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Ex 2: TS operators and identities

Ex 3: VAR - ARIMA

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Ex 4.3: Coefficient Vector

Questions?

Forecasting tools in Stata

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Mexico City, Mexico

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- Solving models for a collection of equations
- Subcommands
- Examples with time series
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Questions?

Solving models for a collection of equations

- Components
  - Stochastic equations fit using estimation commands
  - Identities
  - Coefficient vectors
- Solving the model
  - Obtain static or dynamic forecasts
  - Alternative forecast scenarios
- **forecast** command

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Questions?

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- Building the model
  - create
  - estimates
  - identity
  - coefvector
  - exogenous
- Solving the model
  - solve
  - adjust
- Utilities
  - describe
  - list
  - clear
  - drop
  - query

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Questions?

Examples with Time Series

Example with Time series

Variables and Notation

(Quarterly macroeconomic data for Uruguay)

- m1 : Currency and demand deposits
- pib : Gross domestic product (GDP)
- tcpn : Exchange rate.
- ipcp97 : Consumer price index (1997 = 100):
- mt : Imports
- xt : Exports
- ipex : Exports price index.

Note: "l" will be used for natural logs and "d" for first difference

Source: International Monetary Fund

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Questions?

Example 1: Time series - OLS regressions

```
. regress dlm1 dlpib dlipcp97 if tin(1989q1,2009q4),noheader
```

dlm1	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dlpib	1.081708	.1506757	7.18	0.000	.7818536	1.381562
dlipcp97	-.3440374	.1829109	-1.88	0.064	-.7080417	.0199669
_cons	.0220782	.014986	1.47	0.145	-.0077448	.0519012

```
. estimates store eq_m1
.
. regress dlmt dltcpn dlpib if tin(1989q1,2009q4),noheader
```

dlmt	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dltcpn	-.1963056	.1439482	-1.36	0.176	-.4827717	.0901604
dlpib	.675093	.1495172	4.52	0.000	.3775444	.9726417
_cons	.0204891	.0123684	1.66	0.102	-.0041248	.0451029

```
. estimates store eq_mt
```

Example 1: Time series - OLS regressions

```
. regress dlm1 dlpib dlipcp97 if tin(1989q1,2009q4),noheader
```

dlm1	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dlpib	1.081708	.1506757	7.18	0.000	.7818536	1.381562
dlipcp97	-.3440374	.1829109	-1.88	0.064	-.7080417	.0199669
_cons	.0220782	.014986	1.47	0.145	-.0077448	.0519012

```
. estimates store eq_m1
.
. regress dlmt dltcpn dlpib if tin(1989q1,2009q4),noheader
```

dlmt	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dltcpn	-.1963056	.1439482	-1.36	0.176	-.4827717	.0901604
dlpib	.675093	.1495172	4.52	0.000	.3775444	.9726417
_cons	.0204891	.0123684	1.66	0.102	-.0041248	.0451029

```
. estimates store eq_mt
```

Example 1: Time series - OLS regressions

- Create the model

```
. forecast create myfcst1
  Forecast model myfcst1 started.
```

- Add equations

```
. forecast estimates eq_m1
  Added estimation results from regress.
  Forecast model myfcst1 now contains 1 endogenous variable.
. forecast estimates eq_mt
  Added estimation results from regress.
  Forecast model myfcst1 now contains 2 endogenous variables.
```

- Solve the model

```
. forecast solve, begin(q(2010q1))
Computing dynamic forecasts for model myfcst1.
------------------------------------------------------------

Starting period:  2010q1
Ending period:    2011q2
Forecast prefix:  f_

2010q1:  ..............
2010q2:  ..............
2010q3:  ..............
2010q4:  ..............
2011q1:  ..............
2011q2:  ..............
Forecast 2 variables spanning 6 periods.
```

Example 1: Time series - OLS regressions

- Create the model

```
. forecast create myfcst1
  Forecast model myfcst1 started.
```

- Add equations

```
. forecast estimates eq_m1
  Added estimation results from regress.
  Forecast model myfcst1 now contains 1 endogenous variable.
. forecast estimates eq_mt
  Added estimation results from regress.
  Forecast model myfcst1 now contains 2 endogenous variables.
```

- Solve the model

```
. forecast solve, begin(q(2010q1))
Computing dynamic forecasts for model myfcst1.
---------------------------------------------------------------

Starting period:  2010q1
Ending period:    2011q2
Forecast prefix:  f_

2010q1:  ............
2010q2:  ............
2010q3:  ............
2010q4:  ............
2011q1:  ............
2011q2:  ............

Forecast 2 variables spanning 6 periods.
```

Example 1: Time series - OLS regressions

- Create the model

```
. forecast create myfcst1
  Forecast model myfcst1 started.
```

- Add equations

```
. forecast estimates eq_m1
  Added estimation results from regress.
  Forecast model myfcst1 now contains 1 endogenous variable.
. forecast estimates eq_mt
  Added estimation results from regress.
  Forecast model myfcst1 now contains 2 endogenous variables.
```

- Solve the model

```
. forecast solve, begin(q(2010q1))
Computing dynamic forecasts for model myfcst1.
------------------------------------------------------------

Starting period:  2010q1
Ending period:    2011q2
Forecast prefix:  f_
2010q1:  ............
2010q2:  ............
2010q3:  ............
2010q4:  ............
2011q1:  ............
2011q2:  ............
Forecast 2 variables spanning 6 periods.
```

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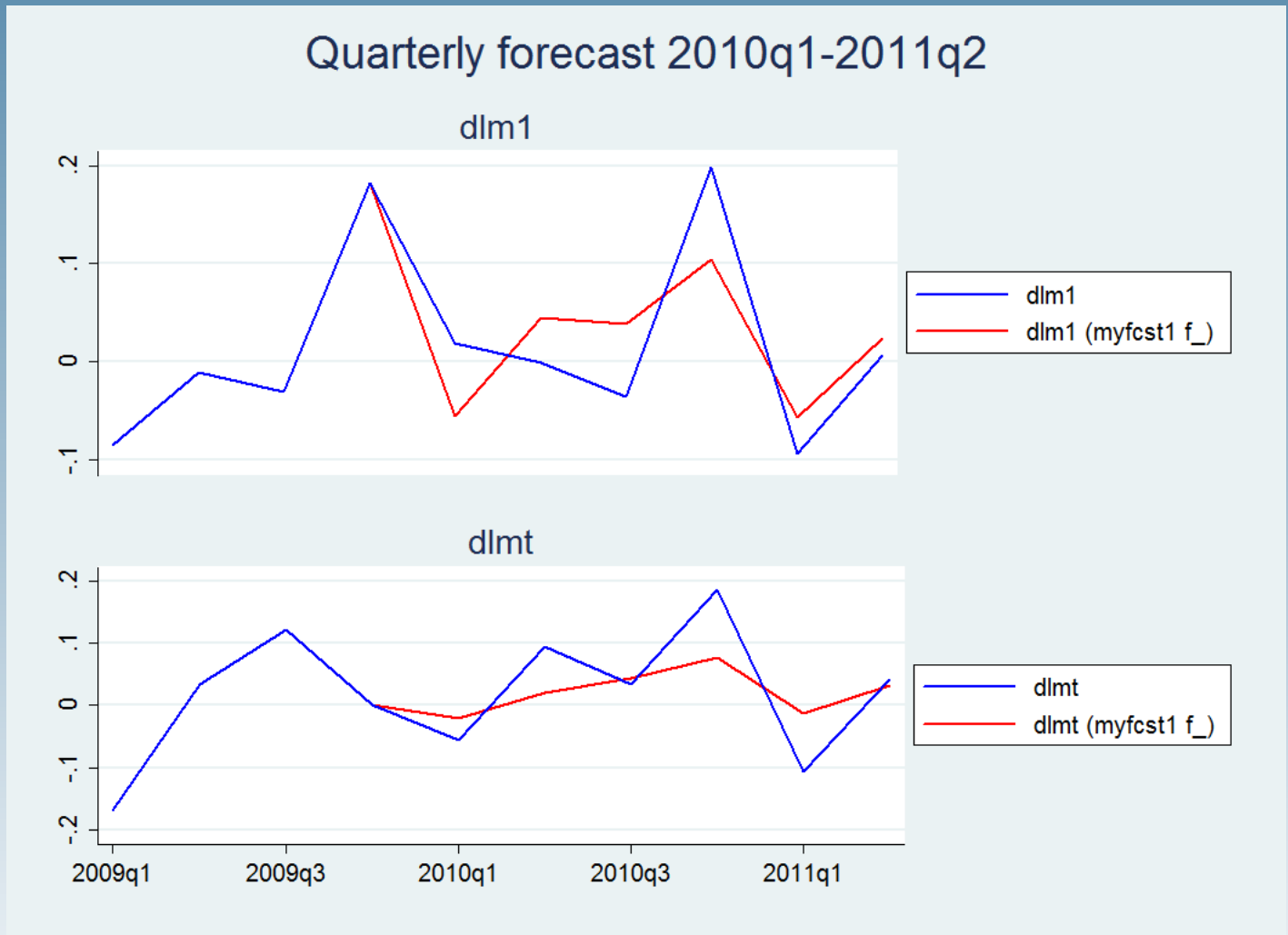
Questions?

Example 1: Time series - OLS regressions



Example 2: Working with time series operators

- Same two models but using first difference operator (D.)

```
. regress D.lm1 D.lpib D.lipcp97 if tin(1989q1,2009q4),noheader vsquish
```

D.lm1	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lpib						
D1.	1.081708	.1506757	7.18	0.000	.7818536	1.381562
lipcp97						
D1.	-.3440374	.1829109	-1.88	0.064	-.7080417	.0199669
_cons	.0220782	.014986	1.47	0.145	-.0077448	.0519012

```
. estimates store eq2_m1
.
. regress D.lmt D.ltcpn D.lpib if tin(1989q1,2009q4),noheader vsquish
```

D.lmt	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ltcpn						
D1.	-.1963056	.1439482	-1.36	0.176	-.4827717	.0901604
lpib						
D1.	.675093	.1495172	4.52	0.000	.3775444	.9726417
_cons	.0204891	.0123684	1.66	0.102	-.0041248	.0451029

```
. estimates store eq2_mt
```

Example 2: Working with time series operators

- Same two models but using first difference operator (D.)

```
. regress D.lm1 D.lpib D.lipcp97 if tin(1989q1,2009q4),noheader vsquish
```

D.lm1	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lpib						
D1.	1.081708	.1506757	7.18	0.000	.7818536	1.381562
lipcp97						
D1.	-.3440374	.1829109	-1.88	0.064	-.7080417	.0199669
_cons	.0220782	.014986	1.47	0.145	-.0077448	.0519012

```
. estimates store eq2_m1
.
. regress D.lmt D.ltcpn D.lpib if tin(1989q1,2009q4),noheader vsquish
```

D.lmt	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ltcpn						
D1.	-.1963056	.1439482	-1.36	0.176	-.4827717	.0901604
lpib						
D1.	.675093	.1495172	4.52	0.000	.3775444	.9726417
_cons	.0204891	.0123684	1.66	0.102	-.0041248	.0451029

```
. estimates store eq2_mt
```

Example 2: Working with time series operators

- Include name for dependent variable

```
. forecast create myfcst2
  Forecast model myfcst2 started.
. forecast estimates eq2_m1,names(Dlm1)
  Added estimation results from regress.
  Forecast model myfcst2 now contains 1 endogenous variable.
. forecast estimates eq2_mt,names(Dlmt) advise
  (These estimation results are no longer needed; you can drop them.)
  Added estimation results from regress.
  Forecast model myfcst2 now contains 2 endogenous variables.
```

- Add identities for log-levels

```
. forecast identity lm1=L.lm1+Dlm1
  Forecast model myfcst2 now contains 3 endogenous variables.
. forecast identity lmt=L.lmt+Dlmt
  Forecast model myfcst2 now contains 4 endogenous variables.
```

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Ex 4.2: Forecast scenarios

Ex 4.3: Coefficient Vector

Questions?

Example 2: Working with time series operators

- Include name for dependent variable

```
. forecast create myfcst2
  Forecast model myfcst2 started.
. forecast estimates eq2_m1,names(Dlm1)
  Added estimation results from regress.
  Forecast model myfcst2 now contains 1 endogenous variable.
. forecast estimates eq2_mt,names(Dlmt) advise
  (These estimation results are no longer needed; you can drop them.)
  Added estimation results from regress.
  Forecast model myfcst2 now contains 2 endogenous variables.
```

- Add identities for log-levels

```
. forecast identity lm1=L.lm1+Dlm1
  Forecast model myfcst2 now contains 3 endogenous variables.
. forecast identity lmt=L.lmt+Dlmt
  Forecast model myfcst2 now contains 4 endogenous variables.
```

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Questions?

Example 2: Working with time series operators

- Add identities for the levels of the dependent variable

```
. forecast identity m1 = exp(lm1)
  Forecast model myfcst2 now contains 5 endogenous variables.
. forecast identity mt = exp(lmt)
  Forecast model myfcst2 now contains 6 endogenous variables.


. forecast solve, begin(q(2010q1)) prefix(f2_)
Computing dynamic forecasts for model myfcst2.
------------------------------------------------------------------------------

Starting period:  2010q1
Ending period:    2011q2
Forecast prefix:  f2_

2010q1:  ..............
2010q2:  ..............
2010q3:  ..............
2010q4:  ..............
2011q1:  ..............
2011q2:  ..............

Forecast 6 variables spanning 6 periods.
------------------------------------------------------------------------------
```

Example 2: Working with time series operators

- Add identities for the levels of the dependent variable

```
. forecast identity m1 = exp(lm1)
  Forecast model myfcst2 now contains 5 endogenous variables.
. forecast identity mt = exp(lmt)
  Forecast model myfcst2 now contains 6 endogenous variables.

. forecast solve, begin(q(2010q1)) prefix(f2_)
Computing dynamic forecasts for model myfcst2.
------------------------------------------------------------------------------

Starting period:  2010q1
Ending period:    2011q2
Forecast prefix:  f2_
2010q1:  ..............
2010q2:  ..............
2010q3:  ..............
2010q4:  ..............
2011q1:  ..............
2011q2:  ..............
Forecast 6 variables spanning 6 periods.
------------------------------------------------------------------------------
```

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Ex 4.1: xtreg xtabond

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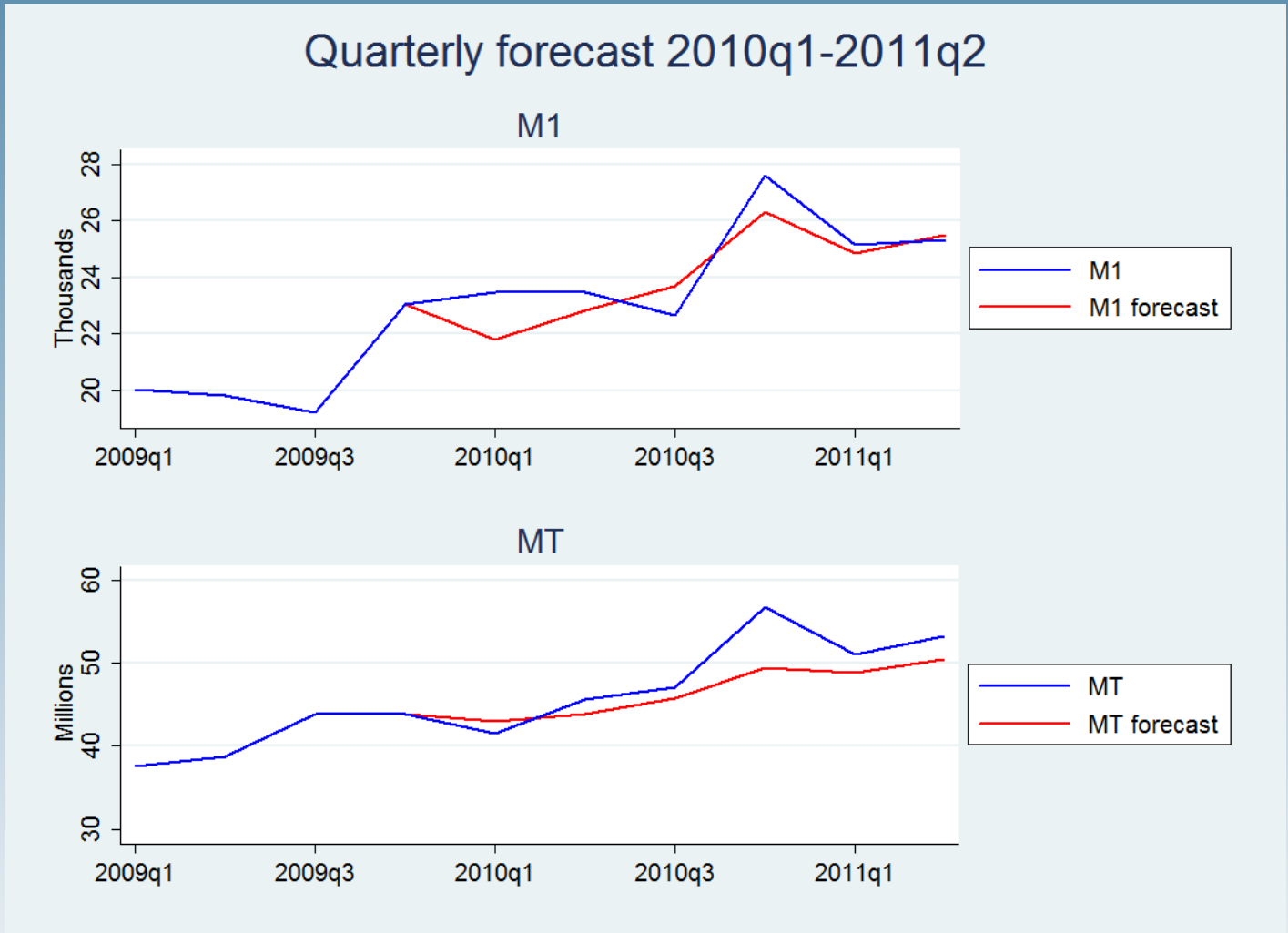
Ex 4.3: Coefficient Vector

Questions?

Example 2: Working with time series operators



Example 3.1: Systems of equations (VAR) and ARIMA

```
. var dlpib dlxt if tin(1989q1,2009q4),lags(1) exog(dlipex) vsquish noconstant

Vector autoregression

Sample:  1989q3 - 2009q4                        No. of obs      =         82
Log likelihood =  202.7663                      AIC             = -4.799178
FPE            =  .0000282                      HQIC            = -4.728476
Det(Sigma_ml)  =  .0000244                      SBIC            = -4.623077

Equation           Parms      RMSE     R-sq      chi2     P>chi2
------------------------------------------------------------------
dlpib                  3     .065405   0.1882   19.01206   0.0003
dlxt                   3     .078392   0.5244   90.42973   0.0000
------------------------------------------------------------------
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
dlpib						
dlpib						
L1.	-.4349428	.1037079	-4.19	0.000	-.6382065	-.231679
dlxt						
L1.	-.1074271	.0657059	-1.63	0.102	-.2362082	.021354
dlipex	.4569253	.3233219	1.41	0.158	-.176774	1.090625
dlxt						
dlpib						
L1.	.9716131	.1243015	7.82	0.000	.7279866	1.21524
dlxt						
L1.	-.2507243	.0787533	-3.18	0.001	-.4050779	-.0963707
dlipex	.4622208	.3875249	1.19	0.233	-.2973142	1.221756

Example 3.1: Systems of equations (VAR) and ARIMA

```
. var dlpib dlxt if tin(1989q1,2009q4),lags(1) exog(dlipex) vsquish noconstant

Vector autoregression

Sample:  1989q3 - 2009q4                        No. of obs      =         82
Log likelihood =  202.7663                      AIC             = -4.799178
FPE            =  .0000282                      HQIC            = -4.728476
Det(Sigma_ml)  =  .0000244                      SBIC            = -4.623077

Equation           Parms      RMSE     R-sq      chi2     P>chi2
------------------------------------------------------------------
dlpib                  3     .065405   0.1882   19.01206   0.0003
dlxt                   3     .078392   0.5244   90.42973   0.0000
------------------------------------------------------------------
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
dlpib						
dlpib L1.	-.4349428	.1037079	-4.19	0.000	-.6382065	-.231679
dlxt L1.	-.1074271	.0657059	-1.63	0.102	-.2362082	.021354
dlipex	.4569253	.3233219	1.41	0.158	-.176774	1.090625
dlxt						
dlpib L1.	.9716131	.1243015	7.82	0.000	.7279866	1.21524
dlxt L1.	-.2507243	.0787533	-3.18	0.001	-.4050779	-.0963707
dlipex	.4622208	.3875249	1.19	0.233	-.2973142	1.221756

Example 3.1: Systems of equations (VAR) and ARIMA

```
. arima dlipex if tin(1989q1,2009q4),arima(4,0,0) nolog vsquish
ARIMA regression
Sample:  1989q1 - 2009q4                        Number of obs      =        84
                                                Wald chi2(4)       =    829.23
Log likelihood =  295.3648                      Prob > chi2        =    0.0000
```

dlipex	Coef.	OPG Std. Err.	z	P>|z|	[95% Conf.	Interval]
dlipex						
_cons	.0041001	.0048688	0.84	0.400	-.0054427	.0136428
ARMA						
ar						
L1.	1.969244	.1136402	17.33	0.000	1.746513	2.191975
L2.	-1.922958	.1900391	-10.12	0.000	-2.295428	-1.550489
L3.	1.053276	.1576608	6.68	0.000	.7442666	1.362286
L4.	-.2896628	.0892802	-3.24	0.001	-.4646488	-.1146769
/sigma	.0070179	.0004398	15.96	0.000	.0061559	.0078799

```
Note: The test of the variance against zero is one sided, and the two-sided
    confidence interval is truncated at zero.
. estimates store eq_ar1
```

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Ex 4.2: Forecast scenarios

Ex 4.3: Coefficient Vector

Questions?

Example 3.1: Systems of equations (VAR) and ARIMA

- Create and solve the model

```
. forecast create myfcst3
  Forecast model myfcst3 started.
. forecast estimates eq_var
  Added estimation results from var.
  Forecast model myfcst3 now contains 2 endogenous variables.
. forecast estimates eq_ar1
  Added estimation results from arima.
  Forecast model myfcst3 now contains 3 endogenous variables.
.
. forecast solve, begin(tq(2010q1)) prefix(f3_)
Computing dynamic forecasts for model myfcst3.
------------------------------------------------------------

Starting period:  2010q1
Ending period:    2011q2
Forecast prefix:  f3_
2010q1:  ..............
2010q2:  ..............
2010q3:  ..............
2010q4:  ..............
2011q1:  ..............
2011q2:  ..............
Forecast 3 variables spanning 6 periods.
------------------------------------------------------------
```

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Ex 1: regress

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Ex 4: Panel data

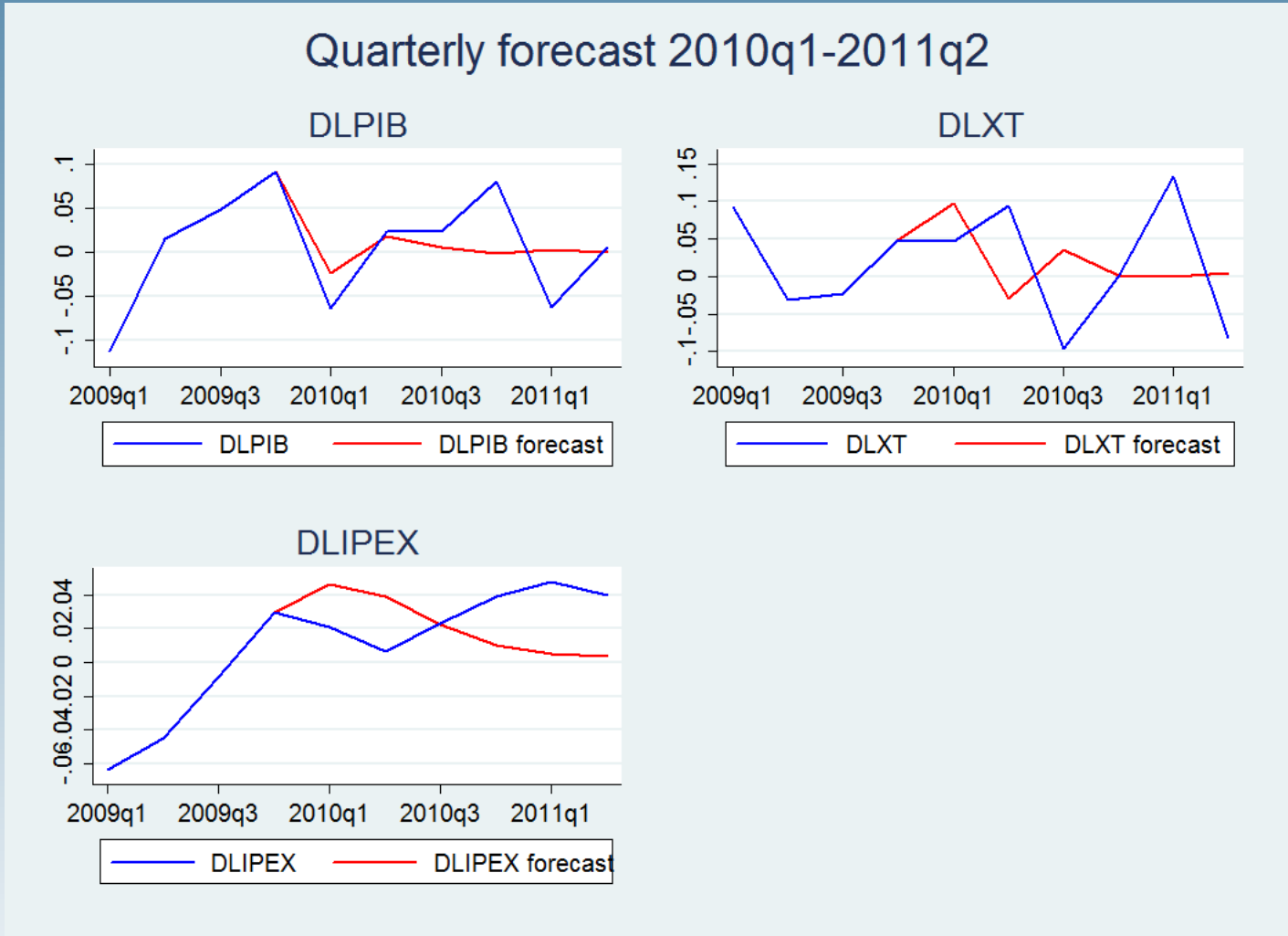
Ex 4.1: xtreg xtabond

Ex 4.2: Forecast scenarios

Ex 4.3: Coefficient Vector

Questions?

Example 3.1: Systems of equations (VAR) and ARIMA



Example 3.2: Simulations

- Solve model (dlpib, dlxt, dlipex) including simulations

```
. forecast solve,  begin(tq(2010q1)) prefix(fs_)  log(off)        ///
>         simulate(betas, statistic(stddev, prefix(sd_)) reps(100))

Computing dynamic forecasts for model myfcst3.

Starting period:  2010q1
Ending period:    2011q2
Forecast prefix:  fs_

Performing simulations (100)
----+--- 1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..................................................    50
..................................................   100

Forecast 3 variables spanning 6 periods.
```

- Compute limits for confidence intervals

```
. foreach x of varlist dlpib dlxt dlipex {
  2.         quietly gen fs_`x´_ul = fs_`x´ + invnormal(0.975)*sd_`x´
  3.         quietly gen fs_`x´_ll = fs_`x´ + invnormal(0.025)*sd_`x´
  4. }
```

Example 3.2: Simulations

- Solve model (dlpib, dlxt, dlipex) including simulations

```
. forecast solve,  begin(tq(2010q1)) prefix(fs_)  log(off)        ///
>         simulate(betas, statistic(stddev, prefix(sd_)) reps(100))
Computing dynamic forecasts for model myfcst3.
------------------------------------------------------------------------------

Starting period:  2010q1
Ending period:    2011q2
Forecast prefix:  fs_

Performing simulations (100)
----+--- 1 ----+--- 2 ----+--- 3 ----+--- 4 ----+--- 5
..................................................    50
..................................................   100
Forecast 3 variables spanning 6 periods.
------------------------------------------------------------------------------
```

- Compute limits for confidence intervals

```
. foreach x of varlist dlpib dlxt dlipex {
  2.         quietly gen fs_`x´_ul = fs_`x´ + invnormal(0.975)*sd_`x´
  3.         quietly gen fs_`x´_ll = fs_`x´ + invnormal(0.025)*sd_`x´
  4. }
```

Example 3.2: Simulations

- Solve model (dlpib, dlxt, dlipex) including simulations

```
. forecast solve,  begin(tq(2010q1)) prefix(fs_)  log(off)        ///
>         simulate(betas, statistic(stddev, prefix(sd_)) reps(100))
Computing dynamic forecasts for model myfcst3.
------------------------------------------------------------------------------

Starting period:  2010q1
Ending period:    2011q2
Forecast prefix:  fs_

Performing simulations (100)
----+--- 1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
.....................................................    50
.....................................................   100

Forecast 3 variables spanning 6 periods.
------------------------------------------------------------------------------
```

- Compute limits for confidence intervals

```
. foreach x of varlist dlpib dlxt dlipex {
  2.         quietly gen fs_`x´_ul = fs_`x´ + invnormal(0.975)*sd_`x´
  3.         quietly gen fs_`x´_ll = fs_`x´ + invnormal(0.025)*sd_`x´
  4. }
```

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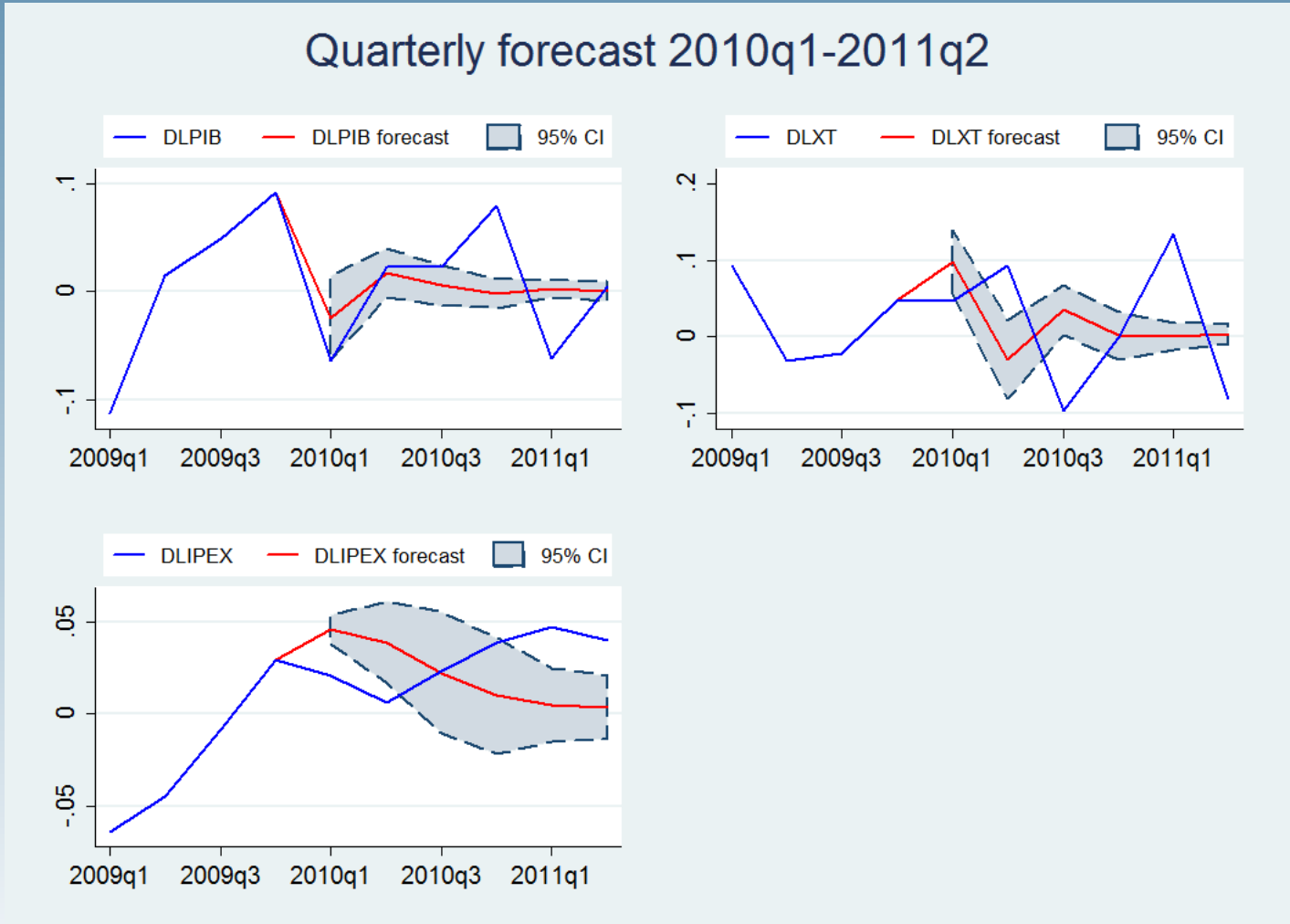
Questions?

Example 3.2: Simulations

- Confidence intervals based on simulations



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Ex 4.2: Forecast scenarios

Ex 4.3: Coefficient Vector

Questions?

Examples with Panel data

- Model for aggregate consumption

$$consumo_{it} = \alpha + pib_{it} * \beta_1 + pib_{it-1} * \beta_2 + irate_{it} * \beta_3 + \mu_i + \nu_{it}$$

Data

- World Bank public online data on:

  consumo: Final consumption expenditure (Y2000=100)
  pib: Gross domestic product (Y2000=100)
  irate deposit interest rate
- Period: 2000-2010 for 112-116 countries :
- Source:http://databank.worldbank.org/data/Home.aspx

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  irate deposit interest rate
- Period: 2000-2010 for 112-116 countries :
- Source:http://databank.worldbank.org/data/Home.aspx

Example 4.1: xtreg xtabond

- Fixed effects model for consumption

```
. xtreg lconsumo L(0/1).lpib lirate if year<2007,fe vsquish
Fixed-effects (within) regression               Number of obs      =       654
Group variable: country                         Number of groups   =       116

R-sq:  within  = 0.7738                         Obs per group: min =         1
       between = 0.9935                                        avg =       5.6
       overall = 0.9924                                        max =         6

                                                F(3,535)           =    610.19
corr(u_i, Xb)  = 0.7688                         Prob > F           =    0.0000
```

lconsumo	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lpib						
--.	.7191382	.0751612	9.57	0.000	.571491	.8667855
L1.	.1410591	.0815228	1.73	0.084	-.0190849	.301203
lirate	-.0138219	.0052345	-2.64	0.009	-.0241045	-.0035393
_cons	3.137966	.5386802	5.83	0.000	2.079778	4.196153
sigma_u	.2614921					
sigma_e	.05014561					
rho	.96452975	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(115, 535) =    55.01                 Prob > F = 0.0000

. estimates store eq_con
```

Example 4.1: xtreg xtabond

- Fixed effects model for consumption

```
. xtreg lconsumo L(0/1).lpib lirate if year<2007,fe vsquish
Fixed-effects (within) regression               Number of obs      =       654
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------------------------------------------------------------------------------
    lconsumo |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       lpib |
         --. |   .7191382   .0751612     9.57   0.000      .571491    .8667855
         L1. |   .1410591   .0815228     1.73   0.084    -.0190849     .301203
     lirate |  -.0138219   .0052345    -2.64   0.009    -.0241045   -.0035393
      _cons |   3.137966   .5386802     5.83   0.000     2.079778    4.196153
-------------+----------------------------------------------------------------
     sigma_u |  .2614921
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         rho |  .96452975   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(115, 535) =    55.01                 Prob > F = 0.0000

. estimates store eq_con
```

Example 4.1: xtreg xtabond

- Dynamic model for GDP

```
. xtabond lpib trend if year<2007,lags(1) vsquish
Arellano-Bond dynamic panel-data estimation  Number of obs      =       538
Group variable: country                      Number of groups   =       115
Time variable: year
                                             Obs per group: min =         1
                                                            avg =  4.678261
                                                            max =         5
Number of instruments =     17               Wald chi2(2)       =   7682.64
                                             Prob > chi2        =    0.0000
One-step results
```

lpib	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lpib						
L1.	.8500304	.038387	22.14	0.000	.7747932	.9252675
trend	.0125958	.0017827	7.07	0.000	.0091019	.0160897
_cons	3.549008	.9035604	3.93	0.000	1.778062	5.319954

```
Instruments for differenced equation
        GMM-type: L(2/.).lpib
        Standard: D.trend
Instruments for level equation
        Standard: _cons
. estimates store eq_lpib
```

Example 4.1: xtreg xtabond

- Dynamic model for interest rate

```
. xtabond lirate if year<2007,lags(2) vsquish
Arellano-Bond dynamic panel-data estimation  Number of obs      =       423
Group variable: country                      Number of groups   =       112
Time variable: year
                                             Obs per group: min =         1
                                                            avg =  3.776786
                                                            max =         4
Number of instruments =     15               Wald chi2(2)       =    211.52
                                             Prob > chi2        =    0.0000
One-step results
```

lirate	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lirate						
L1.	.8837478	.0643112	13.74	0.000	.7577002	1.009795
L2.	-.4333317	.044075	-9.83	0.000	-.519717	-.3469463
_cons	.8355917	.099475	8.40	0.000	.6406244	1.030559

```
Instruments for differenced equation
        GMM-type: L(2/.).lirate
Instruments for level equation
        Standard: _cons
. estimates store eq_lirate
```

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Ex 4.3: Coefficient Vector

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Example 4.1: xtreg xtabond

Create and solve the model

```
. quietly forecast create xtfcst
. quietly forecast estimates eq_con
. forecast estimates eq_lpib
    forecast will use the default type of prediction for xtabond. Verify this
    is appropriate; see xtabond postestimation. Use the predict() option with
    forecast estimates to override the default.
  Added estimation results from xtabond.
  Forecast model xtfcst now contains 2 endogenous variables.

. forecast estimates eq_lirate
    forecast will use the default type of prediction for xtabond. Verify this
    is appropriate; see xtabond postestimation. Use the predict() option with
    forecast estimates to override the default.
  Added estimation results from xtabond.
  Forecast model xtfcst now contains 3 endogenous variables.

. capture noisily forecast solve
must have strongly balanced panel data
```

Oops! Unbalanced panels... Use tsfill

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    forecast estimates to override the default.
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Ex 4.3: Coefficient Vector

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Example 4.1: xtreg xtabond

Create and solve the model

```
. tsfill,full

. capture noisily forecast solve, begin(2007) end(2009)
Computing dynamic forecasts for model xtfcst.
------------------------------------------------------------------------------

Starting period:  2007
Ending period:    2009
Number of panels: 117
Forecast prefix:  f_

Solving panel 1
Solving panel 2
Solving panel 3
Solving panel 4
Solving panel 5
Solving panel 6
Solving panel 7
Solving panel 8
Solving panel 9
missing values encountered
    Missing values were encountered while attempting to solve the model at
    time 2009 in panel 18.  Variable lpib evaluates to missing.
```

Oops! missing data... Drop panels with missing data

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Questions?

Example 4.1: xtreg xtabond

Create and solve the model

```
. tsfill,full


. capture noisily forecast solve, begin(2007) end(2009)
Computing dynamic forecasts for model xtfcst.
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Starting period:  2007
Ending period:    2009
Number of panels: 117
Forecast prefix:  f_

Solving panel 1
Solving panel 2
Solving panel 3
Solving panel 4
Solving panel 5
Solving panel 6
Solving panel 7
Solving panel 8
Solving panel 9

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Ex 4.3: Coefficient Vector

Questions?

Example 4.1: xtreg xtabond

Keep panels with full (required) data for forecast period

```
. /*   Balanced panels for forecasting period
>   egen nomiss=rownonmiss(lconsumo lpib lirate)
>   by country: generate mycount=nomiss==3 if year>=2005
>   keep if mycount==1
>   xtset country year
>   keep country year consumo pib irate lconsumo lpib lirate trend
>   by country:keep if _N==6
>   xtset country year
> */
```

```
. forecast solve, begin(2007) end(2010) log(off)
Computing dynamic forecasts for model xtfcst.
------------------------------------------------------------------------------

Starting period:  2007
Ending period:    2010
Number of panels: 78
Forecast prefix:  f_
Forecast 3 variables spanning 4 periods for 78 panels.
------------------------------------------------------------------------------
```

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Questions?

Example 4.1: xtreg xtabond

Keep panels with full (required) data for forecast period

```
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>   egen nomiss=rownonmiss(lconsumo lpib lirate)
>   by country: generate mycount=nomiss==3 if year>=2005
>   keep if mycount==1
>   xtset country year
>   keep country year consumo pib irate lconsumo lpib lirate trend
>   by country:keep if _N==6
>   xtset country year
> */

. forecast solve, begin(2007) end(2010) log(off)
Computing dynamic forecasts for model xtfcst.
------------------------------------------------------------------------------

Starting period:  2007
Ending period:    2010
Number of panels: 78
Forecast prefix:  f_
Forecast 3 variables spanning 4 periods for 78 panels.
------------------------------------------------------------------------------
```

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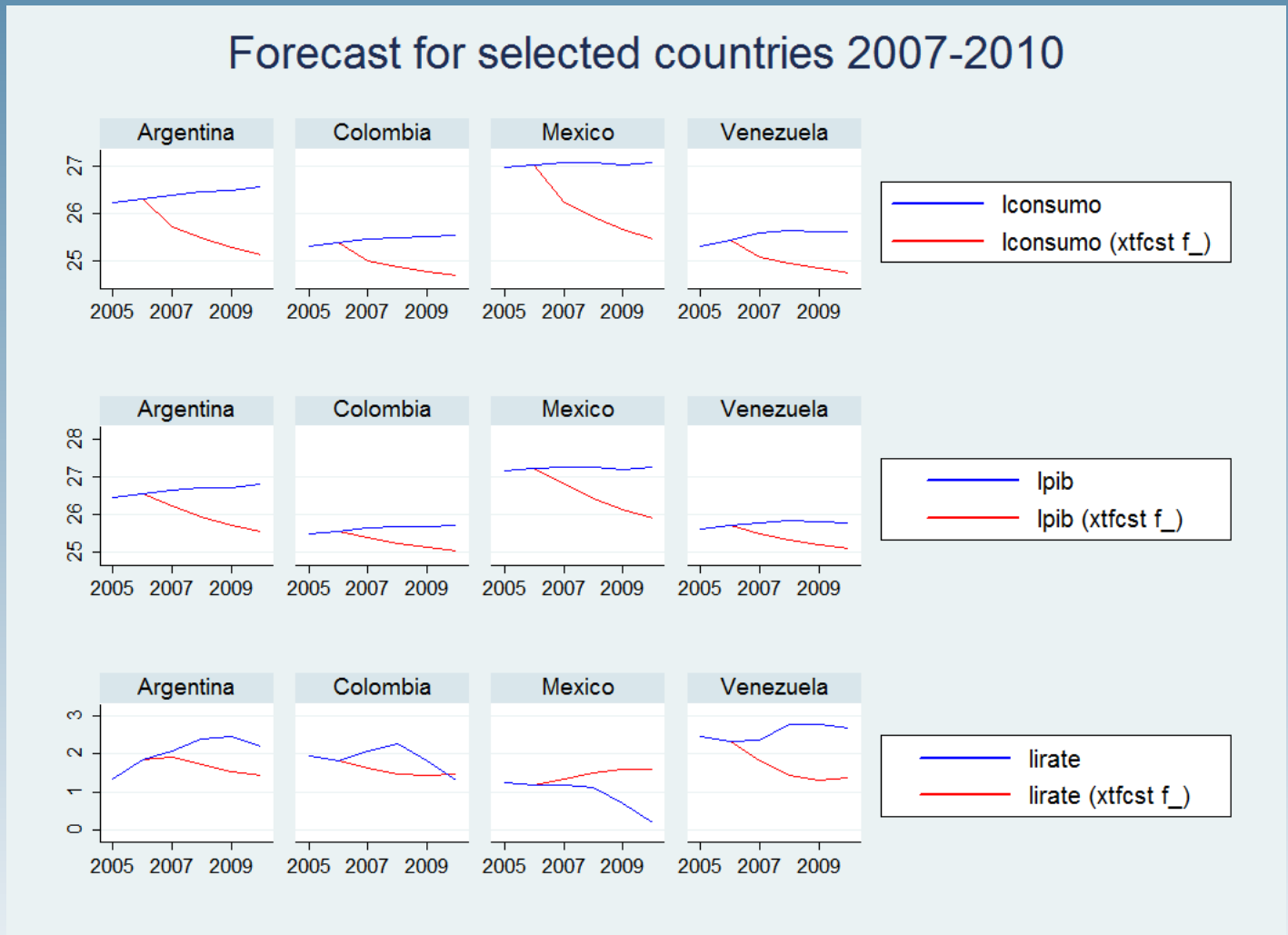
Questions?

Example 4.1: xtreg xtabond



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Ex 4: Panel data

Ex 4.1: xtreg xtabond

Ex 4.2: Forecast scenarios

Ex 4.3: Coefficient Vector

Questions?

Example 4.2: Panel Data - Forecast scenarios

- Scenarios for GDP (PIB) and interest rate

```
. forecast adjust lpib = ln(pib*1.2) if tin(2007,2008)    ///
>         & (country==146 | country==241)
  Endogenous variable lpib now has 1 adjustment.
. forecast adjust lpib = ln(pib*.8) if tin(2007,2008)     ///
>         & (country==9 | country==44)
  Endogenous variable lpib now has 2 adjustments.


. forecast adjust lirate = ln(irate-3) if tin(2007,2010)  ///
>         & (country==9 | country==44 | country==241)
  Endogenous variable lirate now has 1 adjustment.
. forecast adjust lirate = ln(irate-1) if tin(2007,2010)  ///
>         & country==146
  Endogenous variable lirate now has 2 adjustments.

. forecast solve, begin(2007) end(2010)  log(off) prefix(fa_)
Computing dynamic forecasts for model xtfcst.
------------------------------------------------------------

Starting period:  2007
Ending period:    2010
Number of panels: 78
Forecast prefix:  fa_
Forecast 3 variables spanning 4 periods for 78 panels.
------------------------------------------------------------
```

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Ex 4.1: xtreg xtabond

Ex 4.2: Forecast scenarios

Ex 4.3: Coefficient Vector

Questions?

Example 4.2: Panel Data - Forecast scenarios

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>         & (country==9 | country==44 | country==241)
  Endogenous variable lirate now has 1 adjustment.
. forecast adjust lirate = ln(irate-1) if tin(2007,2010)  ///
>         & country==146
  Endogenous variable lirate now has 2 adjustments.


. forecast solve, begin(2007) end(2010)  log(off) prefix(fa_)
Computing dynamic forecasts for model xtfcst.
------------------------------------------------------------

Starting period:  2007
Ending period:    2010
Number of panels: 78
Forecast prefix:  fa_
Forecast 3 variables spanning 4 periods for 78 panels.
------------------------------------------------------------
```

Example 4.2: Panel Data - Forecast scenarios

- Scenarios for GDP (PIB) and interest rate

```
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>         & (country==146 | country==241)
  Endogenous variable lpib now has 1 adjustment.
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>         & (country==9 | country==44)
  Endogenous variable lpib now has 2 adjustments.


. forecast adjust lirate = ln(irate-3) if tin(2007,2010)  ///
>         & (country==9 | country==44 | country==241)
  Endogenous variable lirate now has 1 adjustment.
. forecast adjust lirate = ln(irate-1) if tin(2007,2010)  ///
>         & country==146
  Endogenous variable lirate now has 2 adjustments.


. forecast solve, begin(2007) end(2010)  log(off) prefix(fa_)
Computing dynamic forecasts for model xtfcst.
------------------------------------------------------------

Starting period:  2007
Ending period:    2010
Number of panels: 78
Forecast prefix:  fa_
Forecast 3 variables spanning 4 periods for 78 panels.
------------------------------------------------------------
```

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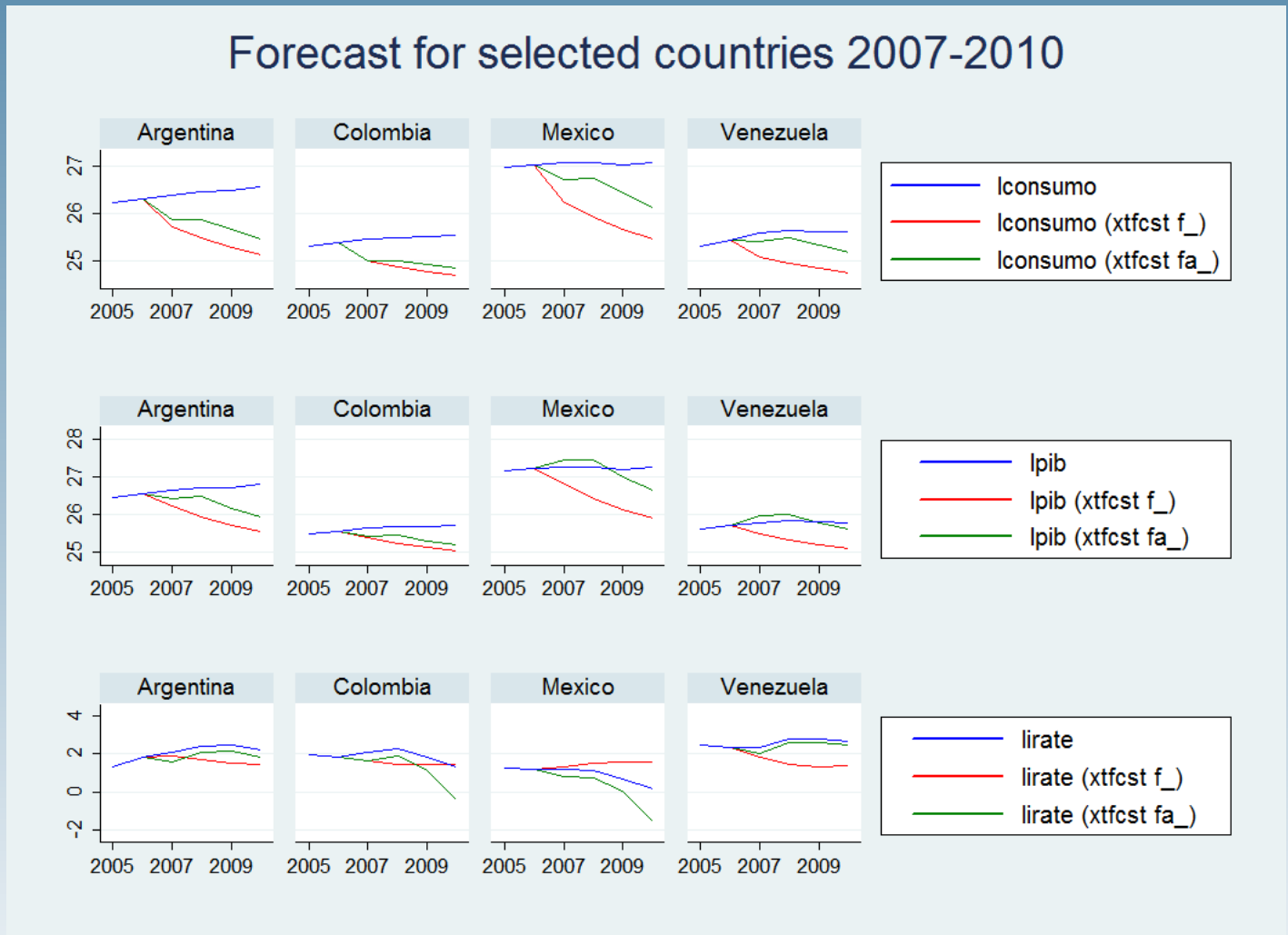
Example 4.2: Panel Data - Forecast scenarios



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Ex 4.2: Forecast scenarios

Ex 4.3: Coefficient Vector

Questions?

Example 4.3: Panel Data - Coefficient Vector

- Coefficient vector for lincome

```
. matrix lincome = (.96, -.06, 2.6)
. matrix coleq lincome =  lincome:L.lincome       ///
>                         lincome:L2.lincome      ///
>                         lincome:_cons
. matrix list lincome
lincome[1,3]
     lincome:  lincome:  lincome:
           L.       L2.
     lincome   lincome     _cons
r1       .96      -.06       2.6
```

```
. forecast coefvector lincome
  Forecast model xtfcst now contains 4 endogenous variables.

. forecast solve, begin(2007) end(2010) prefix(fcv_) log(off)
Computing dynamic forecasts for model xtfcst.
------------------------------------------------------------

Starting period:  2007
Ending period:    2010
Number of panels: 74
Forecast prefix:  fcv_
Forecast 4 variables spanning 4 periods for 74 panels.
------------------------------------------------------------
```

Example 4.3: Panel Data - Coefficient Vector

- Coefficient vector for lincome

```
. matrix lincome = (.96, -.06, 2.6)
. matrix coleq lincome =  lincome:L.lincome       ///
>                         lincome:L2.lincome      ///
>                         lincome:_cons
. matrix list lincome
lincome[1,3]
     lincome:  lincome:  lincome:
           L.       L2.
     lincome   lincome     _cons
r1       .96      -.06       2.6


. forecast coefvector lincome
  Forecast model xtfcst now contains 4 endogenous variables.


. forecast solve, begin(2007) end(2010) prefix(fcv_) log(off)
Computing dynamic forecasts for model xtfcst.
------------------------------------------------------------

Starting period:  2007
Ending period:    2010
Number of panels: 74
Forecast prefix:  fcv_
Forecast 4 variables spanning 4 periods for 74 panels.
------------------------------------------------------------
```

Example 4.3: Panel Data - Coefficient Vector

- Coefficient vector for lincome

```
. matrix lincome = (.96, -.06, 2.6)
. matrix coleq lincome =  lincome:L.lincome       ///
>                         lincome:L2.lincome      ///
>                         lincome:_cons
. matrix list lincome
lincome[1,3]
     lincome:  lincome:  lincome:
           L.       L2.
     lincome   lincome     _cons
r1       .96      -.06       2.6


. forecast coefvector lincome
  Forecast model xtfcst now contains 4 endogenous variables.

. forecast solve, begin(2007) end(2010) prefix(fcv_) log(off)
Computing dynamic forecasts for model xtfcst.
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Starting period:  2007
Ending period:    2010
Number of panels: 74
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Ex 4.2: Forecast scenarios

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Example 4.3: Panel Data - Coefficient Vector

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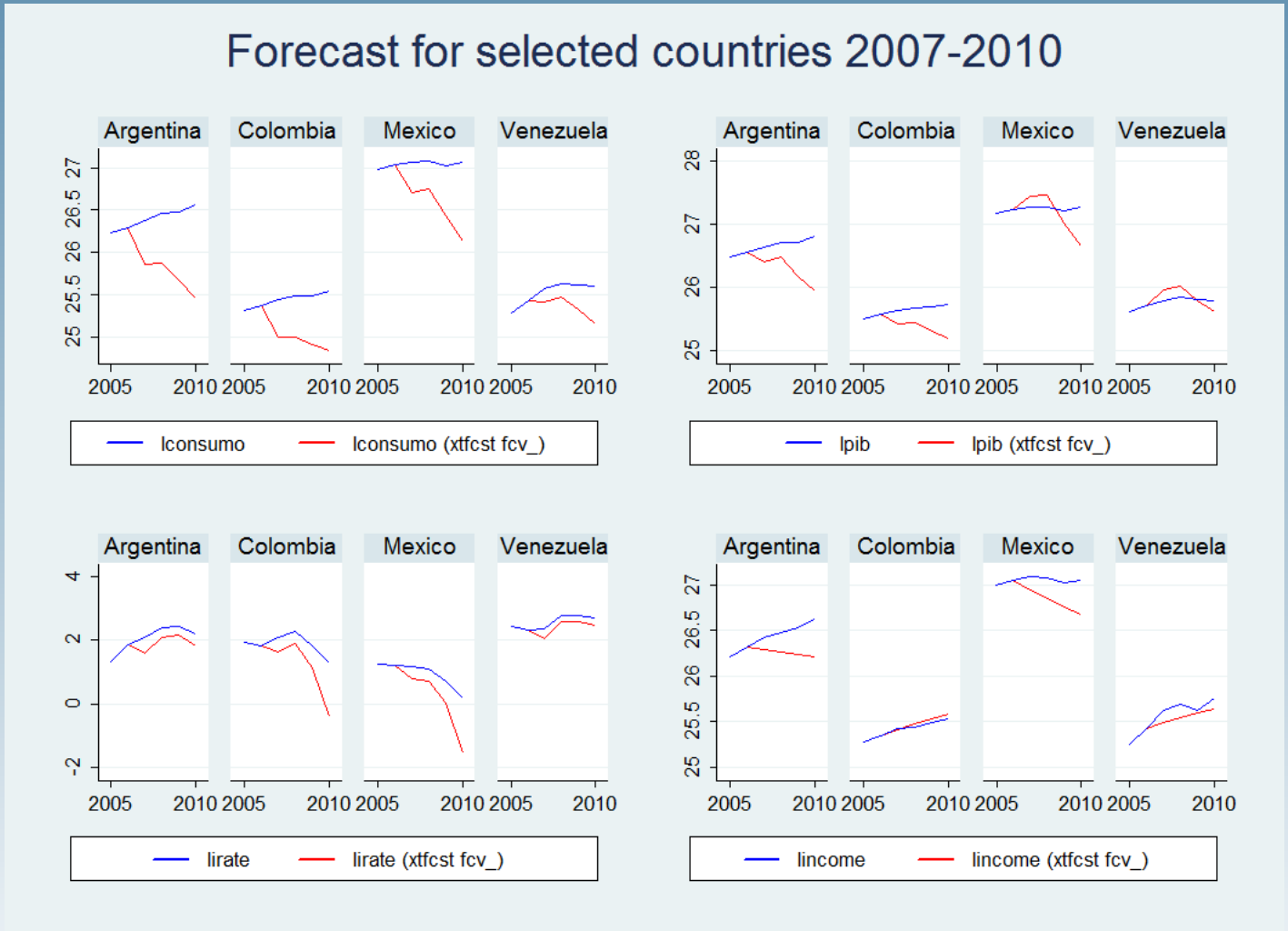

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Ex 4.2: Forecast scenarios

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