# BIRTHS AND HOUSING NEEDS IN SPAIN. AN ANALYSIS OF CAUSALITY

MONTSERRAT DIAZ
Quantitative Economics Professor
QUANTITATIVE ECONOMICS DEPARTMENT
FACULTY OF ECONOMICS AND BUSINESS
OVIEDO UNIVERSITY

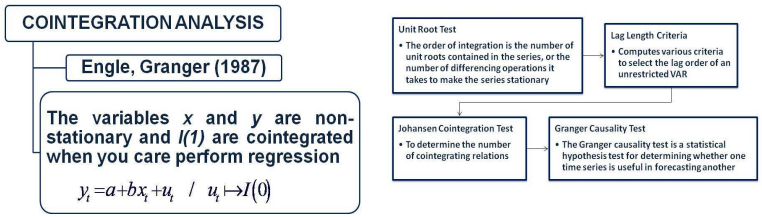
MAR LLORENTE
Quantitative Economics Professor
QUANTITATIVE ECONOMICS DEPARTMENT
FACULTY OF ECONOMICS AND BUSINESS
OVIEDO UNIVERSITY

## ABSTRACT

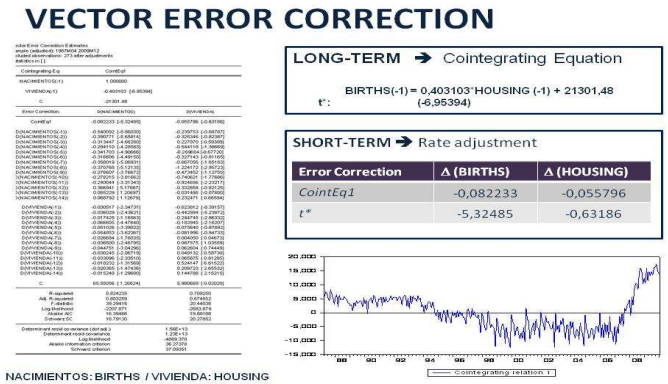
OBJETIVE.- The study analyzes the relationship between the housing market and births in Spain (January 1986-December 2009).
METHOD.- The process of analysis follows traditional patterns in time series studies. A Vector Error Correction (VEC) is specified. VEC will allow consider the adjustment dynamics of the variables in both the short and long term.
RESULTS.- The domain of the effect of short on the long term effect is evaluated. The resulting series is a linear combination of both series and displays a short memory.
CONCLUSIONS.- The demographic variable contributes to achieving the long-run equilibrium when there are changes in the socioeconomic sphere.

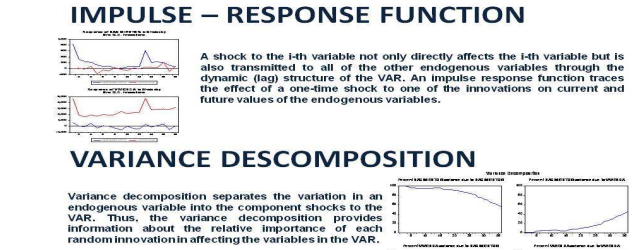
## INTRODUCTION


## METHODOLOGY

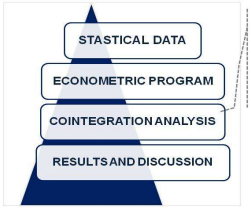



## RESULTS



## EMPIRICAL EXERCISE




- Unit Root Test
- Lag Length Criteria
- Johansen Cointegration Test
- Granger Causality Test
- VECTOR ERROR CORRECTION
- Impulse-Response Function
- Variance Descomposition
- VEC Forecast

### STASTICAL DATA

| STATISTICAL DATA | | VARIABLES | DESCRIPTION |
|---|---|---|---|
| Source | Ministry of housing<br>National Statistics Institute | BIRTHS | Monthly number of births |
| Variables | Housing permits<br>Births | HOUSING | Number of housing starts |
| Sample size | 1998.01 – 2010.03 | | |
| Territorial scope | | Spain | |

### ECONOMETRIC PROGRAM: Eviews 7

## COINTEGRATION ANALYSIS

### UNIT ROOT TEST

| Augmented Dickey-Fuller test statistic (ADF) | | | | |
|---|---|---|---|---|
| Variable | Levels | p-value | First differences | p-value |
| Births | -2,001341 | 0,5976 | -6,586335 | 0,0000 |
| Housing | -1,393642 | 0,8610 | -4,461761 | 0,0021 |
| $H_0$: Unit root | | Test critical values | | |
| 1% | | -3,991780 | | |
| 5% | | -3,420251 | | |
| 10% | | -3,135336 | | |
| *NONSTATIONARY I(1)* | | | | |

### OPTIMAL LAG

VAR Lag Order Selection Criteria
Endogenous variables: NACIMIENTOS
Exogenous variables: C
Sample: 1998M01 2010M03
Included observations: 270

| Lag | LogL | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 14 | -2217.469 | 7.370280* | 890059.0 | 16.53681 | 16.73672* | 16.61706* |
| 17 | -2213.163 | 3.614832 | 881567.0* | 16.52714* | 16.76703 | 16.62347 |

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

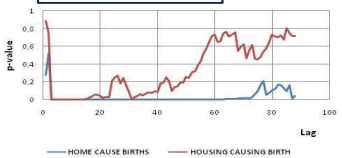
### COINTEGRATION RANK

Trend assumption: No deterministic trend (restricted constant)
Series: NACIMIENTOS VIVIENDA
Lags interval (in first differences): 1 to 14
Unrestricted Cointegration Rank Test (Trace)

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.105796 | 35.42382 | 20.26184 | 0.0002 |
| At most 1 | 0.017777 | 4.899873 | 9.164546 | 0.2948 |

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

### GRANGER CAUSALITY




## CONCLUSIONS

1.- Association between BIRTHS and HOUSING is linearly proportional, rBH= 0,3553 in the short term.
2.- Both series are cointegrated, [I(1)]. A long and short term relationship can be differentiated.
3.- The estimation of the VEC describes a long-term equilibrium relationship.
4.- The cointegration equation shows a crowding-in effect in the long term. A revitalization of the housing activity stimulates the demographic trajectory. Two series of long memory are transformed by a linear combination in a new short term memory series.
5.- Population dynamics responds to short-term imbalances to restore long-term equilibrium [speed of adjustment (t*=-5,32385)]. Housing activity is shown as a weakly exogenous variable in the system [speed of adjustment (t*=-0,63186)].
6.- The demographic variable is explained by its own dynamics. There is a crowding-out in the short term. The births of prior time units negatively impact on the contemporary time unit. The effect on contemporary references is positive from lag 12 (positive sign and statistical significance). Housing activity contributes negatively to population dynamics (in the short term there is a crowding-out). The statistical significance varies depending on the unit and reflects different considerations of the variable in the short term. The independent term positive and statistically significant confirms the independence of the demographic variable.
7.- The present results show the existence of a causal Granger sense relationship from 3 to 24 lags in a two-ways sense. The births do not explain the Granger sense housing series from lag 24 but housing activity explains the births.
8.- The domain of demographic dynamics can be checked by estimating a VEC models, impulse-response functions and variance decomposition. Deviations from the trend of the cointegrated variables in the long term are best described as transient variations of the demographic factor in the long term.

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