Online Appendix for: Sovereign Debt in the US and Growth Expectations

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A Data treatment of CBO projections

An example of the tables provided in the CBO reports is shown in Table A.1. It corresponds to the report published in January 1994. Clearly, the report corresponding to year t (1994, in the example) shows realized values for fiscal year $t-1$ (1993) and forecasts for fiscal years t to $t+5$ (1994 to 1999). In addition, a similar table reports forecasts for the economic outlook: for instance, nominal GDP, inflation, unemployment or interest rates.

In order to keep variable definitions close to their counterparts for the general government, **federal** variables are constructed as:

Revenue = Personal Tax and Nontax Receipts + Corporate Profits Tax Accruals + Indirect Business Tax and Nontax Accruals + Contributions for Government Social

Transfers = Current Transfer Payments + Subsidies Less Current Surplus of Government Enterprises - Current Transfer Receipts

Defence expenditures = Defence consumption + Defence consumption of fixed capital

Net revenue = Revenue - Transfers - Defence expenditures.

Non-defence consumption = non-defence consumption expenditures - non-defence consumption of fixed capital

Non-defence investment = non-defence consumption of fixed capital

Primary surplus = Net federal saving + Interest payments

*Note that, differently from before, I am not considering all gross investment, but only consumption of fixed capital.

Table A.1 in the main text shows correlations between the expected growth rates for real net revenue and GDP and the share of federal consumption, investment and primary surpluses on GDP or net revenue. In other words, I look at the comovement between federal consumption to GDP for any year t (for instance, 1993) and the annualized growth rate of real net revenue from years $t-1$ to $t+5$ (1992 to 1998). The annualized gross growth rate of net revenue is calculated as:

$$\left(1+E_{t-1}\Big[\frac{T_{t+5}}{T_{t-1}}\frac{Defl_{t-1}}{Defl_{t+5}}-1\Big]\right)^{\frac{1}{6}} \qquad or \qquad \left(1+E_{t-1}\Big[\frac{T_{t+5}\frac{Defl_{t-1}}{Defl_{t+5}}-T_{t-1}}{GDP_{t-1}}\Big]\right)^{\frac{1}{6}}$$

where $Defl_t$ is the forecasted GDP deflator corresponding to year t. The first formula is used in most of cases and for the growth rate of real GDP, however the second is used for net revenue growth (excluding military spending) because this variable became negative in 2008. Also

$$\left(E_{t-1}\Big[\frac{T_{t+5}}{T_{t-1}}-\frac{GDP_{t+5}}{GDP_{t-1}}\Big]\right)^{\frac{1}{6}}$$

is the expected (annualized) growth rate at $t-1$ of the fraction of net revenue to GDP from period $t-1$ to $t+5$.

Table A.1: Summary of projections for Fiscal Year 1994

Fiscal year	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Current Receipts	***1,245***	***1,334***	***1,426***	***1,502***	***1,569***	***1,651***	***1,731***
Personal Tax and Nontax Receipts	515	556	606	646	679	720	760
Contributions for Gov.Social Insurance	511	547	581	613	645	677	708
Corporate Profits Tax Accruals	135	141	142	147	152	158	165
Indirect Business Tax and Nontax Accruals	84	90	97	96	93	96	98
Current Expenditures	***1,485***	***1,536***	***1,592***	***1,671***	***1,744***	***1,823***	***1,928***
Consumption Expenditures	446	439	444	455	469	484	501
Defense	307	293	291	297	305	314	325
Nondefense	139	146	153	158	164	170	176
Current Transfer Payments	826	878	923	976	1023	1075	1153
Required Reductions in Discretionary Spending			-11	-19	-35	-51	-50
Interest Payments	181	186	196	209	219	229	239
Subsidies Less Current Surplus of Gov. Enterprises	32	33	29	31	33	35	35
Net Federal Gov. Saving	***-240***	***-202***	***-166***	***-169***	***-175***	***-172***	***-197***

B Other figures and tables

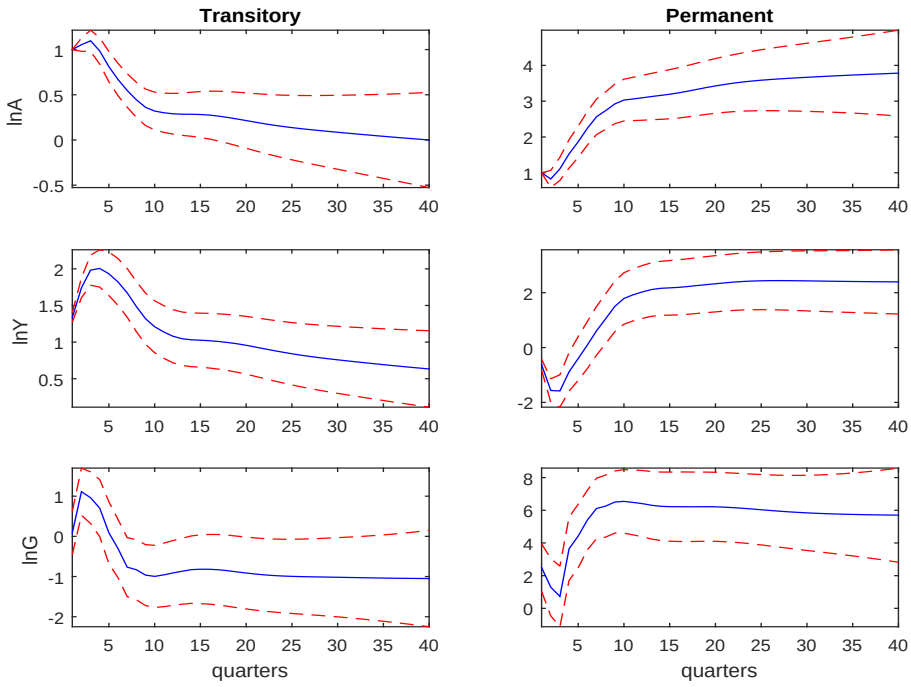

Figure B.1: SVAR responses in levels (1955-2009)

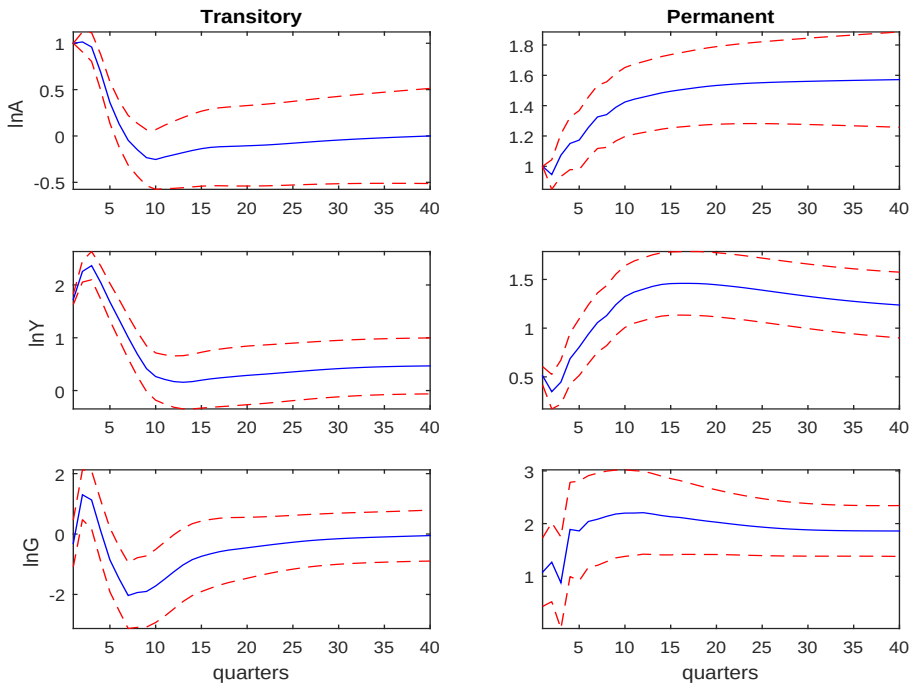

Figure B.2: SVAR responses in levels (1955-2007)

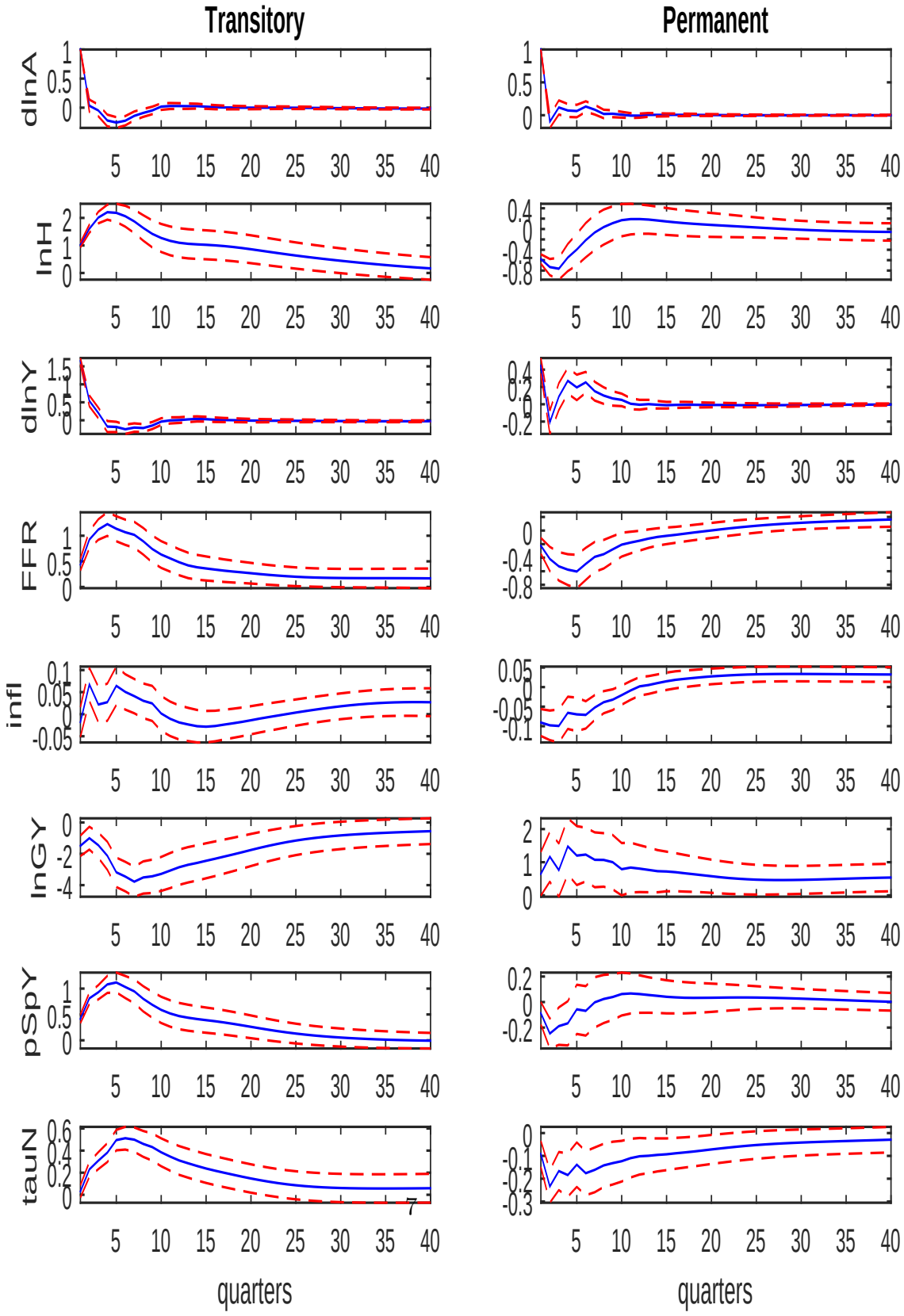

Figure B.3: SVAR responses controlling for nTAX, debt and defence G

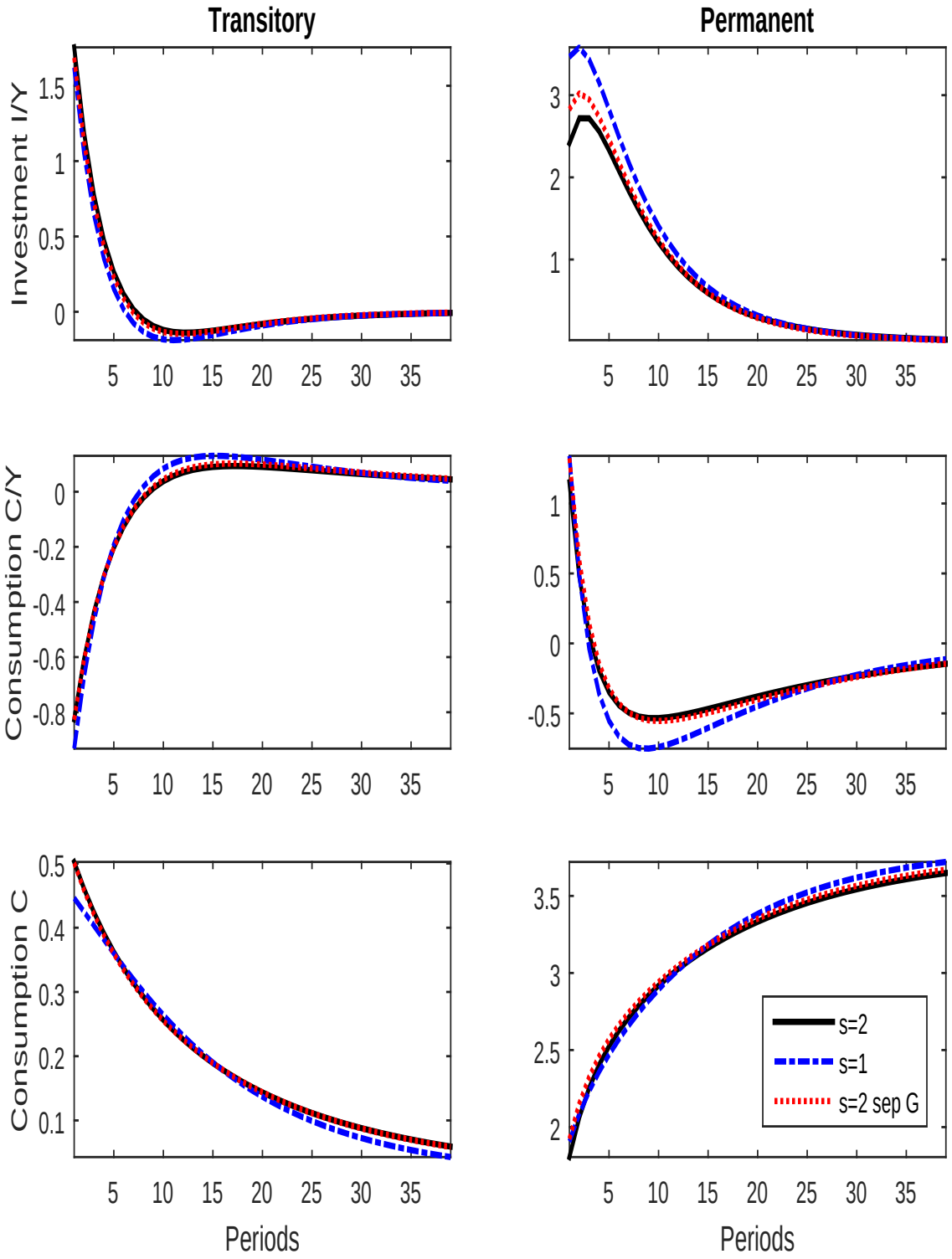

Figure B.4: Responses of the shares of private investment I_t/Y_t and consumption C_t/Y_t on output, and the level of private consumption C_t, to permanent and transitory shocks to productivity. In solid and black the benchmark specification with $s = 2$, in blue and dotted-dashed for $s = 1$, while in red and dotted for $s = 2$ with separable preferences over

References

[1] Aguiar, M. and Gopinath, G. (2007). "Emerging market business cycles: the cycle is the trend. ", *Journal of Political Economy*, 115(1):69-102.

[2] Amdur, D. and Ersal-Kiziler, E. (2014). "Trend shocks and the counter-cyclical us current account. ", *Canadian Journal of Economics / Revue canadienne d'économique*, 47(2):494-516.

[3] Boz, E., Daude, C., and Durdu, C.B. (2011). "Emerging market business cycles: Learning about the trend. ", *Journal of Monetary Economics*, 58(6):616-631.

[4] Ersal-Kiziler, E. (2016). "International portfolio flows with growth shocks. ", *Economics Letters*, 141, 84-86.

[5] Jones, J. B. (2002). "Has fiscal policy helped stabilize the postwar US economy?. ", *Journal of Monetary Economics*, 49(4), 709-746.

Table B.1: Correlations with long-run growth forecasts ($s = 1$)

share		PROD		rGDP		nTAX	
of	*GDP*	data	model	data	model	data	model
a) Ersal-Kiziler (2016)							
a1	C	0,44	0,55	0,17	0,52		
a2	I	0,06	0,61	0,13	0,62		
a3	NX	-0,85	-0,89	-0,79	-0,87		
a4	$pSpl$	-0,28	-0,72	-0,18	-0,69	-0,66	-0,77
a5	G	-0,25	0,60	0,21	0,56	0,67	0,65
a6	T	-0,34	-0,82	-0,48	-0,80	-0,73	-0,84
b) Aguiar and Gopinath (2007)							
b1	C	0,44	-0,17	0,17	-0,20		
b2	I	0,06	0,45	0,13	0,44		
b3	NX	-0,85	-0,44	-0,79	-0,42		
b4	$pSpl$	-0,28	0,01	-0,18	0,04	-0,66	-0,03
b5	G	-0,25	-0,13	0,21	-0,16	0,67	-0,10
b6	T	-0,34	-0,33	-0,48	-0,30	-0,73	-0,38
c) Boz et al. (2011)							
c1	C	0,44	0,13	0,17	0,12		
c2	I	0,06	0,44	0,13	0,44		
c3	NX	-0,85	-0,62	-0,79	-0,61		
c4	$pSpl$	-0,28	-0,21	-0,18	-0,20	-0,66	-0,25
c5	G	-0,25	0,14	0,21	0,14	0,67	0,19
c6	T	-0,34	-0,39	-0,48	-0,39	-0,73	-0,40

The empirical correlation between the average of private forecasts in the Survey of Professional Forecasters (SPF) and CBO forecasts for $PROD$ and $rGDP$ is 0.8 and 0.88, respectively. Correlations of averaged SPF forecasts and the shares of C, I and NX on GDP are: 0.13 & -0.12, 0.38 & 0.49, and -0.79 & -0.63. Ersal-Kiziler (2016) uses $\sigma_z = 0.1\%$, $\sigma_g = 0.1\%$, $\rho_z = 0.7$, and $\rho_g = 0.55$, that yields $V = 0.36$. Aguiar and Gopinath (2007) uses $\sigma_z = 0.63\%$, $\sigma_g = 0.47\%$, $\rho_z = 0.97$ and $\rho_g = 0.29$, that yields $V = 0.22$. Boz et al. (2011) uses $\sigma_z = 0.7\%$, $\sigma_g = 0.56\%$, $\rho_z = 0.9$, and $\rho_g = 0.21$, that yields $V = 0.23$.

Table B.2: Correlations with long-run growth forecasts ($s = 2,\ G$ separable)

share		PROD		rGDP		nTAX	
of	*GDP*	data	model	data	model	data	model
a) Ersal-Kiziler (2016)							
a1	C	0,44	0,60	0,17	0,56		
a2	I	0,06	0,57	0,13	0,58		
a3	NX	-0,85	-0,88	-0,79	-0,85		
a4	$pSpl$	-0,28	-0,75	-0,18	-0,70	-0,66	-0,80
a5	G	-0,25	0,62	0,21	0,57	0,67	0,67
a6	T	-0,34	-0,83	-0,48	-0,80	-0,73	-0,85
b) Aguiar and Gopinath (2007)							
b1	C	0,44	-0,13	0,17	-0,17		
b2	I	0,06	0,45	0,13	0,44		
b3	NX	-0,85	-0,46	-0,79	-0,41		
b4	$pSpl$	-0,28	-0,06	-0,18	-0,01	-0,66	-0,11
b5	G	-0,25	-0,11	0,21	-0,16	0,67	-0,08
b6	T	-0,34	-0,43	-0,48	-0,38	-0,73	-0,48
c) Boz et al. (2011)							
c1	C	0,44	0,14	0,17	0,08		
c2	I	0,06	0,37	0,13	0,37		
c3	NX	-0,85	-0,75	-0,79	-0,72		
c4	$pSpl$	-0,28	-0,24	-0,18	-0,34	-0,66	-0,33
c5	G	-0,25	0,14	0,21	0,31	0,67	0,25
c6	T	-0,34	-0,49	-0,48	-0,41	-0,73	-0,51

The empirical correlation between the average of private forecasts in the Survey of Professional Forecasters (SPF) and CBO forecasts for $PROD$ and $rGDP$ is 0.8 and 0.88, respectively. Correlations of averaged SPF forecasts and the shares of C, I and NX on GDP are: 0.13 & -0.12, 0.38 & 0.49, and -0.79 & -0.63. Ersal-Kiziler (2016) uses $\sigma_z = 0.1\%$, $\sigma_g = 0.1\%$, $\rho_z = 0.7$, and $\rho_g = 0.55$, that yields $V = 0.36$. Aguiar and Gopinath (2007) uses $\sigma_z = 0.63\%$, $\sigma_g = 0.47\%$, $\rho_z = 0.97$ and $\rho_g = 0.29$, that yields $V = 0.22$. Boz et al. (2011) uses $\sigma_z = 0.7\%$, $\sigma_g = 0.56\%$, $\rho_z = 0.9$, and $\rho_g = 0.21$, that yields $V = 0.23$.

Table B.3: Moments for HP filtered simulations ($s = 1$)

$Y = output$		sd_X/sd_Y		$corr(X,Y)$		$corr(Y_t, Y_{t-1})$	
variable X		data	model	data	model	data	model
a) Ersal-Kiziler (2016)							
a1	C	0,54	0,74	0,82	0,89	0,89	0,77
a2	I	3,95	2,45	0,93	0,86	0,85	0,75
a3	NX/Y	0,27	0,51	-0,44	0,00	0,77	0,56
a4	pSp/Y	0,76	0,13	0,65	0,46	0,83	0,55
a5	G	3,41	0,77	0,08	0,89	0,48	0,77
a6	T	2,70	1,01	0,52	0,97	0,81	0,83
b) Aguiar and Gopinath (2007)							
b1	C	0,54	0,70	0,82	0,98	0,89	0,77
b2	I	3,95	2,57	0,93	0,91	0,85	0,71
b3	NX/Y	0,27	0,31	-0,44	-0,27	0,77	0,58
b4	pSp/Y	0,76	0,07	0,65	0,71	0,83	0,66
b5	G	3,41	0,74	0,08	0,98	0,48	0,77
b6	T	2,70	0,99	0,52	0,99	0,81	0,81
c) Boz et al. (2011)							
c1	C	0,54	0,53	0,82	0,86	0,89	0,74
c2	I	3,95	2,25	0,93	0,95	0,85	0,62
c3	NX/Y	0,27	0,32	-0,44	0,45	0,77	0,59
c4	pSp/Y	0,76	0,15	0,65	0,82	0,83	0,60
c5	G	3,41	0,56	0,08	0,86	0,48	0,74
c6	T	2,70	1,12	0,52	0,99	0,81	0,66

All model specifications yield standard deviations for output around 1.7 which are slightly over that observed in the data during that timespan (1.5). Ersal-Kiziler (2016) uses $\sigma_z = 0.1\%$, $\sigma_g = 0.1\%$, $\rho_z = 0.7$, and $\rho_g = 0.55$, that yields $V = 0.36$. Aguiar and Gopinath (2007) uses $\sigma_z = 0.63\%$, $\sigma_g = 0.47\%$, $\rho_z = 0.97$ and $\rho_g = 0.29$, that yields $V = 0.22$. Boz et al. (2011) uses $\sigma_z = 0.7\%$, $\sigma_g = 0.56\%$, $\rho_z = 0.9$, and $\rho_g = 0.21$, that yields $V = 0.23$.

Table B.4: Moments for HP filtered simulations ($s = 2,\ G$ separable)

$Y = output$		sd_X/sd_Y		$corr(X,Y)$		$corr(Y_t, Y_{t-1})$	
variable X		data	model	data	model	data	model
a) Ersal-Kiziler (2016)							
a1	C	0,54	0,80	0,82	0,90	0,89	0,77
a2	I	3,95	2,38	0,93	0,88	0,85	0,75
a3	NX/Y	0,27	0,48	-0,44	-0,06	0,77	0,57
a4	pSp/Y	0,76	0,14	0,65	0,38	0,83	0,54
a5	G	3,41	0,80	0,08	0,87	0,48	0,75
a6	T	2,70	1,00	0,52	0,96	0,81	0,83
b) Aguiar and Gopinath (2007)							
b1	C	0,54	0,76	0,82	0,98	0,89	0,75
b2	I	3,95	2,54	0,93	0,92	0,85	0,69
b3	NX/Y	0,27	0,31	-0,44	-0,34	0,77	0,57
b4	pSp/Y	0,76	0,07	0,65	0,59	0,83	0,62
b5	G	3,41	0,75	0,08	0,97	0,48	0,74
b6	T	2,70	0,96	0,52	0,99	0,81	0,79
c) Boz et al. (2011)							
c1	C	0,54	0,64	0,82	0,94	0,89	0,75
c2	I	3,95	2,48	0,93	0,94	0,85	0,67
c3	NX/Y	0,27	0,24	-0,44	0,04	0,77	0,61
c4	pSp/Y	0,76	0,12	0,65	0,78	0,83	0,68
c5	G	3,41	0,62	0,08	0,92	0,48	0,74
c6	T	2,70	1,07	0,52	0,99	0,81	0,75

All model specifications yield standard deviations for output around 1.7 which are slightly over that observed in the data during that timespan (1.5). Ersal-Kiziler (2016) uses $\sigma_z = 0.1\%$, $\sigma_g = 0.1\%$, $\rho_z = 0.7$, and $\rho_g = 0.55$, that yields $V = 0.36$. Aguiar and Gopinath (2007) uses $\sigma_z = 0.63\%$, $\sigma_g = 0.47\%$, $\rho_z = 0.97$ and $\rho_g = 0.29$, that yields $V = 0.22$. Boz et al. (2011) uses $\sigma_z = 0.7\%$, $\sigma_g = 0.56\%$, $\rho_z = 0.9$, and $\rho_g = 0.21$, that yields $V = 0.23$.