

Measuring a Port's Performance Using the Economic Value of Commodities

Dr. Zamira S. Simkins and Dr. Richard D. Stewart



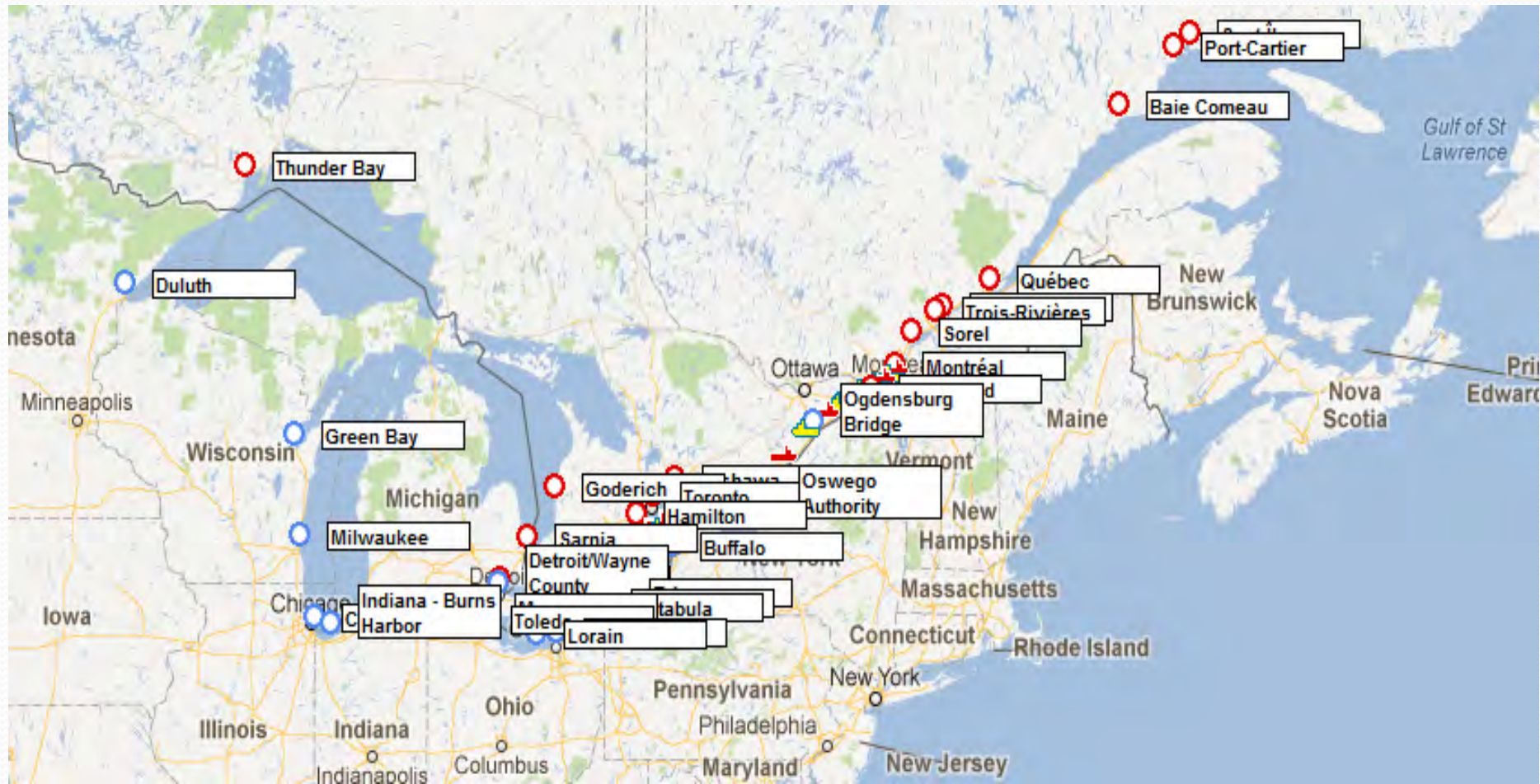
Port Performance Measures

- Ports:
 - Containers, bulk cargo, combination
 - Heterogeneity of cargo and port performance comparison
- Conventional/internal port performance measures:
 - Operational indicators (tonnage)
 - Financial indicators (revenue/ton)
- Cargo value and allocation of economic resources

Cargo Value as a Port Performance Measure

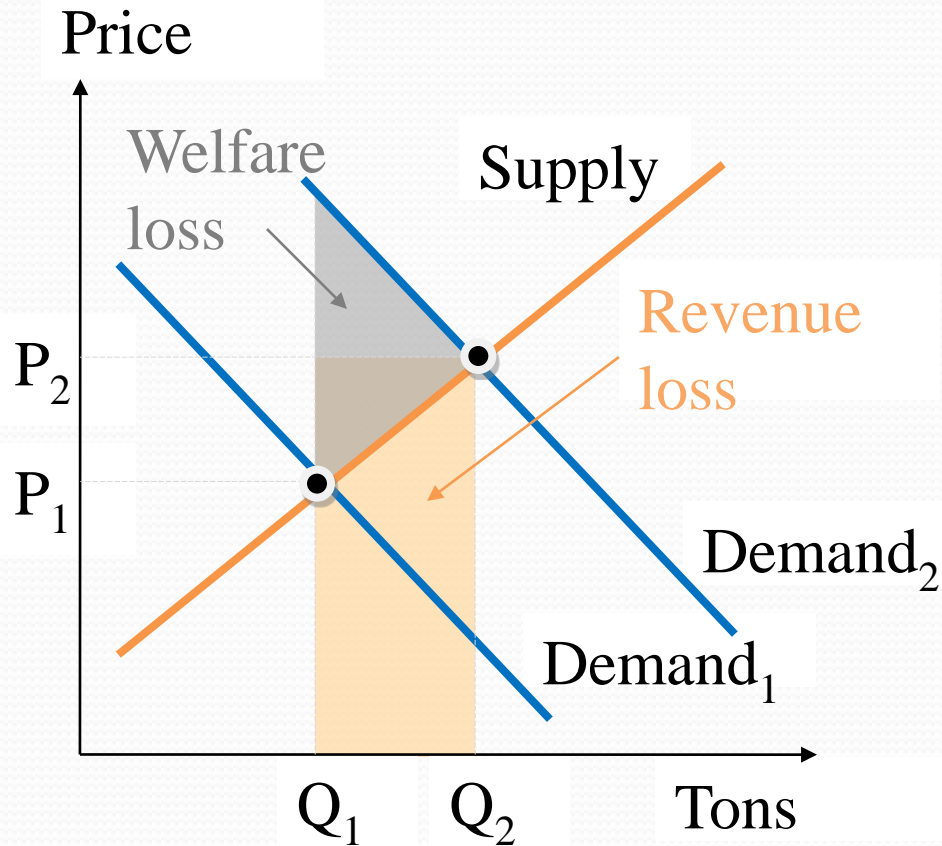
- Container ports:
 - Port of Los-Angeles: #1 in cargo value (2007)
- Martin and Associates (2011)
- U.S. Army Corps of Engineers (2008)
 - Cargo value for the Great Lakes system
- Bureau of Transportation Statistics (2012)
 - Value of cargo by mode on national level
- Lack of bulk port data and no clear methodology
- System-wide view vs. individual port funding

Port of Duluth-Superior: Case Study

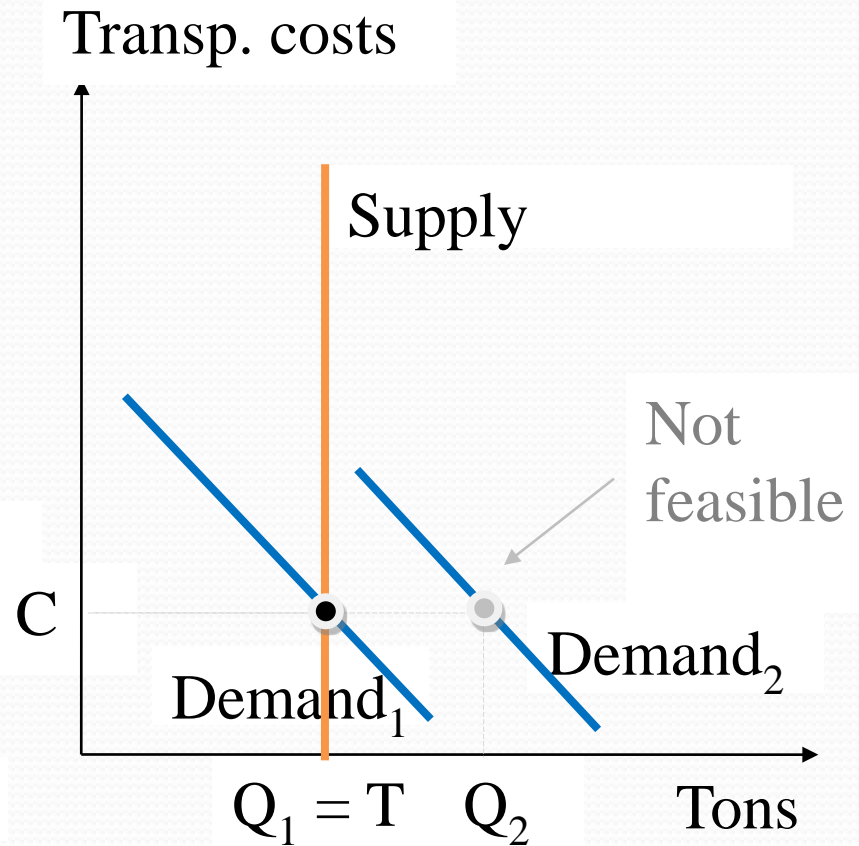


Cargo Value and Port's Performance

Panel A. Commodity Market



Panel B. Port's Services



Proposed Port Performance Measures

1. Total real value of a port's cargo

$$TRV_t = \sum_{i=1}^N P_{it} Q_{it} \div \left(\frac{PPI_{it}}{100} \right)$$

2. Average real value per ton moved

$$ARV_t = \frac{TRV_t}{\sum_{i=1}^N Q_{it}}$$

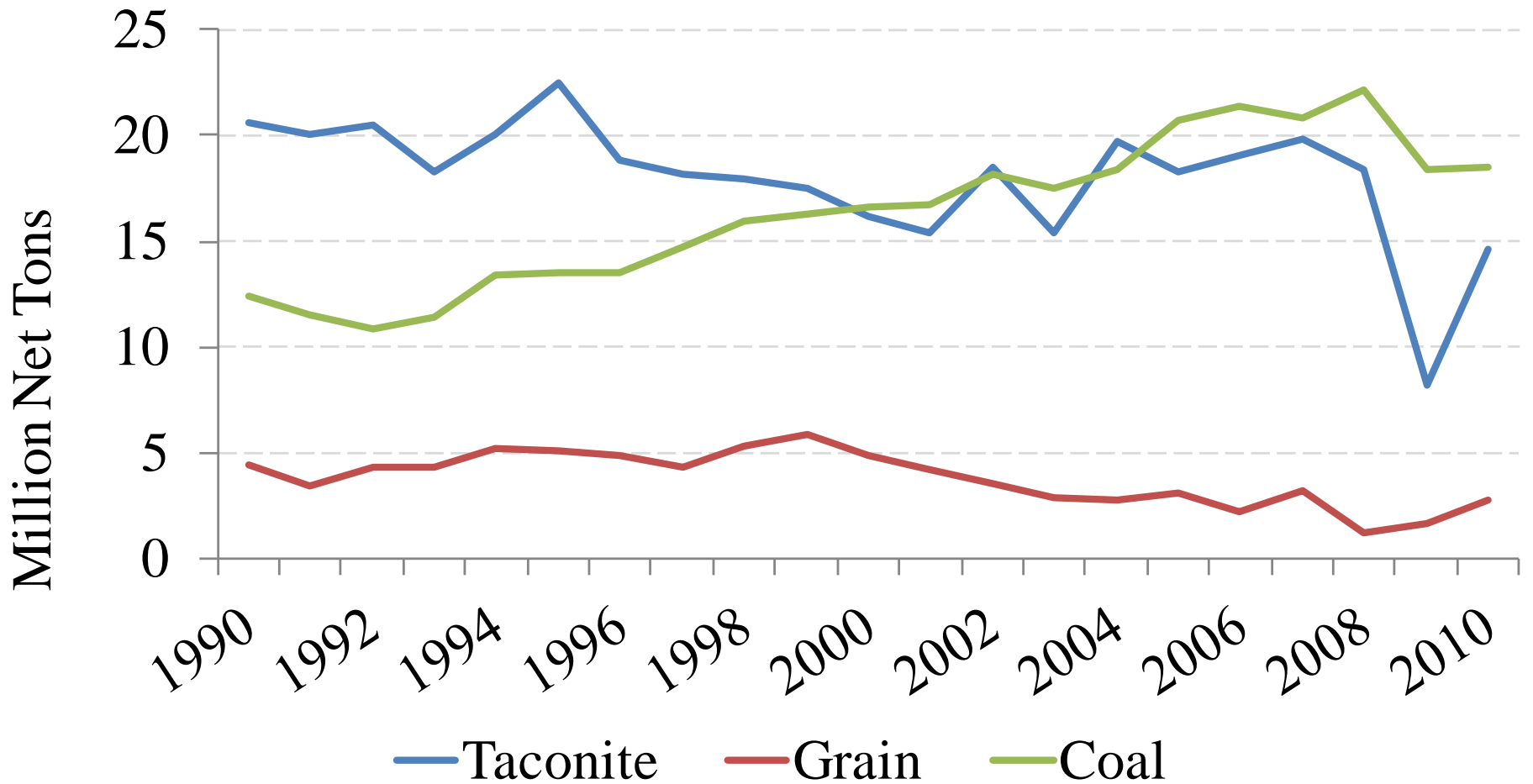
3. Real value index of a port

$$RVI_t = \frac{TRV_t}{TRV_{base}} \times 100$$

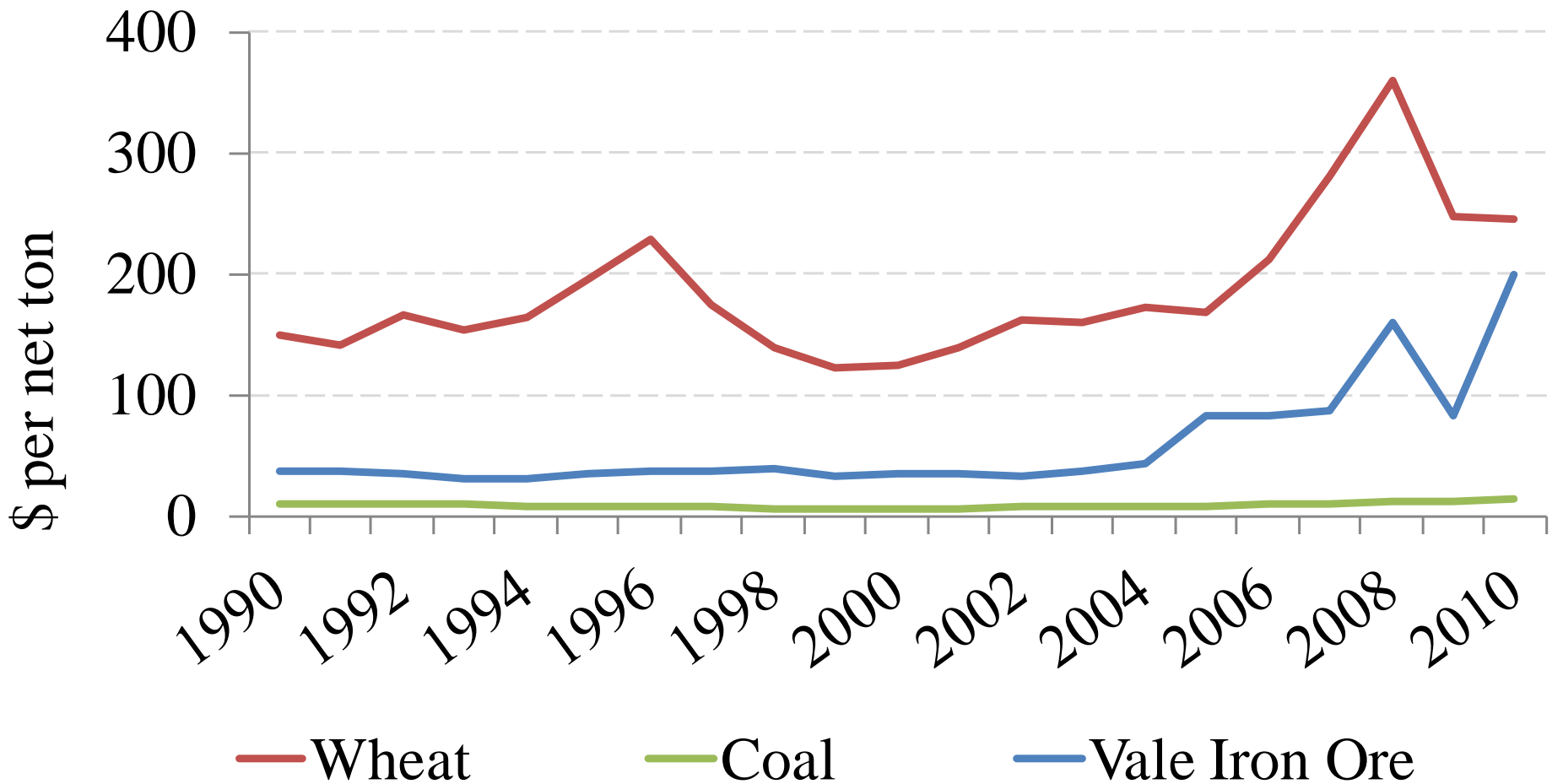
Data Sources

Data	Source
Cargo tonnage	U.S. Army Corps of Engineers
Wheat prices	World Bank
Coal prices	U.S. Energy Information Administration
Taconite prices	MN DNR/World Steel Dynamics
Producer price indices	Bureau of Labor Statistics

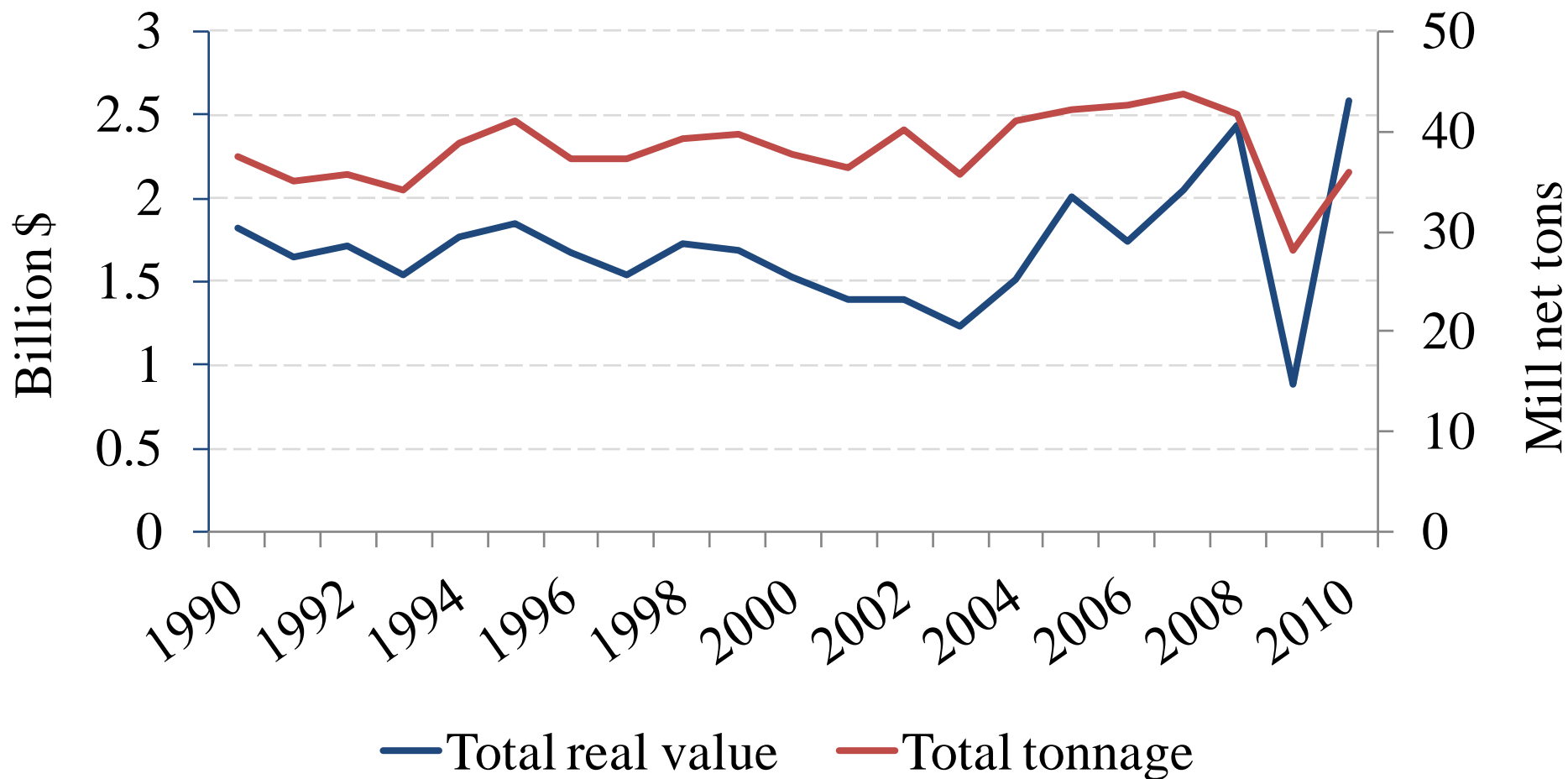
Port of Duluth-Superior Commodities Tonnage



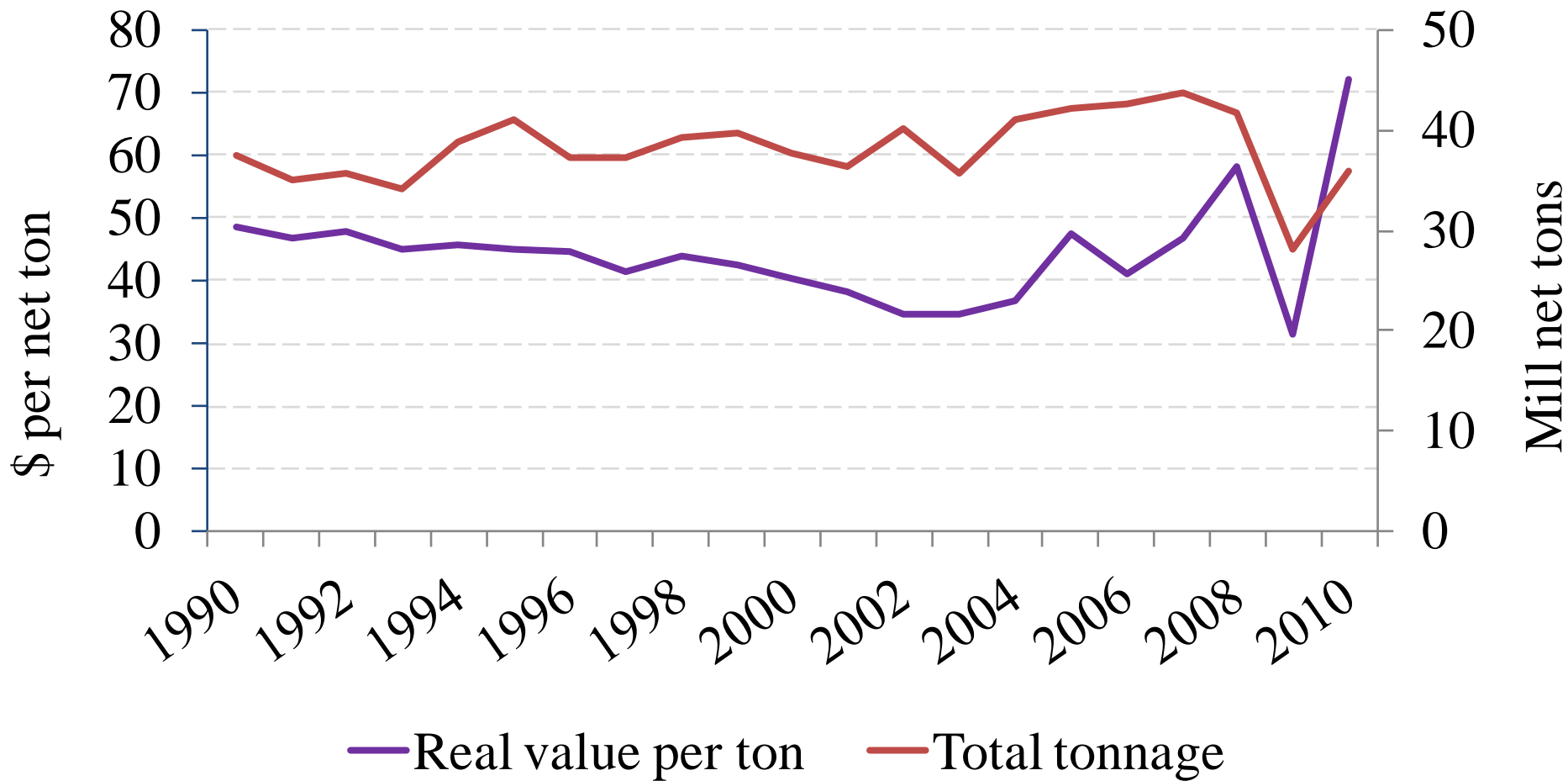
Commodities Nominal Market Prices



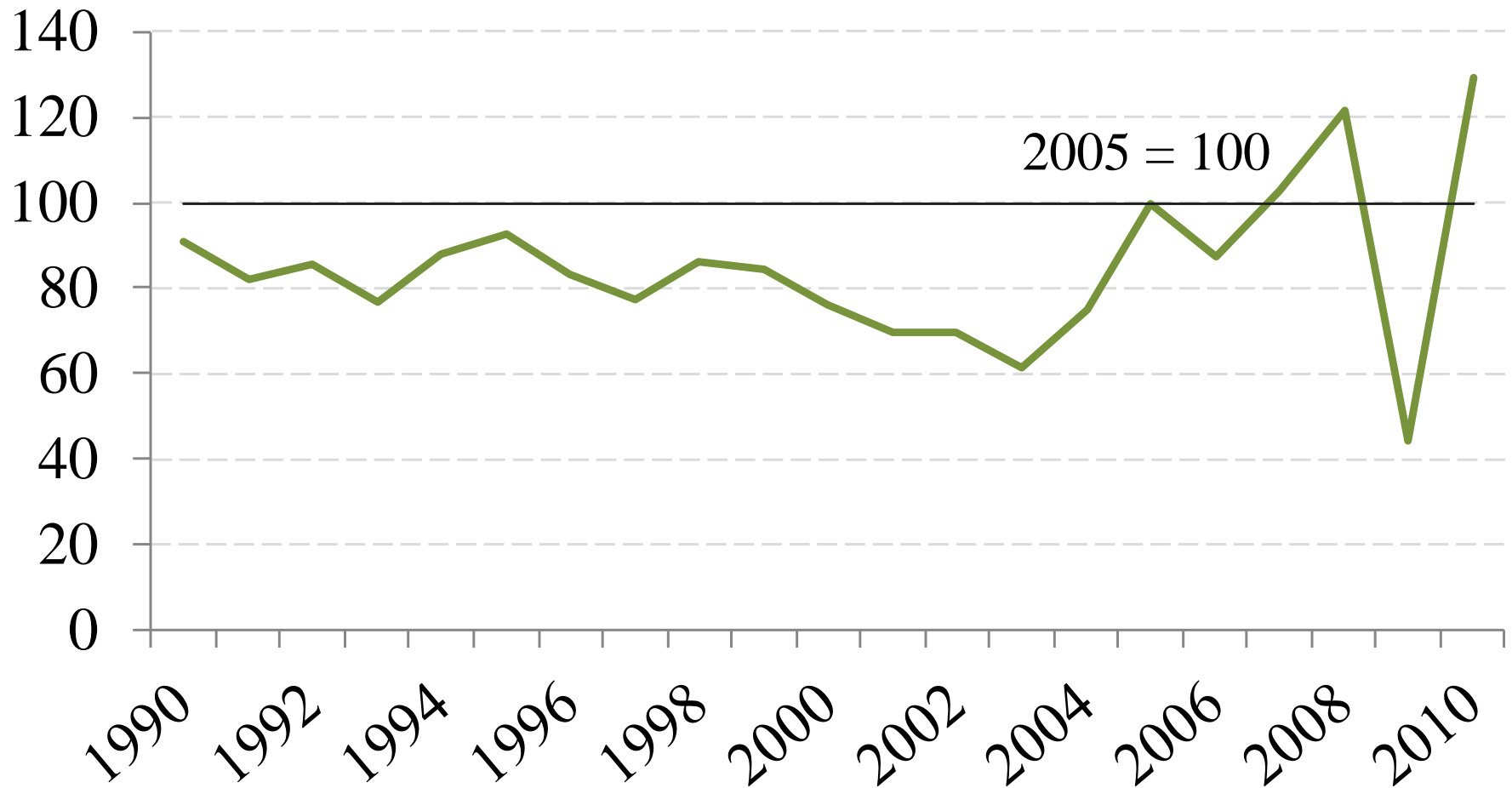
Port of Duluth-Superior Total Real Value



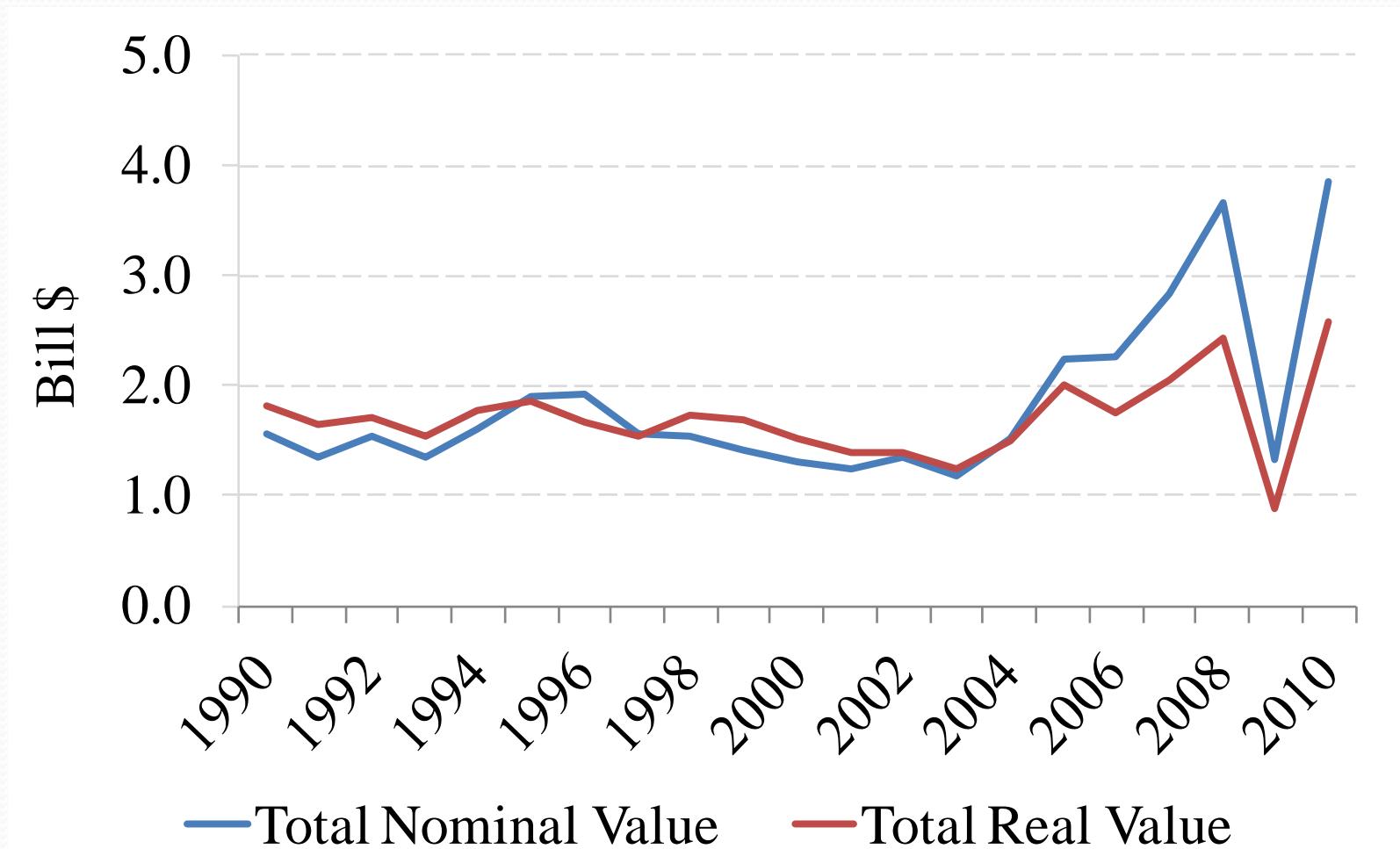
Port of Duluth-Superior Real Value Per Ton



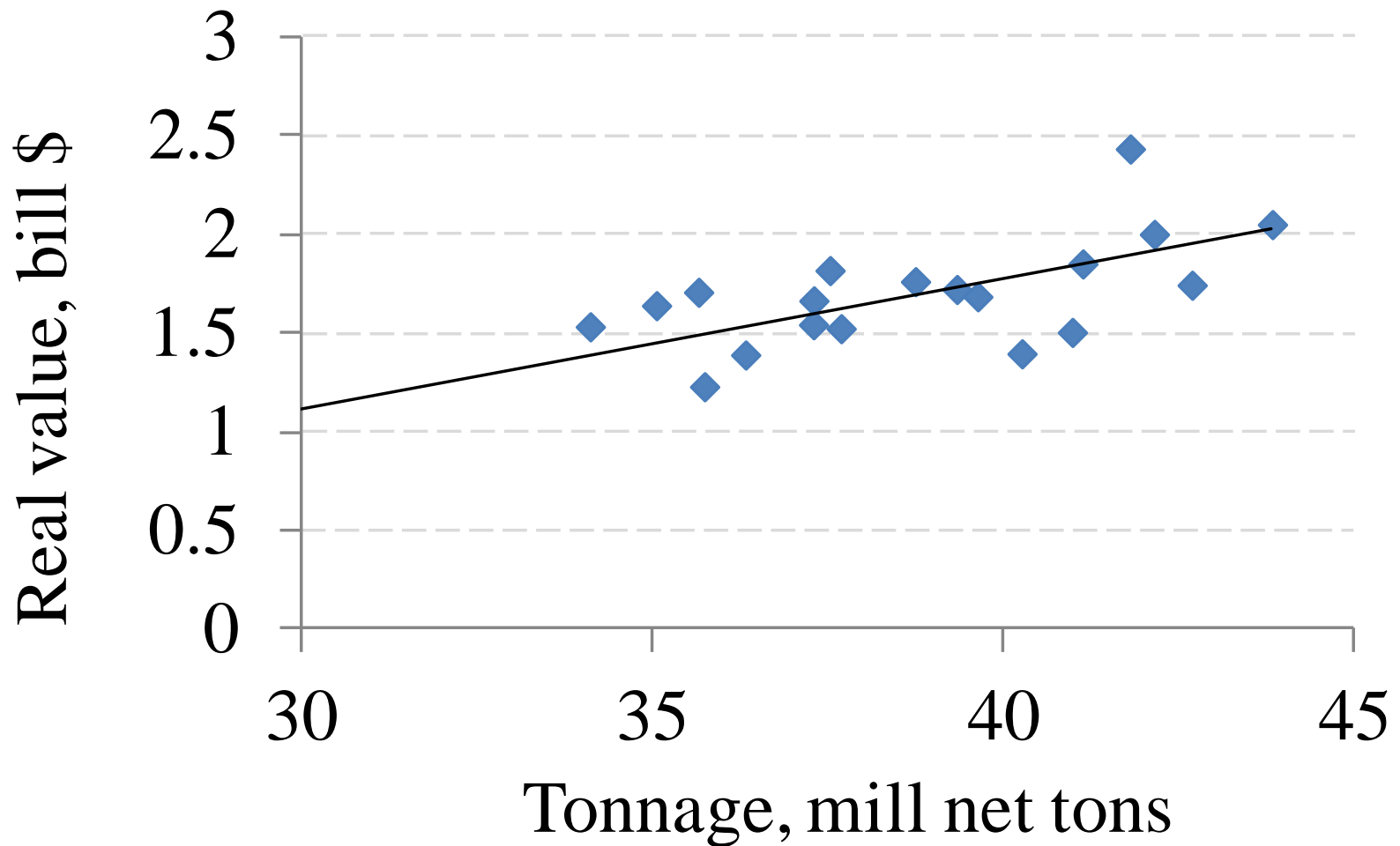
Port of Duluth-Superior Real Value Index



Port of Duluth-Superior Real vs Nominal Value



Real Value of Cargo and Demand for Port's Services



Conclusions

- Ports do not uniformly track their cargo value
- Allocation of funding should depend on internal and external to port performance measures
- Port's cargo should be classified
 - E.g., 2-digit SITC commodity classification code
- Cargo value can be used for:
 - Value of service pricing
 - Price elasticity for freight rates
 - Port economic multipliers, etc.