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Testing for seasonal unit roots in heterogeneous panels using monthly data in the presence of cross sectional dependence

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Abstract

This paper generalises the monthly seasonal unit root tests of Franses (1991) for a heterogeneous panel following the work of Im, Pesaran, and Shin (2003), which we refer to as the F-IPS tests. The paper presents the mean and variance necessary to yield a standard normal distribution for the tests, for different number of time observations, T, and lag lengths. However, these tests are only applicable in the absence of cross-sectional dependence. Two alternative methods for modifying these F-IPS tests in the presence of cross-sectional dependency are presented: the first is the cross-sectionally augmented test, denoted CF-IPS, following Pesaran (2007), the other is a bootstap method, denoted BF-IPS. In general, the BF-IPS tests have greater power than the CF-IPS tests, although for large T and high degree of cross-sectional dependency the CF-IPS test dominates the BF-IPS test.

JEL Classification: C12; C15; C22; C23.

Keywords: Panel unit root tests, seasonal unit roots, monthly data, cross sectional dependence, Monte Carlo

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1 Introduction

Im, Pesaran, and Shin (2003) IPS proposed a test for the presence of unit roots in dynamic heterogeneous panels, that combines information from the time-series dimension with that from the cross-section dimension, so that fewer time series observations are required for the test to have power. The IPS test was developed to test for the presence of unit roots in non-seasonal time series. However, many macroeconomic time series display seasonal behaviour and several tests have been proposed to test for the presence of unit roots at seasonal frequencies; see for example Ghysels and Osborn (2001) for a review of these tests. Of the tests that have been proposed in the literature, the one by Hylleberg, Engle, Granger, and Yoo (1990) HEGY has proved to be the most popular when dealing with quarterly time series and this test has been extended by Franses (1991) and Beaulieu and Miron (1993) to the case of monthly data.

The objective of this paper is to generalise the tests of Franses (1991) to cover a heterogenous panel, in line with previous work by Dreger and Reimers (2005), Otero, Smith, and Giulietti (2005) and Otero, Smith, and Giulietti (2007), who test for panel seasonal unit roots using quarterly data.

The paper is organised as follows. Section 2 sets up the model used to develop the panel version of the Franses (1991) monthly seasonal unit root test, which we shall refer to as the Franses-IPS (F-IPS) test. The proposed F-IPS test is based on the Franses statistics averaged across the individuals of the panel, and the mean and variance required for standardisation are obtained by Monte Carlo simulation. Section 3 considers the potential effect of cross-sectional dependence on the F-IPS test. We find that the test suffers from size distortions in the presence of cross section dependence, and so we consider two alternative procedures to correct for these distortions: the first one uses a generalisation of the cross sectionally augmented IPS (CIPS) test put forward by Pesaran (2007), and the second one applies a bootstrap methodology advocated by Maddala and Wu (1999). Section 4 offers some concluding remarks.

2 Franses-IPS panel seasonal unit root test

IPS consider a sample of N cross section units observed over T time periods. The IPS test averages the (augmented) Dickey-Fuller (Dickey and Fuller (1979)) statistic obtained across the N cross-sectional units of the panel, and show that after a suitable standardisation the resulting statistic follows a standard normal distribution.

Generalising the Franses (1991) test to a panel in which there is a sample of N cross sections observed over T monthly time periods:

$$
\begin{aligned}
\varphi_i(L) y_{8it} &= \pi_{1i} y_{1it-1} + \pi_{2i} y_{2it-1} + \pi_{3i} y_{3it-1} + \pi_{4i} y_{3it-2} + \pi_{5i} y_{4it-1} + \pi_{6i} y_{4it-2} \\
&\quad + \pi_{7i} y_{5it-1} + \pi_{8i} y_{5it-2} + \pi_{9i} y_{6it-1} + \pi_{10i} y_{6it-2} + \pi_{11i} y_{7it-1} + \pi_{12i} y_{7it-2} + \mu_{it} + \varepsilon_{it},
\end{aligned} \tag{1}
$$

where $i = 1, \ldots, N$, $t = 1, \ldots, T$, $\mu_{it} = \alpha_i + \beta_i t + \sum_{j=1}^{s-1} \gamma_{ij} D_{jt}$, D_{jt} are monthly seasonal dummy variables, $\varphi_i(L)$ is a p_i^{th} ordered polynomial in the lag operator, L, $\varepsilon_{it} \sim N(0, \sigma_{\varepsilon_i}^2)$, and:

$$
\begin{aligned}
y_{1it} &= (1 + L)\left(1 + L^2\right)\left(1 + L^4 + L^8\right) y_{it}, \\
y_{2it} &= -(1 - L)\left(1 + L^2\right)\left(1 + L^4 + L^8\right) y_{it}, \\
y_{3it} &= -\left(1 - L^2\right)\left(1 + L^4 + L^8\right) y_{it}, \\
y_{4it} &= -\left(1 - L^4\right)\left(1 - L\sqrt{3} + L^2\right)\left(1 + L^2 + L^4\right) y_{it}, \\
y_{5it} &= -\left(1 - L^4\right)\left(1 + L\sqrt{3} + L^2\right)\left(1 + L^2 + L^4\right) y_{it}, \\
y_{6it} &= -\left(1 - L^4\right)\left(1 - L^2 + L^4\right)\left(1 - L + L^2\right) y_{it}, \\
y_{7it} &= -\left(1 - L^4\right)\left(1 - L^2 + L^4\right)\left(1 + L + L^2\right) y_{it}, \\
y_{8it} &= \left(1 - L^{12}\right) y_{it}.
\end{aligned}
$$

The parameters of (1) can be estimated by ordinary least squares. Franses (1991) shows that testing the significance of the π-coefficients is equivalent to testing for seasonal and non-seasonal unit roots, so that in estimating equation (1) for the i^{th} group, the t statistic on π_{1i} tests the existence of the non-seasonal unit root 1, while the t statistic on π_{2i} tests the presence of the bimonthly (seasonal) unit root -1; in turn, the F statistics on $\{\pi_{3i}, \pi_{4i}\}$, $\{\pi_{5i}, \pi_{6i}\}$, $\{\pi_{7i}, \pi_{8i}\}$, $\{\pi_{9i}, \pi_{10i}\}$, and $\{\pi_{11i}, \pi_{12i}\}$ test the presence of the other complex seasonal unit roots. Furthermore, Franses (1991) considers a joint test for the presence of the complex unit roots, i.e. $\{\pi_{3i}, ..., \pi_{12i}\}$, and subsequent work by Franses and Hobijn (1997) suggest a joint test for the presence of seasonal unit roots, i.e. $\{\pi_{2i}, ..., \pi_{12i}\}$.

Within a panel data context, and following IPS, the null hypothesis to test, for example, the presence of the zero frequency (non-seasonal) unit root 1 becomes $H_0 : \pi_{1i} = 0 \quad \forall i$ against $H_1 : \pi_{1i} < 0$ for $i = 1, 2 \ldots, N_1, \pi_{1i} = 0$ for $i = N_1 + 1, N_1 + 2, \ldots, N$. Notice that under the alternative hypothesis, this specification allows some, but not all, of the individual series to have a unit root at the zero frequency. To test the existence of the bimonthly (seasonal) unit root -1, the null hypothesis becomes $H_0 : \pi_{2i} = 0 \quad \forall i$, and similarly to test for the presence of the other seasonal unit roots.

Denote in (1) the estimated t statistics as $\tilde{t}_{jiT}$ $(j = 1, 2)$, and the corresponding F statistics as $\tilde{F}_{\{3,4\}iT}$, $\tilde{F}_{\{5,6\}iT}$, $\tilde{F}_{\{7,8\}iT}$, $\tilde{F}_{\{9,10\}iT}$, $\tilde{F}_{\{11,12\}iT}$, $\tilde{F}_{\{2,\ldots,12\}iT}$ and $\tilde{F}_{\{3,\ldots,12\}iT}$. For a fixed T define the average statistics:

$$\tilde{t}_j bar_{NT} = \frac{1}{N}\sum_{i=1}^{N}\tilde{t}_{jiT}, \qquad j = 1, 2,$$

and

$$\tilde{F}_j bar_{NT} = \frac{1}{N}\sum_{i=1}^{N}\tilde{F}_{jiT}, \quad j = \{3,4\}, \{5,6\}, \{7,8\}, \{9,10\}, \{11,12\}, \{2,...,12\}, \{3,...,12\}.$$

Following IPS, consider the standardised statistics:

$$\text{F-IPS}_{tj} = \frac{\sqrt{N}\left\{\tilde{t}_j bar_{NT} - \frac{1}{N}\sum_{i=1}^{N} E\left[\tilde{t}_{jiT}(p_i, 0|\pi_i = 0)\right]\right\}}{\sqrt{\frac{1}{N}\sum_{i=1}^{N} Var\left[\tilde{t}_{jiT}(p_i, 0|\pi_i = 0)\right]}} \Rightarrow N(0,1), \tag{2}$$

for $j = 1, 2$, and

$$\text{F-IPS}_{Fj} = \frac{\sqrt{N}\left\{\tilde{F}_j bar_{NT} - \frac{1}{N}\sum_{i=1}^{N} E\left[\tilde{F}_{jiT}(p_i, 0|\pi_i = 0)\right]\right\}}{\sqrt{\frac{1}{N}\sum_{i=1}^{N} Var\left[\tilde{F}_{jiT}(p_i, 0|\pi_i = 0)\right]}} \Rightarrow N(0,1), \tag{3}$$

for $j = \{3,4\}, \{5,6\}, \{7,8\}, \{9,10\}, \{11,12\}, \{2,...,12\}, \{3,...,12\}$. In (2), $E\left[\tilde{t}_{jiT}(p_i, 0|\pi_i = 0)\right]$ and $Var\left[\tilde{t}_{jiT}(p_i, 0|\pi = 0)\right]$ denote the mean and variance of $\tilde{t}_{jiT}$, when $\pi_{1i} = ... = \pi_{12i} = 0$ in the (1). Similarly, in (3), $E\left[\tilde{F}_{jiT}(p_i, 0|\pi_i = 0)\right]$ and $Var\left[\tilde{F}_{jiT}(p_i, 0|\pi_i = 0)\right]$ correspond to the mean and variance of $\tilde{F}_{jiT}$.

Table 1 reports the means and variances required to standardise $\tilde{t}_j bar_{NT}$, for $j = 1, 2$, and $\tilde{F}_j bar_{NT}$, $j = \{3,4\}$,$\{5,6\}$,$\{7,8\}$,$\{9,10\}$,$\{11,12\}$,$\{2,...,12\}$, $\{3,...,12\}$. As in IPS, these moments have been computed via Monte Carlo simulations with 20,000 replications, for different values of T and p_i, and for different combinations of deterministic components, namely constant (c), constant and trend (c,t), constant and seasonal dummy variables (c,s), and constant, trend and seasonal dummy variables (c,s,t).[1] The simulation experiments were carried out for data generated by $y_{8it} \equiv y_t - y_{t-12} = \varepsilon_{it}$, where $i = 1$, $t = 1, \ldots T$ and $\varepsilon_{it} \sim N(0,1)$. From the simulation experiments it appears that for the first and second moments of $\tilde{t}_{jiT}$ and $\tilde{F}_{jiT}$ to exist (when $p_i = 0, ..., 12$), it is required that $T \geq 48$.

To examine the size (at the 5% significance level) of the F-IPS tests, we carry out simulations under the null hypothesis $\pi_{1i} = ... = \pi_{12i} = 0$ in the equation:

$$y_{8it} = y_{it} - y_{it-12} = \mu_{it} + \rho y_{it-12} + \sum_{j=1}^{p_i}\varphi_{ji} y_{8i,t-j} + \varepsilon_{it}, \tag{4}$$

[1] It should be noted that the results for the specification with no constant, no trend and no seasonal dummy variables are not reported since it is too restrictive for practical purposes.

where $\rho = 0$, $p_i = 0$, and $\varepsilon_{it} \sim N(0,1)$. The simulation experiments are based on 2,000 replications, and were carried out for values of N = 5, 15, 25, 40 and T = 48, 60, 96, 120, 240, 360, 480, with the first 100 time observations for each cross-sectional unit being discarded.

Table 2 reports the size and power of the tests when there is no serial correlation and the model includes a constant and a constant and a trend as deterministic components. Both the F-IPS$_{t1}$ and F-IPS$_{t2}$ tests are approximately correctly sized. However, both the F-IPS$_{F\{2,...,12\}}$ and the F-IPS$_{F\{3,...,12\}}$ tests are slightly over-sized especially for smaller N and T. To calculate power, the data are generated as:

$$y_{it} = 0.9y_{it-12} + \varepsilon_{it}.$$

As expected, the results in Table 2 show that for given N power increases with T. Also, it can be seen that for fixed T, power increases with N.[2]

3 Cross sectional dependence

An important assumption underlying the F-IPS tests is that of cross section independence among the individual time series in the panel. Table 3 shows the empirical size results of the F-IPS test based on equation (4) when, as in O'Connell (1998), $E(\varepsilon_{it}\varepsilon_{jt}) = \omega = (0.3, 0.5, 0.7, 0.9)$ for $i \neq j$. As can be seen from the Table, the F-IPS tests suffer from severe size distortions in the presence of cross-sectional dependence, the magnitude of which increases as the strength of the cross-sectional dependence increases.

A number of procedures have been suggested to allow for cross-sectional dependence in panel unit root tests that focus on the zero or long run frequency. In this paper we consider two such approaches. First, we follow Pesaran (2007), who augments the standard ADF regressions with the cross section averages of lagged levels and first-differences of the individual series in the panel. The corresponding cross-sectionally augmented Franses regression is given by:

$$\begin{aligned} y_{8it} = {} & \pi_{1i}y_{1it-1} + \pi_{2i}y_{2it-1} + \pi_{3i}y_{3it-1} + \pi_{4i}y_{3it-2} + \pi_{5i}y_{4it-1} + \pi_{6i}y_{4it-2} \\ & + \pi_{7i}y_{5it-1} + \pi_{8i}y_{5it-2} + \pi_{9i}y_{6it-1} + \pi_{10i}y_{6it-2} + \pi_{11i}y_{7it-1} + \pi_{12i}y_{7it-2} \\ & + \theta_{1i}\bar{y}_{1t-1} + \theta_{2i}\bar{y}_{2t-1} + \theta_{3i}\bar{y}_{3t-2} + \theta_{4i}\bar{y}_{3t-1} + \theta_{5i}\bar{y}_{4t-1} + \theta_{6i}\bar{y}_{4t-1} \\ & + \theta_{7i}\bar{y}_{5t-1} + \theta_{8i}\bar{y}_{5t-1} + \theta_{9i}\bar{y}_{6t-2} + \theta_{10i}\bar{y}_{6t-1} + \theta_{11i}\bar{y}_{7t-1} + \theta_{12i}\bar{y}_{7t-1} \\ & + \sum_{j=0}^{p}\delta_{ij}\bar{y}_{8t-j} + \sum_{j=1}^{p}\varphi_{ij}y_{8i,t-j} + \mu_{it} + \varepsilon_{it}, \end{aligned} \tag{5}$$

where $\bar{y}_{1t}$ is the cross section mean of y_{1it}, defined as $\bar{y}_{1t} = (N)^{-1}\sum_{i=1}^{N} y_{1it}$, and similarly for $\bar{y}_{2t}$, ..., $\bar{y}_{8t}$. The cross-sectionally augmented versions of the Franses-IPS tests, denoted as CF-IPS, are then:

[2] We only report the power probabilities of the $\tilde{F}_{2,...,12}bar_{NT}$ and $\tilde{F}_{3,...,12}bar_{NT}$ tests because they exhibit more power than the other joint F tests.

$$\text{CF-IPS}_{t_j} = N^{-1} \sum_{i=1}^{N} t_{\pi_{ji}}, \quad j = 1, 2,$$

where $t_{\pi_{ji}}$ denotes the $t-$ratio on π_{ji} in equation (5) and

$$\text{CF-IPS}_{F_j} = N^{-1} \sum_{i=1}^{N} F_{\pi_{ji}}, \quad j = \{3,4\}, \{5,6\}, \{7,8\}, \{9,10\}, \{11,12\}, \{2,...,12\}, \{3,...,12\},$$

where $F_{\pi_{ji}}$ denotes the $F-$test of the joint significance of $\{\pi_{3i}, \pi_{4i}\}$, $\{\pi_{5i}, \pi_{6i}\}$, $\{\pi_{7i}, \pi_{8i}\}$, $\{\pi_{9i}, \pi_{10i}\}$, $\{\pi_{11i}, \pi_{12i}\}$, $\{\pi_{2i}, ..., \pi_{12i}\}$ and $\{\pi_{3i}, ..., \pi_{12i}\}$, also in equation (5).

Critical values of the CF-IPS$_{t_j}$ and CF-IPS$_{F_j}$ tests are reported in Table 4, for different combinations of deterministic components, based on a Monte Carlo simulation (with 20,000 replications) when the underlying data are generated as in (4), with $\rho = 0$, $p_i = 0$, $N = 5$, 15, 25, 40, $T = 48$, 60, 96, 120, 240, 360, 480 and $\varepsilon_{it} \sim N(0, 1)$.

As an alternative procedure to test for the presence of unit roots in panels that exhibit cross-sectional dependency, Maddala and Wu (1999) and more recently Chang (2004) have considered bootstrapping unit root tests which, in the context of the F-IPS test, denoted as BF-IPS. In order to implement this procedure, we start off by resampling the restricted residuals $y_{8it} \equiv y_{it} - y_{i,t-12} = \varepsilon_{it}$ after centering, since y_{it} is assumed to be a seasonally integrated series under the null hypothesis; this is what Li and Maddala (1996) refer to as the sampling scheme S_3 which is appropriate in the unit root case. To preserve the cross-correlation structure of the error term within each cross section i, and following Maddala and Wu (1999), we resample the restricted residuals with the cross-section index fixed. Also, in order to ensure that initialisation of ε^*_{it}, i.e. the bootstrap samples of ε_{it}, becomes unimportant, we follow Chang (2004) who advocates generating a large number of ε^*_{it}, say $T + Q$ values and discard the first Q values of ε^*_{it} (in our simulations we choose Q equal to 100). Lastly, the bootstrap samples of y^*_{it} are calculated by taking partial sums of ε^*_{it}. These Monte Carlo simulation results are based on 2,000 replications each of which uses 200 bootstrap repetitions.

With dependent data, serial correlation can be accounted for by resampling from the restricted residuals (after centring) that result from fitting to each individual series AR processes, that is:

$$y_{8it} = \sum_{r=1}^{p} \gamma_{ir} y_{8i,t-r} + \varepsilon_{it}. \tag{6}$$

Next, $y^*_{8i,t}$ is generated recursively from $\varepsilon^*_{i,t}$ as:

$$y^*_{8it} = \sum_{r=1}^{p} \hat{\gamma}_{ir} y^*_{8i,t-r} + \varepsilon^*_{it}, \tag{7}$$

where $\hat{\gamma}_{ir}$ are the coefficient estimates from the fitted regressions (6). Once again, to minimise the effects of initial values in equation (7), we follow Chang (2004) by setting them equal to zero, generating a larger number of $\varepsilon^*_{i,t}$ (say $T+Q$ values), and discarding the first Q values. The bootstrap samples of y^*_{it} are calculated as $y^*_{it} = y^*_{i0} + \sum_{k=1}^{t} \varepsilon^*_{ik}$.

The empirical size of the CF-IPS and BF-IPS tests when $E(\varepsilon_{it}\varepsilon_{jt}) = \omega = (0.3, 0.5, 0.7, 0.9)$ for $i \neq j$, are approximately correct (with 95% critical values of 4.04-5.96 for an empirical 5% signficance level), and a subset of these tests for F-IPS$_{t1}$, F-IPS$_{t2}$, F-IPS$_{F\{2,...12\}}$ and F-IPS$_{F\{3,...12\}}$ are reported in Tables 5 and 6 for the cases with only a constant and a constant and trend, respectively. These tables also report the power of these tests at the 5% significance level when in equation (4) $\rho = -0.1$. In general, we observe that the BF-IPS test outperforms the CF-IPS test. However, the extent of this dominance falls as the degree of cross-sectional correlation increases and as N increases. For large T and high ω there are cases in which the CF-IPS test dominates. Similar results are observed when other deterministic components are included in the test regressions.

4 Concluding remarks

In this paper the seasonal unit root test of Franses (1991) is generalised to cover a heterogenous panel. In particular, following the lines of Im, Pesaran, and Shin (2003), the testing procedure proposes standardised t_{bar} and F_{bar} statistics, denoted F-IPS tests, based on the Franses statistics averaged across the individuals of the panel. The mean and variance required to standardise the test statistics are obtained by Monte Carlo simulation. In addition, the size and power properties of the tests are analysed for different deterministic components.

Monte Carlo simulation results show that the F-IPS tests suffer from severe size distortions in the presence of cross sectional dependence. To correct for this, we consider two alternative methods for modifying the F-IPS tests. The first one is the cross-sectionally augmented approach, denoted CF-IPS, following Pesaran (2007), and the second one is the bootstap approach, following Maddala and Wu (1999), denoted BF-IPS. In general, the BF-IPS tests have greater power than the method CF-IPS tests, although for large T and high degree of cross-sectional dependency the CF-IPS test dominates the BF-IPS test.

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Table 1. Mean and Variance correction for F-IPS$_{t1}$

p		Model	T=48	60	96	120	240	360	480	Model	T=48	60	96	120	240	360	480
0	Mean	c	-1.248	-1.315	-1.404	-1.436	-1.483	-1.504	-1.509	c,s	-1.154	-1.248	-1.371	-1.407	-1.469	-1.493	-1.501
	Variance		0.655	0.656	0.664	0.670	0.674	0.691	0.704		0.585	0.580	0.610	0.625	0.647	0.671	0.687
1	Mean		-1.242	-1.310	-1.398	-1.431	-1.481	-1.502	-1.508		-1.110	-1.214	-1.346	-1.389	-1.460	-1.487	-1.497
	Variance		0.667	0.666	0.671	0.681	0.680	0.694	0.705		0.595	0.591	0.619	0.637	0.653	0.675	0.688
2	Mean		-1.229	-1.303	-1.395	-1.430	-1.481	-1.503	-1.508		-1.097	-1.206	-1.342	-1.387	-1.460	-1.488	-1.497
	Variance		0.684	0.678	0.679	0.684	0.683	0.698	0.706		0.605	0.602	0.625	0.640	0.659	0.678	0.689
3	Mean		-1.226	-1.300	-1.393	-1.427	-1.478	-1.501	-1.507		-1.055	-1.174	-1.322	-1.370	-1.451	-1.481	-1.493
	Variance		0.694	0.693	0.684	0.692	0.685	0.701	0.711		0.609	0.613	0.630	0.646	0.660	0.682	0.694
4	Mean		-1.216	-1.295	-1.391	-1.426	-1.477	-1.500	-1.506		-1.039	-1.163	-1.317	-1.367	-1.449	-1.480	-1.492
	Variance		0.716	0.708	0.698	0.701	0.691	0.705	0.714		0.619	0.624	0.638	0.652	0.665	0.685	0.697
5	Mean		-1.213	-1.291	-1.388	-1.422	-1.474	-1.499	-1.506		-0.996	-1.132	-1.296	-1.348	-1.440	-1.475	-1.488
	Variance		0.744	0.725	0.710	0.709	0.696	0.710	0.715		0.631	0.634	0.648	0.656	0.669	0.691	0.699
6	Mean		-1.206	-1.287	-1.387	-1.420	-1.473	-1.498	-1.504		-0.977	-1.123	-1.290	-1.344	-1.437	-1.474	-1.486
	Variance		0.768	0.741	0.718	0.716	0.700	0.711	0.717		0.642	0.648	0.655	0.662	0.673	0.692	0.701
7	Mean		-1.202	-1.284	-1.384	-1.419	-1.471	-1.496	-1.503		-0.938	-1.088	-1.270	-1.329	-1.428	-1.468	-1.482
	Variance		0.771	0.746	0.729	0.721	0.704	0.711	0.717		0.648	0.655	0.667	0.669	0.677	0.692	0.702
8	Mean		-1.195	-1.281	-1.382	-1.417	-1.470	-1.496	-1.503		-0.926	-1.076	-1.266	-1.325	-1.426	-1.467	-1.481
	Variance		0.789	0.760	0.733	0.729	0.707	0.713	0.719		0.658	0.665	0.668	0.675	0.679	0.694	0.704
9	Mean		-1.194	-1.278	-1.379	-1.414	-1.466	-1.494	-1.501		-0.893	-1.049	-1.247	-1.308	-1.417	-1.462	-1.477
	Variance		0.801	0.772	0.745	0.737	0.711	0.716	0.723		0.669	0.675	0.679	0.684	0.683	0.697	0.707
10	Mean		-1.196	-1.277	-1.380	-1.413	-1.466	-1.495	-1.501		-0.880	-1.036	-1.243	-1.304	-1.415	-1.461	-1.476
	Variance		0.821	0.783	0.751	0.745	0.715	0.718	0.726		0.691	0.684	0.686	0.693	0.686	0.698	0.710
11	Mean		-1.200	-1.278	-1.378	-1.410	-1.462	-1.493	-1.499		-0.845	-1.009	-1.225	-1.288	-1.405	-1.456	-1.472
	Variance		0.848	0.807	0.766	0.755	0.721	0.721	0.729		0.714	0.701	0.697	0.700	0.691	0.701	0.712
12	Mean		-1.007	-1.120	-1.284	-1.338	-1.430	-1.474	-1.485		-0.825	-0.996	-1.228	-1.296	-1.412	-1.461	-1.476
	Variance		0.856	0.829	0.775	0.767	0.726	0.724	0.730		0.737	0.715	0.697	0.707	0.694	0.703	0.713
0	Mean	c,t	-1.818	-1.880	-2.004	-2.042	-2.110	-2.137	-2.145	c,s,t	-1.652	-1.770	-1.952	-2.000	-2.090	-2.122	-2.133
	Variance		0.587	0.563	0.543	0.547	0.551	0.550	0.561		0.567	0.523	0.515	0.521	0.534	0.539	0.552
1	Mean		-1.804	-1.873	-1.997	-2.037	-2.108	-2.135	-2.143		-1.593	-1.728	-1.922	-1.976	-2.079	-2.115	-2.128
	Variance		0.602	0.572	0.549	0.553	0.553	0.550	0.560		0.562	0.531	0.517	0.525	0.535	0.538	0.550
2	Mean		-1.781	-1.861	-1.993	-2.037	-2.110	-2.137	-2.145		-1.578	-1.721	-1.919	-1.977	-2.080	-2.116	-2.129
	Variance		0.607	0.578	0.555	0.558	0.555	0.552	0.562		0.583	0.548	0.526	0.529	0.538	0.540	0.552
3	Mean		-1.770	-1.853	-1.990	-2.035	-2.106	-2.135	-2.144		-1.523	-1.675	-1.891	-1.956	-2.068	-2.109	-2.124
	Variance		0.614	0.592	0.558	0.561	0.559	0.555	0.565		0.590	0.561	0.529	0.532	0.541	0.542	0.554
4	Mean		-1.751	-1.844	-1.989	-2.035	-2.106	-2.135	-2.144		-1.502	-1.662	-1.888	-1.952	-2.066	-2.108	-2.123
	Variance		0.638	0.610	0.572	0.569	0.566	0.558	0.566		0.616	0.574	0.541	0.539	0.547	0.545	0.554
5	Mean		-1.742	-1.838	-1.986	-2.030	-2.102	-2.135	-2.144		-1.445	-1.621	-1.858	-1.928	-2.054	-2.102	-2.119
	Variance		0.670	0.631	0.582	0.574	0.569	0.562	0.568		0.631	0.585	0.543	0.540	0.548	0.548	0.556
6	Mean		-1.733	-1.835	-1.985	-2.029	-2.103	-2.135	-2.143		-1.423	-1.610	-1.852	-1.924	-2.052	-2.102	-2.117
	Variance		0.705	0.650	0.591	0.583	0.572	0.563	0.570		0.661	0.606	0.552	0.547	0.553	0.550	0.558
7	Mean		-1.730	-1.832	-1.984	-2.028	-2.101	-2.133	-2.141		-1.371	-1.564	-1.827	-1.902	-2.040	-2.094	-2.112
	Variance		0.725	0.667	0.603	0.588	0.573	0.563	0.572		0.683	0.622	0.559	0.551	0.551	0.549	0.560
8	Mean		-1.726	-1.831	-1.984	-2.029	-2.101	-2.134	-2.143		-1.353	-1.548	-1.822	-1.898	-2.039	-2.094	-2.112
	Variance		0.746	0.686	0.613	0.600	0.576	0.566	0.573		0.712	0.637	0.569	0.561	0.553	0.552	0.561
9	Mean		-1.733	-1.832	-1.985	-2.027	-2.098	-2.133	-2.141		-1.304	-1.509	-1.797	-1.875	-2.029	-2.087	-2.107
	Variance		0.776	0.711	0.625	0.610	0.578	0.568	0.576		0.737	0.654	0.576	0.566	0.554	0.553	0.563
10	Mean		-1.748	-1.840	-1.988	-2.029	-2.099	-2.134	-2.142		-1.283	-1.490	-1.792	-1.871	-2.027	-2.087	-2.106
	Variance		0.815	0.737	0.643	0.620	0.584	0.572	0.576		0.772	0.673	0.590	0.574	0.558	0.556	0.563
11	Mean		-1.778	-1.857	-1.990	-2.028	-2.095	-2.132	-2.140		-1.223	-1.451	-1.766	-1.848	-2.014	-2.079	-2.101
	Variance		0.886	0.782	0.661	0.630	0.587	0.579	0.579		0.795	0.691	0.600	0.580	0.559	0.561	0.564
12	Mean		-1.498	-1.628	-1.855	-1.925	-2.051	-2.105	-2.121		-1.188	-1.431	-1.771	-1.861	-2.025	-2.087	-2.107
	Variance		0.860	0.778	0.657	0.630	0.580	0.576	0.575		0.800	0.701	0.611	0.594	0.559	0.564	0.564

Table 1 (continued). Mean and Variance correction for F-IPS$_{t2}$

p		Model	T=48	60	96	120	240	360	480	Model	T=48	60	96	120	240	360	480
0	Mean	c	-0.242	-0.275	-0.333	-0.353	-0.385	-0.390	-0.402	c,s	-1.164	-1.246	-1.367	-1.404	-1.476	-1.488	-1.499
	Variance		0.890	0.901	0.925	0.928	0.948	0.974	0.962		0.569	0.581	0.604	0.615	0.655	0.678	0.680
1	Mean		-0.229	-0.262	-0.323	-0.343	-0.378	-0.385	-0.398		-1.121	-1.208	-1.346	-1.386	-1.467	-1.482	-1.494
	Variance		0.902	0.916	0.932	0.936	0.952	0.977	0.964		0.584	0.590	0.609	0.620	0.659	0.682	0.684
2	Mean		-0.249	-0.280	-0.336	-0.356	-0.385	-0.391	-0.402		-1.107	-1.201	-1.339	-1.384	-1.467	-1.482	-1.494
	Variance		0.877	0.894	0.919	0.926	0.952	0.974	0.960		0.593	0.598	0.617	0.625	0.662	0.682	0.683
3	Mean		-0.236	-0.267	-0.325	-0.346	-0.380	-0.386	-0.398		-1.066	-1.169	-1.318	-1.366	-1.459	-1.476	-1.489
	Variance		0.885	0.910	0.931	0.933	0.957	0.978	0.962		0.606	0.606	0.625	0.633	0.667	0.688	0.685
4	Mean		-0.257	-0.287	-0.339	-0.357	-0.386	-0.390	-0.401		-1.046	-1.157	-1.314	-1.362	-1.457	-1.475	-1.488
	Variance		0.858	0.888	0.923	0.923	0.954	0.978	0.958		0.613	0.619	0.637	0.642	0.672	0.691	0.686
5	Mean		-0.242	-0.273	-0.328	-0.348	-0.380	-0.385	-0.397		-1.007	-1.123	-1.295	-1.345	-1.448	-1.468	-1.483
	Variance		0.872	0.897	0.932	0.927	0.953	0.982	0.957		0.631	0.627	0.648	0.649	0.673	0.695	0.687
6	Mean		-0.264	-0.293	-0.342	-0.359	-0.386	-0.389	-0.400		-0.987	-1.114	-1.289	-1.341	-1.446	-1.468	-1.482
	Variance		0.837	0.875	0.920	0.918	0.949	0.980	0.956		0.637	0.635	0.655	0.653	0.678	0.698	0.689
7	Mean		-0.247	-0.278	-0.330	-0.348	-0.380	-0.385	-0.396		-0.951	-1.085	-1.269	-1.325	-1.437	-1.461	-1.477
	Variance		0.845	0.885	0.927	0.925	0.950	0.979	0.958		0.650	0.644	0.659	0.660	0.680	0.700	0.690
8	Mean		-0.270	-0.299	-0.344	-0.360	-0.386	-0.389	-0.400		-0.933	-1.075	-1.266	-1.320	-1.436	-1.461	-1.477
	Variance		0.818	0.867	0.914	0.918	0.948	0.977	0.958		0.664	0.651	0.666	0.666	0.683	0.702	0.694
9	Mean		-0.250	-0.284	-0.332	-0.350	-0.380	-0.384	-0.397		-0.893	-1.040	-1.247	-1.307	-1.427	-1.454	-1.473
	Variance		0.825	0.870	0.923	0.924	0.950	0.976	0.959		0.682	0.659	0.676	0.671	0.687	0.704	0.696
10	Mean		-0.277	-0.306	-0.347	-0.362	-0.386	-0.389	-0.399		-0.880	-1.028	-1.241	-1.304	-1.424	-1.453	-1.472
	Variance		0.796	0.845	0.910	0.916	0.948	0.975	0.958		0.698	0.671	0.682	0.679	0.693	0.708	0.697
11	Mean		-0.254	-0.288	-0.334	-0.351	-0.382	-0.384	-0.396		-0.848	-0.999	-1.222	-1.289	-1.416	-1.447	-1.467
	Variance		0.807	0.853	0.917	0.920	0.948	0.974	0.958		0.722	0.679	0.690	0.686	0.698	0.710	0.697
12	Mean		-0.166	-0.211	-0.283	-0.310	-0.362	-0.371	-0.387		-0.829	-0.989	-1.225	-1.297	-1.423	-1.452	-1.471
	Variance		0.889	0.921	0.948	0.941	0.954	0.978	0.958		0.743	0.691	0.698	0.695	0.702	0.714	0.698
0	Mean	c,t	-0.249	-0.282	-0.339	-0.358	-0.388	-0.393	-0.404	c,s,t	-1.162	-1.246	-1.370	-1.407	-1.477	-1.490	-1.500
	Variance		0.855	0.873	0.909	0.916	0.942	0.970	0.960		0.552	0.568	0.597	0.609	0.652	0.677	0.679
1	Mean		-0.217	-0.250	-0.314	-0.335	-0.374	-0.382	-0.395		-1.077	-1.173	-1.325	-1.369	-1.459	-1.476	-1.490
	Variance		0.892	0.909	0.927	0.931	0.950	0.975	0.963		0.563	0.577	0.602	0.614	0.656	0.680	0.683
2	Mean		-0.254	-0.286	-0.342	-0.360	-0.388	-0.393	-0.404		-1.102	-1.200	-1.342	-1.386	-1.469	-1.483	-1.495
	Variance		0.842	0.867	0.903	0.914	0.947	0.970	0.958		0.573	0.583	0.609	0.618	0.659	0.680	0.682
3	Mean		-0.224	-0.255	-0.316	-0.337	-0.375	-0.383	-0.395		-1.021	-1.134	-1.297	-1.349	-1.450	-1.470	-1.485
	Variance		0.872	0.902	0.926	0.928	0.955	0.976	0.960		0.582	0.593	0.617	0.627	0.664	0.686	0.684
4	Mean		-0.263	-0.293	-0.345	-0.362	-0.389	-0.392	-0.403		-1.041	-1.155	-1.315	-1.363	-1.458	-1.476	-1.489
	Variance		0.824	0.860	0.908	0.911	0.948	0.974	0.955		0.590	0.604	0.629	0.635	0.669	0.689	0.685
5	Mean		-0.229	-0.260	-0.318	-0.339	-0.375	-0.381	-0.395		-0.963	-1.089	-1.274	-1.328	-1.440	-1.463	-1.479
	Variance		0.857	0.888	0.926	0.922	0.951	0.980	0.956		0.603	0.613	0.640	0.643	0.670	0.694	0.686
6	Mean		-0.271	-0.300	-0.348	-0.364	-0.389	-0.392	-0.402		-0.979	-1.110	-1.291	-1.342	-1.447	-1.469	-1.482
	Variance		0.804	0.847	0.904	0.905	0.944	0.976	0.954		0.612	0.618	0.646	0.646	0.675	0.696	0.687
7	Mean		-0.232	-0.264	-0.320	-0.339	-0.375	-0.381	-0.394		-0.906	-1.051	-1.249	-1.308	-1.429	-1.456	-1.473
	Variance		0.829	0.874	0.921	0.920	0.948	0.977	0.956		0.620	0.627	0.651	0.653	0.678	0.698	0.689
8	Mean		-0.278	-0.306	-0.351	-0.365	-0.390	-0.392	-0.402		-0.922	-1.069	-1.267	-1.321	-1.437	-1.462	-1.478
	Variance		0.784	0.837	0.898	0.905	0.942	0.973	0.955		0.633	0.632	0.657	0.658	0.680	0.700	0.692
9	Mean		-0.232	-0.268	-0.322	-0.341	-0.375	-0.381	-0.394		-0.847	-1.006	-1.226	-1.291	-1.419	-1.449	-1.469
	Variance		0.809	0.858	0.917	0.919	0.948	0.974	0.957		0.647	0.639	0.668	0.664	0.684	0.702	0.695
10	Mean		-0.287	-0.315	-0.353	-0.367	-0.390	-0.391	-0.401		-0.866	-1.022	-1.242	-1.304	-1.425	-1.454	-1.472
	Variance		0.761	0.815	0.894	0.903	0.942	0.971	0.955		0.663	0.650	0.672	0.671	0.689	0.706	0.696
11	Mean		-0.230	-0.270	-0.323	-0.341	-0.376	-0.380	-0.393		-0.801	-0.965	-1.202	-1.273	-1.408	-1.442	-1.463
	Variance		0.794	0.842	0.911	0.914	0.946	0.972	0.957		0.681	0.657	0.680	0.678	0.696	0.708	0.696
12	Mean		-0.171	-0.216	-0.287	-0.314	-0.365	-0.374	-0.388		-0.811	-0.981	-1.225	-1.297	-1.425	-1.453	-1.472
	Variance		0.848	0.888	0.931	0.928	0.948	0.975	0.956		0.698	0.669	0.687	0.687	0.698	0.712	0.697

Table 1 (continued). Mean and Variance correction for F-IPS$_{F\{3,4\}}$

p		Model	T=48	60	96	120	240	360	480	Model	T=48	60	96	120	240	360	480
0	Mean	c	0.927	0.955	0.982	0.994	1.027	1.024	1.045	c,s	1.955	2.139	2.472	2.596	2.790	2.895	2.922
	Variance		0.913	0.930	0.957	0.958	1.050	1.033	1.051		2.240	2.379	2.803	3.114	3.280	3.450	3.599
1	Mean		0.935	0.963	0.985	0.995	1.025	1.023	1.044		1.895	2.095	2.447	2.572	2.778	2.888	2.914
	Variance		0.936	0.944	0.960	0.964	1.046	1.027	1.046		2.188	2.336	2.763	3.076	3.279	3.444	3.579
2	Mean		0.923	0.962	0.987	0.998	1.027	1.024	1.045		1.800	2.017	2.394	2.523	2.751	2.870	2.901
	Variance		0.914	0.962	0.971	0.977	1.051	1.038	1.050		2.062	2.250	2.724	2.994	3.255	3.429	3.569
3	Mean		0.926	0.963	0.987	0.997	1.027	1.025	1.044		1.754	1.971	2.363	2.498	2.744	2.865	2.896
	Variance		0.927	0.966	0.971	0.980	1.059	1.038	1.049		1.992	2.195	2.702	2.927	3.259	3.429	3.574
4	Mean		0.880	0.922	0.960	0.976	1.019	1.021	1.041		1.728	1.955	2.355	2.494	2.743	2.865	2.895
	Variance		0.831	0.890	0.915	0.931	1.042	1.028	1.041		1.986	2.188	2.682	2.942	3.264	3.433	3.570
5	Mean		0.875	0.921	0.959	0.976	1.020	1.021	1.041		1.683	1.915	2.327	2.472	2.734	2.860	2.890
	Variance		0.817	0.895	0.909	0.925	1.045	1.029	1.044		1.991	2.126	2.652	2.896	3.267	3.425	3.573
6	Mean		0.872	0.922	0.961	0.977	1.021	1.021	1.041		1.614	1.850	2.282	2.435	2.714	2.844	2.880
	Variance		0.815	0.886	0.900	0.922	1.031	1.030	1.043		1.936	2.044	2.617	2.867	3.248	3.413	3.557
7	Mean		0.877	0.921	0.962	0.978	1.020	1.021	1.040		1.580	1.823	2.258	2.414	2.703	2.838	2.874
	Variance		0.830	0.888	0.903	0.924	1.029	1.025	1.042		1.912	2.036	2.593	2.831	3.227	3.407	3.548
8	Mean		0.838	0.886	0.941	0.964	1.013	1.014	1.036		1.557	1.810	2.256	2.410	2.701	2.836	2.874
	Variance		0.732	0.801	0.859	0.902	1.009	1.010	1.033		1.914	2.049	2.608	2.836	3.214	3.402	3.537
9	Mean		0.836	0.883	0.940	0.962	1.011	1.011	1.035		1.520	1.775	2.236	2.387	2.689	2.824	2.868
	Variance		0.739	0.790	0.856	0.897	1.000	0.998	1.032		1.868	1.993	2.583	2.792	3.197	3.386	3.528
10	Mean		0.839	0.889	0.944	0.964	1.012	1.012	1.034		1.470	1.734	2.195	2.350	2.671	2.812	2.857
	Variance		0.735	0.796	0.860	0.896	1.006	0.999	1.033		1.838	1.970	2.549	2.757	3.184	3.386	3.521
11	Mean		0.845	0.894	0.944	0.963	1.012	1.012	1.035		1.445	1.713	2.174	2.335	2.662	2.807	2.854
	Variance		0.765	0.816	0.863	0.891	1.007	1.000	1.037		1.852	1.966	2.506	2.736	3.165	3.379	3.527
12	Mean		0.926	0.965	0.980	0.992	1.020	1.015	1.036		1.443	1.700	2.174	2.343	2.673	2.814	2.859
	Variance		0.915	0.963	0.925	0.953	1.015	1.001	1.034		2.042	1.969	2.491	2.751	3.185	3.391	3.538
0	Mean	c,t	0.892	0.928	0.964	0.980	1.019	1.020	1.041	c,s,t	1.908	2.111	2.456	2.585	2.784	2.892	2.919
	Variance		0.850	0.872	0.923	0.929	1.036	1.024	1.045		2.156	2.327	2.755	3.078	3.255	3.436	3.587
1	Mean		0.893	0.930	0.966	0.980	1.018	1.019	1.040		1.854	2.071	2.432	2.562	2.773	2.885	2.912
	Variance		0.847	0.878	0.923	0.934	1.031	1.019	1.039		2.112	2.292	2.718	3.040	3.251	3.430	3.569
2	Mean		0.916	0.958	0.984	0.996	1.025	1.023	1.044		1.719	1.953	2.348	2.486	2.731	2.857	2.891
	Variance		0.905	0.966	0.965	0.973	1.048	1.036	1.047		1.932	2.164	2.643	2.932	3.215	3.405	3.553
3	Mean		0.923	0.962	0.985	0.996	1.025	1.024	1.043		1.667	1.902	2.317	2.460	2.723	2.852	2.886
	Variance		0.930	0.974	0.970	0.979	1.056	1.036	1.047		1.844	2.097	2.627	2.863	3.222	3.403	3.556
4	Mean		0.849	0.896	0.943	0.962	1.012	1.016	1.038		1.681	1.922	2.338	2.481	2.737	2.862	2.892
	Variance		0.780	0.837	0.885	0.904	1.028	1.019	1.035		1.922	2.139	2.637	2.898	3.238	3.419	3.558
5	Mean		0.839	0.892	0.940	0.961	1.013	1.017	1.037		1.638	1.887	2.310	2.460	2.728	2.857	2.888
	Variance		0.757	0.839	0.874	0.895	1.031	1.021	1.038		1.921	2.085	2.603	2.854	3.238	3.411	3.562
6	Mean		0.862	0.917	0.957	0.974	1.019	1.020	1.040		1.537	1.791	2.238	2.399	2.694	2.832	2.871
	Variance		0.807	0.882	0.891	0.916	1.027	1.028	1.040		1.802	1.957	2.541	2.804	3.209	3.388	3.540
7	Mean		0.871	0.918	0.960	0.976	1.019	1.019	1.039		1.499	1.758	2.214	2.377	2.683	2.824	2.865
	Variance		0.836	0.894	0.898	0.919	1.025	1.022	1.039		1.774	1.946	2.515	2.767	3.189	3.381	3.530
8	Mean		0.810	0.862	0.924	0.950	1.006	1.010	1.033		1.504	1.772	2.237	2.395	2.694	2.832	2.872
	Variance		0.697	0.761	0.830	0.878	0.997	1.002	1.027		1.814	1.990	2.555	2.794	3.188	3.387	3.526
9	Mean		0.804	0.857	0.922	0.948	1.004	1.007	1.032		1.467	1.740	2.218	2.373	2.683	2.821	2.866
	Variance		0.690	0.746	0.822	0.872	0.987	0.990	1.026		1.758	1.937	2.530	2.752	3.169	3.372	3.516
10	Mean		0.832	0.884	0.940	0.960	1.010	1.011	1.033		1.394	1.674	2.155	2.316	2.652	2.799	2.847
	Variance		0.729	0.792	0.852	0.890	1.002	0.997	1.030		1.710	1.877	2.476	2.700	3.145	3.360	3.504
11	Mean		0.846	0.892	0.941	0.960	1.010	1.011	1.034		1.362	1.648	2.131	2.299	2.642	2.794	2.844
	Variance		0.779	0.812	0.857	0.886	1.004	0.998	1.034		1.700	1.866	2.426	2.676	3.130	3.353	3.510
12	Mean		0.892	0.938	0.962	0.978	1.013	1.011	1.032		1.368	1.655	2.153	2.328	2.666	2.811	2.856
	Variance		0.861	0.910	0.891	0.925	1.002	0.992	1.028		1.846	1.885	2.433	2.711	3.159	3.376	3.527

Table 1 (continued). Mean and Variance correction for F-IPS$_{F\{5,6\}}$

p		Model	T=48	60	96	120	240	360	480	Model	T=48	60	96	120	240	360	480
0	Mean	c	0.931	0.949	0.978	0.987	1.021	1.034	1.037	c,s	1.950	2.150	2.462	2.560	2.783	2.852	2.914
	Variance		0.926	0.956	0.958	0.967	0.995	1.000	1.036		2.215	2.412	2.767	2.987	3.310	3.448	3.574
1	Mean		0.931	0.956	0.982	0.990	1.022	1.034	1.037		1.897	2.109	2.438	2.534	2.771	2.842	2.908
	Variance		0.935	0.986	0.972	0.970	1.003	0.997	1.039		2.165	2.386	2.774	2.951	3.309	3.443	3.562
2	Mean		0.917	0.941	0.973	0.983	1.018	1.031	1.034		1.860	2.084	2.415	2.521	2.766	2.842	2.904
	Variance		0.917	0.942	0.946	0.950	0.999	0.989	1.033		2.141	2.356	2.725	2.920	3.299	3.436	3.538
3	Mean		0.919	0.945	0.972	0.987	1.018	1.030	1.034		1.805	2.037	2.383	2.507	2.754	2.833	2.901
	Variance		0.918	0.952	0.950	0.959	0.995	0.987	1.033		2.048	2.280	2.726	2.938	3.283	3.417	3.536
4	Mean		0.923	0.952	0.976	0.991	1.019	1.030	1.034		1.745	1.977	2.343	2.475	2.740	2.823	2.894
	Variance		0.931	0.956	0.951	0.968	0.997	0.985	1.038		2.056	2.214	2.683	2.934	3.277	3.434	3.536
5	Mean		0.884	0.919	0.959	0.976	1.015	1.028	1.031		1.696	1.936	2.314	2.448	2.728	2.817	2.890
	Variance		0.837	0.885	0.917	0.933	1.001	0.987	1.035		1.992	2.145	2.657	2.884	3.274	3.444	3.546
6	Mean		0.880	0.921	0.961	0.977	1.016	1.029	1.032		1.619	1.871	2.266	2.410	2.707	2.803	2.880
	Variance		0.831	0.872	0.918	0.936	0.998	0.986	1.036		1.889	2.090	2.602	2.845	3.263	3.444	3.544
7	Mean		0.842	0.891	0.943	0.964	1.009	1.025	1.030		1.582	1.837	2.241	2.392	2.697	2.795	2.874
	Variance		0.742	0.805	0.875	0.907	0.984	0.980	1.034		1.892	2.078	2.579	2.814	3.249	3.444	3.534
8	Mean		0.845	0.897	0.945	0.966	1.008	1.025	1.030		1.538	1.795	2.211	2.367	2.681	2.785	2.866
	Variance		0.749	0.816	0.881	0.903	0.974	0.984	1.039		1.833	2.014	2.564	2.767	3.210	3.448	3.527
9	Mean		0.846	0.897	0.948	0.965	1.008	1.025	1.030		1.500	1.762	2.198	2.345	2.673	2.779	2.860
	Variance		0.754	0.819	0.889	0.894	0.970	0.980	1.035		1.799	2.003	2.571	2.733	3.205	3.445	3.513
10	Mean		0.833	0.883	0.940	0.960	1.004	1.023	1.028		1.484	1.743	2.184	2.343	2.666	2.776	2.858
	Variance		0.741	0.790	0.873	0.891	0.962	0.978	1.029		1.877	1.976	2.529	2.734	3.192	3.437	3.520
11	Mean		0.838	0.886	0.940	0.962	1.003	1.023	1.027		1.453	1.707	2.159	2.329	2.656	2.767	2.853
	Variance		0.742	0.783	0.872	0.895	0.955	0.976	1.025		1.888	1.931	2.495	2.744	3.197	3.428	3.507
12	Mean		0.915	0.955	0.976	0.988	1.011	1.027	1.029		1.435	1.697	2.163	2.340	2.667	2.775	2.859
	Variance		0.877	0.919	0.954	0.947	0.970	0.984	1.024		1.898	1.937	2.496	2.792	3.211	3.422	3.516
0	Mean	c,t	0.888	0.916	0.959	0.972	1.014	1.030	1.033	c,s,t	1.904	2.117	2.447	2.548	2.778	2.849	2.912
	Variance		0.844	0.890	0.920	0.936	0.981	0.992	1.030		2.103	2.323	2.714	2.943	3.289	3.435	3.562
1	Mean		0.918	0.948	0.977	0.986	1.020	1.032	1.035		1.810	2.041	2.393	2.500	2.752	2.830	2.898
	Variance		0.912	0.976	0.962	0.963	1.000	0.993	1.036		2.013	2.263	2.681	2.889	3.273	3.421	3.544
2	Mean		0.890	0.920	0.960	0.973	1.013	1.028	1.032		1.789	2.032	2.385	2.498	2.756	2.834	2.898
	Variance		0.863	0.897	0.921	0.929	0.989	0.982	1.028		1.999	2.256	2.658	2.867	3.272	3.419	3.523
3	Mean		0.887	0.923	0.959	0.976	1.013	1.027	1.031		1.741	1.987	2.354	2.486	2.743	2.826	2.895
	Variance		0.855	0.906	0.924	0.940	0.986	0.981	1.028		1.921	2.166	2.644	2.887	3.255	3.401	3.521
4	Mean		0.908	0.942	0.971	0.986	1.016	1.029	1.033		1.654	1.906	2.299	2.440	2.722	2.811	2.885
	Variance		0.898	0.941	0.943	0.959	0.993	0.981	1.034		1.874	2.086	2.599	2.867	3.242	3.411	3.517
5	Mean		0.845	0.888	0.941	0.960	1.008	1.023	1.028		1.638	1.897	2.295	2.435	2.722	2.814	2.888
	Variance		0.766	0.823	0.880	0.904	0.987	0.978	1.029		1.848	2.059	2.592	2.842	3.252	3.432	3.534
6	Mean		0.865	0.913	0.957	0.974	1.014	1.028	1.031		1.528	1.799	2.219	2.373	2.687	2.790	2.870
	Variance		0.799	0.864	0.911	0.930	0.997	0.983	1.033		1.720	1.962	2.510	2.778	3.224	3.420	3.525
7	Mean		0.809	0.864	0.927	0.951	1.003	1.021	1.027		1.516	1.790	2.217	2.375	2.690	2.791	2.870
	Variance		0.684	0.758	0.846	0.881	0.972	0.972	1.028		1.774	1.990	2.519	2.769	3.225	3.429	3.520
8	Mean		0.822	0.880	0.935	0.958	1.004	1.023	1.028		1.460	1.737	2.176	2.339	2.666	2.776	2.859
	Variance		0.705	0.789	0.865	0.889	0.968	0.980	1.034		1.671	1.901	2.481	2.711	3.177	3.429	3.511
9	Mean		0.825	0.881	0.939	0.957	1.004	1.022	1.028		1.415	1.699	2.161	2.316	2.659	2.769	2.853
	Variance		0.720	0.790	0.874	0.879	0.964	0.975	1.031		1.652	1.886	2.496	2.677	3.175	3.424	3.495
10	Mean		0.797	0.856	0.923	0.946	0.997	1.019	1.025		1.414	1.695	2.160	2.325	2.658	2.771	2.854
	Variance		0.678	0.744	0.844	0.866	0.950	0.971	1.023		1.727	1.875	2.458	2.686	3.166	3.423	3.507
11	Mean		0.825	0.878	0.935	0.958	1.000	1.021	1.026		1.352	1.635	2.114	2.293	2.637	2.754	2.843
	Variance		0.716	0.773	0.866	0.887	0.953	0.973	1.022		1.732	1.789	2.405	2.678	3.162	3.403	3.488
12	Mean		0.871	0.919	0.957	0.972	1.004	1.022	1.025		1.351	1.646	2.140	2.324	2.661	2.771	2.857
	Variance		0.804	0.848	0.914	0.917	0.956	0.975	1.018		1.732	1.835	2.433	2.751	3.188	3.409	3.504

Table 1 (continued). Mean and Variance correction for F-IPS$_{F\{7,8\}}$

p		Model	T=48	60	96	120	240	360	480	Model	T=48	60	96	120	240	360	480
0	Mean	c	0.984	0.985	0.986	0.992	1.017	1.035	1.039	c,s	1.944	2.150	2.488	2.583	2.807	2.871	2.910
	Variance		1.068	1.041	0.990	0.977	0.985	1.025	1.002		2.260	2.389	2.898	2.968	3.360	3.354	3.506
1	Mean		0.923	0.938	0.964	0.975	1.012	1.032	1.036		1.894	2.106	2.456	2.553	2.796	2.862	2.905
	Variance		0.940	0.950	0.940	0.944	0.973	1.019	0.997		2.203	2.372	2.855	2.913	3.349	3.338	3.512
2	Mean		0.900	0.920	0.952	0.963	1.007	1.029	1.034		1.851	2.077	2.437	2.542	2.792	2.859	2.903
	Variance		0.920	0.917	0.914	0.925	0.964	1.010	0.990		2.145	2.321	2.790	2.906	3.362	3.341	3.508
3	Mean		0.895	0.919	0.952	0.962	1.008	1.028	1.033		1.791	2.032	2.413	2.519	2.783	2.850	2.898
	Variance		0.905	0.911	0.908	0.921	0.967	1.008	0.986		2.061	2.252	2.755	2.885	3.355	3.323	3.501
4	Mean		0.905	0.926	0.957	0.963	1.008	1.029	1.033		1.720	1.981	2.371	2.491	2.767	2.839	2.890
	Variance		0.927	0.917	0.926	0.915	0.965	1.008	0.988		1.965	2.229	2.700	2.872	3.329	3.328	3.490
5	Mean		0.914	0.935	0.960	0.965	1.007	1.028	1.033		1.672	1.939	2.344	2.466	2.754	2.830	2.884
	Variance		0.930	0.925	0.934	0.916	0.962	1.014	0.994		1.947	2.172	2.658	2.829	3.317	3.330	3.488
6	Mean		0.914	0.939	0.959	0.966	1.011	1.031	1.032		1.607	1.878	2.296	2.424	2.733	2.816	2.872
	Variance		0.921	0.926	0.918	0.919	0.972	1.021	0.993		1.930	2.113	2.614	2.785	3.301	3.326	3.467
7	Mean		0.914	0.940	0.960	0.968	1.011	1.033	1.033		1.565	1.851	2.274	2.405	2.723	2.810	2.867
	Variance		0.915	0.934	0.915	0.918	0.975	1.029	0.994		1.884	2.103	2.619	2.766	3.289	3.324	3.458
8	Mean		0.916	0.946	0.963	0.971	1.010	1.032	1.033		1.515	1.811	2.245	2.378	2.705	2.799	2.860
	Variance		0.897	0.935	0.919	0.923	0.981	1.026	0.992		1.787	2.076	2.594	2.743	3.283	3.312	3.456
9	Mean		0.922	0.949	0.965	0.971	1.010	1.032	1.032		1.485	1.780	2.227	2.361	2.692	2.789	2.854
	Variance		0.910	0.930	0.927	0.916	0.971	1.027	0.992		1.839	2.018	2.589	2.719	3.271	3.310	3.449
10	Mean		0.915	0.940	0.960	0.967	1.007	1.030	1.029		1.457	1.753	2.217	2.351	2.686	2.788	2.851
	Variance		0.899	0.904	0.914	0.908	0.965	1.021	0.989		1.771	1.990	2.564	2.709	3.251	3.314	3.445
11	Mean		0.907	0.926	0.948	0.957	1.004	1.026	1.026		1.433	1.720	2.196	2.331	2.676	2.781	2.845
	Variance		0.902	0.879	0.879	0.889	0.953	1.011	0.979		1.865	1.964	2.526	2.695	3.256	3.300	3.432
12	Mean		0.979	0.992	0.985	0.984	1.012	1.031	1.029		1.419	1.709	2.203	2.343	2.688	2.792	2.852
	Variance		1.002	1.012	0.944	0.935	0.967	1.015	0.985		1.927	1.956	2.555	2.723	3.286	3.317	3.436
0	Mean	c,t	1.054	1.019	0.994	0.991	1.014	1.032	1.036	c,s,t	1.943	2.140	2.478	2.575	2.805	2.869	2.908
	Variance		1.267	1.132	1.013	0.984	0.983	1.021	0.997		2.463	2.485	2.908	2.978	3.350	3.347	3.501
1	Mean		0.959	0.943	0.954	0.961	1.004	1.026	1.032		1.931	2.136	2.476	2.571	2.807	2.868	2.909
	Variance		1.040	0.971	0.928	0.924	0.960	1.010	0.989		2.437	2.511	2.890	2.943	3.353	3.339	3.512
2	Mean		0.901	0.899	0.928	0.940	0.995	1.021	1.028		1.922	2.138	2.478	2.576	2.810	2.871	2.911
	Variance		0.934	0.882	0.873	0.883	0.945	0.996	0.981		2.406	2.509	2.849	2.941	3.373	3.345	3.511
3	Mean		0.872	0.884	0.922	0.935	0.995	1.020	1.027		1.868	2.100	2.455	2.555	2.802	2.862	2.906
	Variance		0.852	0.844	0.856	0.872	0.945	0.992	0.977		2.307	2.469	2.817	2.927	3.369	3.326	3.504
4	Mean		0.880	0.892	0.930	0.940	0.997	1.021	1.028		1.800	2.041	2.404	2.517	2.779	2.846	2.895
	Variance		0.867	0.849	0.877	0.876	0.946	0.994	0.980		2.217	2.438	2.757	2.912	3.341	3.326	3.488
5	Mean		0.905	0.917	0.945	0.951	1.001	1.024	1.030		1.731	1.975	2.355	2.472	2.754	2.829	2.882
	Variance		0.908	0.889	0.906	0.894	0.949	1.006	0.989		2.212	2.360	2.699	2.860	3.317	3.319	3.479
6	Mean		0.933	0.942	0.959	0.963	1.009	1.030	1.032		1.647	1.886	2.281	2.407	2.720	2.806	2.863
	Variance		0.974	0.930	0.916	0.916	0.967	1.018	0.992		2.189	2.251	2.629	2.796	3.286	3.305	3.452
7	Mean		0.958	0.965	0.973	0.976	1.014	1.035	1.034		1.586	1.833	2.234	2.367	2.697	2.792	2.852
	Variance		1.029	0.982	0.938	0.938	0.979	1.032	0.995		2.138	2.209	2.608	2.759	3.259	3.295	3.436
8	Mean		0.978	0.989	0.987	0.987	1.016	1.036	1.035		1.520	1.776	2.189	2.326	2.672	2.775	2.841
	Variance		1.038	1.018	0.964	0.959	0.990	1.033	0.994		2.021	2.168	2.564	2.723	3.243	3.281	3.429
9	Mean		1.002	1.005	0.994	0.990	1.016	1.036	1.034		1.491	1.746	2.172	2.308	2.659	2.766	2.835
	Variance		1.088	1.044	0.988	0.956	0.983	1.035	0.995		2.078	2.122	2.571	2.696	3.230	3.281	3.423
10	Mean		1.013	1.003	0.990	0.984	1.012	1.033	1.031		1.476	1.726	2.171	2.305	2.658	2.769	2.835
	Variance		1.119	1.039	0.977	0.946	0.976	1.028	0.991		2.039	2.097	2.561	2.679	3.217	3.292	3.425
11	Mean		1.026	0.991	0.973	0.968	1.006	1.027	1.026		1.471	1.713	2.170	2.303	2.661	2.769	2.835
	Variance		1.194	1.037	0.939	0.914	0.959	1.014	0.977		2.199	2.105	2.540	2.682	3.232	3.284	3.418
12	Mean		1.069	1.032	0.996	0.984	1.009	1.028	1.027		1.470	1.719	2.199	2.336	2.685	2.789	2.849
	Variance		1.256	1.117	0.977	0.938	0.965	1.011	0.980		2.306	2.104	2.590	2.725	3.274	3.310	3.431

Table 1 (continued). Mean and Variance correction for F-IPS$_{F\{9,10\}}$

p		Model	T=48	60	96	120	240	360	480	Model	T=48	60	96	120	240	360	480
0	Mean	c	0.927	0.947	0.968	0.985	1.011	1.031	1.044	c,s	1.966	2.168	2.498	2.582	2.805	2.868	2.890
	Variance		0.958	0.965	0.925	0.967	0.995	1.042	1.021		2.307	2.535	2.896	2.966	3.301	3.388	3.515
1	Mean		0.946	0.960	0.973	0.988	1.010	1.030	1.044		1.913	2.117	2.464	2.556	2.792	2.859	2.884
	Variance		1.004	0.997	0.937	0.975	0.983	1.036	1.019		2.252	2.459	2.818	2.932	3.287	3.376	3.509
2	Mean		0.949	0.967	0.979	0.994	1.012	1.030	1.044		1.829	2.057	2.423	2.524	2.777	2.846	2.876
	Variance		1.012	1.014	0.953	0.984	0.991	1.034	1.016		2.085	2.375	2.761	2.892	3.274	3.359	3.500
3	Mean		0.886	0.922	0.956	0.975	1.007	1.025	1.042		1.779	2.012	2.397	2.505	2.767	2.838	2.870
	Variance		0.861	0.904	0.915	0.941	0.972	1.023	1.011		2.056	2.301	2.739	2.908	3.274	3.353	3.490
4	Mean		0.890	0.930	0.959	0.978	1.006	1.027	1.043		1.714	1.965	2.360	2.478	2.748	2.828	2.861
	Variance		0.859	0.923	0.920	0.947	0.971	1.028	1.015		1.995	2.296	2.680	2.891	3.247	3.342	3.471
5	Mean		0.895	0.935	0.963	0.980	1.006	1.027	1.043		1.678	1.924	2.333	2.456	2.736	2.821	2.856
	Variance		0.875	0.938	0.924	0.950	0.970	1.029	1.013		1.981	2.252	2.662	2.847	3.230	3.344	3.466
6	Mean		0.850	0.900	0.942	0.964	0.998	1.022	1.040		1.645	1.906	2.326	2.452	2.735	2.821	2.854
	Variance		0.795	0.869	0.889	0.920	0.949	1.013	1.009		1.944	2.222	2.664	2.847	3.234	3.338	3.459
7	Mean		0.859	0.906	0.945	0.965	0.997	1.021	1.040		1.604	1.874	2.299	2.435	2.724	2.813	2.850
	Variance		0.794	0.883	0.892	0.915	0.946	1.009	1.008		1.900	2.171	2.614	2.831	3.226	3.326	3.453
8	Mean		0.866	0.910	0.949	0.967	0.997	1.020	1.040		1.556	1.827	2.267	2.402	2.709	2.799	2.841
	Variance		0.811	0.898	0.897	0.912	0.947	1.003	1.009		1.940	2.115	2.580	2.787	3.204	3.304	3.446
9	Mean		0.827	0.877	0.929	0.953	0.992	1.016	1.038		1.523	1.794	2.246	2.380	2.700	2.793	2.836
	Variance		0.718	0.815	0.847	0.887	0.932	0.999	1.010		1.850	2.088	2.582	2.751	3.200	3.290	3.432
10	Mean		0.832	0.878	0.933	0.955	0.991	1.017	1.038		1.478	1.755	2.218	2.357	2.683	2.782	2.828
	Variance		0.732	0.809	0.849	0.893	0.929	0.998	1.011		1.818	2.060	2.545	2.728	3.168	3.264	3.430
11	Mean		0.833	0.880	0.935	0.958	0.990	1.016	1.037		1.450	1.719	2.197	2.344	2.671	2.774	2.821
	Variance		0.719	0.811	0.850	0.900	0.923	0.995	1.009		1.843	2.007	2.512	2.714	3.168	3.264	3.428
12	Mean		0.917	0.953	0.973	0.984	1.000	1.022	1.039		1.443	1.714	2.200	2.355	2.684	2.784	2.828
	Variance		0.880	0.953	0.937	0.950	0.947	1.009	1.016		1.977	2.055	2.498	2.715	3.191	3.280	3.437
0	Mean	c,t	0.887	0.914	0.949	0.970	1.004	1.026	1.041	c,s,t	1.919	2.134	2.482	2.571	2.800	2.865	2.888
	Variance		0.877	0.893	0.888	0.938	0.980	1.033	1.015		2.190	2.443	2.844	2.931	3.279	3.374	3.503
1	Mean		0.921	0.941	0.961	0.979	1.006	1.027	1.042		1.842	2.064	2.433	2.530	2.779	2.851	2.878
	Variance		0.952	0.961	0.913	0.957	0.975	1.030	1.014		2.113	2.343	2.753	2.876	3.256	3.358	3.493
2	Mean		0.941	0.963	0.976	0.993	1.011	1.029	1.043		1.733	1.981	2.375	2.486	2.756	2.833	2.866
	Variance		0.991	1.011	0.951	0.982	0.989	1.032	1.014		1.917	2.243	2.681	2.828	3.238	3.336	3.480
3	Mean		0.849	0.890	0.937	0.960	1.000	1.021	1.038		1.724	1.973	2.379	2.493	2.762	2.835	2.867
	Variance		0.790	0.838	0.877	0.913	0.959	1.015	1.005		1.941	2.211	2.686	2.869	3.254	3.340	3.478
4	Mean		0.865	0.910	0.947	0.968	1.001	1.024	1.040		1.646	1.910	2.329	2.451	2.735	2.820	2.855
	Variance		0.820	0.886	0.897	0.931	0.962	1.022	1.010		1.873	2.183	2.614	2.834	3.216	3.324	3.456
5	Mean		0.885	0.930	0.959	0.978	1.004	1.026	1.042		1.585	1.852	2.286	2.419	2.716	2.808	2.846
	Variance		0.860	0.927	0.923	0.949	0.968	1.027	1.011		1.800	2.110	2.585	2.779	3.193	3.321	3.447
6	Mean		0.815	0.870	0.923	0.950	0.991	1.018	1.037		1.585	1.863	2.306	2.439	2.729	2.818	2.852
	Variance		0.729	0.809	0.854	0.893	0.936	1.004	1.003		1.833	2.116	2.609	2.808	3.214	3.324	3.448
7	Mean		0.834	0.886	0.934	0.956	0.993	1.018	1.038		1.531	1.817	2.268	2.409	2.710	2.804	2.843
	Variance		0.750	0.851	0.871	0.899	0.938	1.003	1.003		1.779	2.049	2.549	2.777	3.196	3.308	3.438
8	Mean		0.852	0.902	0.945	0.964	0.996	1.019	1.039		1.462	1.754	2.221	2.366	2.689	2.786	2.831
	Variance		0.788	0.881	0.893	0.909	0.944	1.000	1.006		1.709	1.973	2.503	2.722	3.167	3.281	3.427
9	Mean		0.792	0.847	0.912	0.939	0.985	1.012	1.035		1.456	1.747	2.224	2.366	2.694	2.790	2.834
	Variance		0.657	0.761	0.816	0.863	0.920	0.991	1.003		1.724	1.979	2.527	2.712	3.180	3.276	3.420
10	Mean		0.806	0.858	0.921	0.945	0.987	1.014	1.036		1.401	1.697	2.185	2.330	2.670	2.774	2.822
	Variance		0.692	0.776	0.829	0.877	0.921	0.993	1.006		1.696	1.942	2.477	2.668	3.138	3.245	3.414
11	Mean		0.823	0.873	0.931	0.955	0.988	1.015	1.036		1.351	1.648	2.152	2.310	2.652	2.761	2.811
	Variance		0.705	0.802	0.847	0.896	0.920	0.993	1.006		1.664	1.871	2.430	2.646	3.131	3.241	3.409
12	Mean		0.874	0.920	0.954	0.970	0.994	1.018	1.036		1.359	1.662	2.178	2.341	2.678	2.781	2.826
	Variance		0.797	0.890	0.898	0.922	0.935	1.001	1.010		1.786	1.940	2.443	2.675	3.170	3.266	3.425

Table 1 (continued). Mean and Variance correction for F-IPS$_{F\{11,12\}}$

p		Model	T=48	60	96	120	240	360	480	Model	T=48	60	96	120	240	360	480
0	Mean	c	0.943	0.954	0.990	0.993	1.024	1.038	1.039	c,s	1.955	2.150	2.476	2.572	2.797	2.897	2.900
	Variance		0.973	0.930	0.976	0.962	0.997	0.987	1.034		2.267	2.465	2.828	2.904	3.348	3.521	3.602
1	Mean		0.920	0.936	0.981	0.986	1.018	1.035	1.037		1.894	2.105	2.444	2.544	2.785	2.887	2.895
	Variance		0.947	0.912	0.958	0.953	0.978	0.980	1.028		2.190	2.393	2.807	2.875	3.341	3.495	3.594
2	Mean		0.930	0.944	0.986	0.990	1.020	1.037	1.038		1.821	2.040	2.398	2.508	2.767	2.875	2.888
	Variance		0.982	0.939	0.970	0.972	0.979	0.986	1.028		2.115	2.284	2.734	2.817	3.314	3.482	3.594
3	Mean		0.931	0.946	0.985	0.991	1.023	1.036	1.037		1.765	1.997	2.368	2.480	2.757	2.867	2.881
	Variance		0.983	0.934	0.961	0.967	0.999	0.991	1.023		2.045	2.248	2.701	2.764	3.307	3.463	3.587
4	Mean		0.936	0.951	0.986	0.993	1.021	1.036	1.036		1.701	1.947	2.329	2.447	2.739	2.858	2.872
	Variance		1.017	0.932	0.954	0.966	0.992	0.995	1.023		1.995	2.197	2.655	2.734	3.289	3.467	3.581
5	Mean		0.916	0.940	0.981	0.990	1.021	1.035	1.035		1.655	1.914	2.302	2.428	2.728	2.852	2.867
	Variance		0.958	0.911	0.945	0.966	0.991	0.998	1.023		2.003	2.185	2.626	2.725	3.275	3.453	3.569
6	Mean		0.869	0.901	0.957	0.971	1.013	1.030	1.033		1.627	1.892	2.294	2.427	2.726	2.852	2.867
	Variance		0.841	0.830	0.907	0.930	0.976	0.987	1.018		1.963	2.126	2.614	2.741	3.275	3.450	3.577
7	Mean		0.846	0.884	0.948	0.964	1.011	1.029	1.033		1.589	1.858	2.268	2.404	2.718	2.847	2.862
	Variance		0.793	0.792	0.884	0.918	0.966	0.984	1.019		1.927	2.079	2.566	2.714	3.255	3.443	3.567
8	Mean		0.857	0.893	0.954	0.968	1.014	1.030	1.033		1.536	1.813	2.242	2.380	2.708	2.839	2.855
	Variance		0.827	0.821	0.894	0.925	0.964	0.986	1.019		1.867	2.036	2.559	2.690	3.233	3.444	3.561
9	Mean		0.859	0.894	0.955	0.970	1.013	1.030	1.035		1.501	1.784	2.218	2.364	2.696	2.830	2.851
	Variance		0.821	0.809	0.894	0.927	0.964	0.986	1.025		1.840	2.036	2.540	2.673	3.216	3.440	3.569
10	Mean		0.864	0.898	0.962	0.974	1.013	1.029	1.034		1.464	1.742	2.193	2.338	2.681	2.818	2.842
	Variance		0.814	0.813	0.905	0.936	0.963	0.984	1.025		1.823	1.991	2.528	2.639	3.184	3.428	3.563
11	Mean		0.853	0.889	0.955	0.969	1.010	1.027	1.031		1.442	1.707	2.175	2.323	2.673	2.812	2.837
	Variance		0.794	0.800	0.895	0.913	0.958	0.983	1.022		1.880	1.934	2.499	2.625	3.186	3.435	3.555
12	Mean		0.935	0.957	0.994	0.997	1.018	1.031	1.034		1.431	1.694	2.182	2.335	2.684	2.822	2.844
	Variance		0.927	0.935	0.978	0.967	0.968	0.998	1.028		1.980	1.944	2.518	2.636	3.190	3.449	3.566
0	Mean	c,t	0.929	0.937	0.976	0.981	1.017	1.034	1.035	c,s,t	1.916	2.121	2.460	2.560	2.792	2.893	2.898
	Variance		0.947	0.897	0.949	0.936	0.984	0.979	1.028		2.204	2.416	2.783	2.875	3.330	3.504	3.592
1	Mean		0.873	0.895	0.954	0.965	1.008	1.029	1.032		1.883	2.102	2.446	2.547	2.788	2.889	2.897
	Variance		0.853	0.833	0.907	0.909	0.959	0.969	1.021		2.192	2.374	2.776	2.854	3.328	3.486	3.590
2	Mean		0.895	0.912	0.966	0.975	1.013	1.032	1.034		1.801	2.023	2.387	2.500	2.763	2.872	2.886
	Variance		0.910	0.871	0.931	0.940	0.965	0.978	1.023		2.121	2.287	2.695	2.783	3.295	3.468	3.587
3	Mean		0.926	0.938	0.983	0.989	1.021	1.035	1.036		1.708	1.939	2.328	2.445	2.739	2.854	2.871
	Variance		0.972	0.919	0.958	0.963	0.997	0.989	1.021		2.030	2.195	2.643	2.704	3.277	3.438	3.572
4	Mean		0.948	0.959	0.993	0.998	1.023	1.037	1.036		1.620	1.864	2.272	2.398	2.714	2.840	2.858
	Variance		1.051	0.964	0.972	0.978	0.994	0.996	1.023		1.935	2.083	2.580	2.665	3.253	3.435	3.560
5	Mean		0.928	0.944	0.982	0.990	1.020	1.034	1.035		1.586	1.848	2.258	2.390	2.710	2.838	2.856
	Variance		1.001	0.941	0.953	0.967	0.988	0.996	1.020		1.878	2.084	2.568	2.671	3.243	3.426	3.550
6	Mean		0.861	0.886	0.944	0.959	1.007	1.026	1.030		1.590	1.862	2.277	2.413	2.721	2.848	2.864
	Variance		0.841	0.818	0.883	0.905	0.963	0.978	1.012		1.892	2.088	2.580	2.715	3.254	3.434	3.566
7	Mean		0.817	0.852	0.924	0.945	1.002	1.023	1.028		1.576	1.846	2.266	2.402	2.719	2.848	2.864
	Variance		0.743	0.739	0.841	0.879	0.949	0.972	1.012		1.936	2.060	2.548	2.694	3.238	3.433	3.562
8	Mean		0.832	0.866	0.937	0.953	1.007	1.025	1.030		1.523	1.788	2.231	2.370	2.703	2.835	2.853
	Variance		0.786	0.772	0.862	0.895	0.953	0.977	1.014		1.911	1.992	2.528	2.660	3.213	3.429	3.555
9	Mean		0.858	0.887	0.952	0.968	1.011	1.028	1.033		1.462	1.731	2.183	2.332	2.678	2.817	2.842
	Variance		0.831	0.798	0.893	0.922	0.961	0.983	1.023		1.855	1.959	2.482	2.620	3.185	3.415	3.555
10	Mean		0.884	0.904	0.967	0.979	1.014	1.029	1.034		1.405	1.670	2.144	2.294	2.657	2.800	2.829
	Variance		0.865	0.828	0.920	0.944	0.964	0.984	1.024		1.787	1.895	2.454	2.569	3.147	3.397	3.543
11	Mean		0.880	0.895	0.955	0.969	1.009	1.025	1.030		1.389	1.645	2.135	2.288	2.655	2.798	2.826
	Variance		0.881	0.824	0.899	0.911	0.954	0.980	1.019		1.843	1.843	2.437	2.568	3.152	3.410	3.536
12	Mean		0.931	0.940	0.979	0.984	1.012	1.027	1.031		1.391	1.653	2.164	2.320	2.678	2.818	2.841
	Variance		0.955	0.911	0.947	0.937	0.956	0.989	1.022		1.995	1.864	2.482	2.601	3.168	3.435	3.555

Table 1 (continued). Mean and Variance correction for F-IPS$_{F\{2,\ldots,12\}}$

p		Model	T=48	60	96	120	240	360	480	Model	T=48	60	96	120	240	360	480
0	Mean	c	0.992	1.004	1.021	1.027	1.045	1.054	1.058	c,s	2.501	2.611	2.791	2.833	2.933	2.970	2.978
	Variance		0.241	0.225	0.210	0.202	0.197	0.198	0.194		1.238	1.063	0.899	0.842	0.750	0.723	0.718
1	Mean		0.990	1.004	1.020	1.025	1.043	1.053	1.057		2.452	2.572	2.768	2.812	2.924	2.963	2.973
	Variance		0.244	0.227	0.210	0.201	0.196	0.197	0.193		1.203	1.036	0.888	0.829	0.749	0.718	0.716
2	Mean		0.991	1.005	1.020	1.025	1.043	1.052	1.056		2.411	2.543	2.748	2.799	2.918	2.959	2.970
	Variance		0.249	0.230	0.210	0.202	0.196	0.197	0.192		1.177	1.026	0.876	0.824	0.745	0.719	0.714
3	Mean		0.988	1.005	1.019	1.024	1.043	1.051	1.055		2.362	2.504	2.725	2.782	2.911	2.953	2.966
	Variance		0.247	0.231	0.209	0.201	0.196	0.196	0.192		1.149	0.999	0.865	0.817	0.743	0.715	0.712
4	Mean		0.990	1.006	1.019	1.023	1.042	1.051	1.055		2.325	2.476	2.707	2.768	2.904	2.950	2.963
	Variance		0.250	0.231	0.208	0.201	0.195	0.197	0.192		1.163	0.993	0.856	0.815	0.740	0.715	0.711
5	Mean		0.989	1.006	1.018	1.022	1.041	1.051	1.054		2.280	2.439	2.683	2.749	2.896	2.945	2.959
	Variance		0.250	0.231	0.209	0.201	0.195	0.197	0.192		1.154	0.978	0.850	0.803	0.740	0.713	0.707
6	Mean		0.979	1.001	1.015	1.019	1.040	1.050	1.054		2.259	2.429	2.678	2.747	2.895	2.945	2.959
	Variance		0.246	0.229	0.207	0.199	0.194	0.196	0.192		1.168	0.972	0.843	0.801	0.737	0.713	0.706
7	Mean		0.975	0.998	1.013	1.018	1.039	1.049	1.053		2.221	2.398	2.656	2.730	2.888	2.940	2.955
	Variance		0.244	0.230	0.206	0.198	0.193	0.196	0.192		1.177	0.960	0.831	0.791	0.732	0.709	0.704
8	Mean		0.975	0.999	1.013	1.018	1.038	1.048	1.053		2.189	2.372	2.643	2.717	2.882	2.936	2.953
	Variance		0.246	0.233	0.206	0.198	0.193	0.195	0.192		1.189	0.951	0.828	0.785	0.729	0.707	0.703
9	Mean		0.974	0.997	1.013	1.017	1.037	1.047	1.052		2.151	2.340	2.625	2.700	2.873	2.929	2.949
	Variance		0.249	0.231	0.204	0.197	0.191	0.194	0.192		1.203	0.947	0.830	0.775	0.727	0.705	0.702
10	Mean		0.974	0.996	1.013	1.017	1.036	1.046	1.051		2.119	2.314	2.612	2.689	2.866	2.925	2.945
	Variance		0.252	0.230	0.206	0.198	0.191	0.194	0.192		1.236	0.948	0.824	0.769	0.724	0.702	0.701
11	Mean		0.976	0.997	1.012	1.016	1.035	1.045	1.050		2.085	2.279	2.592	2.675	2.858	2.919	2.941
	Variance		0.259	0.234	0.206	0.197	0.191	0.193	0.191		1.292	0.933	0.817	0.769	0.721	0.701	0.700
12	Mean		1.026	1.039	1.031	1.029	1.038	1.047	1.050		1.928	2.128	2.488	2.593	2.817	2.891	2.918
	Variance		0.273	0.251	0.212	0.201	0.191	0.193	0.191		1.292	0.925	0.816	0.783	0.730	0.705	0.700
0	Mean	c,t	0.979	0.988	1.008	1.015	1.039	1.050	1.055	c,s,t	2.461	2.580	2.775	2.822	2.928	2.967	2.976
	Variance		0.240	0.218	0.205	0.197	0.194	0.196	0.192		1.246	1.052	0.892	0.837	0.745	0.721	0.716
1	Mean		0.973	0.985	1.005	1.012	1.037	1.048	1.054		2.405	2.537	2.748	2.797	2.917	2.958	2.970
	Variance		0.238	0.219	0.204	0.196	0.193	0.195	0.192		1.207	1.022	0.874	0.821	0.743	0.716	0.713
2	Mean		0.976	0.988	1.008	1.015	1.038	1.049	1.054		2.375	2.515	2.731	2.785	2.911	2.954	2.967
	Variance		0.243	0.223	0.205	0.198	0.195	0.196	0.192		1.189	1.020	0.866	0.817	0.740	0.717	0.712
3	Mean		0.969	0.985	1.005	1.012	1.037	1.047	1.052		2.321	2.470	2.703	2.764	2.902	2.947	2.961
	Variance		0.238	0.222	0.204	0.197	0.194	0.195	0.191		1.159	0.987	0.853	0.807	0.738	0.712	0.710
4	Mean		0.972	0.989	1.007	1.014	1.037	1.048	1.053		2.291	2.444	2.686	2.751	2.895	2.944	2.958
	Variance		0.242	0.224	0.204	0.197	0.194	0.196	0.192		1.188	0.986	0.847	0.806	0.735	0.712	0.708
5	Mean		0.970	0.988	1.006	1.012	1.036	1.047	1.052		2.236	2.400	2.656	2.727	2.884	2.937	2.953
	Variance		0.244	0.224	0.205	0.197	0.193	0.196	0.191		1.158	0.966	0.836	0.794	0.734	0.709	0.704
6	Mean		0.966	0.988	1.006	1.012	1.037	1.048	1.052		2.217	2.390	2.650	2.724	2.884	2.937	2.953
	Variance		0.243	0.225	0.204	0.196	0.192	0.195	0.191		1.181	0.961	0.831	0.791	0.731	0.709	0.703
7	Mean		0.963	0.985	1.004	1.010	1.035	1.047	1.051		2.172	2.350	2.622	2.702	2.873	2.930	2.948
	Variance		0.243	0.226	0.203	0.195	0.191	0.195	0.191		1.194	0.944	0.816	0.778	0.725	0.704	0.700
8	Mean		0.968	0.991	1.008	1.013	1.035	1.047	1.051		2.142	2.323	2.609	2.689	2.867	2.926	2.945
	Variance		0.248	0.231	0.204	0.197	0.191	0.194	0.191		1.202	0.935	0.813	0.772	0.722	0.704	0.700
9	Mean		0.971	0.992	1.008	1.012	1.034	1.045	1.051		2.089	2.278	2.583	2.665	2.855	2.917	2.940
	Variance		0.254	0.232	0.203	0.195	0.190	0.194	0.191		1.215	0.926	0.811	0.760	0.719	0.700	0.698
10	Mean		0.984	0.999	1.013	1.016	1.035	1.045	1.050		2.052	2.247	2.568	2.652	2.847	2.913	2.936
	Variance		0.265	0.236	0.207	0.198	0.191	0.194	0.191		1.241	0.926	0.805	0.754	0.717	0.698	0.697
11	Mean		1.002	1.008	1.014	1.016	1.033	1.044	1.049		1.981	2.189	2.536	2.630	2.837	2.905	2.930
	Variance		0.284	0.244	0.208	0.197	0.190	0.192	0.191		1.288	0.905	0.797	0.750	0.712	0.696	0.696
12	Mean		1.019	1.023	1.018	1.018	1.032	1.043	1.047		1.883	2.088	2.469	2.578	2.811	2.888	2.916
	Variance		0.281	0.246	0.207	0.196	0.189	0.192	0.190		1.339	0.917	0.808	0.775	0.725	0.704	0.698

Table 1 (continued). Mean and Variance correction for F-IPS$_{F\{3,\ldots,12\}}$

p		Model	T=48	60	96	120	240	360	480	Model	T=48	60	96	120	240	360	480
0	Mean	c	0.979	0.992	1.009	1.015	1.034	1.043	1.049	c,s	2.446	2.567	2.761	2.809	2.917	2.960	2.970
	Variance		0.255	0.239	0.226	0.218	0.213	0.214	0.211		1.231	1.074	0.943	0.899	0.809	0.786	0.791
1	Mean		0.977	0.991	1.008	1.013	1.033	1.042	1.048		2.403	2.534	2.742	2.791	2.910	2.954	2.966
	Variance		0.258	0.241	0.226	0.218	0.212	0.212	0.210		1.202	1.051	0.933	0.887	0.808	0.782	0.789
2	Mean		0.978	0.993	1.008	1.013	1.032	1.041	1.047		2.350	2.492	2.712	2.768	2.899	2.947	2.960
	Variance		0.263	0.245	0.226	0.218	0.213	0.212	0.210		1.160	1.031	0.915	0.878	0.803	0.782	0.786
3	Mean		0.974	0.991	1.006	1.012	1.032	1.040	1.046		2.306	2.458	2.692	2.754	2.893	2.942	2.957
	Variance		0.260	0.244	0.225	0.218	0.212	0.212	0.209		1.135	1.010	0.908	0.871	0.803	0.777	0.785
4	Mean		0.976	0.993	1.005	1.011	1.031	1.040	1.046		2.254	2.415	2.662	2.731	2.882	2.935	2.952
	Variance		0.264	0.244	0.224	0.217	0.211	0.212	0.210		1.138	0.996	0.894	0.869	0.798	0.777	0.783
5	Mean		0.974	0.992	1.005	1.010	1.031	1.039	1.046		2.211	2.382	2.641	2.714	2.874	2.931	2.949
	Variance		0.262	0.245	0.225	0.218	0.211	0.212	0.210		1.131	0.985	0.890	0.857	0.798	0.776	0.780
6	Mean		0.964	0.987	1.001	1.007	1.030	1.039	1.045		2.173	2.355	2.624	2.703	2.869	2.928	2.947
	Variance		0.256	0.243	0.222	0.216	0.209	0.212	0.210		1.139	0.971	0.881	0.852	0.793	0.775	0.777
7	Mean		0.960	0.984	0.999	1.006	1.028	1.038	1.045		2.142	2.332	2.607	2.690	2.863	2.924	2.944
	Variance		0.255	0.244	0.221	0.215	0.209	0.211	0.210		1.149	0.963	0.869	0.844	0.789	0.773	0.777
8	Mean		0.959	0.984	0.999	1.006	1.027	1.037	1.044		2.089	2.288	2.581	2.667	2.852	2.916	2.939
	Variance		0.256	0.245	0.221	0.215	0.209	0.211	0.210		1.143	0.944	0.860	0.835	0.785	0.771	0.776
9	Mean		0.958	0.982	0.998	1.004	1.026	1.036	1.044		2.059	2.262	2.569	2.653	2.845	2.911	2.936
	Variance		0.258	0.243	0.219	0.213	0.207	0.210	0.211		1.157	0.943	0.863	0.826	0.784	0.768	0.775
10	Mean		0.958	0.982	0.999	1.005	1.025	1.035	1.043		1.998	2.213	2.541	2.631	2.833	2.903	2.929
	Variance		0.261	0.242	0.221	0.215	0.207	0.209	0.210		1.170	0.935	0.856	0.817	0.780	0.767	0.774
11	Mean		0.960	0.982	0.998	1.004	1.024	1.034	1.042		1.974	2.184	2.525	2.621	2.827	2.899	2.926
	Variance		0.268	0.246	0.220	0.214	0.206	0.208	0.210		1.233	0.924	0.848	0.818	0.777	0.766	0.774
12	Mean		1.013	1.027	1.019	1.018	1.028	1.036	1.042		1.872	2.082	2.455	2.566	2.799	2.880	2.911
	Variance		0.285	0.266	0.228	0.219	0.207	0.209	0.210		1.271	0.931	0.855	0.834	0.788	0.772	0.774
0	Mean	c,t	0.968	0.977	0.996	1.003	1.028	1.039	1.045	c,s,t	2.405	2.535	2.744	2.797	2.912	2.957	2.967
	Variance		0.255	0.232	0.221	0.213	0.211	0.212	0.210		1.237	1.058	0.934	0.893	0.803	0.784	0.789
1	Mean		0.960	0.973	0.993	1.000	1.026	1.037	1.044		2.364	2.506	2.726	2.779	2.905	2.951	2.963
	Variance		0.251	0.233	0.220	0.212	0.209	0.211	0.209		1.216	1.040	0.922	0.881	0.803	0.780	0.787
2	Mean		0.964	0.976	0.995	1.002	1.027	1.038	1.044		2.314	2.464	2.694	2.754	2.891	2.942	2.956
	Variance		0.257	0.237	0.220	0.214	0.211	0.211	0.209		1.172	1.023	0.903	0.869	0.798	0.779	0.784
3	Mean		0.955	0.971	0.993	1.000	1.027	1.036	1.044		2.273	2.430	2.674	2.740	2.886	2.937	2.953
	Variance		0.250	0.234	0.219	0.213	0.210	0.210	0.209		1.156	1.000	0.897	0.862	0.798	0.774	0.783
4	Mean		0.959	0.976	0.994	1.001	1.026	1.037	1.044		2.220	2.382	2.640	2.712	2.872	2.928	2.946
	Variance		0.257	0.237	0.219	0.214	0.209	0.211	0.209		1.161	0.987	0.883	0.858	0.793	0.773	0.779
5	Mean		0.956	0.975	0.993	1.000	1.026	1.036	1.043		2.176	2.350	2.618	2.696	2.864	2.924	2.944
	Variance		0.256	0.238	0.220	0.214	0.209	0.211	0.209		1.142	0.975	0.879	0.849	0.792	0.772	0.776
6	Mean		0.953	0.975	0.992	1.000	1.026	1.037	1.043		2.131	2.314	2.595	2.679	2.856	2.919	2.940
	Variance		0.255	0.239	0.218	0.213	0.208	0.210	0.209		1.148	0.958	0.867	0.841	0.786	0.771	0.774
7	Mean		0.949	0.971	0.990	0.998	1.024	1.036	1.043		2.105	2.292	2.578	2.665	2.850	2.916	2.937
	Variance		0.255	0.239	0.217	0.212	0.207	0.210	0.209		1.172	0.951	0.855	0.831	0.782	0.769	0.773
8	Mean		0.954	0.978	0.994	1.001	1.025	1.036	1.043		2.040	2.236	2.544	2.636	2.836	2.905	2.930
	Variance		0.260	0.244	0.218	0.213	0.207	0.210	0.210		1.152	0.926	0.843	0.821	0.777	0.766	0.772
9	Mean		0.957	0.978	0.995	1.001	1.024	1.034	1.042		2.011	2.211	2.531	2.622	2.829	2.900	2.927
	Variance		0.264	0.244	0.218	0.212	0.206	0.210	0.210		1.181	0.927	0.846	0.812	0.776	0.764	0.771
10	Mean		0.972	0.987	1.000	1.004	1.024	1.034	1.042		1.926	2.141	2.493	2.591	2.813	2.890	2.919
	Variance		0.277	0.250	0.222	0.215	0.206	0.209	0.210		1.169	0.909	0.835	0.801	0.771	0.762	0.770
11	Mean		0.989	0.996	1.001	1.005	1.023	1.033	1.040		1.888	2.106	2.475	2.579	2.806	2.885	2.915
	Variance		0.296	0.258	0.223	0.214	0.206	0.208	0.209		1.240	0.902	0.829	0.800	0.768	0.761	0.770
12	Mean		1.010	1.012	1.006	1.007	1.022	1.032	1.039		1.830	2.043	2.435	2.551	2.793	2.876	2.908
	Variance		0.295	0.262	0.224	0.214	0.205	0.207	0.209		1.318	0.925	0.846	0.825	0.782	0.769	0.772

Table 2. Size and power of the Franses-IPS test (nominal 5% significance level): No serial correlation

T	N	F-IPS$_{t1}$				F-IPS$_{t2}$				F-IPS$_{F\{2,...,12\}}$				F-IPS$_{F\{3,...,12\}}$			
		Model: c		Model: c,t		Model: c		Model: c,t		Model: c		Model: c,t		Model: c		Model: c,t	
		Size	Power	Size	Power	Size	Power	Size	Power	Size	Power	Size	Power	Size	Power	Size	Power
48	5	5.8	7.4	4.5	5.0	5.2	19.1	5.0	19.4	7.4	18.3	7.8	19.3	7.0	17.3	7.1	17.5
	15	6.2	8.7	5.1	6.1	4.7	41.0	4.8	41.0	7.4	30.5	7.3	29.8	6.7	29.0	6.2	29.0
	25	5.7	10.6	4.7	6.7	4.4	62.5	4.3	63.0	7.3	43.7	7.2	42.6	8.0	40.8	7.3	39.7
	40	5.8	11.9	4.9	7.4	4.5	80.8	4.6	81.3	7.0	57.6	6.3	55.3	6.3	53.3	5.8	50.3
60	5	4.9	6.5	5.7	6.4	5.4	19.5	4.7	19.2	5.1	22.2	5.6	22.0	5.0	20.9	5.4	20.5
	15	5.3	8.2	5.8	9.0	4.7	52.0	4.5	51.3	5.4	41.4	5.3	42.3	5.7	38.6	5.1	38.7
	25	4.7	10.4	5.6	7.7	4.4	71.6	4.7	72.0	5.8	58.3	5.1	59.0	5.7	54.6	5.3	55.5
	40	4.1	12.1	6.2	9.9	5.0	90.8	5.1	90.8	5.8	75.8	5.9	76.3	5.7	71.8	6.0	71.9
96	5	4.7	7.1	5.0	5.5	4.3	28.0	4.3	28.3	6.3	43.3	6.5	44.1	6.2	43.7	6.4	44.3
	15	4.2	9.9	3.7	6.7	3.9	69.8	3.9	69.6	7.7	82.5	7.3	83.2	6.2	80.8	6.3	81.4
	25	4.5	13.6	4.8	7.6	4.9	89.1	4.8	89.3	5.2	95.2	5.4	95.6	5.3	93.7	5.2	93.9
	40	4.4	15.0	4.6	8.3	4.2	98.4	4.3	98.4	4.9	99.7	5.0	99.8	4.5	99.3	4.5	99.6
120	5	5.5	7.1	5.0	6.3	4.1	35.3	4.2	35.5	6.7	63.1	6.6	64.2	6.8	61.8	6.9	62.3
	15	5.3	14.0	6.3	7.7	5.8	80.3	5.8	80.2	5.6	95.7	5.8	95.9	5.3	94.3	5.2	94.9
	25	5.3	15.7	3.7	7.6	5.0	95.9	4.9	95.8	5.4	99.8	5.4	99.8	5.1	99.7	5.5	99.7
	40	4.2	21.2	4.1	8.7	4.2	99.8	4.4	99.7	5.1	99.9	5.4	100.0	5.5	99.9	5.5	100.0
240	5	3.7	13.8	5.2	8.3	5.3	67.1	5.4	66.8	5.9	99.4	5.8	99.4	6.6	99.0	6.8	99.1
	15	4.8	30.7	4.9	10.5	4.1	99.4	4.1	99.4	5.8	100.0	6.0	100.0	6.3	100.0	6.3	100.0
	25	5.2	48.3	5.4	15.7	4.7	100.0	4.6	100.0	6.5	100.0	6.7	100.0	5.9	100.0	5.8	100.0
	40	4.9	65.7	6.0	18.9	5.4	100.0	5.4	100.0	5.7	100.0	5.8	100.0	6.2	100.0	6.2	100.0
360	5	5.3	26.2	6.3	11.3	3.7	88.9	3.7	88.9	5.7	100.0	5.7	100.0	5.9	100.0	5.9	100.0
	15	5.1	57.7	6.4	20.0	4.4	100.0	4.3	100.0	5.2	100.0	5.2	100.0	6.0	100.0	6.1	100.0
	25	4.2	79.3	4.6	28.0	5.1	100.0	5.1	100.0	4.4	100.0	4.2	100.0	4.4	100.0	4.3	100.0
	40	5.0	93.6	4.7	34.6	6.0	100.0	6.1	100.0	4.9	100.0	5.0	100.0	5.3	100.0	5.2	100.0
480	5	5.5	35.5	5.1	15.4	4.2	96.9	4.2	96.9	5.3	100.0	5.4	100.0	6.1	100.0	6.0	100.0
	15	4.6	82.8	6.0	35.2	4.7	100.0	4.7	100.0	4.4	100.0	4.7	100.0	4.8	100.0	4.9	100.0
	25	5.2	97.1	4.8	50.3	4.6	100.0	4.6	100.0	4.8	100.0	4.7	100.0	5.9	100.0	6.2	100.0
	40	4.1	99.6	4.9	63.0	5.6	100.0	5.6	100.0	4.7	100.0	4.9	100.0	5.0	100.0	5.2	100.0

Table 3. Size of the Franses-IPS test in the presence of cross section dependence (nominal 5% significance level). Model includes constant

T	ω	F-IPS$_{t1}$				F-IPS$_{t2}$				F-IPS$_{F\{2,...,12\}}$				F-IPS$_{F\{3,...,12\}}$			
		N=5	15	25	40	N=5	15	25	40	N=5	15	25	40	N=5	15	25	40
48	0.3	6.0	12.6	14.3	18.7	7.0	8.9	12.4	15.3	9.7	11.6	13.1	14.2	9.8	11.7	14.0	15.9
	0.5	10.2	19.4	24.3	32.4	9.7	16.1	22.6	26.6	11.1	15.7	20.2	22.6	10.6	16.0	20.7	22.2
	0.7	14.9	25.3	34.6	40.2	13.8	25.6	32.9	38.3	15.6	18.8	26.7	26.7	14.3	19.7	26.6	26.1
	0.9	20.7	31.1	37.0	42.0	22.8	34.9	39.6	44.6	19.3	23.7	30.0	30.8	19.0	24.5	30.1	29.3
60	0.3	6.6	10.7	15.0	15.3	6.8	9.0	11.3	19.2	5.5	10.2	9.3	12.6	5.6	9.5	10.6	13.3
	0.5	8.9	17.4	24.8	28.9	7.6	18.1	22.1	30.5	7.8	14.6	16.4	20.9	7.7	15.0	16.5	20.9
	0.7	14.9	27.2	33.1	39.5	11.7	26.3	33.4	40.0	11.6	18.2	22.4	25.8	11.4	18.3	23.1	26.3
	0.9	19.8	31.9	38.1	43.4	18.7	36.1	42.1	44.1	15.7	23.1	27.3	31.4	14.8	22.9	27.7	31.1
96	0.3	4.9	9.4	11.9	13.7	5.3	7.4	11.0	16.6	7.7	10.3	10.5	13.1	8.2	10.9	9.4	13.5
	0.5	7.2	16.7	24.2	27.1	7.2	14.4	22.2	30.6	8.8	14.6	14.4	21.2	10.5	15.9	14.7	20.7
	0.7	11.7	25.6	33.8	36.3	10.5	25.5	35.6	39.9	11.6	19.8	22.0	27.4	12.8	20.5	22.3	27.3
	0.9	18.3	30.5	36.7	40.4	18.0	34.6	43.6	44.0	15.6	26.4	28.0	30.5	17.0	26.1	28.0	30.3
120	0.3	7.7	9.5	14.3	15.2	5.0	9.1	11.1	15.0	7.3	9.8	10.6	12.7	8.2	9.1	10.6	12.8
	0.5	10.5	16.3	23.7	30.3	7.7	16.0	22.9	30.9	9.0	12.9	15.7	19.2	9.2	13.0	16.1	19.6
	0.7	15.0	24.6	32.5	40.2	11.6	23.9	33.3	41.1	12.1	19.5	21.7	25.5	12.4	18.8	21.1	25.7
	0.9	18.0	30.2	36.6	42.4	19.1	31.4	39.0	43.4	15.3	25.6	27.9	32.0	15.9	25.2	29.1	32.2
240	0.3	6.1	9.3	14.2	18.4	6.1	8.0	12.0	16.3	6.5	7.7	9.0	11.0	6.6	7.2	9.4	11.4
	0.5	9.3	18.1	24.6	29.1	7.1	17.2	22.6	31.3	7.9	11.6	14.2	18.0	8.6	12.3	14.5	17.3
	0.7	14.1	28.5	33.0	36.8	11.7	28.1	33.6	43.3	10.9	18.1	20.2	26.4	12.3	18.0	20.9	26.3
	0.9	19.9	33.7	36.0	38.8	19.4	36.0	40.1	45.3	18.0	26.6	26.5	35.1	17.8	26.9	27.0	33.6
360	0.3	7.0	10.3	11.8	17.2	5.3	9.2	13.6	16.8	6.2	8.5	7.2	9.6	6.4	8.2	7.0	10.5
	0.5	9.5	19.4	25.0	29.8	6.3	16.5	25.7	33.1	7.7	11.5	12.9	17.6	7.8	11.4	13.6	18.4
	0.7	13.9	27.7	35.1	37.1	10.9	27.1	36.4	43.5	10.0	17.8	23.2	26.9	10.9	18.8	22.9	27.5
	0.9	20.3	34.0	37.3	39.5	16.2	35.6	40.6	44.0	16.0	27.4	30.5	34.8	17.3	27.6	30.9	33.9
480	0.3	7.6	10.2	13.3	17.9	5.2	9.2	11.8	15.9	6.2	7.5	8.2	9.6	6.5	7.2	8.6	10.0
	0.5	10.2	18.1	25.6	30.3	7.2	17.2	24.0	33.4	7.0	10.6	15.4	17.3	8.1	11.1	15.2	17.1
	0.7	15.0	27.5	35.2	37.0	11.8	28.7	37.1	43.5	10.5	16.7	22.0	23.9	12.1	17.1	20.4	23.9
	0.9	22.7	34.1	37.7	40.2	19.5	37.4	41.0	46.3	18.2	25.7	29.9	30.1	18.8	25.5	28.0	30.2

Table 3 (continued). Size of the Franses-IPS test in the presence of cross section dependence (nominal 5% significance level). Model includes constant and trend

T	ω	F-IPS$_{t1}$				F-IPS$_{t2}$				F-IPS$_{F\{2,...,12\}}$				F-IPS$_{F\{3,...,12\}}$			
		N=5	15	25	40	N=5	15	25	40	N=5	15	25	40	N=5	15	25	40
48	0.3	6.9	9.1	12.5	15.8	7.2	9.4	12.3	15.2	10.4	10.7	12.7	14.5	8.6	11.4	14.5	14.5
	0.5	10.4	16.9	23.6	27.7	10.1	16.1	23.5	27.1	11.5	14.5	19.3	22.0	11.0	14.6	20.2	21.3
	0.7	15.0	25.4	32.3	34.3	13.8	25.6	33.4	38.9	14.9	19.5	25.7	25.3	14.2	19.9	25.9	25.9
	0.9	20.3	30.0	35.7	36.7	22.8	35.3	39.7	44.1	19.6	25.3	29.3	29.0	19.2	25.4	30.5	27.9
60	0.3	8.1	12.6	13.5	19.5	6.6	9.5	11.4	19.6	5.2	10.1	10.7	12.6	6.0	9.9	10.6	12.6
	0.5	10.2	19.7	24.4	30.1	7.9	17.9	21.7	30.8	7.7	13.7	17.4	21.2	8.0	14.5	16.7	20.5
	0.7	14.8	28.2	30.2	35.9	11.8	26.5	34.2	40.1	11.6	19.2	22.8	25.1	12.5	18.7	23.7	25.3
	0.9	19.7	31.7	34.2	35.9	19.0	35.5	42.0	44.1	15.2	23.4	28.9	30.5	15.8	22.9	29.1	30.4
96	0.3	5.2	9.6	15.6	16.6	5.4	7.1	10.8	16.4	7.4	10.2	9.6	13.4	7.9	10.7	9.5	13.3
	0.5	9.7	17.5	27.4	29.0	7.3	14.4	21.9	30.4	9.0	14.1	14.6	21.2	10.2	14.5	14.0	21.3
	0.7	15.4	26.5	37.1	36.0	10.5	25.7	35.3	40.0	11.5	19.6	21.7	27.8	12.9	19.5	22.3	27.4
	0.9	20.6	31.9	35.4	39.0	18.0	34.7	43.4	43.6	15.8	26.2	27.8	30.9	16.4	26.1	27.2	30.5
120	0.3	6.7	10.2	13.9	17.3	5.0	9.2	11.1	15.4	7.0	9.6	11.1	13.3	7.3	9.0	10.7	13.4
	0.5	9.1	18.3	24.4	30.0	7.5	15.8	22.7	31.1	9.2	12.6	15.8	19.9	8.9	13.0	15.9	19.4
	0.7	15.6	26.2	33.1	37.9	11.7	24.0	32.9	41.0	11.7	18.3	21.7	25.2	12.7	18.8	21.8	25.1
	0.9	21.4	30.9	35.7	39.8	19.0	31.6	39.1	43.8	15.7	25.7	28.5	31.9	15.8	25.0	28.7	32.2
240	0.3	6.5	11.7	13.5	20.8	6.1	8.0	12.0	16.5	6.5	7.7	9.4	11.4	6.6	7.1	9.4	11.1
	0.5	9.7	19.9	25.4	32.9	7.2	17.4	22.7	31.4	7.7	11.8	14.3	18.3	8.7	12.3	14.8	17.7
	0.7	15.5	26.4	33.1	38.1	11.8	28.4	33.6	43.1	10.7	18.3	20.0	25.9	12.6	18.4	21.3	26.6
	0.9	22.2	31.5	35.3	40.1	19.3	35.9	40.1	45.0	17.8	27.0	27.1	35.0	17.9	26.5	27.8	34.2
360	0.3	8.0	13.1	14.7	20.6	5.3	9.1	13.6	16.6	6.2	8.4	7.1	10.0	6.4	8.3	6.8	10.5
	0.5	11.4	21.7	25.9	32.6	6.3	16.4	25.5	33.0	7.8	11.3	13.0	17.9	7.6	11.7	13.4	18.5
	0.7	15.6	29.2	32.5	39.1	11.0	27.1	36.5	43.3	10.1	17.9	23.1	26.7	10.8	18.6	22.8	27.8
	0.9	21.4	33.0	35.8	40.0	16.3	35.6	40.6	44.0	15.8	27.5	30.3	35.1	17.1	27.6	30.8	34.0
480	0.3	6.5	13.5	14.5	18.0	5.1	9.1	11.8	15.8	6.1	7.4	8.6	10.0	6.5	7.3	8.8	10.3
	0.5	10.0	22.8	28.1	31.7	7.3	17.4	24.1	33.3	7.1	10.7	15.2	17.6	8.1	11.0	15.0	17.1
	0.7	16.3	31.3	35.8	37.3	11.7	28.6	37.2	43.6	11.1	16.8	22.1	23.9	12.0	16.9	20.6	23.9
	0.9	23.4	34.5	39.3	38.0	19.6	37.3	41.0	46.3	18.0	25.7	30.1	30.2	19.2	25.5	28.1	30.5

Table 4. Critical values of the cross-sectionally augmented F-IPS test

N	Level	CF-IPS$_{t1}$							CF-IPS$_{t2}$						
		T=48	60	96	120	240	360	480	T=48	60	96	120	240	360	480
Model: c															
5	1%	-2.21	-2.31	-2.49	-2.56	-2.69	-2.72	-2.76	-1.69	-1.78	-1.93	-2.01	-2.11	-2.13	-2.14
	5%	-1.91	-2.04	-2.20	-2.28	-2.41	-2.44	-2.46	-1.40	-1.49	-1.63	-1.70	-1.80	-1.81	-1.84
	10%	-1.76	-1.88	-2.06	-2.12	-2.25	-2.30	-2.30	-1.24	-1.33	-1.48	-1.53	-1.62	-1.65	-1.67
15	1%	-1.80	-1.92	-2.09	-2.17	-2.30	-2.35	-2.35	-1.32	-1.41	-1.57	-1.61	-1.73	-1.77	-1.78
	5%	-1.63	-1.75	-1.93	-2.00	-2.12	-2.17	-2.19	-1.15	-1.24	-1.39	-1.43	-1.54	-1.58	-1.60
	10%	-1.55	-1.66	-1.85	-1.91	-2.03	-2.08	-2.09	-1.05	-1.14	-1.29	-1.33	-1.43	-1.46	-1.48
25	1%	-1.70	-1.81	-2.00	-2.07	-2.20	-2.24	-2.26	-1.22	-1.31	-1.47	-1.53	-1.64	-1.68	-1.69
	5%	-1.56	-1.68	-1.87	-1.93	-2.05	-2.10	-2.12	-1.09	-1.18	-1.33	-1.38	-1.49	-1.53	-1.54
	10%	-1.48	-1.60	-1.79	-1.85	-1.98	-2.02	-2.04	-1.01	-1.10	-1.25	-1.30	-1.39	-1.43	-1.44
40	1%	-1.64	-1.75	-1.94	-2.00	-2.13	-2.17	-2.19	-1.16	-1.26	-1.42	-1.47	-1.58	-1.62	-1.63
	5%	-1.52	-1.64	-1.82	-1.89	-2.02	-2.06	-2.08	-1.04	-1.14	-1.29	-1.34	-1.45	-1.48	-1.50
	10%	-1.45	-1.57	-1.76	-1.82	-1.95	-1.99	-2.01	-0.98	-1.07	-1.22	-1.27	-1.37	-1.40	-1.41
Model: c,t															
5	1%	-2.67	-2.73	-2.91	-3.00	-3.16	-3.19	-3.22	-1.67	-1.77	-1.93	-2.00	-2.11	-2.13	-2.14
	5%	-2.33	-2.44	-2.64	-2.72	-2.89	-2.92	-2.95	-1.38	-1.48	-1.63	-1.69	-1.80	-1.81	-1.84
	10%	-2.16	-2.29	-2.49	-2.58	-2.74	-2.78	-2.80	-1.22	-1.33	-1.47	-1.53	-1.62	-1.65	-1.66
15	1%	-2.22	-2.32	-2.52	-2.61	-2.76	-2.80	-2.82	-1.31	-1.41	-1.56	-1.61	-1.73	-1.77	-1.78
	5%	-2.04	-2.16	-2.37	-2.45	-2.60	-2.65	-2.67	-1.13	-1.23	-1.39	-1.43	-1.54	-1.58	-1.60
	10%	-1.94	-2.07	-2.29	-2.37	-2.52	-2.57	-2.60	-1.04	-1.14	-1.29	-1.33	-1.43	-1.46	-1.48
25	1%	-2.11	-2.23	-2.42	-2.50	-2.65	-2.70	-2.73	-1.21	-1.31	-1.46	-1.53	-1.64	-1.69	-1.70
	5%	-1.96	-2.09	-2.30	-2.38	-2.53	-2.58	-2.60	-1.07	-1.18	-1.33	-1.38	-1.49	-1.53	-1.54
	10%	-1.88	-2.02	-2.23	-2.31	-2.46	-2.51	-2.54	-0.99	-1.10	-1.25	-1.30	-1.39	-1.43	-1.44
40	1%	-2.03	-2.16	-2.37	-2.44	-2.59	-2.64	-2.66	-1.15	-1.25	-1.42	-1.46	-1.58	-1.62	-1.63
	5%	-1.92	-2.05	-2.26	-2.33	-2.48	-2.54	-2.56	-1.03	-1.14	-1.29	-1.34	-1.45	-1.48	-1.50
	10%	-1.85	-1.98	-2.20	-2.27	-2.42	-2.48	-2.50	-0.97	-1.07	-1.22	-1.27	-1.37	-1.40	-1.41
Model: c, s															
5	1%	-2.02	-2.18	-2.41	-2.50	-2.66	-2.70	-2.74	-2.03	-2.17	-2.40	-2.52	-2.65	-2.71	-2.75
	5%	-1.70	-1.89	-2.13	-2.22	-2.38	-2.42	-2.45	-1.71	-1.88	-2.12	-2.22	-2.37	-2.42	-2.45
	10%	-1.53	-1.73	-1.98	-2.07	-2.22	-2.27	-2.29	-1.54	-1.72	-1.98	-2.07	-2.22	-2.27	-2.29
15	1%	-1.62	-1.78	-2.03	-2.12	-2.27	-2.33	-2.34	-1.61	-1.79	-2.04	-2.13	-2.28	-2.31	-2.34
	5%	-1.43	-1.61	-1.87	-1.95	-2.10	-2.15	-2.17	-1.43	-1.62	-1.87	-1.95	-2.10	-2.15	-2.17
	10%	-1.34	-1.53	-1.79	-1.86	-2.01	-2.06	-2.08	-1.33	-1.53	-1.79	-1.86	-2.01	-2.06	-2.08
25	1%	-1.51	-1.69	-1.95	-2.02	-2.18	-2.22	-2.25	-1.51	-1.70	-1.95	-2.02	-2.17	-2.22	-2.25
	5%	-1.36	-1.55	-1.81	-1.88	-2.03	-2.08	-2.11	-1.36	-1.56	-1.81	-1.89	-2.04	-2.08	-2.11
	10%	-1.28	-1.48	-1.73	-1.81	-1.96	-2.01	-2.03	-1.28	-1.48	-1.74	-1.81	-1.96	-2.01	-2.03
40	1%	-1.45	-1.64	-1.88	-1.96	-2.10	-2.15	-2.18	-1.44	-1.63	-1.89	-1.95	-2.11	-2.15	-2.18
	5%	-1.31	-1.52	-1.77	-1.85	-2.00	-2.04	-2.07	-1.31	-1.51	-1.78	-1.85	-1.99	-2.04	-2.06
	10%	-1.24	-1.45	-1.70	-1.78	-1.93	-1.98	-2.00	-1.24	-1.45	-1.71	-1.78	-1.93	-1.97	-1.99
Model: c,s,t															
5	1%	-2.46	-2.58	-2.81	-2.94	-3.13	-3.16	-3.20	-1.99	-2.16	-2.39	-2.51	-2.65	-2.71	-2.75
	5%	-2.07	-2.27	-2.55	-2.66	-2.86	-2.89	-2.93	-1.67	-1.87	-2.12	-2.22	-2.37	-2.42	-2.45
	10%	-1.88	-2.11	-2.41	-2.51	-2.71	-2.76	-2.79	-1.50	-1.71	-1.98	-2.07	-2.22	-2.27	-2.29
15	1%	-1.98	-2.18	-2.46	-2.55	-2.73	-2.78	-2.80	-1.59	-1.78	-2.04	-2.12	-2.28	-2.31	-2.34
	5%	-1.78	-1.99	-2.30	-2.40	-2.57	-2.63	-2.66	-1.40	-1.61	-1.87	-1.95	-2.10	-2.15	-2.17
	10%	-1.67	-1.90	-2.21	-2.32	-2.49	-2.55	-2.58	-1.30	-1.52	-1.78	-1.86	-2.02	-2.06	-2.08
25	1%	-1.86	-2.08	-2.36	-2.45	-2.62	-2.68	-2.71	-1.48	-1.69	-1.95	-2.01	-2.17	-2.23	-2.25
	5%	-1.69	-1.93	-2.23	-2.32	-2.50	-2.56	-2.59	-1.33	-1.55	-1.81	-1.89	-2.04	-2.09	-2.11
	10%	-1.59	-1.85	-2.16	-2.26	-2.43	-2.49	-2.52	-1.25	-1.47	-1.74	-1.81	-1.96	-2.01	-2.03
40	1%	-1.80	-2.02	-2.30	-2.39	-2.56	-2.62	-2.65	-1.42	-1.62	-1.89	-1.96	-2.11	-2.15	-2.18
	5%	-1.64	-1.88	-2.19	-2.28	-2.45	-2.52	-2.54	-1.28	-1.50	-1.78	-1.85	-1.99	-2.04	-2.06
	10%	-1.57	-1.82	-2.13	-2.22	-2.40	-2.46	-2.49	-1.21	-1.44	-1.71	-1.78	-1.93	-1.98	-2.00

Table 4 (continued). Critical values of the cross-sectionally augmented F-IPS test

		$\text{CF-IPS}_{F\{3,4\}}$							$\text{CF-IPS}_{F\{5,6\}}$						
N	Level	T=48	60	96	120	240	360	480	T=48	60	96	120	240	360	480
Model: c															
5	1%	3.22	3.37	3.71	3.85	4.18	4.36	4.38	3.26	3.37	3.73	3.83	4.17	4.27	4.34
	5%	2.49	2.66	2.97	3.11	3.37	3.49	3.52	2.53	2.67	2.97	3.08	3.38	3.46	3.53
	10%	2.15	2.33	2.61	2.72	2.97	3.06	3.10	2.17	2.31	2.61	2.71	2.98	3.06	3.10
15	1%	2.44	2.55	2.87	3.00	3.32	3.41	3.50	2.38	2.55	2.87	3.01	3.31	3.38	3.50
	5%	2.03	2.18	2.49	2.60	2.87	2.96	3.00	2.01	2.19	2.49	2.61	2.87	2.94	3.01
	10%	1.85	2.00	2.28	2.39	2.63	2.71	2.75	1.83	2.00	2.28	2.40	2.63	2.71	2.77
25	1%	2.19	2.36	2.69	2.81	3.12	3.20	3.27	2.17	2.35	2.67	2.80	3.08	3.20	3.28
	5%	1.91	2.06	2.37	2.49	2.73	2.83	2.89	1.90	2.06	2.36	2.49	2.73	2.84	2.90
	10%	1.76	1.92	2.21	2.31	2.54	2.63	2.67	1.76	1.91	2.19	2.31	2.55	2.64	2.69
40	1%	2.08	2.23	2.55	2.65	2.95	3.09	3.13	2.04	2.23	2.56	2.68	2.97	3.06	3.14
	5%	1.84	1.99	2.30	2.41	2.65	2.76	2.81	1.82	1.99	2.29	2.40	2.67	2.76	2.82
	10%	1.72	1.87	2.15	2.25	2.49	2.58	2.63	1.70	1.86	2.15	2.26	2.50	2.59	2.64
Model: c,t															
5	1%	3.17	3.32	3.68	3.82	4.15	4.34	4.37	3.14	3.28	3.68	3.82	4.17	4.25	4.34
	5%	2.43	2.62	2.93	3.08	3.35	3.49	3.51	2.43	2.61	2.94	3.06	3.36	3.45	3.53
	10%	2.10	2.28	2.57	2.70	2.96	3.05	3.09	2.08	2.26	2.58	2.69	2.97	3.06	3.09
15	1%	2.38	2.49	2.83	2.98	3.31	3.41	3.50	2.30	2.50	2.84	2.99	3.30	3.38	3.50
	5%	1.99	2.14	2.46	2.58	2.86	2.96	3.00	1.94	2.13	2.46	2.59	2.86	2.93	3.01
	10%	1.80	1.96	2.26	2.37	2.63	2.71	2.75	1.77	1.95	2.25	2.38	2.63	2.70	2.76
25	1%	2.13	2.31	2.66	2.79	3.12	3.20	3.26	2.09	2.29	2.64	2.78	3.07	3.19	3.28
	5%	1.86	2.03	2.34	2.47	2.72	2.82	2.88	1.84	2.01	2.33	2.47	2.72	2.84	2.90
	10%	1.72	1.88	2.18	2.30	2.53	2.62	2.67	1.70	1.87	2.17	2.29	2.54	2.64	2.69
40	1%	2.03	2.19	2.53	2.63	2.95	3.08	3.13	1.97	2.18	2.53	2.66	2.96	3.06	3.14
	5%	1.79	1.95	2.27	2.39	2.65	2.75	2.81	1.75	1.94	2.27	2.38	2.66	2.76	2.82
	10%	1.68	1.83	2.13	2.24	2.48	2.58	2.62	1.65	1.82	2.12	2.24	2.49	2.59	2.64
Model: c, s															
5	1%	4.61	4.78	5.48	5.64	6.33	6.64	6.76	4.56	4.70	5.42	5.75	6.43	6.61	6.70
	5%	3.45	3.80	4.56	4.77	5.42	5.65	5.75	3.39	3.79	4.55	4.80	5.47	5.65	5.78
	10%	2.94	3.35	4.12	4.35	4.96	5.16	5.29	2.91	3.35	4.11	4.38	4.99	5.16	5.29
15	1%	3.40	3.63	4.35	4.61	5.23	5.46	5.55	3.32	3.57	4.34	4.63	5.18	5.43	5.54
	5%	2.81	3.15	3.87	4.13	4.71	4.90	5.00	2.75	3.12	3.86	4.14	4.70	4.90	4.99
	10%	2.54	2.89	3.63	3.87	4.42	4.62	4.71	2.50	2.89	3.61	3.89	4.43	4.61	4.70
25	1%	3.12	3.36	4.10	4.37	4.95	5.17	5.26	3.00	3.34	4.11	4.36	4.94	5.13	5.26
	5%	2.64	2.98	3.70	3.98	4.53	4.72	4.81	2.58	2.97	3.72	3.97	4.53	4.71	4.82
	10%	2.42	2.78	3.51	3.78	4.29	4.49	4.57	2.38	2.79	3.50	3.76	4.30	4.48	4.59
40	1%	2.84	3.17	3.94	4.22	4.77	4.97	5.07	2.83	3.18	3.93	4.20	4.79	4.97	5.08
	5%	2.51	2.86	3.62	3.87	4.41	4.61	4.70	2.47	2.87	3.61	3.88	4.44	4.61	4.72
	10%	2.33	2.71	3.44	3.69	4.22	4.40	4.49	2.30	2.71	3.44	3.70	4.23	4.40	4.51
Model: c,s,t															
5	1%	4.67	4.71	5.44	5.62	6.34	6.64	6.75	4.42	4.62	5.38	5.72	6.40	6.61	6.69
	5%	3.39	3.73	4.53	4.76	5.41	5.64	5.76	3.25	3.70	4.51	4.78	5.46	5.64	5.78
	10%	2.89	3.28	4.09	4.34	4.96	5.15	5.28	2.79	3.27	4.07	4.36	4.98	5.15	5.29
15	1%	3.39	3.57	4.33	4.60	5.23	5.46	5.54	3.23	3.50	4.31	4.60	5.18	5.42	5.53
	5%	2.76	3.08	3.85	4.11	4.70	4.89	4.99	2.66	3.05	3.84	4.12	4.70	4.90	4.99
	10%	2.48	2.84	3.60	3.86	4.41	4.61	4.71	2.39	2.82	3.58	3.88	4.43	4.61	4.70
25	1%	3.07	3.29	4.09	4.35	4.94	5.17	5.25	2.92	3.28	4.08	4.35	4.95	5.13	5.26
	5%	2.58	2.93	3.68	3.97	4.53	4.72	4.81	2.47	2.90	3.69	3.96	4.52	4.70	4.81
	10%	2.36	2.73	3.49	3.76	4.29	4.48	4.57	2.27	2.72	3.48	3.74	4.29	4.48	4.59
40	1%	2.78	3.14	3.92	4.21	4.77	4.97	5.07	2.73	3.12	3.90	4.18	4.79	4.96	5.08
	5%	2.45	2.81	3.59	3.86	4.41	4.60	4.69	2.38	2.81	3.58	3.86	4.43	4.61	4.72
	10%	2.28	2.66	3.42	3.68	4.22	4.40	4.49	2.21	2.65	3.42	3.69	4.23	4.40	4.52

Table 4 (continued). Critical values of the cross-sectionally augmented F-IPS test

		CF-IPS$_{F\{7,8\}}$							CF-IPS$_{F\{9,10\}}$						
N	Level	T=48	60	96	120	240	360	480	T=48	60	96	120	240	360	480
Model: c															
5	1%	3.56	3.57	3.77	3.92	4.22	4.30	4.32	3.23	3.35	3.72	3.86	4.19	4.35	4.31
	5%	2.69	2.79	3.01	3.14	3.38	3.46	3.51	2.50	2.65	2.95	3.10	3.36	3.45	3.53
	10%	2.32	2.42	2.63	2.76	2.98	3.06	3.11	2.15	2.30	2.60	2.73	2.97	3.06	3.12
15	1%	2.59	2.66	2.92	3.04	3.32	3.41	3.47	2.39	2.55	2.89	3.00	3.28	3.43	3.45
	5%	2.16	2.26	2.52	2.62	2.85	2.94	3.00	2.02	2.18	2.49	2.60	2.86	2.96	3.00
	10%	1.98	2.07	2.32	2.41	2.62	2.71	2.75	1.84	1.99	2.28	2.39	2.63	2.71	2.75
25	1%	2.34	2.45	2.71	2.85	3.09	3.20	3.28	2.18	2.33	2.68	2.80	3.12	3.20	3.26
	5%	2.04	2.14	2.40	2.50	2.74	2.82	2.89	1.90	2.07	2.37	2.47	2.73	2.84	2.88
	10%	1.89	1.99	2.22	2.32	2.54	2.63	2.68	1.76	1.92	2.21	2.30	2.54	2.63	2.68
40	1%	2.17	2.31	2.58	2.69	2.96	3.08	3.14	2.03	2.22	2.54	2.68	2.97	3.07	3.14
	5%	1.94	2.06	2.31	2.42	2.67	2.76	2.81	1.82	1.99	2.28	2.40	2.68	2.76	2.82
	10%	1.82	1.93	2.17	2.27	2.50	2.58	2.62	1.71	1.87	2.15	2.25	2.50	2.59	2.63
Model: c,t															
5	1%	3.80	3.69	3.82	3.93	4.22	4.29	4.34	3.11	3.29	3.71	3.82	4.18	4.34	4.31
	5%	2.88	2.88	3.02	3.15	3.39	3.45	3.51	2.41	2.58	2.92	3.08	3.34	3.44	3.53
	10%	2.46	2.49	2.66	2.76	2.98	3.06	3.10	2.07	2.25	2.57	2.70	2.96	3.06	3.12
15	1%	2.76	2.73	2.96	3.04	3.31	3.40	3.47	2.32	2.50	2.86	2.97	3.28	3.43	3.45
	5%	2.31	2.33	2.53	2.62	2.86	2.94	3.00	1.96	2.13	2.47	2.58	2.86	2.95	3.00
	10%	2.09	2.13	2.32	2.41	2.61	2.71	2.75	1.78	1.95	2.26	2.37	2.62	2.71	2.75
25	1%	2.46	2.51	2.72	2.84	3.09	3.19	3.27	2.12	2.28	2.64	2.79	3.11	3.19	3.25
	5%	2.14	2.19	2.40	2.51	2.74	2.82	2.89	1.84	2.02	2.35	2.46	2.73	2.83	2.88
	10%	1.99	2.03	2.23	2.33	2.54	2.63	2.68	1.70	1.87	2.18	2.28	2.53	2.63	2.68
40	1%	2.29	2.35	2.58	2.70	2.96	3.08	3.13	1.97	2.17	2.51	2.66	2.96	3.07	3.14
	5%	2.04	2.10	2.32	2.42	2.67	2.75	2.81	1.76	1.94	2.26	2.39	2.67	2.76	2.82
	10%	1.91	1.98	2.17	2.27	2.50	2.58	2.62	1.65	1.82	2.12	2.24	2.49	2.59	2.63
Model: c, s															
5	1%	4.49	4.67	5.47	5.69	6.41	6.71	6.81	4.71	4.80	5.47	5.72	6.49	6.62	6.81
	5%	3.40	3.76	4.55	4.80	5.51	5.65	5.77	3.45	3.82	4.53	4.85	5.46	5.64	5.79
	10%	2.93	3.32	4.11	4.39	5.00	5.15	5.27	2.94	3.35	4.10	4.39	4.98	5.17	5.25
15	1%	3.33	3.56	4.34	4.62	5.26	5.47	5.55	3.35	3.64	4.36	4.61	5.24	5.41	5.54
	5%	2.76	3.11	3.88	4.13	4.73	4.89	4.99	2.78	3.13	3.88	4.14	4.71	4.90	5.00
	10%	2.50	2.88	3.63	3.90	4.43	4.61	4.71	2.52	2.89	3.64	3.88	4.43	4.62	4.71
25	1%	3.01	3.34	4.08	4.37	4.94	5.17	5.26	3.01	3.38	4.10	4.36	4.97	5.19	5.24
	5%	2.59	2.98	3.72	3.98	4.52	4.72	4.82	2.61	2.99	3.71	3.98	4.53	4.73	4.81
	10%	2.39	2.79	3.51	3.78	4.31	4.49	4.58	2.41	2.81	3.50	3.77	4.31	4.48	4.58
40	1%	2.81	3.17	3.94	4.19	4.78	4.95	5.05	2.87	3.22	3.95	4.24	4.78	4.97	5.09
	5%	2.47	2.87	3.61	3.87	4.42	4.60	4.69	2.51	2.89	3.60	3.89	4.42	4.60	4.71
	10%	2.30	2.71	3.43	3.69	4.23	4.40	4.49	2.33	2.72	3.44	3.71	4.22	4.40	4.50
Model: c,s,t															
5	1%	4.97	4.81	5.50	5.73	6.38	6.71	6.78	4.60	4.68	5.42	5.68	6.48	6.62	6.80
	5%	3.61	3.84	4.56	4.80	5.49	5.65	5.78	3.31	3.74	4.49	4.82	5.44	5.63	5.78
	10%	3.10	3.39	4.11	4.39	5.00	5.14	5.26	2.84	3.29	4.07	4.37	4.97	5.16	5.25
15	1%	3.61	3.67	4.35	4.61	5.25	5.46	5.54	3.29	3.54	4.32	4.59	5.23	5.41	5.54
	5%	2.94	3.18	3.88	4.13	4.71	4.88	4.99	2.69	3.06	3.85	4.12	4.70	4.90	5.00
	10%	2.65	2.92	3.64	3.89	4.43	4.61	4.71	2.43	2.83	3.61	3.86	4.42	4.61	4.70
25	1%	3.23	3.42	4.07	4.37	4.94	5.16	5.26	2.94	3.30	4.07	4.34	4.96	5.18	5.24
	5%	2.74	3.02	3.72	3.98	4.52	4.72	4.81	2.53	2.92	3.68	3.97	4.53	4.72	4.81
	10%	2.52	2.83	3.52	3.77	4.30	4.48	4.57	2.32	2.74	3.48	3.75	4.30	4.48	4.57
40	1%	2.98	3.23	3.94	4.19	4.78	4.95	5.04	2.79	3.15	3.93	4.22	4.78	4.97	5.09
	5%	2.59	2.90	3.61	3.87	4.42	4.59	4.69	2.41	2.82	3.58	3.87	4.42	4.60	4.70
	10%	2.41	2.74	3.44	3.69	4.23	4.40	4.49	2.24	2.67	3.42	3.69	4.22	4.40	4.50

Table 4 (continued). Critical values of the cross-sectionally augmented F-IPS test

		$\text{CF-IPS}_{F\{11,12\}}$							$\text{CF-IPS}_{F\{2,\ldots,12\}}$						
N	Level	T=48	60	96	120	240	360	480	T=48	60	96	120	240	360	480
Model: c															
5	1%	3.26	3.44	3.71	3.83	4.21	4.32	4.33	2.74	2.72	2.77	2.80	2.92	2.93	2.97
	5%	2.53	2.69	2.97	3.09	3.39	3.48	3.52	2.32	2.34	2.43	2.47	2.58	2.60	2.63
	10%	2.18	2.35	2.61	2.72	2.98	3.06	3.11	2.11	2.16	2.26	2.31	2.41	2.45	2.47
15	1%	2.41	2.58	2.90	3.00	3.31	3.43	3.48	2.26	2.30	2.41	2.46	2.56	2.59	2.62
	5%	2.05	2.20	2.49	2.59	2.84	2.96	3.01	2.03	2.08	2.21	2.25	2.37	2.40	2.43
	10%	1.87	2.02	2.29	2.39	2.62	2.72	2.77	1.92	1.98	2.10	2.15	2.26	2.30	2.32
25	1%	2.25	2.36	2.67	2.82	3.07	3.20	3.27	2.14	2.20	2.32	2.38	2.49	2.54	2.55
	5%	1.95	2.08	2.36	2.49	2.74	2.83	2.89	1.97	2.02	2.15	2.20	2.31	2.35	2.37
	10%	1.79	1.92	2.21	2.31	2.54	2.63	2.68	1.87	1.93	2.06	2.11	2.21	2.26	2.28
40	1%	2.09	2.24	2.54	2.69	2.94	3.07	3.13	2.07	2.13	2.26	2.32	2.44	2.48	2.51
	5%	1.86	2.01	2.29	2.41	2.66	2.76	2.81	1.92	1.98	2.11	2.17	2.29	2.32	2.35
	10%	1.74	1.88	2.15	2.26	2.49	2.58	2.63	1.84	1.91	2.03	2.08	2.20	2.24	2.26
Model: c,t															
5	1%	3.28	3.41	3.69	3.81	4.21	4.31	4.31	2.75	2.71	2.76	2.79	2.91	2.92	2.96
	5%	2.52	2.67	2.95	3.07	3.38	3.47	3.52	2.32	2.32	2.42	2.46	2.57	2.60	2.63
	10%	2.18	2.32	2.59	2.71	2.97	3.05	3.10	2.11	2.14	2.25	2.30	2.41	2.44	2.47
15	1%	2.41	2.56	2.88	2.99	3.31	3.43	3.48	2.25	2.27	2.39	2.45	2.56	2.59	2.62
	5%	2.03	2.17	2.48	2.58	2.84	2.95	3.01	2.03	2.06	2.20	2.24	2.36	2.39	2.42
	10%	1.86	1.99	2.27	2.37	2.61	2.72	2.76	1.91	1.96	2.08	2.14	2.26	2.29	2.32
25	1%	2.24	2.33	2.66	2.80	3.06	3.20	3.26	2.14	2.18	2.30	2.37	2.48	2.53	2.55
	5%	1.94	2.05	2.35	2.48	2.73	2.83	2.89	1.96	2.00	2.13	2.19	2.30	2.35	2.37
	10%	1.78	1.91	2.19	2.30	2.53	2.62	2.68	1.86	1.91	2.05	2.10	2.21	2.25	2.28
40	1%	2.08	2.22	2.52	2.67	2.94	3.06	3.13	2.07	2.11	2.25	2.31	2.43	2.48	2.51
	5%	1.85	1.98	2.27	2.39	2.65	2.75	2.81	1.91	1.96	2.10	2.16	2.28	2.32	2.35
	10%	1.73	1.85	2.13	2.24	2.48	2.58	2.63	1.83	1.88	2.01	2.07	2.19	2.24	2.26
Model: c, s															
5	1%	4.66	4.71	5.44	5.75	6.41	6.60	6.71	4.99	4.62	4.78	4.86	5.07	5.13	5.14
	5%	3.45	3.80	4.56	4.85	5.50	5.64	5.73	4.04	3.97	4.27	4.38	4.64	4.71	4.75
	10%	2.95	3.36	4.12	4.38	4.99	5.15	5.24	3.59	3.67	4.02	4.14	4.43	4.50	4.54
15	1%	3.36	3.58	4.37	4.64	5.23	5.40	5.53	3.95	3.88	4.14	4.30	4.55	4.61	4.64
	5%	2.80	3.12	3.88	4.13	4.72	4.89	4.99	3.45	3.50	3.87	4.01	4.29	4.37	4.41
	10%	2.54	2.89	3.63	3.88	4.43	4.60	4.71	3.21	3.32	3.73	3.87	4.16	4.24	4.28
25	1%	3.07	3.35	4.11	4.34	4.92	5.13	5.24	3.66	3.68	4.02	4.14	4.40	4.50	4.53
	5%	2.61	2.98	3.71	3.97	4.53	4.71	4.80	3.28	3.39	3.77	3.92	4.20	4.29	4.33
	10%	2.41	2.78	3.51	3.77	4.30	4.48	4.58	3.09	3.25	3.65	3.81	4.09	4.19	4.24
40	1%	2.85	3.18	3.93	4.21	4.77	4.96	5.07	3.51	3.54	3.93	4.07	4.35	4.42	4.47
	5%	2.51	2.87	3.62	3.87	4.43	4.60	4.71	3.19	3.31	3.72	3.87	4.15	4.24	4.28
	10%	2.34	2.71	3.44	3.69	4.23	4.40	4.50	3.04	3.19	3.62	3.76	4.05	4.14	4.20
Model: c,s,t															
5	1%	4.80	4.67	5.42	5.72	6.40	6.59	6.72	5.11	4.59	4.76	4.83	5.06	5.13	5.14
	5%	3.50	3.76	4.54	4.84	5.49	5.63	5.74	4.06	3.95	4.25	4.36	4.63	4.71	4.75
	10%	2.95	3.31	4.08	4.37	4.98	5.15	5.24	3.61	3.63	4.00	4.12	4.42	4.50	4.54
15	1%	3.41	3.57	4.34	4.61	5.23	5.40	5.54	4.00	3.83	4.13	4.27	4.54	4.61	4.64
	5%	2.81	3.09	3.86	4.11	4.71	4.88	4.99	3.47	3.47	3.85	4.00	4.29	4.37	4.41
	10%	2.54	2.86	3.61	3.87	4.43	4.59	4.71	3.21	3.29	3.71	3.85	4.15	4.24	4.28
25	1%	3.08	3.32	4.08	4.33	4.92	5.13	5.23	3.69	3.65	3.99	4.13	4.39	4.49	4.53
	5%	2.62	2.95	3.68	3.96	4.52	4.70	4.80	3.27	3.35	3.75	3.91	4.20	4.29	4.33
	10%	2.41	2.76	3.49	3.75	4.30	4.48	4.58	3.09	3.22	3.64	3.80	4.09	4.18	4.23
40	1%	2.86	3.15	3.91	4.20	4.77	4.95	5.07	3.50	3.50	3.91	4.06	4.34	4.42	4.47
	5%	2.51	2.84	3.60	3.86	4.42	4.59	4.71	3.19	3.28	3.70	3.86	4.15	4.24	4.28
	10%	2.33	2.68	3.42	3.68	4.23	4.40	4.50	3.03	3.16	3.59	3.75	4.05	4.14	4.19

Table 4 (continued). Critical values of the cross-sectionally augmented F-IPS test

		CF-IPS$_{F\{3,\ldots,12\}}$						
N	Level	T=48	60	96	120	240	360	480
Model: c								
5	1%	2.74	2.75	2.79	2.81	2.95	2.99	3.00
	5%	2.31	2.34	2.44	2.50	2.60	2.64	2.66
	10%	2.11	2.15	2.27	2.32	2.42	2.47	2.49
15	1%	2.25	2.29	2.42	2.47	2.59	2.62	2.66
	5%	2.02	2.08	2.21	2.26	2.38	2.41	2.45
	10%	1.91	1.97	2.10	2.15	2.27	2.31	2.34
25	1%	2.14	2.19	2.33	2.39	2.51	2.56	2.59
	5%	1.96	2.01	2.15	2.21	2.32	2.37	2.40
	10%	1.86	1.92	2.06	2.12	2.22	2.27	2.29
40	1%	2.07	2.13	2.26	2.33	2.46	2.51	2.54
	5%	1.90	1.98	2.11	2.17	2.30	2.34	2.37
	10%	1.83	1.90	2.03	2.08	2.21	2.25	2.28
Model: c,t								
5	1%	2.74	2.73	2.78	2.80	2.95	2.97	2.99
	5%	2.32	2.32	2.42	2.48	2.59	2.64	2.66
	10%	2.11	2.14	2.25	2.31	2.42	2.46	2.49
15	1%	2.25	2.28	2.40	2.45	2.59	2.61	2.65
	5%	2.02	2.06	2.20	2.25	2.38	2.41	2.45
	10%	1.90	1.95	2.09	2.14	2.26	2.30	2.33
25	1%	2.13	2.17	2.31	2.38	2.50	2.56	2.58
	5%	1.95	2.00	2.14	2.20	2.32	2.36	2.39
	10%	1.85	1.90	2.04	2.10	2.22	2.27	2.29
40	1%	2.06	2.12	2.25	2.32	2.45	2.50	2.54
	5%	1.90	1.96	2.10	2.16	2.29	2.33	2.36
	10%	1.82	1.88	2.01	2.07	2.20	2.25	2.27
Model: c, s								
5	1%	4.90	4.58	4.76	4.85	5.11	5.16	5.21
	5%	3.93	3.92	4.26	4.37	4.65	4.74	4.79
	10%	3.51	3.61	4.00	4.12	4.44	4.53	4.56
15	1%	3.88	3.83	4.13	4.29	4.57	4.64	4.67
	5%	3.37	3.46	3.85	4.00	4.30	4.39	4.43
	10%	3.14	3.27	3.71	3.85	4.16	4.26	4.30
25	1%	3.58	3.64	4.00	4.14	4.42	4.52	4.55
	5%	3.20	3.35	3.76	3.91	4.21	4.30	4.35
	10%	3.02	3.20	3.63	3.79	4.09	4.19	4.25
40	1%	3.44	3.49	3.91	4.06	4.36	4.44	4.49
	5%	3.12	3.26	3.70	3.85	4.16	4.25	4.30
	10%	2.96	3.14	3.59	3.74	4.05	4.15	4.21
Model: c,s,t								
5	1%	5.01	4.56	4.74	4.82	5.10	5.16	5.21
	5%	3.96	3.89	4.24	4.35	4.65	4.74	4.78
	10%	3.52	3.58	3.98	4.10	4.43	4.52	4.56
15	1%	3.92	3.79	4.11	4.27	4.56	4.64	4.67
	5%	3.39	3.42	3.82	3.98	4.30	4.38	4.43
	10%	3.14	3.24	3.68	3.84	4.16	4.25	4.30
25	1%	3.61	3.61	3.97	4.12	4.41	4.52	4.55
	5%	3.21	3.31	3.74	3.89	4.20	4.30	4.35
	10%	3.02	3.16	3.61	3.78	4.09	4.19	4.24
40	1%	3.43	3.46	3.88	4.05	4.36	4.43	4.49
	5%	3.12	3.23	3.68	3.84	4.15	4.24	4.30
	10%	2.95	3.11	3.57	3.73	4.05	4.14	4.20

Table 5. Size and power of the CF-IPS and BF-IPS tests (nominal 5% significance level). Model includes constant

		CF-IPS$_{t1}$				BF-IPS$_{t1}$				CF-IPS$_{t2}$				BF-IPS$_{t2}$			
T	ω	N=5	15	25	40	5	15	25	40	5	15	25	40	5	15	25	40
Size																	
48	0.3	5.7	5.1	4.3	5.0	5.6	4.8	4.9	3.3	3.8	5.6	4.9	5.6	5.3	4.9	5.7	5.0
	0.5	5.5	4.9	4.5	5.1	5.9	4.7	5.5	3.6	4.8	5.8	4.5	5.8	5.1	5.8	5.6	5.3
	0.7	5.4	3.9	4.2	4.8	6.7	4.6	5.1	3.6	4.8	5.5	5.0	5.2	6.0	6.1	5.7	5.3
	0.9	5.9	3.9	4.6	5.7	6.5	5.8	5.4	4.5	4.8	4.6	4.9	5.7	5.5	7.1	7.0	5.5
60	0.3	5.9	5.0	4.4	5.0	6.0	5.2	5.6	6.6	4.0	4.3	6.0	5.1	5.2	5.5	4.9	5.1
	0.5	6.2	4.2	5.9	4.9	4.9	5.6	4.7	5.3	3.7	5.2	5.5	5.4	5.6	5.8	5.4	5.6
	0.7	5.6	4.6	5.8	5.0	5.1	4.9	4.2	5.5	3.6	5.3	4.8	4.8	6.5	6.0	5.1	6.0
	0.9	5.6	5.2	5.9	4.3	5.9	5.2	5.2	5.5	3.6	5.1	4.4	4.9	6.3	6.0	6.0	5.4
96	0.3	5.4	4.7	5.0	4.3	4.6	6.5	5.0	5.5	6.5	4.4	6.3	6.7	5.9	5.0	5.6	4.2
	0.5	5.0	4.5	5.1	4.4	4.9	6.6	5.3	5.3	7.4	4.7	5.8	7.0	5.0	5.0	5.5	5.1
	0.7	4.4	5.2	5.3	4.3	5.7	5.8	4.7	5.6	6.9	4.5	5.3	7.1	5.3	5.5	5.4	5.0
	0.9	3.5	5.1	5.5	4.6	6.5	5.3	5.1	5.7	6.8	4.5	4.9	7.1	5.3	5.4	6.8	4.9
120	0.3	4.0	4.7	6.0	5.0	5.7	4.0	5.8	5.0	5.6	5.7	6.0	5.0	6.7	4.4	6.2	4.3
	0.5	4.4	5.1	6.3	4.8	5.8	4.4	6.4	4.8	5.2	5.5	5.7	5.6	6.1	4.9	5.5	4.5
	0.7	4.2	5.3	6.4	4.9	5.0	4.0	6.5	5.4	5.8	5.7	5.2	5.5	5.9	5.5	4.9	4.5
	0.9	4.5	5.6	5.6	5.1	4.8	4.8	6.4	6.4	6.2	4.9	4.7	6.9	6.0	5.7	4.4	4.7
240	0.3	3.6	5.0	5.4	4.8	5.2	4.9	4.5	3.7	5.7	6.7	3.9	6.1	6.2	4.4	5.1	5.7
	0.5	3.5	4.6	5.6	4.7	4.9	4.8	3.9	4.6	5.8	6.5	4.4	6.5	6.2	4.7	5.4	5.9
	0.7	4.1	5.2	5.9	5.2	4.3	5.5	4.4	5.3	5.6	5.8	4.3	6.2	5.9	6.9	5.9	5.7
	0.9	5.2	5.1	5.8	5.9	4.9	5.8	4.9	5.1	4.9	6.8	5.0	5.4	5.9	6.9	5.8	5.8
360	0.3	5.6	4.0	4.9	4.9	5.9	6.2	4.5	5.2	5.4	4.7	4.1	4.5	4.5	6.4	5.6	5.4
	0.5	5.5	4.7	4.8	4.0	6.2	5.7	4.6	5.3	5.0	5.2	4.0	4.5	3.8	5.0	5.2	5.8
	0.7	5.4	5.0	5.3	4.0	6.5	4.9	4.9	4.8	5.6	5.2	4.6	4.0	4.9	3.9	5.7	5.5
	0.9	5.4	5.7	5.1	4.7	5.6	5.2	5.6	5.1	5.5	5.3	5.7	4.6	3.6	4.6	5.9	5.5
480	0.3	4.7	5.9	5.7	4.2	4.5	5.2	5.4	5.8	5.2	4.5	4.4	5.2	4.8	3.7	4.6	5.8
	0.5	4.7	5.3	5.3	4.0	5.2	5.2	5.1	5.9	5.5	4.1	5.4	5.4	4.5	5.3	3.9	5.3
	0.7	4.5	6.0	5.7	4.0	5.4	4.0	5.0	5.7	5.7	4.4	5.0	6.1	5.8	5.0	4.7	5.0
	0.9	4.9	5.9	6.3	3.7	5.4	5.3	5.3	5.7	5.9	5.4	5.4	5.0	5.9	5.4	4.8	5.5
Power																	
48	0.3	6.1	5.4	6.3	5.6	6.8	7.1	6.9	6.2	5.3	8.5	8.2	9.2	19.3	30.5	42.0	47.4
	0.5	5.8	5.1	5.2	5.8	6.7	5.9	5.3	5.0	6.0	8.0	8.5	9.1	17.9	22.9	26.5	28.2
	0.7	5.5	4.8	4.6	4.5	6.9	6.5	5.5	4.6	5.7	8.6	8.6	9.1	14.4	15.4	17.0	16.6
	0.9	4.6	2.9	3.3	2.2	5.8	5.8	4.7	3.4	6.3	7.0	7.4	8.6	11.3	11.9	11.0	11.5
60	0.3	5.8	5.2	5.5	7.3	7.8	7.6	8.5	8.8	6.5	8.6	9.7	8.8	19.0	38.2	49.2	58.8
	0.5	5.7	5.4	6.0	6.3	6.7	6.7	6.1	6.6	5.6	8.4	7.8	9.3	17.9	28.1	30.9	37.4
	0.7	5.1	4.2	6.1	4.8	6.1	4.9	4.4	5.7	5.4	8.8	7.6	9.0	14.1	18.7	19.8	23.6
	0.9	3.6	3.4	2.3	2.6	5.3	5.4	5.0	5.2	5.3	8.7	7.6	8.2	11.1	13.5	13.4	14.7
96	0.3	6.2	6.2	5.6	6.4	7.5	11.4	10.2	11.3	9.6	9.7	11.9	14.4	28.2	55.8	69.6	77.2
	0.5	6.0	6.2	5.2	5.3	7.6	9.2	8.1	7.7	10.1	9.4	11.5	14.9	25.1	41.5	49.9	54.1
	0.7	5.4	5.8	4.2	4.4	7.6	6.3	6.2	7.0	11.3	9.3	9.9	15.0	19.7	28.2	31.7	33.1
	0.9	3.7	3.5	2.4	2.3	5.5	5.1	4.5	4.9	11.6	9.5	10.0	13.7	14.3	16.5	17.9	18.1
120	0.3	6.9	7.5	8.0	7.6	7.4	12.1	11.4	13.9	8.5	14.4	14.8	15.8	34.4	64.0	76.3	82.9
	0.5	7.2	7.0	8.5	6.3	6.8	8.2	9.3	7.8	8.8	13.6	16.2	16.0	30.0	47.9	55.7	63.8
	0.7	5.4	6.6	6.8	5.7	6.3	6.6	8.3	6.2	9.4	13.0	14.8	16.0	24.8	33.2	36.5	40.5
	0.9	4.1	3.8	3.3	2.6	5.2	4.4	6.8	5.1	10.0	13.4	13.3	17.2	17.4	18.6	17.5	20.6
240	0.3	7.5	13.0	18.3	15.5	12.9	23.0	29.0	35.0	17.1	28.4	33.8	40.4	63.8	93.2	97.1	97.8
	0.5	7.5	13.1	17.3	14.8	11.1	16.5	19.1	21.9	16.4	27.9	32.2	40.5	54.6	80.1	83.6	85.8
	0.7	6.5	12.1	15.4	12.9	8.4	12.8	12.3	12.3	15.7	26.5	32.6	39.7	44.1	58.6	61.6	62.1
	0.9	5.8	9.9	11.7	10.1	6.6	8.5	8.3	6.9	15.1	25.9	30.9	40.3	27.9	31.1	32.9	31.5
360	0.3	14.5	23.8	31.6	36.6	22.0	44.5	53.2	62.4	28.8	54.7	64.7	78.4	83.0	98.7	99.3	99.5
	0.5	14.7	23.6	30.6	36.5	19.0	32.0	32.9	36.8	28.0	55.5	64.1	79.5	73.4	91.9	93.1	94.4
	0.7	15.2	24.0	31.5	37.1	15.5	19.2	19.6	20.0	28.4	54.7	63.8	78.4	58.5	73.2	75.6	77.4
	0.9	14.6	27.4	35.1	48.1	9.7	10.9	11.6	12.4	27.6	53.1	62.4	78.1	36.7	44.1	43.7	42.3
480	0.3	19.1	40.5	59.4	71.0	33.0	61.6	73.6	80.0	40.6	80.9	93.5	97.6	94.8	99.7	99.8	100.0
	0.5	18.6	41.9	60.9	71.5	28.8	43.4	51.5	52.9	39.9	80.9	93.2	98.0	88.4	95.0	97.3	98.6
	0.7	19.6	44.4	60.4	74.2	21.8	27.0	30.3	29.6	39.8	81.1	93.0	97.8	74.4	82.4	86.1	88.6
	0.9	24.4	53.7	70.1	88.8	15.0	13.4	15.7	15.9	39.4	79.5	92.4	97.7	49.2	55.0	53.4	57.3

Table 5 (continued). Size and power of the CF-IPS and BF-IPS tests (nominal 5% significance level). Model includes constant

		$\text{CF-IPS}_{F\{2,\ldots,12\}}$				$\text{BF-IPS}_{F\{2,\ldots,12\}}$				$\text{CF-IPS}_{F\{3,\ldots,12\}}$				$\text{BF-IPS}_{F\{3,\ldots,12\}}$			
T	ω	5	15	25	40	5	15	25	40	5	15	25	40	5	15	25	40
Size																	
48	0.3	4.7	5.6	5.6	5.7	4.5	6.3	6.5	5.2	4.6	4.8	5.6	5.4	4.5	5.5	6.6	4.8
	0.5	4.6	4.6	5.4	5.4	4.3	6.5	5.5	5.2	4.8	4.8	5.4	5.3	4.0	6.1	5.9	5.4
	0.7	5.1	4.8	6.0	5.2	5.4	6.2	5.5	5.7	5.7	4.7	5.6	5.5	5.4	5.8	5.6	5.3
	0.9	5.3	4.0	4.9	4.9	5.0	5.7	5.7	5.7	5.7	3.5	5.0	5.5	5.2	5.5	5.7	5.4
60	0.3	5.8	4.7	5.8	3.3	5.8	4.5	5.0	5.4	5.7	5.1	5.0	3.2	5.8	5.1	4.4	6.0
	0.5	4.5	4.8	5.6	3.6	4.8	6.0	4.2	6.5	4.6	4.8	5.4	3.2	4.4	5.8	4.4	6.2
	0.7	4.2	4.3	4.9	3.7	4.9	5.9	5.2	6.1	5.0	4.7	5.1	3.9	5.0	6.2	5.5	5.6
	0.9	4.7	4.1	5.4	4.8	5.4	4.8	5.2	5.9	4.6	4.1	5.6	4.6	5.2	5.1	5.1	5.7
96	0.3	5.3	4.0	5.5	5.6	5.9	7.5	4.4	4.2	4.7	4.1	5.0	5.3	6.0	6.7	4.1	4.9
	0.5	4.6	4.8	5.6	5.8	5.3	7.3	4.7	5.3	4.7	4.7	4.8	5.6	5.7	6.6	4.3	6.0
	0.7	4.7	5.1	5.5	5.7	4.5	6.7	4.4	5.4	5.0	4.9	5.0	6.1	4.4	6.3	4.3	6.1
	0.9	5.5	5.2	5.4	6.0	5.4	6.6	5.3	6.7	5.2	5.4	5.2	5.3	5.3	6.3	5.0	6.4
120	0.3	7.2	5.3	5.8	4.5	4.5	4.9	5.0	4.9	6.6	5.2	4.9	4.2	4.3	5.5	5.6	5.0
	0.5	7.0	5.5	5.3	4.2	3.6	5.5	6.8	5.3	6.7	5.2	5.0	3.7	3.9	6.0	6.7	5.4
	0.7	7.0	5.2	4.8	3.6	4.7	5.7	6.5	4.0	6.8	5.4	4.2	4.3	5.4	6.1	6.5	4.9
	0.9	6.2	5.9	5.2	4.4	5.7	5.8	5.4	6.1	6.5	4.9	4.5	4.2	6.0	6.0	5.3	5.7
240	0.3	6.1	5.3	5.3	5.4	5.5	6.1	5.1	5.1	6.1	6.6	5.2	5.8	5.8	6.4	6.1	6.2
	0.5	5.7	5.2	5.7	6.3	5.9	5.7	5.7	5.4	6.4	5.3	6.3	6.1	6.4	5.1	5.6	6.0
	0.7	5.3	5.1	5.9	6.3	5.7	5.2	5.4	5.8	6.0	4.8	6.3	5.7	5.7	6.0	5.4	6.4
	0.9	5.0	4.9	5.5	5.8	5.7	6.7	4.7	5.6	4.9	4.3	5.4	6.0	5.9	5.9	4.1	5.3
360	0.3	6.8	4.2	4.6	5.4	4.4	5.7	6.7	5.9	7.1	5.1	4.3	4.7	3.7	5.9	6.4	6.2
	0.5	7.0	4.8	4.6	4.8	4.1	5.5	5.8	6.5	6.8	5.0	4.5	4.8	4.4	5.0	5.7	6.4
	0.7	6.9	4.6	5.2	5.1	4.7	5.4	6.5	6.2	6.4	5.1	5.5	4.6	5.0	5.4	5.8	5.7
	0.9	6.0	4.3	5.8	4.9	4.7	5.0	4.9	6.4	5.3	4.3	5.5	4.2	4.9	5.4	5.0	5.6
480	0.3	4.8	4.7	5.6	4.1	6.4	5.5	6.0	5.3	5.0	4.4	4.8	4.7	6.7	4.5	4.6	5.2
	0.5	5.0	4.5	6.1	4.4	6.1	5.1	5.4	5.5	4.9	4.8	4.3	4.6	5.8	5.2	5.6	6.0
	0.7	5.4	4.7	6.4	4.9	5.9	6.3	5.1	6.5	4.9	4.4	5.5	5.1	5.6	6.2	5.0	6.3
	0.9	5.2	5.2	6.1	3.7	4.8	5.9	5.4	6.4	5.2	5.1	4.9	4.6	5.8	5.3	5.7	7.1
Power																	
48	0.3	8.3	10.4	12.3	15.1	12.7	19.8	22.1	25.1	8.4	10.5	11.4	14.9	12.1	19.0	20.1	23.8
	0.5	8.1	9.8	12.8	15.0	10.5	14.4	14.4	16.7	8.3	9.7	11.8	15.0	10.1	14.6	13.6	15.6
	0.7	7.6	9.3	11.9	15.4	9.4	10.8	11.0	12.3	7.7	9.6	10.4	15.4	8.5	11.4	10.1	11.3
	0.9	8.6	8.1	11.3	14.3	8.4	9.8	7.8	9.9	8.3	7.9	10.1	13.1	8.4	8.4	8.2	9.0
60	0.3	9.3	11.8	15.9	16.5	19.9	31.2	38.0	46.0	9.2	12.0	15.7	14.5	18.8	28.0	35.4	42.3
	0.5	8.3	12.6	15.7	16.8	18.7	21.7	25.2	25.8	8.8	12.4	15.4	14.8	16.9	20.7	24.0	23.2
	0.7	9.4	12.6	15.4	16.1	14.8	17.0	17.9	17.7	8.9	10.7	14.5	14.0	14.0	14.8	16.6	17.2
	0.9	8.9	11.8	15.3	15.3	13.3	12.6	12.1	14.4	8.8	11.6	14.2	13.9	13.3	11.9	11.7	13.2
96	0.3	15.4	23.1	27.2	33.3	41.3	68.8	81.5	86.8	14.3	22.1	24.7	31.1	39.2	64.3	78.5	84.0
	0.5	16.1	25.0	26.6	34.1	37.2	49.0	58.0	60.3	15.6	23.6	25.1	30.8	36.5	46.8	54.4	57.4
	0.7	15.8	25.0	27.6	34.2	31.3	34.1	36.8	36.2	16.3	24.1	26.2	31.9	29.0	30.0	33.8	33.0
	0.9	15.5	24.0	26.9	35.7	24.1	23.0	21.6	23.2	13.6	23.7	26.6	32.7	22.8	22.5	20.9	21.9
120	0.3	22.1	33.4	39.8	43.1	57.0	86.7	93.0	96.7	20.3	30.6	35.9	39.7	55.3	84.4	93.0	96.1
	0.5	21.0	32.8	38.4	43.4	49.2	69.5	75.1	79.1	19.5	31.6	35.0	40.3	47.3	69.9	73.4	76.9
	0.7	21.2	31.9	40.1	43.4	40.4	51.4	53.1	54.3	19.1	30.1	35.2	41.7	38.8	48.4	51.3	51.4
	0.9	21.4	32.3	37.9	42.7	30.3	30.6	30.8	30.6	19.0	30.2	33.4	39.9	29.1	29.5	28.1	29.3
240	0.3	56.8	87.8	94.4	97.2	98.0	100.0	100.0	100.0	53.5	85.3	92.3	95.7	97.5	100.0	100.0	100.0
	0.5	55.5	86.1	94.6	97.9	95.7	99.5	99.8	99.9	52.8	84.4	92.0	96.9	94.9	99.0	99.5	99.7
	0.7	54.7	85.2	95.8	97.6	87.1	94.4	95.1	96.5	52.4	83.4	93.8	96.3	85.8	93.2	93.6	93.9
	0.9	54.6	84.7	95.9	97.6	70.4	73.7	74.2	73.8	51.6	82.1	93.4	96.1	66.4	70.8	70.4	69.4
360	0.3	90.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	87.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	0.5	90.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	87.2	100.0	100.0	100.0	99.9	100.0	100.0	100.0
	0.7	89.5	100.0	100.0	100.0	99.6	100.0	100.0	100.0	86.7	100.0	100.0	100.0	99.1	100.0	100.0	100.0
	0.9	90.7	100.0	100.0	100.0	94.9	94.8	96.4	94.9	87.1	99.9	100.0	100.0	93.6	93.6	94.6	94.2
480	0.3	99.4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	0.5	99.2	100.0	100.0	100.0	100.0	100.0	100.0	100.0	98.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	0.7	99.1	100.0	100.0	100.0	99.9	100.0	100.0	100.0	98.7	100.0	100.0	100.0	99.9	100.0	99.9	100.0
	0.9	99.1	100.0	100.0	100.0	99.7	99.9	99.5	99.7	98.9	100.0	100.0	100.0	99.3	99.8	99.4	99.5

Table 6. Size and power of the CF-IPS and BF-IPS tests (nominal 5% significance level). Model includes constant and trend

		CF-IPS$_{t1}$				BF-IPS$_{t1}$				CF-IPS$_{t2}$				BF-IPS$_{t2}$			
T	ω	N=5	15	25	40	5	15	25	40	5	15	25	40	5	15	25	40
Size																	
48	0.3	4.6	4.4	5.1	4.2	5.4	6.7	4.6	4.9	4.0	5.8	4.8	5.3	5.2	4.9	5.7	5.1
	0.5	4.8	4.4	5.1	3.8	5.5	6.6	5.9	5.2	4.7	5.9	4.6	5.3	5.4	5.6	5.6	4.9
	0.7	4.6	4.6	5.3	4.1	6.1	6.2	5.5	6.5	5.0	5.2	6.0	5.6	6.2	6.4	5.7	5.6
	0.9	5.0	4.8	5.4	4.0	6.6	6.3	5.7	5.9	4.9	5.1	5.7	6.1	5.7	7.0	7.1	5.1
60	0.3	4.8	4.3	5.1	5.5	4.7	5.4	5.3	4.9	3.8	4.7	5.8	5.0	5.3	5.5	4.5	4.6
	0.5	4.6	4.2	5.2	5.6	5.9	5.8	4.9	5.5	3.5	5.2	5.4	5.1	5.6	6.1	5.6	5.4
	0.7	5.3	4.7	5.6	5.4	6.5	5.2	4.8	4.7	3.4	5.1	4.4	5.0	6.5	6.1	4.9	6.2
	0.9	5.5	4.4	5.8	5.2	8.0	5.6	5.3	4.5	3.5	5.4	4.5	5.0	6.1	5.8	5.4	5.4
96	0.3	4.1	4.3	4.6	4.5	6.6	5.5	5.2	5.3	6.7	4.6	6.1	6.7	5.9	4.8	5.5	3.8
	0.5	3.3	4.5	4.9	4.4	6.0	5.7	5.7	6.0	7.3	4.9	5.7	6.6	5.0	5.1	5.9	5.0
	0.7	3.8	4.7	4.9	3.7	5.4	5.4	5.1	6.1	6.9	4.3	5.2	6.8	5.1	5.7	5.5	4.7
	0.9	3.3	4.9	5.1	3.8	5.4	4.6	4.8	5.6	6.9	4.1	4.8	6.9	5.2	5.4	6.6	5.0
120	0.3	4.9	4.6	5.3	4.5	4.8	5.1	4.9	5.8	5.7	5.5	5.8	4.8	6.5	4.4	6.2	4.4
	0.5	5.5	5.2	4.5	5.0	4.5	4.7	5.0	5.8	5.3	5.4	5.6	5.3	6.2	4.9	5.2	4.8
	0.7	5.1	5.1	4.9	5.3	4.5	4.2	6.3	6.3	5.8	5.4	5.2	5.5	6.3	5.4	4.8	4.3
	0.9	5.4	5.6	4.5	5.4	4.4	4.2	6.1	5.9	6.3	4.8	4.7	6.7	6.2	5.7	4.4	4.8
240	0.3	4.0	4.0	6.2	5.0	5.3	5.4	5.1	5.3	5.7	6.6	4.2	6.1	6.2	4.6	5.3	5.9
	0.5	4.1	3.9	6.1	4.4	5.4	5.6	5.4	5.0	5.9	6.6	4.5	6.8	6.2	4.6	5.6	6.0
	0.7	4.5	4.4	5.8	4.8	5.1	6.3	6.5	5.4	5.7	6.0	4.5	6.1	6.0	7.1	6.0	5.8
	0.9	4.5	5.2	5.3	5.1	4.7	6.6	5.9	4.5	4.8	6.6	5.1	5.5	5.9	6.8	5.8	5.8
360	0.3	6.0	5.2	4.5	3.9	6.6	4.1	4.1	4.8	5.6	4.8	4.6	4.5	4.5	6.4	5.4	5.5
	0.5	6.4	5.2	4.5	4.0	6.3	4.1	4.5	4.3	5.0	5.2	4.1	4.5	3.6	5.0	5.1	5.8
	0.7	6.3	5.2	4.3	3.7	6.9	4.8	3.9	6.0	5.7	5.1	4.6	4.2	4.7	3.9	5.7	5.5
	0.9	6.0	5.8	3.6	3.6	5.9	4.1	4.5	6.1	5.7	5.5	5.6	4.7	3.8	4.6	5.9	5.6
480	0.3	4.9	6.0	5.6	3.9	5.5	6.3	5.0	5.2	5.3	4.6	4.4	5.4	4.8	3.7	4.6	5.5
	0.5	5.0	5.9	5.7	4.5	5.2	4.6	5.3	5.5	5.4	4.1	5.4	5.4	4.5	5.2	3.8	5.3
	0.7	5.5	5.7	5.8	4.4	5.1	4.3	4.8	5.2	5.8	4.5	5.0	6.1	5.6	5.1	4.5	5.1
	0.9	5.4	6.7	5.2	4.3	4.9	4.7	4.9	4.9	5.8	5.4	5.4	5.1	5.8	5.4	4.8	5.4
Power																	
48	0.3	5.0	5.6	6.9	5.6	6.6	7.6	7.0	6.4	5.6	8.8	8.3	9.7	19.6	30.6	41.6	47.8
	0.5	5.4	5.1	6.0	5.1	6.2	6.9	6.3	6.2	5.9	8.8	9.1	9.6	17.5	23.0	26.1	28.9
	0.7	4.8	5.4	6.0	5.0	6.2	7.3	6.2	6.2	5.9	8.9	9.6	8.8	13.7	15.9	18.2	17.6
	0.9	4.7	5.2	5.5	5.5	7.2	6.6	5.8	6.1	6.4	8.2	8.4	9.7	11.6	11.9	11.5	11.8
60	0.3	4.9	5.6	6.2	6.6	6.8	7.5	6.3	6.7	7.1	8.3	9.6	8.7	19.9	38.3	50.3	58.5
	0.5	5.1	5.4	6.6	6.8	6.7	6.7	6.1	6.5	5.6	7.9	8.0	9.3	18.2	28.5	31.3	38.7
	0.7	5.5	5.1	7.0	6.8	7.2	6.2	5.5	4.9	5.0	9.2	7.6	8.8	14.0	18.9	20.0	23.8
	0.9	5.8	4.5	6.7	6.0	8.1	6.5	4.9	5.2	5.0	9.3	7.5	8.3	11.2	14.1	13.0	14.5
96	0.3	4.9	4.9	6.1	6.4	7.0	7.8	6.7	7.1	9.2	9.9	12.2	14.4	28.3	55.9	69.3	76.9
	0.5	4.8	5.0	6.9	5.5	6.6	7.6	6.8	7.5	10.4	9.6	11.2	15.5	25.2	41.7	50.0	54.5
	0.7	4.2	5.8	6.9	5.0	5.9	6.7	6.1	6.4	11.5	9.7	9.9	14.9	20.4	27.9	31.9	33.7
	0.9	3.9	5.4	7.4	4.7	5.8	5.6	6.0	7.0	11.8	9.8	10.0	14.3	14.3	15.9	18.1	17.9
120	0.3	6.7	6.8	7.6	6.0	5.7	6.5	7.0	8.5	8.6	14.4	15.1	15.6	34.2	63.4	76.7	83.4
	0.5	6.6	7.1	6.7	5.6	5.1	6.8	6.8	8.2	9.1	13.6	15.7	16.3	29.7	48.1	56.0	64.0
	0.7	6.5	7.1	6.2	7.2	4.9	5.3	6.9	6.9	9.9	13.1	14.8	16.3	24.4	33.7	36.5	41.0
	0.9	6.2	6.6	5.1	6.6	5.8	5.5	7.0	6.3	10.5	13.5	13.5	18.0	17.7	18.4	17.8	20.9
240	0.3	6.4	7.5	10.5	10.8	6.1	8.9	10.0	12.4	17.1	28.1	33.5	40.7	63.4	93.3	97.0	97.8
	0.5	6.1	6.8	9.9	10.3	5.9	8.4	9.1	9.9	16.3	27.9	32.7	40.7	54.6	80.3	83.9	85.8
	0.7	5.4	6.5	10.4	9.7	5.9	8.0	7.1	8.0	15.7	26.9	32.5	40.5	44.4	58.6	61.8	62.0
	0.9	5.2	5.6	7.5	7.6	5.1	7.4	5.5	5.6	15.4	26.0	31.3	41.2	28.1	31.4	32.7	31.6
360	0.3	8.3	13.3	15.6	14.5	10.8	14.6	17.8	20.7	28.6	54.6	64.9	78.6	82.7	98.6	99.2	99.5
	0.5	8.7	13.5	15.2	14.3	9.5	11.1	13.6	14.2	28.1	55.7	64.2	79.4	73.2	91.8	93.3	94.4
	0.7	8.6	12.8	14.5	13.0	8.5	9.7	9.4	11.1	28.1	54.5	64.1	78.6	58.2	73.0	75.5	77.0
	0.9	7.5	11.4	10.9	10.3	6.7	6.6	6.5	8.6	27.9	53.1	62.8	78.6	36.8	44.4	43.3	42.1
480	0.3	11.0	21.5	28.5	29.1	14.7	24.8	29.6	33.9	40.7	81.0	93.8	97.6	94.8	99.7	99.8	100.0
	0.5	11.0	21.4	28.7	28.8	12.6	16.3	19.0	20.0	40.2	80.9	93.3	98.1	88.4	95.1	97.3	98.6
	0.7	10.7	19.9	27.3	28.5	9.3	12.7	12.7	12.9	39.8	81.1	93.2	97.8	74.7	82.2	86.0	88.7
	0.9	9.4	19.3	23.7	26.3	8.6	8.6	9.5	9.5	39.5	79.7	92.4	97.9	49.1	55.1	53.2	57.1

Table 6 (continued). Size and power of the CF-IPS and BF-IPS tests (nominal 5% significance level). Model includes constant and trend

		$\text{CF-IPS}_{F\{2,\dots,12\}}$				$\text{BF-IPS}_{F\{2,\dots,12\}}$				$\text{CF-IPS}_{F\{3,\dots,12\}}$				$\text{BF-IPS}_{F\{3,\dots,12\}}$			
T	ω	5	15	25	40	5	15	25	40	5	15	25	40	5	15	25	40
Size																	
48	0.3	4.8	5.5	5.3	5.4	4.1	6.9	6.5	5.3	4.4	4.8	5.1	5.0	4.3	6.2	6.1	5.0
	0.5	4.8	4.6	5.5	5.2	4.3	6.5	5.5	6.0	4.6	4.9	6.2	4.9	4.5	6.7	6.0	5.6
	0.7	4.7	3.8	5.5	5.2	5.1	6.6	5.4	5.3	5.0	4.3	6.1	4.8	5.0	5.2	5.5	5.2
	0.9	5.4	3.9	5.2	4.9	4.7	6.0	5.6	5.8	5.1	3.6	5.8	4.6	4.9	5.0	5.5	5.7
60	0.3	5.3	5.2	5.0	3.5	5.4	5.5	5.6	5.2	5.6	5.0	4.6	3.3	5.7	5.6	4.8	6.7
	0.5	4.2	4.7	5.3	3.6	5.0	6.3	5.2	6.7	4.4	5.4	5.4	3.4	5.0	6.1	5.1	6.8
	0.7	4.6	4.5	5.6	3.6	5.0	6.5	5.6	6.4	4.6	5.0	5.1	4.0	5.3	6.0	5.3	5.8
	0.9	4.7	4.4	5.3	4.8	5.4	5.0	5.4	5.5	4.9	4.6	4.9	4.7	5.1	5.1	5.5	5.7
96	0.3	5.2	3.8	5.4	5.5	5.9	7.8	4.3	4.4	4.6	3.8	4.6	4.8	5.8	7.2	4.3	4.7
	0.5	4.4	4.3	5.3	5.6	5.6	6.9	4.4	5.2	4.8	4.8	4.3	5.3	5.7	6.5	4.3	5.6
	0.7	4.3	4.6	5.2	4.8	4.8	6.9	4.7	5.5	4.8	4.8	4.3	5.3	4.5	6.6	4.2	6.4
	0.9	5.5	5.2	5.5	5.2	5.4	6.9	5.6	7.2	5.5	5.0	4.7	5.1	5.8	6.3	5.4	7.1
120	0.3	7.0	5.4	5.1	4.3	4.4	4.9	5.1	4.7	6.5	5.2	5.4	4.1	4.3	5.7	6.2	4.9
	0.5	6.5	5.3	5.4	4.0	3.8	5.4	6.9	4.8	6.8	4.5	5.3	3.5	4.0	6.1	6.8	5.0
	0.7	6.6	5.0	4.8	3.5	4.3	6.0	6.9	4.5	6.5	4.8	4.0	4.0	5.8	6.1	6.7	4.9
	0.9	5.8	5.5	4.8	4.2	5.7	6.2	5.5	5.7	6.5	5.2	4.2	3.9	5.9	6.2	5.5	5.6
240	0.3	6.2	5.6	5.7	5.6	5.5	5.9	5.1	5.2	6.3	6.3	5.1	5.8	5.9	6.2	6.2	6.0
	0.5	5.7	5.4	6.3	6.4	5.6	5.6	5.1	5.7	6.6	5.2	6.1	6.4	6.2	4.9	5.9	6.0
	0.7	5.5	5.5	6.1	6.3	5.6	5.2	5.3	5.8	6.0	4.7	5.7	5.8	5.9	6.0	5.3	6.1
	0.9	5.2	5.0	5.6	5.9	5.3	6.6	4.5	5.4	4.9	4.2	5.0	6.1	5.8	5.9	4.1	5.2
360	0.3	6.4	4.6	4.6	5.1	4.2	5.8	6.8	5.7	6.8	4.8	4.6	5.1	3.7	6.0	6.3	6.1
	0.5	6.6	5.1	4.6	4.6	4.3	5.6	5.8	6.6	6.7	5.1	4.8	4.9	4.7	5.2	5.9	6.5
	0.7	6.6	4.9	5.0	4.8	4.9	5.6	6.4	6.2	6.3	5.0	5.9	4.7	5.0	5.5	5.6	5.7
	0.9	5.7	4.4	5.9	4.8	4.6	5.2	4.8	6.1	5.1	4.4	5.7	4.5	4.9	5.3	5.1	5.6
480	0.3	4.8	4.8	5.6	3.9	6.4	5.6	6.1	5.5	4.8	4.4	4.9	5.1	6.7	4.9	4.8	5.4
	0.5	4.9	4.8	5.9	4.2	6.1	5.2	5.3	5.3	4.9	4.3	4.8	4.7	5.6	5.3	5.5	6.0
	0.7	5.3	4.8	6.3	4.7	5.8	6.4	5.2	6.4	5.0	4.3	6.2	5.5	5.4	6.2	4.9	6.3
	0.9	5.0	5.4	6.0	3.8	4.8	6.0	5.4	6.4	5.3	5.1	5.3	5.0	5.6	5.3	5.8	7.2
Power																	
48	0.3	9.1	10.3	11.9	14.0	11.9	20.3	22.8	25.0	8.5	10.2	10.5	12.6	12.1	19.4	19.1	22.1
	0.5	8.8	9.1	12.2	14.4	10.6	15.2	13.6	16.3	8.7	9.2	11.4	13.9	10.3	13.8	13.1	16.4
	0.7	7.8	9.0	11.3	14.2	9.5	12.2	10.9	12.3	7.7	8.8	10.4	14.2	8.8	11.5	10.0	11.6
	0.9	8.0	8.5	10.5	13.8	8.3	10.1	8.2	10.1	7.8	7.7	10.6	12.4	8.0	8.6	8.4	9.6
60	0.3	9.3	11.5	16.5	15.6	20.9	32.6	39.2	46.9	9.4	12.3	15.0	13.6	18.2	30.4	36.2	42.5
	0.5	8.3	13.0	15.9	15.7	18.5	23.3	24.9	27.5	8.9	12.4	14.0	13.9	16.6	20.9	24.0	24.7
	0.7	9.3	11.9	14.7	16.0	15.2	17.2	17.4	18.1	9.5	11.2	13.9	14.6	14.5	16.1	16.6	17.7
	0.9	9.2	12.5	15.3	15.8	13.4	12.5	12.2	13.3	9.5	10.9	13.7	15.1	12.7	12.1	11.2	13.0
96	0.3	15.7	22.9	27.8	32.6	42.0	70.2	83.2	88.2	14.3	21.4	24.1	30.2	40.1	66.1	80.0	85.0
	0.5	15.9	25.0	27.3	34.5	38.1	50.4	59.1	62.0	15.3	23.1	25.0	30.4	37.5	48.0	55.3	59.1
	0.7	14.8	25.0	28.1	34.1	31.8	36.1	37.1	36.9	15.0	23.8	25.3	32.0	30.3	30.7	35.1	34.9
	0.9	15.3	24.2	27.0	34.7	24.0	23.9	22.9	23.8	13.6	23.1	25.9	32.0	23.4	23.2	21.9	22.7
120	0.3	22.0	33.4	39.2	43.4	57.2	87.6	93.7	97.7	20.4	30.5	36.3	39.3	55.2	85.1	93.0	96.6
	0.5	20.8	33.2	38.3	42.9	50.0	70.6	75.8	80.1	19.9	30.7	35.5	40.5	48.7	69.9	74.5	77.9
	0.7	20.8	31.6	39.4	43.2	42.3	51.8	54.8	54.6	19.5	29.9	35.2	41.1	40.0	48.7	52.3	51.9
	0.9	22.0	31.7	38.3	43.1	30.9	31.3	31.7	31.1	20.0	30.2	33.6	40.8	30.0	29.7	29.0	29.9
240	0.3	57.4	88.3	94.8	97.6	98.2	100.0	100.0	100.0	53.9	84.8	91.5	96.1	97.6	100.0	100.0	100.0
	0.5	55.8	86.8	94.7	98.0	95.6	99.6	99.9	99.9	52.7	83.9	91.7	97.0	95.4	99.1	99.6	99.7
	0.7	55.2	86.0	96.1	97.9	87.7	94.5	95.4	96.4	52.5	83.2	93.6	96.6	86.4	93.0	94.3	94.1
	0.9	55.8	85.7	96.0	98.0	70.7	74.3	74.6	74.9	52.2	82.2	93.6	96.2	67.3	71.3	71.4	69.5
360	0.3	90.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	87.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	0.5	90.2	100.0	100.0	100.0	100.0	100.0	100.0	100.0	86.4	100.0	100.0	100.0	99.9	100.0	100.0	100.0
	0.7	89.4	100.0	100.0	100.0	99.6	100.0	100.0	100.0	86.5	100.0	100.0	100.0	99.2	100.0	100.0	100.0
	0.9	90.6	100.0	100.0	100.0	94.9	95.1	96.7	94.8	87.2	99.9	100.0	100.0	93.6	94.1	94.9	94.2
480	0.3	99.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	0.5	99.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	98.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	0.7	99.1	100.0	100.0	100.0	99.9	100.0	100.0	100.0	98.6	100.0	100.0	100.0	99.9	100.0	99.9	100.0
	0.9	99.1	100.0	100.0	100.0	99.7	99.9	99.6	99.7	98.9	100.0	100.0	100.0	99.3	99.8	99.5	99.5