Using the Bilateral Trade Model

Douglas Nyhus
INFORUM, University of Maryland
13th Inforum World Conference
Huangshan, China
July 2005

What, where, how and why?

- Review of BTM's central equation
- Independent variables for BTM
- BTM itself
- Radiating BTM data
- Final processing
- BTM within the System

INFORUM
Interindustry Forecasting at the University of Maryland

Bilateral Trade Model: The Central Equation

- Shares of imports by originating country
- Prices by exporter
- Production capacity
- Trends
- Tariffs

INFORUM
Interindustry Forecasting at the University of Maryland

$$S_{ijt} = \beta_{ij0} * \left(\frac{P_{eit}}{P_{wjt}}\right)^{\beta_{ij1}} * \left(\frac{K_{eit}}{K_{wjt}}\right)^{\beta_{ij2}} * e^{\beta_{ij3} T_t}$$

- S_{ijt} = the share of country i in the imports of a given product into a given country j in year t (0 denotes the base year 1995)
- P_{eit} = the effective price of the good in question in country i (exporter) in year t, defined as a moving average of domestic market prices for the last three years;
- P_{wjt} = the world price of the good in question as seen from country j (importer) in year t (see fuller description below);

INFORUM
Interindustry Forecasting at the University of Maryland

Equation Cont'd

- K_{eit} = an index of effective capital stock in the industry in question in country i in year t, defined as a moving average of the capital stock indices for the last three years;
- K_{wjt} = an index of world average capital stock in the industry in question as seen from country j in year t (see fuller description below);
- T_t = Nyhus trend variable, set to zero in the base year.
- β_{ij0}, β_{ij1}, β_{ij2}, β_{ij3} are estimated parameters.

INFORUM
Interindustry Forecasting at the University of Maryland

Equation cont'd

- The world price, P_{wjt}, is defined as a fixed-weighted average of effective prices in all exporting countries of the good in question in year t:

$$P_{wjt} = \sum_i S_{ij0} P_{eit} \quad ; \quad \sum_i S_{ij0} = 1$$

- and the world average capital stock, K_{wjt}, is defined as a fixed-weighted average of capital stocks in all exporting countries of the sector in question in year t;
- K_{wjt} similarly defined as P_{wjt} .

INFORUM
Interindustry Forecasting at the University of Maryland

Step one: Creating Independent Variables

- Import levels
- Prices
- Capital stocks

INFORUM
Interindustry Forecasting at the University of Maryland

Country Data

- Create, using G, the country.vam file
- Data from each of the countries in exactly the form from the country model itself
- Directory: \link2025\indpdyme
- Exchange rate scenarios created separately in \link2025\exrats

France: An example

- From country.cfg (portion for France)
- 1972 2025 # Starting and ending dates of the Vam file
- frprice 88 1 0 fratit.ttl # Export price indices for France
- frinvest 38 1 0 fracap.ttl # Capital investment for France
- frimport 88 1 0 fratit.ttl # imports for France
- From Country.add (portion for France)
- fdates 1972 2025
- vam \link2025\daf\fr b
- do {vf frprice%1 = b.pex%1
- vf frimport%1 = b.imp%1
- } (1-88)
- do {vf frinvest%1 = b.cap%1
- } (1-38)

INFORUM
Interindustry Forecasting at the University of Maryland

Linking to BTM data

- Dyme type program
- Links country data to BTM. Assuming the country data acts as an index to BTM
- One country sector to one BTM sector is default
- For aggregations/splits of country it uses the equation override feature of Interdyme
- Equation overrides are also used for extending those models not forecasting to 2025

Special Note for Capital Stock Data

- First pass of Dyme (through all years) assigns capital investment to appropriate BTM sector and then cumulates the investment into a capital stock figure (all in national units) using an 8% depreciation rate
- @cum(stock, invest,.08)
- On second pass the capital stock indexes are computed using BTM base year (1995) and the appropriate unit bucket correction

INFORUM
Interindustry Forecasting at the University of Maryland

Step two: BTM Model

- Uses the resulting dyme.vam file from indpvam directory as input
- Has a stock set of fixes to correct bad equations—all of them are “mul” fixes to retain some of the structure of the model.
- Model runs over the period 2001-2025
- Output is file of bilateral trade flows and shares (dyme.vam); file of those trade shares and sums by column before any fixes (raw.vam); file of total exports and import prices by BTM sector (indp.vam)

INFORUM
Interindustry Forecasting at the University of Maryland

Step Two Continued

- Batch file for BTM
- echo run model
- copy dymesav.vam dyme.vam
- copy \link2025\indpdyme\dyme.vam indp.vam
- call fixes
- fixrbild_12000
- Dymex
- :: these two g files create country totals for trade and prices--
- g7 stub\sectors.get
- g7 maktotal\finish
- copy ws.* dyme.*
- call saver %1

INFORUM
Interindustry Forecasting at the University of Maryland

Step 3: Radiating the Results to Country Models

- Create a vam file with BTM results in country specific sectors
- \link2025\raddyme directory: radiate.cfg for vam file
- Uses the indp.vam file from the model as input
- One-to-one correspondence is the default
- Equation fixes for other cases
- For each country creates a file with country imports in current prices; imports in 1995 prices; and exports in 1995 prices

Step 3 Continued

- Take the results of raddyme and use in a model
- G add files
- Create import prices and link to model
- Link BTM exports to model
- Write out files for use as “fixes” when running model

INFORUM
Interindustry Forecasting at the University of Maryland

```
vam \link2025\daf\us b
ba \link2025\indpdyme\dyme a
fdates 1972 2025
add index usexr 95
vam \link2025\raddyme\dyme c
do {f usaimp%1 =  (c.usimportcur%1/c.usimport%1)*indusexr} (1-97)
do {
        f ex%1 = b.ex%1
        ls ex%1 c.usexport%1 102
   }  (1-58,66(4,7,8,25))
do {
        f fpi%1 = b.fpi%1
        ls fpi%1 usaimp%1 102
   }  (1-58,66(4,7,8,25))
save gfexp.usa
do {
   spr ex%1 102 120
   }  (1-58,66(4,7,8,25))
save off
save gffpi.usa
do {
   spr fpi%1 102 120
   }  (1-58,91,(4,5,7,8,25,40,48,91))
save off
```

INFORUM
Interindustry Forecasting at the University of Maryland

Final Step

- Put files as written by G into form usable by Interdyme's Fixer.
- g7 usa.add
- copy gfexp.usa \idlift\model\btm\gfexp.sav
- copy gffpi.usa \idlift\model\btm\gffpi.sav
- cd \idlift\model\btm
- g7todym gfexp.sav gfexp.fix
- g7todym gffpi.sav gffpi.fix

INFORUM
Interindustry Forecasting at the University of Maryland