



Macroeconomic Modeling of Natural Resource Inflows

PNG Institute of National Affairs

Natural Resource Extraction and *Dutch Disease*: Application to Papua New Guinea

PFTAC/IMF
Bank of PNG



Background

- Request by Treasury and Bank of PNG to IMF to provide macroeconomic modeling tools for helping to manage the expected surge in LNG revenues
- Two modeling workshops were held with Bank of PNG and Treasury in 2011 and 2012 to roll out medium-sized DSGE model developed by IMF's Research Department and provide training in its use
- Model background:
 - Simulating impact of aid surge
 - Boom-bust cycle in Mongolia



The Big Picture: Natural Resource Curse

- Does it exist? At a minimum, it is not an iron law ...
- Dutch disease mechanism is only one possible transmission mechanism that leads to natural resource curse and may not be of critical importance in PNG
- Rent seeking and quality of institutions probably matters more
- Volatility often proves harmful, but PNG managed this well during the last commodity boom-bust cycle



Baseline Scenario

The baseline scenario is characterized by:

- Surge of LNG revenues due to start-up of production
- Full spending by government of LNG-revenue inflows, mostly on consumption
- Fully flexible exchange rate, i.e., no reserve accumulation



Baseline Scenario (continued)

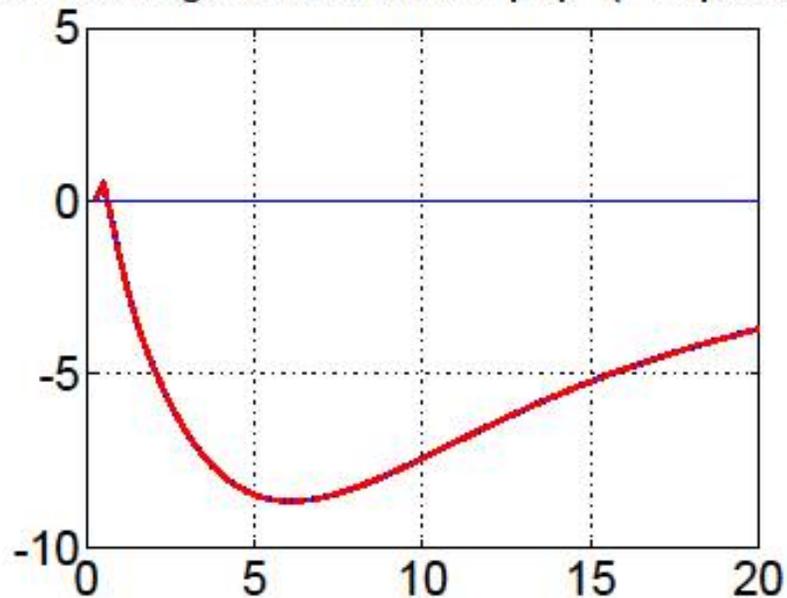
Simulation of baseline scenario generates Dutch disease effects in the form of:

- Real appreciation
- Shrinkage of tradable sector production
- What does not happen is a long-term adverse impact on tradable sector production or real non-mineral GDP—generating these effects requires a modification of the transmission mechanism

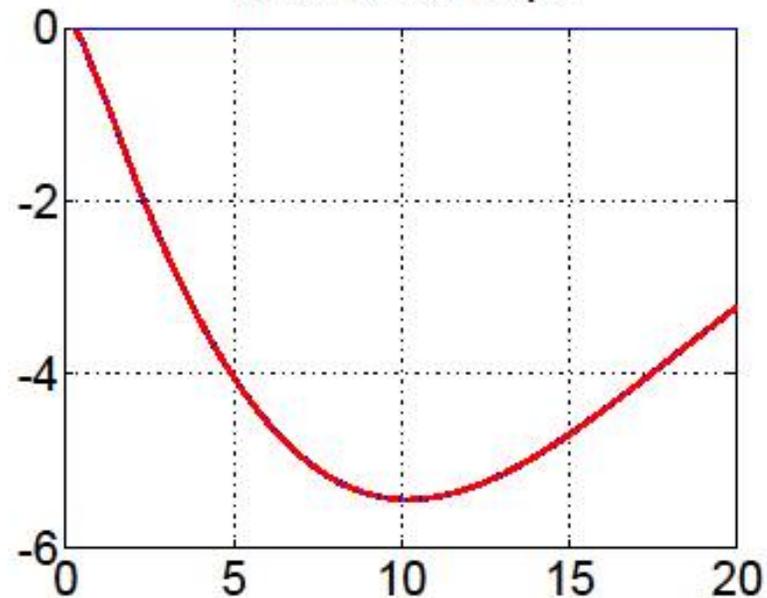


Baseline Scenario (continued)

Real Exchange Rate as Ratio of p^T/p^N (+ Depreciation)



Tradable Real Output



Transmission Mechanism

- It is all about the supply response!
- Specifically, the transmission is driven by an increase in government demand for non-tradables; bringing about a supply response requires shifting production factors from the tradable to the non-tradable sector, thereby necessitating the shrinkage of the tradable sector
- The real appreciation is a critical part of this transmission mechanism



Transmission Mechanism (continued)

- Monetary policy can prevent a real appreciation through sufficient tightening of the monetary policy stance:
 - this is the case both under a fixed and flexible exchange rate regime
 - but this puts it in conflict with an expansionary fiscal policy stance: something has to give, which is private sector demand, i.e., there will be crowding out of private sector demand
 - The bottom line is that macroeconomic management of natural resource inflows is mostly a fiscal task



Transmission Mechanism (continued)

Are Dutch disease effects in the form of the real exchange rate appreciation and shrinkage of traded sector production harmful?

- From the standpoint of the modeling simulations, the answer is no: both effects are equilibrium responses to an increase in demand for non-tradables
- Taking a somewhat broader viewpoint, volatility is likely to prove harmful because shifting resources between sectors is a costly process



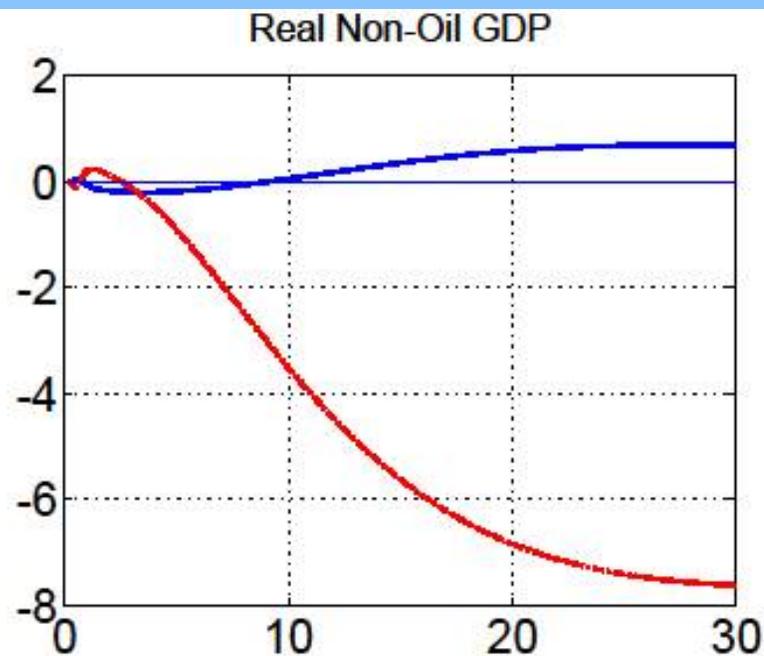
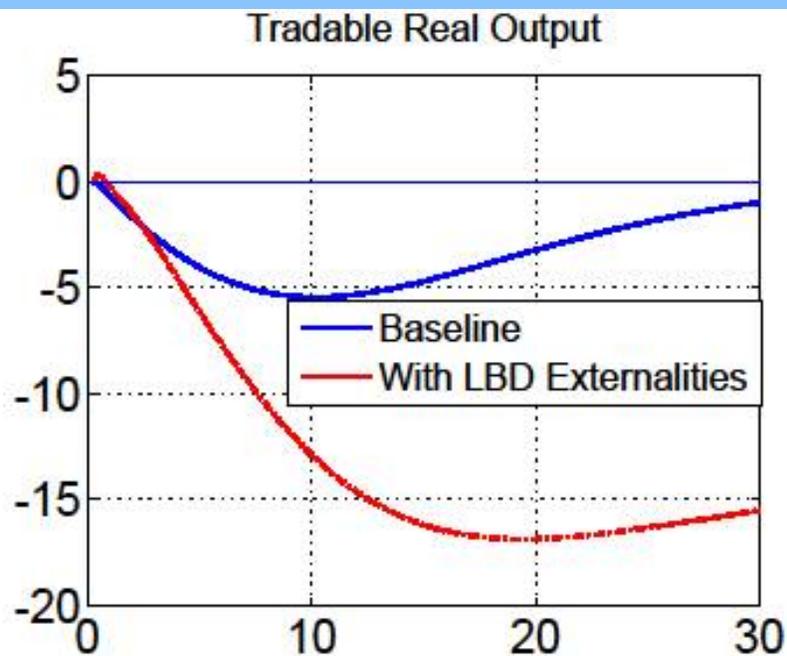
Dutch Disease Effects under a Worst Case Scenario

- Sometimes Dutch disease effects are associated with creating a long-lasting negative effect on economic development by damaging the tradable sector
- This does not happen in the above simulations and requires an additional feature: the tradable sector needs to have a special role for economic development
 - Fits with the notion that industrialization is at the heart of economic development
 - Technically, tradable sector needs to be a special source of productivity growth: if tradable sector declines, productivity levels decline, thereby lowering output



Dutch Disease Effects under a Worst Case Scenario (cont.)

Adding learning-by-doing externalities to the tradable sector:



Dutch Disease Effects under a Worst Case Scenario (cont.)

Are such strong adverse Dutch disease effects realistic for PNG?

- Probably not, because such effects are only realistic for the manufacturing sector, which currently does not play a major role in PNG's economy
- Hence, this is best viewed as a worst-case scenario
- It is nevertheless instructive to consider what policy options are available to prevent these effects from occurring



Policy Responses

- It's all about fiscal policy!
 - Spend or save (financially)?
 - ✓ SWF would enable the latter , which would mitigate macroeconomic impact of rise in natural resource inflows
 - ✓ Actual decision is to spend (now) (?)



Policy Responses (continued)

- It's all about fiscal policy!
 - Spending on what?
 - ✓ Spending on tradables would also mitigate Dutch disease effects – focus on public investment spending with high import content?
 - ✓ Spending on public investment or consumption? The first could compensate in part for some of the Dutch disease effects (on the tradable sector)
 - Expenditure profile - smoothing would be desirable!
 - ✓ Bottlenecks
 - ✓ Sustainability

