The University of Pennsylvania Models for High-Frequency Macroeconomic Modeling

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Project LINK Meeting,
National Autonomous University of Mexico (UNAM),
Mexico City,
May 16-20, 2005

The University of Pennsylvania Models for High-Frequency Macroeconomic Modeling

- University of Pennsylvania Current Quarter Model of the United States Economy (weekly)

- University of Pennsylvania Monthly Projections of the United States Economy-Survey Corner (monthly)

The University of Pennsylvania Models for High-Frequency Macroeconomic Modeling

- University of Pennsylvania Current Quarter Model of the Chinese Economy (biweekly) – Klein & Mak

- University of Pennsylvania and Global Insight Current Quarter Model of the Russian Economy (monthly) – Klein, Eskin and Roudoi

University of Pennsylvania Current Quarter Model of the United States Economy

The Methodology of the Current Quarter Model

- Time Series Models for indicators
- Bridge Equations
  - Expenditure
  - Income
- Principal components

Time Series Models for indicators

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Dependent Variable: DLOG(PCU)
Date: 04/29/05   Time: 09:43
Sample(adjusted): 1960:02 2005:03
Included observations: 542 after adjusting endpoints
Newey-West HAC Standard Errors & Covariance (lag truncation=5)
Backcast: 1959:12 1960:01
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Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003689	0.000809	4.559212	0.0000
AR(1)	0.334373	0.079847	4.187650	0.0000
AR(2)	0.900841	0.068119	13.22447	0.0000
AR(3)	-0.178847	0.098644	-1.813063	0.0704
AR(12)	-0.077034	0.024917	-3.091668	0.0021
MA(2)	-0.817976	0.086629	-9.442288	0.0000

R-squared	0.533724	Mean dependent var	0.003476
Adjusted R-squared	0.529374	S.D. dependent var	0.002996
S.E. of regression	0.002055	Akaike info criter	-9.526016
Sum squared resid	0.002264	Schwarz criterion	-9.478467
Log likelihood	2587.550	F-statistic	122.7066

Bridge Equations

- QUARTERLY data for 180 periods from 1960Q2 to 2005Q1
- Date: 2 MAY 2005
- dlog(pdcced)
- = 0.00934 * dlog(pciudur) + 0.00388
- (2.59622) (1.16390)
- Sum Sq 0.0031 Std Err 0.0042 LHS Mean 0.0038
- R Sq 0.7411 R Bar Sq 0.7367 F 3,176 167.959
- D.W.(1) 1.8983 D.W.(4) 2.0380
- AR_0 = + 0.72591 * AR_1 + 0.18001 * AR_4
- (13.8646) (3.42001)

Principal Components

- Dependent Variable: DLOG(QGDP96)*100
- Method: Least Squares
- Date: 05/09/05 Time: 13:48
- Sample: 1989:1 2005:1
- Included observations: 65
- Newey-West HAC Standard Errors & Covariance (lag truncation=3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.716229	0.046351	15.45213	0.0000
D(Z1)	0.987824	0.110789	8.916228	0.0000
D(Z2)	-0.130443	0.030995	-4.208481	0.0001
D(Z4)	0.054325	0.016017	3.391725	0.0012
D(Z9)	-0.544045	0.305662	-1.779893	0.0802

R-squared	0.628401	Mean dependent var	0.739900
Adjusted R-squared	0.603628	S.D. dependent var	0.519637
S.E. of regression	0.327154	Akaike info criterion	0.677030
Sum squared resid	6.421775	Schwarz criterion	0.844291
Log likelihood	-17.00349	F-statistic	25.36610
Durbin-Watson stat	1.929859	Prob(F-statistic)	0.000000

University of Pennsylvania Monthly Projections of the United States Economy - Survey Corner

- The methodology of the Survey Corner
  - Surveys
    - Conference Board
    - University of Michigan
    - UBS
    - ISM
  - Principal Components

Survey Corner - Employment

- Dependent Variable: D(EMETO)
- Method: Least Squares
- Date: 05/06/05 Time: 12:07
- Sample(adjusted): 1973:03 2005:04
- Included observations: 386 after adjusting endpoints
- Convergence achieved after 13 iterations
- Newey-West HAC Standard Errors & Covariance (lag truncation=5)

- Backcast: 1973:02

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-709.4440	86.35473	-8.215462	0.0000
C2	21.64915	2.978802	7.267736	0.0000
C3	11.22945	4.971620	2.258710	0.0245
C8	-17.37052	6.439549	-2.697475	0.0073
C9	-18.38282	9.107106	-2.018514	0.0443
C6	-13.39382	4.019844	-3.331925	0.0009
C10	-10.69879	5.617682	-1.904486	0.0576
C14	21.05539	6.862662	3.068108	0.0023
C16	18.18080	7.960447	2.283891	0.0229
C19	26.03475	9.587536	2.715479	0.0069
PDL01	5.446292	0.503611	10.81448	0.0000
AR(1)	0.968977	0.014805	65.44887	0.0000
MA(1)	-0.829972	0.055343	-14.99694	0.0000

R-squared	0.661085	Mean dependent var	148.3834
Adjusted R-squared	0.650182	S.D. dependent var	197.6722
S.E. of regression	116.9141	Akaike info criterion	12.39385
Sum squared resid	5098499.	Schwarz criterion	12.52708
Log likelihood	-2379.014	F-statistic	60.63098
Durbin-Watson stat	2.176404	Prob(F-statistic)	0.000000

- Inverted AR Roots .97
- Inverted MA Roots .83

Lag Distribution of JEMPDIF	i	Coefficient	Std. Error	T-Statistic
. *|	0	7.26172	0.67148	10.8145
. * |	1	5.44629	0.50361	10.8145
. * |	2	3.63086	0.33574	10.8145
. * |	3	1.81543	0.16787	10.8145
Sum of Lags		18.1543	1.67870	10.8145

University of Pennsylvania Current Quarter Model of the United States Economy

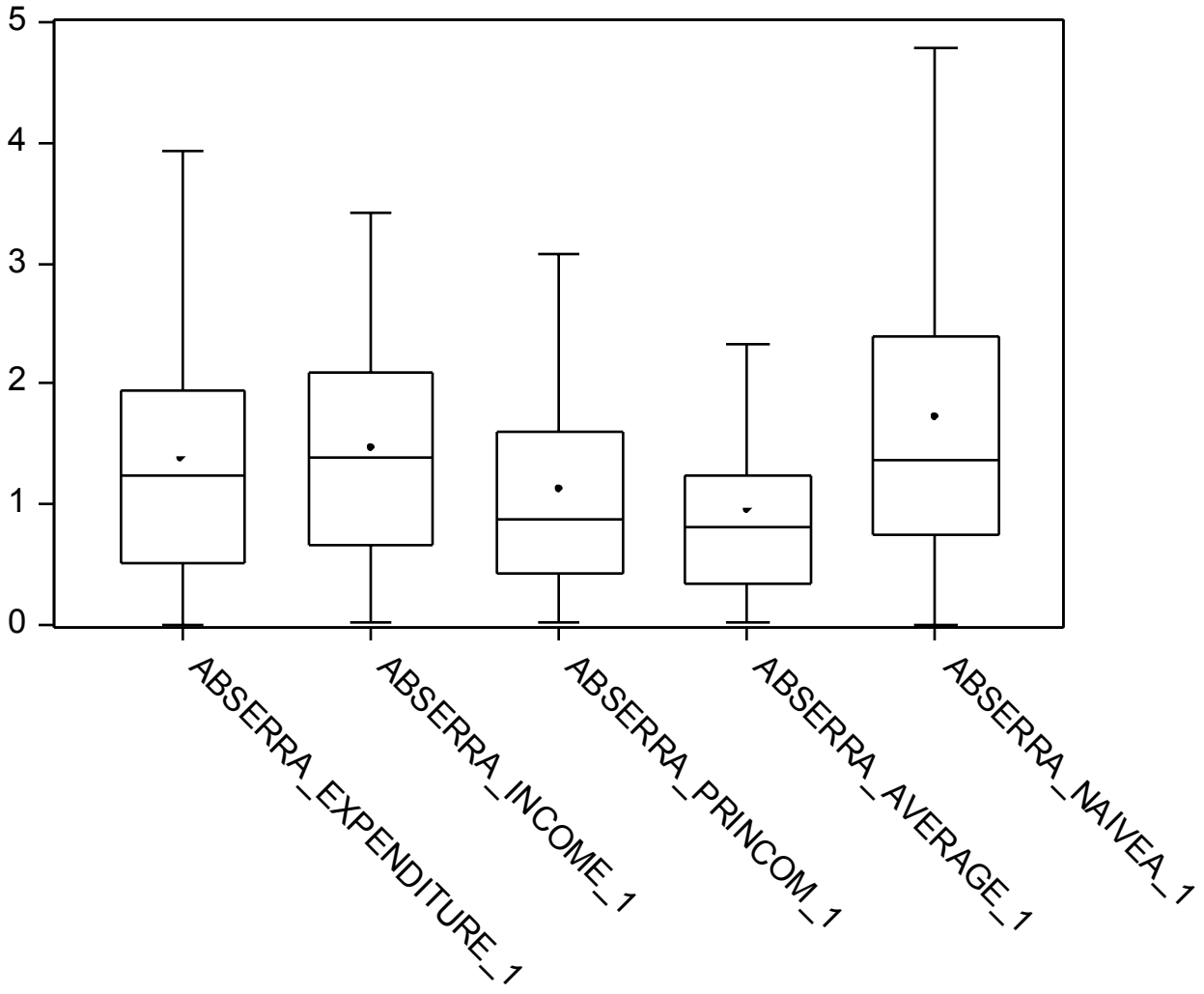
- Estimation of the final GDP using Advance Estimates
  - Expenditure Method
  - Income Method
  - Principal Components

Estimation of the final GDP using Advance Estimates

- Dependent Variable: D(FINAL)
- Method: Least Squares
- Date: 05/06/05 Time: 10:45
- Sample (adjusted): 1989:4 2004:4
- Included observations: 61 after adjustments
- D(FINAL)=D(ADVANCE) + C(111)*(FINAL(-1)-ADVANCE(-1)) + C(1)
- *D(Z1) + C(2)*D(Z2) + C(6)*D(Z6) + C(9)*D(Z9) + C(10)*D(Z10)
- +C(11)*D(Z11)+C(14)*D(Z14)

	Coefficient	Std. Error	t-Statistic	Prob.
C(111)	-0.856422	0.101368	-8.448605	0.0000
C(1)	0.403187	0.173428	2.324816	0.0239
C(2)	-0.641889	0.199954	-3.210175	0.0023
C(6)	-0.560949	0.225999	-2.482083	0.0163
C(9)	-1.200190	0.481253	-2.493886	0.0158
C(10)	-0.807257	0.392327	-2.057615	0.0446
C(11)	0.890802	0.485301	1.835566	0.0720
C(14)	-2.366563	0.909547	-2.601915	0.0120

R-squared	0.964112	Mean dependent var	0.057513
Adjusted R-squared	0.959372	S.D. dependent var	2.378851
S.E. of regression	0.479493	Akaike info criterion	1.489536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4
3
2
1
0
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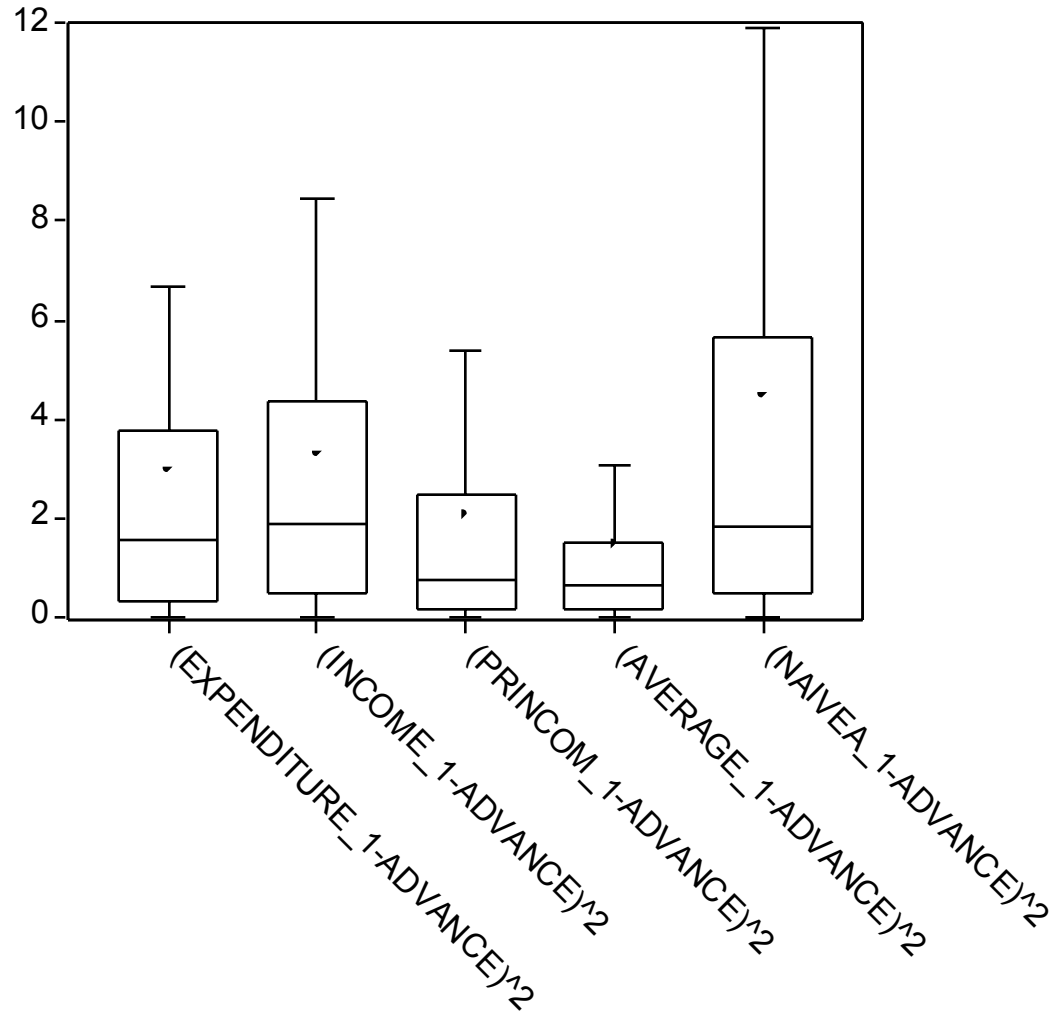
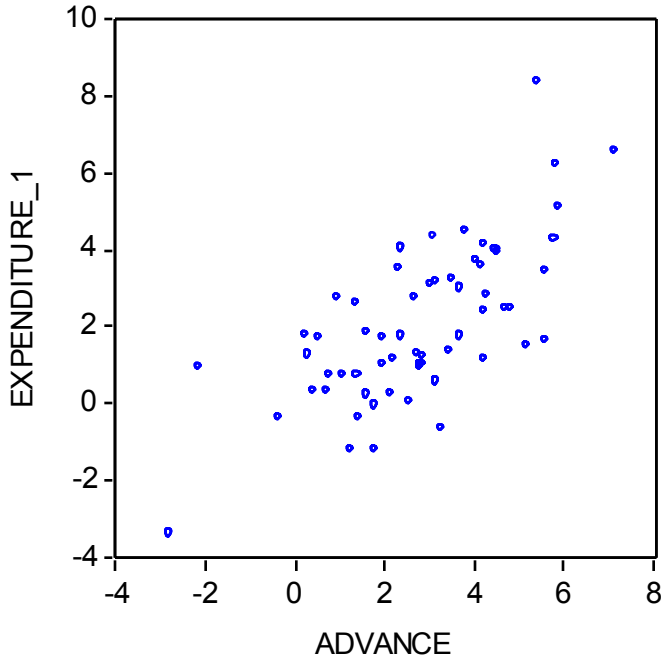
ABSERRA_INCOME_1
ABSERRA_PRINCOM_1
ABSERRA_AVERAGE_1
ABSERRA_NAIVEA_1


12
10
8
6
4
2
0
(EXPENDITURE_1-ADVANCE)^2
(INCOME_1-ADVANCE)^2
(PRINCOM_1-ADVANCE)^2
(AVERAGE_1-ADVANCE)^2
(NAIVEA_1-ADVANCE)^2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6
4
2
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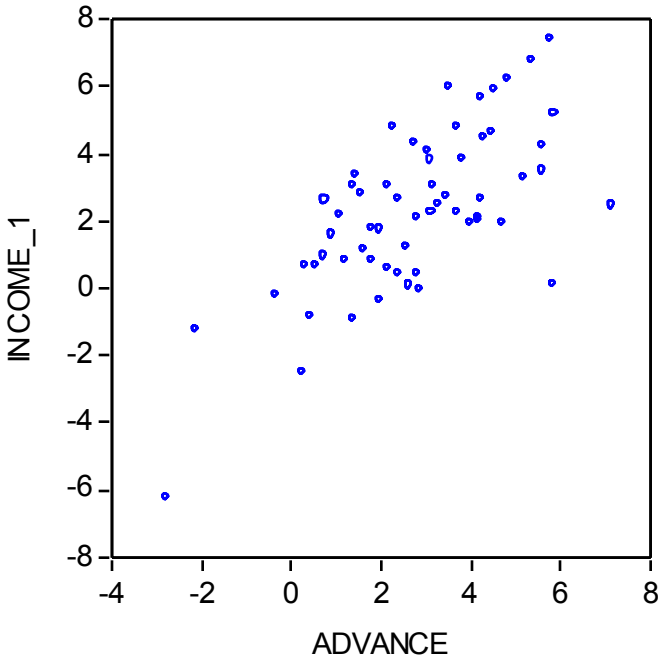
-2
-4
-4
-2
0
2
4
6
8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4
2
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-2
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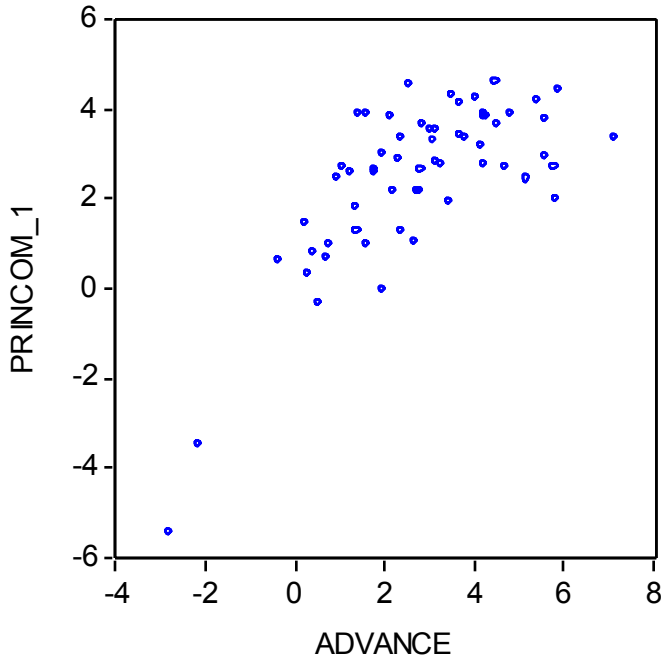
-6
-8
-4
-2
0
2
4
6
8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ADVANCE
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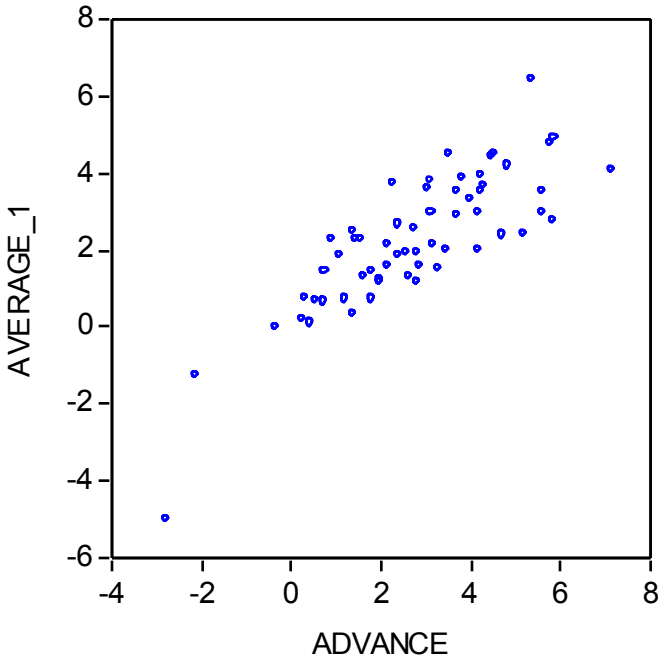
-2
-4
-6
-4
-2
0
2
4
6
8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ADVANCE
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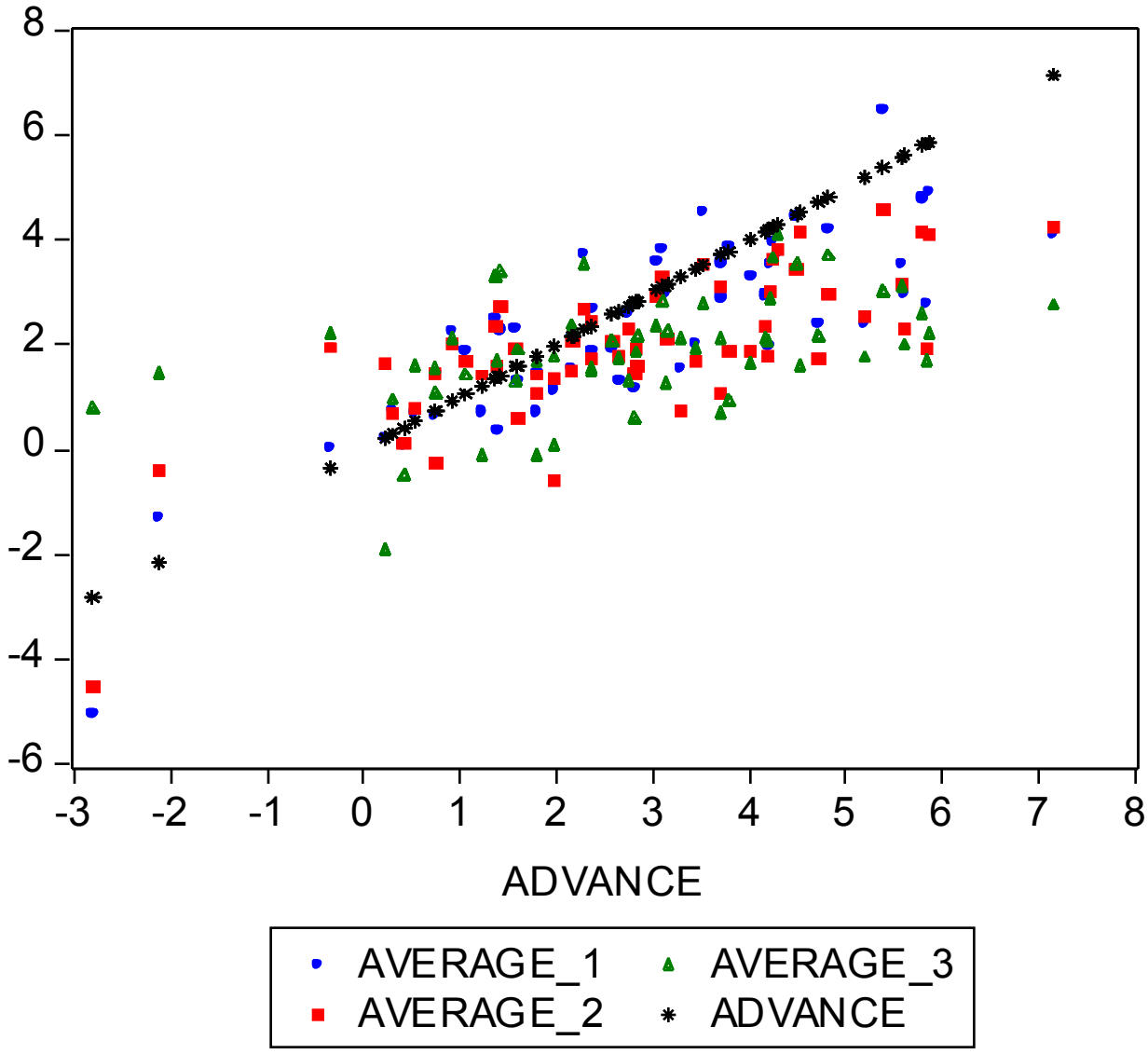
-2
-4
-6
-4
-2
0
2
4
6
8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-2
-4
-6
-3
-2
-1
0
1
2
3
4
5
6
7
8
ADVANCE
AVERAGE_1
AVERAGE_2
AVERAGE_3
ADVANCE

Diebold-Mariano Statistics

Alternative Models compared with the Mechanical Model

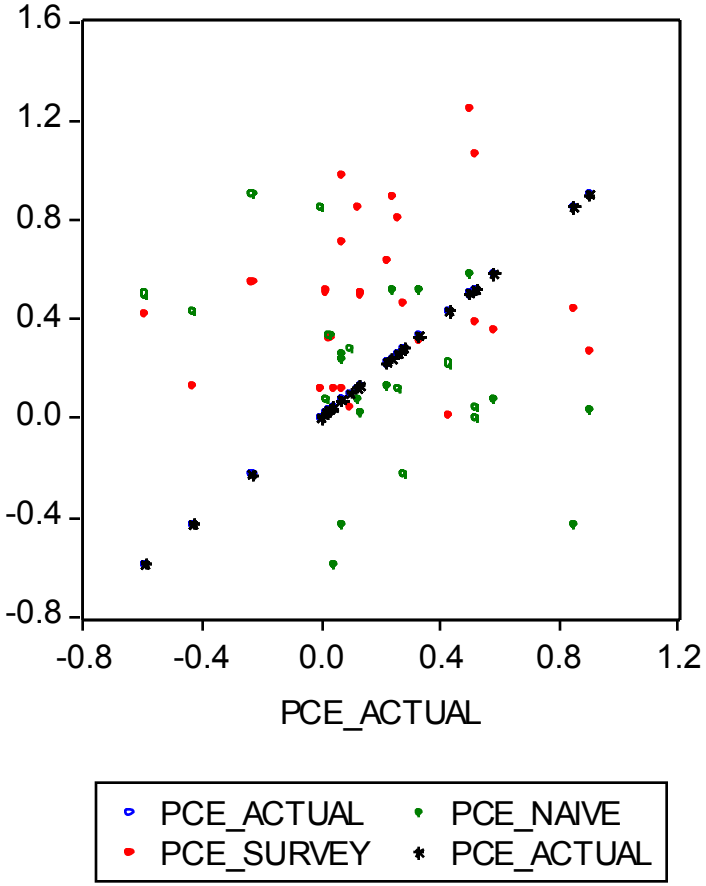
- Expenditure Side Model -1.17
- Income Side Model -3.05
- Principal Components Model -3.20
- Average -4.03

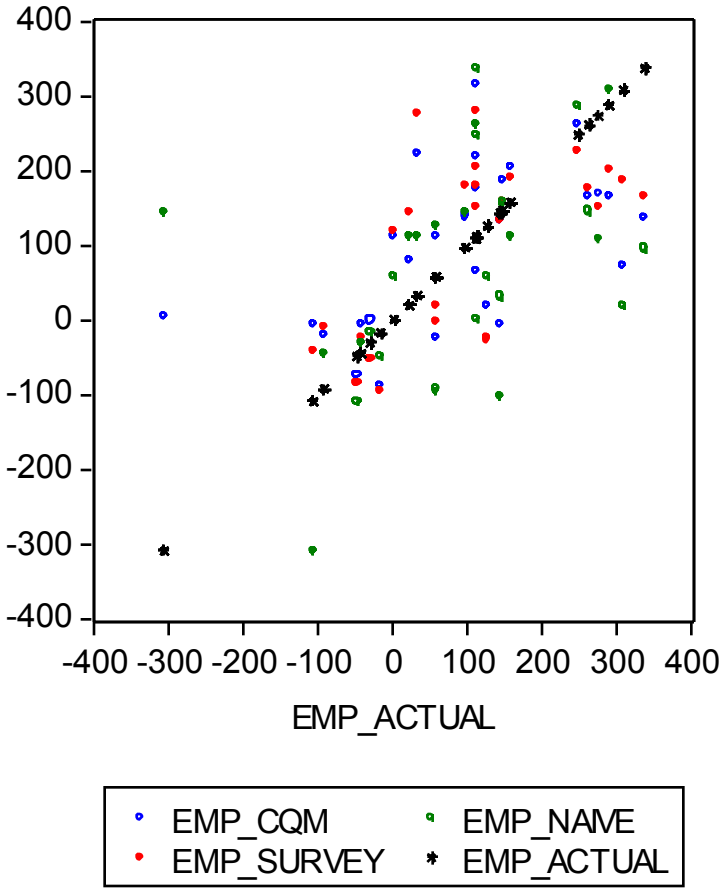
Diebold-Mariano Statistics
for the PCE Deflator

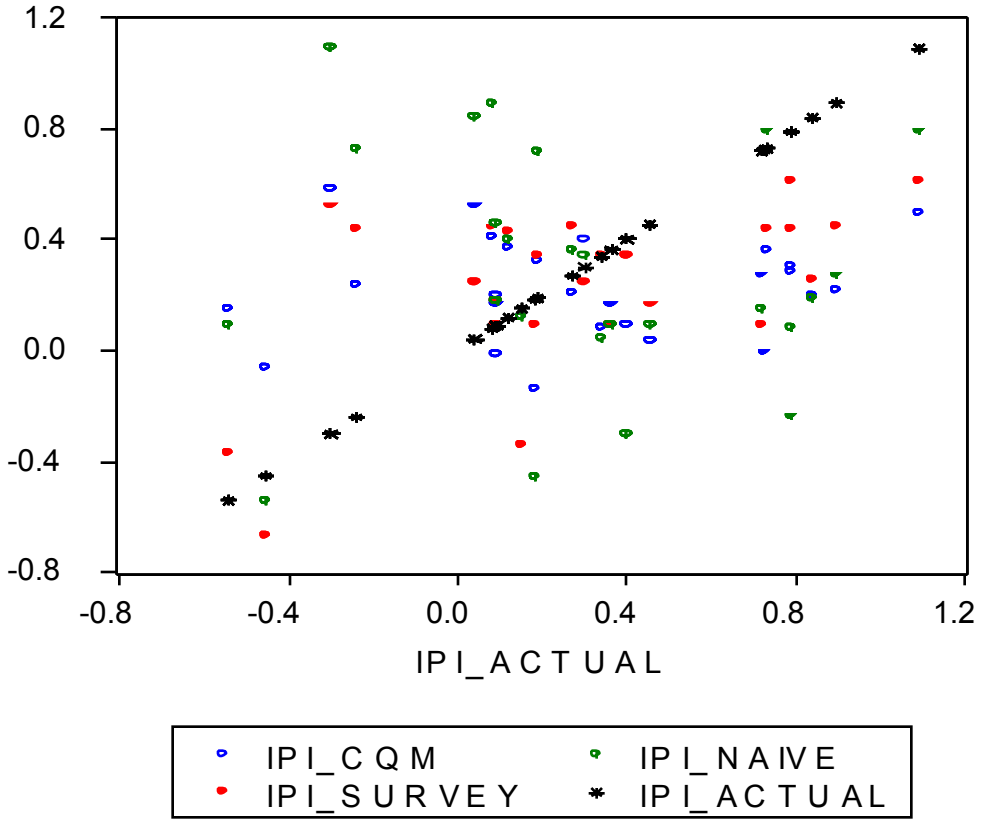
- Expenditure/Income Side Model -1.91

Mean Absolute Error (2003:03-2005:03)

Employment	88	83	100
industrial production	0.37	0.30	0.49
personal consumption expenditures		0.44	0.45


1.6
1.2
0.8
0.4
0.0
-0.4
-0.8
-0.8
-0.4
0.0
0.4
0.8
1.2
PCE_ACTUAL
PCE_ACTUAL
PCE_NAIVE
PCE_SURVEY
PCE_ACTUAL


400
300
200
100
0
-100
-200
-300
-400
-400 -300 -200 -100 0 100 200 300 400
EMP_ACTUAL
EMP_CQM
EMP_NAME
EMP_SURVEY
EMP_ACTUAL


1.2
0.8
0.4
0.0
-0.4
-0.8
-0.8
-0.4
0.0
0.4
0.8
1.2
IPI_ACTUAL
IPI_CQM
IPI_NAIVE
IPI_SURVEY
IPI_ACTUAL

Diebold-Mariano Statistics

- Real Personal Consumption
  - Survey Corner -0.45
- Employment
  - CQM -0.76
  - Survey Corner -2.06
- Industrial Production
  - CQM -2.62
  - Survey Corner -4.71