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A Robust Criterion for Determining the Number of Static Factors in Approximate Factor Models

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Abstract

We propose a refinement of the criterion by Bai and Ng [2002] for determining the number of static factors in factor models with large datasets. It consists in multiplying the penalty function times a constant which tunes the penalizing power of the function itself as in the Hallin and Liška [2007] criterion for the number of dynamic factors. By iteratively evaluating the criterion for different values of this constant, we achieve more robust results than in the case of fixed penalty function. This is shown by means of Monte Carlo simulations on seven data generating processes, including heteroskedastic processes, on samples of different size.

Keywords: Approximate factor models, Information criterion, Number of factors
JEL-classification: C52

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1 Introduction

The literature on factor models has been rapidly growing in the last years, and equally it has been growing the interest into criteria which can consistently estimate the number of common factors driving the data. Indeed, factor models are particularly useful for dimension reduction when datasets are large in both the time and the cross-section dimension. However, this is precisely the case in which the choice of the number of factors cannot be made by means of traditional information criteria which are not designed for diverging N and T. Given the vast use of factor models, determining the number of factors in large cross sections of time series is thus a hot topic. This paper provides a tool to address the issue, the theoretical properties of which are known and the empirical results are robust.

Relatively few authors have dealt with the model selection problem related to the number of common factors when both N and T diverge. Bai and Ng [2002] pioneered the literature by proposing a criterion, specified in six different forms, which basically modifies the AIC and BIC in order to take into account both dimensions of the dataset as arguments of the function penalizing overparametrization. Kapetanios [2005] takes a different approach, based on the limit of the empirical distribution of the eigenvalues of the sample covariance matrix: the idea is that the number of eigenvalues diverging as N diverges is equal to the number of static factors driving the dataset. Onatski [2007] adopts a third strategy and tests the null hypothesis of r_0 static factors against the alternative of r_1 static factors. The test is based on the few largest eigenvalues of the covariance matrix of a complex-valued sample derived from the original dataset, which asymptotically distribute as a Tracy-Widom.
Very recently, some criteria have been proposed to determine the number of dynamic common factors, which are the primitive shocks influencing each of the variables not only contemporaneously, but also via leads and lags. Amengual and Watson [2007] study the consistency properties of an estimator proposed in Stock and Watson [2005], which consists in projecting the data onto lagged values of principal components estimates of the static factors, and then applying the estimator proposed by Bai and Ng [2002] to the residuals. Also the estimator by Bai and Ng [2007] builds on their criterion for the number of static factors, the main intuition being that the q dynamic factors should explain the same percentage of variance as the r selected static factors. Breitung and Kretschmer [2005] apply canonical correlation analysis to the estimated static factors in order to tell which are the dynamic factors and which are just their lags. Finally, Hallin and Liška [2007] develop an information criterion based on the eigenvalues of the spectral density matrix of the observations. Indeed, the estimation of the Generalized Dynamic Factor Model by Forni et al. [2000] is carried out by means of dynamic principal components, and their number is equal to the number of diverging dynamic eigenvalues as N goes to infinity.

The information criterion that we propose is a refinement of the criterion by Bai and Ng [2002], drawing on the Hallin and Liška [2007] criterion for dynamic factors. The idea is fairly simple: we multiply the penalty function times a constant which tunes the penalizing power of the function itself. By evaluating the criterion for a whole range of values for this constant, we finally get an estimation of the number of static factors which is empirically more robust than it would be the constant being fixed. On the other hand, the consistency properties of our estimator are exactly the same of the original Bai and Ng [2002] estimator, the only difference being a multiplicative constant.
The motivation for our work is provided by the fact that there are cases in which the original

criterion cannot give a precise answer. For instance, Forni et al. [2007] implement the six specifications of Bai and Ng [2002] on an 89 series sample including macroeconomic and financial variables: if the maximum number of factors is set to 30, two IC specifications out of three do not converge; the PC specifications do not work either with 30 static factors, and give three different estimates when they converge. As a second example, Alessi et al. [2006] apply the Bai and Ng [2002] criterion on a panel of 89 stock return series and find that when the maximum number of factors is set high, that same value is returned as an estimate; when it is low, the IC criteria indicate the existence of two static factors while the PC criteria point to numbers between seven and fourteen.

The paper is structured as follows. In the first section we outline the factor model and briefly recall the assumptions for consistency of the estimator. In section 2 we present our criterion and a practical guide to the algorithm. In section 3 we validate our method and compare it and the original criterion on the basis of a Monte Carlo study on seven data generating processes, including heteroskedastic processes. Section 4 concludes.

2 The Factor Model

A general approximate dynamic factor model in its static representation can be written as:

$$X_t = \Lambda F_t + \xi_t \,,$$

where X_t is a large panel composed of N time series, Λ is the $N \times r$ matrix of factor loadings, r being the number of static factors, F_t is the $r \times 1$ vector of static factors and ξ_t is the idiosyncratic component. The model is dynamic in that the r static factors can actually be just $q < r$ dynamic factors together with their lags.
For the formal statement of the assumptions of the model we refer to Bai and Ng [2002] and limit ourselves to a brief overview of the main points.

1. The model is approximate since it allows for a small amount of cross-sectional correlation across the idiosyncratic terms.
2. The idiosyncratic parts are allowed to be autocorrelated.
3. Heteroskedasticity is allowed in both the time and the cross-section dimension.
4. Each factor is assumed to have an impact on each of the variables of the panel.
5. Stationarity is not required.

In large cross-sections, the r static factors can be consistently estimated by means of principal components, the cross-sectional correlation across the idiosyncratic components being not enough to survive aggregation. The principal component estimation of the factors can either be static, as in Stock and Watson [1998], or via a two-step estimator which first exploits dynamic principal components for the estimation of dynamic factors and then turns to the static representation, as in Forni et al. [2005]. However, Bai and Ng [2002] show that their criterion works for a more general class of estimators, and our criterion inherits this property. We refer to their paper for the discussion of this latter result, as well as for the proof of the theorem establishing the asymptotic properties of the estimated factors.

3 Determining the Number of Factors

All six criteria by Bai and Ng [2002] search for the number of static factors that minimizes the mean squared distance between observed data and their common part as estimated by static principal components. The mean squared distance is computed for all the possible numbers of static factors k up to $r_{max} = \min\{N, T\}$. Formally an estimate of Λ and F_t^k is obtained by solving the minimization problem:

$$V(k) = \min_{\Lambda^k, F_t^k} \frac{1}{NT} \sum_{i=1}^{N} \sum_{t=1}^{T} (X_{it} - \lambda_i^{k'} F_t^k)^2 \qquad 0 \leq k \leq r_{max} \tag{1}$$

subject to the normalization $\Lambda^{k'}\Lambda^k/N = I_k$ or $F^{k'}F^k/T = I_k$. Actually it is enough to solve problem (1) only for Λ^k given a previous estimate of the static factors $\hat{F}_t^k$. What we get is a function $V(k, \hat{F}_t^k)$ that does not depend on the estimator used for the factors as long as it satisfies Theorem 1 in Bai and Ng [2002]. Indeed all estimators satisfying such theorem span the same space. The sum of squared residuals is a quantity that cannot increase as k approaches r_{max}. On the other hand, overparametrizing is avoided by introducing a penalty function $g(N, T)$ which counterbalances the fit improvement due to the inclusion of additional common factors. For the number of static factors to be consistently estimated, the penalty function has to satisfy the following two conditions as N and T both tend to infinity:

$$\begin{aligned} g(N,T) &\to 0 \\ \min\{\sqrt{N}, \sqrt{T}\} \quad g(N,T) &\to \infty \end{aligned} \tag{2}$$

This is stated as Theorem 2 in Bai and Ng [2002]. The number of static factors is the one minimizing

$$\begin{aligned} PC(k) &= V(k, \hat{F}^k) + k\sigma^2 g(N,T) \\ &\text{or} \\ IC(k) &= \log(V(k, \hat{F}^k)) + kg(N,T)\,, \end{aligned}$$

depending on the information criterion we choose. In the original PC criteria Bai and Ng [2002] introduce the scaling factor σ^2, which is the variance of the residuals associated with principal component estimates. As an estimate of σ^2, Bai and Ng [2002] suggest $V(r_{max}, \hat{F}_t^{r_{max}})$. This introduces a direct dependence of the PC criteria on the maximum number of static factors, which we get rid of since the constant c itself serves the purpose of scaling. We propose the

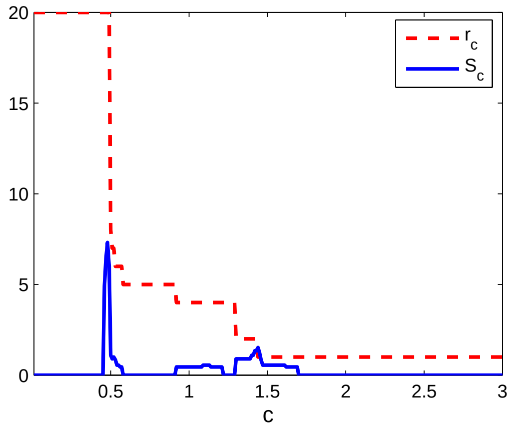


Figure 1: An example of the application of IC_2^* criterion (true number of factors: $r = 5$).

six following criteria:

$$\begin{aligned}
PC_1^*(k) &= V(k, \hat{F}^k) + c\,k\left(\frac{N+T}{NT}\right)\log\left(\frac{NT}{N+T}\right);\\
PC_2^*(k) &= V(k, \hat{F}^k) + c\,k\left(\frac{N+T}{NT}\right)\log(\min\{\sqrt{N},\sqrt{T}\})^2;\\
PC_3^*(k) &= V(k, \hat{F}^k) + c\,k\frac{\log(\min\{\sqrt{N},\sqrt{T}\})^2}{(\min\{\sqrt{N},\sqrt{T}\})^2};\\
IC_1^*(k) &= \ln(V(k, \hat{F}^k)) + c\,k\left(\frac{N+T}{NT}\right)\log\left(\frac{NT}{N+T}\right);\\
IC_2^*(k) &= \ln(V(k, \hat{F}^k)) + c\,k\left(\frac{N+T}{NT}\right)\log(\min\{\sqrt{N},\sqrt{T}\})^2;\\
IC_3^*(k) &= \ln(V(k, \hat{F}^k)) + c\,k\frac{\log(\min\{\sqrt{N},\sqrt{T}\})^2}{(\min\{\sqrt{N},\sqrt{T}\})^2}.
\end{aligned}$$

As Hallin and Liška [2007] observe, if $g(N, T)$ satisfies conditions (2), any deterministic function obtained by multiplying $g(N, T)$ times an arbitrary positive real c will be an appropriate penalty function as well. The penalty function that we use is indeed just the penalty function used by Bai and Ng [2002] multiplied by a positive constant c. Therefore properties (2) are trivially satisfied also by our criterion, insuring a consistent estimation of the number of static factors.

The procedure for selecting the number of static factors basically explores the behavior of the variance S_c of the estimated number of factors for N and T going to infinity, for a whole interval of values for the constant c. The implementation of our criterion is analogous to the procedure follwed in Hallin and Liška [2007]. We refer to that paper for an extensive explanation of the role of the constant c and the other parameters used, and we just outline here the necessary steps.

1. Set the maximum number of static common factors r_{max}. We will show in the next section our criterion does not heavily depend on this choice. Thus, in practice, to be sure to find the right number of static factors, we can choose a very high value for r_{max} (in principle also $r_{max} = N$ is a feasible choice).

2. Set an upper bound for the constant c, i.e. $c \in [0, c_{max}]$.

3. For each considered value of c, perform the following:

   (a) choose different random subsamples of increasing dimension $n_j = N - j$, where $j = 0, \dots, m$, with m integer such that $N - m$ is not too small (subsamples of different increasing time dimension t_i could also be chosen);

   (b) minimize the PC^* or IC^* with respect to the number of static factors k;

   (c) compute the variance S_c of the estimated number of factors as $n_j \to N$ and in case also as $t_i \to T$.

For increasing values of $c \in [0, c_{max}]$ we seek the first stability region, i.e. $S_c = 0$, of the estimated number of factors as n_j and t_i increase, corresponding to a constant number of factors $r_c < r_{max}$ minimizing PC* or IC*. The reason for looking only at values of $r_c < r_{max}$ is that we want to avoid the case in which c does not penalize enough the criterion, thus giving as result the maximum possible number of factors.

Figure 1 shows how the IC_2^* criterion works. As the constant c increases, the dashed line provides the suggested number of factors. A plateau of the dashed line means a region where the suggested number of factors r_c is stable across different values of c. On the other side, the solid line provides a measure of the instability of r_c when different subsamples of the dataset are considered. When the solid line goes to zero, the value provided by the dashed line is stable across different subsamples, i.e. is not biased by the whole sample size. Therefore, we have to choose the smallest value of c for which both a plateau of the dashed line (not including the extreme left one) and a zero of the solid line occur. The traditional IC criteria by Bai and Ng [2002] implicitly consider only the case $c = 1$. The example of figure 1 when $c = 1$ suggests a number of factors $r_{c=1} = 4$ which is smaller than the true one $r = 5$, moreover when $c = 1$ we have $S_c \neq 0$. Our refinement of the IC criterion considers also different values of c, thus finding a value $c = 0.6$ for which the number of factors suggested by the dashed line is the correct one ($r_c = 5$). The estimated r in this case seems to be stable across adjacent values of c (plateau of the dashed line) and across different subsample sizes (zero of the solid line). This way, we avoid an overpenalization of the number of factors and success in finding the true number of static factors.

4 Monte Carlo Study

In this section we conduct a set of simulation experiments to evaluate in finite samples the performance of our refined criterion, relative to that of the original Bai and Ng [2002] criterion. The experimental design is taken from Bai and Ng [2002] where seven data-generating processes (DGPs) are considered.
The baseline model is:

$$X_{it} = \sum_{j=1}^{r} \lambda_{ij} F_{tj} + \sqrt{\theta} e_{it}$$

with factors and factor loadings normally distributed with zero mean and unit variance. We summarize the different specifications.
DGP1) Homoskedastic idiosyncratic component, with the same variance for the common component and the idiosyncratic component:

$$e_{it} \sim N(0,1) \quad \text{and} \quad r = \theta \,.$$

DGP2) Heteroskedastic idiosyncratic component, with the same variance for the common component and the idiosyncratic component:

$$e_{it} = \begin{cases} e^1_{it} & \text{if } t \text{ odd} \\ e^1_{it} + e^2_{it} & \text{if } t \text{ even} \end{cases} \,, \quad e^1_{it}, e^2_{it} \sim NID(0,1) \quad \text{and} \quad r = \theta \,.$$

DGP3) Homoskedastic idiosyncratic component, with the variance of the common component larger than the variance of the idiosyncratic component:

$$e_{it} \sim N(0,1) \quad \text{and} \quad r = 2\theta \,.$$

DGP4) Homoskedastic idiosyncratic component, with the variance of the common component smaller than the variance of the idiosyncratic component:

$$e_{it} \sim N(0,1) \quad \text{and} \quad r = \frac{\theta}{2} \,.$$

DGP5) Allow for small cross-section correlation across idiosyncratic parts, with the same variance for the common component and the idiosyncratic component:

$$e_{it} = v_{it} + \sum_{j\neq 0\; j=-J}^{J} \beta v_{i-jt} \,, \quad v_{it} \sim N(0,1) \quad \text{and} \quad r = \theta \,.$$

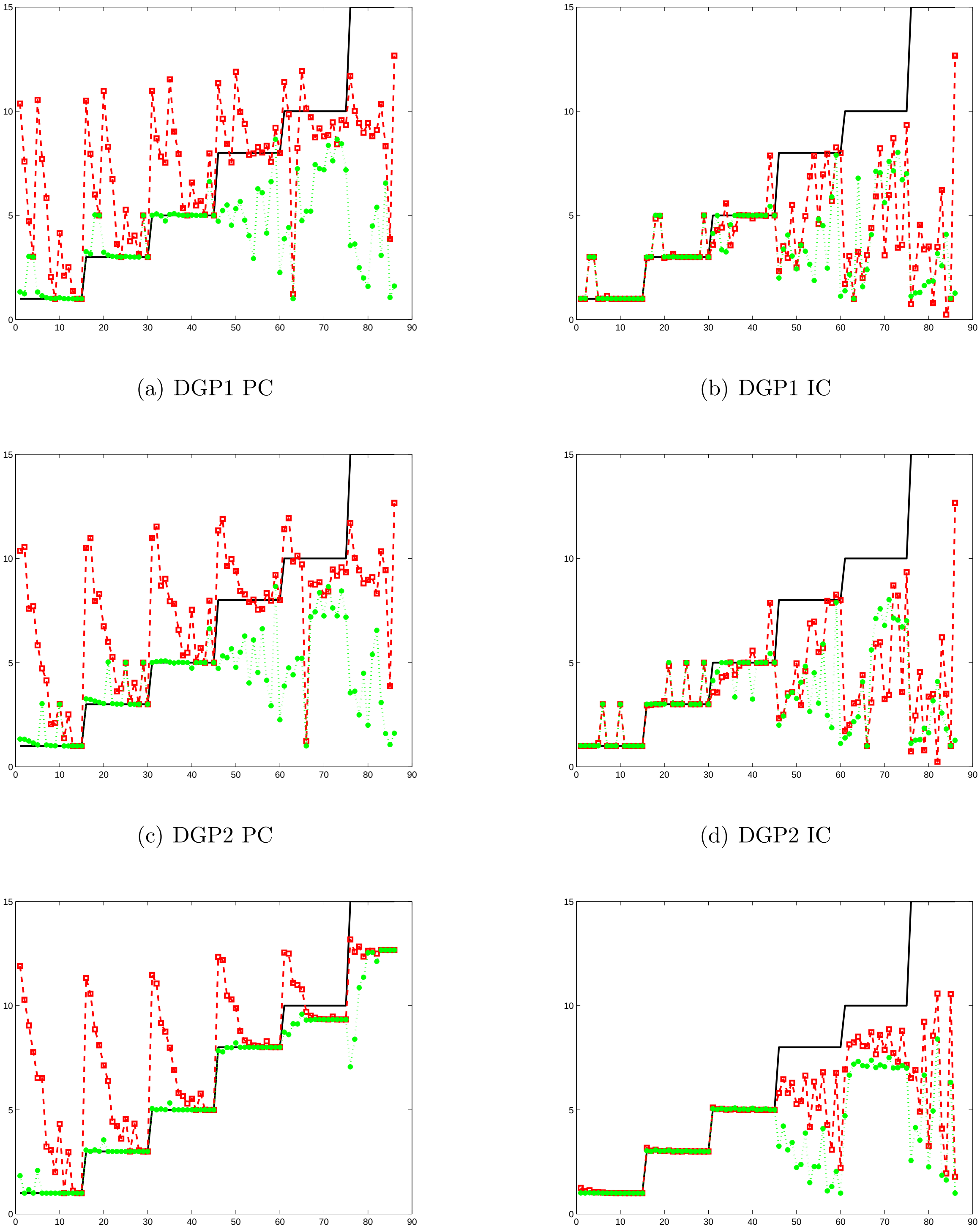
DGP6) Allow for serial correlation across idiosyncratic parts, with the variance of the common component smaller than the variance of the idiosyncratic component:

$$e_{it} = \rho e_{it-1} + v_{it} \,, \quad e_{it} \sim N(0,1) \,, \quad v_{it} \sim N(0,1) \,, \quad r = \theta \quad \text{and} \quad r < \frac{\theta}{1-\rho^2} \,.$$

DGP7) Allow for serial and small cross-section correlation across idiosyncratic parts, the variance of the common component is larger than the variance of the idiosyncratic component:

$$e_{it} = \rho e_{it-1} + v_{it} + \sum_{j\neq 0\; j=-J}^{J} \beta v_{i-jt} \,, \quad e_{it} \sim N(0,1) \,, \quad v_{it} \sim N(0,1) \,, \quad r = \theta \quad \text{and} \quad r < \frac{\theta}{1-\rho^2} \,.$$

For each model we set r = 1, 3, 5, 8, 10, 15 (compatibly with $r < \min\{N,T\}$). The values of the parameters are chosen as in Bai and Ng [2002]: $\rho = 0.5$, $\beta = 0.2$, and $J = \max\{N/20, 10\}$. We generate samples with N, T = 40, 50, 60, 100, 200, 500. For each model and each (standardized) sample we implement the six criteria by Bai and Ng [2002] and our six criteria setting r_{max} = 8, 15, 20 and c_{max} = 7 with step size for c of 0.01. For each of the 12 criteria, we compute the average number of factors returned as a result over 500 Monte Carlo replications together with its standard deviation.
Tables 2-29 in the appendix show, for each of the 86 generated samples, the average result over the three PC criteria and the average result over the three PC^* criteria, as well as the

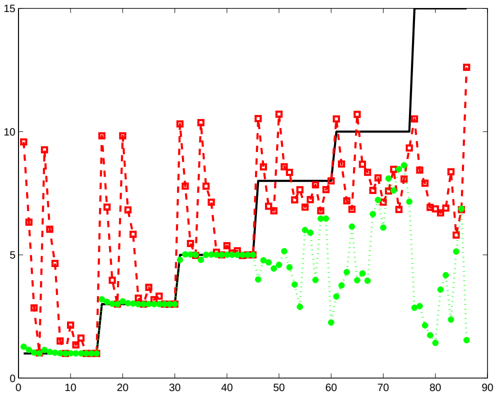


(a) DGP1 PC (b) DGP1 IC

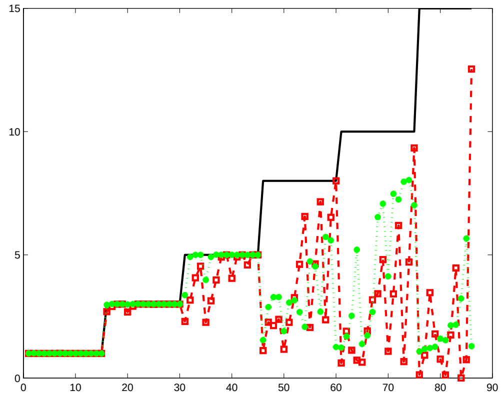
(c) DGP2 PC (d) DGP2 IC

(e) DGP3 PC (f) DGP3 IC

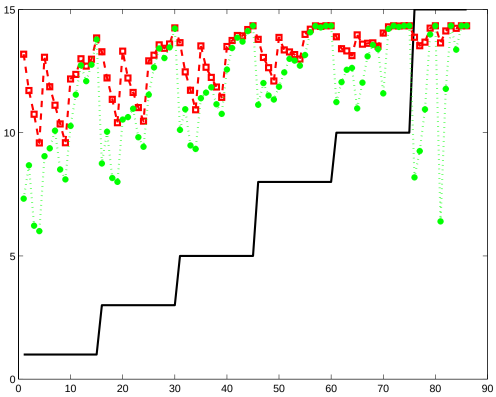
Figure 2: Average estimated number of factors. Horizontal axis: 86 generated samples ordered by increasing r. Solid line: r, dashed line: original criteria $\hat{r}$, dotted line: modified criteria $\hat{r}$.



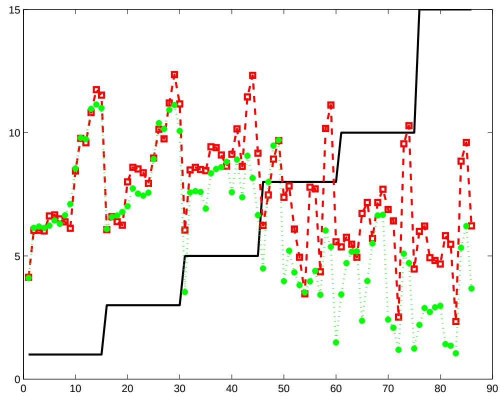
(a) DGP4 PC



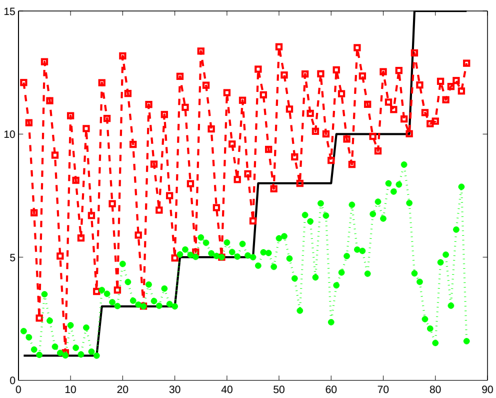
(b) DGP4 IC



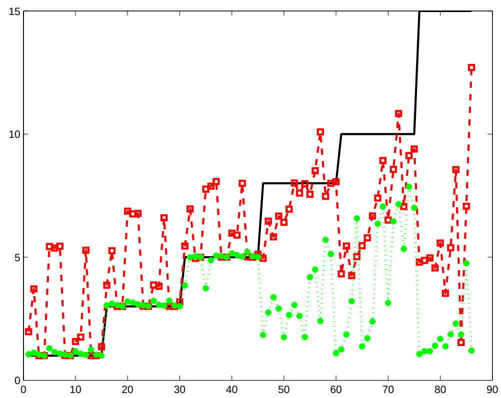
(c) DGP5 PC



(d) DGP5 IC

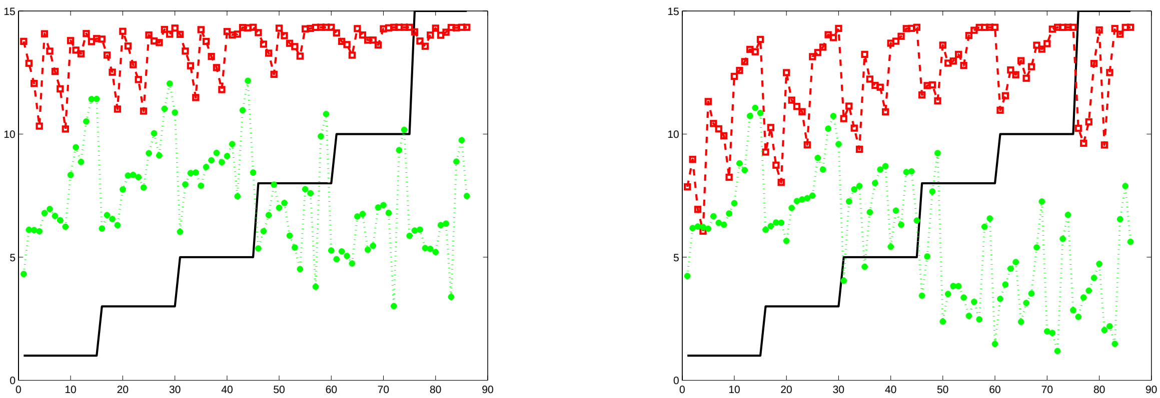


(e) DGP6 PC



(f) DGP6 IC

Figure 3: Average estimated number of factors. Horizontal axis: 86 generated samples ordered by increasing r. Solid line: r, dashed line: original criteria $\hat{r}$, dotted line: modified criteria $\hat{r}$.



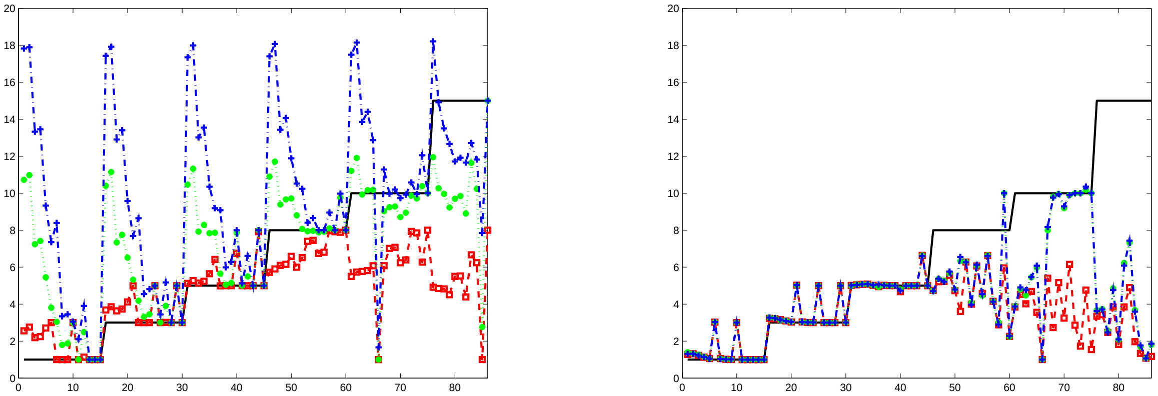
(a) DGP7 PC

(b) DGP7 IC

Figure 4: Average estimated number of factors. Horizontal axis: 86 generated samples ordered by increasing r. Solid line: r, dashed line: original criteria $\hat{r}$, dotted line: modified criteria $\hat{r}$.

average result over the three IC criteria and the average result over the three IC^* criteria. The same information is summarized in figures 2, 3 and 4, where the simulated samples on the horizontal axis are ordered by increasing r.

The plots show that both the original and the modified criteria become in general less and less reliable once the true number of static factors exceeds 5. However, when the true number of factors is small, in five DGPs out of seven the PC^* criteria perform on average better than the PC criteria. Indeed, for a given r, the latter ones always give a very variable result which depend on the size of the sample, while this problem affects PC^* criteria only when small cross-section correlation across idiosyncratic parts is allowed for (DGP 5 and DGP 7). Another possible explanation for the lack of robustness of the PC criteria is the following: although both PC and IC criteria need a maximum number of factors r_{max} as an input, only PC criteria explicitly take into account its resulting minimum squared distance. This makes the PC criteria less robust to the choice of the r_{max}. In order to investigate whether PC^* criteria are also heavily influenced by the choice of the r_{max}, in figure 5 we break down simulation results on the basis of the r_{max}, taking DGP 1 as an example. An important depencence of the PC^* criteria on the r_{max} seems not to be the case, at least when the true number of static factors is not large.



(a) DGP1 PC criteria

(b) DGP1 PC^* criteria

Figure 5: Average estimated number of factors. Horizontal axis: 86 generated samples ordered by increasing r. Solid line: r, dashed line: $\hat{r}$ when $r_{max} = 8$, dotted line: $\hat{r}$ when $r_{max} = 15$, dashed-dotted line: $\hat{r}$ when $r_{max} = 20$.

DGP	RMSE PC_1	RMSE PC_2	RMSE PC_3	RMSE IC_1	RMSE IC_2	RMSE IC_3	Average RMSE for PC	Average RMSE for IC
1	-2.22	**0.01**	**3.22**	-3.06	-1.14	-1.17	**0.34**	-1.79
2	-1.38	**0.41**	**3.53**	-1.22	**0.22**	**0.16**	**0.85**	-0.28
3	-2.25	**0.84**	**4.78**	-4.93	-3.20	-3.13	**1.12**	-3.75
4	-0.86	-0.16	**2.16**	**0.08**	**1.33**	**1.24**	-0.31	**0.88**
5	-1.11	**2.48**	**7.93**	-2.80	**0.14**	**2.99**	**3.10**	**0.11**
6	-1.08	**3.47**	**8.85**	-1.59	**0.91**	**2.40**	**3.75**	**0.57**
7	-0.81	**3.72**	**10.28**	-2.32	**1.63**	**5.22**	**4.30**	**1.51**

Table 1: RMSE differences for the number of static factors, computed as the value by Bai and Ng [2002] minus the value obtained with our refined criterion.

Gains over the IC criteria are not as striking as in the PC case. However, there is at least one case, DGP 6, in which the IC^* criteria on average dominate the IC criteria when the true number of static factors is up to 5. Moreover, as shown in table 1, in for four DGPs the average RMSE difference between the IC and the IC^* criteria is positve, i.e. the IC RMSE is on average higher than the IC^* RMSE. These are precisely the more realistic DGPs, where either the variance of the common component is smaller than the variance of the idiosyncratic component or small cross-section correlation and/or serial correlation across idiosyncratic parts are allowed for.[1]

5 Conclusions

This paper proposes an information criterion for the determination of the number of static factors in approximate factor models. It refines the Bai and Ng [2002] criterion, which is one of the most popular criteria available for addressing this issue. The appeal of our criterion stands in the fact that it builds on a well known criterion, the theoretical properties of which have been proved, and inherits them all. In addition, our criterion improves the finite sample performance of the original criterion, being capable of giving an answer even when the Bai and Ng [2002] criterion does not converge and yielding generally more robust results. Indeed, both criteria in their six formulations have been compared on the basis of a large number of simulations, whose results are encouraging.

The major gains from using the criteria we propose versus the criteria by Bai and Ng [2002] concern samples driven by a relatively small number of static factors (less than 5), which is also the case in which the Bai and Ng [2002] criteria performance is better if compared to their performance on samples driven by a large number of factors. In the case of PC criteria, the accuracy improvement is striking in five models out of seven, while in the case of IC criteria the advantages from our proposed critera are more modest. However, the potential applications of our criteria go beyond the estimation of the number of static factors. Indeed, in principle those estimators for the number of dynamic factors which implement the Bai and

[1]Matlab codes and disaggregated results are available at `https://mail.sssup.it/~matteo.barigozzi`

Ng [2002] criterion for the number of static factors would work as well with the criterion we propose. For example, Amengual and Watson [2007] show that the criterion by Bai and Ng [2002] is still consistent when applied to variables measured with error, provided that the (estimation) error is sufficiently small. Straightforwardly, this result holds for our criterion too.

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Appendix: Tables

Table 2: DGP 1 - Homoskedastic idiosyncratic component, same variance for the common component and the idiosyncratic component - Average results.

DGP 1								
			AVERAGE PC			AVERAGE PC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
100	40	1	2.01	9.66	17.29	1.11	1.12	1.12
		3	3.47	9.68	17.17	3.08	3.09	3.08
		5	5.11	9.98	17.17	5.04	5.05	5.04
		8	6.80	10.72	17.36	6.06	6.07	6.13
		10	6.76	11.38	17.50	5.29	6.59	6.43
		15	6.01	12.16	17.81	4.23	4.87	4.87
100	60	1	1.89	6.15	12.16	1.04	1.05	1.05
		3	3.41	6.53	12.03	3.02	3.04	3.03
		5	5.10	7.42	12.20	5.02	5.03	5.02
		8	7.18	9.33	12.84	6.00	6.12	6.05
		10	6.94	10.41	13.43	5.26	8.06	8.06
		15	6.05	11.34	15.03	4.10	5.20	5.27
200	60	1	1.00	1.67	5.00	1.01	1.01	1.01
		3	3.00	3.26	5.53	3.00	3.00	3.00
		5	5.00	5.04	6.60	5.00	5.00	5.00
		8	7.58	7.99	8.75	6.52	6.48	6.55
		10	7.51	9.70	10.38	5.86	9.94	9.92
		15	6.43	11.09	13.38	4.81	7.88	7.86
500	60	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	7.88	8.00	8.00	6.76	6.75	6.76
		10	7.87	9.83	10.00	6.37	10.00	10.00
		15	6.78	11.30	13.13	5.53	11.05	11.11
40	100	1	2.62	11.05	18.06	1.21	1.25	1.22
		3	3.72	10.38	17.38	3.16	3.16	3.15
		5	5.19	10.24	17.19	5.10	5.11	5.10
		8	6.81	10.79	17.23	5.39	5.51	5.52
		10	6.72	11.34	17.35	4.43	4.99	5.11
60	100	1	2.14	7.08	13.25	1.13	1.12	1.13
		3	3.55	7.01	12.57	3.09	3.08	3.09
		5	5.16	7.59	12.48	5.06	5.05	5.05
		8	7.16	9.37	12.92	5.69	5.74	5.77
		10	6.97	10.47	13.55	4.45	7.49	7.21
100	100	1	2.45	5.07	8.57	1.03	1.03	1.03
		3	3.86	6.17	8.79	3.02	3.01	3.03
		5	5.40	7.48	9.64	5.01	5.02	5.01
		8	7.60	9.61	11.42	5.00	5.10	5.15
		10	7.45	10.75	12.81	3.87	9.81	9.79
		15	6.28	11.58	14.53	2.82	3.73	3.54

Table 3: DGP 1 - Homoskedastic idiosyncratic component, same variance for the common component and the idiosyncratic component - Average results.

DGP 1								
			AVERAGE PC			AVERAGE PC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
200	100	1	1.00	1.23	2.47	1.00	1.00	1.00
		3	3.00	3.03	3.90	3.00	3.00	3.00
		5	5.00	5.00	5.46	5.00	5.00	5.00
		8	7.99	8.00	8.07	6.26	6.28	6.27
		10	7.99	9.97	10.00	5.39	10.00	10.00
		15	7.27	12.43	13.61	4.27	8.54	8.70
500	100	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	8.00	8.00	8.00	6.69	6.68	6.68
		10	8.00	10.00	10.00	6.31	10.00	10.00
		15	7.98	13.35	14.22	5.31	12.03	12.01
60	200	1	1.01	3.04	8.54	1.03	1.05	1.03
		3	3.00	3.87	7.59	3.03	3.03	3.03
		5	5.00	5.32	7.67	5.01	5.01	5.01
		8	7.62	8.00	9.10	5.24	5.23	5.28
		10	7.55	9.75	10.58	3.85	9.38	9.56
60	500	1	1.00	1.02	2.89	1.00	1.00	1.00
		3	3.00	3.00	3.39	3.00	3.00	3.00
		5	5.00	5.00	5.04	5.00	5.00	5.00
		8	7.88	8.00	8.00	4.86	4.68	4.79
		10	7.89	9.87	10.00	3.33	9.96	9.99
200	200	1	1.02	1.98	3.30	1.00	1.00	1.00
		3	3.00	3.44	4.53	3.00	3.00	3.00
		5	5.00	5.12	5.94	5.00	5.00	5.00
		8	8.00	8.00	8.32	4.28	4.24	4.21
		10	8.00	10.00	10.11	3.07	10.00	10.00
		15	7.99	13.98	14.55	2.25	4.14	4.22
500	500	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	8.00	8.00	8.00	2.34	2.39	2.38
		10	8.00	10.00	10.00	1.52	10.00	10.00
		15	8.00	15.00	15.00	1.19	1.80	1.75
100	200	1	1.00	1.71	3.28	1.01	1.01	1.01
		3	3.00	3.23	4.41	3.00	3.00	3.00
		5	5.00	5.03	5.82	5.00	5.00	5.00
		8	7.99	8.00	8.19	4.18	4.15	4.10
		10	7.99	9.96	10.02	2.78	10.00	10.00
		15	7.28	12.38	13.63	2.01	3.09	3.16
100	500	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	8.00	8.00	8.00	2.94	3.04	2.76
		10	8.00	10.00	10.00	1.82	10.00	10.00
		15	7.98	13.34	14.25	1.39	1.87	1.87

Table 4: DGP 1 - Homoskedastic idiosyncratic component, same variance for the common component and the idiosyncratic component - Average results.

DGP 1								
			AVERAGE IC			AVERAGE IC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
100	40	1	1.00	1.00	1.00	1.01	1.01	1.00
		3	3.00	3.00	3.00	3.02	3.00	3.00
		5	4.73	4.73	4.73	5.01	4.99	4.99
		8	4.65	4.65	4.65	4.27	4.05	4.08
		10	3.47	3.67	3.67	2.40	3.31	2.88
		15	2.11	2.47	2.77	1.42	1.38	1.34
100	60	1	1.00	1.00	1.00	1.01	1.01	1.00
		3	3.00	3.00	3.00	3.01	3.01	3.00
		5	4.94	4.94	4.94	5.01	5.01	5.00
		8	5.94	5.94	5.94	4.19	4.19	4.33
		10	4.61	5.19	5.19	2.51	7.02	6.80
		15	2.89	4.27	4.28	1.46	1.92	1.82
200	60	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.01	5.00	5.00
		8	7.26	7.26	7.26	5.19	5.19	5.03
		10	6.47	6.98	6.98	3.34	9.97	9.95
		15	2.94	3.33	3.33	1.97	5.81	5.80
500	60	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	7.78	7.78	7.78	5.84	5.79	5.94
		10	7.64	8.32	8.32	4.26	10.00	10.00
		15	3.01	3.09	3.09	2.46	10.58	10.68
40	100	1	1.00	1.00	1.04	1.01	1.00	1.00
		3	3.00	3.00	3.00	3.03	3.01	3.00
		5	4.69	4.69	4.69	4.97	4.94	4.81
		8	4.68	4.68	4.68	3.26	3.18	2.92
		10	3.52	3.74	3.76	1.93	1.97	1.64
60	100	1	1.00	1.00	1.00	1.01	1.01	1.00
		3	3.00	3.00	3.00	3.03	3.02	3.01
		5	4.95	4.95	4.95	5.03	5.02	5.01
		8	5.97	5.98	5.98	3.87	4.00	3.88
		10	4.63	5.20	5.20	2.15	6.26	5.90
100	100	1	1.03	1.03	1.03	1.01	1.00	1.00
		3	3.03	3.03	3.03	3.01	3.00	3.01
		5	5.03	5.03	5.03	5.01	5.01	5.01
		8	7.16	7.22	7.22	3.19	3.17	3.24
		10	6.10	6.98	6.98	1.82	9.86	9.81
		15	3.33	5.64	6.07	1.28	2.84	2.88

Table 5: DGP 1 - Homoskedastic idiosyncratic component, same variance for the common component and the idiosyncratic component - Average results.

DGP 1								
			AVERAGE IC			AVERAGE IC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
200	100	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	7.98	7.98	7.98	4.05	3.99	4.00
		10	7.95	9.43	9.43	2.43	10.00	10.00
		15	5.32	7.48	7.48	1.67	6.76	6.77
500	100	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	8.00	8.00	8.00	4.83	4.79	4.82
		10	8.00	9.96	9.96	3.19	10.00	10.00
		15	7.90	11.43	11.43	2.12	10.57	10.54
60	200	1	1.00	1.00	1.00	1.01	1.00	1.00
		3	3.00	3.00	3.00	3.02	3.01	3.00
		5	5.00	5.00	5.00	5.01	5.01	5.00
		8	7.31	7.31	7.31	3.27	3.32	3.41
		10	6.54	7.05	7.05	1.80	9.49	9.64
60	500	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.01	5.00	5.00
		8	7.79	7.79	7.79	2.69	2.75	2.81
		10	7.70	8.39	8.39	1.49	10.00	9.99
200	200	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	8.00	8.00	8.00	1.99	1.98	1.97
		10	8.00	9.99	9.99	1.32	10.00	10.00
		15	7.90	12.68	12.68	1.16	3.25	3.34
500	500	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	8.00	8.00	8.00	1.01	1.01	1.02
		10	8.00	10.00	10.00	1.00	10.00	10.00
		15	8.00	15.00	15.00	1.01	1.14	1.18
100	200	1	1.00	1.00	1.00	1.01	1.00	1.00
		3	3.00	3.00	3.00	3.01	3.00	3.01
		5	5.00	5.00	5.00	5.01	5.01	5.01
		8	7.97	7.97	7.97	2.17	2.28	2.22
		10	7.95	9.43	9.43	1.31	10.01	10.00
		15	5.39	7.53	7.53	1.12	3.25	3.41
100	500	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	8.00	8.00	8.00	1.57	1.61	1.57
		10	8.00	9.97	9.97	1.08	10.00	10.00
		15	7.89	11.45	11.45	1.02	2.02	1.91

Table 6: DGP2 - Heteroskedastic idiosyncratic component, same variance for the common component and the idiosyncratic component - Average results.

DGP 2								
			AVERAGE PC			AVERAGE PC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
100	40	1	2.76	10.98	17.90	1.32	1.32	1.32
		3	3.86	11.15	17.92	3.21	3.25	3.24
		5	5.27	11.33	17.99	5.05	5.06	5.04
		8	5.90	11.71	18.07	5.21	5.37	5.38
		10	5.73	11.90	18.15	4.53	4.81	4.90
		15	4.91	11.95	18.21	3.35	3.68	3.63
100	60	1	2.25	7.42	13.46	1.13	1.15	1.14
		3	3.73	7.75	13.41	3.09	3.10	3.09
		5	5.23	8.29	13.54	5.08	5.08	5.09
		8	6.16	9.66	14.07	5.56	5.68	5.76
		10	5.82	10.16	14.40	4.69	5.45	5.47
		15	4.85	10.27	14.92	3.43	3.73	3.71
200	60	1	1.00	3.04	8.39	1.06	1.05	1.03
		3	3.00	4.18	8.64	3.03	3.03	3.03
		5	4.99	5.65	9.08	5.02	5.02	5.01
		8	6.52	8.07	10.24	6.28	6.28	6.27
		10	6.08	9.03	11.28	5.40	8.00	8.17
		15	4.51	9.23	12.67	3.84	4.85	4.77
500	60	1	1.00	1.00	2.10	1.00	1.00	1.00
		3	3.00	3.00	3.44	3.00	3.00	3.00
		5	5.00	5.00	5.12	5.00	5.00	5.00
		8	6.81	7.92	8.00	6.63	6.64	6.60
		10	6.39	8.94	9.92	6.15	9.90	9.90
		15	4.39	8.90	11.66	4.89	7.32	7.43
40	100	1	2.56	10.72	17.83	1.28	1.39	1.31
		3	3.68	10.40	17.43	3.23	3.28	3.27
		5	5.12	10.46	17.35	5.01	4.99	5.01
		8	5.72	10.89	17.40	4.75	4.71	4.70
		10	5.50	11.21	17.49	3.84	3.90	3.87
60	100	1	2.19	7.24	13.32	1.23	1.26	1.22
		3	3.64	7.33	12.90	3.17	3.14	3.16
		5	5.14	7.92	13.02	5.07	5.07	5.07
		8	6.10	9.39	13.43	5.23	5.26	5.21
		10	5.77	9.93	13.85	4.02	4.47	4.76
100	100	1	2.71	5.45	9.33	1.06	1.06	1.05
		3	4.12	6.51	9.58	3.03	3.04	3.04
		5	5.65	7.84	10.35	5.02	5.02	5.03
		8	6.59	9.72	11.89	4.73	4.80	4.79
		10	6.08	10.18	12.87	3.56	5.97	6.08
		15	4.82	9.96	13.50	2.47	2.55	2.47

Table 7: DGP2 - Heteroskedastic idiosyncratic component, same variance for the common component and the idiosyncratic component - Average results.

DGP 2								
			AVERAGE PC			AVERAGE PC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
200	100	1	1.00	1.88	3.45	1.01	1.01	1.01
		3	3.00	3.45	4.81	3.00	3.01	3.01
		5	5.00	5.15	6.28	5.00	5.00	5.00
		8	7.45	7.96	8.65	6.07	6.07	6.13
		10	7.07	9.28	10.20	5.17	9.96	9.95
		15	5.52	9.85	11.92	3.85	6.23	6.08
500	100	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	5.00	5.00	5.00	5.00	5.00	5.00
		5	7.92	8.00	8.00	6.63	6.64	6.60
		8	7.88	9.76	9.98	5.96	10.00	10.00
		10	6.27	10.38	12.05	4.76	10.19	10.36
		15	1.01	2.76	7.85	1.08	1.07	1.06
60	200	1	3.00	3.81	7.36	3.03	3.03	3.03
		3	4.99	5.32	7.69	5.02	5.01	5.03
		5	6.42	7.86	9.19	4.95	4.93	5.06
		8	6.00	8.80	10.52	3.61	6.34	6.55
		10	1.00	1.00	1.66	1.00	1.00	1.00
60	500	1	3.00	3.00	3.06	3.00	3.00	3.00
		3	5.00	5.00	5.00	5.00	5.00	5.00
		5	6.75	7.86	8.00	4.68	4.80	4.73
		8	6.75	7.88	8.00	4.58	4.46	4.55
		10	6.24	8.71	9.74	3.25	9.19	9.29
200	200	1	1.13	2.49	3.91	1.00	1.00	1.00
		3	3.01	3.91	5.17	3.00	3.00	3.00
		5	5.00	5.50	6.61	5.00	5.00	5.00
		8	7.97	8.10	8.95	4.15	4.16	4.13
		10	7.93	9.88	10.58	2.86	10.00	10.00
		15	6.67	11.64	12.72	1.97	3.68	3.59
500	500	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	8.00	8.00	8.00	2.25	2.24	2.28
		10	8.00	10.00	10.00	1.54	10.00	10.00
		15	8.00	15.00	15.00	1.17	1.81	1.86
100	200	1	1.00	1.79	3.34	1.02	1.01	1.02
		3	3.00	3.31	4.54	3.01	3.01	3.01
		5	5.00	5.05	5.99	5.00	5.00	5.00
		8	7.40	7.94	8.40	4.00	4.09	3.97
		10	7.02	9.24	9.97	2.74	9.81	9.76
		15	5.50	9.70	11.72	1.82	2.07	2.10
100	500	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	7.92	8.00	8.00	2.88	3.02	2.89
		10	7.85	9.72	9.95	1.73	10.00	10.00
		15	6.24	10.24	11.82	1.33	1.69	1.77

Table 8: DGP2 - Heteroskedastic idiosyncratic component, same variance for the common component and the idiosyncratic component - Average results.

DGP 2								
			AVERAGE IC			AVERAGE IC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
100	40	1	1.00	1.00	1.00	1.02	1.00	1.00
		3	2.96	2.96	2.96	3.03	3.01	3.00
		5	3.56	3.56	3.56	4.68	4.56	4.41
		8	2.47	2.47	2.57	2.59	2.49	2.22
		10	1.90	1.93	2.17	1.75	1.53	1.45
		15	0.66	0.67	0.89	1.19	1.12	1.06
100	60	1	1.00	1.00	1.00	1.01	1.01	1.01
		3	3.00	3.00	3.00	3.01	3.01	3.00
		5	4.37	4.37	4.37	5.01	5.00	4.99
		8	3.57	3.58	3.58	3.62	3.50	3.60
		10	2.91	3.18	3.18	2.23	2.47	2.49
		15	2.27	2.55	2.55	1.30	1.26	1.27
200	60	1	1.00	1.00	1.00	1.01	1.00	1.00
		3	3.00	3.00	3.00	3.01	3.01	3.00
		5	4.86	4.86	4.86	5.01	5.01	5.00
		8	4.59	4.59	4.59	4.79	4.89	4.79
		10	3.06	3.09	3.09	3.03	6.93	6.87
		15	0.79	0.79	0.79	1.60	1.97	1.98
500	60	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	4.98	4.98	4.98	5.00	5.00	5.00
		8	5.69	5.69	5.69	5.91	5.89	5.87
		10	3.45	3.46	3.46	4.22	9.94	9.90
		15	0.24	0.24	0.24	2.19	5.22	4.86
40	100	1	1.00	1.00	1.00	1.02	1.00	1.00
		3	2.94	2.94	2.94	3.03	3.00	2.99
		5	3.60	3.60	3.60	4.51	4.25	3.63
		8	2.33	2.33	2.33	2.32	2.11	1.57
		10	1.70	1.71	1.72	1.59	1.32	1.23
60	100	1	1.00	1.00	1.00	1.03	1.01	1.00
		3	3.00	3.00	3.00	3.04	3.01	3.01
		5	4.30	4.30	4.30	5.01	4.99	4.99
		8	3.52	3.52	3.52	3.38	3.35	3.39
		10	2.90	3.11	3.11	1.98	2.30	2.21
100	100	1	1.14	1.14	1.14	1.01	1.01	1.01
		3	3.15	3.15	3.15	3.01	3.01	3.01
		5	5.00	5.01	5.01	5.02	5.01	5.01
		8	4.69	5.09	5.11	3.21	3.29	3.33
		10	3.54	4.75	4.90	1.91	5.16	5.15
		15	2.71	4.97	5.96	1.26	1.39	1.26

Table 9: DGP2 - Heteroskedastic idiosyncratic component, same variance for the common component and the idiosyncratic component - Average results.

DGP 2								
			AVERAGE IC			AVERAGE IC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
200	100	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.01	3.01
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	6.97	6.97	6.97	4.48	4.55	4.50
		10	5.57	6.18	6.18	2.81	9.97	9.98
		15	2.92	3.78	3.78	1.66	4.08	3.77
500	100	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	5.00	5.00	5.00	5.00	5.00	5.00
		5	7.87	7.87	7.87	5.48	5.47	5.36
		8	7.71	8.54	8.54	3.67	10.00	10.00
		10	3.48	3.65	3.65	2.25	8.86	9.02
		15	1.00	1.00	1.00	1.02	1.00	1.00
60	200	1	3.00	3.00	3.00	3.01	3.01	3.00
		3	4.85	4.85	4.85	5.01	5.00	5.01
		5	4.42	4.42	4.42	3.34	3.29	3.42
		8	2.95	2.97	2.97	1.82	5.40	4.95
		10	1.00	1.00	1.00	1.00	1.00	1.00
60	500	1	3.00	3.00	3.00	3.00	3.00	3.00
		3	4.98	4.98	4.98	5.00	5.00	5.00
		5	5.57	5.57	5.57	3.20	3.31	3.24
		8	5.50	5.50	5.50	3.07	2.99	3.10
		10	3.25	3.25	3.25	1.81	9.34	9.21
200	200	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	7.96	7.96	7.96	2.47	2.50	2.44
		10	7.82	9.14	9.14	1.42	10.00	10.00
		15	4.65	6.99	6.99	1.20	3.28	3.26
500	500	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	8.00	8.00	8.00	1.12	1.12	1.12
		10	8.00	10.00	10.00	1.01	10.00	10.00
		15	8.00	15.00	15.00	1.00	1.38	1.43
100	200	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.01	3.01	3.01
		5	5.00	5.00	5.00	5.01	5.01	5.00
		8	6.88	6.88	6.88	2.60	2.77	2.58
		10	5.50	6.12	6.12	1.62	9.91	9.81
		15	2.88	3.61	3.61	1.15	1.83	1.92
100	500	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	7.86	7.86	7.86	1.87	1.83	1.93
		10	7.68	8.48	8.48	1.14	10.00	10.00
		15	3.40	3.56	3.56	1.05	2.10	2.29

Table 10: DGP 3 - Homoskedastic idiosyncratic component, the variance of the common component is bigger than the variance of the idiosyncratic component - Average results.

DGP 3								
			AVERAGE PC			AVERAGE PC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
100	40	1	2.50	10.58	17.78	1.09	1.11	1.09
		3	3.70	10.45	17.55	3.04	3.04	3.04
		5	5.23	10.51	17.45	5.03	5.02	5.02
		8	7.88	11.10	17.57	6.43	6.48	6.48
		10	7.94	11.82	17.73	5.99	9.17	9.24
		15	7.61	13.67	18.24	5.08	7.18	7.30
100	60	1	2.26	7.48	13.57	1.03	1.05	1.04
		3	3.71	7.53	13.05	3.02	3.02	3.02
		5	5.28	7.97	13.01	5.01	5.01	5.01
		8	7.99	9.56	13.34	6.27	6.33	6.30
		10	8.00	11.01	13.96	5.69	9.92	9.92
		15	7.79	13.69	16.28	4.67	7.98	8.08
200	60	1	1.00	2.19	6.52	1.00	1.01	1.01
		3	3.00	3.61	6.69	3.00	3.00	3.00
		5	5.00	5.20	7.21	5.00	5.00	5.00
		8	8.00	8.00	8.99	6.64	6.64	6.65
		10	8.00	10.00	10.56	6.16	10.00	10.00
		15	8.00	14.15	14.91	5.34	11.04	11.30
500	60	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	8.00	8.00	8.00	6.80	6.80	6.80
		10	8.00	10.00	10.00	6.59	10.00	10.00
		15	8.00	14.52	14.97	6.05	12.82	12.88
40	100	1	4.04	12.65	19.00	1.26	1.26	1.25
		3	4.43	11.54	18.01	3.17	3.18	3.18
		5	5.53	11.20	17.69	5.12	5.10	5.10
		8	7.89	11.50	17.62	5.66	5.86	5.91
		10	7.94	12.01	17.69	4.86	8.04	7.90
60	100	1	2.81	9.14	15.19	1.14	1.12	1.14
		3	4.02	8.56	13.99	3.08	3.11	3.09
		5	5.42	8.53	13.55	5.06	5.05	5.06
		8	7.98	9.74	13.72	5.80	5.78	5.82
		10	7.99	11.10	14.18	4.90	9.88	9.92
100	100	1	3.01	6.14	10.43	1.05	1.04	1.04
		3	4.34	6.82	10.22	3.02	3.02	3.02
		5	5.71	7.83	10.40	5.02	5.01	5.01
		8	8.00	9.87	11.76	5.27	5.29	5.26
		10	8.00	11.31	13.02	4.16	10.00	10.00
		15	7.95	14.17	16.38	3.17	5.80	5.76

Table 11: DGP 3 - Homoskedastic idiosyncratic component, the variance of the common component is bigger than the variance of the idiosyncratic component - Average results.

DGP 3								
			AVERAGE PC			AVERAGE PC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
200	100	1	1.00	1.76	3.25	1.00	1.00	1.00
		3	3.00	3.32	4.53	3.00	3.00	3.00
		5	5.00	5.03	5.87	5.00	5.00	5.00
		8	8.00	8.00	8.26	6.37	6.35	6.32
		10	8.00	10.00	10.05	5.78	10.00	10.00
		15	8.00	14.90	14.99	4.85	10.43	10.39
500	100	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	8.00	8.00	8.00	6.77	6.76	6.77
		10	8.00	10.00	10.00	6.39	10.00	10.00
		15	8.00	15.00	15.00	5.77	12.95	12.95
60	200	1	1.32	5.91	12.33	1.04	1.03	1.03
		3	3.09	5.68	10.39	3.05	3.03	3.06
		5	5.00	6.12	9.62	5.03	5.04	5.05
		8	8.00	8.24	10.10	5.38	5.39	5.47
		10	8.00	10.03	11.09	4.16	10.00	9.99
60	500	1	1.00	2.62	9.34	1.00	1.00	1.00
		3	3.00	3.66	7.00	3.02	3.01	3.01
		5	5.00	5.09	6.51	5.02	5.02	5.03
		8	8.00	8.00	8.21	5.07	5.06	5.15
		10	8.00	10.00	10.03	3.64	10.00	10.00
200	200	1	1.37	2.99	4.53	1.00	1.00	1.00
		3	3.11	4.31	5.58	3.00	3.00	3.00
		5	5.00	5.62	6.70	5.00	5.00	5.00
		8	8.00	8.08	8.79	4.17	4.37	4.27
		10	8.00	10.01	10.41	3.17	10.00	10.00
		15	8.00	15.00	15.01	2.36	4.92	5.00
500	500	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	8.00	8.00	8.00	2.23	2.21	2.22
		10	8.00	10.00	10.00	1.48	10.00	10.00
		15	8.00	15.00	15.00	1.22	2.14	2.00
100	200	1	1.11	2.77	5.33	1.01	1.01	1.01
		3	3.02	4.05	5.61	3.01	3.00	3.00
		5	5.00	5.41	6.55	5.00	5.00	5.00
		8	8.00	8.03	8.65	4.13	4.19	4.23
		10	8.00	10.00	10.27	2.97	10.00	10.00
		15	8.00	14.88	15.00	2.19	3.86	3.71
100	500	1	1.00	1.00	1.34	1.00	1.00	1.00
		3	3.00	3.00	3.15	3.00	3.00	3.00
		5	5.00	5.00	5.01	5.00	5.00	5.00
		8	8.00	8.00	8.00	3.03	3.13	3.10
		10	8.00	10.00	10.00	1.93	10.00	10.01
		15	8.00	15.00	15.00	1.37	2.13	2.33

Table 12: DGP 3 - Homoskedastic idiosyncratic component, the variance of the common component is bigger than the variance of the idiosyncratic component - Average results.

DGP 3								
			AVERAGE IC			AVERAGE IC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
100	40	1	1.00	1.00	1.00	1.01	1.00	1.00
		3	3.00	3.00	3.00	3.02	3.01	3.00
		5	5.00	5.00	5.00	5.03	5.01	5.00
		8	7.78	7.78	7.78	4.17	4.29	4.20
		10	7.75	8.99	9.09	2.43	8.94	8.61
		15	4.89	7.41	8.89	1.56	3.31	2.83
100	60	1	1.00	1.00	1.00	1.01	1.01	1.01
		3	3.01	3.01	3.01	3.02	3.01	3.01
		5	5.00	5.00	5.00	5.02	5.01	5.01
		8	7.97	7.98	7.98	3.38	3.48	3.42
		10	7.98	9.69	9.69	2.01	9.98	9.98
		15	6.13	9.42	9.61	1.31	5.50	5.63
200	60	1	1.00	1.00	1.00	1.01	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.01	5.00	5.00
		8	8.00	8.00	8.00	3.87	3.92	3.85
		10	8.00	9.96	9.96	2.12	10.01	10.00
		15	7.97	13.06	13.06	1.51	9.02	9.45
500	60	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	8.00	8.00	8.00	4.10	4.07	4.12
		10	8.00	10.00	10.00	2.51	10.00	10.00
		15	8.00	14.19	14.19	1.89	11.65	11.66
40	100	1	1.09	1.44	2.98	1.02	1.01	1.00
		3	3.04	3.05	3.10	3.06	3.03	3.00
		5	5.06	5.06	5.06	5.10	5.04	5.01
		8	7.78	7.84	7.89	3.19	3.31	3.25
		10	7.75	9.10	9.31	1.77	6.92	5.45
60	100	1	1.06	1.12	1.32	1.03	1.01	1.01
		3	3.07	3.07	3.07	3.07	3.09	3.05
		5	5.04	5.04	5.04	5.07	5.06	5.04
		8	7.96	8.00	8.00	2.93	3.14	3.16
		10	7.97	9.71	9.71	1.63	9.96	9.99
100	100	1	1.61	1.98	2.67	1.02	1.01	1.01
		3	3.49	3.56	3.62	3.03	3.03	3.02
		5	5.32	5.33	5.33	5.05	5.03	5.03
		8	8.00	8.31	8.31	2.11	2.29	2.28
		10	8.00	10.36	10.40	1.30	10.03	10.03
		15	7.41	12.11	13.07	1.15	4.62	4.85

Table 13: DGP 3 - Homoskedastic idiosyncratic component, the variance of the common component is bigger than the variance of the idiosyncratic component - Average results.

DGP 3								
			AVERAGE IC			AVERAGE IC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
200	100	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	8.00	8.00	8.00	2.25	2.28	2.29
		10	8.00	10.00	10.00	1.45	10.00	10.00
		15	8.00	14.82	14.82	1.27	6.85	6.71
500	100	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	8.00	8.00	8.00	2.03	2.04	2.05
		10	8.00	10.00	10.00	1.36	10.00	10.00
		15	8.00	15.00	15.00	1.33	8.94	8.68
60	200	1	1.00	1.00	1.00	1.01	1.00	1.00
		3	3.00	3.00	3.00	3.07	3.05	3.05
		5	5.00	5.00	5.00	5.09	5.09	5.07
		8	8.00	8.00	8.00	2.21	2.58	2.33
		10	8.00	9.96	9.96	1.23	10.03	10.02
60	500	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.04	3.03	3.02
		5	5.00	5.00	5.00	5.09	5.07	5.07
		8	8.00	8.00	8.00	2.03	2.33	2.45
		10	8.00	10.00	10.00	1.13	10.04	10.03
200	200	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.01	5.00	5.01
		8	8.00	8.00	8.00	1.08	1.13	1.11
		10	8.00	10.00	10.00	1.01	10.01	10.00
		15	8.00	15.00	15.00	1.03	2.19	2.35
500	500	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	8.00	8.00	8.00	1.00	1.00	1.00
		10	8.00	10.00	10.00	1.00	10.00	10.00
		15	8.00	15.00	15.00	1.00	1.00	1.00
100	200	1	1.00	1.00	1.00	1.01	1.00	1.00
		3	3.00	3.00	3.00	3.03	3.04	3.02
		5	5.00	5.00	5.00	5.05	5.03	5.04
		8	8.00	8.00	8.00	1.41	1.53	1.58
		10	8.00	10.00	10.00	1.03	10.03	10.02
		15	8.00	14.80	14.80	1.05	2.84	2.89
100	500	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.01	3.02	3.01
		5	5.00	5.00	5.00	5.04	5.05	5.04
		8	8.00	8.00	8.00	1.13	1.46	1.36
		10	8.00	10.00	10.00	1.00	10.03	10.03
		15	8.00	15.00	15.00	1.00	1.83	2.06

Table 14: DGP 4 - homoskedastic idiosyncratic component, the variance of the common component is smaller than the variance of the idiosyncratic component - Average results.

DGP 4								
			AVERAGE PC			AVERAGE PC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
100	40	1	1.77	9.08	16.93	1.13	1.15	1.14
		3	3.31	9.24	16.93	3.12	3.10	3.13
		5	4.54	9.58	16.98	4.81	4.79	4.79
		8	4.79	10.20	17.13	4.50	4.64	4.64
		10	4.45	10.44	17.20	3.88	4.03	4.00
		15	3.65	10.56	17.32	2.81	2.85	2.90
100	60	1	1.64	5.27	11.20	1.07	1.06	1.06
		3	3.24	5.97	11.26	3.05	3.04	3.03
		5	4.62	7.10	11.63	5.01	5.00	4.99
		8	4.95	8.46	12.30	5.08	5.17	5.19
		10	4.55	8.70	12.78	4.08	4.25	4.41
		15	3.51	8.56	13.24	2.85	2.96	2.95
200	60	1	1.00	1.38	4.06	1.01	1.01	1.01
		3	3.00	3.11	4.94	3.00	3.00	3.01
		5	4.80	5.02	6.30	5.01	5.00	5.01
		8	5.09	7.17	8.54	5.94	6.01	6.06
		10	4.43	7.51	9.48	4.99	6.65	6.68
		15	2.82	7.01	10.27	3.35	3.69	3.73
500	60	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	4.92	5.00	5.00	5.00	5.00	5.00
		8	5.37	7.13	7.87	6.45	6.46	6.49
		10	4.55	7.16	8.81	5.80	9.81	9.81
		15	2.35	6.19	8.86	4.22	5.82	5.37
40	100	1	1.95	9.60	17.20	1.31	1.26	1.24
		3	3.37	9.31	16.80	3.23	3.20	3.16
		5	4.60	9.55	16.78	4.81	4.81	4.78
		8	4.73	10.01	16.84	3.97	4.01	4.01
		10	4.39	10.26	16.89	3.35	3.27	3.31
60	100	1	1.71	5.60	11.66	1.16	1.14	1.14
		3	3.28	6.10	11.42	3.11	3.08	3.09
		5	4.62	7.11	11.63	5.03	5.02	5.01
		8	4.98	8.46	12.26	4.74	4.77	4.82
		10	4.60	8.71	12.75	3.58	3.89	3.81
100	100	1	2.05	4.53	7.37	1.04	1.02	1.03
		3	3.57	5.81	8.12	3.03	3.03	3.02
		5	4.97	7.22	9.22	5.01	5.01	5.01
		8	5.52	8.47	11.04	4.44	4.44	4.60
		10	4.95	8.53	11.56	3.17	4.35	4.32
		15	3.84	8.21	11.66	2.09	2.18	2.15

Table 15: DGP 4 - homoskedastic idiosyncratic component, the variance of the common component is smaller than the variance of the idiosyncratic component - Average results.

DGP 4								
			AVERAGE PC			AVERAGE PC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
200	100	1	1.00	1.04	2.00	1.00	1.00	1.00
		3	3.00	3.00	3.54	3.00	3.00	3.00
		5	4.98	5.00	5.24	5.00	5.00	5.00
		8	6.37	7.45	7.91	5.86	5.91	5.92
		10	5.75	8.01	9.00	4.87	9.69	9.73
		15	3.83	7.34	9.52	3.35	4.55	4.63
500	100	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	7.13	7.84	7.98	6.49	6.43	6.49
		10	6.51	8.44	9.28	5.89	10.00	10.00
		15	3.92	7.41	9.17	4.23	8.37	8.01
60	200	1	1.00	1.87	5.68	1.04	1.03	1.03
		3	3.00	3.29	5.62	3.02	3.01	3.02
		5	4.81	5.04	6.53	5.01	5.01	5.01
		8	5.11	7.22	8.59	4.66	4.68	4.75
		10	4.48	7.56	9.54	3.61	4.62	4.67
60	500	1	1.00	1.00	1.06	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	4.93	5.00	5.00	5.00	5.00	5.00
		8	5.36	7.13	7.86	4.42	4.43	4.48
		10	4.53	7.22	8.80	2.89	7.70	7.85
200	200	1	1.00	1.38	2.49	1.00	1.00	1.00
		3	3.00	3.07	3.89	3.00	3.00	3.00
		5	5.00	5.00	5.49	5.00	5.00	5.00
		8	7.51	7.91	8.11	4.03	3.94	3.97
		10	7.00	8.94	9.48	2.84	10.00	10.00
		15	4.97	9.52	10.63	1.80	2.70	2.62
500	500	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	8.00	8.00	8.00	2.25	2.30	2.21
		10	8.00	10.00	10.00	1.47	10.00	10.00
		15	8.00	14.86	14.96	1.16	1.72	1.74
100	200	1	1.00	1.15	2.36	1.01	1.01	1.01
		3	3.00	3.00	3.72	3.00	3.00	3.00
		5	4.99	5.00	5.32	5.00	5.00	5.00
		8	6.33	7.44	7.92	3.73	3.90	3.76
		10	5.74	8.06	9.04	2.50	8.71	8.74
		15	3.82	7.41	9.54	1.72	1.76	1.73
100	500	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	7.13	7.82	7.98	2.92	2.84	2.92
		10	6.56	8.49	9.32	1.69	9.98	10.00
		15	3.96	7.43	9.20	1.27	1.44	1.57

Table 16: DGP 4 - homoskedastic idiosyncratic component, the variance of the common component is smaller than the variance of the idiosyncratic component - Average results.

DGP 4								
			AVERAGE IC			AVERAGE IC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
100	40	1	1.00	1.00	1.00	1.01	1.00	1.00
		3	2.68	2.68	2.68	3.00	2.99	2.97
		5	2.26	2.26	2.26	4.26	4.03	3.66
		8	1.17	1.17	1.17	2.04	2.00	1.68
		10	0.64	0.64	0.64	1.52	1.39	1.24
		15	0.13	0.13	0.13	1.12	1.08	1.05
100	60	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	2.92	2.92	2.92	3.00	3.00	3.00
		5	3.14	3.14	3.14	4.92	4.92	4.90
		8	2.26	2.26	2.26	3.10	2.97	3.11
		10	1.90	1.91	1.91	1.66	1.73	1.79
		15	0.93	0.93	0.93	1.23	1.16	1.16
200	60	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	2.99	2.99	2.99	3.00	3.00	3.00
		5	4.05	4.05	4.05	5.00	5.00	5.00
		8	2.05	2.05	2.05	4.65	4.77	4.78
		10	1.09	1.09	1.09	2.87	4.72	4.78
		15	0.13	0.13	0.13	1.48	1.57	1.57
500	60	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	4.59	4.59	4.59	5.00	5.00	5.00
		8	2.36	2.36	2.36	5.74	5.75	5.69
		10	0.67	0.67	0.67	4.21	9.88	9.81
		15	0.00	0.00	0.00	2.09	4.10	3.50
40	100	1	1.00	1.00	1.00	1.01	1.00	1.00
		3	2.70	2.70	2.70	3.01	2.99	2.91
		5	2.30	2.30	2.30	3.97	3.47	2.65
		8	1.12	1.12	1.12	1.84	1.56	1.23
		10	0.61	0.61	0.61	1.37	1.25	1.08
60	100	1	1.00	1.00	1.00	1.02	1.01	1.00
		3	2.90	2.90	2.90	3.02	3.00	3.00
		5	3.16	3.16	3.16	4.94	4.91	4.88
		8	2.26	2.26	2.26	2.96	2.88	2.80
		10	1.89	1.90	1.90	1.68	1.77	1.61
100	100	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.01	3.01	3.01
		5	3.98	3.98	3.98	5.01	5.00	5.00
		8	3.25	3.27	3.27	3.15	3.04	3.27
		10	2.80	3.36	3.36	1.81	3.17	3.07
		15	2.67	3.86	3.87	1.21	1.22	1.22

Table 17: DGP 4 - homoskedastic idiosyncratic component, the variance of the common component is smaller than the variance of the idiosyncratic component - Average results.

DGP 4								
			AVERAGE IC			AVERAGE IC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
200	100	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	4.92	4.92	4.92	5.00	5.00	5.00
		8	4.63	4.63	4.63	4.50	4.49	4.58
		10	3.29	3.48	3.48	2.88	9.79	9.76
		15	1.75	1.75	1.75	1.46	2.43	2.52
500	100	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	6.52	6.52	6.52	5.56	5.57	5.63
		10	4.67	4.73	4.73	4.10	10.00	10.00
		15	0.75	0.75	0.75	2.14	7.64	7.21
60	200	1	1.00	1.00	1.00	1.01	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	4.07	4.07	4.07	5.00	5.00	4.99
		8	2.13	2.13	2.13	3.28	3.22	3.36
		10	1.13	1.13	1.13	1.93	3.08	2.58
60	500	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	4.54	4.54	4.54	5.00	5.00	5.00
		8	2.38	2.38	2.38	3.22	3.24	3.41
		10	0.73	0.73	0.73	1.63	7.76	6.24
200	200	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	7.15	7.15	7.15	2.82	2.70	2.56
		10	5.74	6.42	6.42	1.73	10.00	10.00
		15	2.96	5.22	5.22	1.22	2.61	2.66
500	500	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	8.00	8.00	8.00	1.27	1.25	1.27
		10	8.00	10.00	10.00	1.04	10.00	10.00
		15	8.00	14.80	14.80	1.01	1.39	1.48
100	200	1	1.00	1.00	1.00	1.01	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	4.91	4.91	4.91	5.00	5.00	5.00
		8	4.61	4.61	4.61	2.61	2.79	2.64
		10	3.29	3.49	3.49	1.61	8.97	9.01
		15	1.78	1.79	1.79	1.16	1.28	1.35
100	500	1	1.00	1.00	1.00	1.00	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	6.56	6.56	6.56	2.13	2.02	2.07
		10	4.77	4.83	4.83	1.23	9.99	10.00
		15	0.77	0.77	0.77	1.06	1.78	1.96

Table 18: DGP 5 - Small cross-section correlation across idiosyncratic parts, same variance for the common component and the idiosyncratic component - Average results.

DGP 5								
			AVERAGE PC			AVERAGE PC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
100	40	1	7.72	12.80	18.65	6.57	6.63	6.67
		3	8.00	13.17	18.74	6.39	8.85	8.78
		5	8.00	13.65	18.91	5.94	9.81	9.61
		8	7.99	14.47	19.13	5.51	8.32	8.30
		10	7.93	14.64	19.33	5.41	7.38	7.38
		15	7.58	14.47	19.56	5.29	6.33	6.36
100	60	1	7.89	11.55	16.14	6.57	6.73	6.69
		3	8.00	12.27	16.38	6.42	9.67	9.68
		5	8.00	13.16	16.79	5.78	11.24	11.25
		8	8.00	14.51	17.56	5.35	8.99	9.18
		10	7.97	14.64	18.16	5.35	7.89	8.27
		15	7.64	14.25	18.68	5.34	6.62	6.67
200	60	1	8.00	13.17	15.36	5.73	9.85	9.74
		3	8.00	14.19	16.55	5.91	10.42	10.57
		5	8.00	14.74	17.74	5.84	10.52	11.00
		8	8.00	14.92	19.04	5.20	8.46	9.70
		10	7.94	14.85	19.34	4.89	7.51	8.25
		15	7.44	14.38	19.10	4.63	6.26	6.57
500	60	1	8.00	14.40	15.70	6.56	12.83	13.06
		3	8.00	14.99	17.28	6.48	12.96	14.18
		5	8.00	15.00	18.78	6.22	12.68	15.46
		8	8.00	15.00	19.93	6.12	11.11	13.27
		10	8.00	15.00	19.97	6.19	10.52	11.92
		15	8.00	14.92	19.78	6.32	10.00	10.21
40	100	1	6.33	13.67	19.54	4.13	4.14	4.12
		3	6.96	13.48	19.41	6.05	6.06	6.07
		5	7.99	13.57	19.40	6.00	6.04	6.11
		8	7.99	13.91	19.45	5.25	6.74	6.71
		10	7.97	14.21	19.48	4.87	5.66	5.57
60	100	1	6.73	11.60	16.79	6.04	6.04	6.04
		3	7.99	11.93	16.73	6.55	6.61	6.61
		5	8.00	12.51	16.89	5.96	9.75	9.75
		8	8.00	13.75	17.40	5.10	8.61	8.70
		10	7.99	14.44	17.79	4.95	6.14	6.17
100	100	1	7.98	10.96	14.40	6.44	6.54	6.53
		3	8.00	11.93	14.96	5.62	9.98	9.99
		5	8.00	13.06	15.66	4.35	11.90	11.92
		8	8.00	14.82	17.00	4.09	7.18	6.99
		10	8.00	14.88	17.99	4.37	5.33	7.42
		15	7.78	14.47	18.76	4.65	5.08	5.05

Table 19: DGP 5 - Small cross-section correlation across idiosyncratic parts, same variance for the common component and the idiosyncratic component - Average results.

DGP 5								
			AVERAGE PC			AVERAGE PC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
200	100	1	8.00	13.83	15.25	5.46	11.87	11.98
		3	8.00	14.72	16.70	5.69	11.75	12.96
		5	8.00	14.99	18.23	5.71	10.95	13.80
		8	8.00	15.00	19.59	4.48	7.85	10.83
		10	8.00	15.00	19.88	4.21	6.70	8.35
		15	7.91	14.83	19.64	4.17	5.87	6.37
500	100	1	8.00	14.93	16.00	6.57	13.68	14.98
		3	8.00	15.00	17.79	6.44	13.60	17.03
		5	8.00	15.00	19.54	6.04	13.05	17.87
		8	8.00	15.00	20.00	6.08	11.42	15.85
		10	8.00	15.00	20.00	6.24	10.98	13.63
		15	8.00	15.00	20.00	6.43	10.77	11.60
60	200	1	6.45	10.22	15.58	6.04	6.03	6.05
		3	8.00	10.74	15.31	6.35	6.41	6.40
		5	8.00	11.65	15.51	5.83	9.98	9.97
		8	8.00	13.55	16.35	4.74	11.26	10.77
		10	8.00	14.82	17.13	4.68	5.89	5.85
60	500	1	6.12	8.67	13.95	6.01	6.01	6.02
		3	8.00	9.86	13.35	6.23	6.25	6.24
		5	8.00	11.17	13.61	5.51	10.00	10.00
		8	8.00	13.21	15.07	4.44	12.31	12.29
		10	8.00	14.96	16.42	4.16	5.31	5.36
200	200	1	8.00	14.40	16.59	3.24	12.23	13.30
		3	8.00	14.99	17.69	4.13	10.43	14.69
		5	8.00	15.00	18.82	3.86	7.59	14.44
		8	8.00	15.00	19.99	2.23	3.03	7.81
		10	8.00	15.00	20.00	2.07	2.48	3.01
		15	8.00	15.00	20.00	2.15	2.35	2.52
500	500	1	8.00	15.00	18.53	2.76	13.99	17.81
		3	8.00	15.00	19.75	2.28	13.21	18.01
		5	8.00	15.00	20.00	1.45	7.97	18.07
		8	8.00	15.00	20.00	2.95	3.58	10.19
		10	8.00	15.00	20.00	3.57	4.89	4.95
		15	8.00	15.00	20.00	3.90	7.34	7.42
100	200	1	8.00	10.25	12.81	6.30	6.44	6.41
		3	8.00	11.46	13.59	5.08	10.02	10.02
		5	8.00	12.88	14.67	3.25	12.02	12.01
		8	8.00	15.00	16.50	3.49	5.50	5.85
		10	8.00	15.00	17.93	3.85	4.21	13.44
		15	8.00	14.99	19.72	4.72	4.82	4.91
100	500	1	8.00	9.59	11.18	6.09	6.14	6.13
		3	8.00	10.96	12.44	3.80	10.01	10.01
		5	8.00	12.48	13.81	1.91	12.01	12.01
		8	8.00	15.00	15.96	2.62	3.90	3.86
		10	8.00	15.00	17.52	3.25	3.45	16.40
		15	8.00	15.00	20.00	4.65	4.62	4.74

Table 20: DGP 5 - Small cross-section correlation across idiosyncratic parts, same variance for the common component and the idiosyncratic component - Average results.

DGP 5								
			AVERAGE IC			AVERAGE IC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
100	40	1	7.52	8.68	10.93	6.08	6.34	6.25
		3	7.99	10.81	12.79	3.41	8.90	8.73
		5	8.00	12.23	13.96	1.94	9.55	9.26
		8	7.83	13.02	14.73	1.80	5.16	4.97
		10	7.21	11.93	13.82	1.84	2.61	2.66
		15	5.61	8.50	10.45	2.25	2.32	2.04
100	60	1	7.80	9.47	10.82	6.19	6.58	6.55
		3	8.00	11.22	12.67	3.33	9.96	9.92
		5	8.00	12.66	14.21	1.50	11.75	11.81
		8	7.98	13.84	15.50	1.64	6.72	7.26
		10	7.76	13.24	15.08	1.95	3.59	6.40
		15	6.54	9.75	11.47	2.62	2.94	3.08
200	60	1	7.98	11.41	11.42	3.03	11.19	11.41
		3	8.00	13.18	13.43	3.77	10.28	12.74
		5	8.00	14.31	15.38	2.14	7.04	13.56
		8	7.89	14.52	17.04	1.39	2.35	8.16
		10	6.89	12.62	15.26	1.38	1.62	4.24
		15	4.10	6.71	8.39	1.36	1.38	1.53
500	60	1	8.00	14.11	14.15	3.23	13.57	16.09
		3	8.00	14.97	16.10	2.27	12.61	17.90
		5	8.00	15.00	18.08	1.54	7.41	18.23
		8	8.00	15.00	19.80	2.17	3.41	12.50
		10	8.00	15.00	19.87	2.60	4.15	8.50
		15	7.99	14.29	17.81	3.64	5.79	6.57
40	100	1	5.07	7.54	9.35	4.21	4.09	4.02
		3	6.63	8.91	10.70	6.14	6.09	6.04
		5	7.98	10.32	12.03	3.35	3.76	3.49
		8	7.97	11.87	13.55	2.63	5.89	4.95
		10	7.82	12.10	13.80	2.95	4.03	3.33
60	100	1	6.65	8.77	10.60	6.14	6.15	6.12
		3	7.98	10.20	11.93	6.21	6.79	6.74
		5	8.00	11.58	13.27	2.65	10.07	10.01
		8	7.99	13.19	14.85	2.69	10.91	10.38
		10	7.91	13.28	14.95	3.08	5.21	5.81
100	100	1	7.97	10.30	11.97	5.95	6.46	6.50
		3	8.00	11.62	13.29	2.07	10.26	10.24
		5	8.00	12.93	14.59	1.17	12.21	12.19
		8	8.00	14.65	16.32	1.39	5.18	6.43
		10	7.99	14.54	16.75	1.69	2.44	12.39
		15	7.23	11.70	13.91	2.53	2.65	2.99

Table 21: DGP 5 - Small cross-section correlation across idiosyncratic parts, same variance for the common component and the idiosyncratic component - Average results.

DGP 5								
			AVERAGE IC			AVERAGE IC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
200	100	1	8.00	13.21	13.41	2.30	12.98	14.08
		3	8.00	14.52	15.42	3.49	11.30	16.36
		5	8.00	14.97	17.33	2.17	7.39	17.16
		8	8.00	15.00	19.21	1.21	1.68	10.28
		10	8.00	15.00	19.64	1.11	1.26	3.89
		15	7.23	12.45	15.65	1.30	1.37	1.40
500	100	1	8.00	14.89	15.37	2.39	13.83	17.20
		3	8.00	15.00	17.37	1.76	13.11	18.49
		5	8.00	15.00	19.36	1.26	4.60	18.61
		8	8.00	15.00	20.00	1.99	2.57	11.56
		10	8.00	15.00	20.00	2.86	3.88	7.39
		15	8.00	15.00	20.00	3.66	7.17	7.80
60	200	1	6.22	6.23	6.23	6.21	6.19	6.17
		3	8.00	8.24	8.24	6.10	6.95	6.87
		5	8.00	10.22	10.22	2.37	10.29	10.23
		8	8.00	13.25	13.27	2.89	12.85	12.68
		10	8.00	14.63	15.02	3.15	5.74	6.62
60	500	1	6.01	6.01	6.01	6.15	6.14	6.12
		3	8.00	8.01	8.01	5.99	7.35	7.01
		5	8.00	10.01	10.01	1.79	10.57	10.41
		8	8.00	13.02	13.02	2.93	13.05	13.11
		10	8.00	14.92	14.95	3.14	5.50	6.91
200	200	1	8.00	14.26	15.92	1.22	12.68	15.32
		3	8.00	14.99	17.26	3.06	9.79	17.60
		5	8.00	15.00	18.56	1.52	3.96	16.65
		8	8.00	15.00	19.97	1.01	1.05	8.20
		10	8.00	15.00	20.00	1.02	1.00	1.54
		15	8.00	15.00	20.00	1.04	1.06	1.05
500	500	1	8.00	15.00	18.33	1.00	13.94	18.04
		3	8.00	15.00	19.67	1.00	11.03	18.19
		5	8.00	15.00	20.00	1.00	1.01	17.95
		8	8.00	15.00	20.00	1.05	1.00	2.42
		10	8.00	15.00	20.00	1.31	1.28	1.13
		15	8.00	15.00	20.00	1.46	4.77	4.80
100	200	1	8.00	8.75	8.75	5.98	7.00	6.96
		3	8.00	10.72	10.72	1.43	10.45	10.44
		5	8.00	12.71	12.74	1.03	12.36	12.41
		8	8.00	15.00	15.77	1.19	3.06	7.19
		10	8.00	15.00	17.68	1.50	1.64	16.79
		15	8.00	14.92	19.03	2.89	2.78	3.08
100	500	1	8.00	8.16	8.16	5.99	7.71	7.60
		3	8.00	10.14	10.14	1.02	10.81	10.86
		5	8.00	12.14	12.14	1.00	12.70	12.74
		8	8.00	15.00	15.15	1.03	1.94	7.58
		10	8.00	15.00	17.16	1.19	1.23	17.58
		15	8.00	15.00	20.00	2.92	2.92	3.08

Table 22: DGP 6 - Serial correlation across idiosyncratic parts, the variance of the common component is smaller than the variance of the idiosyncratic component - Average results.

DGP 6								
			AVERAGE PC			AVERAGE PC^{*}		
		$rmax$	8	15	20	8	15	20
N	T	r						
100	40	1	6.61	13.34	18.85	3.35	3.54	3.59
		3	6.87	13.64	19.02	4.45	4.86	4.87
		5	7.17	13.83	19.11	5.45	6.02	5.93
		8	7.26	14.02	19.34	5.07	6.05	6.18
		10	7.06	14.07	19.39	4.67	5.56	5.70
		15	6.49	13.94	19.45	3.91	4.60	4.50
100	60	1	5.40	11.90	16.77	2.31	2.46	2.48
		3	5.82	12.16	16.96	3.89	4.03	4.05
		5	6.39	12.37	17.19	5.39	5.66	5.71
		8	7.02	12.71	17.46	5.42	6.07	6.05
		10	6.74	12.77	17.56	4.61	5.55	5.60
		15	5.90	12.52	17.56	3.55	4.20	4.23
200	60	1	5.11	11.31	15.81	2.09	2.28	2.33
		3	5.61	11.77	16.22	3.78	3.93	3.95
		5	6.22	12.16	16.66	5.42	5.70	5.66
		8	7.42	12.61	17.28	6.16	7.02	6.96
		10	7.24	12.86	17.50	5.37	7.21	7.11
		15	6.22	12.62	17.58	4.20	5.07	5.09
500	60	1	4.55	10.95	15.17	1.93	2.24	2.24
		3	4.97	11.55	15.86	3.57	3.73	3.87
		5	5.68	12.00	16.43	5.33	5.68	5.60
		8	7.74	12.49	17.11	6.59	7.47	7.49
		10	7.65	12.68	17.41	6.04	8.84	8.97
		15	6.35	12.61	17.57	4.80	6.86	6.70
40	100	1	4.88	12.63	18.76	1.98	2.03	1.98
		3	5.26	12.48	18.52	3.65	3.67	3.66
		5	5.99	12.57	18.47	5.09	5.07	5.17
		8	6.61	12.77	18.53	4.52	4.73	4.72
		10	6.41	12.85	18.56	3.78	3.81	3.97
60	100	1	4.36	10.86	16.15	1.76	1.71	1.75
		3	4.99	10.90	16.01	3.48	3.53	3.53
		5	6.02	11.12	16.12	5.30	5.31	5.33
		8	6.79	11.63	16.36	4.99	5.34	5.26
		10	6.50	11.88	16.53	4.13	4.46	4.54
100	100	1	3.87	9.43	14.12	1.37	1.36	1.36
		3	4.81	9.70	14.22	3.24	3.22	3.23
		5	6.01	10.13	14.49	5.15	5.15	5.17
		8	7.16	10.96	14.93	4.72	5.00	5.12
		10	6.85	11.52	15.25	3.55	4.65	4.78
		15	5.65	11.40	15.55	2.43	2.50	2.52

Table 23: DGP 6 - Serial correlation across idiosyncratic parts, the variance of the common component is smaller than the variance of the idiosyncratic component - Average results.

DGP 6								
			AVERAGE PC			AVERAGE PC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
200	100	1	3.28	8.36	12.71	1.30	1.29	1.36
		3	4.48	8.81	13.04	3.21	3.21	3.23
		5	5.93	9.39	13.47	5.18	5.21	5.23
		8	7.84	10.52	14.16	6.20	6.56	6.59
		10	7.72	11.55	14.62	5.22	9.39	9.38
		15	6.53	12.03	15.62	3.80	5.61	5.88
500	100	1	1.77	6.87	11.43	1.17	1.16	1.16
		3	3.32	7.31	11.86	3.09	3.09	3.11
		5	5.04	7.83	12.27	5.07	5.07	5.07
		8	8.00	9.14	12.87	6.63	6.72	6.72
		10	8.00	10.50	13.34	6.15	10.06	10.07
		15	7.51	12.58	15.15	4.82	9.25	9.50
60	200	1	1.65	6.58	12.17	1.25	1.22	1.27
		3	3.22	6.66	11.64	3.17	3.16	3.18
		5	5.01	7.19	11.75	5.09	5.09	5.09
		8	7.05	8.81	12.27	4.95	5.29	5.27
		10	6.73	9.85	12.81	3.67	5.82	5.65
60	500	1	1.00	1.32	5.25	1.03	1.03	1.03
		3	3.00	3.02	4.97	3.01	3.02	3.01
		5	5.00	5.00	5.62	5.01	5.01	5.02
		8	7.28	7.98	8.07	4.70	4.57	4.56
		10	6.97	9.35	9.97	3.19	9.14	9.06
200	200	1	3.33	5.76	8.24	1.06	1.04	1.05
		3	4.67	7.00	9.07	3.03	3.02	3.03
		5	6.00	8.33	10.13	5.02	5.02	5.03
		8	8.00	10.33	12.00	4.20	4.18	4.16
		10	8.00	11.65	13.33	2.99	10.00	10.00
		15	7.44	12.76	15.59	2.00	3.71	3.38
500	500	1	2.27	3.69	4.86	1.00	1.00	1.00
		3	3.74	5.03	6.12	3.00	3.00	3.00
		5	5.36	6.51	7.54	5.00	5.00	5.00
		8	8.00	8.93	9.86	2.37	2.35	2.34
		10	8.00	10.59	11.46	1.59	10.00	10.00
		15	8.00	15.00	15.63	1.21	1.74	1.81
100	200	1	1.93	4.69	8.51	1.10	1.12	1.12
		3	3.47	5.47	8.74	3.08	3.07	3.06
		5	5.14	6.67	9.22	5.04	5.06	5.05
		8	7.76	8.92	10.53	4.14	4.20	4.06
		10	7.59	10.32	11.81	2.74	8.67	8.86
		15	6.29	11.23	13.74	1.95	2.13	2.22
100	500	1	1.00	1.00	1.35	1.01	1.00	1.01
		3	3.00	3.00	3.04	3.00	3.00	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	7.99	8.00	8.00	2.88	2.84	2.76
		10	7.99	9.95	10.00	1.76	10.00	10.00
		15	7.10	11.43	13.03	1.32	1.66	1.55

Table 24: DGP 6 - Serial correlation across idiosyncratic parts, the variance of the common component is smaller than the variance of the idiosyncratic component - Average results.

DGP 6								
			AVERAGE IC			AVERAGE IC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
100	40	1	3.35	5.55	7.39	1.37	1.25	1.28
		3	4.76	7.06	8.77	3.24	3.21	3.15
		5	5.64	7.98	9.66	3.68	3.89	3.62
		8	4.27	6.65	8.32	1.78	1.77	1.69
		10	3.34	5.69	7.36	1.44	1.43	1.24
		15	2.60	5.06	6.73	1.09	1.06	1.04
100	60	1	3.32	5.55	7.24	1.14	1.15	1.14
		3	4.67	6.97	8.62	3.17	3.15	3.14
		5	5.78	8.10	9.77	4.89	4.91	4.81
		8	4.84	7.17	8.84	2.57	2.75	2.64
		10	3.68	6.01	7.68	1.69	1.71	1.71
		15	2.76	5.09	6.76	1.20	1.19	1.15
200	60	1	1.57	1.58	1.58	1.14	1.20	1.18
		3	3.77	3.92	3.92	3.18	3.27	3.22
		5	5.62	6.13	6.17	5.13	5.15	5.18
		8	6.60	7.87	8.18	3.91	4.37	4.28
		10	5.22	6.87	7.43	2.51	3.54	3.38
		15	2.56	3.70	4.33	1.41	1.39	1.34
500	60	1	1.00	1.00	1.00	1.05	1.31	1.38
		3	3.00	3.00	3.00	3.13	3.26	3.30
		5	5.01	5.01	5.01	5.11	5.24	5.28
		8	7.45	7.48	7.48	5.28	5.99	5.83
		10	6.72	7.22	7.22	3.37	6.26	6.36
		15	1.51	1.55	1.55	1.75	1.97	1.83
40	100	1	1.25	1.41	3.25	1.10	1.05	1.01
		3	3.30	3.42	4.86	3.10	3.03	3.00
		5	4.59	4.95	6.82	4.04	3.96	3.56
		8	3.55	4.48	6.83	2.12	1.85	1.55
		10	2.74	3.91	6.31	1.37	1.26	1.14
60	100	1	2.44	3.59	5.10	1.13	1.12	1.10
		3	4.22	5.23	6.34	3.10	3.13	3.10
		5	5.58	6.93	8.37	5.00	4.99	4.99
		8	4.63	6.61	8.14	2.74	2.71	2.81
		10	3.50	5.63	7.23	1.81	1.91	1.87
100	100	1	3.33	5.67	7.33	1.09	1.08	1.08
		3	4.67	7.00	8.67	3.10	3.07	3.09
		5	5.96	8.29	9.96	5.07	5.05	5.07
		8	5.90	8.23	9.90	2.81	3.13	3.24
		10	4.56	6.90	8.56	1.68	2.86	2.63
		15	2.86	5.19	6.86	1.17	1.17	1.20

Table 25: DGP 6 - Serial correlation across idiosyncratic parts, the variance of the common component is smaller than the variance of the idiosyncratic component - Average results.

DGP 6								
			AVERAGE IC			AVERAGE IC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
200	100	1	1.74	1.76	1.76	1.06	1.08	1.08
		3	3.78	3.83	3.83	3.07	3.07	3.05
		5	5.69	5.99	6.01	5.09	5.07	5.11
		8	7.71	8.87	8.95	4.26	4.61	4.64
		10	7.19	9.14	9.36	2.45	8.44	8.47
		15	3.58	5.85	6.72	1.43	2.05	2.12
500	100	1	1.00	1.00	1.00	1.04	1.04	1.04
		3	3.00	3.00	3.00	3.04	3.04	3.04
		5	5.00	5.00	5.00	5.05	5.04	5.04
		8	8.00	8.00	8.00	5.14	5.10	5.13
		10	7.99	9.69	9.69	3.47	10.05	10.06
		15	5.98	7.61	7.61	2.08	5.92	6.25
60	200	1	1.00	1.00	1.00	1.05	1.05	1.04
		3	3.00	3.00	3.00	3.07	3.06	3.04
		5	4.95	4.95	4.95	5.05	5.03	5.02
		8	5.83	5.83	5.83	3.17	3.48	3.47
		10	4.13	4.31	4.31	1.66	4.15	3.82
60	500	1	1.00	1.00	1.00	1.01	1.00	1.00
		3	3.00	3.00	3.00	3.00	3.01	3.00
		5	5.00	5.00	5.00	5.01	5.01	5.00
		8	6.67	6.67	6.67	2.91	2.87	2.96
		10	5.00	5.03	5.03	1.63	9.13	8.97
200	200	1	3.33	5.57	6.95	1.04	1.03	1.03
		3	4.67	6.92	8.21	3.03	3.03	3.04
		5	6.00	8.29	9.71	5.03	5.02	5.04
		8	8.00	10.33	11.94	2.31	2.50	2.41
		10	7.99	11.43	13.07	1.44	10.01	10.01
		15	6.10	8.95	10.62	1.19	2.84	2.88
500	500	1	1.36	1.36	1.36	1.00	1.00	1.00
		3	3.18	3.18	3.18	3.00	3.00	3.00
		5	5.12	5.12	5.12	5.00	5.00	5.00
		8	8.00	8.10	8.10	1.09	1.11	1.09
		10	8.00	10.09	10.09	1.01	10.00	10.00
		15	8.00	15.00	15.11	1.01	1.25	1.35
100	200	1	1.01	1.01	1.01	1.04	1.05	1.04
		3	3.01	3.01	3.01	3.05	3.04	3.04
		5	5.00	5.00	5.00	5.04	5.05	5.03
		8	7.60	7.60	7.60	2.49	2.72	2.62
		10	6.88	7.66	7.66	1.48	8.75	8.85
		15	3.41	5.13	5.13	1.15	1.50	1.56
100	500	1	1.00	1.00	1.00	1.01	1.00	1.01
		3	3.00	3.00	3.00	3.01	3.01	3.00
		5	5.00	5.00	5.00	5.00	5.00	5.00
		8	7.98	7.98	7.98	1.80	1.70	1.77
		10	7.96	9.40	9.40	1.14	10.01	10.00
		15	5.03	5.84	5.84	1.06	1.98	2.00

Table 26: DGP 7 - Allow for serial and small cross-section correlation across idiosyncratic parts, the variance of the common component is smaller than the variance of the idiosyncratic component - Average results.

DGP 7								
			AVERAGE PC			AVERAGE PC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
100	40	1	7.97	14.55	19.70	6.46	6.91	6.99
		3	8.00	14.72	19.79	6.42	8.43	8.40
		5	8.00	14.86	19.85	5.96	8.87	8.86
		8	7.99	14.95	19.95	5.60	7.75	7.66
		10	7.96	14.93	19.96	5.61	7.22	7.12
		15	7.72	14.79	19.95	5.40	6.30	6.54
100	60	1	7.97	13.75	18.38	6.62	7.11	7.13
		3	8.00	14.08	18.65	6.35	9.25	9.34
		5	8.00	14.40	18.88	5.71	10.16	10.10
		8	8.00	14.79	19.20	5.47	7.98	8.15
		10	7.96	14.76	19.35	5.50	7.37	7.38
		15	7.68	14.39	19.27	5.50	6.44	6.41
200	60	1	8.00	14.56	18.83	6.11	9.51	9.39
		3	8.00	14.87	19.19	6.23	10.68	10.76
		5	8.00	14.98	19.50	5.83	10.48	11.00
		8	8.00	14.99	19.83	5.37	8.62	9.29
		10	7.99	14.97	19.86	5.28	7.83	8.23
		15	7.75	14.65	19.64	5.18	6.85	6.87
500	60	1	8.00	14.98	19.25	6.64	12.41	12.48
		3	8.00	15.00	19.74	6.54	12.94	13.60
		5	8.00	15.00	19.97	6.38	12.37	14.15
		8	8.00	15.00	20.00	6.43	11.06	12.24
		10	8.00	15.00	20.00	6.41	10.43	11.19
		15	8.00	14.98	19.97	6.52	9.87	10.25
40	100	1	7.15	14.32	19.82	4.32	4.32	4.30
		3	7.52	14.29	19.76	6.15	6.17	6.17
		5	7.98	14.37	19.79	5.83	6.12	6.14
		8	7.99	14.54	19.83	5.09	5.50	5.47
		10	7.91	14.60	19.82	4.73	5.03	4.98
60	100	1	7.24	13.17	18.21	6.09	6.12	6.11
		3	7.99	13.37	18.26	6.47	6.82	6.83
		5	8.00	13.72	18.39	5.66	9.11	9.09
		8	8.00	14.26	18.69	4.93	6.51	6.71
		10	7.96	14.48	18.85	4.75	5.41	5.54
100	100	1	7.99	12.70	16.94	6.49	6.75	6.78
		3	8.00	13.20	17.25	5.51	9.76	9.76
		5	8.00	13.80	17.65	4.48	11.19	11.13
		8	8.00	14.80	18.26	4.59	6.36	6.67
		10	7.99	14.79	18.65	4.79	5.51	5.60
		15	7.73	14.24	18.72	5.12	5.52	5.46

Table 27: DGP 7 - Allow for serial and small cross-section correlation across idiosyncratic parts, the variance of the common component is smaller than the variance of the idiosyncratic component - Average results.

DGP 7								
			AVERAGE PC			AVERAGE PC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
200	100	1	8.00	14.45	17.78	5.92	11.18	11.28
		3	8.00	14.95	18.39	5.97	11.71	12.40
		5	8.00	15.00	19.08	5.33	10.75	12.68
		8	8.00	15.00	19.87	4.79	8.10	9.89
		10	8.00	15.00	19.94	4.74	7.36	8.28
		15	7.96	14.80	19.65	4.99	6.92	7.18
500	100	1	8.00	15.00	18.26	6.62	13.47	14.16
		3	8.00	15.00	19.16	6.46	13.51	16.18
		5	8.00	15.00	19.94	6.23	12.71	17.55
		8	8.00	15.00	20.00	6.45	11.42	14.57
		10	8.00	15.00	20.00	6.52	11.26	12.73
		15	8.00	15.00	20.00	6.57	11.14	11.54
60	200	1	6.94	11.99	17.23	6.10	6.08	6.11
		3	8.00	12.31	17.22	6.47	6.62	6.56
		5	8.00	12.95	17.37	5.50	9.88	9.86
		8	8.00	14.01	17.84	4.66	7.85	7.62
		10	8.00	14.66	18.23	4.46	5.29	5.39
60	500	1	6.34	9.62	15.00	6.05	6.05	6.04
		3	8.00	10.30	14.74	6.25	6.31	6.33
		5	8.00	11.50	14.95	5.30	10.00	10.01
		8	8.00	13.41	15.87	4.28	9.78	9.77
		10	8.00	14.78	16.83	4.18	5.01	5.04
200	200	1	8.00	14.65	17.12	3.85	11.20	11.55
		3	8.00	15.00	18.15	4.37	10.10	12.91
		5	8.00	15.00	19.17	2.88	6.65	12.88
		8	8.00	15.00	20.00	2.41	3.16	5.81
		10	8.00	15.00	20.00	2.66	3.10	3.27
		15	8.00	15.00	19.98	3.14	3.51	3.50
500	500	1	8.00	15.00	18.63	3.22	13.90	17.15
		3	8.00	15.00	19.90	1.87	12.71	18.05
		5	8.00	15.00	20.00	2.57	4.77	17.97
		8	8.00	15.00	20.00	3.76	5.72	6.33
		10	8.00	15.00	20.00	3.76	6.97	6.87
		15	8.00	15.00	20.00	3.81	9.33	9.31
100	200	1	8.00	11.90	15.60	6.37	6.56	6.57
		3	8.00	12.63	16.00	4.67	10.05	10.04
		5	8.00	13.47	16.63	3.69	12.01	12.00
		8	8.00	14.99	17.66	4.28	5.95	5.95
		10	8.00	15.00	18.45	4.74	5.09	6.55
		15	8.00	14.82	19.23	5.25	5.37	5.40
100	500	1	8.00	10.22	12.40	6.15	6.28	6.27
		3	8.00	11.46	13.34	3.41	10.03	10.03
		5	8.00	12.86	14.55	2.54	12.01	12.02
		8	8.00	15.00	16.49	4.03	4.65	4.87
		10	8.00	15.00	17.85	4.62	4.80	11.64
		15	8.00	15.00	19.90	5.20	5.22	5.21

Table 28: DGP 7 - Allow for serial and small cross-section correlation across idiosyncratic parts, the variance of the common component is smaller than the variance of the idiosyncratic component - Average results.

DGP 7								
			AVERAGE IC			AVERAGE IC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
100	40	1	7.91	11.87	14.18	5.57	6.44	6.46
		3	8.00	13.29	16.20	2.90	7.20	6.88
		5	8.00	14.19	17.52	1.80	6.10	5.93
		8	7.91	14.42	18.51	1.91	2.71	2.53
		10	7.54	13.55	17.84	2.22	2.48	2.42
		15	6.37	10.18	14.15	2.63	2.59	2.50
100	60	1	7.93	10.84	12.51	6.13	6.92	6.92
		3	8.00	12.22	13.90	3.01	8.93	9.05
		5	8.00	13.46	15.23	1.75	9.28	9.45
		8	7.98	14.19	16.47	2.23	4.01	4.27
		10	7.75	13.27	15.78	2.68	3.23	3.51
		15	6.74	10.10	12.03	3.35	3.43	3.31
200	60	1	8.00	13.62	15.39	3.50	8.94	9.14
		3	8.00	14.60	16.83	3.34	9.09	10.06
		5	8.00	14.92	18.15	1.64	5.59	9.03
		8	7.98	14.89	19.13	1.54	2.05	4.25
		10	7.76	14.54	18.71	1.69	1.88	2.39
		15	6.35	9.91	12.41	1.99	2.04	2.08
500	60	1	8.00	14.94	17.37	4.23	13.00	14.97
		3	8.00	15.00	19.10	2.16	12.05	16.44
		5	8.00	15.00	19.84	2.54	6.22	16.61
		8	8.00	15.00	19.99	3.55	5.17	9.98
		10	8.00	15.00	19.99	4.05	5.67	7.50
		15	8.00	14.78	19.39	4.75	7.20	7.67
40	100	1	5.71	8.05	9.81	4.35	4.21	4.13
		3	7.05	9.51	11.24	6.15	6.12	6.07
		5	7.95	10.94	12.99	3.68	4.34	4.10
		8	7.87	12.13	14.76	3.20	3.67	3.43
		10	7.38	11.41	14.10	3.31	3.38	3.23
60	100	1	6.85	9.20	10.86	6.17	6.20	6.17
		3	7.99	10.57	12.24	5.67	6.53	6.59
		5	8.00	11.87	13.54	3.07	9.32	9.40
		8	7.98	13.12	14.81	3.21	5.89	5.98
		10	7.71	12.60	14.36	3.33	4.07	4.25
100	100	1	7.97	10.50	12.17	5.84	6.75	6.60
		3	8.00	11.84	13.51	1.83	10.04	9.97
		5	8.00	13.13	14.80	1.33	11.35	11.35
		8	8.00	14.53	16.36	1.97	4.23	5.28
		10	7.93	13.99	16.27	2.49	3.08	5.00
		15	7.23	11.15	13.10	3.51	3.70	3.71

Table 29: DGP 7 - Allow for serial and small cross-section correlation across idiosyncratic parts, the variance of the common component is smaller than the variance of the idiosyncratic component - Average results.

DGP 7								
			AVERAGE IC			AVERAGE IC^*		
		$rmax$	8	15	20	8	15	20
N	T	r						
200	100	1	8.00	14.03	15.72	3.09	11.33	12.00
		3	8.00	14.87	17.06	3.21	10.39	13.48
		5	8.00	14.99	18.32	1.46	5.73	13.48
		8	8.00	15.00	19.64	1.33	1.90	6.33
		10	8.00	14.99	19.78	1.53	1.64	2.60
		15	7.77	13.25	16.47	2.09	2.20	2.28
500	100	1	8.00	15.00	17.03	3.28	13.61	16.30
		3	8.00	15.00	18.75	1.59	12.54	18.06
		5	8.00	15.00	19.88	2.10	4.85	18.49
		8	8.00	15.00	20.00	3.65	5.31	10.74
		10	8.00	15.00	20.00	4.28	6.89	8.97
		15	8.00	15.00	19.99	4.62	9.23	9.81
60	200	1	6.61	7.04	7.17	6.22	6.27	6.23
		3	8.00	9.01	9.20	5.85	6.73	6.63
		5	8.00	11.16	11.56	2.94	10.16	10.16
		8	8.00	13.48	14.50	3.26	9.88	9.86
		10	8.00	14.17	15.65	3.30	4.99	5.30
60	500	1	6.05	6.05	6.05	6.22	6.23	6.21
		3	8.00	8.06	8.06	5.65	6.86	6.68
		5	8.00	10.07	10.07	2.91	10.37	10.38
		8	8.00	13.02	13.02	3.20	12.16	12.31
		10	8.00	14.56	14.66	3.24	5.01	6.15
200	200	1	8.00	14.55	16.28	1.49	11.17	12.94
		3	8.00	14.99	17.59	2.06	8.51	15.10
		5	8.00	15.00	18.91	1.06	2.89	15.00
		8	8.00	15.00	19.99	1.06	1.02	5.34
		10	8.00	15.00	20.00	1.11	1.09	1.36
		15	8.00	14.99	19.87	1.45	1.49	1.49
500	500	1	8.00	15.00	18.53	1.00	13.59	17.97
		3	8.00	15.00	19.87	1.00	9.51	18.26
		5	8.00	15.00	20.00	1.00	1.00	17.46
		8	8.00	15.00	20.00	1.32	1.61	1.48
		10	8.00	15.00	20.00	1.40	3.72	3.42
		15	8.00	15.00	20.00	1.41	7.72	7.73
100	200	1	8.00	10.34	11.46	5.70	6.63	6.61
		3	8.00	11.72	13.00	1.27	10.39	10.37
		5	8.00	13.08	14.63	1.14	12.26	12.28
		8	8.00	14.99	16.72	1.84	3.65	5.98
		10	8.00	14.99	17.83	2.62	2.71	10.86
		15	7.98	13.97	16.65	4.15	4.08	4.24
100	500	1	8.00	8.37	8.37	5.96	7.23	7.14
		3	8.00	10.34	10.34	1.05	10.56	10.58
		5	8.00	12.36	12.36	1.03	12.50	12.55
		8	8.00	15.00	15.36	1.62	2.40	6.06
		10	8.00	15.00	17.34	2.77	2.70	16.30
		15	8.00	15.00	19.69	4.71	4.69	4.78