining cost, long-term subsidized funding or the INH (IHRU) or any credit institution;
	(E5) RECRIA (€ million): the amount of bonuses, via INH (IHRU), the municipalities, landlords and tenants of fires, since should proceed conservation works or improvement;
	(E6) (E1 + E2 + E3 + E4 + E5) / GDP: on the combined weight of these variables in GDP at current currency values, which quantifies the economic activity by sector of activity, considering only the consumer goods and services finals.

Source: own elaboration

3 RESULTS

The comparison of the groups of variables in the space of the first two principal components for STATIS interstructure is displayed in Figure 2. From this analysis we can explore the stability of the set of observations.

Figure 2. The interstructure: A global comparison of the sets of data on the three economic agents
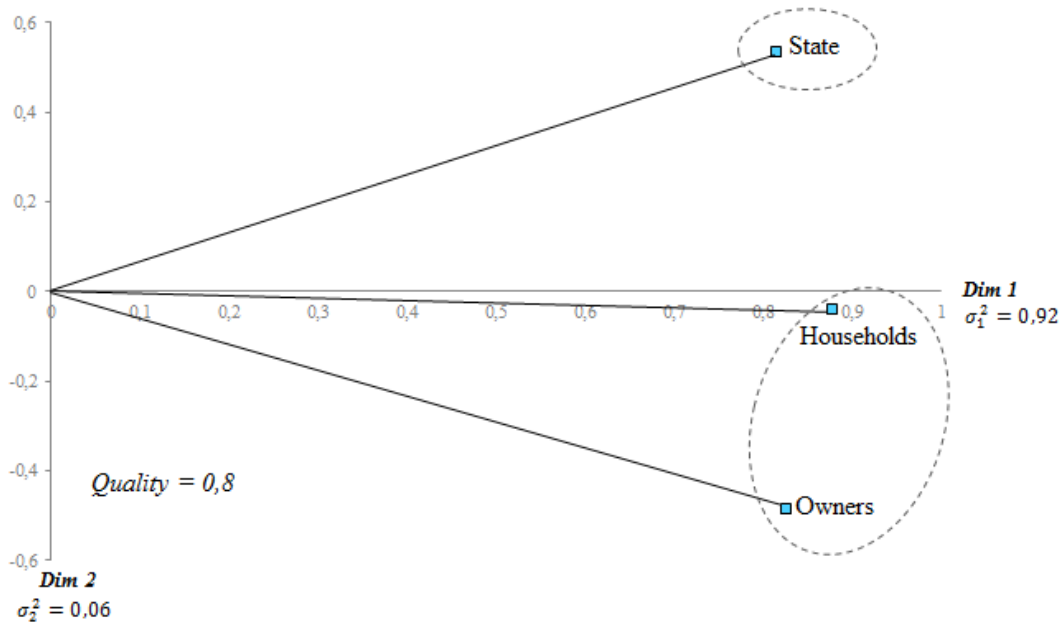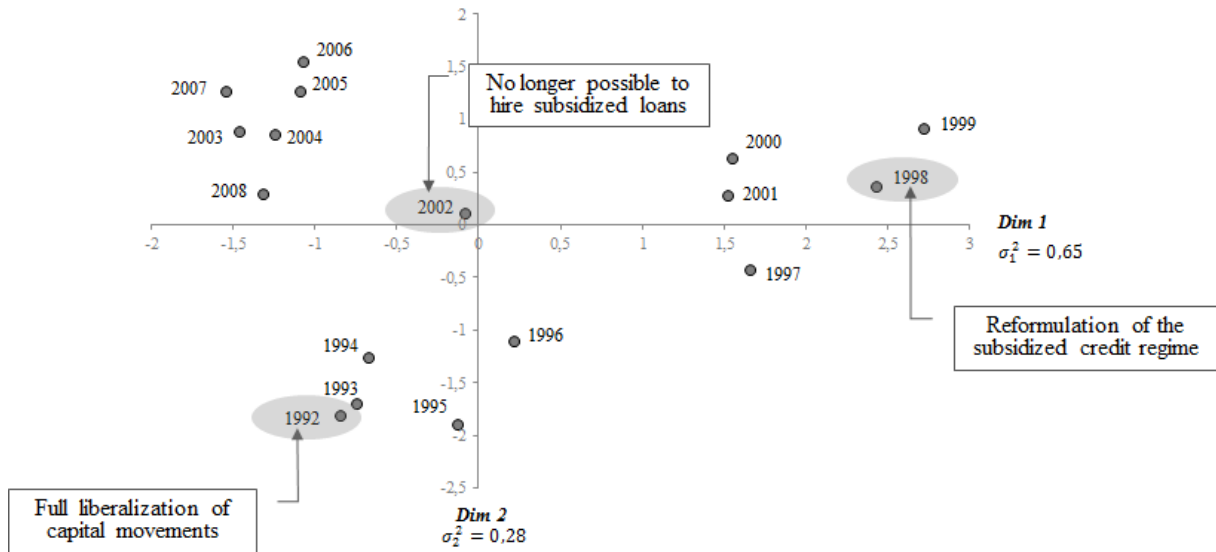

Source: own elaboration

The distances between the entities reflect similarities / differences in the stability of 3 economic agents over the period 1992-2008

The coordinates of this factorial structure, with a quality of representation 80%, are associated with the first dimension which retains 92% of the total information.

In the STATIS results, the configuration of the interstructure denotes stability, for all three entities are associated to the first dimension, and this method, by its nature, is well interpretable over the first dimension.

In the STATIS method, the computation of the compromise matrix, where each row represents a observation of (Portugal per year), and each column is a component. The compromise matrix is a scalar product matrix, and therefore its eigendecomposition amounts to a PCA. In Figure 3 the Euclidian image coordinates in compromise space is presented along axes 1-2. From this analysis we can explore the structure of the set of observations from the STATIS point of view.

Figure 3. The compromise: A description of the structure common to the various tables of data with an Euclidean representation of the years on plane 1-2

Source: own elaboration

Identifies the level of commitment between the years. Detects the temporal position in question, reflected by the Active Variables of the 3 agents. The identification of the three clusters defined by Ward's method is represented in Figure 4.

Figure 4. Identification of three Clusters in the common structure by Hierarchical segmentation using the squared Euclidean distance and Ward Criteria
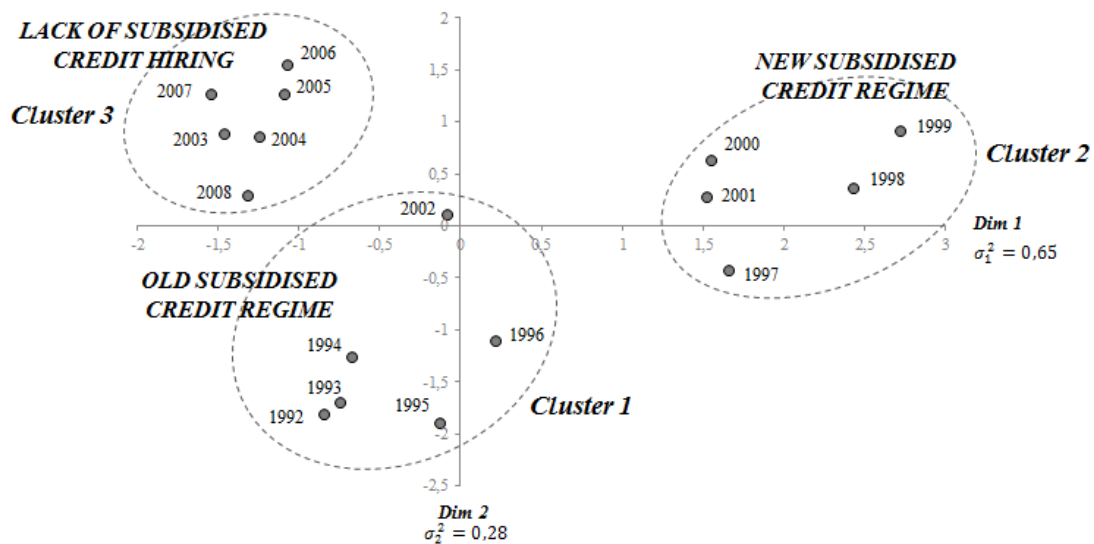
Source: own elaboration

The application of a singular value decomposition (SVD) and subsequent principal component analysis (PCA) now reveals a factorial space that captures, in two dimensions, 92.31% of the compromise matrix, being 64.55% of the information held in the first dimension.

In Figure 4 can be noticed the most important periods that marked the 1992-2008 period as for the credit schemes used in Portugal.

Thus, the second dimension can be interpreted by the opposition between the years before and after entry into force of Decree-Law No. 349/98 of 11 November, decree amending and starts to regulate the new subsidized credit agreements (Figure 4).

Thus, it becomes possible to characterize, at first, the three clusters detected. Cluster 1 is to be marked by the period of the former subsidized credit scheme, Cluster 2, as the period of the new subsidized credit scheme and the Cluster 3, a period in which ceases to exist hiring of subsidized loans (Figure 4).

In order to distinguish the three clusters, depending on variables considered significant, and, for a 95% confidence interval, was performed a test of the difference of averages of three independent samples. It were obtained in this way, the following significances values associated with the test (Table 3).

Table 3. Test to the difference of averages for independent samples (Clusters)

	Significance	DECISION
The averages of zP1 are equal between Clusters	0,11	Do not reject H0
The averages of zP2 are equal between Clusters	0,11	Do not reject H0
The averages of zE1 are equal between Clusters	0,004	Reject H0
The averages of zE2 are equal between Clusters	0,214	Do not reject H0
The averages of zE3 are equal between Clusters	0,002	Reject H0
The averages of zE4 are equal between Clusters	0,175	Do not reject H0
The averages of zE5 are equal between Clusters	0,002	Reject H0
The averages of zF1 are equal between Clusters	0,002	Reject H0
The averages of zF2 are equal between Clusters	0,004	Reject H0
The averages of zF3 are equal between Clusters	0,004	Reject H0

Source: own elaboration

It was found the presence of six significant active variables (zP1, zP2, zP4, zE2, zE4 and zE6) differentiating the clusters. In Table 4 are observed movements of these six variables per cluster, over the period 1992-2008

Table 4. Differentiation between clusters according to the significant active variables

| Trends of ACTIVE VARIABLES		Cluster 1	Cluster 2	Cluster 3
Subsidized General Interests	zE1	↗	↘	=
Incentive to rent for the young	zE3	↗	↘	↗
RECRIA	zE5	↗	↘	↗
General Credit Scheme	zF1	↘	↗	↗
Subsidised Credit	zF2	↗	↘	=
Credit Subsidised for the young	zF3	↗	↘	=

Source: own elaboration

The variables Subsidized General Interest Rate, Incentive to youth renting, RECRIA, General Credit Regime, Subsidized Credit and Subsidized Credit for the young had different movements for each cluster as exposed in Table 4. This gives us an insight of the relative homogeneity of policy for the years encompassed in each cluster and heterogeneity of policy between clusters.

This phase of intrastructure spatially represent the structure of each original matrix data in the compromise space. Each trajectory represents one year the period 1992-2008 for the three economic agents, thus delineating approaches or deviations regarding individual's compromise.

These deviations and approaches are better understood using the correlation of active variables and supplementary variables that most significantly are associated with each of the compromise axes.

Figure 5 shows the significant correlations between the original variables and dimensions of the compromise space concerning each economic agent.

Figure 5. The intrastructure: Circles of Correlations
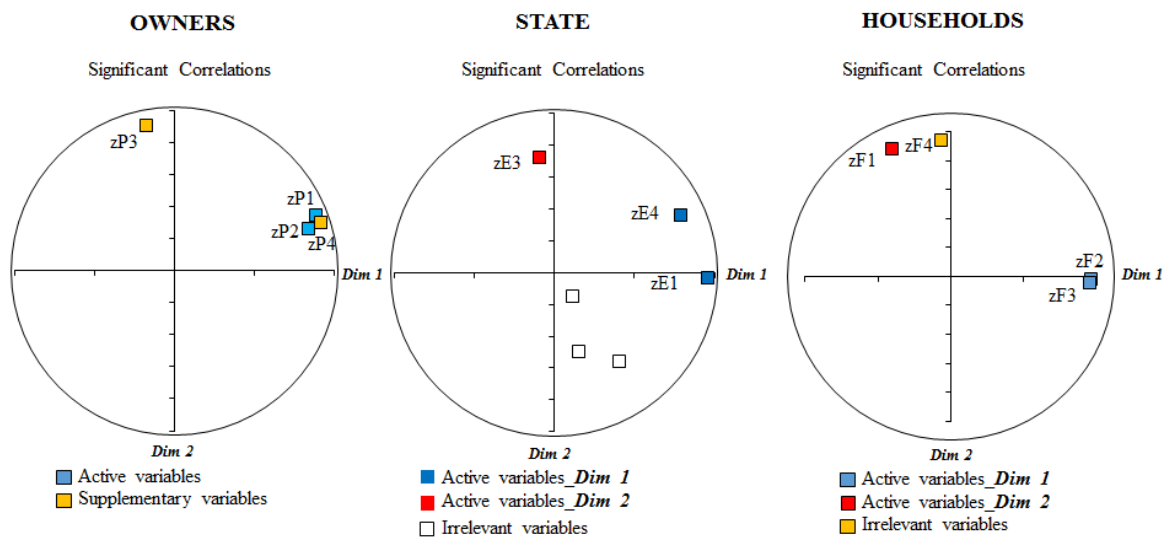
Source: own elaboration

It is possible to identify the variables that contributed to instability for each economic entity.

The variables F1 and F4 for Households, E3 for State and P3 for Owners, diverged and in this sense did not support the formation of the compromise.

Thus the reproduction of trajectories in Euclidean image of compromise is based on the representation in this image of the three clouds of individuals (Figure 6). We

believe, therefore, to be able to indicate the year in which the structure is more or less consistent in the relations between the three economic agents.

Figure 6. The intrastructure: identification of three examples for the 1992, 2000 and 2008 trajectories
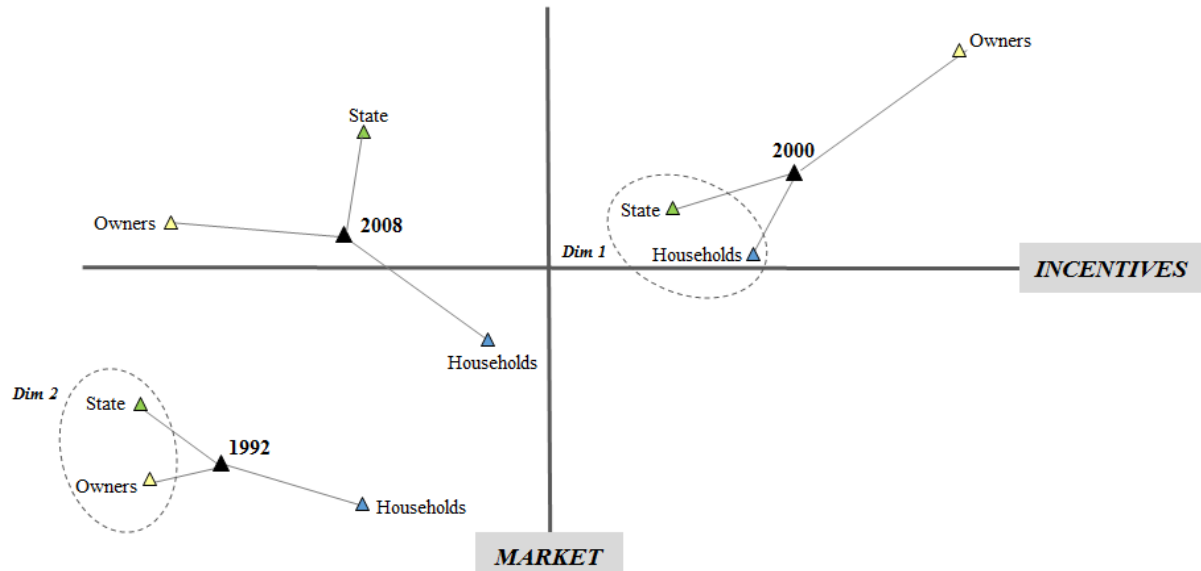
Source: own elaboration

For 1992 the households contribute the most to the average of the behavior. There is a strong positive correlation between the state and owners. Owners and especially the state contributes, opposed to households, to the formation of compromise.

On 2000 it is shown that it is the owners who contribute most to the behavior of the average. There is a strong positive correlation between state and households. Households and the state contribute as opposed to owners for the formation of compromise.

In the year 2008 it is observed that are the owners who contribute most to the average behavior. There is a negative correlation between Households, State and Owners. There has been a greater contrast between owners and households, keeping the state on an equal relationship with both for the formation of commitment.

4 DISCUSSION

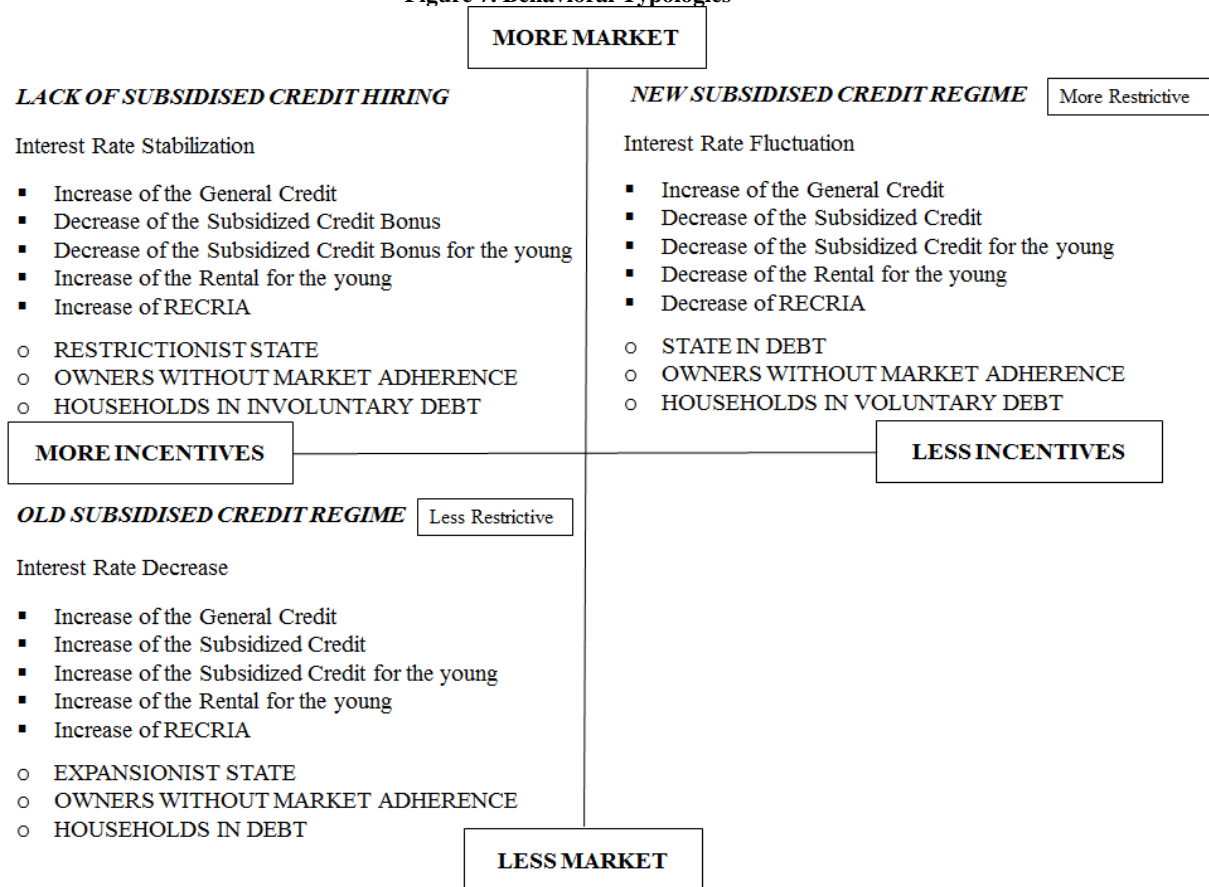The analysis of the results showed that there is a change in relative position of economic agents which notes:

1. The Association of State and property opposed to families in the years 1992-1994, 1998 and 2004-2007;
2. The Association of State and Families as opposed to owners in the years 1995-1996, 1999-2001 and 2003;
3. In 1997, 2002 and 2008, years of change, the three economic agents are negatively correlated (in opposition);

4. At no time was association (positive correlation) between families and owners.

According to the characterization of clusters performed in Table 4 and taking into account the additional information of the evolution of the interest rate, it is possible to establish behavioral typologies that are displayed in Figure 7.

Figure 7. Behavioral Typologies

MORE MARKET

LACK OF SUBSIDISED CREDIT HIRING

Interest Rate Stabilization

- Increase of the General Credit
- Decrease of the Subsidized Credit Bonus
- Decrease of the Subsidized Credit Bonus for the young
- Increase of the Rental for the young
- Increase of RECRIA

o RESTRICTIONIST STATE
o OWNERS WITHOUT MARKET ADHERENCE
o HOUSEHOLDS IN INVOLUNTARY DEBT

NEW SUBSIDISED CREDIT REGIME   More Restrictive

Interest Rate Fluctuation

- Increase of the General Credit
- Decrease of the Subsidized Credit
- Decrease of the Subsidized Credit for the young
- Decrease of the Rental for the young
- Decrease of RECRIA

o STATE IN DEBT
o OWNERS WITHOUT MARKET ADHERENCE
o HOUSEHOLDS IN VOLUNTARY DEBT

MORE INCENTIVES   **LESS INCENTIVES**

OLD SUBSIDISED CREDIT REGIME   Less Restrictive

Interest Rate Decrease

- Increase of the General Credit
- Increase of the Subsidized Credit
- Increase of the Subsidized Credit for the young
- Increase of the Rental for the young
- Increase of RECRIA

o EXPANSIONIST STATE
o OWNERS WITHOUT MARKET ADHERENCE
o HOUSEHOLDS IN DEBT

LESS MARKET

Source: own elaboration

Thus, the years that are positioned in the first cluster are the result of:

1. A STATE trying to balance the high interest context in decline with the need to own housing for FAMILIES or through the Subsidised credit schemes and Credit Subsidised Young little restrictive with regard to hiring, either by encouraging the young Rent . On the other hand promotes the rehabilitation of buildings leased by RECRIA program directed to the OWNERS;

2. FAMILIES forced into debt, given the still high interest rate for own house purchase and the absence of a genuine rental market; it's from,

3. OWNERS that given the rents freeze history, maintain a very high level of suspicion, either for rehabilitation investment, whether to increase the lease offer.

Similarly, the years that are positioned in the second cluster are the result of:

4.   A debt STATE, via the subsidized loans previously contracted and still in force, trying to balance the new lower interest context and oscillation, or by restricting access to the hiring of new credits Subsidised and Subsidised Young or by reducing Encouraging Young People's rent, directed to the households. On the other hand, it reduces the incentive to rehabilitation of leased property through targeted RECRIA program for OWNERS;

5.   HOUSEHOLDS rationally, given the low level of interest rates and the added difficulty of framing the credits subsidized and maintenance of the lack of a real rental market, resort to borrowing via General Credit scheme for purchase of homes; it's from,

6.   OWNERS that, given the shrinkage of state incentives or credits in Subsidised and Subsidised Young wants investment in rehabilitation, maintain a high level of suspicion, either for rehabilitation investment, whether to increase the lease offer.

Finally, the years that are positioned in the third cluster are the result of:

7.   A STATE trying to rationally balance the low and stable interest context, with less need for private housing for HOUSEHOLDS, either by elimination of contracting new loans in subsidized schemes, either by encouraging the rent Young. On the other hand promotes the rehabilitation of buildings leased by RECRIA program directed to the OWNERS;

8.   HOUSEHOLDS forced into debt to purchase private housing via Credit General, given the withdrawal of support by the State to purchase a pair of an increase in the incentive to rent Young; it's from,

9.   PROPRIETARY that given the rents freeze history, maintain a very high level of suspicion, either for rehabilitation investment, whether to increase the supply of accommodation, despite the increase in support from the state via RECRIA in promoting property leased rehabilitation.

5 CONCLUSIONS

Relative to owners:

1.   In the old, the new and the Credit Regime absence Subsidised period, the OWNERS maintained a low level of adherence to the market, both for investment in rehabilitation, and for increasing the supply of homes for rent.

Relative to state:

2.   In the Old Credit Scheme Subsidised, and in the presence of decreasing interest rates, STATE sought to balance the needs of two economic agents. For HOUSEHOLDS through interest subsidy for purchase of homes and through the encouragement of young

lease. For OWNERS, promoting the rehabilitation of leased properties through a targeted program for this purpose.

3. New Credit Scheme Subsidised and a swing in interest rate environment, debt STATE via the previously contracted subsidized loans, restricted access to new credits subsidized and reduced the incentive for young leasing, targeted for HOUSEHOLDS. On the other hand, it decreased the incentive to rehabilitation of properties leased to the OWNERS.

4. In the absence of Subsidised Credit Contracting and in an environment of stable interest rates, STATE tried to rebalance the demand for private housing HOUSEHOLDS of either the extinction of new loans in subsidized schemes, either by encouraging young lease. On the other hand, promoted the rehabilitation of properties leased to the OWNERS.

Relative to households:

5. In the Old Credit Scheme Subsidised, the HOUSEHOLDS were induced indebtedness, given the decrease in interest rates for the purchase of homes and the lack of a true rental market.

6. New Credit Scheme Subsidised, given the low level of interest rates, the added difficulty of framing the credits subsidized, as well as maintaining the absence of a genuine lease market, HOUSEHOLDS, rationally, resorted to borrowing through regime General Credit.

7. In Credit Hiring None Subsidised, and given the increase in encouraging young lease, the HOUSEHOLDS were forced into debt via General Credit scheme.

Our empirical study, to detect a common structure, although instability between OWNERS, STATE, and HOUSEHOLDS, showed that public housing policies are not separable in the analysis and understanding of the relationships among the three clusters, in Portugal, in the period 1992-2008.

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