Table 1

Data Generating Processes

A. Parameters of Cost Function

Mnemonic	β_1	β_2	β_3
A	0.160	0.016	0.002
B	0.126	-0.252	0.376
C	0.099	0.199	0.01001
D	0.197	-0.099	0.010

B. Parameters of Exogenous Processes

ϕ_1	ϕ_2	var(ϵ_S)	var(u)	$\rho(\epsilon_S,u)$
.75	.20	.120833	3.5	-.5

C. Implied Coefficients of Inventory Equation

DGP	$\lambda_1+\lambda_2$	$-\lambda_1\lambda_2$	π_1	π_2
A	1.22	-0.42	0.14	-0.12
B	0.24	-0.14	0.38	0.05
C	1.07	-0.22	0.10	-0.09
D	1.43	-0.69	0.33	-0.15

Notes:

1. β_1, β_2 and β_3 are the regression parameters in (3.1); ϕ_1 and ϕ_2 are the autoregressive parameters of the sales process defined in (2.2); ϵ_S is the sales shock defined in (2.2); u is the cost shock defined in (2.1); $\lambda_1+\lambda_2$, $-\lambda_1\lambda_2$, π_1, and π_2 are the coefficients of the reduced form inventory equation (2.3b).

Table 2

Parameters of the MA(2) Disturbance

DGP	θ_1	θ_2	Modulus of Larger Root
A	1.27	-0.45	0.67
B	0.50	-0.19	0.43
C	0.93	-0.18	0.67
D	1.44	-0.71	0.85

Notes:

1. θ_1 and θ_2 are the parameters of the MA(2) disturbance v_{t+2}; see (3.1) and (3.9). The modulus presented is that of the larger of the two roots to $z^2-\theta_1 z-\theta_2 = 0$.

Table 3

Asymptotic Standard Errors, IVq Relative to IV*

DGP	Estimator	Parameter β_1	β_2	β_3
A	IV4	2.21	2.26	1.40
A	IV6	1.46	1.47	1.13
A	IV8	1.19	1.20	1.05
A	IV12	1.03	1.03	1.01
B	IV4	1.12	1.10	1.02
B	IV6	1.00	1.00	1.00
B	IV8	1.00	1.00	1.00
B	IV12	1.00	1.00	1.00
C	IV4	1.49	1.51	1.31
C	IV6	1.16	1.17	1.10
C	IV8	1.06	1.07	1.04
C	IV12	1.01	1.01	1.01
D	IV4	3.02	2.99	1.31
D	IV6	1.67	1.63	1.07
D	IV8	1.23	1.22	1.03
D	IV12	1.08	1.08	1.03

Notes:

1. IVq is the conventional instrumental variables estimator described in (3.2) and (3.3), where Z_t consists of q instruments (q=4,6,8, or 12); IV* is the optimal estimator described in (3.12) and (3.13). The table presents the ratio of the square roots of the diagonal elements of (1)the variance-covariance matrix of IVq (computed according to (3.5)), to (2)the variance-covariance matrix of IV* (computed according to (3.11)).

Table 4

Distributions of Standardized Parameter Estimates, From Simulations, T=100

DGP/ Estimator	$\hat{\beta}_1-\beta_1$ 50% CI	Median	Trimmed MSE	$\hat{\beta}_2-\beta_2$ 50% CI	Median	Trimmed MSE	$\hat{\beta}_3-\beta_3$ 50% CI	Median	Trimmed MSE
A									
IV4	(-0.6,0.8)	0.07	1.14	(-0.8,0.6)	-0.10	1.20	(-3.1,1.6)	-0.68	2.51
IV12	(-0.3,0.9)	0.29	0.92	(-0.9,0.3)	-0.30	0.98	(-4.3,0.8)	-1.26	2.52
IV*	(-0.4,0.4)	0.04	0.61	(-0.5,0.4)	-0.06	0.63	(-2.7,1.6)	-0.39	2.27
asy*	(-0.3,0.3)	0.00	0.21	(-0.3,0.3)	0.00	0.20	(-0.5,0.5)	0.00	0.51
B									
IV4	(-0.5,1.0)	0.27	1.13	(-1.1,0.4)	-0.38	1.24	(-0.5,1.2)	0.23	1.47
IV12	(-0.2,1.0)	0.47	0.94	(-1.4,-0.0)	-0.63	1.34	(-0.2,1.7)	0.67	1.79
IV*	(-0.5,0.7)	0.14	0.93	(-0.9,0.4)	-0.22	1.09	(-0.5,1.1)	0.24	1.33
asy*	(-0.6,0.6)	0.00	0.79	(-0.6,0.6)	0.00	0.82	(-0.7,0.7)	0.00	0.97
C									
IV4	(-0.7,0.8)	0.11	1.14	(-0.8,0.6)	-0.13	1.17	(-1.1,2.8)	0.66	2.41
IV12	(0.0,1.0)	0.54	0.98	(-1.1,-0.1)	-0.59	1.06	(-2.3,1.0)	-0.59	2.18
IV*	(-0.8,0.5)	-0.06	0.91	(-0.5,0.8)	0.03	0.91	(-0.4,3.9)	1.19	2.06
asy*	(-0.5,0.5)	0.00	0.45	(-0.4,0.4)	0.00	0.44	(-0.5,0.5)	0.00	0.59
D									
IV4	(-0.6,0.9)	0.11	1.23	(-0.9,0.6)	-0.11	1.28	(-3.1,0.5)	-1.02	2.30
IV12	(-0.4,0.8)	0.15	1.05	(-0.8,0.5)	-0.15	1.06	(-3.6,0.3)	-1.39	2.38
IV*	(-0.3,0.4)	0.05	0.53	(-0.5,0.3)	-0.07	0.55	(-2.6,0.5)	-0.84	2.11
asy*	(-0.2,0.2)	0.00	0.11	(-0.2,0.2)	0.00	0.11	(-0.5,0.5)	0.00	0.58
asy4	(-0.7,0.7)	0.00	1.00	(-0.7,0.7)	0.00	1.00	(-0.7,0.7)	0.00	1.00

Notes:

1. The estimating equations are: IV4, (3.3); IV12, (3.3); IV*, (3.13).

2. The difference between estimated and population parameter is standardized by dividing by asymptotic standard error for IV4.

3. The "50% CI" is a 50 percent confidence interval constructed using the 250'th and 750'th largest of the 1000 estimates; "Median" is the 500'th largest such entry; "Trimmed MSE" is a mean squared error computed after dropping observations greater than 3.0 in absolute value, and is expressed relative to the MSE for a standard normal similarly trimmed.

4. "asy*" presents the asymptotic values for IV* and (approximately) IV12, which vary from DGP to DGP because the ratio of standard errors of IV* to IV4 varies from DGP to DGP (see Table 3 and the text). "asy4" presents the asymptotic values for IV4.

Table 5

Distributions of Standardized Parameter Estimates, From Simulations, T=300

DGP/ Estimator	$\hat{\beta}_1-\beta_1$ 50% CI	Median	Trimmed MSE	$\hat{\beta}_2-\beta_2$ 50% CI	Median	Trimmed MSE	$\hat{\beta}_3-\beta_3$ 50% CI	Median	Trimmed MSE
A									
IV4	(-0.7,0.8)	0.14	1.14	(-0.8,0.6)	-0.15	1.14	(-1.2,0.9)	-0.17	1.76
IV12	(-0.2,0.7)	0.29	0.57	(-0.7,0.2)	-0.29	0.57	(-1.3,0.6)	-0.32	1.64
IV*	(-0.3,0.4)	0.08	0.36	(-0.4,0.3)	-0.09	0.35	(-0.9,0.6)	-0.14	1.38
asy*	(-0.3,0.3)	0.00	0.21	(-0.3,0.3)	0.00	0.20	(-0.5,0.5)	0.00	0.51
B									
IV4	(-0.6,0.9)	0.21	1.10	(-0.9,0.5)	-0.30	1.16	(-0.6,0.9)	0.14	1.21
IV12	(-0.3,1.0)	0.41	0.98	(-1.1,0.2)	-0.49	1.15	(-0.4,1.2)	0.37	1.38
IV*	(-0.5,0.7)	0.14	0.84	(-0.8,0.4)	-0.22	0.92	(-0.5,0.9)	0.18	1.11
asy*	(-0.6,0.6)	0.00	0.79	(-0.6,0.6)	0.00	0.82	(-0.7,0.7)	0.00	0.97
C									
IV4	(-0.7,0.8)	0.10	1.13	(-0.8,0.7)	-0.11	1.14	(-0.6,1.5)	0.36	1.66
IV12	(-0.2,0.9)	0.44	0.78	(-0.9,0.1)	-0.45	0.78	(-0.8,0.9)	-0.07	1.33
IV*	(-0.7,0.4)	-0.06	0.70	(-0.4,0.7)	0.04	0.70	(-0.1,1.7)	0.58	1.39
asy*	(-0.5,0.5)	0.00	0.45	(-0.4,0.4)	0.00	0.44	(-0.5,0.5)	0.00	0.59
D									
IV4	(-0.6,0.8)	0.15	1.14	(-0.8,0.6)	-0.15	1.16	(-1.3,0.4)	-0.34	1.53
IV12	(-0.3,0.6)	0.16	0.48	(-0.6,0.3)	-0.15	0.49	(-1.3,0.4)	-0.43	1.56
IV*	(-0.2,0.3)	0.06	0.25	(-0.3,0.2)	-0.06	0.26	(-1.1,0.4)	-0.29	1.28
asy*	(-0.2,0.2)	0.00	0.11	(-0.2,0.2)	0.00	0.11	(-0.5,0.5)	0.00	0.58
asy4	(-0.7,0.7)	0.00	1.00	(-0.7,0.7)	0.00	1.00	(-0.7,0.7)	0.00	1.00

See notes to Table 4.

Table 6

A. Size of Nominal .05 T-Tests, from Simulations

DGP	Estimator	T=100 β_1	T=100 β_2	T=100 β_3	T=300 β_1	T=300 β_2	T=300 β_3
A	IV4	0.061	0.056	0.004	0.063	0.060	0.001
	IV12	0.142	0.134	0.020	0.080	0.067	0.004
	IV*	0.080	0.077	0.068	0.076	0.073	0.087
B	IV4	0.073	0.072	0.065	0.065	0.053	0.061
	IV12	0.193	0.260	0.231	0.103	0.104	0.106
	IV*	0.115	0.073	0.059	0.056	0.052	0.066
C	IV4	0.073	0.071	0.010	0.075	0.076	0.011
	IV12	0.264	0.264	0.031	0.158	0.154	0.014
	IV*	0.115	0.119	0.053	0.080	0.082	0.050
D	IV4	0.020	0.018	0.002	0.037	0.028	0.002
	IV12	0.047	0.044	0.026	0.017	0.015	0.006
	IV*	0.083	0.086	0.091	0.118	0.117	0.114

B. Size of Nominal .05 J-Tests, from Simulations

DGP	Estimator	T=100 J-size	T=300 J-size
A	IV4	0.041	0.056
	IV12	0.001	0.001
B	IV4	0.052	0.061
	IV12	0.004	0.023
C	IV4	0.039	0.051
	IV12	0.003	0.001
D	IV4	0.042	0.055
	IV12	0.001	0.000

Notes:

1. In each of 1000 simulations, we computed t-statistics testing whether each of the three β_is equals its Table 1A population value. Panel A presents the fraction of simulations in which the square of the t-statistic exceeded 3.84, which is the .05 critical value for a $\chi^2(1)$ random variable.

2. In each of 1000 simulations, tests of instrument-residual orthogonality were computed as in (3.16). Panel B presents the fraction of simulations in which the resulting statistic was greater than 3.84 (IV4) or 16.92 (IV12), which are the .05 critical values for $\chi^2(1)$ and $\chi^2(9)$ random variables.

Table 7

Estimates of Aggregate Nondurables in Manufacturing, 1967-1992

(1) Estimator	(2) $\hat{\beta}_1$	(3) $\hat{\beta}_2$	(4) $\hat{\beta}_3$	(5) $\hat{\theta}_1$	(6) $\hat{\theta}_2$	(7) Modulus of Larger Root
IV4	0.114	0.160	0.004	0.84	-0.35	0.42
	(0.044)	(0.134)	(0.008)			
IV12	0.155	0.036	-0.004			
	(0.016)	(0.048)	(0.004)			
IV*	0.145	0.068	0.001			
	(0.024)	(0.071)	(0.006)			

Notes:

1. The table presents estimates of IV4, IV12 and IV*, computed according to (3.3) and (3.13). The vector $\hat{R}_t$ (defined above (3.12)) was the set of lags that maximized the Schwarz criterion, where the following four sets were considered: $H_{t-1}, S_{t-1}, H_{t-2}$; $H_{t-1}, S_{t-1}, H_{t-2}, S_{t-2}$; $H_{t-1}, S_{t-1}, H_{t-2}, S_{t-2}, H_{t-3}, S_{t-3}$; $H_{t-1}, S_{t-1}, H_{t-2}, S_{t-2}, H_{t-3}, S_{t-3}, H_{t-4}, S_{t-4}$. All four also included intercept and trend.

2. Columns (5)-(7) are as described in Table 2, and are estimated from the two stage least squares residuals.