Valuation of oil and gas reserves after SNA 2008/ESA 2010

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Outline

– Short history
– Changes as a result of SNA 2008 / ESA 2010
– Some reassessments of the method
– Results and sensitivity analysis of discount rates
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Short history

– Oil and gas reserves have been measured for some time
– Started with the government appropriation method
– Deemed too low, as it does not capture the full value of the reserves.
– As of 2008/2009 NPV method, based on ESA 1995. Main reasons were
  - i.) mfp and capital estimates for the mining and quarrying industry;
  - ii.) inclusion in environmental accounts and;
  - iii.) balance sheets for non financial assets.
Changes as a result of SNA 2008 / ESA 2010

– Revision of NA provided the basis for implementing changes in method of oil and gas reserves.
– Need to align requirements from SEEA-CF & SNA/ESA
– Four changes were implemented:
  1. Single year unit resource rent;
  2. Revaluations based on in situ price;
  3. Other items on the balance sheet based on the in situ price;
  4. All physical future extraction paths for gas taken from TNO (Dutch applied scientific research organisation).
Some reassessments of the method

- The adoption of SEEA-CF and SNA 2008/ ESA 2010 not only made changes, but also a reassessment of the method within SN was in order. Four items concerning the method were reassessed:
  1. The government (S.13) is the owner of the assets;
  2. Real discount rate is set at 4 percent;
  3. Dividing resource rent of oil and gas uses gross production as weights;
  4. UN framework (UNFC-2009) for the classification of reserves is adopted.
Results and sensitivity analysis

- Single year unit resource rent
  - More volatile than 3 year moving average;
  - Gives higher NPV for the period 2002-2014;
  - Correctly reflects changes in the resource rent;
  - Prevents the emergence of a negative net income when the value of physical extraction exceeds the resource rent.
Results and sensitivity analysis

- Single year unit resource rent vs. Three year moving average
Results and sensitivity analysis

– Revaluations based on the in situ price
  - Used to be based on the unit resource rent
  - In situ price is the ratio between the physical and monetary stock
  - Now the monetary volume change follows the evolution of the physical quantity in the ground.
Results and sensitivity analysis

- Revaluations based on the in situ price
Results and sensitivity analysis

– Other items on the balance sheet based on the in situ price;
– If the revaluations are based on the in situ price, so can the other items on the balance sheet.
Results and sensitivity analysis

– Other items on the balance sheet based on the in situ price; e.g. extractions:
Results and sensitivity analysis

- All physical extraction paths taken from TNO.
  - Provides reliable and detailed information on the extraction of oil and natural gas.
  - If the path does not add up to exhaustion of the reserves, we add our own linearly declining path for the remainder.
  - A debate on the maximum threshold extraction level has started because of increase in the risk of earthquakes in Groningen.
Results and sensitivity analysis
Results and sensitivity analysis

- All physical extraction paths taken from TNO
- NPV of natural gas varies according to extraction ceiling for the Groningen accumulation set by ministry of Economic Affairs:
Results and sensitivity analysis

– Discount rate set at 4 percent
  - Other rates are possible and should preferably include the importance of future generations.
  - The bandwidth is between 2 and 8 percent.
Results and sensitivity analysis

- NPV at different discount rates

![Graph showing NPV at different discount rates](image-url)
Concluding remarks

- Monetary and physical balance sheets are now aligned and consistent with both environmental accounts (SEEA-CF) and national accounts (SNA/ESA).
- Future research includes:
  - Include decommissioning costs of produced capital
  - Further research and change of the discount rate at next NA benchmark revision
Questions

– Questions?
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