
A Model-Based Comparison of the Three Greatest Crisis of the Modern Economic History

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Abstract

We estimate, from a Bayesian approach, a medium-scale DSGE model with several rigidities and enriched with the financial accelerator of Bernanke et al. (1999), for three alternative periods: The Great Depression, The Stagflation and The Great Recession. We compare the different sources of fluctuations among the subsamples explaining which shocks drove the instability of each period and which frictions were especially important. Moreover we carry out an optimal monetary policy analysis in order to assess, up to which extent, the crisis could have been mitigated. We demonstrate that the model is able to capture the historical evidences of each period and that monetary policy could have been a powerful tool during the three crisis.

1 Introduction

New Keynesian models are nowadays widely used for monetary policy. These models are typically estimated using long time series. However, how do these models perform when we consider very specific subsamples where different shocks cause huge fluctuations in the economy?. In particular, does the model that we consider capture the different features that characterized three different crisis as the Great Depression the Stagflation and the Great Recession?. The aim of this model-based analysis is to enlighten which the main sources of fluctuation in three different crisis are and contrast them with the historical evidences. We investigate the similarities and highlight

the differences which may explain their causes. We compare the Great Depression with the Great Recession, the two big financial crisis of the modern economic history. Moreover, we also consider another crisis whose causes seem to be rather different, the Stagflation.

The first exercise that we carry out is the comparison of the rigidities across the three samples. For instance, some researches, as Dighe (1997), state that wage rigidity was unusually high during the Great Depression and it played a crucial role in the consequences of the crisis. Other researches claim that financial frictions are the main cause of both the Great Depression (Kobayashi, 2004) and the Great Recession (Zhen and Ríos-Rull, 2016). Therefore, we assess the empirical importance of these rigidities and compare them across the different sample periods in order to evaluate their role in each crisis. We find that financial and investment frictions are crucial during the three crisis. The wage stickiness, in contrast with other researchers results, is not especially high.

Moreover, we also identify the role of the shocks that affected the economy in each sample. In such a way we can enlighten the shocks that causes each crisis and their transmission mechanism. For instance, Barsky and Kilian (2001) claim that the Stagflation was not caused, up to some extent, by an increase in the oil prices, but it is mainly driven by a monetary issue. In the case of the Great Depression and the Great Recession we assess the role of the financial shocks in contrast to other important sources of fluctuations in that periods as the monetary or the investment-specific technology shock. We provide results that are in line with the historical evidences. Therefore, we can claim that the model is able to capture the main features of each period and, considering our seven observables, the model identifies the causes of each crisis. We find that the shocks that mainly cause the Great Depression are the risk premium shock, that represents the burst of the financial bubble, and the monetary policy shock, that represents the failure of an inappropriate monetary policy. The price markup shock identifies the oil crisis as the main driving force of the Stagflation whereas the Great Recession was mainly caused by the investment-specific technology shock that captures the bubble of the real state sector.

Finally, considering the estimated parameters of the model we carry out an optimal monetary policy analysis across the different samples. We implement a objective function for the Central Bank whose targets are the stabilization of inflation, potential output growth, interest rate and growth of interest rate. Once we estimate the optimal parameters of the Taylor rule we conduct a counterfactual simulation of each period considering the actual realization of the shocks and the optimal behavior of the Central Bank. In such a way, we are able to assess the role of monetary policy in each crisis and the capability of the Central Bank had to refrain them. For instance, Friedman and Schwartz (1967) claimed that the severity of the Great Depression was due to the wrong monetary policies. We assess this issue and look for similarities in the other two crisis under the framework of our model. We find that this optimal monetary policy could have eliminate the drop in output during the 30's. Regarding the Stagflation, the effects of monetary policy on output are limited but it could have decreased substantially the inflation that characterized this period. Finally, the Great Recession could have been mitigated through this optimal monetary policy reducing the drop in output and labor and its length.

The structure of the paper is as follows. Section 2 summarize the model and present the log-linearized version. Section 3 briefly explains the methodology used in the estimation of the DSGE, mentions the data set sources and described the prior distribution of the parameter that we choose. Section 4 explains the results, i.e. the posterior distribution of the parameters, the impulse-response functions, the variance decomposition and the historical variance decomposition. Section 5 presents the optimal monetary policy computation and the counterfactual simulations. Finally, section 6 concludes.

2 The model

In this paper, we consider a medium-scale DSGE model. The model considers several nominal and real rigidities that together with various exogenous shocks allow us to match the main features of the US business cycle. The model is similar to the well-known New Keynesian models presented by Smets and Wouters (2003, 2005, 2007)

and Christiano, Eichenbaum and Evans (2005). The rigidities are considered in order to capture the persistence of the macroeconomic variables, whereas the exogenous shocks processes hit the economy giving rise to the business cycle.

In this section we provide an overview of the model and present the log-linearized equations that characterized the equilibrium. The demand side of the model economy is compounded by households who choose consumption, hours worked, investment (capital stock), capital utilization and bonds. Hours worked are homogeneously supplied from households to an intermediate labor union. This union differentiates the labor and supply it to the intermediate good sector. Moreover, households rent capital to intermediate good sector and decide how much accumulate depending on the adjustment cost. The intermediate good firms choose their production inputs (labor and capital) and sell a differentiated good to the final sector that close the circle selling a homogeneous good to the household. Both intermediate good sector and labor union supply a differentiated good, and consequently, they are assumed to have some degree of market power. Moreover both wage and price stickiness are modeled à la Calvo. In addition to these nominal rigidities, we also consider that prices which are not re-optimized are indexed to past inflation realizations.

Moreover, as in De Graeve (2008), the model is enriched throughout an endogenous financial sector. More precise, we consider the financial accelerator of Bernanke, Gertler and Gilchrist (1999). This specification considers that a fraction of the households are entrepreneurs who own the stock of capital and choose the degree of utilization. They borrow money from financial intermediaries at an interest rate which is determined by the interest rate established by the central bank plus a premium which depends on the entrepreneurial net-worth. This premium is justified by the existence of an idiosyncratic shock that affect to the productivity of each entrepreneur that the bank cannot observe (due to the linearity assumption this idiosyncratic shock does not show up in the log-linearized equations, what makes the model more tractable). The entrepreneurs face a survival probability that captures the creation and closure of firms. Moreover it avoids the possibility that an entrepreneur becomes rich enough to be self-financing. Since the survival probability is assumed to be constant the number of

entrepreneurs is constant. The entrepreneurs' net-worth comes from the profits accumulated from the investment in previous period. The financial friction is determined by the survival probability of the entrepreneurs, inasmuch as new entrepreneurs incorporate in the market with a proportion of the net-worth of the previous period.

The financial intermediaries are characterized by a representative and perfectly competitive bank. In addition to fund entrepreneurs, banks issue deposit liabilities to households.

2.1 The log-linearized model

Since the model is the Smets and Wouters (2005) model with some minor changes and the financial accelerator is introduced as described in Bernanke, Gertler and Gilchrist (1999) in this section we simply describe the log-linearized equations that characterize the general equilibrium of this model economy. All variables are expressed in log-deviations from their steady states.

Households

The utility function is non-separable in consumption and labor and incorporates habit formation. From the optimality conditions of the household maximization problem we get the following Euler equation.

$$c_t = \frac{h}{1+h} c_{t-1} + \left(1 - \frac{h}{1+h}\right) E_t c_{t+1} + \frac{\sigma_c - 1}{(1 + \lambda_w)(1+h)\sigma_c} (l_t - E_t l_{t+1}) - \frac{1-h}{(1+h)\sigma_c} \left[R_t^n - E_t \pi_{t+1} + \epsilon_t^B \right] \quad (1)$$

where the parameter h represents the degree of habit persistence, the parameter σ_c is the elasticity of intertemporal substitution, $R_t^n - E_t \pi_{t+1}$ is the real interest rate and the risk premium shock, ϵ_t^B , that is assume to follow a AR(1) process.

As in Smets and Wouters (2007), the Household supply of labor and the labor union, that have market power and can just adjust prices with probability $1 - \xi_w$, give rise to the following equation for wages:

$$w_t = \frac{\beta}{1+\beta} (E_t w_{t+1} + E_t \pi_{t+1}) + \left(1 - \frac{\beta}{1+\beta}\right) w_{t-1} - \frac{1+\beta\gamma_w}{1+\beta} E_t \pi_t + \frac{\gamma_w}{1+\beta} \pi_{t-1} - \frac{1}{1+\beta} \frac{(1-\beta\xi_w)(1-\xi_w)}{(1+(1+\lambda_w)\sigma_l/\lambda_w)\xi_w} \left[w_t - \sigma_l l_t - \frac{\sigma_c}{1-h} (c_t - h c_{t-1}) \right] + \epsilon_t^w \quad (2)$$

where the term in brackets is the wage mark-up, the parameter β is the discount factor, the parameter γ_w is the degree of past inflation indexation in wage and λ_w measures the degree of competition in the labor market. Moreover the disturbance ϵ_t^w captures the wage mark-up shock, and it is assumed to follow an AR(1) process.

Supply side

We assume that the aggregate production function is a Cobb-Douglas function, where the inputs are capital and labor:

$$y_t = \phi \alpha k_{t-1} + \frac{\phi \alpha}{\psi} r_t^k + \phi(1-\alpha)l_t + \phi \epsilon_t^a \quad (3)$$

where α is the capital share in the production, $\phi - 1$ represents the share of fixed costs in production, ψ represents the elasticity of capital utilization and ϵ_t^a is a AR(1) process that captures the productivity shocks.

As usual the labor demand is determined by the marginal productivity of labor:

$$l_t = w_t + \left(1 + \frac{1}{\psi}\right) r_t^k + k_{t-1} \quad (4)$$

Firms have some degree of market power. Moreover they are able to adjust prices with probability $1 - \xi_p$. Therefore from the firm profit maximization we get the so-called New Keynesian Phillips curve:

$$\pi_t = \frac{\beta}{1+\beta\gamma_p} E_t \pi_{t+1} + \frac{\gamma_p}{1+\beta\gamma_p} \pi_{t-1} + \frac{1}{1+\beta\gamma_p} \frac{(1-\beta\xi_p)(1-\xi_p)}{\xi_p} \left[\alpha r_t^k + (1-\alpha)w_t - \epsilon_t^a \right] + \epsilon_t^p \quad (5)$$

The term in brackets is the price mark-up, the parameter γ_p represents the degree of indexation of past inflation and the disturbance ϵ_t^p captures the price mark-up shock. This disturbance is assumed to follow a AR(1) process.

Entrepreneurs and financial sector

Capital-good producers turn out the capital and sell it to entrepreneurs at price q_t . Entrepreneurs are the owners of the capital. Therefore, they choose the level of investment. Since investment is subject to adjustment cost we get the following equation:

$$i_t = \frac{1}{1+\beta} i_{t-1} + \frac{\beta}{1+\beta} E_t i_{t+1} + \frac{1}{\varphi(1+\beta)} (q_t + \epsilon_t^I) \quad (6)$$

where φ is the parameter that captures the investment adjustment cost and the disturbance ϵ_t^I is a AR(1) process that represents the investment-specific technology shock.

The capital stock evolves in the following way:

$$k_{t+1} = (1-\tau)k_t + \tau i_t + \tau \epsilon_t^I \quad (7)$$

where τ is the depreciation rate of capital.

Aggregate real expected return to capital is determined by the rental rate of capital r_{t+1}^k plus the increase of its value:

$$E_t R_{t+1}^k = \frac{1-\tau}{\bar{R}^k} E_t q_{t+1} + \frac{\bar{r}^k}{\bar{R}^k} E_t r_{t+1}^k - q_t \quad (8)$$

where \bar{R}^k and \bar{r}^k are the steady state return to capital and rental rate, respectively.

The equilibrium condition describes that entrepreneurs finance their investment up to the point in which the cost of the external finance is equal to the expected return of capital:

$$E_t R_{t+1}^k = -\epsilon E_t [n_{t+1} - q_t - k_{t+1}] + R_t^n - E_t \pi_{t+1} + \epsilon_t^B \quad (9)$$

where the brackets contain the net worth of the entrepreneurs (n_{t+1}) and the gross price of capital ($q_t k_{t+1}$), this difference is the proportion of the project that the entrepreneur is not able to self-finance, and consequently, requires external funding. The parameter ϵ is the elasticity of external finance premium to this entrepreneurial financial health. Therefore, a higher value of this parameter would make the interest rate spread more sensible to the proportion of the investment for which entrepreneurs need external

funding. Moreover, the spread is also characterized by an exogenous, ϵ_t^B process that captures the fluctuations of this risk premium that the financial frictions are not able to describe. This disturbance is assumed to follow a AR(1) process.

Entrepreneurial net-worth accumulation is given by profits of the survival entrepreneurs. This profit is defined as the difference between the revenue from holding capital and the cost of external finance. The log-linearized equation is as follows:

$$n_{t+1} = \gamma \bar{R}^k \left[\frac{\bar{K}}{\bar{N}} (R_t^k - E_{t-1} R_t^k) + E_{t-1} R_t^k + n_t \right] \quad (10)$$

where γ is the survival rate of entrepreneurs and $\frac{\bar{K}}{\bar{N}}$ is the steady state capital net-worth ratio. From this equation we observe that the variations in the net worth are mostly explained by the unexpected changes in the real return. Therefore, under this framework one of the main sources of volatility is the change in assets price.

Markets clearing condition

The market clearing condition is augmented by considering the cost of capital utilization and bankruptcy. Nevertheless, as De Graeve (2008) claims, this terms are negligible under reasonable parametrization.

$$y_t = c_y c_t + \tau k_y i_t + \epsilon_t^g + c_t^{kutil} + c_t^{bankrupt} \quad (11)$$

Central Bank

Finally we close the model with a Taylor rule that react to inflation, changes in inflation, output gap and changes in output gap. The gap is defined as the difference between the rigid and flexible economy.

$$R_t^n = \rho R_{t-1}^n + (1-\rho) \left[r_\pi \pi_t + r_y (y_t - y_t^f) \right] + r_{\Delta\pi} (\pi_t - \pi_{t-1}) + r_{\Delta y} ((y_t - y_t^f) - (y_{t-1} - y_{t-1}^f)) + \eta_t^R \quad (12)$$

3 Methodology: Bayesian estimation and Data

Methodology

Due to the complex structure of the model, in order to estimate the parameters and shocks, we consider a Bayesian approach¹. More precise we use the Markov Chain Montecarlo's Method applying the Metropolis-Hasting algorithm². The first step in the estimation of a DSGE model is the evaluation of its likelihood. The Kalman filter generates projections of the state of the linear model given an information set of observed time series. Basically the Kalman filter generates a projection of the state space at time t given the information at time $t-1$ and computes the likelihood of this projection. The likelihood computed for $t = 2, \dots, T$ are added to compute the likelihood of the model. The MH-MCMC algorithm pass the initial values of the parameters Θ_0 through the Kalman filter which computes the likelihood. Then, the algorithm propose an update of Θ following a random walk $\Theta_l = \Theta_{l-1} + \kappa \epsilon_l$. Where κ is a scalar which control the size of the jump of the proposed update (according to Roberts, Gelman and Gilks, 1997, the optimal acceptance rate is 0.234, therefore we calibrate this parameter to achieve it) and ϵ_l is assume to be a IID and normally distributed with mean 0 and variance 1. Thereupon, the algorithm pass the proposed update through the Kalman filter to get the likelihood and it decides whether to accept the new draw or keep the previous one according to the following rule:

$$\alpha = \frac{Prob(\Theta_l|Y_t)}{Prob(\Theta_{l-1}|Y_t)}$$

where Y_t are the observed time series. Then, the candidates are accepted if $\alpha \geq 1$ and rejected with probability $1 - \alpha$ if $\alpha < 1$. The likelihood of the parameters given the time series is computed through the Bayes theorem:

$$Prob(\Theta_l|Y_t) = \frac{Prob(Y_t|\Theta_l) Prob(\Theta_p)}{\int Prob(Y_t, \Theta) d\Theta}$$

where $Prob(Y_t|\Theta_l)$ is computed through the kalman filter and $Prob(\Theta_p)$ represents the prior distributions.

¹For a more detailed explanation about the estimation techniques see Fernández-Villaverde (2010) or An and Schorfheide (2007).

²For the estimation and the computation of the optimal monetary policy we use the software Dynare

We repeat this procedure 3 million times in order to ensure the convergence of all the parameters. We consider two blocks of draws in order to check this convergence. Finally, in order to compute the mean and standard deviation of the parameters we only consider the second half of the draws in order to get rid of the effects of the initial values of the parameters on the draws.

The data and the priors

The observables we consider in the model are the real per capita output, consumption, investment, hours worked, wages, inflation and interest rate. I do not include financial data as observables since, as De Graeve (2008) points out, it is problematic to find a proxy for the finance premium or net worth of entrepreneurs that would be consistent with the model dynamics. Output, investment, consumption and wages are linearly detrended. For the Stagflation and the Great Recession data is taken from the U.S. Bureau of Economic Analysis and U.S. Bureau of Labor Statistics. Nevertheless, in the case of the Great Depression quarterly data is not available in these databases. Therefore, GNP, consumption and investment are taken from the data set provided by Balke and Gordon (1986). GNP deflator is taken from the National Bureau of Economic Research's Macro History. In order to express the data in per capita terms we construct quarterly data in population interpolating the annual data provided by Chari, Kehoe, and McGrattan (2002). Interest rate is taken from the NBER data set. Hourly earnings in manufacturing are taken from Hanes (1996) whereas hours worked are taken from Chari, Kehoe, and McGrattan (2002).

We choose the prior distribution considered in Smets and Wouters (2003 and 2007) for most of the parameters. The priors of the parameters related with the financial accelerator are chosen consistently with De Graeve (2008). A detailed description of these prior distribution can be found in these papers.

4 Estimation results

4.1 Parameters estimates

In this section we show the posterior maximization of the parameters considered in the model for the three alternative periods. In both tables, 1 and 2, we show the 90% highest posterior density intervals below the posterior mean of each parameter. Column one shows the estimation for the Great Depression and columns two and three show the estimation for the Stagflation and the Great Recession respectively.

Table 1 shows the estimated values of the structural parameters of the model. The first four parameters of this table are the parameters that determine the effects of the financial accelerator. More precisely, higher values of these four parameters amplify the effects of the financial frictions on the economy. From the estimated values of these parameters we observe that the financial frictions play an important role in the three crisis (the relative importance of these frictions will be assessed afterwards) but they are remarkably high during the Stagflation period. For instance, the elasticity of external finance premium reach a level of 0.08 which is remarkably higher than the value that Bernanke et al. (1999) consider in their simulations (this calibration is based on realistic values of bankruptcy rates and monitoring cost). In comparison with the results of De Graeve (2008) who gets an elasticity of 0.1047 we may think that the financial frictions were not extremely relevant in these periods, nevertheless, we get a higher value for the capital net-worth ratio for the three periods what, indeed, points in the opposite direction. Moreover, the estimated values of the survival probability of entrepreneurs also indicate that financial frictions were important, especially in the Stagflation and in the Great Recession, where the values reach 0.98 and 0.97 respectively. These findings are consistent with other researches that claim that financial frictions are crucial in the Great Depression (Kobayashi, 2004) and the Great Recession (Zhen and Rios-Rull, 2016)

Regarding the rigidity of investment we observe that in the three periods the investment adjustment cost parameter is estimated to be rather high. Comparing the three estimations with the results of Smets and Wouters (2007), who report a value of 5.74,

the estimations for the Stagflation is especially higher. On the other hand, we observe that the rigidity of consumption characterized by the habit formation parameter is remarkably higher in the Great Depression.

Turning to the nominal rigidities, we find that the stickiness of wages is not as high as other studies have pointed. For example, Dighe (1997) states that wage rigidity was unusually high during the Great Depression and it played a crucial role in the consequences of the crisis. Indeed, it seems that the wage rigidity could have played a more important role in the other two considered crisis. On the other hand price stickiness is estimated to be extremely high in both Great Depression and Great Recession.

Regarding the coefficients of the Taylor rule, we observe the main difference in the interest rate smoother parameter which was much lower during the Stagflation. This indicates that the nominal interest rate was more volatile during this period, what may means that Central Bank was more conducting a more interventionist monetary policy.

Table 2 shows the estimated values of the parameters associated with the shock processes. We observe that the persistence of the productivity shock is substantial. The main important differences across periods arise in the persistence of the risk premium, investment and price mark-up shocks. The former has a noticeable importance in the Great Depression whereas the latter is crucial during the Stagflation and the investment shock presents a higher persistence during the Great Recession. Moreover, it is worthy to mention that, although the Calvo parameter of wages is the lowest during the Great Depression, the persistence of the wage mark-up shock is substantially greater. Nevertheless, the most interesting fact that Table 2 shows is the differences on the variances of the shocks between the Great Depression and the other two periods. Looking at the estimation of the structural and shock processes parameters we notice that the Great Recession and the Stagflation are characterized by higher rigidities than the Great Depression. This fact may indicate that the crisis experienced during the 30's could be caused and aggravated by remarkably volatile shocks and rigidities played a secondary role.

Table 1: Posterior distribution of the Structural parameters

Parameter	Description	Prior Distribution		Great Depression	Stagflation	Great Recession
		Type	Mean/Std	(1923:1-1940:4)	(1964:1-1982:4)	(2003:1-2017:4)
\bar{R}^K	Steady State return to capital	Normal	1.015/0.002	1,0146 (1,011-1,017)	1,0140 (1,01-1,02)	1,0129 (1,01-1,02)
$\frac{\bar{K}}{\bar{N}}$	SS ratio of capital to networth	Normal	2 / 0,25	1,54 (1,11-1,93)	1,81 (1,51-2,10)	1,93 (1,59-2,26)
γ	Survival probability of entrepreneurs	Beta	0,95/0,02	0,93 (0,90-0,96)	0,98 (0,97-0,99)	0,97 (0,96-0,98)
ϵ	Elasticity of external finance premium to entrepreneurial Financial health	Normal	0,05/0,02	0,06 (0,04-0,09)	0,08 (0,06-0,11)	0,07 (0,05-0,09)
φ	Investment adjustment cost	Normal	4/1,5	6,33 (4,27-8,21)	7,66 (5,09-9,97)	6,90 (4,83-8,97)
σ_c	Risk aversion	Normal	1,5/0,37	0,32 (0,06-1,75)	2,07 (1,64-2,51)	1,59 (0,77-2,17)
h	Habit formation	Normal	0,7/0,1	0,61 (0,45-0,76)	0,48 (0,38-0,60)	0,48 (0,34-0,65)
ψ	Elasticity of capital utilization	Gamma	0,2/0,075	0,49 (0,28-0,67)	0,04 (0,03-0,05)	0,74 (0,51-0,98)
ϕ	Fixed cost	Normal	1,25/0,125	1,36 (1,12-1,81)	1,42 (1,28-1,56)	1,50 (1,35-1,65)
σ_l	Elasticity of labor supply	Normal	2/0,75	2,40 (1,31-2,61)	1,47 (0,64-2,22)	1,43 (0,61-2,18)
ξ_w	Calvo's Lottery for wage	Beta	0,5/0,1	0,66 (0,54-0,79)	0,77 (0,71-0,83)	0,79 (0,74-0,84)
ξ_p	Calvo's Lottery for prices	Beta	0,5/0,1	0,94 (0,93-0,95)	0,69 (0,61-0,78)	0,92 (0,90-0,95)
γ_w	Indexation of past inflation in wages	Beta	0,5/0,15	0,69 (0,50-0,87)	0,65 (0,48-0,81)	0,41 (0,18-0,64)
γ_p	Indexation of past inflation in NKPC	Beta	0,5/0,15	0,36 (0,14-0,50)	0,25 (0,10-0,36)	0,22 (0,10-0,33)
r_π	Response to inflation	Normal	1,5/0,1	1,50 (1,34-1,65)	1,45 (1,30-1,59)	1,51 (1,35-1,68)
$r_{\Delta\pi}$	Response to change in inflation	Gamma	0,3/0,1	0,09 (0,05-0,12)	0,19 (0,10-0,27)	0,09 (0,05-0,12)
ρ	Interest rate smoother	Beta	0,75/0,1	0,93 (0,91-0,95)	0,77 (0,71-0,83)	0,91 (0,88-0,94)
r_y	Response to output gap	Gamma	0,125/0,05	0,06 (0,02-0,17)	0,07 (0,02-0,12)	0,14 (0,09-0,19)
$r_{\Delta y}$	Response to output gap change	Gamma	0,063/0,05	0,08 (0,05-0,07)	0,16 (0,07-0,24)	0,04 (0,01-0,07)

Table 2: Posterior distribution of the parameters associated with the shocks processes

Parameter	Description	Prior distribution		Great Depression	Stagflation	Great Recession
		Type	Mean/Std	(1923:1-1940:4)	(1964:1-1982:4)	(1995:1-2017:4)
ρ_a	Persistence of productivity shock	Beta	0,5/0,2	0,92 (0,89-0,96)	0,98 (0,96-0,99)	0,93 (0,89-0,97)
ρ_b	Persistence of risk premium shock	Beta	0,5/0,2	0,92 (0,85-0,98)	0,32 (0,11-0,48)	0,78 (0,63-0,93)
ρ_g	Persistence of public spending shock	Beta	0,5/0,2	0,76 (0,60-0,997)	0,93 (0,86-0,98)	0,86 (0,77-0,96)
ρ_i	Persistence of Investment shock	Beta	0,5/0,2	0,43 (0,14-0,76)	0,53 (0,38-0,67)	0,92 (0,87-0,97)
ρ_w	Persistence of Wage mark-up shock	Beta	0,5/0,2	0,47 (0,25-0,69)	0,24 (0,10-0,38)	0,14 (0,10-0,18)
ρ_p	Persistence of Price mark-up shock	Beta	0,5/0,2	0,42 (0,19-0,64)	0,92 (0,87-0,98)	0,24 (0,05-0,40)
$\sigma(\epsilon_t^a)$	Std of productivity shock	Gamma	0,25/2	0,80 (0,64-0,96)	0,56 (0,48-0,64)	0,53 (0,46-0,60)
$\sigma(\epsilon_t^b)$	Std of risk premium shock	Gamma	0,25/2	0,19 (0,09-0,30)	0,09 (0,07-0,11)	0,16 (0,07-0,26)
$\sigma(\epsilon_t^g)$	Std of public spending shock	Gamma	0,25/2	1,28 (1,10-1,47)	0,62 (0,53-0,70)	0,49 (0,43-0,55)
$\sigma(\epsilon_t^i)$	Std of Investment shock	Gamma	0,25/2	2,28 (1,48-2,98)	0,68 (0,51-0,84)	0,42 (0,33-0,50)
$\sigma(\eta_t^R)$	Std of monetary policy shock	Gamma	0,25/2	0,15 (0,12-0,18)	0,38 (0,32-0,44)	0,11 (0,09-0,12)
$\sigma(\eta_t^P)$	Std of price mark-up shock	Gamma	0,25/2	0,20 (0,14-0,26)	0,09 (0,06-0,13)	0,11 (0,08-0,14)
$\sigma(\eta_t^w)$	Std of wage mark-up shock	Gamma	0,25/2	0,54 (0,39-0,69)	0,20 (0,16-0,24)	0,46 (0,40-0,52)

4.2 What are the main driving forces behind each crisis?

4.2.1 Variance decomposition

The variance decomposition of the key variables of the economy can shed light on the causes of each crisis. Table 3 shows this variance decomposition of some selected variables for the Great Depression, the Stagflation and the Great Recession from top to bottom. As a common feature of all the periods we observe that the wage mark-up shock is not an important source of fluctuation, except for explaining the volatility of wage during the Great Depression and Great Recession. The productivity shock and the investment shock play a crucial role during the three periods. Moreover, the

importance of the risk premium shock is substantial. Therefore, in addition to the endogenous financial sector, the exogenous process characterized by this shock is a cornerstone in the determination of the interest rate spread.

Regarding the Great Depression, the monetary policy shock accounts for one fifth of the volatility of output. This number is much higher than in the other two crisis, what indicates that the monetary policy conducted during this period may have exacerbated the severity of the Great Depression as pointed by Friedman and Schwartz (1967). The risk premium shock also plays a remarkable role explaining the volatility of not just output but most of the variable.

During the period that considers the Stagflation, the price mark-up shock relative importance in explaining the volatility of output and consumption is higher than in the other two periods, especially than in the Great Recession when the shock is almost negligible. This fact captures the rise of the oil price that had a significant impact on the economy.

The most important shock during the Great Recession is the investment shock. It explains more than the half of the volatility of output and labor, almost 80% of the spread volatility and around 47% of the volatility of consumption and investment. These facts are consistent with the interpretation of the Great Recession as a crisis caused by the burst of the real estate bubble. In the beginning, investment on the housing sector was extremely efficient and, therefore, an important part of the output and labor was based on it. Nevertheless, when the bubble burst the investment on this sector which represented a significant part of the economy became inefficient, provoking the well-known crisis.

It is noteworthy that, under the framework of this model, one important difference between the Great Recession and the Great Depression arises. The bubble created in the former seems to be caused by an investment shock whereas in the later the higher relative weight of the risk premium may indicate that the bubble of the 20's is caused by this shock.

Finally, we observe that the differences across the variance decomposition of the alternative periods is significant. Therefore, the model is able to capture the different features that characterized each period and properly identify the shocks that drove the fluctuations. These results stress the power of the model for policy analysis.

Table 3: Variance decomposition of some selected variables

Great Depression									
Parameter	Description	Output	Consumption	Investment	Labor	Inflation	Wage	Interest rate	Spread
$\sigma(\epsilon_t^a)$	Productivity shock	28,0%	16,1%	1,2%	2,7%	0,7%	3,7%	6,9%	1,2%
$\sigma(\epsilon_t^B)$	risk premium shock	15,6%	27,4%	28,8%	26,3%	7,8%	7,3%	52,6%	36,1%
$\sigma(\epsilon_t^G)$	Publics spending shock	6,1%	13,2%	0,2%	8,6%	0,1%	0,1%	2,0%	0,6%
$\sigma(\epsilon_t^I)$	Investment shock	17,9%	33,5%	61,8%	16,5%	1,9%	6,7%	8,6%	56,1%
$\sigma(\eta_t^R)$	Monetary policy shock	18,9%	5,5%	5,0%	25,8%	6,4%	10,0%	12,0%	2,6%
$\sigma(\epsilon_t^P)$	Price mark-up shock	11,9%	3,2%	2,8%	13,5%	74,5%	11,8%	8,7%	2,3%
$\sigma(\epsilon_t^w)$	Wage mark-up shock	1,6%	1,2%	0,3%	6,6%	8,6%	60,4%	9,3%	1,1%
Stagflation									
Parameter	Description	Output	Consumption	Investment	Labor	Inflation	Wage	Interest rate	Spread
$\sigma(\epsilon_t^a)$	Productivity shock	48,0%	75,6%	16,8%	51,5%	38,7%	68,3%	51,4%	24,1%
$\sigma(\epsilon_t^B)$	risk premium shock	1,2%	3,8%	10,5%	1,5%	0,4%	0,0%	2,1%	18,5%
$\sigma(\epsilon_t^G)$	Publics spending shock	12,6%	3,0%	5,3%	15,5%	3,2%	0,0%	5,4%	4,9%
$\sigma(\epsilon_t^I)$	Investment shock	16,8%	5,4%	59,6%	19,8%	9,1%	0,4%	17,5%	44,6%
$\sigma(\eta_t^R)$	Monetary policy shock	1,0%	0,8%	0,8%	1,1%	0,8%	0,0%	1,6%	0,7%
$\sigma(\epsilon_t^P)$	Price mark-up shock	19,4%	10,1%	6,3%	8,8%	44,4%	30,1%	20,2%	6,7%
$\sigma(\epsilon_t^w)$	Wage mark-up shock	1,0%	1,4%	0,7%	1,8%	3,4%	1,2%	1,8%	0,6%
Great Recession									
Parameter	Description	Output	Consumption	Investment	Labor	Inflation	Wage	Interest rate	Spread
$\sigma(\epsilon_t^a)$	Productivity shock	17,1%	27,9%	3,3%	19,2%	2,5%	21,8%	14,4%	1,8%
$\sigma(\epsilon_t^B)$	risk premium shock	12,1%	18,7%	46,3%	13,5%	4,5%	2,6%	19,8%	18,2%
$\sigma(\epsilon_t^G)$	Publics spending shock	8,0%	2,2%	0,3%	9,1%	0,4%	0,2%	3,7%	0,3%
$\sigma(\epsilon_t^I)$	Investment shock	55,1%	46,8%	46,5%	52,3%	8,6%	43,6%	50,2%	78,6%
$\sigma(\eta_t^R)$	Monetary policy shock	5,1%	2,6%	2,8%	4,1%	1,8%	4,1%	6,1%	0,9%
$\sigma(\epsilon_t^P)$	Price mark-up shock	2,5%	1,3%	0,6%	1,3%	79,7%	7,6%	4,2%	0,1%
$\sigma(\epsilon_t^w)$	Wage mark-up shock	0,1%	0,6%	0,2%	0,5%	2,5%	20,2%	1,7%	0,2%

4.2.2 Impulse response functions

In this section we focus on the impulse response functions (IRF) of some selected variables of the economy in order to assess how they react to different shocks in each of the crisis. In all the figures the black line represents the Great Recession, the discontinuous black line represents the Stagflation and the dotted grey line represents the Great

Depression.

Figure 1 shows the IRF to a productivity shock. All the responses are qualitatively similar across periods. We observe that the reaction of output and consumption during the Great recession is less steep than in the other two periods. This is due to lower estimated value for fixed costs and higher habit formations. The productivity shock has a remarkable effect on investment, inflation and interest rate during the Stagflation. This is caused by the higher reaction of the Central bank to changes in output and its much lower interest rate smoother parameter.

Figure 2 shows the IRF to a risk premium shock. An interesting remark of this IRF is the huge effect of the risk premium shock on labor and wage during the Great Depression. Chari, Kehoe and McGrattan (2007) argue that the biggest contribution to explain the Great Depression is the labor wedge. They also claim that a DSGE model that analyses the Great Depression may replicate this fact through the financial sector. In our model, the risk premium is able to substantially affect wages and labor. Nevertheless, the response of wage is much more persistent than the response of labor due to the wage stickiness, what may be capturing this labor wedge.

Regarding the monetary policy shock showed in Figure 3, we observe that the response of output, consumption, labor and wage during the Great Depression was huge in comparison with the other periods. Therefore, as pointed in previous section, the monetary policy played a crucial role in this crisis. Moreover, it is also remarkable the aggressive response of inflation to this shock during the Stagflation.

In figure 4 we observe that the price mark-up shock had a minor role during the Great Recession, as claimed in the previous section but the responses during the other two periods are rather aggressive. Moreover, the response of the interest rate during the Stagflation is much higher due to the lower interest rate smoother parameter.

Figure 1: Impulse Response Function to a Productivity shock

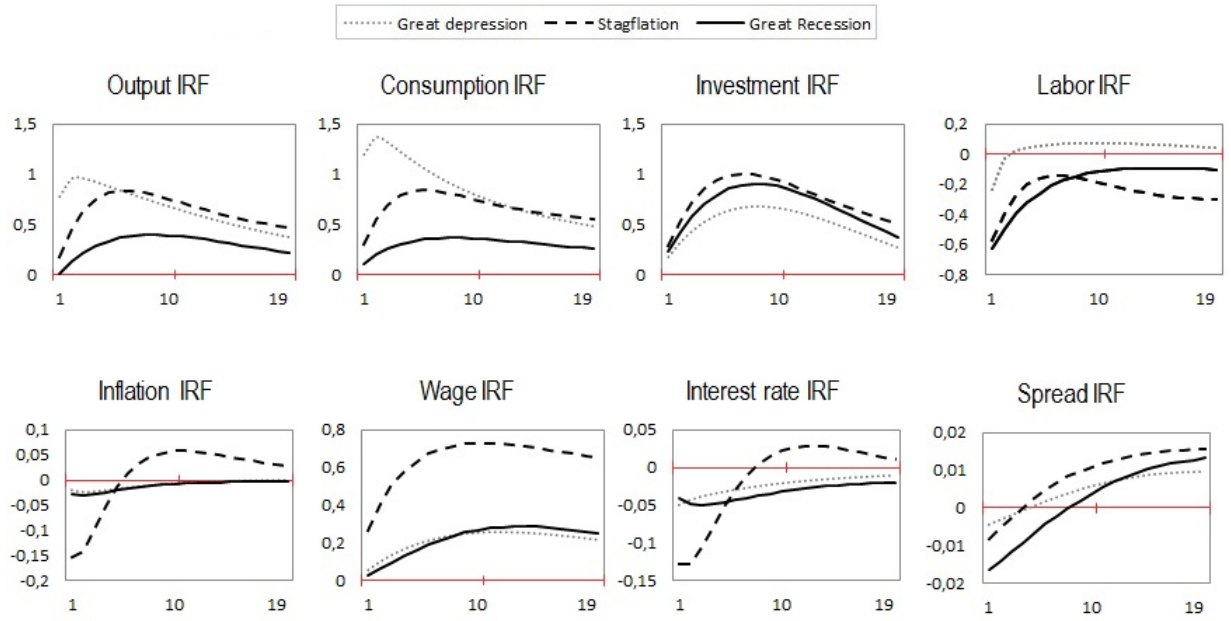


Figure 2: Impulse Response Function to a Risk Premium shock

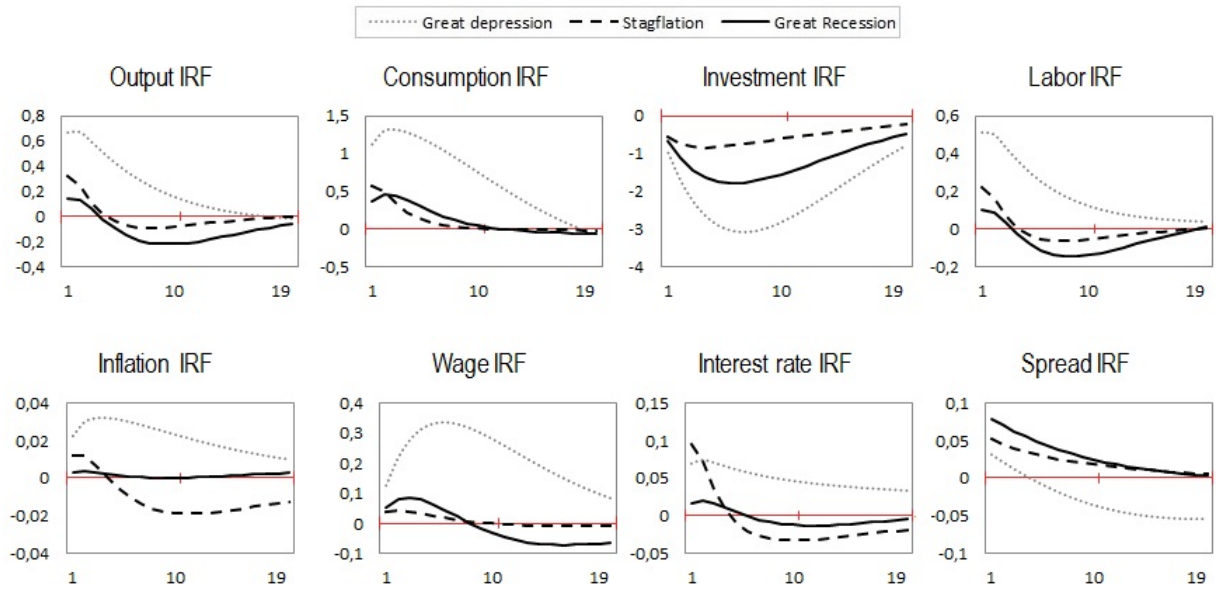


Figure 3: Impulse Response Function to an monetary policy shock

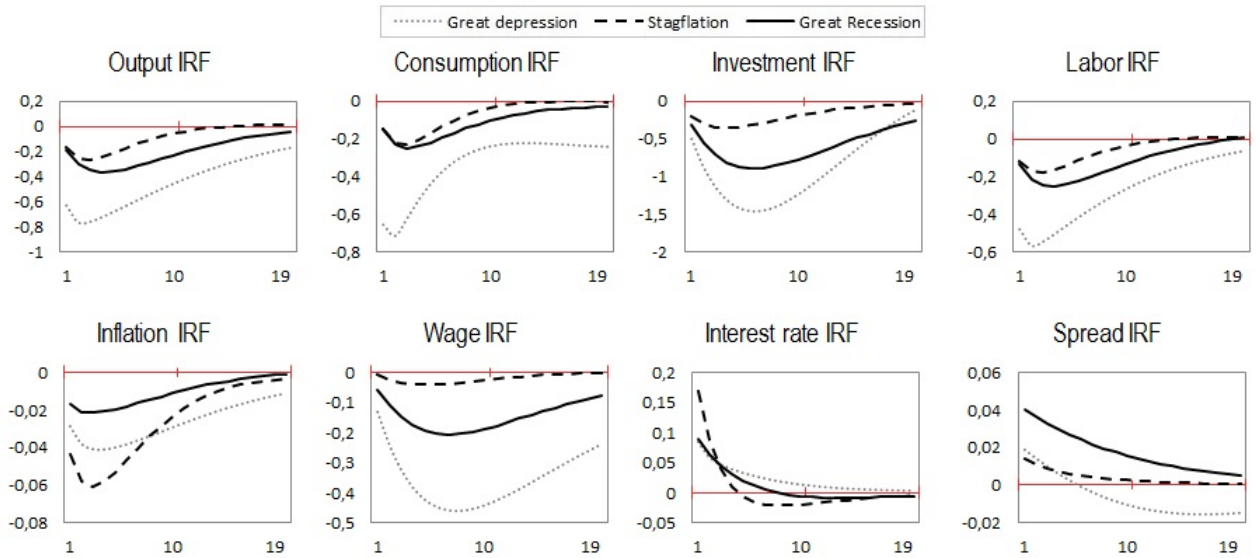
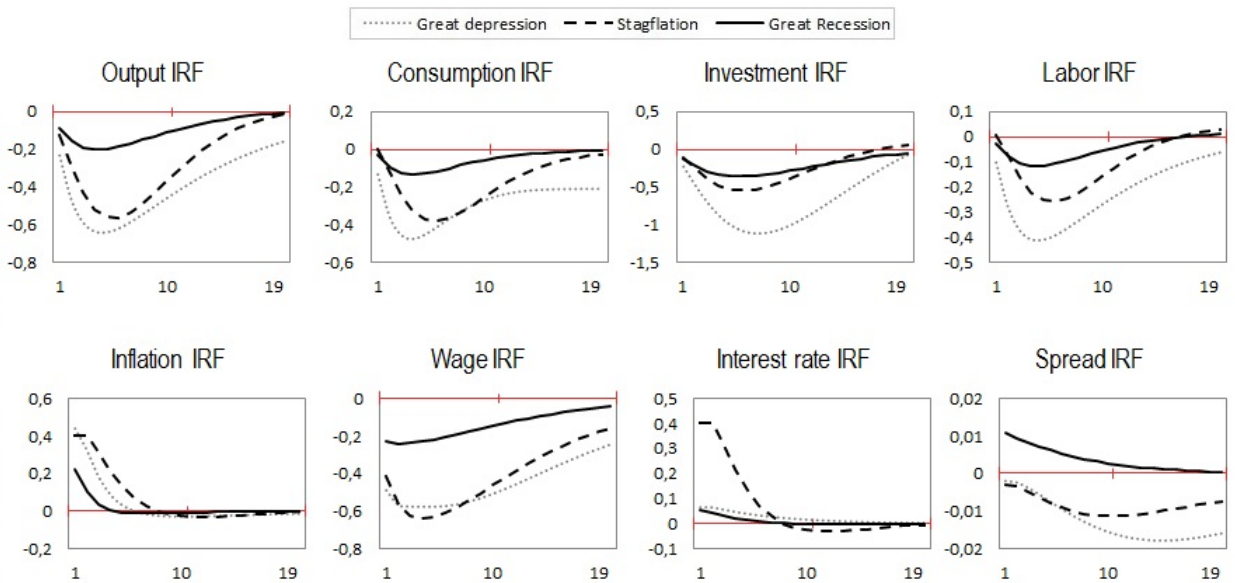


Figure 4: Impulse Response Function to a Price mark-up shock



4.2.3 Historical variance decomposition

In the previous sections we looked at the variance decomposition and the IRF in order to have a picture about which the main sources of volatility were and how they were transmitted over the economy. In this section we analyze which specific shocks are the cause of each crisis looking at the historical variance decomposition. The historical variance decomposition shows the cumulative effect of a given structural shock on each variable at every given point in time. Figures 5 to 7 represents the historical variance decomposition of detrended output. Then, zero in the vertical axis represents the trend of output, the black line is the actual detrended output and the bars are the contribution of each shock to the fluctuation of this variable at a certain point in time. Therefore, adding up the bars we get the actual detrended output.

Figure 5 shows the historical variance decomposition of output in the period that contains the Great Depression. A significant rise of the output is experienced during the 20's. The technological changes that characterizes this period (like the car industry) is captured in the model by the positive investment shocks and the decrease of the prices represented by the price mark-up shock. Moreover, we can observe that the exogenous risk premium also play a crucial role in the rise of the output. This means that the risk premium shock reduce the net-worth that the entrepreneurs need to self-finance, or in other words, the external funds become cheaper. Therefore, investment becomes more attractive.

Nevertheless, in 1929 these risk premium shocks decrease exponentially until negative shocks realize making investment much less attractive. This is how the model reproduce the Stock Market Crash of 1929 and the beginning of the Great Depression. This crisis is characterized as a huge and lengthy meltdown of the capital accumulation. After the 1929 crash labor and consumption drops dramatically, and therefore, the return on capital also drops. In consequence, the demand contraction shrinks the returns of investment, giving rise to the so-called multiplier effect. Moreover, we observe that monetary policy was conducted in a way in that magnified the severity of the crisis. At the beginning of the 30's, while the economy was collapsing and the employment was rapidly increasing, the Federal Reserve increased the interest rate. Moreover, in 1931,

the US government was concerned about the possible outflow of capital to overseas markets, and consequently, they increased the interest rate in an unprecedented way. This shocks are captured by the model and explained a substantial part of the crisis as Figure 5 shows. Nevertheless, during the New Deal the Federal Reserve and the Roosevelt government announced a new objective of the monetary policy: "monetary policy will help to restore the economic growth". We observe that monetary policy shocks vanishes, what means that the monetary policy is well captured by the Taylor rule. As we analyze in the following section, the features of this crisis allows monetary policy to be rather helpful in the mitigation of this recession.

Moreover, the countercyclical productivity shock that is noticeable during the 20's is able to explain the high employment rates accounted during these years. In contrast to RBC models, negative productivity shocks in New Keynesian models raise employment rates as more workers are needed to produce the quantity of output demanded at a fixed price.

After the golden age the US economy suffer a crisis with unprecedented features. This crisis is the Stagflation and the historical variance decomposition is showed by figure 6. During this period a new problem appears in the US economy: high rates of inflation. In order to define a beginning for this economic phase we choose the Vietnam war in 1965. Before 1965 inflation was barely 1%. Nevertheless, in 1966 inflation reached 1.6%, the following year 2.9%, three years after 5.7% and finally in 1974 inflation reached 11% in annual base. Nevertheless, the main cause of the high inflation was not the effort of winning the Vietnam war but the so-called oil crisis. During the golden age US was one of the main producers of oil. However, among other reasons, due to the increase of the car sector, the consumption of oil exceed the production This situation empowered the new cartel, OPEC, that became the main oil supplier of US and Europe. In 1973, as a response to the political support of Israel, the OPEC carried out an oil supplied interruption. Since the oil demand is extremely inelastic, the price increased exponentially what provoked an increase of the production costs of almost all the sectors. Figure 6 shows how these cost-push shocks are the main reason of this recession. Heretofore, the US economy was characterized by the so-called Phillips curve. High levels of inflation were contemporary with high level of employment and

output, and viceversa. High inflation was caused by a high employment rates, wages increase and this rise is transmitted to prices. On the other hand, high unemployment decrease wages and, consequently inflation drops. The repeated sequence of this relation meant the wide acceptance of the ideas defined by the Keynesians (like Keynes, 1936, Hicks, 1937 and Modigliani, 1944). Indeed, president Nixon would even go so far as to say that "now, we are all Keynesians". Therefore, policy-makers only had to decide the optimal combination of unemployment and inflation. Nevertheless, the Stagflation broke this idea. As we observe in figure 6 this crisis is mainly driven by a cost-push shock that moves employment (and output) and inflation in opposite directions, making the exercise defined by the Phillips curve impossible and creating a dilemma in the objectives of the Central Bank. In the following section we will analyze the optimal monetary policy that could have been carried out.

As we observe in the section where we explain the model, equation 6 describes the investment decision. Investment depends on the value of capital which is determined by the actual value plus the investment shock. Therefore, we can interpret this shock as an artificial increase of the value of capital. Therefore, as figure 7 shows, the historical variance decomposition clearly identifies the cause of the Great Recession as an investment shock issue. During the years before the Great Recession we observe a sequence of high and persistent investment shocks that artificially rise the price of capital, and consequently, investment grows significantly making output be above its trend. This means that investment was extremely profitable at this moment but because of an exogenous reason, what can be interpreted as a bubble. This shocks is basically capturing the increase of the profitability of investing in the real state industry. Nevertheless, once this exogenous process vanishes and even takes high negative values from 2007 onward, investment became extremely inefficient and this provokes a sharp and lengthy drop in output. Moreover, it is also worthy to note the response of the US government to the burst of the bubble. The US government thought, as Keynesians would have suggested, that the way of solving this crisis was to stimulate the demand throughout public spending. Nevertheless, the recession was that deep that the public spending was not able to stimulate the demand since the drop of labor was not sufficiently offset. On the contrary, the public spending generates a crowding-out

effect on investment and consumption deepening the crisis. Moreover, during the following years we observe negative public spending shocks that capture the austerity policies that the indebtedness of the previous attempt of solving the crisis caused.

Figure 5: Great Depression: Historical variance decomposition of output

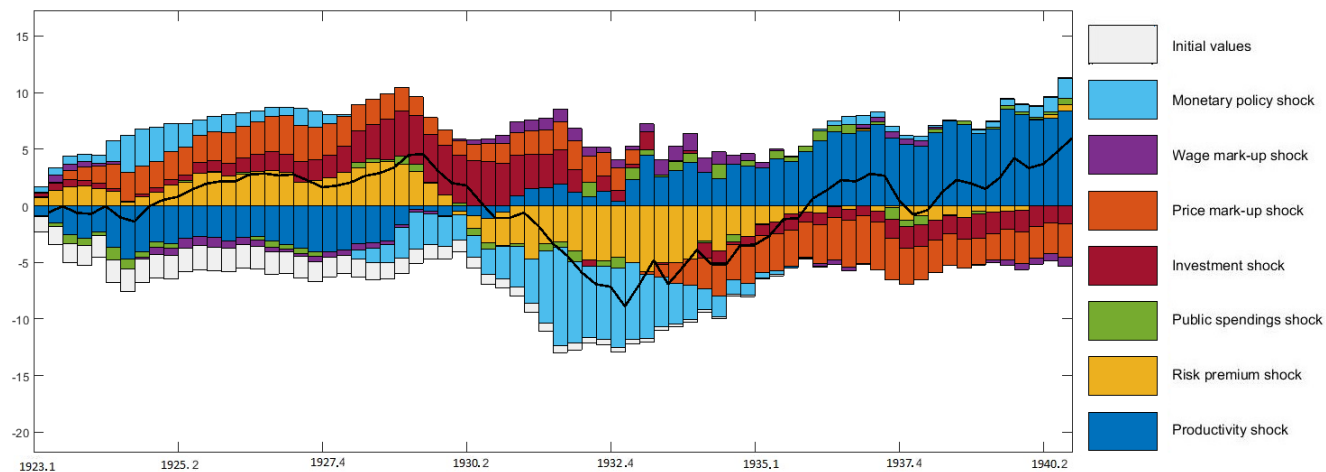


Figure 6: Stagflation: Historical variance decomposition of output

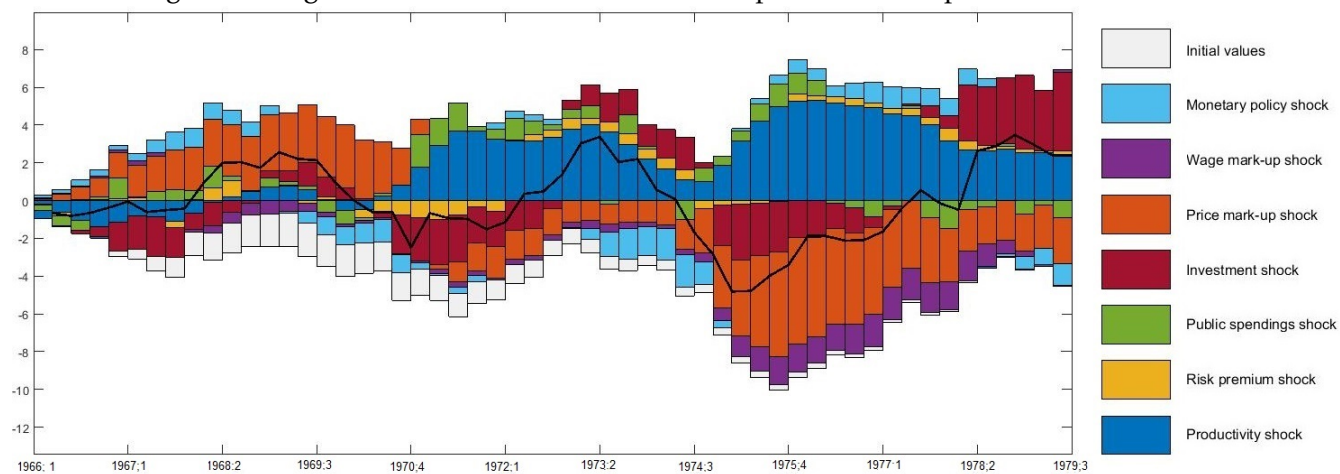
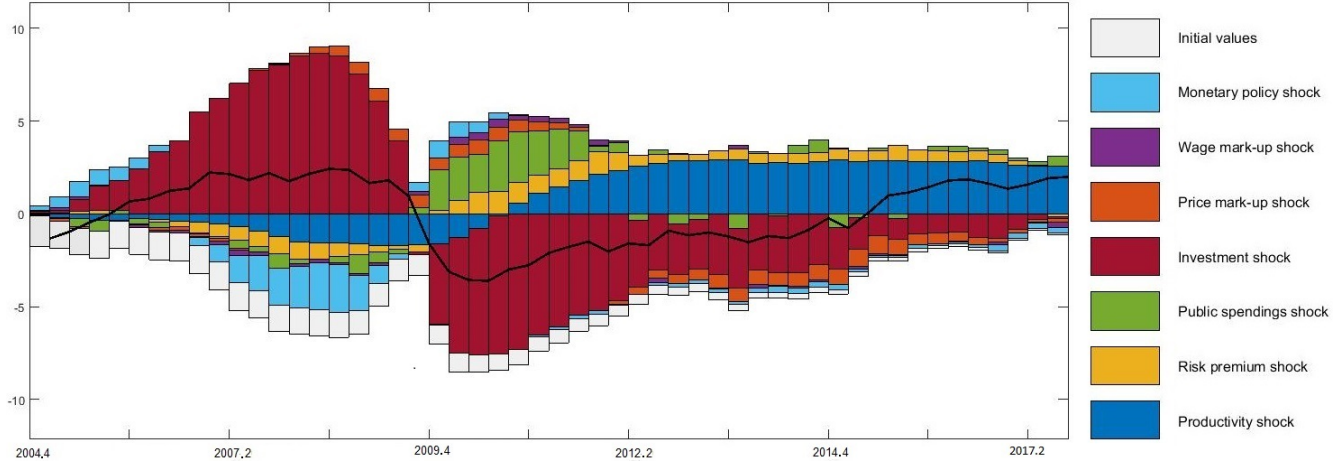


Figure 7: Great Recession: Historical variance decomposition of output



5 Optimal Monetary Policy analysis

In the previous section we described the main features of each period and we match the estimated shocks with the historical evidences. In this section we analyze how monetary policy could have mitigated the effects of each crisis. In order to do so we consider that the Central Bank had complete information about the values of the estimated parameters and the variances of the shocks (but not the actual realization). Moreover, we assume that the Central Bank aim is to minimize the following objective function:

$$\mathcal{L}_t = \pi_t^2 + \Lambda (y_t^{gap} - y_{t-1}^{gap})^2 + 0.5 R_t^2 + 0.5 (R_t - R_{t-1})^2$$

where y^{gap} is the output gap, which is defined as the difference between the rigid and flexible economy. This period loss function incorporates an interest rate variability and interest rate smoothing objective. These components are adopted to capture observed inertial behavior in the interest rates. Moreover, we consider as an objective the growth in potential output since it is less sensitive to measurement errors than a policy based on the level of the output gap (Orphanides et al., 2000). The weight for inflation is normalized to 1 and the rest of the weights are interpreted as the relative importance with respect to the inflation objective. We conduct the analysis for Λ equal to 0.5 and 1, in order to show how robust is the optimal policy for alternative calibration². Therefore,

subject to the previous period losses function and the model economy structure, we conduct an analysis of the optimal policy rule.

More precisely, calibrating the model with the estimated parameters showed in Tables 1 and 2 we are able to simulate the model and generate alternative time series. Depending on the calibration of the Taylor rule the obtained time series generate a different value for the objective function. Applying the Montecarlo's method we compute the values of the parameters of the Taylor rule that minimize this objective function.

Table 4: Optimal Taylor Rule Coefficient for the Alternative periods

	Great Depression			Stagflation			Great Recession		
	Estimated	$\Lambda = 0,5$	$\Lambda = 1$	Estimated	$\Lambda = 0,5$	$\Lambda = 1$	Estimated	$\Lambda = 0,5$	$\Lambda = 1$
r_π	1,50	4,34	5,23	1,45	2,47	2,64	1,51	4,55	4,98
$r_{\Delta\pi}$	0,09	-0,32	-0,36	0,19	-0,46	-0,50	0,09	-0,32	-0,32
r_y	0,06	0,44	0,6	0,07	0,14	0,2	0,14	0,19	0,30
$r_{\Delta y}$	0,08	0,69	0,96	0,16	0,77	1,07	0,04	0,40	0,66

Table 4 shows a comparison between the estimated and the optimal parameters of the Taylor rule for each period. We observe that the optimal response to inflation is much more aggressive in all the periods than the estimated response. Another interesting result is that the optimal response to inflation changes is negative for all the periods whereas the estimation of the actual responses are all positive. The optimal responses to the output gap are the parameters that suffer less changes respect to the estimated response, but it is still higher. Regarding the estimated responses to the output gap growth we find that it is substantially smaller than the optimal responses. These results suggest that the monetary policy could have been conducted in a much better way during all the periods. Indeed, in the following analysis we show how would have been each period if these monetary polices had been applied.

Figures 8 to 10 show the counterfactual simulation of the realization of output, labor and inflation for each different period. We use the optimal monetary policies presented above to simulate the dynamics of the model considering the actual (estimated) realization of the shocks.

Regarding the Great Depression we observe that under both calibrations of the objective function the optimal monetary policy rule would have completely mitigated the crisis. These optimal policies not just prevent the drop of output but also elevate it above its trend. In the case of labor the optimal policies eliminate the dramatic downfall that characterizes the Great Depression. In terms of inflation the optimal policies achieve similar rates to the actual inflation rates with the exception of the third quarter of 1933 where the inflation rate reach 2.46 in quarterly base. Nevertheless, the annual inflation of that year under the optimal policy is 4.87 in annual base what is not problematic since this is just an off-chance event. This huge improvement of the counterfactual simulations with respect the actual data is attainable since the shocks that provoked the crisis were risk premium shocks and it was aggravated by wrong monetary policy. Since the risk premium shock moves output and inflation in opposite direction, an optimal monetary policy allows the stabilization of both variables simultaneously.

Figure 9 shows the counterfactual simulation of the Stagflation. The main source of fluctuations of this period is the price mark-up shock. The particularity of this shock is that moves inflation and output (and labor) in opposite directions, something that Keynesians did not consider. Then, for the first time the government faced the trade-off between stabilizing output and stabilizing inflation. Nevertheless, during the 70's they did not stabilize any of them. The optimal policy, for both calibrations, reacts stronger to inflation. Therefore, we observe that the Central Bank partially stabilizes inflation. However, regarding output and labor the difference between the counterfactual simulations and the actual data are negligible, and in the case of $\Lambda = 0.5$ the optimal policy reports even a higher drop in output and labor. Indeed, the policy that advocates for stabilizing inflation is what actually happened years after, during the so-called Volker-Greenspan period, when government focused on decreasing the extremely high inflation rate relegating the stabilization of output in a second plane. At the end of 1979, Volcker explained that the Federal Reserve would start a non-borrowed reserves operating procedure that will lead to a more volatile interest rate but will rein the high inflation.

Our findings are in contrast to other researchers conclusions, like Barsky and Kilian

(2001). They claim that a substantial part of Stagflation could have been avoided if the Federal reserve would not have permitted major monetary expansions, inasmuch as they conclude that the Stagflation was a monetary phenomenon. Nevertheless, we find that this crisis was caused by supply shocks and, therefore, any kind of monetary policy that they could propose would have worsened the recession.

Figure 10 shows the counterfactual simulation of the Great Recession. We observe that the optimal policy substantially mitigates the effects of the 2007 crisis. During the first part of the decade the simulation of the output roughly match the actual data. Nevertheless, once the negative investment shock realizes the optimal policy rule is able to stem the decline up to some extent. This is due to the fact that monetary policy is able to offset the risk premium shocks that caused a significant drop of consumption. These shocks capture the credit squeeze generated by the loss of confidence of the markets after the burst of the real state sector bubble. Hence, as we observe in figure 10 the cost in inflation of this policy is almost negligible with respect to the gain derived from reducing significantly the drop and the length of output during the 2007 crisis.

Figure 8: Great Depression: Actual Data vs Counterfactual Simulation.

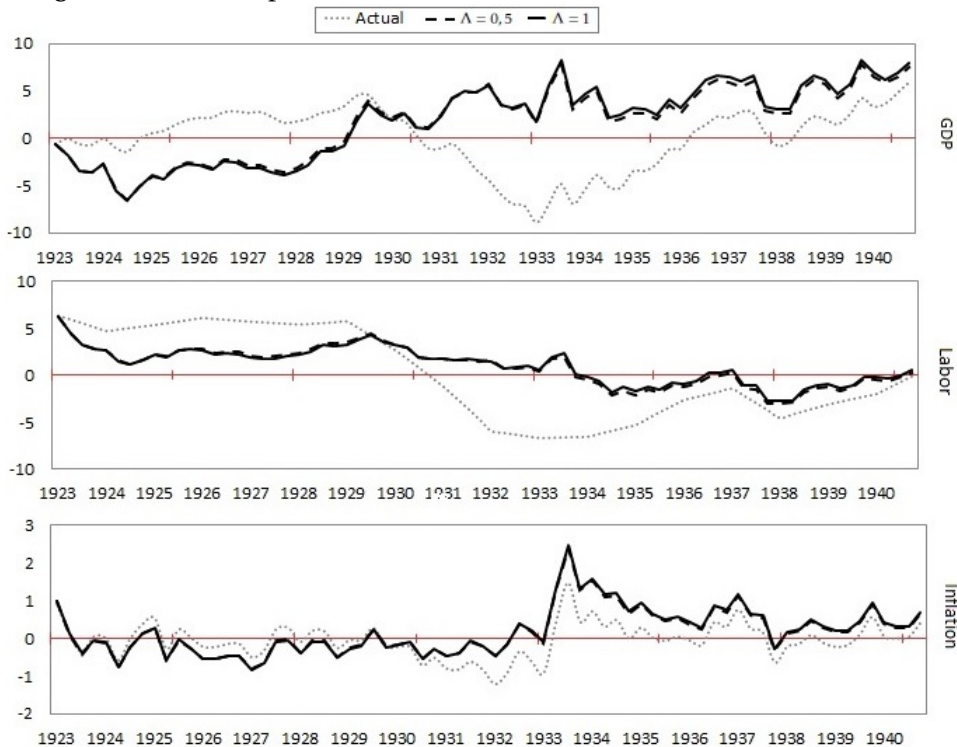


Figure 9: Stagflation: Actual Data vs Counterfactual Simulation.

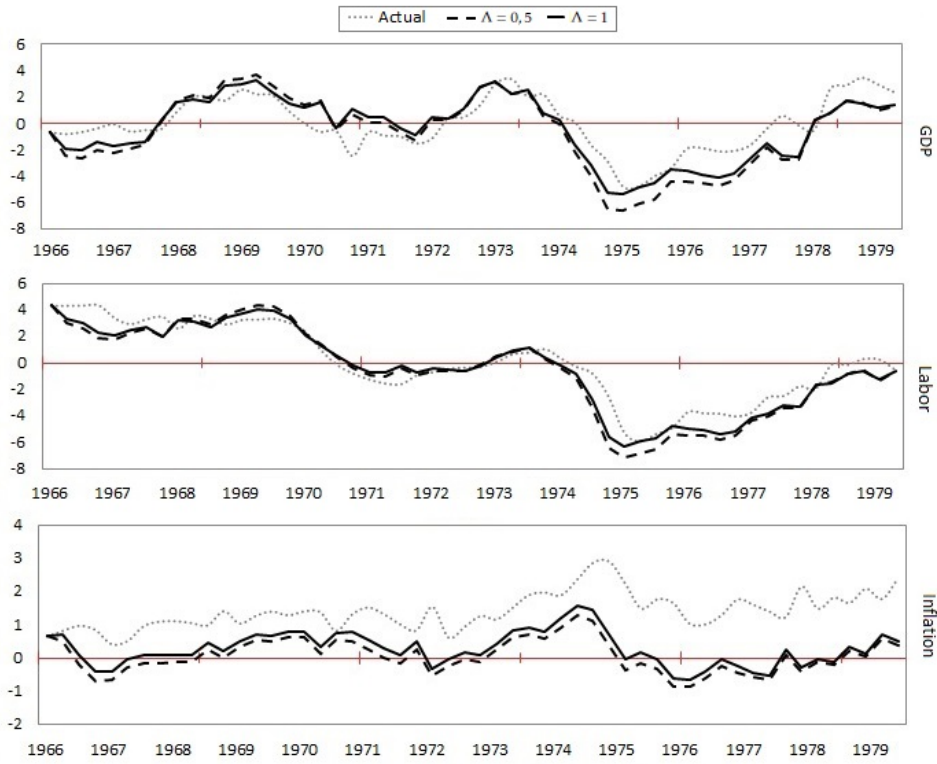
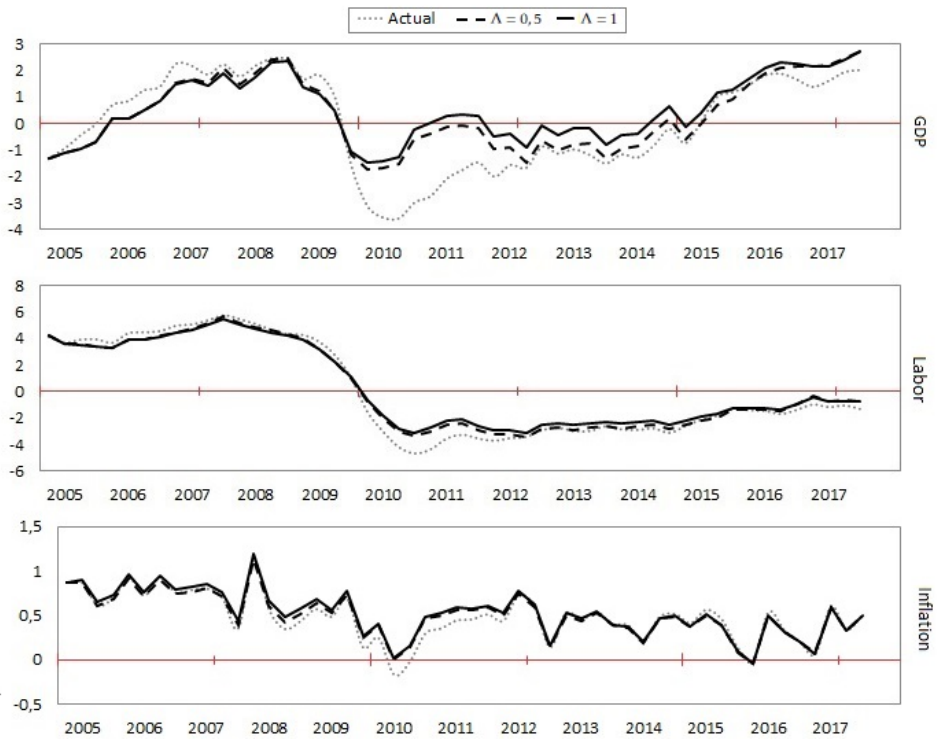


Figure 10: Great Recession: Actual Data vs Counterfactual Simulation.



6 Conclusions

In this paper we estimate a medium-scale DSGE model for three alternative periods: The Great Depression, The Stagflation and The Great Recession. We find that this model is able to capture the different features that characterized each period and properly identify the shocks that drove the fluctuations. These results stress the power of the model for policy analysis and to perform an accurate diagnosis of each crisis.

We compare the different sources of rigidities across the three crisis. We find that the price rigidity was significantly high during the Great Depression and the Great Recession and, in contrast with other results as Dighe (1997), the wage rigidity during the Great Depression was not especially high. Moreover, the habit formation parameter is substantially higher during the Great Depression. Regarding the persistence of the alternative shock we observe that their estimated values enlighten the main causes of each crisis since the persistence of the risk premium shock was especially high during the Great Depression, the persistence of price mark-up shock was rather high during the Stagflation and the persistence of investment shock was significantly higher during the Great Recession.

Regarding the sources of fluctuations of each crisis we observe that the causes are rather different. The Great Depression was caused by risk premium shocks and unwise monetary policies whereas the Great Recession was caused by the burst of the real state sector that is captured by the model through the investment shock and was aggravated by the confidence loss of the market that increased the risk premium contracting the demand. The Stagflation represents a completely different crisis inasmuch as was provoked by the oil crisis and then, policy makers suffered the trade-off between stabilizing inflation or potential output. This crisis is mostly captured by the price mark-up shock. These model estimation results match the historical evidences rather precisely. Therefore, we can conclude that this medium-scale model with financial frictions is able to capture the main features of each period and, consequently, provide trustable results.

The counterfactual simulation under the optimal policy shows the strength that monetary policy has. To some extent, monetary policy had the ability to mitigate all the three crisis. In the case of the Great Depression the benefits of a well-conducted policy would have been rather large, it could even have refrained the crisis. Concerning the Great Recession, the optimal monetary policy would have not had the same power as in the Great Depression but it would have mitigated the drop of output with almost no costs in inflation by boosting the demand. As pointed before, the policy makers during the Stagflation had to face the trade-off between stabilizing inflation or potential output and therefore, the optimal monetary policy in this case is not as powerful as in the two other crisis. Nevertheless, we find that this monetary policy would have remarkably decrease the high level of inflation that characterized this period, just as Volcker's aim was during the 80's.

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