Rotated Slice Sampling for Efficient and Robust Estimation of DSGE Models[*]

PRELIMINARY and INCOMPLETE

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Abstract

We investigate the performance of the rotated slice sampler first introduced by Planas et al. (2015) for the Bayesian estimation of medium/large scale DSGE models. We benchmark the rotated slice sampler together with the standard slice and the Metropolis-Hastings in the estimation of the Smets and Wouters (2007) model and the European Commission's Global Multicountry model by Albonico et al. (2017). Unlike Metropolis kinds of samplers, the slice algorithm does not require any ad-hoc tuning nor any proposal distribution, hence featuring greater robustness and eliminating the cost of preliminary posterior maximization required by Metropolis. Moreover, the Rotated Slice extension boosts the efficiency of the sampler in case of highly correlated posterior distributions. We measure the relative performance of samplers based on inefficiency factors and we also test the rejection rates of the samplers against known distributions. We also suggest an optimal parallel slice algorithm that provides accurate posterior draws with a computational cost comparable to the preliminary posterior maximization required by Metropolis, which makes the slice algorithm a strongly advisable approach in medium/large scale DSGE models. Finally, we also propose and test a further extension of the algorithm which allows to dramatically increase the mixing properties of the slice sampler in successfully exploring the shape of complex multi-modal distributions.

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1 Introduction

In the Bayesian estimation of DSGE models, the parameters' posterior distribution is usually explored using Markov chain sampling methods such as the Metropolis-Hastings sampler (Hastings , 1970). The main shortcoming of this algorithm is that it requires some tuning such as proposal distributions. This aspect is relevant, as tuning strongly affects the efficiency of the Markov chain sampling, and prevents an automatic implementation of the method.

The slice sampling has been introduced by Neal (2003) with the aim of providing a method which does not require such fine tuning, and adapts automatically to the distribution under study. In this paper we show how a new version of the slice sampler can be efficiently employed to explore the posterior distribution of medium/large scale DSGE models.

This note is structured as follows. Section 2 presents the standard slice sampler introduced by Neal (2003). Section 3 presents the improvement brought by Planas et al. (2015). Section 4 presents the DYNARE implementation of the rotated slice sampler. Section 5 compares the performance of the Metropolis-Hastings, the standard slice by Neal (2003) and the rotated slice samplers in empirical applications. Section 7 presents a modified rotated slice sampler improving its mixing properties. Section 8 concludes.

2 The Standard Slice Sampler

The idea of the slice sampler is that in order to sample from a distribution, one can sample uniformly from the region under its density function. More precisely, suppose that one wants to sample from a distribution for a variable x whose density $f(x)$ is unknown, non-normalized but continuous. By introducing an auxiliary random variable y uniformly distributed over $[0, f(x)]$, the joint density for (x, y) is uniform over $U = [(x, y) \mid 0 < y < f(x)]$. So, we could sample for x by sampling jointly for (x, y) and ignore y, that is considering the marginal distribution of x. In practice, the direct sampling of (x, y) over U can be difficult. So we will rely on a Gibbs sampling strategy which samples iteratively $x \mid y$ and $y \mid x$:

- $y \mid x$ is sampled uniformly over $[0, f(x)]$
- $x \mid y$ is sampled uniformly over the slice S which is defined as follows: $S = \{x \mid y < f(x)\}$.

As an illustration, in Figure 1, y has been drawn uniformly from $[0, f(x_0)]$ and the next x shall be drawn from the bold horizontal segments (the slice S).

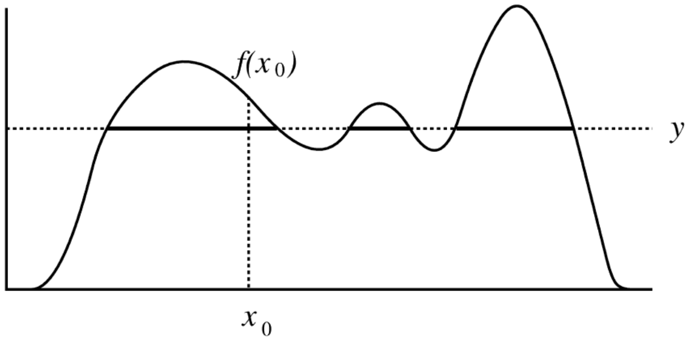

Figure 1: Illustration of the slice sampling. Source: Figure 1 from Neal (2003)

Most likely, the sampling of $x \mid y$ over S cannot be done directly as the slice S is generally unknown. Neal (2003) proposed 3 methods built in such a way that the resulting Markov chain leaves invariant $f(x)$, that is the probability distribution of x. These 3 methods define a region I, that is placed around the starting point of the chain x_0, and over which one could find a successive point x_1 in the sequence which defines the Markov chain. These methods require a minimal tuning, given by the scale parameter W, which defines the width of I. If W is too large, $S \cap I$ will be small and drawing an update of x_0 will generate an high rejection rate which leads to inefficient sampling. On the opposite, if W is too small, the update of x_0 will be near the original x_0 generating autocorrelation and thus inefficiency in the Markov chain. Planas et al. (2015) investigate the performance of these 3 methods associated to 4 different choices of the scale parameter W in sampling from 12 representative distributions.[1] The performance is measured in terms of efficiency (linked to the auto-correlation structure of the Markov chain) and number of evaluations of $f(x)$. They found that the most efficient method is the 'stepping out' method with a scaling parameter $W = 3\sigma$, where σ is the standard deviation of the density under study.

The stepping out method, in the univariate case works as follows:

(i) starting from the initial point x_0, draw y from $U[0, f(x_0)]$, which defines the slice as $S = \{x : y < f(x)\}$,

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[1] These distributions are 12 out of the 15 examples of normal mixture densities presented in Marron and Wand (1992). These distributions present different characteristics: Skewed, Strongly skewed, Kurtotic, Outlier, Bimodal, Separate Bimodal, Skewed Bimodal, Trimodal, Claw, Double Claw, Asymmetric claw and Smooth comb.

(ii) position $I = (L, R)$ randomly around the starting value of the Markov chain x_0, that is set $L = x_0 - uW$, $u \sim U(0, 1)$, and $R = L + W$,

(iii) expand the interval setting $L = L - W$ and $R = R + W$, until both the new extremes are outside the slice, that is $y > f(L)$ and $y > f(R)$,

(iv) use non accepted draws to shrink the interval I as follows: draw a candidate point x^c from a uniform distribution over the set I, that is $x^c = L+v(R-L)$, $v \sim U(0, 1)$, and set

$$\begin{cases} L = x^c, & \text{if } x^c < x_0 \\ R = x^c, & \text{otherwise} \end{cases}$$

(v) repeat until $y < f(x^c)$ and then set $x_1 = x^c$, that is x^c is an accepted draw and updates x_0 in the Markov chain.

3 The Rotated Slice Sampler

In order to sample $x \mid y$ more efficiently from highly correlated variables, Planas et al. (2015) proposed to modify the stepping out method with respect to the choice of the interval I. While in the original proposal by Neal (2003) I is expressed in the standard orthonormal basis, in the rotated slice sampler the interval I is expressed in the basis of the parameters principal components. This change of basis allows I to improve the efficiency of the slice sampler.

As an example, consider two correlated parameters following a bivariate normal distribution. As illustrated in Figure 2, the contour of the density has an elliptical shape (in blue). In the left figure, we represent illustrative slices along the Euclidean basis (in red), and in the right figure we represent illustrative slices along the principal components basis (in green). As observed, the slices along the major axis of the ellipse better fit the distribution than any of the Euclidean slices.

The new method, called rotated slice sampling, can be decomposed into two steps:

(i) perform the standard slice sampling using the standard Euclidean basis, obtaining a set of posterior draws x from which to compute the principal components, i.e. the eigenvectors of the parameters variance-covariance matrix, denoted Σ_x,

(ii) perform the slice sampling using the principal components as a new basis for the parameters space.

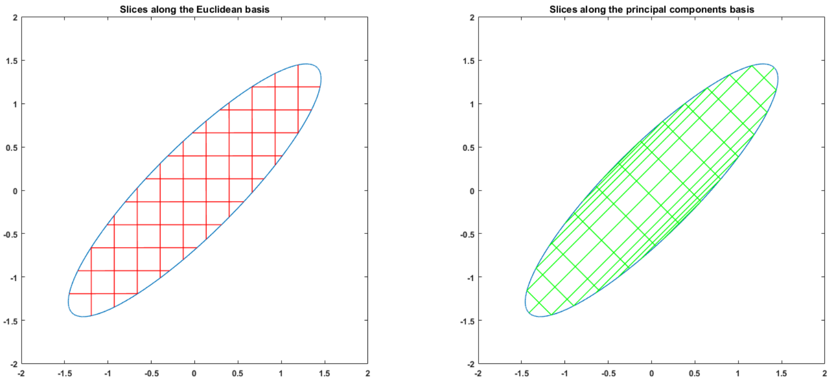

Figure 2: Illustrations of the classical stepping out method by Neal (2003) (left) and the stepping out method with principal components by Planas et al. (2015) (right).

Note that a multivariate version of the rotated slice sampler is also presented in Planas et al. (2015). However, it is not suitable for medium/large scale problems.

4 DYNARE Implementation

The classical slice sampling by Neal (2003) has been implemented into DYNARE[2] in its stepping out version. For implementing the slice, the following parameters of the estimation command have been added or reset to different values:

- `posterior_sampling_method='slice'`
- the parameter `mh_replic` defining the length of the Markov chain has been set to a lower value than with the Metropolis-Hastings algorithm because of the higher efficiency of the slice sampler.[3]

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[2] Available at www.dynare.org.

[3] In the following, for estimating the model by Smets and Wouters (2007), the total length

The rotated slice sampling is based on procedure with at least 2 steps:

(i) run an estimation with the classical slice method, with a short Markov chain. The number of iterations should be made as short as possible as it is only used to get an estimate of the variance-covariance matrix, the classical slice method being less efficient than the rotated one.

(ii) run the rotated slice sampling, by means of the following DYNARE estimation command options:

  - `posterior_sampling_method='slice'`
  - `posterior_sampler_options=`
    `('rotated',1,'use_mh_covariance_matrix',1)`
  - `load_mh_file`, which is loading the variance-covariance matrix obtained in the previous step.

(iii) (optional) repeat step (ii) using the variance-covariance matrix obtained from the previous step.

As an illustration, consider our first application, i.e. with the model by Smets and Wouters (2007). The estimation is performed in 3 steps. The first one completes 50 iterations with the standard slice sampler and returns a first estimate of the variance covariance matrix. The second one makes 200 iterations with the rotated slice sampler and gets a better estimate of the variance covariance matrix. Finally the third step performs the rotated slice sampler over 1000 iterations, using the updated variance covariance matrix. As recommended, the number of iterations in the first step is rather small compared to the two following steps.

5 Applications

In the following, we assess the performance of the three sampling methods considered in the previous sections (Metropolis-Hastings, standard slice, and rotated slice) in the Bayesian estimations of two DSGE models: the model by Smets and Wouters (2007)[4] and the Global Multi-country model by the European Commission, which is a slightly modified version of the model by Kollmann et al. (2016).

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of each chain has been set to 200 for the slice sampler, while it has been set to 250000 for the Metropolis-Hastings sampler.

[4] The DYNARE code for the model by Smets and Wouters (2007) has been downloaded from Johannes Pfeifer's website and is available on line at `https://github.com/johannespfeifer/dsge_mod`.

The performance of the methods is assessed through two key measures. The first one is the inefficiency factor, IF, which provides an indication of the sample size needed to get a certain accuracy in computing the posterior moments, and is defined as follows:

$$IF = 1 + 2\sum_{j=1}^{p} \omega_j \rho_j$$

where ρ_j is the j-th order auto-correlation of the sample, and ω_j are the Parzen-weights. The inefficiency factor is thus a weighted average of the auto-correlations of the Markov chain, at different lags. The lower the auto-correlation, the more efficient is the sampling method. The second measure is the average number of evaluations of $f(x)$ needed to generate a single draw of the Markov chain. Indeed, in DSGE applications, a draw from the posterior distribution requires to solve the model and to compute the likelihood function by the Kalman filter, which takes seconds of computations in medium-large scale models.

In the following two empirical applications we will report the aforementioned efficiency indicators, along with the computation time.[5]

5.1 Smets and Wouters (2007)

The results of the estimations with the three different sampling methods (the Metropolis-Hastings, the standard slice and the rotated slice) are reported in annex, in Table 4. Overall, the rotated slice sampler provides the best posterior likelihood at the mode,[6] closely followed by the standard slice sampler, and ahead of the Metropolis-Hastings sampler. With regards to the structural parameters, the estimates obtained by the slice and rotated slice samplers are almost equivalent to those obtained with the Metropolis-Hastings' ones, with the exceptions of the parameters $\bar{\pi}$ and $\bar{L}$. The estimated mean of $\bar{\pi}$ is close to the alternative mean identified in Chib and Ramamurthy (2010) while the estimated mean of $\bar{L}$ is between the estimate of Smets and Wouters (2007) and the one of Chib and Ramamurthy (2010). Obtaining different estimates than with the Metropolis-Hastings sampler illustrates the interesting mixing properties of slice sampling. A modified version of the rotated slice sampler improving these mixing properties is presented in Section 7. For the time being, we do not have estimated the Smets and Wouters' model with this modified rotated slice sampler.

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[5] The computations were performed on a bi-xeon E5 2620 v3 2.40GHz, with 32 GB of RAM.

[6] The lower the better, as Dynare minimizes minus the posterior likelihood.

	M-H	Slice	Rot. Slice
Nb chains	10	10	10
Nb iterations per chain	250000	1000	1250 (50+200+1000)
Maximum Inefficiency Factor	696.8	24.8	4.6
Number of pseudo independent draws	287.0	32.3	217.4
Avg nb of function evaluations per iteration	1	234.3	203.0
Total number of evaluation per chain	250000	187440	203000
Total computing time	1h35min	1h09min	1h18min
Posterior at mode	-846.1	-849.3	-849.0

Table 1: Performances of the Metropolis-Hastings, the standard slice and the rotated slice, with **10 chains**.

With regards to the performance,[7] the results for the three sampling methods are presented in Table 1. All samplers used 10 independent Markov chains. In order to allow for comparison, the length of the chains for each method has been set such that the numbers of evaluations are equivalent across the methods. For the Metropolis-Hastings algorithm the length of each chain has been set to 250000, for the standard Slice it has been set to 1000, while the rotated slice has been implemented in three steps,[8] for a total number of 1250 points. The details of the inefficiency factors are presented in annex, in Tables 5, 6, and 7.

The Metropolis-Hastings is strongly auto-correlated, with an inefficiency factor which largely exceeds the inefficiency of the slice samplers. It means that using Metropolis-Hastings leads to a high probability that the Markov chain remains stuck into some region of the parameters space, which is risky especially in the case of multi-modal distributions. On the contrary, the slice and rotated slice samplers are much less auto-correlated, even though they require a lot more evaluations per iteration. Overall, and from Table 1, we estimate the number of pseudo independent draws per minute of computation which are 3.0 for Metropolis-Hastings, 0.5 for the standard slice and 2.8 for the rotated slice. So, for this medium scale model, the performance of the Metropolis-Hastings and the rotated slice samplers are equivalent, with a preference for the rotated slice sampler which has better mixing properties.

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[7] The performance measures are computed net of the burn-in sample (20%).

[8] In the first step we run the standard slice to get an estimate of Σ_x, in the second step we run the rotated slice based on the previous estimate of Σ_x, and in the last step we run again the rotated slice with the estimate of Σ_x updated in the second step.

5.2 The Global Multi-country Model by the European Commission (2017)

The Global Multi-country Model is a large DSGE model developed by the European Commission. The version of the model considered is very similar to the one presented in Kollmann et al. (2016). Its description is not the purpose of the present paper. It entails 307 state variables and 156 parameters are estimated. Overall and as shown in Table 3, the standard slice and rotated slice samplers provide the best posterior likelihood at the mode, ahead of the Metropolis-Hastings sampler. The results of the estimations with the three different sampling methods (Metropolis-Hastings, standard slice and rotated slice) are reported in annex, in Table 8. The estimates obtained by the slice and rotated slice samplers are almost equivalent with the only exception being ${\phi^y}_{RoW}$ (0.21 with standard slice and 0.16 with rotated slice). We report in Table 2 the estimates obtained from the standard slice and rotated slice samplers which differ by more than 20% from those obtained from the Metropolis-Hastings sampler. As in the previous section, we attribute these differences to the good mixing properties of the slice samplers.

	M-H	Slice	Rot. Slice
${\eta^{DPHI}}_{EA}$	0.0032	0.0047	0.0046
${\alpha^T}_{EA}$	0.0101	0.0123	0.0119
${\rho^{Oil}}_{EA}$	0.0457	0.0530	0.0594
${\rho^Z}_{EA}$	0.1223	0.1406	0.1517
${\rho^{APC}}_{EA}$	0.1425	0.1722	0.1741
${\eta^{i,y}}_{US}$	0.0459	0.0584	0.0565
${\alpha^G}_{US}$	0.0248	0.0324	0.0330
${\phi^y}_{RoW}$	0.0832	0.2090	0.1609
${\rho^{IM}}_{RoW}$	0.2579	0.3349	0.3091
$\sigma^{\epsilon}_{BW\_US}$	0.0015	0.0024	0.0020

Table 2: Posterior mean of the parameters differing by over 20% from the Metropolis-Hastings' ones.

With regards to the performance,[9] the results for the three sampling methods are presented in Table 3. All samplers used 10 independent Markov chains. For the Metropolis-Hastings algorithm the length of each chain has been set to 12500, for the standard slice it has been set to 50, while the rotated slice has been implemented in two steps, using the standard slice results as first step and presenting the results of the second step only, i.e. 50 points. The details of the inefficiency

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[9] The performance measures are computed net of the burn-in sample: 20% for the Metropolis-Hastings and standard slice samplers, and 50% for the rotated slice sampler.

factors is presented in annex in the Tables 9, 10, and 11.

	M-H	Slice	Rot. Slice
Nb chains	10	10	10
Nb iterations per chain	12500	50	50
Maximum Inefficiency Factor	651.2	7.8	8.4
Number of pseudo independent draws	19.2	6.4	6.0
Avg nb of function evaluations per iteration	1	969.0	679.0
Total number of evaluation per chain	12500	38760	33950
Optimization	18h10min	-	-
Sampling	42h05min	65h10min	42h11min
Total running time	60h15min	65h10min	42h11min
Posterior at mode	1353.1	1346.8	1347.3

Table 3: Performances of the Metropolis-Hastings, the standard slice and the rotated slice, with **10 chains**. The rotated slice sampler used the variance-covariance matrix obtained from the previously computed standard slice (i.e. 50 iterations of rotated slice sampling on top the 50 iterations of the standard slice used as burn-in).

The efficiency of the Metropolis-Hastings sampler is roughly the same as in the previous application while the standard slice sampler offers an efficiency improved by a factor 4. The rotated slice sampler has the same efficiency as the standard slice sampling but requires 30% less evaluations, making the computation faster. Focusing on computation time, the Metropolis-Hastings sampler requires a first optimization step which is very long, non reducible and not parallelizable. On the contrary, optimization is not required with the standard and rotated slice samplers, which implies saving of computational time. This property, together with high comparative efficiency and the good mixing properties of the slice samplers make them suitable for fast and reliable estimations in a parallel computing environment, especially if short chains provide satisfactory results.

6 Optimal parallel slice algorithm

We propose here an optimal parallel algorithm to be applied in the estimation of medium/large scale DSGE models. We assume here the availability of a cluster of some hundreds of cores (200-250 cores): such a computing power is nowadays affordable by simply clustering a few standard multi-core desktop computers. The algorithm is simply the following:

1. take N cores;
2. for each core, run one independent chain of the slice sample with a small number of iterations (50 iterations);
3. for each independent chain, take the last draw, obtaining a sample of N draws from the posterior which are iid by construction, thus ensuring an inefficiency factor of 1.
4. if the total budget of computer time permits, take another batch of 50 iterations of parallel slice chains with the rotated algorithm, by using the information about correlation obtained in the first batch of draws.
5. take the last draw of each chain of the second batch of iterations, obtaining a more accurate sample of N draws.

Remembering that the slice algorithm does not require ad-hoc tuning nor a proposal distribution, the main advantage of the short chains run in parallel on a large number of cores is that it provides accurate draws from the posterior, simply initializing the chains from random prior draws. This has a computational cost that is of the same order of magnitude of the posterior maximization, which is the essential pre-requisite to tune the proposal distribution of the Metropolis.

Since the proposed algorithm produces iid draws by construction, we do not need to test the inefficiency factor. We need, however, to test whether the very short length of the chains is sufficient to get draws that cannot be rejected against known benchmark multivariate distributions.

Our results show that with a budget of 50 burn-in standard slice + 50 rotated slice draws, the rejection rate is always within the significant level, thus ensuring an accurate posterior sample. We also show that, stopping the algorithm at the end of the first 50 burn-in iterations, provides a rejection rate that can exceed the significance level: around 7-8$\%$ rejection rate against a significance level of 5$\%$. The latter result indicates that for large models, even the burn-in sample can be taken as a good approximation of the posterior distribution.

[full table of results and examples to be completed]

7 A modified rotated slice sampler for multimodal distributions

The idea of changing the axes of the standard slice sampler in order to improve its efficiency can also be applied, though differently, to sampling from multi-modal posterior distributions. In this case, the Metropolis-Hastings sampler has difficulties to move from one mode to another one, due to its high auto-correlation, and it remains stuck in a local mode. On the contrary, the slice and the rotated slice samplers have good mixing properties, as shown in Section 5.1. We find that through a proper choice of the axes employed as directions for the exploration of multi-modal surfaces, it is possible to further improve these mixing properties.

Chib and Ramamurthy (2010) developed an extended version of their tailored randomized block Metropolis-Hastings algorithm which jumps regularly from pre-identified modes. Thus, in a first step, we propose to identify the different modes by running, in parallel, several independent chains of the standard slice sampler. The chains might converge to different parameter values and posterior distributions, which indicates different local optima. In the second step, the axes of the standard slice sampler are replaced by lines which are parallel to the lines joining the different modes.

Thus the modified rotated slice follows two steps:

(i) identify the different modes by running several parallel independent chains of the standard slice sampler,

(ii) perform the rotated slice sampler, sampling along lines which are parallel to the lines joining the different local optima, instead of the principal components.

The mixing capabilities of this new algorithm have been tested on the second example of Chib and Ramamurthy (2010) which considers a mixture of four 12-variate normal distributions. The draws from the chains of the modified rotated slice sampler are reported in Figure 3 and those of the standard slice sampler in Figure 4. We observed that while the standard slice is unable to switch from a mode to another one, the modified rotated slice sampler does it frequently. It illustrates the improved mixing capabilities of the new proposed algorithm.

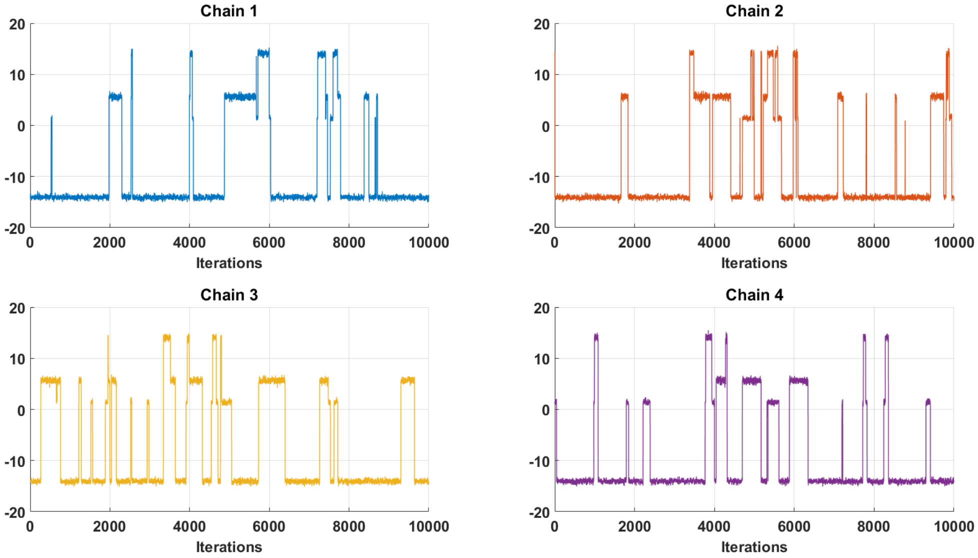

Figure 3: Four independent Markov chains of the modified rotated slice sampler in the second example of Chib and Ramamurthy (2010). The burn-in has been removed.

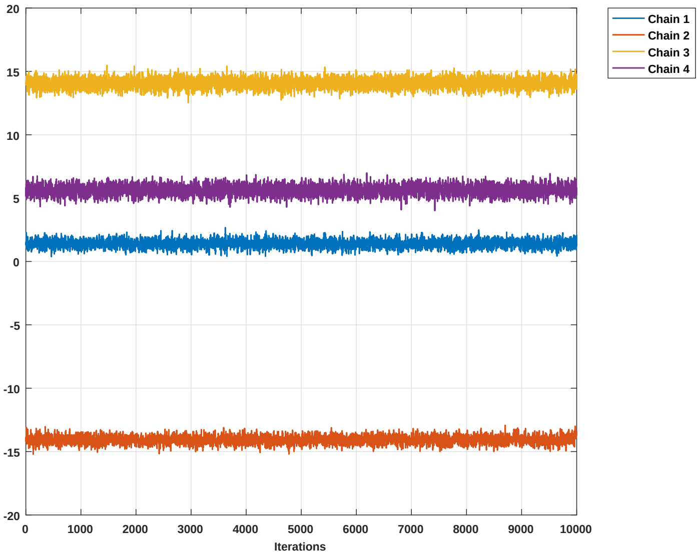

Figure 4: Four independent Markov chains of the standard rotated slice sampler in the second example of Chib and Ramamurthy (2010). The burn-in has been removed.

8 Conclusion

We assess the performance of the rotated slice sampler, a modified version of the slice sampler introduced by Neal (2003) where the one-at-a-time Gibbs algorithm operates along the principal components of the correlation structure. We show that it is a reliable and efficient sampler for the estimation of medium-large scale DSGE models. The main advantages of the proposed sampler over the Metropolis-Hastings and standard slice ones are its efficiency and its mixing properties. We also discuss the trade-off between the efficiency of this algorithm and the number of likelihood evaluations required per iteration. We demonstrate that immediate sampling (no posterior optimization required to tune proposal distribution), the efficiency and the good mixing properties of the slice sampler makes it very suitable for fast and reliable estimations in a large parallel computing environment and considering short chains. We also introduce a modified version of the rotated slice for sampling multi-modal distributions. We show that this modified slice algorithm offers good performance, and that even relatively short chains are characterized by good mixing properties, out-performing results presented in Chib and Ramamurthy (2010).

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9 Annex

9.1 Smets and Wouters (2007)

Structural parameters									
	Posterior M-H sampling			Posterior Slice sampling			Posterior Slice sampling - PC		
	Mean	90% HDP interval		Mean	90% HDP interval		Mean	90% HDP interval	
Φ	5.74	4.04	7.42	5.81	4.12	7.50	5.62	3.85	7.32
σ_c	1.38	1.16	1.60	1.32	1.11	1.53	1.32	1.06	1.56
h	0.71	0.65	0.78	0.73	0.67	0.80	0.72	0.67	0.79
ξ_w	0.70	0.59	0.81	0.69	0.58	0.79	0.67	0.53	0.84
σ_L	1.83	0.90	2.76	1.87	0.93	2.75	1.75	0.83	2.67
ξ_p	0.65	0.56	0.74	0.62	0.54	0.71	0.63	0.55	0.72
ι_w	0.58	0.38	0.79	0.59	0.39	0.80	0.60	0.38	0.82
ι_p	0.24	0.10	0.38	0.25	0.10	0.39	0.26	0.10	0.41
Ψ	0.54	0.36	0.72	0.56	0.38	0.74	0.57	0.37	0.74
ϕ	1.61	1.48	1.74	1.61	1.48	1.74	1.61	1.49	1.73
r_π	2.04	1.75	2.34	2.06	1.80	2.35	2.08	1.81	2.36
ρ	0.81	0.77	0.85	0.80	0.76	0.84	0.80	0.76	0.84
r_y	0.09	0.05	0.13	0.09	0.05	0.12	0.09	0.05	0.11
$r_{\Delta y}$	0.22	0.18	0.27	0.22	0.17	0.27	0.23	0.18	0.27
$\bar{\pi}$	0.79	0.61	0.96	0.70	0.52	0.87	0.69	0.54	0.85
$100(\beta^{-1}-1)$	0.17	0.07	0.26	0.17	0.07	0.25	0.17	0.07	0.25
$\bar{L}$	0.51	-1.29	2.29	0.63	-1.15	2.58	0.60	-1.07	2.79
$\bar{\gamma}$	0.43	0.41	0.46	0.42	0.39	0.45	0.41	0.37	0.46
α	0.19	0.16	0.22	0.19	0.16	0.22	0.19	0.16	0.22
Shock processes									
σ_a	0.46	0.41	0.50	0.46	0.41	0.50	0.46	0.42	0.51
σ_b	0.24	0.20	0.28	0.24	0.20	0.28	0.23	0.17	0.29
σ_g	0.53	0.48	0.58	0.53	0.48	0.58	0.53	0.48	0.58
σ_I	0.45	0.37	0.53	0.46	0.37	0.54	0.45	0.36	0.52
σ_r	0.25	0.22	0.27	0.25	0.22	0.27	0.25	0.22	0.27
σ_p	0.14	0.11	0.17	0.14	0.11	0.17	0.14	0.11	0.16
σ_w	0.24	0.21	0.28	0.25	0.21	0.28	0.24	0.21	0.29
ρ_a	0.96	0.94	0.98	0.96	0.94	0.98	0.96	0.93	0.98
ρ_b	0.22	0.07	0.36	0.22	0.07	0.35	0.28	0.06	0.53
ρ_g	0.98	0.96	0.99	0.98	0.97	0.99	0.98	0.97	0.99
ρ_I	0.71	0.61	0.81	0.70	0.61	0.80	0.72	0.62	0.83
ρ_r	0.15	0.05	0.25	0.16	0.05	0.26	0.16	0.04	0.25
ρ_p	0.89	0.82	0.97	0.92	0.86	0.98	0.90	0.80	0.97
ρ_w	0.97	0.95	0.99	0.97	0.96	0.99	0.96	0.86	1.00
μ_p	0.70	0.56	0.85	0.71	0.55	0.87	0.67	0.52	0.86
μ_w	0.84	0.74	0.94	0.84	0.74	0.93	0.79	0.64	0.91
ρ_{ga}	0.52	0.37	0.67	0.52	0.37	0.67	0.52	0.37	0.64

Table 4: Smets and Wouters: Parameters posterior mean and confidence intervals obtained with the Metropolis-Hasting, the standard slice and the rotated slice, with **10 chains**.

	Metropolis - Hastings										
	1	2	3	4	5	6	7	8	9	10	Average
Φ	258.9	253.9	233.6	252.5	265.9	276.0	253.3	247.4	248.8	248.0	253.8
σ_c	359.5	311.6	375.4	333.9	341.0	323.8	368.1	371.9	355.1	339.2	348.0
h	332.8	267.0	296.6	272.0	301.5	280.4	319.3	286.1	248.1	272.1	287.6
ξ_w	518.0	502.3	562.3	509.8	506.1	511.2	592.4	489.0	490.0	498.2	517.9
σ_L	217.0	208.2	232.5	230.0	236.2	210.7	259.7	277.1	236.5	215.8	232.4
ξ_p	381.0	350.7	355.4	399.7	362.8	390.0	401.8	352.3	376.9	366.0	373.7
ι_w	263.7	257.8	270.1	275.3	255.5	288.0	261.0	255.5	265.1	274.3	266.6
ι_p	283.5	267.4	289.3	300.3	267.7	277.3	271.7	266.3	269.2	288.8	278.2
Ψ	286.4	244.8	266.4	274.0	231.9	298.9	265.0	296.9	302.7	294.6	276.2
ϕ_p	218.6	217.4	231.0	216.7	228.1	226.8	223.9	239.1	210.5	204.9	221.7
r_π	238.6	244.1	242.1	232.9	233.5	244.0	238.3	230.9	249.4	250.5	240.4
ρ	422.9	410.5	400.4	397.0	398.8	375.6	424.8	411.4	401.1	408.8	405.1
r_y	233.8	252.8	232.3	238.4	213.3	222.2	254.5	252.1	250.3	239.0	238.9
$r_{\Delta y}$	347.4	337.0	349.1	336.5	366.7	300.3	356.7	332.3	331.2	336.3	339.3
$\bar{\pi}$	227.9	221.4	220.5	240.0	212.8	226.9	258.7	240.1	200.2	235.4	228.4
$100(\beta^{-1}-1)$	292.7	282.0	285.7	312.1	285.6	287.7	260.6	293.2	298.5	293.5	289.2
$\bar{L}$	292.7	304.6	316.7	342.2	274.4	304.4	319.9	329.5	305.2	299.9	309.0
$\bar{\gamma}$	301.8	286.1	285.9	295.5	281.3	342.6	296.3	299.4	309.4	307.3	300.6
α	238.3	230.1	213.6	222.1	207.1	201.2	208.2	215.0	216.9	234.6	218.7
σ_a	206.4	195.3	217.2	203.2	227.0	219.6	235.1	213.2	212.0	213.1	214.2
σ_b	218.0	159.4	160.3	156.4	173.4	181.6	179.1	167.9	171.4	175.0	174.2
σ_g	162.6	183.2	171.5	165.3	153.8	172.3	164.6	190.0	164.7	165.7	169.4
σ_I	206.0	202.5	204.6	191.2	198.2	179.6	176.8	201.9	198.2	194.4	195.3
σ_r	288.2	269.1	266.1	270.0	284.7	267.2	272.1	258.1	256.5	230.2	266.2
σ_p	237.6	269.4	297.2	355.3	226.8	281.0	291.0	204.8	215.4	220.9	260.0
σ_w	327.5	332.6	337.1	344.8	306.1	322.8	361.2	349.7	330.9	314.3	332.7
ρ_a	591.4	572.9	565.7	621.7	595.2	585.1	573.9	620.7	611.8	609.8	594.8
ρ_b	339.9	252.2	257.4	244.1	266.4	284.3	261.6	273.7	260.1	270.5	271.0
ρ_g	185.4	189.0	183.2	215.5	210.2	206.6	204.0	198.6	190.8	212.4	199.6
ρ_I	259.8	290.1	274.7	276.6	259.4	262.2	242.1	262.9	277.2	267.8	267.3
ρ_r	206.8	246.9	230.4	238.2	217.6	210.6	195.4	244.5	208.3	216.6	221.5
ρ_p	707.8	681.3	684.8	708.6	700.1	694.8	710.9	680.8	696.9	702.2	696.8
ρ_w	411.3	442.0	434.8	363.4	477.2	403.8	439.1	494.1	440.1	431.3	433.7
μ_p	535.6	503.7	546.2	591.9	513.4	524.6	585.3	482.6	535.6	515.8	533.4
μ_w	674.7	662.2	691.0	649.3	630.3	650.6	710.1	637.1	620.1	603.8	652.9
ρ_{ga}	195.7	176.8	199.1	205.4	188.7	196.7	210.0	194.3	216.3	196.5	198.0
Maximum											696.8

Table 5: Smets and Wouters: Inefficiency factors per parameter over the **10 chains**, for the **Metropolis - Hastings**

	Slice										
	1	2	3	4	5	6	7	8	9	10	Average
Φ	4.9	3.6	7.0	3.6	5.6	8.6	2.9	3.8	7.8	3.9	5.2
σ_c	12.2	5.5	9.3	4.3	13.4	15.4	5.0	8.5	6.5	6.7	8.7
h	13.1	2.7	8.3	7.5	13.6	26.2	4.3	5.7	5.7	6.8	9.4
ξ_w	16.0	13.5	24.5	53.7	9.9	29.8	7.9	38.9	45.9	7.4	24.8
σ_L	8.2	7.0	6.4	19.7	3.3	10.3	4.6	17.5	14.4	5.3	9.7
ξ_p	6.6	7.5	13.8	5.1	6.1	11.4	5.8	7.6	23.7	2.3	9.0
ι_w	3.2	4.0	3.2	3.1	2.4	2.5	4.6	4.1	7.1	3.1	3.7
ι_p	5.1	4.7	21.2	7.7	5.7	14.0	9.0	6.2	10.9	5.2	9.0
Ψ	3.6	5.6	2.9	4.4	3.0	3.9	2.5	4.7	6.6	4.3	4.1
ϕ_p	3.7	3.3	4.8	4.6	3.0	2.4	5.3	5.7	5.6	3.1	4.2
r_π	3.5	4.0	3.5	7.3	5.5	3.6	4.7	6.1	6.0	4.9	4.9
ρ	3.1	8.6	6.9	4.8	5.3	7.3	3.2	8.0	14.0	5.8	6.7
r_y	4.7	7.3	4.2	11.6	6.9	2.7	4.3	3.1	6.9	5.2	5.7
$r_{\Delta y}$	5.0	2.2	3.3	3.0	4.5	3.8	2.6	3.5	3.8	2.5	3.4
$\bar{\pi}$	5.3	3.0	7.6	4.6	2.8	2.4	3.0	3.4	3.8	3.7	4.0
$100(\beta^{-1}-1)$	2.8	2.2	2.9	2.2	3.1	2.5	2.3	6.1	4.1	3.0	3.1
$\bar{L}$	3.8	2.9	5.2	4.5	4.2	2.5	3.2	3.0	3.1	2.6	3.5
$\bar{\gamma}$	7.6	8.5	10.3	8.0	3.6	7.5	4.9	11.9	3.7	6.8	7.3
α	2.9	2.2	6.7	3.1	3.0	2.7	3.6	4.7	4.9	2.6	3.6
σ_a	3.4	2.4	2.2	2.8	3.0	2.9	3.4	2.9	3.7	2.7	2.9
σ_b	6.1	5.9	4.1	7.9	8.4	12.2	6.5	8.9	5.1	3.9	6.9
σ_g	3.4	3.2	2.2	2.2	2.5	2.2	2.3	4.5	4.0	2.9	3.0
σ_I	16.8	7.9	4.6	5.7	9.5	5.1	4.2	3.8	9.0	4.7	7.1
σ_r	2.9	3.1	3.5	4.4	2.8	3.9	2.5	4.1	4.0	3.4	3.5
σ_p	9.9	7.8	28.1	6.8	4.2	12.9	17.9	14.9	11.0	2.4	11.6
σ_w	3.1	3.7	2.8	3.6	3.6	8.3	3.4	7.2	5.2	6.0	4.7
ρ_a	3.8	5.6	4.4	5.9	11.9	2.9	3.8	3.5	3.2	3.2	4.8
ρ_b	6.2	8.5	3.9	12.4	7.1	12.4	7.1	14.1	7.6	3.6	8.3
ρ_g	3.1	4.7	8.5	8.2	5.0	6.2	6.4	4.0	3.7	2.7	5.3
ρ_I	13.1	10.1	6.4	9.1	8.9	11.9	3.3	3.7	12.5	6.2	8.5
ρ_r	2.9	3.4	4.6	4.1	3.8	6.2	2.4	3.7	4.0	3.9	3.9
ρ_p	9.6	18.7	74.1	14.9	9.6	29.3	26.5	23.2	20.1	18.9	24.5
ρ_w	7.8	4.6	14.8	12.0	5.6	20.9	3.8	7.1	8.6	9.7	9.5
μ_p	11.2	12.5	64.5	16.4	7.7	28.4	31.1	32.4	21.9	11.1	23.7
μ_w	14.4	13.3	12.3	57.6	10.6	23.5	4.5	38.1	41.9	4.5	22.1
ρ_{ga}	2.4	2.5	4.1	3.8	3.6	3.1	4.4	2.1	5.5	2.9	3.4
Maximum											24.8
Nb eval	234.1	233.4	234.8	234.8	235.3	234.1	234.0	234.4	234.3	234.1	234.3

Table 6: Smets and Wouters: Inefficiency factors per parameter over the **10 chains**, for the **standard slice**

	Rotated slice										
	1	2	3	4	5	6	7	8	9	10	Average
Φ	2.5	2.1	2.4	2.8	3.3	2.4	2.1	2.6	3.1	2.2	2.5
σ_c	3.0	4.3	4.1	5.7	4.1	2.8	3.2	2.8	4.6	4.7	3.9
h	2.5	2.3	2.6	6.3	2.7	2.2	3.8	2.5	4.2	3.2	3.2
ξ_w	2.7	7.3	10.5	4.9	5.7	2.8	3.2	4.5	2.3	2.6	4.6
σ_L	2.6	3.1	3.3	3.7	3.9	2.9	2.2	3.7	3.6	2.6	3.2
ξ_p	3.5	3.9	5.1	3.4	2.8	3.6	4.0	3.1	3.0	2.9	3.5
ι_w	3.2	3.2	2.2	2.4	3.8	2.3	4.8	2.6	3.6	4.0	3.2
ι_p	2.8	4.1	2.9	2.8	8.5	2.9	3.2	3.0	3.4	2.3	3.6
Ψ	2.8	2.3	2.5	2.5	2.6	2.9	3.4	2.6	3.7	2.9	2.8
ϕ_p	2.7	4.0	2.4	2.9	2.6	4.0	4.4	2.1	4.0	2.7	3.2
r_π	2.7	2.8	2.3	2.8	2.6	2.5	2.4	3.4	3.5	3.5	2.8
ρ	3.3	3.6	4.7	2.7	5.8	2.9	3.0	4.4	2.9	3.8	3.7
r_y	2.3	2.4	2.4	2.3	2.6	2.6	2.4	4.4	2.8	3.8	2.8
$r_{\Delta y}$	2.6	2.4	2.4	2.7	3.6	2.5	2.5	3.1	2.2	3.8	2.8
$\bar{\pi}$	2.5	3.5	2.2	2.3	3.5	3.7	2.6	3.7	5.8	2.2	3.2
$100(\beta^{-1}-1)$	2.7	2.3	2.3	2.4	2.4	3.2	2.6	2.3	4.2	2.5	2.7
$\bar{L}$	2.9	3.4	2.7	2.2	3.8	3.0	3.0	3.1	8.9	2.4	3.5
$\bar{\gamma}$	3.0	5.9	2.2	2.6	2.8	2.5	3.3	4.2	2.4	3.1	3.2
α	2.3	2.9	2.5	3.2	3.7	2.8	2.4	2.5	2.9	2.2	2.7
σ_a	2.4	3.3	2.2	4.8	2.4	3.7	3.4	2.4	3.2	3.1	3.1
σ_b	4.0	3.9	2.1	4.5	4.2	3.6	2.9	3.8	3.5	3.1	3.5
σ_g	2.7	2.7	3.0	4.0	2.5	3.5	2.6	2.9	3.3	2.4	3.0
σ_I	3.9	2.5	3.5	3.4	2.3	2.6	3.4	3.6	3.8	3.8	3.3
σ_r	2.9	2.3	2.3	2.2	2.3	2.4	2.9	3.3	3.2	2.5	2.6
σ_p	3.0	2.9	2.6	4.2	4.6	3.4	3.5	2.4	2.5	3.6	3.3
σ_w	3.7	3.3	2.5	4.2	2.6	5.7	2.9	3.2	3.0	2.6	3.4
ρ_a	2.5	3.2	3.8	3.0	2.2	2.4	3.1	4.0	3.7	2.6	3.0
ρ_b	4.2	3.6	2.1	6.2	5.1	2.7	3.1	2.8	4.5	2.5	3.7
ρ_g	5.2	4.5	2.9	4.6	5.5	2.6	2.4	5.5	6.4	3.1	4.3
ρ_I	4.0	2.4	4.1	3.6	2.6	2.2	2.9	2.8	5.6	3.7	3.4
ρ_r	2.4	2.1	4.5	2.3	3.7	3.2	2.5	3.5	2.3	4.7	3.1
ρ_p	3.0	7.1	3.0	4.6	4.1	3.9	2.3	2.7	2.8	3.3	3.7
ρ_w	4.4	6.2	4.4	4.1	2.8	2.8	3.4	3.6	5.3	3.0	4.0
μ_p	4.1	6.7	3.3	3.3	4.6	4.6	4.1	3.1	3.3	3.7	4.1
μ_w	6.4	5.1	7.3	3.7	4.0	2.7	3.3	4.6	2.7	3.0	4.3
ρ_{ga}	2.6	2.9	2.1	3.0	2.6	2.3	2.1	2.1	2.3	2.9	2.5
Maximum											4.6
Nb eval	202.9	202.9	203.2	203.0	202.9	203.4	202.9	203.2	203.0	202.6	

Table 7: Smets and Wouters: Inefficiency factors per parameter over the **10 chains**, for the **rotated slice**

9.2 The DSGE Model by the European Commission (2017)

Structural parameters									
	Posterior M-H sampling			Posterior Slice sampling			Posterior Slice sampling - PC		
	Mean	90% HDP interval		Mean	90% HDP interval		Mean	90% HDP interval	
ρ_{BW_EA}	0.81	0.73	0.87	0.78	0.66	0.88	0.79	0.68	0.90
$\eta^{i,\pi}{}_{EA}$	1.13	1.02	1.24	1.22	1.03	1.40	1.21	1.02	1.39
$\eta^{i,y}{}_{EA}$	0.10	0.08	0.13	0.10	0.08	0.13	0.10	0.08	0.13
$\rho^{i}{}_{EA}$	0.74	0.71	0.77	0.74	0.67	0.81	0.75	0.67	0.82
$\eta^{DPHI}{}_{EA}$	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01
$\alpha^{BW,1}{}_{EA}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\eta^{BT}{}_{EA}$	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01
$\eta^{DEFT}{}_{EA}$	0.03	0.02	0.04	0.03	0.02	0.04	0.03	0.02	0.04
FC_{EA}	0.11	0.06	0.16	0.10	0.05	0.17	0.11	0.05	0.16
$\gamma^{I,1}{}_{EA}$	29.73	16.48	43.79	27.21	12.83	42.51	30.41	13.04	47.33
$\gamma^{I,2}{}_{EA}$	32.64	16.32	49.81	34.50	16.21	54.10	35.85	15.72	53.91
$\gamma^{n}{}_{EA}$	46.37	28.68	65.62	54.13	29.27	82.53	54.86	24.78	77.26
$\gamma^{p}{}_{EA}$	36.01	20.04	52.42	39.72	24.00	57.39	37.17	23.09	51.72
$\gamma^{U,2}{}_{EA}$	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01
$\gamma^{w}{}_{EA}$	5.70	3.46	7.91	6.15	3.36	8.66	5.93	3.66	8.45
$\gamma^{wr}{}_{EA}$	0.97	0.96	0.98	0.96	0.94	0.98	0.96	0.94	0.98
$\gamma^{FN,2}{}_{EA}$	1.29	1.15	1.42	1.34	1.08	1.55	1.32	1.12	1.53
FN_EA	0.09	0.03	0.14	0.09	0.03	0.14	0.09	0.03	0.14
$\alpha^{G}{}_{EA}$	0.04	0.02	0.07	0.04	0.02	0.07	0.04	0.02	0.07
$\alpha^{IG}{}_{EA}$	0.06	0.02	0.11	0.07	0.03	0.10	0.07	0.02	0.11
$\alpha^{T}{}_{EA}$	0.01	0.00	0.02	0.01	0.00	0.02	0.01	0.00	0.02
H_EA	0.86	0.82	0.90	0.85	0.79	0.89	0.85	0.81	0.90
$\omega^{s}{}_{EA}$	0.87	0.85	0.90	0.86	0.83	0.90	0.86	0.83	0.90
$\rho^{Oil}{}_{EA}$	0.05	0.01	0.08	0.05	0.01	0.09	0.06	0.01	0.11
$\rho^{Z}{}_{EA}$	0.12	0.07	0.17	0.14	0.02	0.24	0.15	0.02	0.26
$\rho^{APC}{}_{EA}$	0.14	0.05	0.23	0.17	0.04	0.28	0.17	0.03	0.29
$\rho^{APG}{}_{EA}$	0.23	0.07	0.38	0.25	0.08	0.39	0.26	0.10	0.42
$\rho^{API}{}_{EA}$	0.15	0.03	0.25	0.16	0.04	0.27	0.17	0.04	0.28
$\rho^{APIG}{}_{EA}$	0.80	0.72	0.89	0.78	0.65	0.88	0.78	0.68	0.89
$\rho^{GAYTREND}{}_{EA}$	0.94	0.90	0.98	0.93	0.89	0.97	0.94	0.90	0.98
$\rho^{M}{}_{EA}$	0.98	0.97	0.99	0.97	0.95	0.99	0.97	0.95	0.99
$\rho^{MUY}{}_{EA}$	0.53	0.39	0.67	0.55	0.37	0.72	0.57	0.41	0.76
$\rho^{ND}{}_{EA}$	0.85	0.78	0.91	0.85	0.79	0.94	0.86	0.78	0.92
$\rho^{P}{}_{EA}$	0.77	0.71	0.83	0.77	0.68	0.85	0.77	0.69	0.85
$\rho^{PX}{}_{EA}$	0.95	0.93	0.97	0.95	0.92	0.97	0.95	0.92	0.97
$\rho^{TAX}{}_{EA}$	0.89	0.83	0.95	0.89	0.82	0.95	0.89	0.83	0.95
sfp_{EA}	0.93	0.87	0.99	0.92	0.86	0.98	0.92	0.86	0.98
sfw_{EA}	0.79	0.65	0.93	0.75	0.58	0.94	0.75	0.57	0.95

Table 8: GM3 (part 1 of 5): Parameters posterior mean and confidence intervals obtained with the Metropolis-Hasting, the standard slice and the rotated slice, with **10 chains**.

Structural parameters									
	Posterior M-H sampling			Posterior Slice sampling			Posterior Slice sampling - PC		
	Mean	90% HDP interval		Mean	90% HDP interval		Mean	90% HDP interval	
$\sigma^{FM}{}_{EA}$	0.56	0.20	0.92	0.61	0.25	0.98	0.59	0.20	0.99
$\sigma^{O}{}_{EA}$	0.40	0.32	0.48	0.41	0.32	0.50	0.41	0.31	0.50
$\sigma^{Z}{}_{EA}$	2.57	2.15	3.01	2.73	1.88	3.52	2.83	1.97	3.62
$\theta^{N}{}_{EA}$	2.32	1.65	3.04	2.29	1.57	2.87	2.25	1.56	2.85
θ_{EA}	1.49	1.24	1.74	1.56	1.24	1.85	1.55	1.22	1.86
$\rho^{B}{}_{EA\_EA}$	0.90	0.84	0.96	0.89	0.84	0.96	0.89	0.83	0.96
$\rho^{S}{}_{EA\_EA}$	0.95	0.93	0.97	0.95	0.93	0.97	0.95	0.93	0.98
$\rho^{BW}{}_{US}$	0.96	0.94	0.98	0.94	0.91	0.97	0.94	0.92	0.97
$\eta^{i,\pi}{}_{US}$	1.66	1.18	2.21	1.60	1.12	2.02	1.61	1.14	2.05
$\eta^{i,y}{}_{US}$	0.05	0.03	0.07	0.06	0.03	0.09	0.06	0.03	0.08
$\rho^{i}{}_{US}$	0.80	0.74	0.86	0.80	0.73	0.86	0.80	0.73	0.85
$\eta^{DPHI}{}_{US}$	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.01	0.02
$\alpha^{BW,1}{}_{US}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\eta^{BT}{}_{US}$	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00
$\eta^{DEFT}{}_{US}$	0.03	0.01	0.04	0.03	0.01	0.04	0.03	0.01	0.04
FC_{EA}	0.05	0.02	0.08	0.05	0.02	0.08	0.05	0.02	0.08
$\gamma^{I,1}{}_{US}$	21.71	11.05	30.45	23.48	10.05	40.59	25.66	9.81	41.66
$\gamma^{I,2}{}_{US}$	44.37	23.21	69.80	43.15	19.51	65.05	46.17	20.14	71.95
$\gamma^{n}{}_{US}$	23.03	12.82	34.54	23.15	9.48	36.96	23.68	8.87	35.98
$\gamma^{p}{}_{US}$	32.21	21.30	42.37	30.63	21.31	42.15	29.91	19.74	40.76
$\gamma^{U,2}{}_{US}$	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01
$\gamma^{w}{}_{US}$	3.72	1.92	5.42	3.62	2.10	5.30	3.66	1.99	5.15
$\gamma^{wr}{}_{US}$	0.98	0.97	0.99	0.97	0.96	0.99	0.97	0.96	0.99
$\gamma^{FN,2}{}_{US}$	2.45	1.98	3.05	2.53	1.98	3.11	2.53	1.97	3.10
FN_US	0.12	0.06	0.18	0.12	0.05	0.18	0.12	0.05	0.18
$\alpha^{G}{}_{US}$	0.02	0.01	0.04	0.03	0.01	0.05	0.03	0.01	0.05
$\alpha^{IG}{}_{US}$	0.04	0.01	0.06	0.04	0.02	0.07	0.04	0.02	0.07
$\alpha^{T}{}_{US}$	0.06	0.02	0.09	0.06	0.01	0.09	0.06	0.02	0.09
H_US	0.86	0.81	0.89	0.85	0.80	0.90	0.85	0.81	0.90
$\omega^{s}{}_{US}$	0.88	0.86	0.90	0.88	0.87	0.90	0.88	0.87	0.90
$\rho^{Oil}{}_{US}$	0.08	0.01	0.16	0.09	0.01	0.17	0.09	0.02	0.18
$\rho^{Z}{}_{US}$	0.10	0.05	0.15	0.11	0.03	0.19	0.12	0.03	0.19
$\rho^{APC}{}_{US}$	0.54	0.46	0.63	0.50	0.38	0.64	0.52	0.38	0.64
$\rho^{APG}{}_{US}$	0.26	0.12	0.39	0.25	0.08	0.38	0.24	0.09	0.39
$\rho^{API}{}_{US}$	0.34	0.21	0.47	0.33	0.21	0.48	0.33	0.19	0.48
$\rho^{APIG}{}_{US}$	0.97	0.96	0.98	0.97	0.96	0.98	0.97	0.96	0.98
$\rho^{GAYTREND}{}_{US}$	0.97	0.95	0.98	0.96	0.95	0.98	0.96	0.95	0.98
$\rho^{M}{}_{US}$	0.97	0.96	0.99	0.93	0.85	0.99	0.95	0.90	0.99
$\rho^{MUY}{}_{US}$	0.31	0.14	0.50	0.35	0.18	0.59	0.36	0.16	0.56
$\rho^{ND}{}_{US}$	0.89	0.84	0.93	0.88	0.83	0.93	0.89	0.83	0.94
$\rho^{P}{}_{US}$	0.80	0.75	0.85	0.78	0.72	0.85	0.78	0.72	0.84
$\rho^{P}{}_{US}$	0.93	0.90	0.98	0.92	0.87	0.97	0.92	0.88	0.97
$\rho^{TAX}{}_{US}$	0.95	0.93	0.98	0.95	0.92	0.98	0.95	0.93	0.98

Table 8: GM3 (part 2 of 5): Parameters posterior mean and confidence intervals obtained with the Metropolis-Hasting, the standard slice and the rotated slice, with **10 chains**.

Structural parameters									
	Posterior M-H sampling			Posterior Slice sampling			Posterior Slice sampling - PC		
	Mean	90% HDP interval		Mean	90% HDP interval		Mean	90% HDP interval	
sfp_{US}	0.88	0.80	0.98	0.88	0.80	0.98	0.88	0.80	0.98
sfw_{US}	0.62	0.35	0.91	0.63	0.33	0.91	0.63	0.37	0.93
${\sigma^{FM}}_{US}$	0.67	0.34	0.99	0.62	0.33	1.00	0.61	0.31	1.00
${\sigma^{O}}_{US}$	0.35	0.31	0.39	0.36	0.31	0.41	0.36	0.31	0.41
${\sigma^{Z}}_{US}$	1.83	1.53	2.20	1.85	1.41	2.32	1.87	1.41	2.27
${\theta^{N}}_{US}$	2.00	1.46	2.53	2.00	1.42	2.51	1.98	1.40	2.44
θ_{US}	1.52	1.21	1.80	1.51	1.24	1.77	1.48	1.23	1.75
${\rho^{B}}_{US\_US}$	0.89	0.84	0.94	0.89	0.83	0.95	0.89	0.83	0.95
${\rho^{S}}_{US\_US}$	0.97	0.96	0.99	0.97	0.96	0.99	0.97	0.96	0.99
${\rho^{P}}_{RoW}$	0.78	0.71	0.85	0.79	0.67	0.90	0.79	0.69	0.89
${\rho^{Y}}_{RoW}$	0.64	0.54	0.76	0.73	0.50	0.94	0.69	0.50	0.90
${\alpha^{BW,1}}_{RoW}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
${\eta^{i,\pi}}_{RoW}$	2.25	1.77	2.74	2.29	1.74	2.86	2.27	1.75	2.87
${\eta^{i,y}}_{RoW}$	0.81	0.55	1.09	0.68	0.30	1.06	0.75	0.40	1.12
h_{RoW}	0.89	0.86	0.92	0.89	0.83	0.94	0.88	0.83	0.92
${\phi^{y}}_{RoW}$	0.08	0.04	0.13	0.21	0.03	0.49	0.16	0.02	0.38
${\rho^{i}}_{RoW}$	0.97	0.96	0.97	0.96	0.95	0.98	0.97	0.96	0.98
${\rho^{IM}}_{RoW}$	0.26	0.19	0.33	0.33	0.19	0.46	0.31	0.18	0.42
$\rho^{GAYTREND}_{RoW}$	0.90	0.87	0.93	0.90	0.87	0.94	0.90	0.87	0.93
${\rho^{M}}_{RoW}$	0.99	0.98	0.99	0.98	0.98	0.99	0.98	0.98	0.99
${\rho^{M}}_{EA\_RoW}$	0.92	0.88	0.96	0.92	0.88	0.96	0.91	0.88	0.96
${\rho^{PX}}_{EA\_RoW}$	0.99	0.98	0.99	0.98	0.98	0.99	0.98	0.98	0.99
${\rho^{PX}}_{US\_RoW}$	0.98	0.98	0.99	0.98	0.97	0.99	0.98	0.97	0.99
sfp_{US}	0.91	0.83	0.98	0.90	0.82	0.98	0.90	0.82	0.98
${\sigma^{C}}_{RoW}$	1.69	1.46	1.99	2.01	1.47	2.43	1.90	1.53	2.35
${\sigma^{FM}}_{RoW}$	0.13	0.03	0.21	0.14	0.04	0.22	0.14	0.04	0.22
θ_{RoW}	1.56	1.22	1.90	1.52	1.16	1.84	1.52	1.19	1.85

Table 8: GM3 (part 3 of 5): Parameters posterior mean and confidence intervals obtained with the Metropolis-Hasting, the standard slice and the rotated slice, with **10 chains**.

Structural parameters									
	Posterior M-H sampling			Posterior Slice sampling			Posterior Slice sampling - PC		
	Mean	90% HDP interval		Mean	90% HDP interval		Mean	90% HDP interval	
Shock processes									
$\sigma^{\epsilon}_{INOM\_EA}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{BW\_EA}$	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
$\sigma^{\epsilon}_{APC\_EA}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{APG\_EA}$	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01
$\sigma^{\epsilon}_{API\_EA}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{APIG\_EA}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{ND\_EA}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{G\_EA}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{GAYTREND\_EA}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{LAYTREND\_EA}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{IG\_EA}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{M\_EA}$	0.03	0.03	0.04	0.03	0.03	0.04	0.03	0.03	0.04
$\sigma^{\epsilon}_{MUY\_EA}$	0.04	0.03	0.06	0.04	0.02	0.06	0.04	0.02	0.06
$\sigma^{\epsilon}_{PX\_EA}$	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
$\sigma^{\epsilon}_{T\_EA}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{TAX\_EA}$	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01
$\sigma^{\epsilon}_{UC\_EA}$	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02
$\sigma^{\epsilon}_{U\_EA}$	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.02
$\sigma^{\epsilon}_{B\_EA\_EA}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{S\_EA\_EA}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{INOM\_US}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{BW\_US}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{APC\_US}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{APG\_US}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{API\_US}$	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
$\sigma^{\epsilon}_{APIG\_US}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{ND\_US}$	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
$\sigma^{\epsilon}_{G\_US}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{GAYTREND\_US}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{LAYTREND\_US}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{IG\_US}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{M\_US}$	0.04	0.03	0.05	0.04	0.03	0.05	0.04	0.03	0.05
$\sigma^{\epsilon}_{MUY\_US}$	0.05	0.04	0.06	0.05	0.03	0.06	0.05	0.03	0.06
$\sigma^{\epsilon}_{PX\_US}$	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
$\sigma^{\epsilon}_{T\_US}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{TAX\_US}$	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
$\sigma^{\epsilon}_{UC\_US}$	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02
$\sigma^{\epsilon}_{U\_US}$	0.02	0.01	0.03	0.02	0.01	0.03	0.02	0.01	0.03

Table 8: GM3 (part 4 of 5): Parameters posterior mean and confidence intervals obtained with the Metropolis-Hasting, the standard slice and the rotated slice, with **10 chains**.

	Posterior M-H sampling			Posterior Slice sampling			Posterior Slice sampling - PC		
	Mean	90% HDP interval		Mean	90% HDP interval		Mean	90% HDP interval	
$\sigma^{\epsilon}_{B\_US\_US}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{S\_US\_US}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{INOM\_RoW}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{M\_RoW}$	0.02	0.02	0.03	0.03	0.02	0.03	0.02	0.02	0.03
$\sigma^{\epsilon}_{M\_EA\_RoW}$	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
$\sigma^{\epsilon}_{PX\_EA\_RoW}$	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
$\sigma^{\epsilon}_{PX\_US\_RoW}$	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03
$\sigma^{\epsilon}_{UC\_RoW}$	0.01	0.01	0.01	0.01	0.00	0.02	0.01	0.00	0.01
$\sigma^{\epsilon}_{Y\_RoW}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\sigma^{\epsilon}_{GAYTREND\_RoW}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 8: GM3 (part 5 of 5): Parameters posterior mean and confidence intervals obtained with the Metropolis-Hasting, the standard slice and the rotated slice, with **10 chains**.

	Metropolis - Hastings										
	1	2	3	4	5	6	7	8	9	10	Average
$\sigma^{\epsilon}_{INOM\_EA}$	614.0	624.6	650.7	466.5	532.6	396.5	648.7	626.2	546.5	365.8	547.2
$\sigma^{\epsilon}_{BW\_EA}$	663.1	557.2	596.8	620.4	655.8	645.5	532.7	538.7	613.6	548.5	597.2
$\sigma^{\epsilon}_{APC\_EA}$	675.7	660.0	579.1	611.4	547.9	685.6	655.9	691.5	617.3	604.0	632.8
$\sigma^{\epsilon}_{APG\_EA}$	661.0	636.3	664.9	613.8	594.9	580.6	660.7	632.7	570.3	571.8	618.7
$\sigma^{\epsilon}_{API\_EA}$	425.7	633.2	576.1	557.1	681.3	528.3	442.2	604.2	634.9	646.9	573.0
$\sigma^{\epsilon}_{APIG\_EA}$	544.0	570.2	634.3	665.8	584.1	574.0	498.7	645.1	623.2	516.8	585.6
$\sigma^{\epsilon}_{ND\_EA}$	472.2	558.9	628.5	654.5	672.2	645.3	511.4	564.1	667.4	494.4	586.9
$\sigma^{\epsilon}_{G\_EA}$	680.3	676.6	677.5	647.2	617.6	552.0	695.7	560.2	625.2	554.0	628.6
$\sigma^{\epsilon}_{GAYTREND\_EA}$	681.8	635.7	683.4	692.0	641.3	600.5	660.5	577.7	608.7	574.3	635.6
$\sigma^{\epsilon}_{LAYTREND\_EA}$	534.2	619.1	672.4	699.0	569.6	681.4	664.2	667.9	690.3	662.1	646.0
$\sigma^{\epsilon}_{IG\_EA}$	668.2	669.6	710.7	630.2	588.0	592.8	667.0	661.2	694.8	544.9	642.7
$\sigma^{\epsilon}_{M\_EA}$	569.2	624.8	666.0	626.3	553.5	652.6	661.2	590.2	579.2	575.2	609.8
$\sigma^{\epsilon}_{MUY\_EA}$	669.5	596.7	600.4	579.7	281.8	433.3	648.0	557.6	541.2	544.6	545.3
$\sigma^{\epsilon}_{PX\_EA}$	620.7	690.9	657.0	650.2	592.7	549.0	677.2	701.9	654.5	611.1	640.5
$\sigma^{\epsilon}_{T\_EA}$	624.5	600.8	696.1	653.9	653.7	420.9	491.6	655.9	651.4	647.7	609.7
$\sigma^{\epsilon}_{TAX\_EA}$	650.9	558.9	619.4	569.2	665.4	559.0	575.7	573.9	686.1	551.7	601.0
$\sigma^{\epsilon}_{UC\_EA}$	309.6	488.0	418.9	509.9	432.1	287.0	527.5	327.7	396.3	575.7	427.3
$\sigma^{\epsilon}_{U\_EA}$	380.0	401.3	366.5	339.6	434.3	257.5	398.2	417.4	579.4	556.5	413.1
$\sigma^{\epsilon}_{B\_EA\_EA}$	517.6	640.0	549.8	483.8	526.1	529.9	611.5	619.7	453.4	665.7	559.8
$\sigma^{\epsilon}_{S\_EA\_EA}$	350.9	334.9	482.8	383.4	374.1	385.6	354.9	385.0	452.5	567.5	407.2
$\sigma^{\epsilon}_{INOM\_US}$	568.4	539.9	577.8	534.4	571.7	547.1	596.3	646.1	569.0	599.0	575.0
$\sigma^{\epsilon}_{BW\_US}$	520.0	595.6	626.4	525.6	417.9	621.8	679.7	663.7	625.8	610.8	588.7
$\sigma^{\epsilon}_{APC\_US}$	657.0	480.0	601.4	607.5	588.2	507.8	579.9	550.6	520.3	583.4	567.6
$\sigma^{\epsilon}_{APG\_US}$	622.9	701.2	582.3	708.8	633.7	654.7	618.2	586.3	491.0	639.2	623.8
$\sigma^{\epsilon}_{API\_US}$	572.2	540.0	526.7	658.6	620.7	633.4	609.1	654.0	542.3	634.7	599.2
$\sigma^{\epsilon}_{APIG\_US}$	606.2	504.3	651.5	414.6	646.0	394.4	612.3	602.5	587.2	551.6	557.1
$\sigma^{\epsilon}_{ND\_US}$	516.6	658.1	532.2	415.8	634.4	643.8	478.9	599.6	638.1	517.5	563.5
$\sigma^{\epsilon}_{G\_US}$	677.6	703.2	597.8	651.3	670.5	577.0	641.9	598.8	456.5	635.6	621.0
$\sigma^{\epsilon}_{GAYTREND\_US}$	554.4	536.3	645.2	594.6	454.2	605.7	611.2	645.6	525.5	556.3	572.9
$\sigma^{\epsilon}_{LAYTREND\_US}$	622.8	594.4	624.5	578.5	559.7	591.1	643.9	611.7	484.3	688.1	599.9
$\sigma^{\epsilon}_{IG\_US}$	667.3	565.2	667.2	645.9	669.4	569.8	626.0	587.0	626.9	570.8	619.6
$\sigma^{\epsilon}_{M\_US}$	660.0	612.0	609.0	641.7	677.7	526.6	695.2	562.0	480.6	576.8	604.2
$\sigma^{\epsilon}_{MUY\_US}$	487.4	563.2	444.1	412.6	221.6	546.2	436.3	545.6	456.1	482.4	459.6
$\sigma^{\epsilon}_{PX\_US}$	665.0	670.4	545.0	619.8	593.5	599.0	689.9	614.6	671.4	661.7	633.0
$\sigma^{\epsilon}_{T\_US}$	650.9	661.4	676.2	598.2	587.1	700.3	656.0	612.5	686.9	681.8	651.1
$\sigma^{\epsilon}_{TAX\_US}$	626.8	616.7	570.1	489.9	592.3	572.4	644.8	497.6	630.2	484.1	572.5
$\sigma^{\epsilon}_{UC\_US}$	589.4	599.7	611.6	364.1	370.2	529.7	535.6	478.3	539.7	509.7	512.8
$\sigma^{\epsilon}_{U\_US}$	536.1	282.8	302.5	446.4	268.8	461.6	345.1	324.8	331.5	419.3	371.9
$\sigma^{\epsilon}_{B\_US\_US}$	659.2	666.4	608.6	475.3	646.6	530.3	620.5	640.5	653.5	585.7	608.7
$\sigma^{\epsilon}_{S\_US\_US}$	395.9	463.7	290.6	400.4	397.5	339.0	547.9	459.9	549.8	366.1	421.1
$\sigma^{\epsilon}_{INOM\_RoW}$	480.7	650.8	626.9	475.2	647.2	646.5	684.7	629.9	575.6	578.7	599.6

Table 9: GM3 (part 1 of 4): Inefficiency factors per parameter over the **10 chains**, for the **Metropolis - Hastings**

	Metropolis - Hastings										
	1	2	3	4	5	6	7	8	9	10	Average
$\sigma^{\epsilon}_{M\_RoW}$	471.3	593.9	660.4	505.6	573.9	577.5	530.1	605.6	634.6	605.8	575.9
$\sigma^{\epsilon}_{M\_EA\_RoW}$	523.5	594.8	503.4	659.5	633.8	698.8	627.8	641.6	529.8	627.6	604.1
$\sigma^{\epsilon}_{PX\_EA\_RoW}$	661.9	560.3	602.9	590.3	566.1	666.7	470.9	495.3	436.3	647.6	569.8
$\sigma^{\epsilon}_{PX\_US\_RoW}$	620.4	611.1	686.1	601.8	640.8	555.4	600.6	688.9	610.0	490.7	610.6
$\sigma^{\epsilon}_{UC\_RoW}$	469.2	347.6	492.1	266.9	409.6	507.6	448.9	470.7	435.4	638.7	448.7
$\sigma^{\epsilon}_{Y\_RoW}$	660.5	600.3	659.2	523.7	646.0	615.6	677.7	556.3	631.3	602.1	617.3
$\sigma^{\epsilon}_{GAYTREND\_RoW}$	626.7	608.6	633.3	519.2	656.8	638.2	603.3	640.9	648.6	667.4	624.3
ρ_{BW_EA}	679.1	561.0	594.8	634.8	619.4	610.1	542.8	480.3	614.9	555.5	589.3
${\eta^{i,\pi}}_{EA}$	399.1	391.6	240.2	474.8	349.5	312.5	676.4	358.2	622.3	459.5	428.4
${\eta^{i,y}}_{EA}$	646.7	647.4	566.0	683.2	562.8	587.1	623.7	338.6	550.5	623.5	583.0
${\rho^{i}}_{EA}$	570.8	516.6	580.3	595.4	541.5	663.2	610.1	579.8	473.0	608.9	574.0
${\eta^{DPHI}}_{EA}$	539.7	510.2	441.1	367.3	445.1	545.2	588.5	379.3	549.2	475.1	484.1
${\alpha^{BW,1}}_{EA}$	330.1	279.1	352.7	280.4	258.6	244.1	513.5	404.0	271.9	386.7	332.1
${\eta^{BT}}_{EA}$	613.8	506.1	616.2	374.0	571.1	600.5	502.8	506.4	473.7	608.5	537.3
${\eta^{DEFT}}_{EA}$	45.7	64.5	52.8	48.4	103.0	71.4	42.8	53.2	80.9	51.0	61.4
FC_{EA}	410.0	418.1	387.5	519.1	417.9	509.0	470.4	390.8	441.4	317.2	428.1
${\gamma^{I,1}}_{EA}$	528.8	583.9	589.4	530.7	428.4	543.7	648.9	505.9	517.3	686.6	556.4
${\gamma^{I,2}}_{EA}$	399.1	563.1	555.7	671.5	578.1	594.2	520.4	571.0	414.8	610.6	547.9
${\gamma^{n}}_{EA}$	524.4	523.1	378.2	600.9	494.7	543.6	337.0	663.8	543.6	579.7	518.9
${\gamma^{p}}_{EA}$	529.4	606.4	598.3	621.3	399.9	596.7	566.3	591.7	516.6	497.1	552.4
${\gamma^{U,2}}_{EA}$	545.8	502.0	438.1	371.3	445.6	381.2	469.7	293.6	502.7	296.5	424.7
${\gamma^{w}}_{EA}$	401.8	319.8	408.6	419.4	366.4	222.7	465.4	457.0	531.0	564.4	415.7
${\gamma^{wr}}_{EA}$	578.0	383.7	362.2	270.4	279.7	449.6	306.6	504.1	322.5	447.1	390.4
${\gamma^{FN,2}}_{EA}$	476.3	614.4	593.4	691.8	695.8	669.6	516.0	577.7	616.4	522.3	597.4
FN_EA	407.0	386.3	407.1	374.3	434.1	369.4	299.4	186.9	353.8	288.1	350.6
${\alpha^{G}}_{EA}$	617.9	659.4	604.0	695.0	709.3	619.3	601.8	624.7	687.6	685.0	650.4
${\alpha^{IG}}_{EA}$	575.6	654.0	590.6	641.2	369.2	680.9	643.5	584.9	617.1	584.3	594.1
${\alpha^{T}}_{EA}$	395.7	551.5	557.5	480.4	664.8	510.7	593.8	417.9	512.4	495.7	518.0
H_EA	532.0	377.5	459.7	443.3	255.5	431.1	568.6	434.3	485.5	589.8	457.7
${\omega^{s}}_{EA}$	527.7	598.4	637.8	652.9	612.2	611.4	494.5	618.2	493.8	465.6	571.3
${\rho^{Oil}}_{EA}$	588.4	409.1	256.2	214.0	261.1	179.4	301.4	182.3	369.6	402.5	316.4
${\rho^{Z}}_{EA}$	572.8	401.9	641.5	674.8	570.9	603.3	620.2	660.7	595.2	593.7	593.5
${\rho^{APC}}_{EA}$	476.9	514.6	668.1	511.9	517.1	579.5	592.6	415.4	589.5	563.9	543.0
${\rho^{APG}}_{EA}$	704.0	659.8	628.7	581.0	619.6	406.7	686.2	666.7	673.7	523.5	615.0
${\rho^{API}}_{EA}$	588.8	633.8	569.5	597.0	554.8	608.5	530.0	539.9	662.1	664.5	594.9
${\rho^{APIG}}_{EA}$	612.4	680.5	609.7	547.1	572.9	648.9	663.6	649.4	673.1	517.4	617.5
${\rho^{GAYTREND}}_{EA}$	615.7	377.8	490.5	671.7	475.7	405.9	607.6	550.4	475.5	650.8	532.2
${\rho^{M}}_{EA}$	383.0	533.5	304.8	596.5	522.7	628.7	296.1	562.3	579.9	574.2	498.2
${\rho^{MUY}}_{EA}$	695.0	552.2	525.6	369.9	489.3	665.8	662.4	530.7	555.6	580.8	562.7
${\rho^{ND}}_{EA}$	564.7	616.5	454.3	450.1	569.6	580.8	628.8	549.3	659.1	606.2	567.9
${\rho^{P}}_{EA}$	583.3	523.1	473.8	444.6	574.1	491.6	502.1	452.6	518.1	529.1	509.2
${\rho^{PX}}_{EA}$	640.1	654.2	680.0	567.3	658.6	482.2	704.9	625.7	636.5	587.4	623.7
${\rho^{TAX}}_{EA}$	478.5	531.5	246.4	580.4	421.2	555.9	469.0	609.0	353.8	508.8	475.5
sfp_{EA}	438.9	398.8	462.2	296.7	403.4	297.6	379.0	333.9	454.0	491.6	395.6
sfw_{EA}	470.6	503.3	363.6	428.1	564.1	453.9	559.1	574.4	379.6	515.9	481.3
${\sigma^{FM}}_{EA}$	228.5	449.0	480.6	238.2	543.0	463.6	255.7	380.0	381.0	276.2	369.6

Table 9: GM3 (part 2 of 4): Inefficiency factors per parameter over the **10 chains**, for the **Metropolis - Hastings**

	Metropolis - Hastings										
	1	2	3	4	5	6	7	8	9	10	Average
${\sigma^{O}}_{EA}$	371.8	345.4	198.7	237.9	213.1	125.1	317.8	302.3	313.1	254.6	268.0
${\sigma^{Z}}_{EA}$	645.6	463.8	596.7	630.3	611.1	594.4	638.4	640.0	561.8	551.0	593.3
${\theta^{N}}_{EA}$	397.2	494.1	357.3	369.2	351.4	247.4	453.6	440.5	278.2	259.2	364.8
θ_{EA}	373.4	328.0	364.7	425.1	435.9	289.9	394.9	368.1	556.2	423.3	396.0
${\rho^{B}}_{EA\_EA}$	610.1	606.3	565.4	599.7	638.6	610.6	624.4	662.2	501.5	662.9	608.2
${\rho^{S}}_{EA\_EA}$	558.4	562.3	595.2	349.4	502.7	405.3	590.1	481.0	615.8	648.8	530.9
${\rho^{BW}}_{US}$	513.3	621.1	585.7	470.9	239.5	563.5	573.5	595.4	591.5	617.8	537.2
${\eta^{i,\pi}}_{US}$	388.2	695.1	536.0	540.3	345.2	558.4	682.9	635.2	514.2	676.0	557.2
${\eta^{i,y}}_{US}$	602.0	668.3	668.3	601.7	694.6	643.2	672.5	625.5	578.2	591.5	634.6
${\rho^{i}}_{US}$	540.2	419.9	564.2	644.6	664.4	536.4	613.5	639.8	546.5	475.7	564.5
${\eta^{DPHI}}_{US}$	509.2	401.2	363.4	444.1	451.8	372.2	419.0	565.2	498.0	373.2	439.7
${\alpha^{BW,1}}_{US}$	193.9	165.0	121.4	230.5	233.1	239.8	194.0	245.0	337.2	195.1	215.5
${\eta^{BT}}_{US}$	513.0	513.2	583.1	580.9	642.8	455.0	478.8	581.4	584.1	637.5	557.0
${\eta^{DEFT}}_{US}$	43.8	49.3	58.4	41.2	61.4	75.9	58.7	75.3	72.9	96.1	63.3
FC_{EA}	160.0	151.9	208.6	203.0	187.2	122.6	262.6	283.9	208.5	177.8	196.6
${\gamma^{I,1}}_{US}$	637.2	560.2	627.4	340.2	564.3	548.2	642.0	596.3	561.6	628.4	570.6
${\gamma^{I,2}}_{US}$	496.8	605.9	641.9	569.6	627.5	532.6	620.1	535.5	438.8	486.5	555.5
${\gamma^{n}}_{US}$	423.0	636.2	672.9	647.0	618.0	548.4	623.6	525.2	530.2	668.1	589.3
${\gamma^{p}}_{US}$	398.7	509.8	492.2	382.9	379.9	564.0	391.2	504.0	420.0	481.5	452.4
${\gamma^{U,2}}_{US}$	424.8	412.8	451.9	454.8	563.2	491.7	600.7	459.1	367.3	494.8	472.1
${\gamma^{w}}_{US}$	507.9	258.0	378.4	438.1	304.4	389.7	375.1	332.0	193.6	428.0	360.5
${\gamma^{wr}}_{US}$	283.7	342.2	192.5	313.5	432.6	407.7	457.7	425.0	412.8	599.0	386.7
${\gamma^{FN,2}}_{US}$	530.0	619.0	615.6	654.0	611.4	702.5	661.9	569.3	585.8	330.2	588.0
FN_US	188.1	366.8	278.1	455.6	265.6	248.2	433.1	385.5	257.3	365.7	324.4
${\alpha^{G}}_{US}$	669.1	485.0	601.9	642.7	521.5	387.6	631.8	555.1	614.6	633.5	574.3
${\alpha^{IG}}_{US}$	639.4	556.6	623.7	489.1	559.4	561.0	628.9	432.6	631.1	625.7	574.8
${\alpha^{T}}_{US}$	437.3	420.1	485.4	544.4	470.6	545.9	551.1	582.6	523.8	568.8	513.0
H_US	498.0	602.9	555.3	478.4	341.7	525.6	570.7	438.5	502.1	467.9	498.1
${\omega^{s}}_{US}$	575.8	571.0	456.4	677.6	496.7	577.4	562.1	496.8	684.7	640.4	573.9
${\rho^{Oil}}_{US}$	388.8	590.3	463.3	286.6	504.2	277.3	627.9	247.1	312.8	319.8	401.8
${\rho^{Z}}_{US}$	590.3	642.0	598.3	695.0	622.2	480.6	621.4	509.9	534.2	593.6	588.8
${\rho^{APC}}_{US}$	554.5	447.9	645.0	594.2	648.8	635.4	617.7	636.3	489.3	564.2	583.3
${\rho^{APG}}_{US}$	589.5	577.9	616.2	563.5	626.5	587.9	635.1	670.0	631.5	653.1	615.1
${\rho^{API}}_{US}$	606.3	607.3	453.6	592.9	602.2	601.7	540.9	507.2	561.7	671.5	574.5
${\rho^{APIG}}_{US}$	608.2	428.8	612.5	446.9	658.0	618.6	638.2	626.7	578.3	655.3	587.2
${\rho^{GAYTREND}}_{US}$	634.7	623.8	565.9	611.4	583.5	679.5	551.9	649.1	567.2	555.6	602.3
${\rho^{M}}_{US}$	559.2	428.5	495.9	531.9	674.5	519.8	477.1	511.4	563.1	572.4	533.4
${\rho^{MUY}}_{US}$	546.4	549.2	386.6	351.3	488.8	534.9	451.2	546.3	455.8	599.3	491.0
${\rho^{ND}}_{US}$	616.8	583.3	515.1	599.9	608.8	569.6	598.5	565.8	633.2	598.1	588.9
${\rho^{P}}_{US}$	532.2	587.4	646.1	548.6	505.9	498.5	594.0	447.9	589.8	606.0	555.6
${\rho^{P}}_{US}$	674.1	575.5	542.0	606.6	562.1	571.2	622.1	481.2	629.9	635.5	590.0
${\rho^{TAX}}_{US}$	385.5	293.2	406.8	323.0	516.9	249.0	332.9	534.8	349.7	318.6	371.0

Table 9: GM3 (part 3 of 4): Inefficiency factors per parameter over the **10 chains**, for the **Metropolis - Hastings**

	Metropolis - Hastings										
	1	2	3	4	5	6	7	8	9	10	Average
sfp_{US}	385.1	327.2	356.7	185.8	327.9	290.6	555.1	296.7	271.3	420.3	341.7
sfw_{US}	584.2	492.9	474.9	586.0	487.8	547.3	483.5	475.7	558.5	582.8	527.4
${\sigma^{FM}}_{US}$	495.5	541.1	624.8	623.9	412.7	532.7	381.3	454.4	560.4	370.5	499.7
${\sigma^{O}}_{US}$	389.5	298.7	128.1	325.2	224.4	244.3	230.5	379.9	147.2	243.4	261.1
${\sigma^{Z}}_{US}$	605.2	632.5	555.8	684.0	643.9	497.8	626.5	524.0	553.9	539.1	586.3
${\theta^{N}}_{US}$	191.2	193.9	241.4	124.4	209.0	229.5	176.9	149.8	228.2	300.5	204.5
θ_{US}	407.6	328.1	216.2	299.9	356.3	326.1	503.6	398.2	538.3	408.9	378.3
${\rho^{B}}_{US\_US}$	615.3	669.3	529.4	595.4	641.5	538.5	561.9	440.4	555.9	613.2	576.1
${\rho^{S}}_{US\_US}$	461.5	529.5	462.4	371.7	570.0	528.6	586.2	427.3	647.9	611.2	519.6
${\rho^{P}}_{RoW}$	543.9	557.5	628.5	342.5	588.0	553.9	483.6	590.7	483.5	628.0	540.0
${\rho^{Y}}_{RoW}$	497.0	646.3	545.9	576.6	515.6	637.9	362.9	517.2	501.4	504.9	530.6
${\alpha^{BW,1}}_{RoW}$	394.8	342.2	349.1	430.5	470.7	429.8	474.9	372.6	425.2	453.2	414.3
${\eta^{i,\pi}}_{RoW}$	540.3	428.0	559.7	550.9	550.8	440.6	526.7	500.3	597.6	559.2	525.4
${\eta^{i,y}}_{RoW}$	521.1	390.0	630.3	509.1	411.2	444.0	538.4	486.1	538.9	529.6	499.9
h_{RoW}	565.1	325.9	266.8	572.5	509.9	553.0	586.3	526.5	655.7	633.7	519.5
${\phi^{y}}_{RoW}$	588.6	673.7	674.3	519.2	560.5	529.7	360.4	609.5	663.8	585.4	576.5
${\rho^{i}}_{RoW}$	449.1	355.1	373.0	570.6	603.6	418.8	413.6	594.5	541.7	386.9	470.7
${\rho^{IM}}_{RoW}$	667.3	574.0	600.5	646.1	492.3	593.5	512.8	589.0	514.0	630.9	582.0
$\rho^{GAYTREND}_{RoW}$	578.8	606.6	546.3	645.8	569.8	654.8	605.7	566.7	467.0	649.9	589.1
${\rho^{M}}_{RoW}$	587.1	468.6	593.5	661.3	541.4	547.0	450.6	468.9	631.8	585.6	553.6
${\rho^{M}}_{EA\_RoW}$	569.1	648.5	503.7	643.3	591.5	635.6	651.6	681.3	641.8	587.9	615.4
${\rho^{PX}}_{EA\_RoW}$	430.3	465.2	575.3	267.4	296.2	309.1	206.2	162.1	356.2	316.8	338.5
${\rho^{PX}}_{US\_RoW}$	486.2	350.0	563.7	487.5	479.8	436.4	530.7	588.2	576.3	420.3	491.9
sfp_{US}	380.4	616.7	349.4	537.3	345.3	522.8	414.8	271.4	594.8	552.5	458.5
${\sigma^{C}}_{RoW}$	640.5	513.0	630.0	599.0	595.0	620.6	515.0	482.6	553.9	572.3	572.2
${\sigma^{FM}}_{RoW}$	317.0	363.6	262.0	292.4	317.7	612.1	218.5	303.2	386.1	184.3	325.7
θ_{RoW}	286.5	198.3	487.5	418.1	354.9	335.1	302.1	279.1	473.8	325.8	346.1
Maximum											651.1

Table 9: GM3 (part 4 of 4): Inefficiency factors per parameter over the **10 chains**, for the **Metropolis - Hastings**

	Slice										
	1	2	3	4	5	6	7	8	9	10	Average
$\sigma^{\epsilon}_{INOM\_EA}$	3.3	3.9	3.2	2.5	2.3	3.5	3.7	3.2	2.4	2.2	3.0
$\sigma^{\epsilon}_{BW\_EA}$	4.0	7.7	5.8	6.9	4.7	5.0	7.9	8.7	6.3	10.5	6.7
$\sigma^{\epsilon}_{APC\_EA}$	2.4	3.5	2.4	2.9	3.2	2.8	2.6	2.5	2.9	2.7	2.8
$\sigma^{\epsilon}_{APG\_EA}$	2.4	2.4	2.1	4.0	3.0	3.7	2.9	2.5	2.2	2.6	2.8
$\sigma^{\epsilon}_{API\_EA}$	2.2	3.3	3.5	2.2	5.2	2.2	2.6	2.7	5.8	3.1	3.3
$\sigma^{\epsilon}_{APIG\_EA}$	2.9	2.7	3.6	3.2	2.6	3.6	2.4	4.4	2.8	2.5	3.1
$\sigma^{\epsilon}_{ND\_EA}$	3.4	4.2	3.7	4.8	4.3	2.8	3.7	4.7	8.8	6.4	4.7
$\sigma^{\epsilon}_{G\_EA}$	2.4	3.2	3.0	2.4	3.3	2.2	3.7	2.2	3.6	2.9	2.9
$\sigma^{\epsilon}_{GAYTREND\_EA}$	2.7	4.0	3.1	2.7	2.9	4.5	2.3	2.4	3.3	2.2	3.0
$\sigma^{\epsilon}_{LAYTREND\_EA}$	2.5	4.7	3.1	2.2	2.9	2.5	2.7	2.3	2.7	2.5	2.8
$\sigma^{\epsilon}_{IG\_EA}$	2.5	2.6	2.7	2.2	2.3	3.0	3.0	2.3	2.3	2.2	2.5
$\sigma^{\epsilon}_{M\_EA}$	3.4	3.5	5.4	6.4	6.2	4.1	6.9	4.1	4.4	5.6	5.0
$\sigma^{\epsilon}_{MUY\_EA}$	5.9	9.1	7.8	7.8	7.3	6.8	6.1	6.9	5.7	7.6	7.1
$\sigma^{\epsilon}_{PX\_EA}$	3.6	2.5	2.4	3.0	3.7	3.7	2.6	4.5	2.6	2.2	3.1
$\sigma^{\epsilon}_{T\_EA}$	2.5	3.9	2.8	2.7	2.8	3.9	3.0	3.1	2.6	2.5	3.0
$\sigma^{\epsilon}_{TAX\_EA}$	2.8	2.2	2.4	2.5	3.2	3.4	2.6	2.2	2.3	2.4	2.6
$\sigma^{\epsilon}_{UC\_EA}$	10.3	5.3	8.8	7.6	8.3	6.1	6.0	8.3	4.7	9.9	7.5
$\sigma^{\epsilon}_{U\_EA}$	4.9	8.2	9.7	9.6	7.8	5.8	5.6	8.3	8.9	8.9	7.8
$\sigma^{\epsilon}_{B\_EA\_EA}$	2.7	2.6	2.1	2.5	2.7	2.2	2.9	3.1	2.7	2.4	2.6
$\sigma^{\epsilon}_{S\_EA\_EA}$	4.3	5.7	3.0	3.9	6.0	6.0	4.3	2.7	5.4	3.4	4.5
$\sigma^{\epsilon}_{INOM\_US}$	2.8	2.3	2.6	3.3	2.6	2.5	2.3	3.6	2.8	2.8	2.8
$\sigma^{\epsilon}_{BW\_US}$	6.5	7.5	9.1	5.8	5.6	6.6	7.4	8.3	5.0	5.6	6.7
$\sigma^{\epsilon}_{APC\_US}$	2.4	2.5	3.1	2.9	3.4	3.2	2.9	2.2	3.6	2.3	2.8
$\sigma^{\epsilon}_{APG\_US}$	2.6	3.4	3.1	2.3	3.6	2.8	3.6	3.6	3.4	3.2	3.2
$\sigma^{\epsilon}_{API\_US}$	4.4	2.8	4.2	2.8	2.3	3.5	4.3	2.6	2.2	3.5	3.3
$\sigma^{\epsilon}_{APIG\_US}$	2.4	2.2	2.4	2.9	2.8	2.4	2.6	2.5	2.3	2.6	2.5
$\sigma^{\epsilon}_{ND\_US}$	4.1	7.4	3.3	4.8	4.6	5.2	5.4	5.8	3.0	3.6	4.7
$\sigma^{\epsilon}_{G\_US}$	3.2	2.5	2.3	3.6	3.3	2.8	3.1	2.1	2.5	2.7	2.8
$\sigma^{\epsilon}_{GAYTREND\_US}$	4.2	3.6	3.2	4.1	2.8	2.6	3.7	2.1	4.6	2.6	3.3
$\sigma^{\epsilon}_{LAYTREND\_US}$	2.5	3.3	2.8	2.1	3.2	2.7	3.1	2.9	2.7	2.4	2.8
$\sigma^{\epsilon}_{IG\_US}$	3.9	2.5	2.9	3.3	2.4	3.5	5.3	2.6	2.4	2.7	3.2
$\sigma^{\epsilon}_{M\_US}$	6.6	4.9	3.9	4.7	3.6	3.7	3.7	7.5	5.4	4.3	4.8
$\sigma^{\epsilon}_{MUY\_US}$	3.5	4.8	6.9	5.5	6.2	8.2	6.5	2.6	8.4	5.3	5.8
$\sigma^{\epsilon}_{PX\_US}$	3.2	3.4	3.1	2.3	2.5	2.6	2.6	2.6	2.6	3.6	2.8
$\sigma^{\epsilon}_{T\_US}$	2.9	2.5	3.6	2.6	2.4	2.5	2.7	2.2	3.0	2.6	2.7
$\sigma^{\epsilon}_{TAX\_US}$	2.3	2.5	2.2	2.3	2.6	3.2	3.3	2.9	2.9	2.5	2.7
$\sigma^{\epsilon}_{UC\_US}$	6.8	10.3	7.1	3.0	7.3	10.5	6.3	7.2	7.7	10.3	7.7
$\sigma^{\epsilon}_{U\_US}$	7.2	7.3	6.2	8.9	6.6	7.6	7.1	6.8	7.5	4.3	6.9
$\sigma^{\epsilon}_{B\_US\_US}$	2.8	2.7	2.2	2.3	2.5	2.5	2.3	2.5	2.3	2.8	2.5
$\sigma^{\epsilon}_{S\_US\_US}$	4.9	6.8	5.0	3.2	5.7	9.2	5.3	3.8	6.1	4.0	5.4
$\sigma^{\epsilon}_{INOM\_RoW}$	4.0	4.7	4.7	2.9	4.9	3.9	4.2	3.7	6.9	4.1	4.4
$\sigma^{\epsilon}_{M\_RoW}$	7.8	3.5	2.7	5.7	4.1	4.9	8.0	7.9	4.8	7.4	5.7
$\sigma^{\epsilon}_{M\_EA\_RoW}$	3.1	2.2	2.9	2.8	6.1	3.9	3.3	2.4	3.0	3.4	3.3
$\sigma^{\epsilon}_{PX\_EA\_RoW}$	2.3	3.2	2.7	3.0	2.6	3.1	2.8	2.4	2.2	2.5	2.7
$\sigma^{\epsilon}_{PX\_US\_RoW}$	2.2	3.1	3.5	2.4	2.2	2.7	2.6	2.5	2.3	3.4	2.7

Table 10: GM3 (part 1 of 4): Inefficiency factors per parameter over the **10 chains**, for the **standard slice**

	Slice										
	1	2	3	4	5	6	7	8	9	10	Average
$\sigma^{\epsilon}_{UC\_RoW}$	9.3	6.5	6.5	7.0	8.7	7.8	6.9	8.6	4.5	8.5	7.4
$\sigma^{\epsilon}_{Y\_RoW}$	8.4	4.6	9.1	7.6	5.1	6.9	7.8	6.3	4.3	4.0	6.4
$\sigma^{\epsilon}_{GAYTREND\_RoW}$	2.1	3.0	2.7	3.0	2.2	2.9	2.3	2.4	2.3	4.0	2.7
ρ_{BW_EA}	2.9	8.0	5.8	7.6	7.2	5.5	4.3	8.5	4.9	10.4	6.5
$\eta^{i,\pi}{}_{EA}$	2.7	3.1	4.9	3.5	3.0	5.1	5.2	2.9	2.3	5.3	3.8
$\eta^{i,y}{}_{EA}$	5.9	4.9	4.3	3.9	3.5	3.0	3.6	3.8	4.1	5.0	4.2
$\rho^{i}{}_{EA}$	4.4	3.1	2.8	3.7	3.1	2.3	4.5	4.9	2.5	4.2	3.5
$\eta^{DPHI}{}_{EA}$	2.6	3.5	2.2	2.5	4.1	4.5	6.0	3.9	2.5	3.9	3.6
$\alpha^{BW,1}{}_{EA}$	3.7	2.6	3.4	2.5	3.0	2.7	3.2	2.3	2.6	3.5	3.0
$\eta^{BT}{}_{EA}$	3.2	3.1	3.5	2.9	2.9	2.4	3.5	2.4	2.5	3.0	2.9
$\eta^{DEFT}{}_{EA}$	3.0	2.5	2.9	2.8	2.8	2.4	2.9	2.3	3.1	3.1	2.8
FC_{EA}	2.2	2.5	2.5	2.9	2.4	3.3	4.4	2.7	3.1	4.1	3.0
$\gamma^{I,1}{}_{EA}$	7.3	4.4	5.2	7.3	9.6	4.2	7.7	7.8	3.8	4.5	6.2
$\gamma^{I,2}{}_{EA}$	3.7	2.3	4.5	3.2	2.2	3.9	3.5	2.7	4.5	3.8	3.4
$\gamma^{n}{}_{EA}$	3.3	7.6	3.9	5.6	3.0	4.0	5.7	3.6	3.6	6.0	4.6
$\gamma^{p}{}_{EA}$	6.1	8.5	5.6	3.5	5.4	5.5	10.1	6.6	6.7	8.9	6.7
$\gamma^{U,2}{}_{EA}$	2.6	3.4	2.5	4.1	2.7	2.5	2.3	3.1	3.7	5.0	3.2
$\gamma^{w}{}_{EA}$	5.5	7.9	8.5	8.0	8.0	6.1	5.9	8.0	8.9	9.4	7.6
$\gamma^{wr}{}_{EA}$	3.7	5.0	2.7	2.2	4.6	4.1	3.6	3.8	5.5	6.8	4.2
$\gamma^{FN,2}{}_{EA}$	3.3	8.0	3.4	4.8	4.5	2.4	3.5	4.6	9.0	7.9	5.1
FN_EA	3.1	3.4	4.1	3.7	3.0	4.1	2.7	2.5	3.3	3.1	3.3
$\alpha^{G}{}_{EA}$	3.0	2.8	2.3	3.1	2.5	2.7	2.4	3.4	2.8	2.8	2.8
$\alpha^{IG}{}_{EA}$	3.0	3.4	2.3	2.5	2.5	3.0	2.4	2.5	2.4	2.1	2.6
$\alpha^{T}{}_{EA}$	2.6	2.7	3.2	3.3	2.4	3.0	2.8	3.1	3.2	3.0	3.0
H_EA	10.2	6.8	7.0	6.1	9.2	2.7	5.9	6.7	3.1	3.7	6.1
$\omega^{s}{}_{EA}$	3.1	3.3	3.5	2.3	2.4	2.4	2.9	3.6	2.5	2.4	2.9
$\rho^{Oil}{}_{EA}$	4.0	2.9	2.9	4.2	2.9	4.6	4.2	4.0	3.1	2.5	3.5
$\rho^{Z}{}_{EA}$	3.2	3.6	5.8	5.8	8.3	6.0	6.5	5.7	7.9	6.2	5.9
$\rho^{APC}{}_{EA}$	2.3	3.6	2.2	2.7	2.5	3.7	3.2	2.5	3.5	2.9	2.9
$\rho^{APG}{}_{EA}$	2.2	3.6	3.2	2.7	2.4	3.5	2.5	2.5	2.9	3.0	2.8
$\rho^{API}{}_{EA}$	3.2	4.9	2.5	2.6	2.4	2.6	2.1	4.0	2.9	2.4	3.0
$\rho^{APIG}{}_{EA}$	2.5	2.4	2.3	2.3	2.5	2.8	3.0	2.7	2.7	2.3	2.6
$\rho^{GAYTREND}{}_{EA}$	2.5	3.5	3.1	3.5	4.2	3.5	2.6	3.5	2.8	2.7	3.2
$\rho^{M}{}_{EA}$	5.4	5.2	3.0	3.0	2.5	4.6	2.8	3.4	3.1	3.0	3.6
$\rho^{MUY}{}_{EA}$	4.7	5.0	7.7	5.8	5.0	6.4	8.2	4.5	6.1	5.1	5.9
$\rho^{ND}{}_{EA}$	3.5	3.4	2.6	3.6	2.2	2.5	3.5	2.3	3.7	3.7	3.1
$\rho^{P}{}_{EA}$	9.3	7.5	6.5	7.4	4.0	7.5	4.9	5.2	5.1	9.3	6.7
$\rho^{PX}{}_{EA}$	2.6	2.7	2.2	2.3	2.3	2.6	2.3	2.9	2.9	2.6	2.5
$\rho^{TAX}{}_{EA}$	3.0	2.5	3.5	3.2	2.5	2.7	3.2	2.7	2.6	2.7	2.9
sfp_{EA}	3.0	2.7	3.6	3.3	3.8	3.3	2.8	3.2	2.6	2.9	3.1
sfw_{EA}	2.4	2.7	3.6	3.3	2.7	2.3	2.3	2.5	2.8	2.2	2.7
$\sigma^{FM}{}_{EA}$	2.5	3.0	3.4	2.2	2.3	2.2	2.8	3.1	2.5	3.6	2.8
$\sigma^{O}{}_{EA}$	2.4	4.6	2.7	2.9	2.3	4.0	2.8	3.6	2.6	2.5	3.0
$\sigma^{Z}{}_{EA}$	3.6	4.4	6.6	6.6	8.4	5.4	7.0	4.4	6.8	6.3	6.0

Table 10: GM3 (part 2 of 4): Inefficiency factors per parameter over the **10 chains**, for the **standard slice**

	Slice										
	1	2	3	4	5	6	7	8	9	10	Average
θ^{N}_{EA}	3.3	3.0	3.0	3.0	3.7	2.7	2.6	2.4	2.8	5.4	3.2
θ_{EA}	3.7	7.8	2.7	3.4	4.5	3.3	4.4	3.7	4.6	4.5	4.3
$\rho^{B}_{EA\_EA}$	3.9	2.3	3.1	3.1	2.7	2.8	2.7	2.2	2.5	3.8	2.9
$\rho^{S}_{EA\_EA}$	9.6	6.3	5.3	5.6	9.7	6.3	7.8	7.8	4.5	4.0	6.7
ρ^{BW}_{US}	6.8	6.9	9.2	5.2	5.0	5.8	5.7	7.3	4.7	5.2	6.2
$\eta^{i,\pi}_{US}$	2.6	6.0	3.5	3.7	3.2	2.6	3.5	3.6	3.3	3.3	3.5
$\eta^{i,y}_{US}$	4.2	8.3	3.7	6.9	3.9	3.4	6.4	3.7	8.3	5.3	5.4
ρ^{i}_{US}	2.1	3.1	4.0	2.9	3.6	3.0	3.5	4.1	4.0	4.7	3.5
η^{DPHI}_{US}	4.5	6.6	3.1	6.2	3.8	3.0	4.2	2.7	4.5	5.0	4.4
$\alpha^{BW,1}_{US}$	4.6	4.6	2.8	2.8	2.8	2.3	3.0	2.8	2.6	2.7	3.1
η^{BT}_{US}	2.4	2.4	2.2	2.6	3.3	2.2	2.6	3.9	2.9	2.8	2.7
η^{DEFT}_{US}	3.0	2.5	3.3	2.6	3.9	2.9	2.3	2.8	2.3	2.5	2.8
FC_{EA}	2.6	3.6	2.6	2.2	2.3	2.6	3.4	2.7	2.5	3.2	2.8
$\gamma^{I,1}_{US}$	3.0	4.7	4.9	8.6	5.7	8.0	5.4	3.4	10.1	5.4	5.9
$\gamma^{I,2}_{US}$	3.6	6.9	4.3	7.2	2.9	5.6	3.2	3.9	2.8	5.9	4.6
γ^{n}_{US}	3.6	3.6	3.4	3.3	3.0	3.8	3.6	2.7	2.9	2.7	3.3
γ^{p}_{US}	4.4	5.7	4.9	5.8	5.4	7.5	3.3	2.9	6.1	5.4	5.2
$\gamma^{U,2}_{US}$	2.9	3.1	2.8	2.6	2.3	2.2	2.8	3.5	2.9	2.9	2.8
γ^{w}_{US}	6.6	7.6	5.7	9.0	6.5	7.8	6.8	6.4	7.3	4.0	6.8
γ^{wr}_{US}	2.6	3.1	3.9	3.8	4.8	3.5	4.1	2.5	4.6	4.3	3.7
$\gamma^{FN,2}_{US}$	3.5	6.1	3.0	4.9	6.0	5.1	4.3	4.0	2.8	3.3	4.3
FN_US	4.6	3.3	3.5	3.1	3.6	4.2	2.2	2.8	2.5	3.5	3.3
α^{G}_{US}	3.2	3.0	3.6	2.8	4.6	2.4	3.3	2.6	2.4	2.2	3.0
α^{IG}_{US}	2.3	2.7	3.0	2.6	3.6	3.3	2.4	2.2	3.9	3.2	2.9
α^{T}_{US}	2.5	2.6	3.4	2.2	3.2	2.5	2.4	2.1	2.4	2.5	2.6
H_US	5.7	9.0	3.6	5.5	7.0	8.4	8.2	6.5	5.8	9.6	6.9
ω^{s}_{US}	3.1	2.6	3.1	2.9	2.9	5.7	6.3	5.1	4.3	3.2	3.9
ρ^{Oil}_{US}	3.5	4.4	2.6	4.0	3.0	2.5	3.6	3.7	3.1	4.6	3.5
ρ^{Z}_{US}	7.6	5.1	5.1	5.1	3.9	3.6	3.8	7.9	5.4	5.5	5.3
ρ^{APC}_{US}	2.3	2.7	2.7	4.0	2.6	3.6	2.6	2.4	2.3	3.6	2.9
ρ^{APG}_{US}	3.6	2.8	2.4	3.3	4.4	2.5	2.5	2.9	4.4	2.8	3.2
ρ^{API}_{US}	2.4	3.0	2.5	3.9	2.6	2.6	2.6	3.3	3.9	3.3	3.0
ρ^{APIG}_{US}	2.8	2.3	2.4	2.5	2.8	2.3	2.8	2.2	2.3	2.7	2.5
$\rho^{GAYTREND}_{US}$	4.5	3.2	2.8	4.0	4.1	2.9	3.9	2.2	4.8	3.9	3.6
ρ^{M}_{US}	8.8	4.4	5.9	4.0	5.5	5.4	4.0	7.7	3.0	6.8	5.5
ρ^{MUY}_{US}	6.4	6.2	4.3	4.2	4.4	5.4	5.5	3.1	9.8	3.8	5.3
ρ^{ND}_{US}	2.9	4.7	3.0	4.1	3.5	4.6	2.7	3.0	2.6	2.5	3.4
ρ^{P}_{US}	5.5	7.3	7.2	4.4	8.1	9.5	6.0	7.5	5.0	8.4	6.9
ρ^{P}_{US}	3.3	3.4	2.3	3.0	2.5	2.3	3.0	2.3	2.8	3.1	2.8
ρ^{TAX}_{US}	3.6	2.7	2.4	3.1	2.1	2.9	3.0	2.4	3.0	3.1	2.8
sfp_{US}	3.0	3.1	3.0	4.4	2.4	4.2	3.4	2.7	4.1	3.8	3.4
sfw_{US}	3.5	2.6	2.7	3.5	3.1	2.4	2.7	3.2	3.3	2.3	2.9
σ^{FM}_{US}	4.9	2.6	3.0	2.5	3.1	3.2	2.9	3.4	3.1	2.8	3.1
σ^{O}_{US}	4.3	2.2	2.6	3.0	4.0	4.0	2.6	3.4	2.4	3.3	3.2
σ^{Z}_{US}	7.0	5.4	5.4	4.9	4.0	4.1	4.4	7.8	5.4	5.5	5.4
θ^{N}_{US}	2.8	2.3	2.3	3.5	3.5	3.1	2.9	2.3	3.7	3.0	2.9
θ_{US}	3.0	4.1	3.5	3.2	5.5	4.9	6.0	3.3	2.5	3.5	3.9

Table 10: GM3 (part 3 of 4): Inefficiency factors per parameter over the **10 chains**, for the **standard slice**

	Slice										
	1	2	3	4	5	6	7	8	9	10	Average
${\rho^{B}}_{US\_US}$	3.2	2.1	2.6	2.6	2.2	2.3	2.3	3.3	2.7	3.9	2.7
${\rho^{S}}_{US\_US}$	5.4	9.1	3.6	7.8	5.9	8.1	7.1	3.9	9.9	6.8	6.8
${\rho^{P}}_{RoW}$	8.2	6.3	6.5	6.2	7.9	7.3	5.7	7.9	6.2	8.1	7.0
${\rho^{Y}}_{RoW}$	7.2	9.1	10.5	5.8	6.6	11.0	8.1	4.7	3.9	5.6	7.2
${\alpha^{BW,1}}_{RoW}$	3.2	3.0	3.6	2.9	3.0	3.6	4.7	3.6	2.9	3.4	3.4
${\eta^{i,\pi}}_{RoW}$	4.5	8.1	6.7	3.7	3.8	7.5	5.5	4.0	4.9	5.1	5.4
${\eta^{i,y}}_{RoW}$	4.9	3.8	8.0	4.9	3.1	7.5	4.5	4.4	3.9	5.1	5.0
h_{RoW}	8.6	6.3	4.7	7.2	6.3	7.5	4.3	7.1	4.3	7.1	6.3
${\phi^{y}}_{RoW}$	3.4	8.9	7.3	8.2	8.5	11.0	4.7	2.8	4.7	3.9	6.3
${\rho^{i}}_{RoW}$	5.9	7.8	6.0	3.6	4.2	4.5	4.1	4.7	6.0	4.4	5.1
${\rho^{IM}}_{RoW}$	8.3	4.5	3.4	3.7	5.1	7.3	8.1	9.5	4.6	8.9	6.3
${\rho^{GAYTREND}}_{RoW}$	4.9	4.8	3.6	4.2	3.9	5.0	2.9	3.3	3.6	2.4	3.9
${\rho^{M}}_{RoW}$	4.5	3.5	2.7	3.8	3.5	6.0	2.3	6.6	2.6	5.6	4.1
${\rho^{M}}_{EA\_RoW}$	2.3	2.6	3.5	2.9	2.6	2.7	2.8	2.5	2.2	2.9	2.7
${\rho^{PX}}_{EA\_RoW}$	2.7	2.3	4.4	4.3	3.8	3.2	4.3	3.4	3.4	3.6	3.5
${\rho^{PX}}_{US\_RoW}$	5.8	2.8	3.7	4.2	3.4	2.7	2.4	4.9	4.9	3.9	3.9
sfp_{US}	3.2	3.4	4.2	3.8	3.1	5.7	2.9	3.2	2.6	2.8	3.5
${\sigma^{C}}_{RoW}$	7.6	3.5	3.5	4.4	5.8	6.8	8.7	9.3	5.0	10.3	6.5
${\sigma^{FM}}_{RoW}$	3.7	2.8	2.5	3.2	3.6	2.8	2.6	4.6	3.0	3.2	3.2
θ_{RoW}	4.1	8.6	3.2	4.6	3.4	4.9	6.7	4.0	5.2	4.9	5.0
Maximum											7.8
Nb eval	971.8	969.1	967.4	967.6	972.7	963.5	975.2	971.4	962.4	971.1	

Table 10: GM3 (part 4 of 4): Inefficiency factors per parameter over the **10 chains**, for the **standard slice**

	Rotated Slice										
	1	2	3	4	5	6	7	8	9	10	Average
$\sigma^{\epsilon}_{INOM\_EA}$	2.3	3.8	2.5	2.8	6.1	2.4	2.6	3.4	2.8	2.3	3.1
$\sigma^{\epsilon}_{BW\_EA}$	3.0	5.4	6.3	2.4	4.7	3.7	5.5	5.5	3.8	6.0	4.6
$\sigma^{\epsilon}_{APC\_EA}$	3.7	3.0	2.7	3.9	3.3	2.3	3.2	2.2	2.7	3.3	3.0
$\sigma^{\epsilon}_{APG\_EA}$	2.6	3.8	3.1	2.1	3.4	3.5	4.3	3.2	2.9	2.7	3.2
$\sigma^{\epsilon}_{API\_EA}$	2.3	3.1	2.5	2.8	2.5	3.7	3.8	2.5	2.4	3.0	2.9
$\sigma^{\epsilon}_{APIG\_EA}$	2.4	3.4	2.9	2.5	2.5	2.4	3.5	2.4	3.5	2.8	2.8
$\sigma^{\epsilon}_{ND\_EA}$	4.7	3.8	2.8	2.9	4.4	5.4	4.4	3.0	3.7	3.6	3.9
$\sigma^{\epsilon}_{G\_EA}$	2.2	2.8	2.2	3.8	2.7	2.4	2.3	2.8	2.8	2.7	2.7
$\sigma^{\epsilon}_{GAYTREND\_EA}$	3.3	4.7	3.5	2.6	2.4	3.3	3.0	2.5	2.3	2.7	3.0
$\sigma^{\epsilon}_{LAYTREND\_EA}$	2.5	3.1	3.0	2.9	2.6	2.1	2.4	3.0	2.8	2.5	2.7
$\sigma^{\epsilon}_{IG\_EA}$	2.4	2.5	2.7	2.8	2.3	2.3	3.4	2.4	2.9	2.6	2.6
$\sigma^{\epsilon}_{M\_EA}$	2.9	6.5	4.8	3.0	6.7	9.9	7.8	4.0	2.2	5.7	5.3
$\sigma^{\epsilon}_{MUY\_EA}$	4.4	5.7	3.4	4.1	8.3	6.0	5.9	3.4	5.2	3.1	5.0
$\sigma^{\epsilon}_{PX\_EA}$	2.7	2.8	3.5	4.1	4.2	3.3	2.6	5.2	3.1	3.0	3.5
$\sigma^{\epsilon}_{T\_EA}$	3.3	3.2	3.2	2.1	2.4	3.2	2.7	4.3	3.2	2.5	3.0
$\sigma^{\epsilon}_{TAX\_EA}$	3.5	5.5	3.8	3.3	3.4	2.9	3.8	3.0	3.5	3.2	3.6
$\sigma^{\epsilon}_{UC\_EA}$	4.6	9.1	5.3	3.7	5.1	4.8	5.1	2.9	5.6	6.7	5.3
$\sigma^{\epsilon}_{U\_EA}$	3.3	5.9	4.8	5.1	4.2	4.4	4.2	3.4	4.9	5.5	4.6
$\sigma^{\epsilon}_{B\_EA\_EA}$	2.4	2.4	2.3	3.3	4.1	2.7	2.2	3.2	2.7	2.7	2.8
$\sigma^{\epsilon}_{S\_EA\_EA}$	2.3	5.7	3.7	3.8	3.3	3.9	2.9	3.2	3.8	5.2	3.8
$\sigma^{\epsilon}_{INOM\_US}$	3.0	2.6	2.6	3.1	2.3	2.6	2.7	3.0	3.0	3.7	2.9
$\sigma^{\epsilon}_{BW\_US}$	4.3	3.3	5.7	3.8	6.2	4.3	3.7	3.6	5.0	4.3	4.4
$\sigma^{\epsilon}_{APC\_US}$	3.4	3.0	2.7	3.6	2.5	3.8	2.9	3.2	2.3	2.5	3.0
$\sigma^{\epsilon}_{APG\_US}$	3.2	2.6	3.7	2.4	4.8	2.3	2.3	6.1	2.7	3.7	3.4
$\sigma^{\epsilon}_{API\_US}$	2.8	3.1	2.7	2.5	2.7	2.4	3.1	4.1	2.6	2.3	2.8
$\sigma^{\epsilon}_{APIG\_US}$	2.5	4.3	3.1	2.7	3.0	2.2	2.9	3.1	2.8	3.2	3.0
$\sigma^{\epsilon}_{ND\_US}$	2.7	4.2	2.9	2.5	4.1	4.5	4.8	2.9	2.5	3.3	3.4
$\sigma^{\epsilon}_{G\_US}$	2.5	2.3	2.5	2.3	2.7	2.7	2.3	2.6	4.8	3.2	2.8
$\sigma^{\epsilon}_{GAYTREND\_US}$	2.9	3.5	4.7	3.2	3.1	3.6	4.4	4.5	3.2	4.4	3.7
$\sigma^{\epsilon}_{LAYTREND\_US}$	3.7	3.3	3.9	3.8	2.9	3.2	2.9	3.2	2.4	2.5	3.2
$\sigma^{\epsilon}_{IG\_US}$	2.3	2.4	2.4	2.8	2.8	3.7	3.3	3.3	2.6	2.6	2.8
$\sigma^{\epsilon}_{M\_US}$	2.9	4.4	3.1	4.2	5.0	2.9	3.3	2.6	3.1	3.4	3.5
$\sigma^{\epsilon}_{MUY\_US}$	8.6	3.0	4.2	7.1	4.2	4.0	6.7	4.3	5.1	4.5	5.2
$\sigma^{\epsilon}_{PX\_US}$	2.5	2.6	3.0	2.9	2.4	3.1	3.6	2.6	2.6	2.8	2.8
$\sigma^{\epsilon}_{T\_US}$	2.3	2.8	3.4	2.7	2.9	2.7	3.7	2.9	3.9	2.4	3.0
$\sigma^{\epsilon}_{TAX\_US}$	3.0	2.3	4.6	2.7	2.6	4.2	3.1	3.7	3.4	3.6	3.3
$\sigma^{\epsilon}_{UC\_US}$	3.9	4.5	3.4	6.5	5.6	6.6	5.8	4.4	3.3	6.9	5.1
$\sigma^{\epsilon}_{U\_US}$	3.5	3.6	4.4	3.9	3.9	5.4	6.2	4.3	7.7	4.0	4.7
$\sigma^{\epsilon}_{B\_US\_US}$	2.6	4.3	2.5	2.3	2.4	2.4	2.6	2.4	2.6	3.0	2.7
$\sigma^{\epsilon}_{S\_US\_US}$	2.8	3.7	5.7	5.7	4.9	4.7	3.8	2.8	4.9	4.0	4.3
$\sigma^{\epsilon}_{INOM\_RoW}$	2.5	5.5	3.4	2.8	3.6	3.7	2.5	3.8	3.0	6.7	3.7
$\sigma^{\epsilon}_{M\_RoW}$	4.0	9.1	3.4	3.1	4.1	4.3	3.5	7.0	5.2	2.7	4.6
$\sigma^{\epsilon}_{M\_EA\_RoW}$	2.7	2.3	4.3	3.6	3.5	2.9	3.0	3.8	2.4	4.5	3.3
$\sigma^{\epsilon}_{PX\_EA\_RoW}$	2.5	3.0	2.3	3.7	3.0	3.0	2.5	3.2	2.8	2.8	2.9
$\sigma^{\epsilon}_{PX\_US\_RoW}$	3.9	3.4	2.7	2.2	2.8	4.6	4.7	4.2	3.0	2.5	3.4

Table 11: GM3 (part 1 of 4): Inefficiency factors per parameter over the **10 chains**, for the **rotated slice**

	Rotated Slice										
	1	2	3	4	5	6	7	8	9	10	Average
$\sigma^{\epsilon}_{UC\_RoW}$	6.0	3.6	3.8	4.5	4.2	3.3	2.3	9.5	4.9	6.3	4.9
$\sigma^{\epsilon}_{Y\_RoW}$	4.0	3.0	5.4	2.8	3.6	2.9	2.7	3.6	3.9	5.6	3.8
$\sigma^{\epsilon}_{GAYTREND\_RoW}$	2.9	3.6	2.3	2.7	4.1	2.5	2.8	3.2	2.3	3.1	2.9
ρ_{BW_EA}	3.0	4.9	5.1	2.4	4.4	5.7	5.2	5.0	2.7	5.3	4.4
${\eta^{i,\pi}}_{EA}$	4.5	2.3	5.4	3.8	9.2	3.7	4.1	5.8	7.7	2.9	4.9
${\eta^{i,y}}_{EA}$	2.9	5.7	4.7	4.4	4.4	3.4	3.9	5.1	5.9	4.5	4.5
${\rho^{i}}_{EA}$	6.4	4.7	3.8	4.9	4.2	3.1	4.4	3.1	4.8	4.3	4.4
${\eta^{DPHI}}_{EA}$	3.0	5.1	2.9	3.0	5.2	3.2	5.1	4.0	4.5	2.6	3.9
${\alpha^{BW,1}}_{EA}$	3.8	3.8	3.3	2.3	3.6	4.7	3.7	2.7	2.7	2.6	3.3
${\eta^{BT}}_{EA}$	4.6	4.1	3.9	3.5	3.7	5.4	3.2	2.9	2.7	3.5	3.8
${\eta^{DEFT}}_{EA}$	3.8	3.9	2.5	4.2	3.4	3.7	3.2	4.3	3.3	3.0	3.5
FC_{EA}	2.4	4.5	5.1	5.5	2.7	4.6	4.7	4.4	3.6	3.1	4.1
${\gamma^{I,1}}_{EA}$	6.9	9.0	8.9	9.7	4.2	9.3	5.9	6.5	5.6	5.7	7.2
${\gamma^{I,2}}_{EA}$	9.2	7.6	7.0	3.1	5.0	4.5	7.1	8.0	3.0	6.2	6.1
${\gamma^{n}}_{EA}$	3.3	7.7	6.6	4.8	3.6	7.0	3.5	3.1	5.3	7.4	5.2
${\gamma^{p}}_{EA}$	5.9	8.7	4.9	4.0	5.4	5.4	6.7	3.7	4.0	3.5	5.2
${\gamma^{U,2}}_{EA}$	3.2	2.8	2.7	4.4	3.4	3.4	4.4	2.8	3.3	4.2	3.5
${\gamma^{w}}_{EA}$	4.0	5.9	5.0	5.6	4.1	4.6	4.4	3.4	5.2	6.2	4.8
${\gamma^{wr}}_{EA}$	2.3	4.1	4.1	5.3	2.6	7.3	2.7	4.3	3.3	5.5	4.1
${\gamma^{FN,2}}_{EA}$	6.4	2.5	5.6	3.2	3.5	2.6	7.0	2.3	4.5	7.3	4.5
FN_EA	3.3	3.2	2.7	5.3	3.9	3.6	2.9	3.4	2.8	3.0	3.4
${\alpha^{G}}_{EA}$	2.8	5.0	2.7	4.2	2.7	2.9	2.7	2.9	3.5	4.1	3.4
${\alpha^{IG}}_{EA}$	4.0	2.5	6.2	3.6	3.5	6.0	3.5	4.6	3.4	3.1	4.0
${\alpha^{T}}_{EA}$	2.4	2.9	4.4	2.6	2.5	3.3	4.6	2.9	3.5	3.3	3.3
H_EA	4.2	4.5	3.7	3.4	7.8	5.4	2.5	3.0	5.5	6.0	4.6
${\omega^{s}}_{EA}$	5.1	3.2	4.5	3.1	3.3	6.7	7.4	4.2	4.7	2.6	4.5
${\rho^{Oil}}_{EA}$	2.9	4.7	4.4	5.7	4.1	2.8	8.9	3.5	5.1	4.0	4.6
${\rho^{Z}}_{EA}$	2.7	5.6	6.4	3.0	5.5	9.7	7.0	5.5	2.2	6.7	5.4
${\rho^{APC}}_{EA}$	2.7	3.5	4.1	2.4	6.4	3.5	5.3	4.6	4.2	6.2	4.3
${\rho^{APG}}_{EA}$	5.4	4.8	4.2	5.1	3.2	3.0	6.8	3.5	6.8	4.3	4.7
${\rho^{API}}_{EA}$	2.5	4.8	3.1	3.2	3.3	4.0	6.8	4.6	2.9	4.4	4.0
${\rho^{APIG}}_{EA}$	5.1	4.1	3.2	3.7	3.4	3.4	3.8	7.0	2.3	5.1	4.1
${\rho^{GAYTREND}}_{EA}$	4.8	7.4	2.7	5.0	2.3	4.4	3.3	4.1	3.8	3.1	4.1
${\rho^{M}}_{EA}$	2.6	2.8	2.9	6.9	3.8	5.5	3.6	5.5	3.6	3.0	4.0
${\rho^{MUY}}_{EA}$	3.1	5.3	3.7	3.9	8.6	5.1	5.1	4.5	4.6	2.6	4.7
${\rho^{ND}}_{EA}$	3.1	4.1	3.8	3.5	4.6	4.3	2.4	4.0	4.9	3.2	3.8
${\rho^{P}}_{EA}$	5.7	10.6	4.9	3.7	3.3	3.5	6.7	3.3	5.6	8.7	5.6
${\rho^{PX}}_{EA}$	4.8	2.9	3.6	4.5	2.4	3.1	3.1	2.5	2.3	2.7	3.2
${\rho^{TAX}}_{EA}$	5.7	4.4	5.4	3.0	2.6	3.8	4.6	5.8	3.8	3.4	4.3
sfp_{EA}	6.2	2.7	4.0	2.9	3.7	4.6	3.0	2.9	6.0	4.1	4.0
sfw_{EA}	6.4	3.4	5.0	4.3	5.4	4.3	6.0	3.9	5.8	5.0	4.9
${\sigma^{FM}}_{EA}$	3.8	3.6	4.9	5.5	3.7	5.3	6.9	4.4	2.9	6.3	4.7
${\sigma^{O}}_{EA}$	4.6	3.1	4.3	4.7	3.1	3.9	4.9	5.5	4.0	4.4	4.3
${\sigma^{Z}}_{EA}$	3.7	6.7	4.9	3.7	5.6	10.0	8.4	5.2	2.5	7.9	5.9

Table 11: GM3 (part 2 of 4): Inefficiency factors per parameter over the **10 chains**, for the **rotated slice**

	Rotated Slice										
	1	2	3	4	5	6	7	8	9	10	Average
θ^{N}_{EA}	5.3	3.2	4.8	5.7	5.2	3.0	3.9	4.3	5.4	7.2	4.8
θ_{EA}	3.1	5.5	4.5	6.6	3.6	3.1	2.8	5.4	3.1	6.6	4.4
$\rho^{B}_{EA\_EA}$	5.0	4.6	4.5	2.9	4.6	4.8	3.9	5.4	3.3	2.9	4.2
$\rho^{S}_{EA\_EA}$	4.4	8.8	9.0	6.9	2.8	4.6	4.5	5.0	3.7	6.2	5.6
ρ^{BW}_{US}	3.5	4.6	6.4	2.8	6.8	4.6	5.0	3.6	4.2	4.0	4.6
$\eta^{i,\pi}_{US}$	6.4	5.1	7.0	9.2	8.7	5.5	4.2	4.5	7.2	5.3	6.3
$\eta^{i,y}_{US}$	4.2	4.7	3.5	3.4	4.2	4.2	2.3	3.1	3.7	5.2	3.9
ρ^{i}_{US}	5.2	4.6	2.2	3.5	4.1	3.4	2.4	3.6	3.2	3.4	3.6
η^{DPHI}_{US}	7.0	3.5	2.3	3.9	2.6	3.4	2.4	2.9	2.9	5.9	3.7
$\alpha^{BW,1}_{US}$	3.1	2.3	3.0	4.1	3.0	3.0	4.0	3.5	3.2	5.2	3.4
η^{BT}_{US}	2.6	5.0	3.7	5.0	5.8	3.0	4.7	2.7	3.3	2.9	3.9
η^{DEFT}_{US}	4.1	5.4	3.1	2.9	4.3	5.5	6.4	4.4	3.8	3.2	4.3
FC_{EA}	5.5	3.3	4.5	2.7	4.6	4.1	4.5	2.5	3.2	2.9	3.8
$\gamma^{I,1}_{US}$	5.9	8.4	6.8	8.3	12.4	6.3	5.9	8.5	11.7	9.9	8.4
$\gamma^{I,2}_{US}$	3.3	6.0	6.2	4.4	3.7	12.1	6.1	6.4	9.4	3.6	6.1
γ^{n}_{US}	9.0	7.8	6.2	4.5	3.3	7.5	9.6	4.0	7.7	5.5	6.5
γ^{p}_{US}	8.7	3.4	3.8	7.3	4.8	5.2	8.1	5.4	3.9	4.8	5.5
$\gamma^{U,2}_{US}$	2.6	3.5	2.9	3.7	7.3	5.0	7.0	3.3	3.2	5.7	4.4
γ^{w}_{US}	4.0	4.0	4.4	3.7	3.4	4.9	6.4	4.2	7.9	4.3	4.7
γ^{wr}_{US}	3.0	4.8	4.8	3.0	4.5	7.1	4.1	2.9	2.9	3.2	4.0
$\gamma^{FN,2}_{US}$	3.7	3.2	4.0	2.4	6.2	2.8	7.2	4.4	4.5	4.5	4.3
FN_US	3.6	3.8	3.3	4.5	3.2	3.2	2.9	2.7	3.7	4.2	3.5
α^{G}_{US}	4.7	4.8	6.5	6.1	3.5	4.1	3.9	3.7	4.0	3.0	4.4
α^{IG}_{US}	4.2	3.9	4.9	3.9	7.0	4.7	4.9	4.2	2.3	2.8	4.3
α^{T}_{US}	4.8	5.2	2.1	2.7	2.6	3.7	2.6	3.1	3.3	3.2	3.3
H_US	2.9	2.7	4.0	2.8	3.6	4.3	5.3	2.4	3.1	5.1	3.6
ω^{s}_{US}	5.5	3.6	4.9	3.2	4.0	2.1	5.3	6.3	4.9	4.0	4.4
ρ^{Oil}_{US}	6.2	3.0	5.7	2.8	3.7	5.7	4.5	3.2	4.1	4.6	4.4
ρ^{Z}_{US}	3.5	3.6	3.2	4.2	4.4	3.2	3.7	3.0	4.4	4.9	3.8
ρ^{APC}_{US}	2.8	5.4	4.5	3.6	2.9	5.0	6.4	5.1	6.5	4.1	4.6
ρ^{APG}_{US}	5.3	3.5	5.1	2.9	2.5	2.6	3.5	3.8	3.7	2.7	3.6
ρ^{API}_{US}	5.0	4.0	3.9	6.0	3.3	4.3	3.9	4.3	4.9	4.8	4.4
ρ^{APIG}_{US}	3.5	5.7	2.5	3.6	3.2	3.6	2.3	2.6	2.8	2.5	3.2
$\rho^{GAYTREND}_{US}$	2.6	4.4	3.5	4.2	3.0	3.3	5.9	3.5	4.1	5.2	3.9
ρ^{M}_{US}	3.7	4.7	2.6	5.6	2.2	3.5	2.7	3.7	6.5	3.0	3.8
ρ^{MUY}_{US}	6.7	4.3	5.9	4.5	4.0	3.6	6.4	3.2	7.0	4.6	5.0
ρ^{ND}_{US}	3.7	4.2	5.1	2.5	3.6	2.6	6.6	3.0	2.9	6.1	4.0
ρ^{P}_{US}	4.5	5.5	4.9	4.2	7.6	3.9	3.4	4.6	7.2	6.8	5.3
ρ^{P}_{US}	3.2	3.7	3.1	5.1	2.5	3.5	5.4	2.9	3.8	3.1	3.6
ρ^{TAX}_{US}	3.0	3.6	5.4	3.6	2.7	4.3	5.2	6.5	4.3	2.3	4.1
sfp_{US}	5.4	3.9	3.3	4.8	3.8	8.1	4.8	3.6	2.4	4.4	4.4
sfw_{US}	3.0	4.5	2.6	4.7	4.2	3.7	5.9	5.7	3.5	3.7	4.1
σ^{FM}_{US}	4.2	3.2	4.1	4.9	2.2	5.0	5.1	4.2	2.4	3.9	3.9
σ^{O}_{US}	4.7	4.9	5.4	4.7	4.2	3.1	6.5	4.3	4.4	6.1	4.8
σ^{Z}_{US}	3.9	5.1	3.7	4.9	7.0	5.4	4.4	2.7	6.3	5.0	4.8
θ^{N}_{US}	4.7	4.5	4.2	5.2	3.1	2.7	8.2	3.2	2.9	2.8	4.1
θ_{US}	3.7	3.8	3.3	4.7	5.8	2.4	5.3	4.1	9.7	3.5	4.6

Table 11: GM3 (part 3 of 4): Inefficiency factors per parameter over the **10 chains**, for the **rotated slice**

	Rotated Slice										
	1	2	3	4	5	6	7	8	9	10	Average
$\rho^{B}{}_{US\_US}$	3.0	5.2	4.6	4.4	3.5	2.9	3.9	4.2	2.7	6.8	4.1
$\rho^{S}{}_{US\_US}$	4.3	4.4	4.6	6.7	7.3	9.6	6.4	5.5	7.5	5.8	6.2
$\rho^{P}{}_{RoW}$	4.9	5.9	3.7	6.0	4.3	3.9	3.3	8.7	5.5	7.0	5.3
$\rho^{Y}{}_{RoW}$	5.2	7.5	5.2	5.5	8.1	7.4	3.0	6.1	6.3	8.7	6.3
$\alpha^{BW,1}{}_{RoW}$	2.6	3.4	2.9	3.1	3.2	3.6	2.3	2.7	2.3	3.1	2.9
$\eta^{i,\pi}{}_{RoW}$	6.3	6.9	8.4	3.3	8.8	7.4	12.0	4.3	9.7	10.6	7.8
$\eta^{i,y}{}_{RoW}$	6.7	10.2	3.9	3.8	9.6	3.2	4.6	8.5	3.3	10.3	6.4
h_{RoW}	4.8	2.9	3.8	5.1	4.2	3.0	4.4	10.8	3.9	5.6	4.9
$\phi^{y}{}_{RoW}$	4.8	8.8	3.9	6.4	7.4	5.0	4.8	4.5	4.9	8.1	5.9
$\rho^{i}{}_{RoW}$	3.7	8.9	5.0	4.0	4.9	5.0	8.5	7.9	4.5	4.9	5.7
$\rho^{IM}{}_{RoW}$	5.4	9.5	3.9	4.2	4.9	5.9	3.5	6.9	5.7	4.6	5.4
$\rho^{GAYTREND}{}_{RoW}$	6.6	5.9	4.1	3.7	7.3	2.7	4.0	6.3	3.7	4.3	4.9
$\rho^{M}{}_{RoW}$	4.2	3.5	4.4	2.6	2.6	4.9	3.6	3.2	2.2	3.2	3.4
$\rho^{M}{}_{EA\_RoW}$	3.7	4.0	6.1	7.8	3.6	3.0	2.4	4.1	4.0	3.3	4.2
$\rho^{PX}{}_{EA\_RoW}$	3.2	2.7	2.8	4.0	3.5	7.1	4.2	3.5	2.8	3.8	3.8
$\rho^{PX}{}_{US\_RoW}$	3.1	2.4	2.8	2.8	3.9	4.1	2.9	2.7	6.3	5.7	3.7
sfp_{US}	2.4	3.6	3.6	5.6	4.7	5.2	2.7	2.6	2.4	3.2	3.6
$\sigma^{C}{}_{RoW}$	4.7	9.8	4.8	6.5	4.8	4.7	4.4	6.4	8.8	4.6	6.0
$\sigma^{FM}{}_{RoW}$	4.0	3.9	4.2	2.6	3.3	4.6	7.1	3.3	5.1	3.5	4.2
θ_{RoW}	5.3	4.9	4.4	9.5	3.8	4.0	9.9	3.4	3.7	3.8	5.3
Maximum											8.4

Table 11: GM3 (part 4 of 4): Inefficiency factors per parameter over the **10 chains**, for the **rotated slice**