Not-for-Publication Appendix to "Presidents, Fed Chairs, and the Deviations from the Taylor Rule"

Fang-Shuo Chang* Shiu-Sheng Chen† Tzu-Yu Lin‡
Po-Yuan Wang§

October 2022

A Presidential Election Model

A finding that monetary policy is expansionary prior to presidential elections would provide additional evidence that monetary policy is not generally independent of politics. We thus consider a presidential election dummy variable Elect_YY = 1 for the last three quarters of the election year YY = $\{76, 80, 84, 88, 92, 96, 00, 04, 08, 12, 16\}$, and report the results in Table A1. Here, there is some evidence that monetary policy tends to ease prior to presidential elections, and the coefficients are significant for the elections in 1976, 1980, 1984, 1992, 1996, 2004, and 2012. In addition, the unemployment rate also has a significant effect on the deviations.

*Department of Economics, National Taiwan University.
†Corresponding author. Department of Economics, National Taiwan University. Phone number: (886) 2-3366-8365. Address: Social Science Building No. 1, Sec. 4, Roosevelt Road, Taipei, Taiwan. email: sschen@ntu.edu.tw
‡Department of Economics, National Cheng Kung University.
§Department of Economics, National Taiwan University.

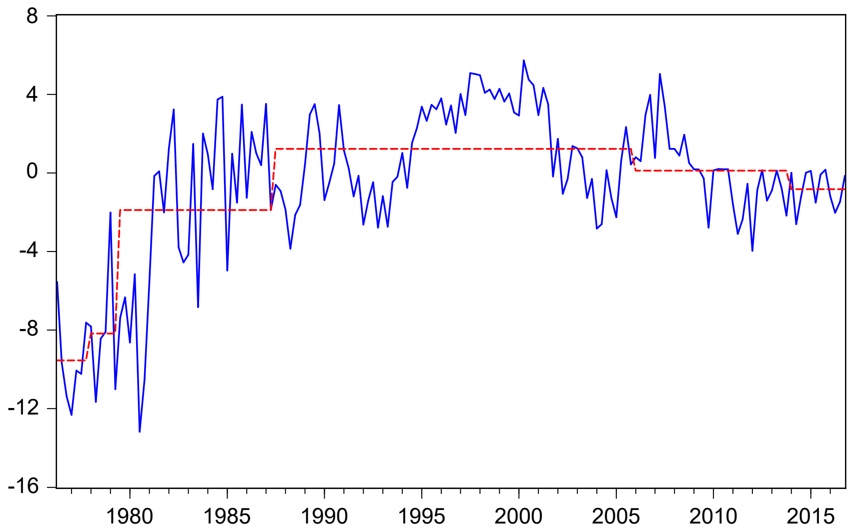

Figure B1: Federal Funds Bank Chair Regime and the Optimal Taylor Rule Deviations (The dashed (red) line indicates the fitted values of the simple Fed chair turnover model (column (1) of Table **??**)

However, it is worth noting that the adjusted R^2 is only 0.063 in the presidential election model without additional covariates (column (1) of Table A1), while adding other controls raises the adjusted R^2 to near 0.63 (columns (2)–(5) of Table A1). This means that presidential elections have a limited ability to explain the Taylor rule deviations.

B An Evaluation of Political Dummy Variables – Fed Chairmanship Model

Figures B1 plots the estimated relationships between Fed chairmanship and the optimal Taylor rule deviations.

Table A1: Presidential Election Models (1976Q2-2016Q4)

	(1)	(2)	(3)	(4)	(5)
Constant	-0.518	1.751 **	1.655 *	1.702 **	1.585
	(0.839)	(0.750)	(0.940)	(0.759)	(0.963)
Elect_76	-9.151 ***	-5.375 ***	-5.400 ***	-5.433 ***	-5.466 ***
	(0.839)	(0.521)	(0.504)	(0.497)	(0.478)
Elect_80	-12.661 ***	-8.996 ***	-9.096 ***	-6.779 **	-6.851 **
	(0.839)	(0.560)	(0.551)	(3.349)	(3.185)
Elect_84	4.252 ***	4.929 ***	4.781 ***	4.875 ***	4.695 ***
	(0.839)	(0.292)	(0.539)	(0.259)	(0.555)
Elect_88	-1.620 **	0.408	0.431	0.283	0.309
	(0.839)	(0.487)	(0.548)	(0.485)	(0.527)
Elect_92	0.049	1.045 ***	1.059 ***	1.178 **	1.198 ***
	(0.839)	(0.276)	(0.290)	(0.387)	(0.407)
Elect_96	3.946 ***	1.623 ***	1.611 ***	1.450 **	1.432 ***
	(0.839)	(0.280)	(0.295)	(0.338)	(0.363)
Elect_00	5.265 ***	0.190	0.207	0.109	0.128
	(0.839)	(0.448)	(0.451)	(0.447)	(0.445)
Elect_04	0.653	1.888 ***	1.931 ***	1.783 ***	1.834 ***
	(0.839)	(0.491)	(0.556)	(0.458)	(0.514)
Elect_08	2.458 ***	1.399 ***	1.424 ***	0.935	0.955
	(0.839)	(0.385)	(0.409)	(0.660)	(0.633)
Elect_12	0.662	1.319 ***	1.310 ***	1.338 ***	1.328 ***
	(0.839)	(0.259)	(0.253)	(0.266)	(0.258)
Elect_16	-0.948	-0.196	-0.194	-0.190	-0.188
	(0.839)	(0.505)	(0.518)	(0.501)	(0.516)
Dev_{t-1}		0.685 ***	0.686 ***	0.703 ***	0.704 ***
		(0.088)	(0.092)	(0.093)	(0.097)
Stock_{t-1}		0.030	0.036	0.025	0.032
		(0.024)	(0.038)	(0.022)	(0.036)
Oil_{t-1}		-0.009	-0.009	-0.007	-0.007
		(0.014)	(0.014)	(0.014)	(0.014)
$\text{Unemployment}_{t-1}$		-0.299 ***	-0.285 **	-0.290 ***	-0.272 **
		(0.109)	(0.133)	(0.111)	(0.137)
Rex_{t-1}		0.029	0.024	0.030	0.024
		(0.069)	(0.066)	(0.068)	(0.066)
ΔFCI_{t-1}			0.229		0.278
			(0.897)		(0.890)
$\Delta\text{ISpread}_{t-1}$				-0.616	-0.630
				(0.868)	(0.857)
$\bar{R}^2$	0.063	0.629	0.627	0.632	0.630

Note: The regression models are $Dev_t = \theta + \sum_{j=1}^{p} \boldsymbol{\beta_j'} \boldsymbol{X_{t-j}} + \sum_{j\in \text{YY}} \gamma_j \text{Elect}_j + \varepsilon_t$, where Dev_t is the Taylor Rule deviation, and YY = $\{76, 80, 84, 88, 92, 96, 00, 04, 08, 12, 16\}$. The entries in brackets are the Newey–West HAC standard errors. Asterisks *, ** and *** indicate rejection at 10%, 5%; and 1% levels, respectively. See notes to Table **??** for more details about macroeconomic variables.

C Robustness Analysis

C.1 Controlling for Additional Variables

We conduct further robustness checks of our results. Although the Taylor rule includes inflation, an interaction between inflation and the political regime may still arise. We therefore add inflation or changes in inflation as an additional explanatory variable. Given that our model incorporates the effect of collateral housing, we then test whether the results are sensitive to the inclusion of changes in real house prices. In addition, as the Fed may be concerned about the dynamics of the labor market when setting rates, we replace the unemployment rate with the changes in unemployment rate or the unemployment gap. Following Hamilton (2018), we estimate the following regression to extract the unemployment gap.

$$\begin{aligned}\text{Unemployment}_t = \alpha_0 + \alpha_1 \text{Unemployment}_{t-8} + \alpha_2 \text{Unemployment}_{t-9} \\ + \alpha_3 \text{Unemployment}_{t-10} + \alpha_4 \text{Unemployment}_{t-11} + v_t.\end{aligned}$$

In the presidential regime models, columns (1) and (2) of Table C4 suggest that the deviations are influenced by the level of unemployment rather than the changes in unemployment or the unemployment gap. Besides, adding inflation, changes in inflation, or real house price changes do not alter our results that presidential regime matters (see columns (3), (4), and (5) of Table C2). In addition, the interest rate spread remains significant.

The nested regression models also reveal the similar results (see Table C4). However, Table C3 shows that the Fed chairman effect is not that robust.

Table C2: Presidential Regimes and Deviations from Optimal Taylor Rule (1976Q2-2016Q4)– Extension

	(1)	(2)	(3)	(4)	(5)
Nixon-Ford (DP_0)	-8.069 ***	-7.942 ***	-6.549 ***	-4.984 ***	-4.498 ***
	(0.714)	(0.744)	(1.622)	(1.181)	(1.349)
Carter (DP_1)	-6.049 ***	-6.212 ***	-5.733 ***	-3.249 ***	-3.008 **
	(0.870)	(0.946)	(1.593)	(1.060)	(1.246)
Reagan-Bush (DP_2)	-0.123	-0.005	1.264	2.466 *	3.565 ***
	(0.294)	(0.274)	(1.590)	(1.264)	(1.320)
Clinton (DP_3)	2.015 ***	1.876 ***	3.581 ***	3.700 ***	5.081 ***
	(0.650)	(0.655)	(1.334)	(1.160)	(1.188)
G.W. Bush (DP_4)	0.554	0.443	2.089 *	2.334 **	3.499 ***
	(0.445)	(0.426)	(1.169)	(1.006)	(1.077)
Obama (DP_5)	-0.578 ***	-0.443	2.355	2.054	3.284 **
	(0.187)	(0.274)	(1.454)	(1.270)	(1.389)
Dev_{t-1}	0.318 ***	0.301 ***	0.370 ***	0.382 ***	0.245 **
	(0.096)	(0.103)	(0.099)	(0.094)	(0.094)
$Stock_{t-1}$	-0.004	-0.007	-0.007	-0.006	-0.002
	(0.043)	(0.039)	(0.034)	(0.036)	0.035
Oil_{t-1}	0.004	0.004	-0.001	0.001	0.003
	(0.013)	(0.013)	(0.012)	(0.011)	0.012
$Unemployment_{t-1}$			-0.475 **	-0.349 **	-0.525 ***
			(0.187)	(0.171)	0.182
Rex_{t-1}	0.024	0.024	-0.015	0.041	0.025
	(0.071)	(0.069)	(0.067)	(0.066)	0.065
ΔFCI_{t-1}	0.599	0.404	0.140	0.235	0.110
	(0.847)	(0.858)	(0.786)	(0.807)	0.825
$\Delta ISpread_{t-1}$	-0.894 **	-0.852 **	-0.945 **	-0.853 **	-0.851 **
	(0.392)	(0.365)	(0.417)	(0.442)	(0.391)
$\Delta Unemployment_{t-1}$	0.160				
	(0.621)				
U Gap_{t-1}		-0.214			
		(0.189)			
π_{t-1}			1.834 **		
			(0.898)		
$\Delta\pi_{t-1}$				2.623 ***	
				(0.866)	
$House_{t-1}$					-0.188
					(0.120)
$\bar{R}^2$	0.726	0.729	0.752	0.758	0.745

Note: The regression model is $Dev_t = \sum_{j=1}^{p} \boldsymbol{\beta_j' X_{t-j}} + \sum_{j=0}^{k} \gamma_j \mathrm{DP}_j + \varepsilon_t$, where Dev_t is the Taylor Rule deviation. The entries in brackets are the Newey–West HAC standard errors. Asterisks *, ** and *** indicate rejection at 10%, 5%; and 1% levels, respectively. See notes to Table **??** for more details about macroeconomic variables. Besides, ΔUnemployment, U-Gap, π, $\Delta\pi$, and House respectively denote unemployment rate changes, unemployment gap, inflation, changes in inflation, and real house price changes.

Table C3: Fed Chair Regimes and Deviations from Optimal Taylor Rule (1976Q2-2016Q4)– Extension

	(1)	(2)	(3)	(4)	(5)
Burns (DCB_0)	-4.863 ***	-5.018 ***	-2.320 *	-2.126 *	-1.957
	(1.027)	(1.107)	(1.262)	(1.155)	(1.202)
Miller (DCB_1)	-4.044 ***	-4.168 ***	-1.799	-1.484	-1.367
	(0.851)	(0.876)	(1.238)	(0.992)	(1.146)
Volcker (DCB_2)	-0.642	-0.442	2.199	1.288	2.289
	(0.406)	(0.505)	(2.069)	(1.669)	(1.859)
Greenspan (DCB_3)	0.559 *	0.442	2.748 **	1.648	2.933 **
	(0.297)	(0.268)	(1.387)	(1.223)	(1.291)
Bernanke (DCB_4)	0.094	0.227	2.753 *	1.560	2.788 *
	(0.384)	(0.311)	(1.516)	(1.444)	(1.504)
Yellen (DCB_5)	-0.573 **	-0.634 **	1.624	0.811	1.914 *
	(0.247)	(0.257)	(1.095)	(1.081)	(1.110)
Dev_{t-1}	0.564 ***	0.536 ***	0.507 ***	0.671 ***	0.522 ***
	(0.086)	(0.099)	(0.124)	(0.107)	(0.117)
$Stock_{t-1}$	0.003	0.015	0.018	0.013	0.022
	(0.041)	(0.036)	(0.034)	(0.033)	(0.033)
Oil_{t-1}	-0.008	-0.010	-0.010	-0.013	-0.011
	(0.015)	(0.015)	(0.015)	(0.013)	(0.015)
$Unemployment_{t-1}$			-0.370 *	-0.215	-0.398 *
			(0.200)	(0.196)	(0.203)
Rex_{t-1}	0.021	0.018	0.026	0.040	0.021
	(0.072)	(0.070)	(0.069)	(0.075)	(0.069)
ΔFCI_{t-1}	0.513	0.467	0.399	0.392	0.315
	(0.862)	(0.872)	(0.887)	(0.928)	(0.881)
$\Delta ISpread_{t-1}$	-1.027 *	-1.099 **	-1.058 *	-1.091 *	-1.115 **
	(0.537)	(0.539)	(0.537)	(0.584)	(0.561)
$\Delta Unemployment_{t-1}$	-0.901				
	(0.770)				
U Gap_{t-1}		-0.292 *			
		(0.170)			
π_{t-1}			-0.116 **		
			(0.672)		
$\Delta\pi_{t-1}$				3.875 ***	
				(0.968)	
$House_{t-1}$					-0.179
					(0.149)
$\bar{R}^2$	0.660	0.662	0.665	0.700	0.667

Note: The regression model is $Dev_t = \sum_{j=1}^{p} \boldsymbol{\beta_j'} \boldsymbol{X_{t-j}} + \sum_{j=0}^{k} \gamma_j \mathrm{DP}_j + \varepsilon_t$, where Dev_t is the Taylor Rule deviation. The entries in brackets are the Newey–West HAC standard errors. Asterisks *, ** and *** indicate rejection at 10%, 5%; and 1% levels, respectively. See notes to Table **??** for more details about macroeconomic variables. Besides, ΔUnemployment, U-Gap, π, $\Delta\pi$, and House respectively denote unemployment rate changes, unemployment gap, inflation, changes in inflation, and real house price changes.

Table C4: Nested Regression Models (1976Q2-2016Q4)– Extension

	(1)	(2)	(3)	(4)	(5)
Nixon-Ford (DP_0)	-8.235 ***	-8.061 ***	-3.036	-2.087	-0.872
	(0.761)	(0.801)	(1.974)	(1.499)	(1.627)
Carter (DP_1)	-6.987 ***	-7.631 ***	-2.501	-1.145	-0.261
	(1.305)	(1.435)	(2.049)	(1.531)	(1.721)
Reagan-Bush (DP_2)	-1.048	-1.289	6.309 ***	6.630 ***	8.399 ***
	(1.321)	(1.077)	(2.256)	(1.992)	(2.029)
Clinton (DP_3)	1.194	0.775	8.568 ***	8.314 ***	10.352 ***
	(1.297)	(1.125)	(2.030)	(1.904)	(1.966)
G.W. Bush (DP_4)	-0.697	-1.105	6.621 ***	6.426 ***	8.465 ***
	(1.430)	(1.237)	(1.944)	(1.858)	(2.047)
Obama (DP_5)	-2.574	-2.279	8.255 ***	7.528 ***	10.286 ***
	(1.678)	(1.426)	(2.465)	(2.409)	(2.714)
Miller (DCB_1)	1.060	1.356	0.204	0.387	0.456
	(0.818)	(0.832)	(0.872)	(0.993)	(0.982)
Volcker (DCB_2)	0.943	1.543	-0.336	0.055	0.087
	(1.117)	(1.061)	(0.947)	(0.917)	(0.938)
Greenspan (DCB_3)	0.888	1.113	-1.842 *	-1.697	-2.005 *
	(1.385)	(1.132)	(1.004)	(1.080)	(1.059)
Bernanke (DCB_4)	1.941	2.159	-1.228	-0.968	-1.773
	(1.644)	(1.337)	(1.195)	(1.210)	(1.382)
Yellen (DCB_5)	2.028	1.463	-3.991 **	-3.450 **	-4.673 ***
	(1.591)	(1.415)	(1.624)	(1.561)	(1.717)
Dev_{t-1}	0.297 ***	0.264 **	0.240 **	0.270 ***	0.154
	(0.103)	(0.112)	(0.119)	(0.101)	(0.107)
$Stock_{t-1}$	-0.010	-0.013	-0.010	-0.012	-0.006
	(0.044)	(0.039)	(0.033)	(0.034)	(0.034)
Oil_{t-1}	0.004	0.002	0.002	0.002	0.004
	(0.014)	(0.014)	(0.011)	(0.010)	(0.011)
$Unemployment_{t-1}$			-0.945 ***	-0.839 ***	-1.089 ***
			(0.233)	(0.228)	(0.233)
Rex_{t-1}	0.026	0.024	0.013	0.043	0.028
	(0.076)	(0.073)	(0.062)	(0.063)	(0.060)
ΔFCI_{t-1}	0.498	0.248	-0.159	-0.101	-0.257
	(0.860)	(0.889)	(0.840)	(0.841)	(0.839)
$\Delta ISpread_{t-1}$	-0.863 **	-0.824 **	-0.832 **	-0.777 **	-0.794 **
	(0.409)	(0.383)	(0.419)	(0.400)	(0.382)
$\Delta Unemployment_{t-1}$	0.095				
	(0.723)				
U Gap_{t-1}		-0.344			
		(0.257)			
π_{t-1}			1.156		
			(1.059)		
$\Delta\pi_{t-1}$				2.085 **	
				(0.835)	
$House_{t-1}$					-0.217
					(0.171)
$\bar{R}^2$	0.721	0.727	0.762	0.769	0.761

Note: The regression model is $Dev_t = \sum_{j=1}^{p} \boldsymbol{\beta_j'} \boldsymbol{X_{t-j}} + \sum_{j=0}^{k} \gamma_j \mathrm{DP}_j + \sum_{j=1}^{m} \delta_j \mathrm{DCB}_j + \varepsilon_t$, where Dev_t is the Taylor Rule deviation. The entries in brackets are the Newey–West HAC standard errors. Asterisks *, ** and *** indicate rejection at 10%, 5%; and 1% levels, respectively. See notes to Table **??** for more details about macroeconomic variables. Besides, ΔUnemployment, U-Gap, π, $\Delta\pi$, and House respectively denote unemployment rate changes, unemployment gap, inflation, changes in inflation, and real house price changes.

C.2 Widening the Grid-Search Interval

In section **??**, the weight on inflation for a optimal Taylor rule is 3.0, which reaches the upper bound of the interval ($r_\pi \in [1, 3]$). Hence, we widen the grid-search interval for $r_R \in [0, 1]$, $r_\pi \in [1, 6]$, and $r_y \in [0, 3]$, and find the optimal policy-rule coefficients are $\tilde{r}_R = 0$, $\tilde{r}_\pi = 4.05$, and $\tilde{r}_y = 0.56$. Total welfare gains are only 0.005% of consumption more than the policy rule with parameters $\tilde{r}_R = 0$, $\tilde{r}_\pi = 3$, and $\tilde{r}_y = 0.27$ (see Panel I of Table C5). The empirical results in Table C6 show that our main findings on the relationship between political regime changes and the Taylor rule deviations are robust.

Table C5: Optimized Interest Rate Rules – Robustness

				Welfare gains (CE %)		
	$\tilde{r}_R$	$\tilde{r}_\pi$	$\tilde{r}_Y$	Patient	Impatient	Social
I. Enlarge Parameter Ranges	0	4.05	0.56	0.074	0.616	0.691
II. Different Criteria:						
Based on Unconditional Welfare Criterion	0	3	0.52	0.076	0.605	0.681
Fixed Interest-Rate Smoothing Coefficient	0.53	3	0.37	0.076	0.525	0.601
Loss Function Criterion	0	3	1.55	0.031	0.576	0.608
III. Subsamples:						
1976Q2∼2008Q4	0	3	0.47	0.113	0.607	0.720
1979Q3∼2016Q4	0	3	0	0.089	0.701	0.791
IV. Different Rules:						
B-1. Based on PCE Inflation	0	3	0	0.232	0.924	1.158
C-1. Based on GDP Deflator	0	3	0.24	0.245	0.988	1.235
V. Incorporate Fiscal Policy	0	3	0.4	-0.057	1.554	1.496
VI. Standard DSGE Model	0	3	0	–	–	0.153

Table C6: Political Regimes and Deviations from Optimal Taylor Rule of $(\tilde{r}_R, \tilde{r}_\pi, \tilde{r}_y)$ = (0, 4.05, 0.56) (1976Q2-2016Q4)

	Presidential Regime		Fed Chair Regime		Nested Model	
	(1)	(2)	(3)	(4)	(5)	(6)
Nixon-Ford (DP_0)	-12.691 ***	-7.225 ***			-12.691 ***	-3.735 **
	(1.026)	(1.712)			(1.094)	(1.823)
Carter (DP_1)	-13.565 ***	-6.044 ***			-14.436 ***	-2.861
	(0.772)	(1.506)			(0.680)	(1.866)
Reagan-Bush (DP_2)	-2.106 ***	3.481 *			-3.307 **	8.645 ***
	(0.750)	(1.787)			(1.632)	(2.488)
Clinton (DP_3)	3.137 ***	6.161 ***			1.145	11.369 ***
	(0.860)	(1.632)			(2.013)	(2.525)
G.W. Bush (DP_4)	1.364 **	4.514 ***			-1.327	9.285 ***
	(0.685)	(1.481)			(1.995)	(2.446)
Obama (DP_5)	-0.525 ***	4.921 **			-4.431 **	11.616 ***
	(0.155)	(1.996)			(2.057)	(3.216)
Burns (DCB_0)			-13.688 ***	-4.371 ***	–	–
			(0.599)	(1.438)	–	–
Miller (DCB_1)			-12.645 ***	-3.967 ***	1.791 *	-0.128
			(0.664)	(1.274)	(1.021)	(1.009)
Volcker (DCB_2)			-4.862 **	0.934	0.532	-0.876
			(2.116)	(2.244)	(1.417)	(1.309)
Greenspan (DCB_3)			1.145	2.793 *	1.992	-2.168
			(0.864)	(1.569)	(1.862)	(1.475)
Bernanke (DCB_4)			0.591	3.144	3.858 *	-1.340
			(0.796)	(1.900)	(2.035)	(1.599)
Yellen (DCB_5)			-0.445 ***	1.937	3.986 *	-4.950 **
			(0.138)	(1.421)	(2.063)	(2.070)
Dev_{t-1}		0.231 **		0.521 ***		0.172
		(0.105)		(0.115)		(0.126)
$Stock_{t-1}$		0.000		0.040		0.000
		(0.050)		(0.047)		(0.046)
Oil_{t-1}		0.013		-0.007		0.013
		(0.016)		(0.021)		(0.016)
$Unemployment_{t-1}$		-0.695 ***		-0.402		-1.236 ***
		(0.254)		(0.254)		(0.306)
Rex_{t-1}		-0.011		0.032		0.004
		(0.095)		(0.098)		(0.089)
ΔFCI_{t-1}		0.580		0.951		0.202
		(1.066)		(1.207)		(1.109)
$\Delta ISpread_{t-1}$		-0.985 **		-1.444 *		-0.917 **
		(0.464)		(0.807)		(0.462)
$\bar{R}^2$	0.721	0.777	0.541	0.699	0.724	0.784

Note: The regression models are $Dev_t = \sum_{j=1}^{p} \boldsymbol{\beta_j'} \boldsymbol{X_{t-j}} + \sum_{j=0}^{k} \gamma_j \mathrm{DP}_j + \sum_{j=1}^{m} \gamma_j \mathrm{DCB}_j + \varepsilon_t$, where Dev_t is the Taylor Rule deviation. The entries in brackets are the Newey–West HAC standard errors. Asterisks *, ** and *** indicate rejection at 10%, 5%; and 1% levels, respectively. See notes to Table **??** for more details about macroeconomic variables.

C.3 Different Criteria

C.3.1 Unconditional Welfare

Rather than being just based on a conditional welfare criterion, we also consider unconditional welfare in establishing robustness, which is the mean welfare across regimes, rather than conditioning on the same initial point in the state space. That is, the unconditionally expected welfare measure is

$$\begin{aligned} E[V_t^i] &= E\left[E_t\left(\sum_{j=0}^{\infty}(\beta^i)^j U(c_{t+j}^i, h_{t+j}^i, n_{c,t+j}^i, n_{h,t+j}^i)\right)\right] \\ &= E\left[\sum_{j=0}^{\infty}(\beta^i)^j U(c_{t+j}^i, h_{t+j}^i, n_{c,t+j}^i, n_{h,t+j}^i)\right], \end{aligned}$$

where $V^i = \{V, V'\}$.

The optimal Taylor rule based on unconditional welfare is in Panel II row (1) of Table C5, which incorporate higher output growth coefficient ($\tilde{r}_Y = 0.52$) in comparison with the rule based on conditional welfare. Table C7 shows the empirical results, and we can observe that our main findings are not altered.

Table C7: Political Regimes and Deviations from Optimal Taylor Rule based on Unconditional Welfare (1976Q2-2016Q4)

	Presidential Regime		Fed Chair Regime		Nested Model	
	(1)	(2)	(3)	(4)	(5)	(6)
Nixon-Ford (DP_0)	-9.784 ***	-5.337 ***			-9.784 ***	-1.737
	(0.835)	(1.418)			(0.897)	(1.697)
Carter (DP_1)	-8.997 ***	-3.187 **			-10.958 ***	-1.020
	(0.916)	(1.314)			(0.599)	(1.621)
Reagan-Bush (DP_2)	-0.856 *	3.303 **			-3.927 ***	6.926 ***
	(0.474)	(1.528)			(1.367)	(2.281)
Clinton (DP_3)	1.989 ***	4.310 ***			-1.271	8.238 ***
	(0.717)	(1.266)			(1.684)	(2.181)
G.W. Bush (DP_4)	0.646	3.114 **			-3.370 *	6.441 ***
	(0.745)	(1.232)			(1.790)	(2.194)
Obama (DP_5)	-1.282 ***	3.104 *			-6.525 ***	8.172 ***
	(0.219)	(1.583)			(1.866)	(2.870)
Burns (DCB_0)			-10.454 ***	-2.907 ***	–	–
			(0.485)	(1.113)	–	–
Miller (DCB_1)			-8.639 ***	-1.939 *	2.319 **	0.684
			(0.686)	(1.043)	(1.039)	(0.873)
Volcker (DCB_2)			-2.335 **	2.513	2.910 **	1.298
			(1.135)	(1.993)	(1.204)	(1.019)
Greenspan (DCB_3)			0.633	3.069 **	3.261 **	-0.597
			(0.658)	(1.296)	(1.588)	(1.251)
Bernanke (DCB_4)			-0.068	3.431 **	5.274 ***	0.475
			(0.812)	(1.534)	(1.823)	(1.381)
Yellen (DCB_5)			-1.334 ***	1.879 *	5.191 ***	-2.989
			(0.157)	(1.132)	(1.872)	(1.913)
Dev_{t-1}		0.271 ***		0.439 ***		0.165 *
		(0.083)		(0.106)		(0.090)
$Stock_{t-1}$		-0.011		0.019		-0.020
		(0.046)		(0.042)		(0.043)
Oil_{t-1}		0.015		-0.003		0.013
		(0.014)		(0.016)		(0.013)
$Unemployment_{t-1}$		-0.530 **		-0.485 **		-1.115 ***
		(0.208)		(0.215)		(0.256)
Rex_{t-1}		0.061		0.060		0.064
		(0.074)		(0.071)		(0.067)
ΔFCI_{t-1}		0.520		0.684		0.111
		(0.888)		(0.955)		(0.940)
$\Delta ISpread_{t-1}$		-0.953 **		-1.207 *		-0.821 **
		(0.420)		(0.620)		(0.393)
$\bar{R}^2$	0.610	0.691	0.464	0.629	0.619	0.713

Note: The regression models are $Dev_t = \sum_{j=1}^{p} \boldsymbol{\beta_j'} \boldsymbol{X_{t-j}} + \sum_{j=0}^{k} \gamma_j \mathrm{DP}_j + \sum_{j=1}^{m} \gamma_j \mathrm{DCB}_j + \varepsilon_t$, where Dev_t is the Taylor Rule deviation. The entries in brackets are the Newey–West HAC standard errors. Asterisks *, ** and *** indicate rejection at 10%, 5%; and 1% levels, respectively. See notes to Table **??** for more details about macroeconomic variables.

C.3.2 Interest Rate Inertia

We find that the optimal Taylor coefficient for interest rate smoothing is zero in our baseline model. However, as argued in recent work by Lei and Tseng (2017), increased uncertainty makes central banks more reluctant to change their target interest rate, and results in a "wait-and-see" monetary policy. Moreover, as argued in Yellen (2017),

> "[w]ith the federal funds rate still near zero, the Committee recognizes that, should the economy unexpectedly weaken in the next year or two, there would likely be only limited scope to respond by lowering short-term rates. But if the economy instead began to overheat, threatening to push inflation to an undesirably high level, the FOMC would have ample scope to respond through tighter monetary policy. Such asymmetric risks arguably call for a more gradual path of rate increases than indicated by the prescriptions of a simple policy rule."

Therefore, while interest rate smoothing may play a key role, this feature is omitted under the optimal policy. We thus implement a two-dimensional grid search on r_π and r_Y, with the value of the smoothing parameter fixed at its Bayesian estimate $\hat{r}_R = 0.53$. The optimal Taylor rule coefficients with fixed interest rate smoothing are in Panel II row (2) of Table C5.

As shown, the optimal parameters of $\tilde{r}_\pi$ and $\tilde{r}_Y$ are 3 and 0.37, respectively. Both the actual interest rates and the interest rates implied by the optimal Taylor rule with interest rate smoothing, and the associated deviation, are in Figures C2 and C3, respectively.

Unsurprisingly, the optimal rule is more persistent and less volatile under interest rate inertia. The empirical results of the presidential administration and Fed chair turnover models are in Table C8. We can see that the results continue to show evidence supporting the relationship between mean shifts in the Taylor rule deviations and political regimes.

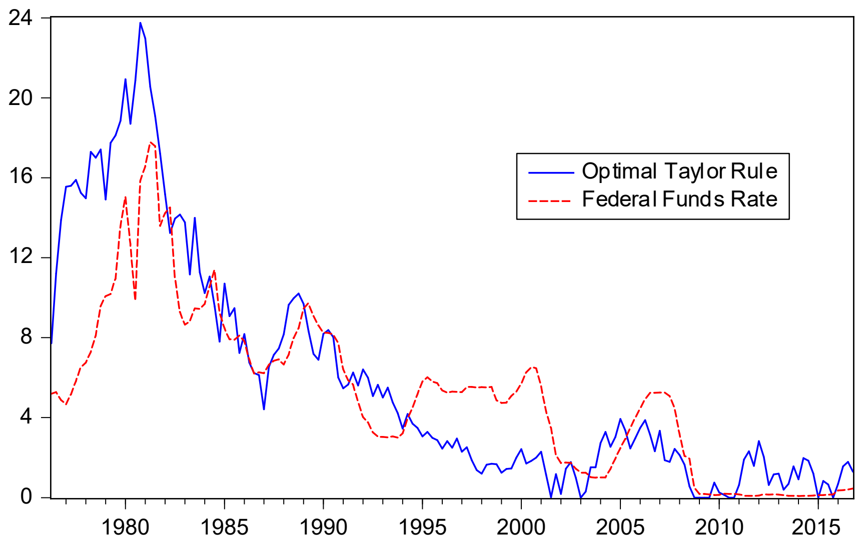

Figure C2: Interest Rates Implied by Optimal Rule with Interest Rate Inertia (solid line) and Actual Interest Rates (dashed line)

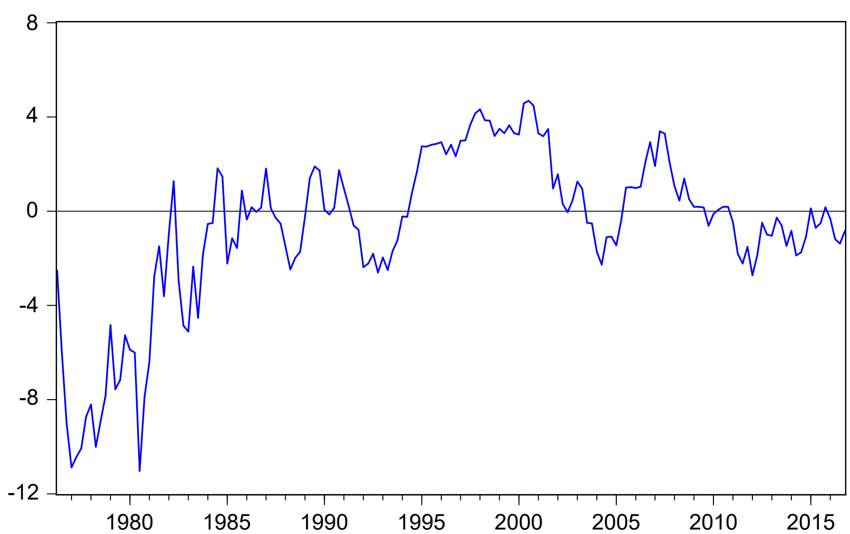

Figure C3: Deviations from the Optimal Taylor Rule with Interest Rate Inertia

Table C8: Political Regimes and Deviations from Optimal Taylor Rule with Interest-Rate Inertia (1976Q2-2016Q4)

	Presidential Regime		Fed Chair Regime		Nested Model	
	(1)	(2)	(3)	(4)	(5)	(6)
Nixon-Ford (DP_0)	-5.823 ***	-2.639 ***			-5.823 ***	-0.533
	(0.714)	(0.716)			(0.729)	(0.975)
Carter (DP_1)	-8.171 ***	-1.015 *			-10.035 ***	-0.065
	(0.693)	(0.613)			(0.239)	(0.853)
Reagan-Bush (DP_2)	-0.977 **	1.674 **			-4.196 ***	3.602 ***
	(0.482)	(0.760)			(0.781)	(1.260)
Clinton (DP_3)	2.373 ***	2.402 ***			-1.310	4.581 ***
	(0.823)	(0.750)			(1.167)	(1.256)
G.W. Bush (DP_4)	0.918	1.589 **			-3.268 ***	3.491 ***
	(0.567)	(0.662)			(1.182)	(1.197)
Obama (DP_5)	-0.800 ***	1.744 **			-5.789 ***	4.666 ***
	(0.212)	(0.834)			(1.269)	(1.568)
Burns (DCB_0)			-8.230 ***	-1.267	–	–
			(0.852)	(0.778)	–	–
Miller (DCB_1)			-7.890 ***	-0.153	2.146 ***	0.521
			(0.408)	(0.530)	(0.493)	(0.595)
Volcker (DCB_2)			-2.466 **	1.302	2.825 ***	0.736
			(1.181)	(0.890)	(0.489)	(0.548)
Greenspan (DCB_3)			0.986	1.444 **	3.683 ***	-0.256
			(0.680)	(0.713)	(0.952)	(0.651)
Bernanke (DCB_4)			0.179	1.562 *	5.023 ***	0.097
			(0.685)	(0.860)	(1.200)	(0.705)
Yellen (DCB_5)			-0.856 ***	1.016	4.933 ***	-1.657 *
			(0.137)	(0.636)	(1.275)	(0.969)
Dev_{t-1}		0.657 ***		0.778 ***		0.569 ***
		(0.069)		(0.067)		(0.063)
$Stock_{t-1}$		-0.004		0.006		-0.007
		(0.019)		(0.018)		(0.017)
Oil_{t-1}		0.004		-0.003		0.004
		(0.005)		(0.006)		(0.005)
$Unemployment_{t-1}$		-0.268 **		-0.218 *		-0.592 ***
		(0.112)		(0.116)		(0.150)
Rex_{t-1}		0.000		0.007		0.000
		(0.036)		(0.039)		(0.035)
ΔFCI_{t-1}		-0.165		-0.124		-0.348
		(0.425)		(0.470)		(0.473)
$\Delta ISpread_{t-1}$		-0.740 ***		-0.813 **		-0.711 ***
		(0.277)		(0.327)		(0.242)
$\bar{R}^2$	0.731	0.906	0.552	0.888	0.747	0.914

Note: The regression models are $Dev_t = \theta + \sum_{j=1}^{p} \boldsymbol{\beta_j'} \boldsymbol{X_{t-j}} + \sum_{j=1}^{k} \gamma_0 \mathrm{DP}_j + \sum_{j=1}^{m} \gamma_j \mathrm{DCB}_j + \varepsilon_t$, where Dev_t is the Taylor Rule deviation. The entries in brackets are the Newey–West HAC standard errors. Asterisks *, ** and *** indicate rejection at 10%, 5%; and 1% levels, respectively. See notes to Table **??** for more details about macroeconomic variables.

C.3.3 Loss Function-Oriented Objective

Although we adopt a welfare-based measure to search for the optimal interest rate rule, we may alternatively believe that the monetary authority has more traditional goals of stabilizing inflation and output. Hence, following Badarau and Popescu (2014), we consider a standard quadratic loss function:[1]

$$L_t = \sigma_\pi^2 + \lambda_{GDP}\sigma_{GDP}^2,$$

where σ_π^2 and σ_{GDP}^2 are variance of net inflation rate and GDP growth, and λ_{GDP} is the weight on GDP volatility. We derive the optimized interest rate rule by minimizing the loss function.

Following Walsh (2003) and Agénor and Zilberman (2015), λ_{GDP} is set at 0.25, and resulting parameters of the optimized rule are $\tilde{r}_R = 0$, $\tilde{r}_\pi = 3$, and $\tilde{r}_Y = 1.55$ (see Panel II row (3) of Table C5). Table C9 shows that unemployment and interest rate spread remain to significantly account for regime shifts in Taylor rule deviations. The presidential regime and Fed chair regime models exhibit that politics matter in explaining deviations from the optimal interest rate rule (see columns (1)–(2) and (3)–(4) of Table C9). However, the results of the nested model suggest that the president would not have the independent influence on monetary policy (see column (6) of Table C9).

[1] The traditional view of minimizing a loss function that stabilizes inflation and output is based on the implicit assumption that minimizing the variation in inflation and output can be regarded as equivalent to maximizing welfare (Juillard et al., 2006). However, Svensson (2003) notes that the welfare-based goal of monetary policy would be noncontroversial.

Table C9: Political Regimes and Deviations from Optimal Taylor Rule Based on Loss Function (1976Q2-2016Q4)

	Presidential Regime		Fed Chair Regime		Nested Model	
	(1)	(2)	(3)	(4)	(5)	(6)
Nixon-Ford (DP_0)	-13.586 ***	-6.306 **			-13.586 ***	-1.286
	(1.372)	(2.585)			(1.622)	(3.031)
Carter (DP_1)	-10.108 ***	-1.643			-14.667 ***	0.640
	(2.376)	(2.588)			(0.887)	(2.788)
Reagan-Bush (DP_2)	-3.010 **	4.131 *			-11.773 ***	6.739
	(1.172)	(2.359)			(3.432)	(4.179)
Clinton (DP_3)	-1.529 **	3.247 *			-11.126 ***	5.741
	(0.666)	(1.841)			(3.820)	(4.097)
G.W. Bush (DP_4)	-0.655	3.531 *			-11.664 ***	5.343
	(1.371)	(1.815)			(4.055)	(3.987)
Obama (DP_5)	-2.902 ***	4.300 *			-15.956 ***	8.651 *
	(0.440)	(2.552)			(4.161)	(5.210)
Burns (DCB_0)			-14.204 ***	-4.389 **	–	–
			(0.840)	(1.868)	–	–
Miller (DCB_1)			-10.567 ***	-1.696	4.100	1.441
			(1.885)	(2.113)	(2.526)	(1.605)
Volcker (DCB_2)			-4.257 ***	4.322 *	8.059 ***	3.718 **
			(1.273)	(2.292)	(2.744)	(1.856)
Greenspan (DCB_3)			-1.867 **	3.992 **	9.597 **	1.678
			(0.735)	(1.539)	(3.791)	(2.642)
Bernanke (DCB_4)			-0.985	6.124 ***	13.362 ***	3.449
			(1.060)	(1.854)	(4.121)	(2.809)
Yellen (DCB_5)			-3.415 ***	2.835 **	12.542 ***	-2.090
			(0.612)	(1.417)	(4.205)	(3.620)
Dev_{t-1}		0.349 ***		0.270 ***		0.240 ***
		(0.068)		(0.074)		(0.070)
Stock_{t-1}		-0.012		-0.014		-0.035
		(0.080)		(0.074)		(0.079)
Oil_{t-1}		0.051 **		0.027		0.045 *
		(0.024)		(0.021)		(0.024)
$\mathrm{Unemployment}_{t-1}$		-0.805 **		-0.953 ***		-1.612 ***
		(0.318)		(0.272)		(0.385)
Rex_{t-1}		0.191		0.174		0.193
		(0.149)		(0.126)		(0.133)
$\Delta\mathrm{FCI}_{t-1}$		1.890		1.716		1.282
		(1.245)		(1.278)		(1.318)
$\Delta\mathrm{ISpread}_{t-1}$		-1.653 **		-1.368 *		-1.325 *
		(0.787)		(0.824)		(0.715)
$\bar{R}^2$	0.267	0.448	0.291	0.449	0.310	0.473

Note: The regression models are $Dev_t = \sum_{j=1}^{p} \boldsymbol{\beta_j'} \boldsymbol{X_{t-j}} + \sum_{j=0}^{k} \gamma_j \mathrm{DP}_j + \sum_{j=1}^{m} \gamma_j \mathrm{DCB}_j + \varepsilon_t$, where Dev_t is the Taylor Rule deviation. The entries in brackets are the Newey–West HAC standard errors. Asterisks *, ** and *** indicate rejection at 10%, 5%; and 1% levels, respectively. See notes to Table **??** for more details about macroeconomic variables.

C.4 Original Taylor Rule

In previous analysis, we obtain the optimal monetary policy by maximizing social welfare and then construct the Taylor rule deviations. However, Chen and Wang (2014) directly construct the Taylor rule deviations from the original Taylor rule using the monthly data for 1961M1–2008M12. They find that changes in political regimes are able to account for the deviations from the original Taylor rule.

Here, for the robustness, we implement the similar experiment to investigate the influence of politics for the deviations from the original Taylor rule. The original Taylor rule is proposed in Taylor (1993):

$$\bar{i}_t = \pi_t^A + rr^* + 0.5(\pi_t^A - \pi^*) + 0.5\tilde{y}_t, \tag{C.1}$$

where π_t^A is the annual inflation rate, rr^* is the equilibrium real federal funds rate, $\tilde{y}_t$ denotes the output gap, and π^* is the target level of inflation. Taylor (1993) assumes that the equilibrium real interest rate is 2% and the appropriate target for inflation is also 2%. Thus, the original Taylor rule is:

$$\bar{i}_t = 1.0 + 1.5\pi_t^A + 0.5\tilde{y}_t. \tag{C.2}$$

We follow Nikolsko-Rzhevskyy et al. (2014) and Nikolsko-Rzhevskyy et al. (2019) to construct the deviations from the original Taylor rule by:

$$\overline{Dev}_t = i_t^* - \bar{i}_t. \tag{C.3}$$

where i_t^* denotes the federal funds rate replaced with the shadow rate calculated by Wu and Xia (2016) starting in 2009Q1.

Figure C4 shows the original Taylor rule and the Federal funds rate, while the deviations from original Taylor rule and optimal Taylor rule are respectively illustrated in Figure C5.[2] The federal funds rate is below the original Taylor rule during 1976Q2–1979Q3, 1992Q1–1994Q1, 2001Q4–2006Q1 and 2009Q4–2016Q4, which is consistent with Nikolsko-Rzhevskyy et al. (2014) and Nikolsko-Rzhevskyy et al. (2019).[3] We can observe that the eras of the negative deviations from original Taylor rule are similar with the deviations from the optimal Taylor rule. This suggests that the interest rates are lower during these eras in both perspectives of the original Taylor rule and welfare maximization.

The empirical results are shown in Table C10. Column (4) of Table C10 indicates that all the chairman dummies in the Fed chairman regime model, except Burns and Yelen, are statistically significant. This suggests that the deviations from the original Taylor rule are influenced by the Fed chairs. However, the results of the presidential administration models, as well as the nested models, do not demonstrate the strong evidence that the deviations differ from different presidents (see columns (1)–(2) and (5)–(6) of Table C10). Besides, unemployment rate and interest rate spread are still significantly account for regime shifts in deviations from the original Taylor rule.

[2]The output gap is calculated as the difference between real GDP and estimated potential GDP. The real GDP is obtained from U.S. Bureau of Economic Analysis, and the potential GDP is estimated by the Congressional Budget Office. Inflation is measured by the core PCE index.

[3]However, Nikolsko-Rzhevskyy et al. (2014) and Nikolsko-Rzhevskyy et al. (2019) find that, following the recession of 2008–2009, the shadow federal funds rate is either above or close to the rate implied by a modified Taylor rule.

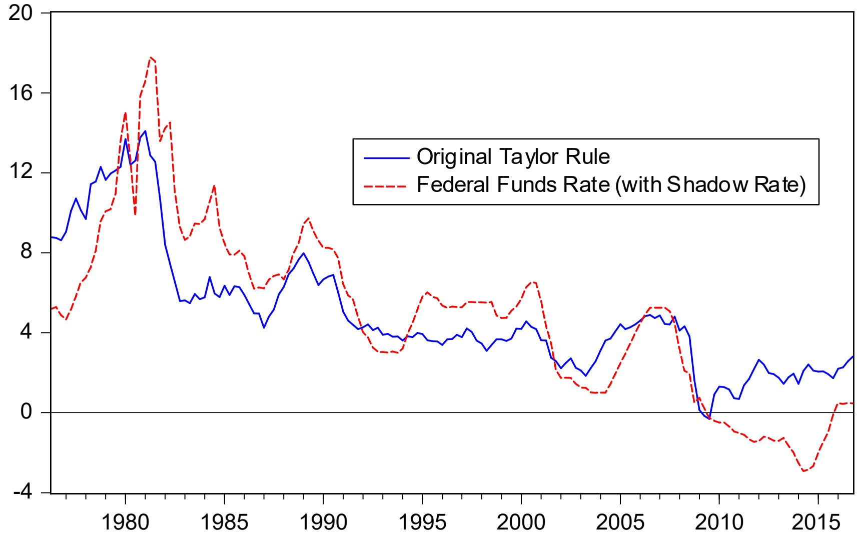

Figure C4: Interest Rates Implied by Original Taylor Rule and Federal Funds Rates (with Shadow Rates)

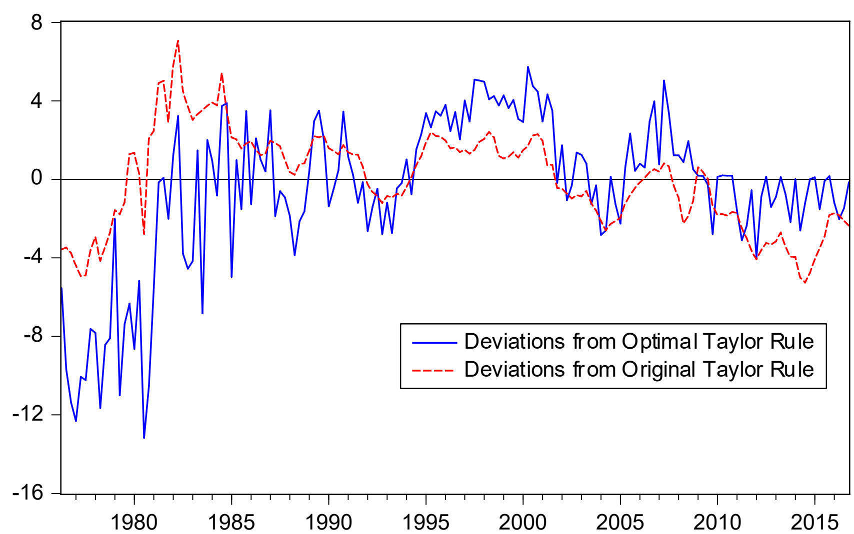

Figure C5: Deviations from the Optimal rule (solid line) and Original Taylor Rule (dotted line)

Table C10: Political Regimes and Deviations from Original Taylor Rule (1976Q2-2016Q4)

	Presidential Regime		Fed Chair Regime		Nested Model	
	(1)	(2)	(3)	(4)	(5)	(6)
Nixon-Ford (DP_0)	-3.597 ***	0.052			-3.597 ***	0.531
	(0.023)	(0.351)			(0.024)	(0.511)
Carter (DP_1)	-2.085 **	0.550 *			-4.456 ***	0.197
	(1.031)	(0.327)			(0.112)	(0.517)
Reagan-Bush (DP_2)	2.177 ***	0.675 **			-1.404 **	0.695
	(0.620)	(0.298)			(0.653)	(0.982)
Clinton (DP_3)	1.247 ***	0.640 ***			-1.089	0.826
	(0.362)	(0.231)			(0.767)	(0.962)
G.W. Bush (DP_4)	-0.675 *	0.175			-3.227 ***	0.049
	(0.350)	(0.247)			(0.896)	(0.848)
Obama (DP_5)	-2.658 ***	0.182			-5.197 ***	0.219
	(0.555)	(0.350)			(1.278)	(1.081)
Burns (DCB_0)			-4.088 ***	0.232	–	–
			(0.150)	(0.363)	–	–
Miller (DCB_1)			-2.768 ***	0.740 **	1.688 ***	0.654 **
			(0.271)	(0.332)	(0.309)	(0.284)
Volcker (DCB_2)			2.659 ***	1.535 ***	4.636 ***	1.586 ***
			(0.627)	(0.551)	(0.246)	(0.363)
Greenspan (DCB_3)			0.575	0.832 ***	2.336 ***	0.632
			(0.422)	(0.306)	(0.756)	(0.460)
Bernanke (DCB_4)			-1.547 **	0.636 *	2.911 ***	0.787
			(0.693)	(0.352)	(0.988)	(0.478)
Yellen (DCB_5)			-3.280 ***	0.278	1.917	0.142
			(0.579)	(0.293)	(1.357)	(0.770)
Dev_{t-1}		0.892 ***		0.840 ***		0.763 ***
		(0.043)		(0.040)		(0.081)
$Stock_{t-1}$		-0.017		-0.014		-0.023
		(0.015)		(0.014)		(0.016)
Oil_{t-1}		-0.001		-0.003		-0.001
		(0.004)		(0.004)		(0.004)
$Unemployment_{t-1}$		-0.066 *		-0.132 ***		-0.189 **
		(0.038)		(0.049)		(0.087)
Rex_{t-1}		0.016		0.020		0.020
		(0.024)		(0.025)		(0.023)
ΔFCI_{t-1}		-0.351		-0.358		-0.453
		(0.323)		(0.332)		(0.367)
$\Delta ISpread_{t-1}$		-0.663 ***		-0.637 ***		-0.620 ***
		(0.240)		(0.216)		(0.191)
$\bar{R}^2$	0.627	0.908	0.619	0.894	0.755	0.917

Note: The regression models are $Dev_t = \sum_{j=1}^{p} \boldsymbol{\beta_j'} \boldsymbol{X_{t-j}} + \sum_{j=0}^{k} \gamma_j \mathrm{DP}_j + \sum_{j=1}^{m} \gamma_j \mathrm{DCB}_j + \varepsilon_t$, where Dev_t is the Taylor Rule deviation. The entries in brackets are the Newey–West HAC standard errors. Asterisks *, ** and *** indicate rejection at 10%, 5%; and 1% levels, respectively. See notes to Table **??** for more details about macroeconomic variables.

C.5 Subsample Analysis

C.5.1 Period before Zero Lower Bound

In considering that the Taylor deviations may result from the zero lower bound (ZLB) event in the Fed funds rate, we restrict our sample period up to 2008Q4 to investigate the results in the pre-ZLB era.

For Bayesian estimation, we calibrate the steady-state value of π at 1.0087 to match the sample mean of the core PCE inflation. The discount factor of patient households is set at 0.993 to coincide with the annual real interest rate of 2.891% during the subsample period. We find the parameters of optimal interest rate are $\tilde{r}_R = 0$, $\tilde{r}_\pi = 3$, and $\tilde{r}_Y = 0.47$ by maximizing social welfare (see Panel III row (1) of Table C5. The results of the political regime models are in Table C11. The main findings are still unchanged in the period before ZLB.

C.5.2 Period after 1979Q3

In this paper, we study the optimal Taylor rule based on welfare maximization. We pay more attention to portraying the optimality of the interest rate rule and suggest that the monetary authority could enhance social welfare by implementing this optimal rule. We reveal the fact that the Fed could optimally set interest rates to maximize social welfare. However, we could argue that Miller did not use the Taylor rule. For robustness, we start the analysis with Volcker and restrict our subsample period from 1979Q3 to 2016Q4. To appraise the optimal interest rate rule, the steady-state value of π is set to 1.0070 to meet the sample mean of core PCE inflation. We set the discount factor of patient households at 0.995 to ensure consistency with the annual real interest rate of 2.196%. Following the same process, we obtain the parameters of the optimal interest rule, which are $\tilde{r}_R = 0$, $\tilde{r}_\pi = 3$, and $\tilde{r}_Y = 0$ (see Panel III row (2) of Table C5). The empirical results are in Table C12. We can observe that the main results still hold.

Table C11: Political Regimes and Deviations from Optimal Taylor Rule (1976Q2-2008Q4)

	Presidential Regime		Fed Chair Regime		Nested Model	
	(1)	(2)	(3)	(4)	(5)	(6)
Nixon-Ford (DP_0)	-9.625 ***	-2.431			-9.625 ***	0.268
	(0.831)	(1.536)			(0.880)	(1.430)
Carter (DP_1)	-8.980 ***	-0.887			-10.804 ***	0.703
	(0.857)	(1.352)			(0.597)	(1.420)
Reagan-Bush (DP_2)	-0.781 *	6.280 ***			-3.545 ***	9.325 ***
	(0.455)	(1.842)			(1.299)	(1.945)
Clinton (DP_3)	2.134 ***	6.698 ***			-0.785	10.517 ***
	(0.717)	(1.461)			(1.615)	(1.912)
G.W. Bush (DP_4)	0.687	5.433 ***			-2.954 *	8.695 ***
	(0.710)	(1.369)			(1.705)	(1.845)
Burns (DCB_0)			-10.299 ***	-1.532	–	–
			(0.493)	(1.613)	–	–
Miller (DCB_1)			-8.572 ***	-0.883	2.232 **	0.444
			(0.671)	(1.395)	(1.013)	(1.078)
Volcker (DCB_2)			-2.273 *	3.667	2.633 **	1.059
			(1.180)	(2.651)	(1.161)	(1.070)
Greenspan (DCB_3)			0.727	3.897 **	2.919 *	-1.305
			(0.650)	(1.760)	(1.508)	(1.201)
Bernanke (DCB_4)			1.890 ***	3.974 **	4.844 ***	-0.400
			(0.310)	(1.756)	(1.740)	(1.323)
Dev_{t-1}		0.211 **		0.465 ***		0.136
		(0.093)		(0.116)		(0.101)
$Stock_{t-1}$		-0.006		0.013		-0.023
		(0.050)		(0.046)		(0.047)
Oil_{t-1}		0.005		-0.019		0.006
		(0.019)		(0.022)		(0.018)
$Unemployment_{t-1}$		-0.949 ***		-0.621 **		-1.382 ***
		(0.238)		(0.302)		(0.231)
Rex_{t-1}		0.134 *		(0.114)		0.115
		(0.078)		(0.080)		(0.073)
ΔFCI_{t-1}		0.633		1.054		0.281
		(1.039)		(1.126)		(1.086)
$\Delta ISpread_{t-1}$		-1.059 **		-1.416 **		-0.937 *
		(0.526)		(0.711)		(0.487)
$\bar{R}^2$	0.641	0.743	0.507	0.666	0.649	0.758

Note: The regression models are $Dev_t = \theta + \sum_{j=1}^{p} \boldsymbol{\beta_j'} \boldsymbol{X_{t-j}} + \sum_{j=0}^{k} \gamma_j \mathrm{DP}_j + \sum_{j=0}^{m} \gamma_j \mathrm{DCB}_j + \varepsilon_t$, where Dev_t is the Taylor Rule deviation. The entries in brackets are the Newey–West HAC standard errors. Asterisks *, ** and *** indicate rejection at 10%, 5%; and 1% levels, respectively. See notes to Table **??** for more details about macroeconomic variables.

Table C12: Political Regimes and Deviations from Optimal Taylor Rule (1979Q3-2016Q4)

	Presidential Regime		Fed Chair Regime		Nested Model	
	(1)	(2)	(3)	(4)	(5)	(6)
Carter (DP_1)	-9.638 ***	-4.971 ***			-9.638 ***	-2.792 *
	(0.556)	(1.391)			(0.568)	(1.487)
Reagan-Bush (DP_2)	-0.377	2.310 **			-0.232	6.168 ***
	(0.402)	(1.143)			(0.692)	(1.798)
Clinton (DP_3)	3.160 ***	4.264 ***			3.477 ***	8.568 ***
	(0.818)	(1.071)			(1.112)	(1.805)
G.W. Bush (DP_4)	0.731	2.380 **			0.685	6.266 ***
	(0.450)	(0.938)			(0.966)	(1.696)
Obama (DP_5)	-1.024 ***	1.895			-1.813 *	7.089 ***
	(0.162)	(1.221)			(1.074)	(2.284)
Volcker (DCB_2)			-1.995	1.394	–	
			(1.726)	(1.695)	–	
Greenspan (DCB_3)			1.303 *	1.973	-0.317	-1.760 ***
			(0.754)	(1.258)	(0.808)	(0.613)
Bernanke (DCB_4)			-0.225	1.786	0.651	-1.228
			(0.646)	(1.408)	(1.044)	(0.776)
Yellen (DCB_5)			-0.794 ***	1.070	1.019	-3.321 **
			(0.143)	(1.013)	(1.086)	(1.350)
Dev_{t-1}		0.274 **		0.617 ***		0.199 *
		(0.106)		(0.135)		(0.117)
$Stock_{t-1}$		-0.006		0.007		-0.008
		(0.030)		(0.031)		(0.029)
Oil_{t-1}		-0.005		-0.015		-0.005
		(0.012)		(0.014)		(0.010)
$Unemployment_{t-1}$		-0.357 **		-0.261		-0.792 ***
		(0.162)		(0.194)		(0.222)
Rex_{t-1}		0.030		(0.031)		0.031
		(0.063)		(0.061)		(0.058)
ΔFCI_{t-1}		-0.540		-0.537		-0.835
		(0.730)		(0.769)		(0.743)
$\Delta ISpread_{t-1}$		-0.537 *		-0.593		-0.506
		(0.310)		(0.433)		(0.306)
$\bar{R}^2$	0.599	0.655	0.153	0.528	0.597	0.673

Note: The regression models are $Dev_t = \sum_{j=1}^{p} \boldsymbol{\beta_j' X_{t-j}} + \sum_{j=1}^{k} \gamma_j \mathrm{DP}_j + \sum_{j=1}^{m} \gamma_j \mathrm{DCB}_j + \varepsilon_t$, where Dev_t is the Taylor Rule deviation. The entries in brackets are the Newey–West HAC standard errors. Asterisks *, ** and *** indicate rejection at 10%, 5%; and 1% levels, respectively. See notes to Table **??** for more details about macroeconomic variables.

C.6 Evaluation of Interest Rate Rules

In our baseline model, we assume the monetary authority implements a current-looking interest rate rule with the time-varying inflation target. Following the spirit of Knotek et al. (2016), we consider several monetary policy rules, examine the relative model fit, and detect the impact of politics on Taylor rule deviations. As in Smets and Wouters (2003) and An and Schorfheide (2007), we demonstrate the logarithm of marginal data density for different specifications of interest rate rules and compute posterior odds ratios (or the Bayesian factor) to appraise the empirical performance of the estimated models.

We evaluate several different rules in addition to the baseline model in which the monetary authority conducts the current-looking Taylor-type rule (**??**). To start, we assume that the policymaker would respectively deploy backward- and forward-looking rules following Clarida et al. (1998):

$$R_t = R_{t-1}^{r_R} \left[\left(\frac{\pi_{t-1}}{\pi_d} \right)^{r_\pi} \left(\frac{GDP_{t-1}}{GDP_{t-2}} \right)^{r_{ya}} \right]^{1-r_R} R^{1-r_R} \frac{\exp(u_{R,t})}{A_{s,t}}, \tag{C.4}$$

$$R_t = R_{t-1}^{r_R} \left[R \left(\frac{\mathrm{E}_t(\pi_{t+1})}{\pi_d} \right)^{r_\pi} \left(\frac{GDP_t}{GDP_{t-1}} \right)^{r_{ya}} \right]^{1-r_R} R^{1-r_R} \frac{\exp(u_{R,t})}{A_{s,t}}. \tag{C.5}$$

Columns (2) and (3) of Table C13 detail the marginal data density of these different specifications and the posterior odds ratios compared with the baseline model, respectively. We can see that the current-looking interest rate rule in the baseline model is supported by the data as the marginal likelihood of the baseline model is greater than either the backward- or forward-looking interest rate rule (see A-1, A-2, and A-3 in Table C13).

Next, we assume that the monetary authority conducts the monetary policy with a fixed inflation target as the following forms, respectively:

$$R_t = R_{t-1}^{r_R}\left[\left(\frac{\pi_{t-1}}{\pi}\right)^{r_\pi}\left(\frac{GDP_{t-1}}{GDP_{t-2}}\right)^{r_{ya}}\right]^{1-r_R} R^{1-r_R}\exp(u_{R,t}), \tag{C.6}$$

$$R_t = R_{t-1}^{r_R}\left[\left(\frac{\pi_{t-1}}{\pi}\right)^{r_\pi}\left(\frac{GDP_{t-1}}{GDP_{t-2}}\right)^{r_{ya}}\right]^{1-r_R} R^{1-r_R}\exp(u_{R,t}), \tag{C.7}$$

$$R_t = R_{t-1}^{r_R}\left[R\left(\frac{\mathrm{E}_t(\pi_{t+1})}{\pi}\right)^{r_\pi}\left(\frac{GDP_t}{GDP_{t-1}}\right)^{r_{ya}}\right]^{1-r_R} R^{1-r_R}\exp(u_{R,t}). \tag{C.8}$$

A-4, A-5, and A-6 in Table C13 show that our baseline model better fits data.

Then, we assume that policy inertia is not necessary in the interest rate rules, i.e., $r_R = 0$ in equations (C.6), (C.7), and (C.8). A-7, A-8, and A-9 in Table C13 portray that the interest rate rules without policy inertia receive less support from the data.

Moreover, the alternative monetary policy that we consider includes the output gap rather than output growth in the interest rate rule:

$$R_t = R_{t-1}^{r_R}\left[\left(\frac{\pi_t}{\pi}\right)^{r_\pi}\left(\frac{GDP_t}{GDP}\right)^{r_{ya}}\right]^{1-r_R} R^{1-r_R}\exp(u_{R,t}), \tag{C.9}$$

where GDP is the steady-state value of GDP_t. We also consider the backward- and forward-looking versions of the interest rate rules, respectively:

$$R_t = R_{t-1}^{r_R}\left[\left(\frac{\pi_{t-1}}{\pi}\right)^{r_\pi}\left(\frac{GDP_{t-1}}{GDP}\right)^{r_{ya}}\right]^{1-r_R} R^{1-r_R}\exp(u_{R,t}), \tag{C.10}$$

$$R_t = R_{t-1}^{r_R}\left[R\left(\frac{\mathrm{E}_t(\pi_{t+1})}{\pi}\right)^{r_\pi}\left(\frac{GDP_t}{GDP}\right)^{r_{ya}}\right]^{1-r_R} R^{1-r_R}\exp(u_{R,t}). \tag{C.11}$$

Apart from these, we examine that the monetary authority does not consider policy inertia in policymaking. That is, r_R equals zero in equations (C.9), (C.10), and (C.11).

A-10 to A-15 in Table C13 present the settings including the output gap.[4] We can see

[4] A-10 to A-12 in Table C13 respectively present the results of equations (C.9), (C.10), and (C.11). A-13 to A-15 in Table C13 are the results for where r_R equals zero in equations (C.9), (C.10), and (C.11), respectively.

that including the output gap would not be better than the baseline model.

In addition, as suggested by Ireland (2004b), we can assume the central bank conducts the following modified Taylor rule:

$$R_t = R_{t-1}^{r_R}\left[\left(\frac{\pi_t}{\pi}\right)^{r_\pi}\left(\frac{GDP_t}{GDP_{t-1}}\right)^{r_{ya}}\left(\frac{GDP_t}{GDP}\right)^{r_x}\right]^{1-r_R} R^{1-r_R}\exp(u_{R,t}), \tag{C.12}$$

where r_x is the reaction coefficient for output gap. A-16 in Table C13 details the marginal likelihood and Bayesian factor of rule (C.12), and suggests that the data favor the baseline model.

We also replace core PCE inflation by PCE inflation to evaluate the model fitness.[5] As shown in Table C14, the model with rule (**??**) is supported by the data. Following the same procedure, we find the optimal interest rate rule based on rule (**??**). Panel IV row (1) of Table C5 shows that the optimized parameters are $\tilde{r}_R = 0$, $\tilde{r}_\pi = 3$, and $\tilde{r}_Y = 0$. Table C16 provides the results of the presidential administration and Fed chair turnover models. We can see that replacing core PCE inflation with PCE inflation does not change the main conclusions.

Lastly, following Iacoviello and Neri (2010), we use the implicit price deflator for the nonfarm business sector as the measure of inflation and see if the performance of the model would be more favorable given the data.[6] C-1 to C-13 in Table C15 suggest that the current-looking rule (**??**) is favorable given the data. Panel IV row (2) of Table C5 shows that the optimized interest rate parameters under the current-looking rule are

[5]The sample mean of PCE inflation is 1.0078, which is similar to the sample mean of core PCE inflation. Hence, the calibration of the steady-state value of π and the value of β are at the same values as our baseline model.

[6]The steady-state value of inflation is calibrated at 1.0069 to match the sample mean of inflation using the implicit price deflator. β is set at 0.994 to meet the average annual real interest rate of 2.408%.

$\tilde{r}_R = 0$, $\tilde{r}_\pi = 3$, and $\tilde{r}_Y = 0.24$. The empirical results of political regime models are in Table C17, which show our main findings are robust to the relationship between political regime changes and Taylor deviations.

Table C13: Fit of Different Monetary Policy Rules (Core PCE inflation) (1976Q2-2016Q4)

Monetary policy	MDD	Bayes factor versus the baseline
A-1. Current-looking (baseline) (output growth)	5,434	1
A-2. Backward-looking (output growth)	5,391	1.00E+19
A-3. Forward-looking (output growth)	5,414	7.57E+08
A-4. Current-looking (output growth, fixed inflation target)	5,422	1.71E+05
A-5. Backward-looking (output growth, fixed inflation target)	5,382	3.61E+22
A-6. Forward-looking (output growth, fixed inflation target)	5,404	1.56E+13
A-7. Current-looking ($r_R = 0$, output growth, fixed inflation target)	5,398	5.55E+15
A-8. Backward-looking ($r_R = 0$, output growth, fixed inflation target)	5,316	2.33E+51
A-9. Forward-looking ($r_R = 0$, output growth, fixed inflation target)	5,385	2.02E+21
A-10. Current-looking (output gap, fixed inflation target)	5,392	1.68E+18
A-11. Backward-looking (output gap, fixed inflation target)	5,358	8.99E+32
A-12. Forward-looking (output gap, fixed inflation target)	5,377	6.26E+24
A-13. Current-looking ($r_R = 0$, output gap, fixed inflation target)	5,353	3.00E+35
A-14. Backward-looking ($r_R = 0$, output gap, fixed inflation target)	5,295	4.88E+60
A-15. Forward-looking ($r_R = 0$, output gap, fixed inflation target)	5,350	2.70E+36
A-16. Current-looking (output growth, output gap, fixed inflation target)	5,411	1.32E+10

Note: MDD, marginal data density.

Table C14: Fit of Different Monetary Policy Rules (PCE inflation) (1976Q2-2016Q4)

Monetary policy	MDD	Bayes factor versus the baseline
B-1. Current-looking (baseline) (output growth)	5,355	1
B-2. Backward-looking (output growth)	5,217	2.86E+46
B-3. Forward-looking (output growth)	5,298	2.71E+11
B-4. Current-looking (output growth, fixed inflation target)	5,317	2.27E+03
B-5. Backward-looking (output growth, fixed inflation target)	5,254	2.68E+30
B-6. Forward-looking (output growth, fixed inflation target)	5,287	1.49E+16
B-7. Current-looking ($r_R = 0$, output growth, fixed inflation target)	5,302	5.04E+09
B-8. Backward-looking ($r_R = 0$, output growth, fixed inflation target)	5,162	4.23E+70
B-9. Forward-looking ($r_R = 0$, output growth, fixed inflation target)	5,263	4.15E+26
B-10. Current-looking (output gap, fixed inflation target)	5,285	7.84E+16
B-11. Backward-looking (output gap, fixed inflation target)	5,229	3.00E+41
B-12. Forward-looking (output gap, fixed inflation target)	5,263	4.30E+26
B-13. Current-looking ($r_R = 0$, output gap, fixed inflation target)	5,246	8.73E+33
B-14. Backward-looking ($r_R = 0$, output gap, fixed inflation target)	5,142	1.78E+79
B-15. Forward-looking ($r_R = 0$, output gap, fixed inflation target)	5,243	1.72E+35
B-16. Current-looking (output growth, output gap, fixed inflation target)	5,304	5.70E+08

Note: MDD, marginal data density.

Table C15: Fit of Different Monetary Policy Rules (GDP deflator) (1976Q2-2016Q4)

Monetary policy	MDD	Bayes factor versus the baseline
C-1. Current-looking (baseline) (output growth)	5,355	1
C-2. Backward-looking (output growth)	5,277	5.45E+33
C-3. Forward-looking (output growth)	5,329	2.60E+11
C-4. Current-looking (output growth, fixed inflation target)	5,342	6.98E+05
C-5. Backward-looking (output growth, fixed inflation target)	5,277	8.67E+33
C-6. Forward-looking (output growth, fixed inflation target)	5,317	2.37E+16
C-7. Current-looking ($r_R = 0$, output growth, fixed inflation target)	5,327	1.90E+12
C-8. Backward-looking ($r_R = 0$, output growth, fixed inflation target)	5,197	4.18E+68
C-9. Forward-looking ($r_R = 0$, output growth, fixed inflation target)	5,305	4.73E+21
C-10. Current-looking (output gap, fixed inflation target)	5,307	1.05E+21
C-11. Backward-looking (output gap, fixed inflation target)	5,247	5.10E+46
C-12. Forward-looking (output gap, fixed inflation target)	5,289	3.76E+28
C-13. Current-looking ($r_R = 0$, output gap, fixed inflation target)	5,267	2.10E+38
C-14. Backward-looking ($r_R = 0$, output gap, fixed inflation target)	5,169	4.34E+80
C-15. Forward-looking ($r_R = 0$, output gap, fixed inflation target)	5,266	4.97E+38
C-16. Current-looking (output growth, output gap, fixed inflation target)	5,328	6.66E+11

Note: MDD, marginal data density.

Table C16: Political Regimes and Deviations from Optimal Taylor Rule based on PCE Inflation (1976Q2-2016Q4)

	Presidential Regime		Fed Chair Regime		Nested Model	
	(1)	(2)	(3)	(4)	(5)	(6)
Nixon-Ford (DP_0)	-6.287 ***	-6.900 ***			-6.287 ***	-4.119 **
	(1.226)	(1.364)			(1.775)	(1.677)
Carter (DP_1)	-11.163 ***	-7.678 ***			-9.399 ***	-3.883 *
	(0.997)	(1.778)			(1.299)	(2.202)
Reagan-Bush (DP_2)	1.189 **	2.043			5.299 ***	8.790 ***
	(0.530)	(1.330)			(1.741)	(2.760)
Clinton (DP_3)	3.286 ***	3.594 ***			8.318 ***	11.111 ***
	(0.568)	(1.008)			(1.871)	(2.715)
G.W. Bush (DP_4)	-0.680	0.387			4.367 **	7.654 ***
	(0.658)	(1.061)			(1.951)	(2.638)
Obama (DP_5)	-1.265 ***	0.070			3.394	8.664 **
	(0.430)	(1.214)			(2.391)	(3.345)
Burns (DCB_0)			-8.065 ***	-4.100 ***	–	–
			(0.781)	(1.547)	–	–
Miller (DCB_1)			-10.773 ***	-5.399 ***	-1.374	-2.155
			(0.690)	(1.412)	(1.601)	(1.788)
Volcker (DCB_2)			-0.787	0.278	-3.330 **	-2.726 *
			(2.596)	(1.933)	(1.472)	(1.431)
Greenspan (DCB_3)			1.320 *	0.806	-5.032 ***	-5.180 ***
			(0.740)	(1.223)	(1.810)	(1.838)
Bernanke (DCB_4)			-1.313 **	-0.204	-5.072 **	-5.314 **
			(0.587)	(1.414)	(2.308)	(2.184)
Yellen (DCB_5)			-0.577 ***	-0.202	-3.971	-6.246 **
			(0.115)	(1.026)	(2.402)	(2.564)
Dev_{t-1}		0.199 **		0.577 ***		0.138
		(0.091)		(0.112)		(0.115)
$Stock_{t-1}$		-0.007		0.020		-0.009
		(0.042)		(0.042)		(0.042)
Oil_{t-1}		-0.040 **		-0.027		-0.041 ***
		(0.016)		(0.019)		(0.015)
$Unemployment_{t-1}$		-0.160		-0.044		-0.560 **
		(0.172)		(0.193)		(0.230)
Rex_{t-1}		-0.023		-0.029		-0.042
		(0.087)		(0.104)		(0.084)
ΔFCI_{t-1}		-0.460		(0.067)		-0.724
		(1.039)		(1.008)		(1.088)
$\Delta ISpread_{t-1}$		-0.528		-0.528		-0.482
		(0.528)		(0.663)		(0.476)
$\bar{R}^2$	0.662	0.709	0.325	0.611	0.671	0.716

Note: The regression models are $Dev_t = \sum_{j=1}^{p} \boldsymbol{\beta_j'} \boldsymbol{X_{t-j}} + \sum_{j=0}^{k} \gamma_j \mathrm{DP}_j + \sum_{j=1}^{m} \gamma_j \mathrm{DCB}_j + \varepsilon_t$, where Dev_t is the Taylor Rule deviation. The entries in brackets are the Newey–West HAC standard errors. Asterisks *, ** and *** indicate rejection at 10%, 5%; and 1% levels, respectively. See notes to Table **??** for more details about macroeconomic variables.

Table C17: Political Regimes and Deviations from Optimal Taylor Rule based on GDP Deflator (1976Q2-2016Q4)

	Presidential Regime		Fed Chair Regime		Nested Model	
	(1)	(2)	(3)	(4)	(5)	(6)
Nixon-Ford (DP_0)	-11.027 ***	-7.581 ***			-11.027 ***	-4.209 *
	(0.384)	(1.919)			(0.413)	(2.457)
Carter (DP_1)	-11.548 ***	-7.217 ***			-9.677 ***	-1.813
	(0.538)	(1.626)			(0.742)	(2.475)
Reagan-Bush (DP_2)	1.758 ***	2.825 **			4.249 ***	10.684 ***
	(0.626)	(1.396)			(1.442)	(3.163)
Clinton (DP_3)	2.817 ***	2.941 **			6.134 ***	11.438 ***
	(0.616)	(1.127)			(1.593)	(3.168)
G.W. Bush (DP_4)	-0.381	0.780			1.913	8.368 **
	(1.286)	(1.248)			(2.310)	(3.350)
Obama (DP_5)	-1.917 ***	0.042			-1.396	8.421 **
	(0.306)	(1.423)			(2.406)	(4.244)
Burns (DCB_0)			-10.255 ***	-2.906	–	–
			(0.525)	(1.943)	–	–
Miller (DCB_1)			-12.874 ***	-5.132 ***	-3.197 ***	-3.870 **
			(0.424)	(1.666)	(0.872)	(1.513)
Volcker (DCB_2)			-0.154	1.590	-1.791	-2.932
			(2.530)	(2.416)	(1.362)	(1.955)
Greenspan (DCB_3)			1.115	1.605	-3.318 **	-5.597 **
			(0.882)	(1.360)	(1.530)	(2.232)
Bernanke (DCB_4)			-0.744	1.115	-0.589	-3.846
			(0.932)	(1.722)	(2.334)	(2.653)
Yellen (DCB_5)			-1.794 ***	-0.015	-0.398	-5.887 *
			(0.237)	(1.380)	(2.423)	(3.107)
Dev_{t-1}		0.268 ***		0.520 ***		0.219 **
		(0.095)		(0.079)		(0.107)
$Stock_{t-1}$		0.045		0.090 *		0.039
		(0.051)		(0.047)		(0.045)
Oil_{t-1}		0.011		-0.002		0.008
		(0.016)		(0.020)		(0.015)
$Unemployment_{t-1}$		-0.204		-0.214		-0.717 **
		(0.185)		(0.230)		(0.293)
Rex_{t-1}		0.133		0.150		0.102
		(0.112)		(0.115)		(0.113)
ΔFCI_{t-1}		0.712		1.139		0.324
		(1.015)		(1.508)		(0.928)
$\Delta ISpread_{t-1}$		0.046		-0.210		0.179
		(0.473)		(0.732)		(0.469)
$\bar{R}^2$	0.624	0.646	0.369	0.543	0.637	0.662

Note: The regression models are $Dev_t = \sum_{j=1}^{p} \boldsymbol{\beta_j'} \boldsymbol{X_{t-j}} + \sum_{j=0}^{k} \gamma_j \mathrm{DP}_j + \sum_{j=1}^{m} \gamma_j \mathrm{DCB}_j + \varepsilon_t$, where Dev_t is the Taylor Rule deviation. The entries in brackets are the Newey–West HAC standard errors. Asterisks *, ** and *** indicate rejection at 10%, 5%; and 1% levels, respectively. See notes to Table **??** for more details about macroeconomic variables.

C.7 Incorporating the Fiscal Policy

Following Faia and Monacelli (2007), we assume the government conducts fiscal policy through exogenous public spending, which is financed by means of a lump-sum tax. The government purchase and the government budget constraint respectively are:

$$\log g_t = (1-\rho_g)\log g + \rho_g \log g_{t-1} + u_{g,t},$$

$$tax_t = g_t GDP,$$

where g is the steady-state share of government purchases in GDP, $u_{g,t} \sim^{i.i.d} (0, \sigma_g^2)$, and tax_t denotes the lump-sum tax.

We follow Khan and Reza (2017) to assume patient and impatient households respectively pay a lump-sum tax to the fiscal authority. Thus, the patient households' budget constraint reads as follows:

$$\begin{aligned} c_t + \frac{k_{c,t}}{A_{k,t}} + k_{h,t} + k_{b,t} + q_t h_t + p_{l,t} l_t + b_t &= \frac{w_{c,t} n_{c,t}}{X_{wc,t}} + \frac{w_{h,t} n_{h,t}}{X_{wh,t}} + \left(R_{c,t} z_{c,t} + \frac{1-\delta_{kc}}{A_{k,t}}\right) k_{c,t-1} \\ &+ (R_{h,t} z_{h,t} + 1 - \delta_{kh}) k_{h,t-1} + p_{b,t} k_{b,t} + \frac{R_{t-1} b_{t-1}}{\pi_t} + (p_{l,t} + R_{l,t}) l_{t-1} + q_t (1-\delta_h) h_{t-1} \\ &+ Div_t - \phi_t - \alpha tax_t, \end{aligned} \tag{C.13}$$

where αtax_t is the lump-sum tax, and α denotes the labor income share of patient households.

Besides, the budget constraint of impatient households is:

$$c'_t + q_t h'_t + \frac{R_{t-1} b'_{t-1}}{\pi_t} = \frac{w'_{c,t} n'_{c,t}}{X'_{wc,t}} + \frac{w'_{h,t} n'_{h,t}}{X'_{wh,t}} + q_t (1-\delta_h) h'_{t-1} + b'_t + Div'_t - (1-\alpha) tax_t, \tag{C.14}$$

where $(1-\alpha)tax_t$ represents the lump-sum tax, and $(1-\alpha)$ denotes the labor income share of impatient households.

Moreover, the equilibrium condition for goods market is:[7]

$$C_t + IK_t + k_{b,t} + g_t GDP = Y_t - \phi_t, \tag{C.15}$$

We further add the data of real government purchases to implement the Bayesian estimation and calibrate $g = 0.220$ to match the sample mean of government spending-GDP ratio. Following similar procedures, we find the parameters of the optimal interest rule are $\tilde{r}_R = 0$, $\tilde{r}_\pi = 3$, and $\tilde{r}_Y = 0.4$ (see Panel V of Table C5).

Table C18 displays the results of political regime models, which manifest that politics still matter. Besides, unemployment rate and interest rate spread remain significant.

[7]Note that now $GDP_t = \frac{1}{1-g_t}(C_t + IK_t + \bar{q}IH_t)$.

Table C18: Political Regimes and Deviations from Optimal Taylor Rule Including Fiscal Policy (1976Q2-2016Q4)

	Presidential Regime		Fed Chair Regime		Nested Model	
	(1)	(2)	(3)	(4)	(5)	(6)
Nixon-Ford (DP_0)	-8.562 ***	-5.288 ***			-8.562 ***	-1.985
	(0.782)	(1.379)			(0.824)	(1.607)
Carter (DP_1)	-8.815 ***	-3.998 ***			-10.172 ***	-1.878
	(0.657)	(1.280)			(0.610)	(1.680)
Reagan-Bush (DP_2)	-0.581	3.006 **			-2.488 **	6.655 ***
	(0.373)	(1.406)			(1.030)	(2.096)
Clinton (DP_3)	2.695 ***	4.729 ***			0.644	8.694 ***
	(0.707)	(1.211)			(1.340)	(1.970)
G.W. Bush (DP_4)	0.817	3.019 ***			-1.865	6.392 ***
	(0.613)	(1.144)			(1.366)	(1.996)
Obama (DP_5)	-0.905 ***	2.881			-4.601 ***	7.813 ***
	(0.152)	(1.480) *			(1.439)	(2.630)
Burns (DCB_0)			-9.482 ***	-2.899 **	–	–
			(0.493)	(1.138)	–	–
Miller (DCB_1)			-8.338 ***	-2.395 **	1.833 **	0.542
			(0.578)	(1.064)	(0.908)	(0.960)
Volcker (DCB_2)			-2.143 *	1.898	1.785 *	0.780
			(1.287)	(1.866)	(0.930)	(0.910)
Greenspan (DCB_3)			1.086	2.714 **	2.051 *	-0.925
			(0.676)	(1.257)	(1.196)	(1.073)
Bernanke (DCB_4)			0.159	2.806 **	3.734 ***	0.064
			(0.701)	(1.461)	(1.408)	(1.226)
Yellen (DCB_5)			-0.969 ***	1.531	3.631 **	-3.059 *
			(0.113)	(1.071)	(1.444)	(1.712)
Dev_{t-1}		0.204 **		0.465 ***		0.108
		(0.097)		(0.115)		(0.105)
$Stock_{t-1}$		-0.015		0.016		-0.021
		(0.038)		(0.036)		(0.036)
Oil_{t-1}		0.007		-0.010		0.006
		(0.011)		(0.014)		(0.010)
$Unemployment_{t-1}$		-0.472 **		-0.380 *		-0.995 ***
		(0.192)		(0.200)		(0.235)
Rex_{t-1}		0.018		0.015		0.025
		(0.061)		(0.066)		(0.057)
ΔFCI_{t-1}		0.252		0.477		-0.118
		(0.889)		(0.936)		(0.913)
$\Delta ISpread_{t-1}$		-0.785 **		-1.045 *		-0.713 *
		(0.376)		(0.562)		(0.386)
$\bar{R}^2$	0.670	0.722	0.476	0.640	0.673	0.740

Note: The regression models are $Dev_t = \sum_{j=1}^{p} \boldsymbol{\beta_j'} \boldsymbol{X_{t-j}} + \sum_{j=0}^{k} \gamma_j \mathrm{DP}_j + \sum_{j=1}^{m} \gamma_j \mathrm{DCB}_j + \varepsilon_t$, where Dev_t is the Taylor Rule deviation. The entries in brackets are the Newey–West HAC standard errors. Asterisks *, ** and *** indicate rejection at 10%, 5%; and 1% levels, respectively. See notes to Table **??** for more details about macroeconomic variables.

C.8 Results for the Standard DSGE Model

For robustness, we turn off the credit channel and remove the housing sector, and the DSGE model reduces to a standard macroeconomic model similar to Christiano et al. (2005) and Smets and Wouters (2003). This model includes a representative household, and one production sector, and reserves the capital adjustment cost, capital utilization cost, habit formation in consumption, as well as sticky prices and wages with partial indexation. Details of the model and the results for the Bayesian estimation are in the Appendix G.

The optimized interest rate rule features an aggressive response to inflation and no response to output growth (see Panel VI in Table C5) and is consistent with the finding in Schmitt-Grohé and Uribe (2007). Besides, the results for the presidential and nested model show that the presidential regime does matter, and the unemployment rate and interest rate spread are other key factors in the Taylor deviations (see Table C19).

Table C19: Political Regimes and Deviations from Optimal Taylor Rule based on Standard DSGE Model (1976Q2-2016Q4)

	Presidential Regime		Fed Chair Regime		Nested Model	
	(1)	(2)	(3)	(4)	(5)	(6)
Nixon-Ford (DP_0)	-7.864 ***	-4.902 ***			-7.864 ***	-2.004
	(0.551)	(1.330)			(0.566)	(1.482)
Carter (DP_1)	-8.544 ***	-4.155 ***			-9.085 ***	-1.718
	(0.492)	(1.279)			(0.459)	(1.630)
Reagan-Bush (DP_2)	0.199	2.861 **			0.322	7.575 ***
	(0.403)	(1.133)			(0.830)	(1.879)
Clinton (DP_3)	3.622 ***	4.868 ***			3.916 ***	10.068 ***
	(0.776)	(1.061)			(1.179)	(1.792)
G.W. Bush (DP_4)	1.217 ***	2.866 ***			1.123	7.632 ***
	(0.458)	(0.930)			(1.060)	(1.769)
Obama (DP_5)	-0.646 ***	2.313 *			-1.525	8.483 ***
	(0.140)	(1.203)			(1.164)	(2.335)
Burns (DCB_0)			-8.562 ***	-2.180 **	–	–
			(0.364)	(1.082)	–	–
Miller (DCB_1)			-7.666 ***	-2.157 **	1.419 **	0.210
			(0.363)	(1.083)	(0.591)	(0.807)
Volcker (DCB_2)			-1.419	1.483	0.023	-0.580
			(1.741)	(1.702)	(0.636)	(0.761)
Greenspan (DCB_3)			1.798 **	2.151 *	-0.295	-2.452 ***
			(0.737)	(1.206)	(0.931)	(0.908)
Bernanke (DCB_4)			0.209	1.867	0.741	-1.939 *
			(0.687)	(1.370)	(1.143)	(1.065)
Yellen (DCB_5)			-0.417 ***	1.139	1.108	-4.182 ***
			(0.100)	(0.997)	(1.169)	(1.508)
Dev_{t-1}		0.220 **		0.578 ***		0.133
		(0.107)		(0.112)		(0.123)
$Stock_{t-1}$		0.003		0.019		0.001
		(0.030)		(0.029)		(0.027)
Oil_{t-1}		-0.006		-0.018		-0.005
		(0.011)		(0.014)		(0.010)
$Unemployment_{t-1}$		-0.376 **		-0.248		-0.836 ***
		(0.156)		(0.183)		(0.209)
Rex_{t-1}		-0.006		-0.015		0.000
		(0.065)		(0.073)		(0.061)
ΔFCI_{t-1}		-0.041		0.127		-0.351
		(0.806)		(0.817)		(0.816)
$\Delta ISpread_{t-1}$		-0.699 **		-0.825 *		-0.677 *
		(0.346)		(0.497)		(0.349)
$\bar{R}^2$	0.731	0.769	0.455	0.683	0.730	0.780

Note: The regression models are $Dev_t = \sum_{j=1}^{p} \boldsymbol{\beta_j'} \boldsymbol{X_{t-j}} + \sum_{j=0}^{k} \gamma_j \mathrm{DP}_j + \sum_{j=1}^{m} \gamma_j \mathrm{DCB}_j + \varepsilon_t$, where Dev_t is the Taylor Rule deviation. The entries in brackets are the Newey–West HAC standard errors. Asterisks *, ** and *** indicate rejection at 10%, 5%; and 1% levels, respectively. See notes to Table **??** for more details about macroeconomic variables.

D Description of the Model

D.1 Patient Households

The lifetime utility that the representative patient household seeks to maximize is

$$E_0 \sum_{t=0}^{\infty} \beta^t z_t \left[\log(c_t - \varepsilon c_{t-1}) + j_t \log h_t - \frac{\tau_t}{1+\eta} \left(n_{c,t}^{1+\xi} + n_{h,t}^{1+\xi} \right)^{\frac{1+\eta}{1+\xi}} \right], \tag{D.16}$$

where β is the discount factor for the patient household, c_t and h_t respectively denote the consumption and house holding of the patient household, $n_{c,t}$ and $n_{h,t}$ represent the labor supply in the consumption sector and housing sector, respectively, and ε measures consumption habits.

The parameter $\eta > 0$ is the inverse of the Frisch elasticity of labor supply, while $\xi > 0$ measures imperfect substitutability between work hours in the two sectors, which allows for less than perfect labor mobility across sectors. The terms z_t, τ_t, and j_t are shocks to intertemporal preferences, labor supply, and housing preferences, respectively, which are assumed to obey the following stochastic processes:

$$\log z_t = \rho_z \log z_{t-1} + u_{z,t},$$

$$\log \tau_t = \rho_\tau \log \tau_{t-1} + u_{\tau,t},$$

$$\log j_t = (1 - \rho_j) \log j + \rho_j \log j_{t-1} + u_{j,t},$$

where $u_{i,t} \sim^{i.i.d.} (0, \sigma_i^2)$, $i \in \{z, \tau, j\}$.

Patient households are subject to the following budget constraint,

$$
\begin{aligned}
c_t + \frac{k_{c,t}}{A_{k,t}} + k_{h,t} + k_{b,t} + q_t h_t + p_{l,t} l_t + b_t = \frac{w_{c,t} n_{c,t}}{X_{wc,t}} + \frac{w_{h,t} n_{h,t}}{X_{wh,t}} + \left(R_{c,t} z_{c,t} + \frac{1-\delta_{kc}}{A_{k,t}} \right) k_{c,t-1} \\
+ (R_{h,t} z_{h,t} + 1 - \delta_{kh}) k_{h,t-1} + p_{b,t} k_{b,t} + \frac{R_{t-1} b_{t-1}}{\pi_t} + (p_{l,t} + R_{l,t}) l_{t-1} + q_t (1-\delta_h) h_{t-1} \\
+ Div_t - \phi_t. \qquad \text{(D.17)}
\end{aligned}
$$

Given the constraint in equation (D.17), patient households choose consumption, house holding (priced at q_t), land l_t (priced at $p_{l,t}$), labor supply in the consumption sector, labor supply in the housing sector, capital in the consumption sector $k_{c,t}$, capital in the housing sector $k_{h,t}$, housing sector intermediate inputs $k_{b,t}$ (priced at $p_{b,t}$), capital utilization rates $z_{c,t}$ and $z_{h,t}$, and lending b_t to maximize expected lifetime utility.

The term $A_{k,t}$ represents investment-specific technology shocks.[8] Real wages are denoted by $w_{c,t}$ and $w_{h,t}$, $R_{c,t}$, $R_{h,t}$ and $R_{l,t}$ are real rental rates, and δ_{kc} and δ_{kh} represent the depreciation rates. The terms $X_{wc,t}$ and $X_{wh,t}$ denote the markup between the wage paid by the wholesale firm and the wage paid to households, which accrues to labor unions given monopolistic competition in the labor market. Nominal loans yield a risk-free return of R_t, and $\pi_t = P_t/P_{t-1}$ is the inflation rate in the consumption goods sector. Finally, Div_t are lump sum profits from final good firms and labor unions, andϕ_t denotes convex adjustment costs for capital. The equations for Div_t and ϕ_t are given by

$$
\begin{aligned}
Div_t &= \frac{X_t - 1}{X_t} Y_t + \frac{X_{wc,t} - 1}{X_{wc,t}} w_{c,t} n_{c,t} + \frac{X_{wh,t} - 1}{X_{wh,t}} w_{h,t} n_{h,t}, \\
\phi_t &= \frac{\phi_{kc}}{2A_{k,t}} \left(\frac{k_{c,t}}{k_{c,t-1}} - 1 \right)^2 k_{c,t-1} + \frac{\phi_{kh}}{2} \left(\frac{k_{h,t}}{k_{h,t-1}} - 1 \right)^2 k_{h,t-1} + \frac{a(z_{c,t}) k_{c,t-1}}{A_{k,t}} + a(z_{h,t}) k_{h,t-1},
\end{aligned}
$$

[8] $A_{k,t}$ is assumed to follow the AR(1) process: $\log A_{k,t} = \rho_{AK} \log A_{k,t-1} + u_{k,t}$, where $u_{k,t} \sim^{i.i.d.} (0, \sigma^2_{AK})$.

where X_t is the markup between retailers and wholesale firms, and ϕ_{kc} and ϕ_{kh} are adjustment costs for the consumption and housing sectors, respectively. Terms $a(z_{c,t})$ and $a(z_{h,t})$ are the convex costs of setting the capital utilization rate to $z_{c,t}$ and $z_{h,t}$, which are defined by:

$$a(z_{c,t}) = R_c \left[\frac{\varpi z_{c,t}^2}{2} + (1-\varpi) z_{c,t} + (\frac{\varpi}{2} - 1) \right],$$
$$a(z_{h,t}) = R_h \left[\frac{\varpi z_{h,t}^2}{2} + (1-\varpi) z_{h,t} + (\frac{\varpi}{2} - 1) \right],$$

where $\varpi > 0$ is the parameter of the curvature of the capacity utilization function.

The first-order conditions are:

$$\lambda_t = uc_t, \tag{D.18}$$

$$\lambda_t \frac{w_{c,t}}{X_{wc,t}} = z_t \tau_t \left(n_{c,t}^{1+\xi} + n_{h,t}^{1+\xi} \right)^{\frac{\eta-\xi}{1+\xi}} n_{c,t}^{\xi}, \tag{D.19}$$

$$\lambda_t \frac{w_{h,t}}{X_{wh,t}} = z_t \tau_t \left(n_{c,t}^{1+\xi} + n_{h,t}^{1+\xi} \right)^{\frac{\eta-\xi}{1+\xi}} n_{h,t}^{\xi}, \tag{D.20}$$

$$\lambda_t q_t = \beta E_t \left[\lambda_{t+1} q_{t+1} (1-\delta_h) \right] + uh_t, \tag{D.21}$$

$$\lambda_t = \beta E_t \left[\lambda_{t+1} \frac{R_t}{\pi_{t+1}} \right], \tag{D.22}$$

$$\lambda_t \left[\frac{1}{A_{k,t}} + \frac{\phi_{kc}}{A_{k,t}} \left(\frac{k_{c,t}}{k_{c,t-1}} - 1 \right) \right] = \beta E_t \left\{ \lambda_{t+1} \left[R_{c,t+1} z_{c,t+1} + \frac{1-\delta_{kc}}{A_{k,t+1}} - \frac{a(z_{c,t+1})}{A_{k,t+1}} + \frac{\phi_{k,c}}{2A_{k,t+1}} \left(\frac{k_{c,t+1}^2}{k_{c,t}^2} - 1 \right) \right] \right\}, \tag{D.23}$$

$$\lambda_t \left[1 + \phi_{k,h} \left(\frac{k_{h,t}}{k_{h,t-1}} - 1 \right) \right] = \beta E_t \left\{ \lambda_{t+1} \left[R_{h,t+1} z_{h,t+1} + (1-\delta_{kh}) - a(z_{h,t+1}) + \frac{\phi_{kh}}{2} \left(\frac{k_{h,t+1}^2}{k_{h,t}^2} - 1 \right) \right] \right\}, \tag{D.24}$$

$$p_{b,t} = 1, \tag{D.25}$$

$$\lambda_t p_{l,t} = \beta E_t \left[\lambda_{t+1} (p_{l,t+1} + R_{l,t+1}) \right], \tag{D.26}$$

$$R_{c,t} = \frac{R_c(\bar{\omega} z_{c,t} + 1 - \bar{\omega})}{A_{k,t}}, \tag{D.27}$$

$$R_{h,t} = R_h(\bar{\omega} z_{h,t} + 1 - \bar{\omega}), \tag{D.28}$$

where λ_t denotes the Lagrange multiplier for the budget constraint, and uc_t and uh_t respectively present the first derivative of patient households' utility with respect to consumption and housing:

$$uc_t \equiv E_t \left[\frac{z_t}{c_t - \varepsilon c_{t-1}} - \frac{\beta z_{t+1} \varepsilon}{c_{t+1} - \varepsilon c_t} \right],$$

$$uh_t \equiv \frac{z_t j_t}{h_t}.$$

D.2 Impatient Households

Variables with a prime refer to impatient households. Having a smaller discount factor $\beta' < \beta$, impatient households do not accumulate capital or own finished good firms or land, as their dividends come only from labor unions. They choose consumption, housing service, labor, and borrowing to maximize their lifetime utility,

$$E_0 \sum_{t=0}^{\infty} \beta'^t z_t \left[\ln(c'_t - \varepsilon' c'_{t-1}) + j_t \ln h'_t - \frac{\tau_t}{1+\eta'} \left((n')_{c,t}^{1+\xi'} + (n')_{h,t}^{1+\xi'} \right)^{\frac{1+\eta'}{1+\xi'}} \right], \tag{D.29}$$

subject to the following budget constraint:

$$c'_t + q_t h'_t + \frac{R_{t-1} b'_{t-1}}{\pi_t} = \frac{w'_{c,t} n'_{c,t}}{X'_{wc,t}} + \frac{w'_{h,t} n'_{h,t}}{X'_{wh,t}} + q_t (1-\delta_h) h'_{t-1} + b'_t + Div'_t, \tag{D.30}$$

where

$$Div'_t = \frac{X'_{wc,t} - 1}{X'_{wc,t}} w'_{c,t} n'_{c,t} + \frac{X'_{wh,t} - 1}{X'_{wh,t}} w'_{h,t} n'_{h,t}.$$

In addition, being a borrower, their borrowing b'_t is limited by collateralizing the value of their houses:

$$b'_t \leq m E_t \left(\frac{q_{t+1} h'_t \pi_{t+1}}{R_t} \right), \tag{D.31}$$

where m denotes the loan-to-value (LTV) ratio. The fraction $m \in [0,1]$ represents the standard lending criteria used in the mortgage and consumer loan markets.

Let uc'_t and uh'_t stand for the first derivative of impatient households' utility function with respect to consumption and housing:

$$uc'_t \equiv E_t \left[\frac{z_t}{c'_t - \varepsilon c'_{t-1}} - \frac{\beta' z_{t+1} \varepsilon}{c'_{t+1} - \varepsilon c'_t} \right],$$

$$uh'_t \equiv \frac{z_t j_t}{h'_t}.$$

The first-order conditions are:

$$\lambda'_t = uc'_t, \tag{D.32}$$

$$\lambda'_t \frac{w'_{c,t}}{X'_{wc,t}} = z_t \tau_t \left((n'_{c,t})^{1+\xi} + (n'_{h,t})^{1+\xi} \right)^{\frac{\eta-\xi}{1+\xi}} (n'_{c,t})^{\xi}, \tag{D.33}$$

$$\lambda'_t \frac{w'_{h,t}}{X'_{wh,t}} = z_t \tau_t \left((n'_{c,t})^{1+\xi} + (n'_{h,t})^{1+\xi} \right)^{\frac{\eta-\xi}{1+\xi}} (n'_{h,t})^{\xi}, \tag{D.34}$$

$$\lambda'_t q_t = E_t \left[\beta' \lambda'_{t+1} q_{t+1} (1-\delta_h) + \rho'_t \frac{m q_{t+1} \pi_{t+1}}{R_t} \right] + uh'_t, \tag{D.35}$$

$$\lambda'_t = \beta' E_t \left[\lambda'_{t+1} \frac{R_t}{\pi_{t+1}} \right] + \rho'_t, \tag{D.36}$$

where λ'_t and ρ'_t denote the Lagrange multipliers for the budget constraint and borrowing limit, respectively.

D.3 Wholesale Firms

In a competitive market with flexible prices, wholesale firms use labor, capital, land, and intermediate goods to produce consumption goods (Y) and new houses (IH) by maximizing their profits

$$\frac{Y_t}{X_t} + q_t IH_t - \left(\sum_{i=c,h} w_{i,t} n_{i,t} + \sum_{i=c,h} w'_{i,t} n'_{i,t} + \sum_{i=c,h} R_{i,t} z_{i,t} k_{i,t-1} + R_{l,t} l_{t-1} + p_{b,t} k_{b,t} \right) \tag{D.37}$$

with production technologies:

$$Y_t = \left(A_{c,t} (n_{c,t}^{\alpha} n_{c,t}'^{1-\alpha}) \right)^{1-\mu_c} (z_{c,t} k_{c,t-1})^{\mu_c}, \tag{D.38}$$

$$IH_t = \left(A_{h,t} (n_{h,t}^{\alpha} n_{h,t}'^{1-\alpha}) \right)^{1-\mu_h-\mu_b-\mu_l} (z_{h,t} k_{h,t-1})^{\mu_h} k_{b,t}^{\mu_b} l_{t-1}^{\mu_l}, \tag{D.39}$$

where α measures the labor income share of patient households, and $A_{c,t}$ and $A_{h,t}$ are total factor productivity in the nonhousing and housing sectors, respectively:

$$\log A_{c,t} = \rho_{AC} \log A_{c,t-1} + u_{c,t},$$

$$\log A_{h,t} = \rho_{AH} \log A_{h,t-1} + u_{h,t},$$

where $u_{c,t} \sim^{i.i.d.} (0, \sigma_{AC})^2$, and $u_{h,t} \sim^{i.i.d.} (0, \sigma_{AH}^2)$.

Besides, capital stock in the two sectors evolves according to:

$$k_{c,t} = A_{k,t} IK_{c,t} + (1 - \delta_{kc}) k_{c,t-1}, \tag{D.40}$$

$$k_{h,t} = IK_{h,t} + (1 - \delta_{kh}) k_{h,t-1}. \tag{D.41}$$

where $IK_{c,t}$ and $IK_{h,t}$ are business investment in the consumption and housing sector, respectively.

The first-order conditions are:

$$w_{c,t} = (1 - \mu_c)\alpha \frac{Y_t}{X_t n_{c,t}}, \tag{D.42}$$

$$w'_{c,t} = (1 - \mu_c)(1 - \alpha) \frac{Y_t}{X_t n'_{c,t}}, \tag{D.43}$$

$$R_{c,t} = \mu_c \frac{Y_t}{X_t z_{c,t} k_{c,t-1}}, \tag{D.44}$$

$$w_{h,t} = (1 - \mu_h - \mu_b - \mu_l)\alpha \frac{q_t IH_t}{n_{h,t}}, \tag{D.45}$$

$$w'_{h,t} = (1 - \mu_h - \mu_b - \mu_l)(1 - \alpha) \frac{q_t IH_t}{n'_{h,t}}, \tag{D.46}$$

$$R_{h,t} = \mu_h \frac{q_t IH_t}{z_{h,t} k_{h,t-1}}, \tag{D.47}$$

$$p_{b,t} = \mu_b \frac{q_t IH_t}{k_{b,t}}, \tag{D.48}$$

$$R_{l,t} = \mu_l \frac{q_t IH_t}{l_{t-1}}, \tag{D.49}$$

D.4 Retailers and Price Rigidity

We assume monopolistic competition at the retail level, and price stickiness in the fashion of Calvo (1983) stickiness. There is a continuum of mass unity of final goods firms (retailers) indexed by s. Retailer s buys intermediate goods Y_t from wholesale firms at P_t^w in a competitive market, differentiates the goods at no cost into $Y_t(s)$, and then sells them at a markup $X_t = P_t/P_t^w$ over the marginal cost. The final output Y_t^f is a CES composite given by

$$Y_t^f = \left[\int_0^1 Y_t(s)^{\frac{\varepsilon-1}{\varepsilon}} ds\right]^{\frac{\varepsilon}{\varepsilon-1}}.$$

Users of final output obtain the individual demand curve from cost minimization, shown as

$$Y_t(s) = \left(\frac{P_t(s)}{P_t}\right)^{-\varepsilon} Y_t^f,$$

where $P_t(s)$ is the price of $Y_t(s)$, and therefore, the composite price index is given by

$$P_t = \left[\int_0^1 P_t(s)^{\varepsilon-1} ds\right]^{\frac{1}{\varepsilon-1}}.$$

Retailers use one unit of intermediate good to produce one unit of retail output, and each chooses a sale price $P_t(s)$, taking P_t^w and the demand curve as given. In particular, a retailer can freely adjust its price with probability $1-\theta_\pi$ in every period. Therefore, the retailer chooses the optimal reset price $P_t^*(z)$ to solve

$$E_t \sum_{i=0}^{\infty} \theta_\pi^i \Lambda_{t,t+i} \left[\frac{P_t^*(s)}{P_{t+i}} \prod_{k=1}^{i} (1+\pi_{t+k-1})^{\iota_\pi} - \frac{X}{X_{t+i}}\right] Y_{t+i}^*(s),$$

where $\Lambda_{t,t+i}$ is the patient household stochastic discount factor. X_t is the markup and $X = \varepsilon/(\varepsilon-1)$ is its steady state value. The term $Y_{t+i}^*(s) = (P_t^*(s)/P_{t+i})^{-\varepsilon} Y_{t+i}$ is the corresponding demand. Now with the constant probability θ_π, the evolution of the aggregate price level is

$$P_t = \left[(1-\theta_\pi)(P_t^*)^{1-\varepsilon} + \theta_\pi(\pi_{t-1}^{\iota_\pi} P_{t-1})^{1-\varepsilon}\right]^{\frac{1}{1-\varepsilon}}.$$

We thus obtain the following consumption sector Phillips curve augmented with a cost-push shock $u_{p,t}$,

$$\log\left(\frac{\pi_t}{\pi}\right) - \iota_\pi \log\left(\frac{\pi_{t-1}}{\pi}\right) = \beta\left[E_t \log\left(\frac{\pi_{t+1}}{\pi}\right) - \iota_\pi \log\left(\frac{\pi_t}{\pi}\right)\right] - \varepsilon_\pi \log\left(\frac{X_t}{X}\right), \tag{D.50}$$

where $\varepsilon_\pi = (1-\theta_\pi)(1-\beta\theta_\pi)/\theta_\pi$, and π is the steady-state value of π_t.

D.5 Labor Market and Wage Rigidity

In the labor market, both patient and impatient households supply homogeneous labor services to unions. Following Smets and Wouters (2007), the unions differentiate labor services, set wages subject to a Calvo scheme, and offer labor services to wholesale labor packers. Wholesale firms then hire homogeneous labor composite services, n_c, n_c', n_h, and n_h', which are reassembled by the wholesale labor packers. Under Calvo pricing with partial indexation to past inflation, we obtain four wage Phillips curves:

$$\log\left(\frac{W_{c,t}}{\pi}\right) - \iota_{wc}\log\left(\frac{\pi_{t-1}}{\pi}\right) = \beta\left[E_t\log\left(\frac{W_{c,t+1}}{\pi}\right) - \iota_{wc}\log\left(\frac{\pi_t}{\pi}\right)\right] - \varepsilon_{wc}\log\left(\frac{X_{wc,t}}{X_{wc}}\right), \tag{D.51}$$

$$\log\left(\frac{W'_{c,t}}{\pi}\right) - \iota_{wc}\log\left(\frac{\pi_{t-1}}{\pi}\right) = \beta'\left[E_t\log\left(\frac{W'_{c,t+1}}{\pi}\right) - \iota_{wc}\log\left(\frac{\pi_t}{\pi}\right)\right] - \varepsilon'_{wc}\log\left(\frac{X_{wc,t}}{X_{wc}}\right), \tag{D.52}$$

$$\log\left(\frac{W_{h,t}}{\pi} - \iota_{wh}\right)\log\left(\frac{\pi_{t-1}}{\pi}\right) = \beta\left[E_t\log\left(\frac{W_{h,t+1}}{\pi}\right) - \iota_{wh}\log\left(\frac{\pi_t}{\pi}\right)\right] - \varepsilon_{wh}\log\left(\frac{X_{wh,t}}{X_{wh}}\right), \tag{D.53}$$

$$\log\left(\frac{W'_{h,t}}{\pi} - \iota_{wh}\right)\log\left(\frac{\pi_{t-1}}{\pi}\right) = \beta'\left[E_t\log\left(\frac{W'_{h,t+1}}{\pi}\right) - \iota_{wh}\log\left(\frac{\pi_t}{\pi}\right)\right] - \varepsilon'_{wh}\log\left(\frac{X_{wh,t}}{X_{wh}}\right), \tag{D.54}$$

where $W_{i,t} = w_{i,t}\pi_t/w_{i,t-1}$ (or $W'_{i,t} = w'_{i,t}\pi_t/w'_{i,t-1}$) is the nominal wage inflation for $i = \{c, h\}$, $\varepsilon_{wc} = (1-\theta_{wc})(1-\beta\theta_{wc})/\theta_{wc}$, $\varepsilon'_{wc} = (1-\theta_{wc})(1-\beta'\theta_{wc})/\theta_{wc}$, $\varepsilon_{wh} = (1-\theta_{wh})(1-\beta\theta_{wh})/\theta_{wh}$, and $\varepsilon'_{wh} = (1-\theta_{wh})(1-\beta'\theta_{wh})/\theta_{wh}$.

D.6 Market Equilibrium

The equilibrium conditions in the goods, loan, and housing markets are as follows:[9]

$$C_t + IK_t + k_{b,t} = Y_t - \phi_t, \tag{D.55}$$

$$b_t = b'_t, \tag{D.56}$$

$$H_t - (1-\delta_h)H_{t-1} = IH_t, \tag{D.57}$$

where $H_t = h_t + h'_t$ represents the aggregate stock of housing. Total land l_t is fixed and normalized to one.

[9]Monetary policy has shown in equation (**??**).

E Model Calibration and Estimation

We estimate the posterior distribution for the parameters using the Metropolis–Hastings algorithm. The estimation consists of the following 10 observables: real personal consumption, real residential investment, real business investment, real house prices, nominal interest rates, inflation, hours and wage inflation in consumption sector, and hours and wage inflation in housing sector.[10] We estimate the model using US quarterly data from 1976:Q1 to 2016:Q4. Real personal consumption, real residential investment and real business investment are measured from their nominal counterparts deflated by their implicit price deflators, and then divided by population. For inflation, we adopt the core PCE inflation according to Knotek et al. (2016). Real house prices and wages are deflated by the core PCE price index. All variables are seasonally adjusted and in log difference, except interest rates, which are simply subtracted from their mean. Details of data sources and descriptions are in the Section F of the Appendix.

Following Iacoviello and Neri (2010), a subset of model parameters is calibrated and not included in the Bayesian estimation process because these parameters are either notoriously difficult to estimate (in the case of the markups) or are better identified using other information (in the case of factor shares and discount factors). Allowing fixed parameters in the estimation process can be viewed as imposing strict priors for these parameters. The steady-state value of inflation (π) is calibrated at 1.0078 to match the sample mean of the core PCE inflation. β is set at 0.995 to meet the average annual real interest rate

[10]Following Ireland (2004a) and Iacoviello and Neri (2010), we allow for i.i.d. measurement error in wages and hours in housing and non-housing sector.

of 2.058%. Other parameters are chosen according to the conventional values in Iacoviello and Neri (2010), which are summarized in Table E20.

Table E21 and Table E22 show the prior and posterior distributions for structural parameters and shock processes. We find a substantial degree of habit persistence for patient and impatient households ($\hat{\varepsilon} = 0.46$, $\hat{\varepsilon}' = 0.43$). The parameter estimates concerning the preferences for labor mobility across sectors (ξ and ξ') are all positive, which suggests that hours in the two sectors are less than perfect substitutes, and that there is some degree of sector specificity. As labor supply elasticity is defined as $1/\eta$, labor hours for the two types of households are found to be sensitive to wages ($\hat{\eta} = \hat{\eta}' = 0.50$). The parameter measuring the cost of adjusting the capital stock is larger than that for the housing stock ($\hat{\phi}_{k,c} = 16.57 > 11.88 = \hat{\phi}_{k,h}$). The labor income share of patient agents is estimated to be $\hat{\alpha} = 0.70$. We also find significant stickiness in prices and wages for the consumption and housing sectors ($\hat{\theta}_\pi = 0.46$, $\hat{\theta}_{w,c} = 0.96$ and $\hat{\theta}_{w,h} = 0.97$). About the estimates of monetary policy rule, there is evidence of interest rate smoothing ($\hat{r}_R = 0.53$), which is consistent with similar models, such as 0.59 of Iacoviello and Neri (2010) and 0.55 of Guerrieri and Iacoviello (2017). However, it is smaller than the value of 0.81 obtained by Smets and Wouters (2007) and 0.77 of Brzoza-Brzezina and Kolasa (2013).[11] Besides, the reaction coefficient to inflation is estimated to be 1.82, which is larger the Taylor's canonical value of 1.5. The reaction parameter to GDP growth $\hat{r}_Y$ is 0.24, which is lower than the value of 0.52 estimated by Iacoviello and Neri (2010), while is higher than the value of close to

[11] Although monetary policy inertia has several potential benefits according to Coibion and Gorodnichenko (2011) and Coibion and Gorodnichenko (2012), Rudebusch (2006) argues that actual amount of policy inertia is quite low.

Table E20: Calibrated Parameters

Parameter	Value	Descriptions
β	0.995	Patient household discount rate
β'	0.97	Impatient household discount rate
j	0.12	Weight on housing services in the utility function
μ_c	0.35	Capital share in the goods production function
μ_h	0.10	Capital share in the housing production function
μ_l	0.10	Land share in the housing production function
μ_b	0.10	Intermediate goods share in the housing production function
δ_h	0.01	Depreciation rate for housing
δ_{kc}	0.025	Depreciation rate for capital, consumption sector
δ_{kh}	0.03	Depreciation rate for capital, housing sector
π	1.0078	Steady-state inflation
X	1.15	Price markup in the consumption-good sector
X_{wc}	1.15	Wage markup, consumption sector
X_{wh}	1.15	Wage markup, housing sector
m	0.85	LTV ratio
ρ_{As}	0.975	AR ofinflationtargetshock

zero obtained by Brzoza-Brzezina and Kolasa (2013). Finally, Table E22 indicates that all shocks are quite persistent: for $i = \{z, j, \tau, AK, AC, AH\}$, $\hat{\rho}_i \in [0.90, 0.99]$.

Table E21: Prior and Posterior Distributions of Structural Parameters

Parameter	Prior Distribution			Posterior Distribution		
	Density	Mean	S.D.	Mean	10%	90%
ε	Beta	0.5	0.075	0.457	0.353	0.564
ε'	Beta	0.5	0.075	0.433	0.308	0.555
η	Gamma	0.5	0.1	0.504	0.313	0.711
η'	Gamma	0.5	0.1	0.498	0.308	0.699
ξ	Normal	1	0.1	0.895	0.687	1.101
ξ'	Normal	1	0.1	0.942	0.746	1.145
$\phi_{k,c}$	Gamma	10	2.5	16.574	13.316	19.866
$\phi_{k,h}$	Gamma	10	2.5	11.884	7.050	17.187
α	Beta	0.65	0.05	0.703	0.625	0.777
r_R	Beta	0.75	0.1	0.530	0.453	0.603
r_π	Normal	1.5	0.1	1.816	1.662	1.972
r_Y	Beta	0.125	0.05	0.238	0.139	0.335
θ_π	Beta	0.667	0.1	0.463	0.377	0.544
ι_π	Beta	0.5	0.2	0.062	0.004	0.138
$\theta_{w,c}$	Beta	0.667	0.1	0.964	0.947	0.978
$\iota_{w,c}$	Beta	0.5	0.2	0.276	0.142	0.413
$\theta_{w,h}$	Beta	0.667	0.1	0.974	0.967	0.980
$\iota_{w,h}$	Beta	0.5	0.2	0.398	0.138	0.659
ζ	Beta	0.5	0.2	0.950	0.901	0.995

Note: $\zeta = \varpi/(1+\varpi)$.

F Data and Source

Following data are used in the Bayesian estimation:

1. Personal consumption expenditures, billions of dollars, quarterly, seasonally adjusted at annual rate (table 1.1.5.: gross domestic product, line 2), Source: Bureau of Economic Analysis (www.bea.gov).

2. Gross private domestic investment, fixed investment, nonresidential, billions of dollars, quarterly, seasonally adjusted at annual rate (table 1.1.5.: gross domestic product, line 9), Source: Bureau of Economic Analysis.

3. Gross private domestic investment, fixed investment, residential, billions of dollars, quarterly, seasonally adjusted at annual rate (table 1.1.5.: gross domestic product, line 13), Source: Bureau of Economic Analysis.

4. Government consumption expenditures and gross investment, billions of dollars, quarterly, seasonally adjusted at annual rate (table 1.1.5.: gross domestic product, line 22), Source: Bureau of Economic Analysis.

5. Personal consumption expenditures, index numbers, 2012=100, quarterly, seasonally adjusted (table 1.1.9.: implicit price deflators for gross domestic product, line 2), Source: Bureau of Economic Analysis.

6. Private domestic investment, fixed investment, nonresidential, index numbers, 2012=100, quarterly, seasonally adjusted (table 1.1.9.: implicit price deflators for gross domestic product, line 9), Source: Bureau of Economic Analysis.

Table E22: Prior and Posterior Distributions of Shock Processes

	Prior Distribution			Posterior Distribution		
Parameter	Density	Mean	S.D.	Mean	10%	90%
ρ_z	Beta	0.8	0.1	0.907	0.853	0.956
ρ_j	Beta	0.8	0.1	0.965	0.949	0.982
ρ_τ	Beta	0.8	0.1	0.959	0.929	0.986
ρ_{AK}	Beta	0.8	0.1	0.959	0.938	0.979
ρ_{AC}	Beta	0.8	0.1	0.987	0.977	0.997
ρ_{AH}	Beta	0.8	0.1	0.992	0.981	0.999
σ_z	Inverse Gamma	0.001	0.01	0.0124	0.0090	0.0160
σ_j	Inverse Gamma	0.001	0.01	0.0423	0.0296	0.0557
σ_τ	Inverse Gamma	0.001	0.01	0.0469	0.0223	0.0793
σ_{AK}	Inverse Gamma	0.001	0.01	0.0193	0.0139	0.0251
σ_{AC}	Inverse Gamma	0.001	0.01	0.0067	0.0058	0.0076
σ_{AH}	Inverse Gamma	0.001	0.01	0.0126	0.0112	0.0141
σ_R	Inverse Gamma	0.001	0.01	0.0031	0.0026	0.0036
σ_{As}	Inverse Gamma	0.001	0.01	0.0004	0.0002	0.0005
$\sigma_{w,c}$	Inverse Gamma	0.001	0.01	0.0014	0.0012	0.0016
$\sigma_{w,h}$	Inverse Gamma	0.001	0.01	0.0050	0.0044	0.0056
$\sigma_{n,c}$	Inverse Gamma	0.001	0.01	0.0065	0.0058	0.0073
$\sigma_{n,h}$	Inverse Gamma	0.001	0.01	0.0423	0.0379	0.0470

7. Private domestic investment, fixed investment, residential, index numbers, 2012=100, quarterly, seasonally adjusted (table 1.1.9.: implicit price deflators for gross domestic product, line 13), Source: Bureau of Economic Analysis.
8. Government consumption expenditures and gross investment, index numbers, 2012=100, quarterly, seasonally adjusted (table 1.1.9.: implicit price deflators for gross domestic product, line 22), Source: Bureau of Economic Analysis.
9. Personal Consumption Expenditures Excluding Food and Energy (Chain-Type Price Index), index 2012=100, quarterly, seasonally adjusted, Source: Federal Reserve Bank of St. Louis. (www.stlouisfed.org)
10. Effective federal funds rate, percent, quarterly (average), not seasonally adjusted, Source: Federal Reserve Bank of St. Louis.
11. OECD analytical house price index (http://stats.oecd.org/), seasonally adjusted.
12. All employees: total nonfarm payrolls, thousands of persons, quarterly (average), seasonally adjusted, Source: Federal Reserve Bank of St. Louis.
13. All employees: construction, thousands of persons, quarterly (average), seasonally adjusted, Source: Federal Reserve Bank of St. Louis.
14. Average weekly hours of production and nonsupervisory employees: total private, hours, quarterly (average), seasonally adjusted, Source: Federal Reserve Bank of St. Louis.

15. Average weekly hours of production and nonsupervisory employees: construction, hours, quarterly (average), seasonally adjusted, Source: Federal Reserve Bank of St. Louis.

16. Average hourly earnings of production and nonsupervisory employees: total private, dollars per hour, quarterly (average), seasonally adjusted, Source: Federal Reserve Bank of St. Louis.

17. Average hourly earnings of production and nonsupervisory employees: construction, dollars per hour, monthly, not seasonally adjusted, Source: Federal Reserve Bank of St. Louis.

18. Civilian noninstitutional population, thousands of persons, monthly, not seasonally adjusted, Source: Federal Reserve Bank of St. Louis.

Following data are used as additional covariates to explain the deviations from the optimal Taylor rule:

1. Stock price index, monetary and financial accounts, financial market prices, equities, index, Source: International Financial Statistics.

2. Oil price, Spot crude oil price: West Texas Intermediate (WTI), dollars per barrel, Source: Federal Reserve Bank of St. Louis.

3. Unemployment rate, percent, quarterly, seasonally adjusted, Source: Federal Reserve Bank of St. Louis.

4. Chicago Fed National Financial Conditions Index, Index, Quarterly, Not Seasonally Adjusted, Source: Federal Reserve Bank of St. Louis.

5. Lending rate, Bank Prime Loan Rate, Percent, Quarterly, Not Seasonally Adjusted, Source: Federal Reserve Bank of St. Louis.

6. Deposit rate, 3-Month or 90-day Rates and Yields: Certificates of Deposit for the United States, Percent, Quarterly, Not Seasonally Adjusted, Source: Federal Reserve Bank of St. Louis.

7. Real effective exchange rate, narrow indices, 2010=100, Source: Bank for International Settlements.

We use following data to implement Bayesian estimation for different interest rate rules in Section C.6.

1. Personal consumption expenditures: chain-type price index, index 2012=100, quarterly, seasonally adjusted, Source: Source: Federal Reserve Bank of St. Louis. (www.stlouisfed.org)

2. Nonfarm business sector: implicit price deflator, index 2012=100, quarterly, seasonally adjusted, Source: Federal Reserve Bank of St. Louis. (www.stlouisfed.org)

G Standard DSGE Model

G.1 Households

The representative household maximizes the lifetime utility given the following preference:

$$E_0 \sum_{t=0}^{\infty} \beta^t z_t \left[\log(c_t - \varepsilon_c c_{t-1}) - \frac{\tau_t}{1+\eta} n_{c,t}^{1+\eta} \right].$$

The household faces the following budget constraint:

$$c_t + \frac{k_{c,t}}{A_{k,t}} + b_t = \frac{w_{c,t} n_{c,t}}{X_{wc,t}} + \left(R_{c,t} z_{c,t} + \frac{1-\delta_{kc}}{A_{k,t-1}} \right) k_{c,t-1} + \frac{R_{t-1}}{\Pi_t} b_{t-1} + Div_t^h - \phi_t^h,$$

where Div_t^h are dividend from labor unions and retailers, and $\phi_t^h = \frac{\phi_{kc}}{2A_{k,t}} \left(\frac{k_{c,t}}{k_{c,t-1}} - 1 \right)^2 k_{c,t-1} + \frac{a(z_{c,t}) k_{c,t-1}}{A_{k,t}}$.

The first-order conditions are:

$$\lambda_t = uc_t,$$

$$\lambda_t \frac{w_{c,t}}{X_{wc,t}} = z_t \tau_t n_{c,t}^{\eta},$$

$$\lambda_t = \beta E_t \left[\lambda_{t+1} \frac{R_t}{\pi_{t+1}} \right],$$

$$\lambda_t \left[\frac{1}{A_{k,t}} + \frac{\phi_{kc}}{A_{k,t}} \left(\frac{k_{c,t}}{k_{c,t-1}} - 1 \right) \right] = \beta E_t \left\{ \lambda_{t+1} \left[R_{c,t+1} z_{c,t+1} + \frac{1-\delta_{kc}}{A_{k,t+1}} - \frac{a(z_{c,t+1})}{A_{k,t+1}} + \frac{\phi_{k,c}}{2A_{k,t+1}} \left(\frac{k_{c,t+1}^2}{k_{c,t}^2} - 1 \right) \right] \right\},$$

$$R_{c,t} = \frac{R_c(\bar{\omega} z_{c,t} + 1 - \bar{\omega})}{A_{k,t}}.$$

G.2 Firms Side

The final good firm sector and the retailer sector are modelled the same as Section D.4, while there is only one production sector. Monopolistic retailers buy intermediate goods from wholesale firms in a competitive market, differentiate the goods at no cost, and sell them at a markup X_t to the final good sector.

The wholesale firm's profit maximizing problem is:

$$\max \frac{Y_t}{X_t} - w_{c,t} n_{c,t} - R_{c,t} z_{c,t} k_{t-1},$$

subject to:

$$Y_t = (A_{c,t} n_{c,t})^{1-\mu_c} (z_{c,t} k_{c,t-1})^{\mu_c}.$$

Capital law of motion is:

$$k_t = A_{k,t} IK_{c,t} + (1 - \delta_{kc}) k_{t-1}.$$

The first-order conditions are:

$$w_{c,t} = (1 - \mu_c) \frac{Y_t}{X_t n_{c,t}},$$

$$R_{c,t} = \mu_c \frac{Y_t}{X_t z_t k_{t-1}}.$$

G.3 Labor Market and Wage Rigidity

The modelling of labor packers and unions are the same as Section D.5, while there is one representative household.

G.4 Monetary Policy and Market Clearing Conditions

Monetary policy is set by:

$$R_t = R_{t-1}^{r_R} \left(\frac{\pi_t}{\pi} \right)^{(1-r_R) r_\pi} \left(\frac{Y_t}{Y_{t-1}} \right)^{(1-r_R) r_Y} R^{1-r_R} \frac{\exp(u_{R,t})}{A_{s,t}}.$$

Market clearing conditions are:

$$c_t + IK_{c,t} = Y_t - \phi_t^h,$$

$$b_t = 0.$$

G.5 Bayesian Estimation

The estimation consists of the following 6 observables: real personal consumption, real business investment, nominal interest rates, inflation, hours and wage inflation in consumption sector. Calibrated parameters such as β, δ_{kc}, μ_c, X, and X_{wc} are the same as the baseline model. Table G23 shows the prior and posterior distributions for structural parameters and shock processes.

Table G23: Prior and Posterior Distributions for Parameters of the Standard DSGE Model

	Prior Distribution			Posterior Distribution		
Parameter	Density	Mean	S.D.	Mean	10%	90%
ε	Beta	0.5	0.075	0.435	0.352	0.520
η	Gamma	0.5	0.1	0.470	0.296	0.657
$\phi_{k,c}$	Gamma	10	2.5	17.926	14.843	21.278
r_R	Beta	0.75	0.1	0.576	0.509	0.640
r_π	Normal	1.5	0.1	1.852	1.697	2.010
r_Y	Beta	0.125	0.05	0.273	0.174	0.370
θ_π	Beta	0.667	0.1	0.480	0.397	0.561
ι_π	Beta	0.5	0.2	0.067	0.004	0.155
$\theta_{w,c}$	Beta	0.667	0.1	0.943	0.918	0.965
$\iota_{w,c}$	Beta	0.5	0.2	0.282	0.140	0.425
ζ	Beta	0.5	0.2	0.946	0.894	0.992
ρ_z	Beta	0.8	0.1	0.890	0.825	0.948
ρ_τ	Beta	0.8	0.1	0.977	0.958	0.995
ρ_{AK}	Beta	0.8	0.1	0.961	0.940	0.980
ρ_{AC}	Beta	0.8	0.1	0.985	0.975	0.995
σ_z	Inverse Gamma	0.001	0.01	0.0114	0.0082	0.0148
σ_τ	Inverse Gamma	0.001	0.01	0.0267	0.0176	0.0381
σ_{AK}	Inverse Gamma	0.001	0.01	0.0238	0.0174	0.0307
σ_{AC}	Inverse Gamma	0.001	0.01	0.0068	0.0059	0.0078
σ_R	Inverse Gamma	0.001	0.01	0.0026	0.0022	0.0030
σ_{As}	Inverse Gamma	0.001	0.01	0.0003	0.0002	0.0005
$\sigma_{w,c}$	Inverse Gamma	0.001	0.01	0.0014	0.0012	0.0016
$\sigma_{n,c}$	Inverse Gamma	0.001	0.01	0.0065	0.0057	0.0073

Note: $\zeta = \varpi/(1+\varpi)$.

References

Agénor, Pierre-Richard and Roy Zilberman (2015), "Loan Loss Provisioning Rules, Procyclicality, and Financial Volatility," *Journal of Banking & Finance*, 61, 301–315.

An, Sungbae and Frank Schorfheide (2007), "Bayesian Analysis of DSGE Models," *Econometric Reviews*, 26, 113–172.

Badarau, Cristina and Alexandra Popescu (2014), "Monetary policy and credit cycles: A DSGE analysis," *Economic Modelling*, 42, 301–312.

Brzoza-Brzezina, Michał and Marcin Kolasa (2013), "Bayesian Evaluation of DSGE Models with Financial Frictions," *Journal of Money, Credit and Banking*, 45(8), 1451–1476.

Calvo, Guillermo A. (1983), "Staggered prices in a utility-maximizing framework," *Journal of Monetary Economics*, 12(3), 383–398.

Chen, Shiu-Sheng and Chun-Chieh Wang (Apr. 2014), "Do Politics Cause Regime Shifts In Monetary Policy?" *Contemporary Economic Policy*, 32(2), 492–502.

Christiano, Lawrence J., Martin Eichenbaum, and Charles L. Evans (Feb. 2005), "Nominal Rigidities and the Dynamic Effects of a Shock to Monetary Policy," *Journal of Political Economy*, 113(1), 1–45.

Clarida, Richard, Jordi Gali, and Mark Gertler (1998), "Monetary policy rules in practice Some international evidence," *European Economic Review*, 42(6), 1033–1067.

Coibion, Olivier and Yuriy Gorodnichenko (2011), "Monetary Policy, Trend Inflation, and the Great Moderation: An Alternative Interpretation," *The American Economic Review*, 110(1), 341–370.

Coibion, Olivier and Yuriy Gorodnichenko (2012), "Why Are Target Interest Rate Changes so Persistent?" *American Economic Journal: Macroeconomics*, 4(4), 126–162.

Faia, Ester and Tommaso Monacelli (2007), "Optimal interest rate rules, asset prices, and credit frictions," *Journal of Economic Dynamics & Control*, 31(10), 3228–3254.

Guerrieri, Luca and Matteo Iacoviello (2017), "Collateral Constraints and Macroeconomic Asymmetries," *Journal of Monetary Economics*, 90, 28–49.

Hamilton, James D. (2018), "Why You Should Never Use the Hodrick-Prescott Filter," *The Review of Economics and Statistics*, 100(5), 831–843, DOI: 10.1162/rest_a_00706, eprint: https://doi.org/10.1162/rest_a_00706, URL: https://doi.org/10.1162/rest_a_00706.

Iacoviello, Matteo and Stefano Neri (2010), "Housing Market Spillovers: Evidence from an Estimated DSGE Model," *American Economic Journal: Macroeconomics*, 2(2), 125–164.

Ireland, Peter N. (2004a), "A method for taking models to the data," *Journal of Economic Dynamics & Control*, 28(6), 1205–1226.

Ireland, Peter N. (2004b), "Technology shocks in the new Keynesian model," *The Review of Economics and Statistics*, 86(4), 923–936.

Juillard, Michel, Philippe Karam, Douglas Laxton, and Paolo Pesenti (2006), "Welfare-based monetary policy rules in an estimated DSGE model of the US economy," ECB Working Paper, No. 613, European Central Bank.

Khan, Hashmat and Abeer Reza (2017), "House prices and government spending shocks," *Journal of Money, Credit and Banking*, 49(6), 1247–1271.

Knotek, Edward S. II, Randal Verbrugge, Christian Garciga, Caitlin Treanor, and Saeed Zaman (2016), "Federal Funds Rates Based on Seven Simple Monetary Policy Rules," *Economic Commentary*, July.

Lei, Xiaowen and Michael C. Tseng (2017), "“WAIT-AND-SEE” MONETARY POLICY," *Macroeconomic Dynamics*, 1–22.

Nikolsko-Rzhevskyy, Alex, David H. Papell, and Ruxandra Prodan (2014), "Deviations from rules-based policy and their effects," *Journal of Economic Dynamics and Control*, 49(C), 4–17.

Nikolsko-Rzhevskyy, Alex, David H. Papell, and Ruxandra Prodan (2019), "The Taylor Principles," *Journal of Macroeconomics*, 62, 103159.

Rudebusch, Glenn D. (2006), "Monetary Policy Inertia: Fact or Fiction?" *International Journal of Central Banking*, 2(4), 85–135.

Schmitt-Grohé, Stephanie and Martin Uribe (2007), "Optimal simple and implementable monetary and fiscal rules," *Journal of Monetary Economics*, 54(6), 1702–1725.

Smets, Frank and Rafael Wouters (2003), "An Estimated Dynamic Stochastic General Equilibrium Model of the Euro Area," *Journal of the European Economic Association*, 1(5), 1123–1175.

Smets, Frank and Rafael Wouters (2007), "Shocks and Frictions in US Business Cycles: A Bayesian DSGE Approach," *American Economic Review*, 97(3), 586–606.

Svensson, Lars E. O. (2003), "What Is Wrong with Taylor Rules? Using Judgment in Monetary Policy through Targeting Rules," *Journal of Economic Literature*, 41(2), 426–477.

Taylor, John B. (Dec. 1993), "Discretion versus policy rules in practice," *Carnegie-Rochester Conference Series on Public Policy*, 39(1), 195–214.

Walsh, Carl E. (2003), "Speed Limit Policies: The Output Gap and Optimal Monetary Policy," *The American Economic Review*, 93(1), 265–278.

Wu, Jing Cynthia and Fan Dora Xia (2016), "Measuring the Macroeconomic Impact of Monetary Policy at the Zero Lower Bound," *Journal of Money, Credit and Banking*, 48(2-3), 253–291.

Yellen, Janet L. (Jan. 2017), *The Economic Outlook and the Conduct of Monetary Policy*, The Stanford Institute for Economic Policy Research, Stanford University, Stanford, California.