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Loyola de Palacio Chair

Implementing incentive regulation and regulatory alignment with bounded regulators

Paper published in Competition and Regulation in Network Industries (2013)

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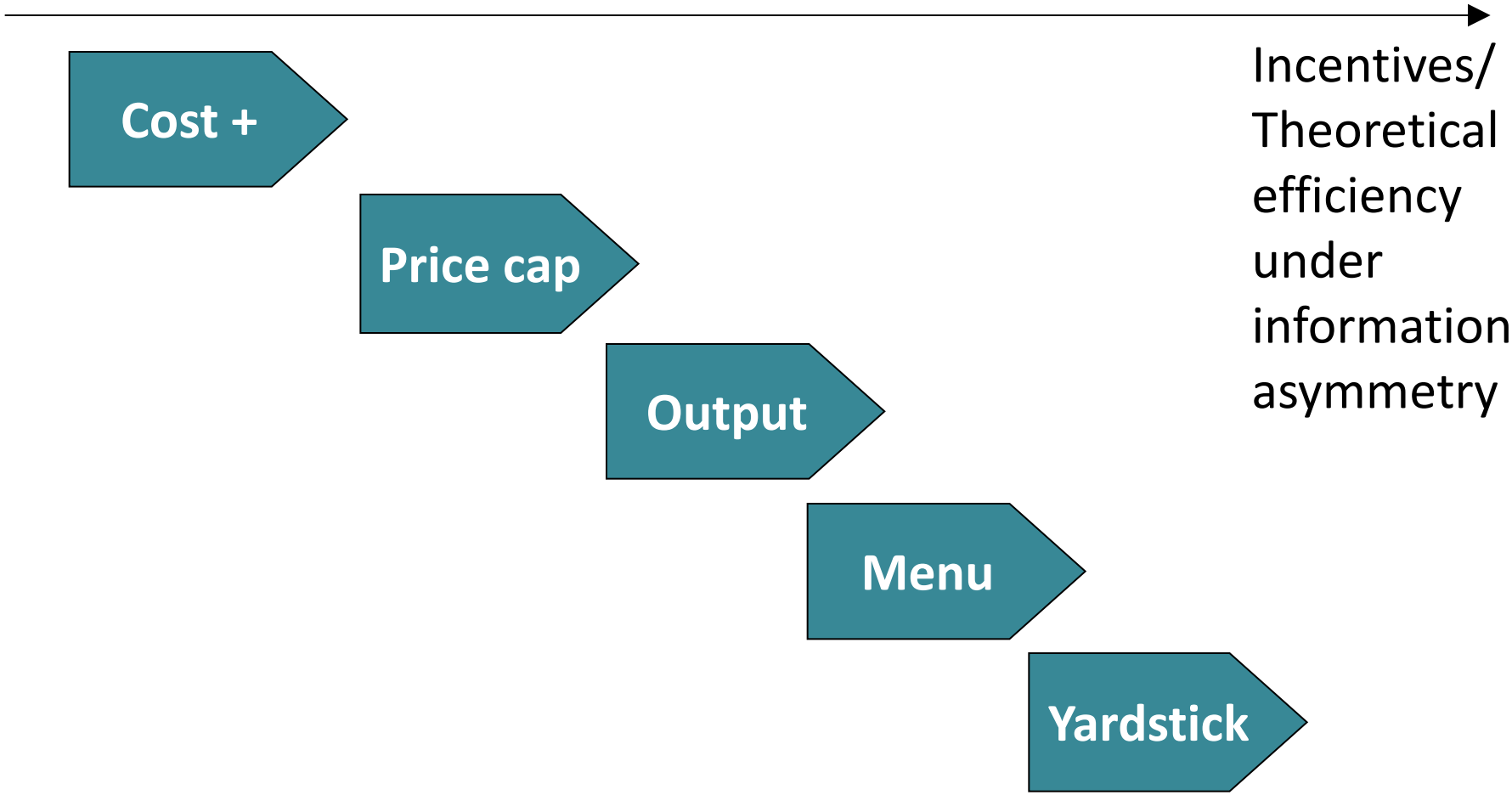
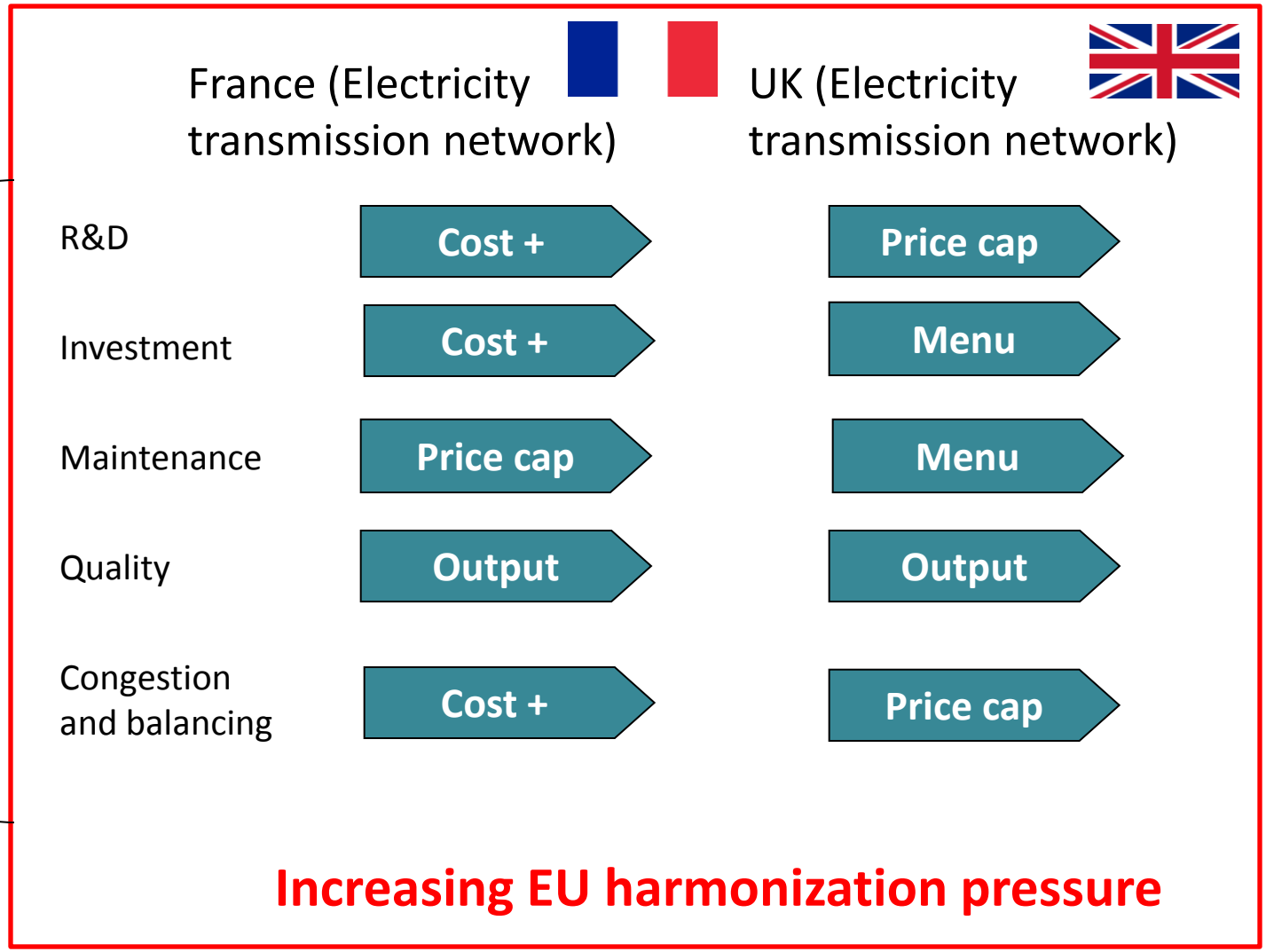
Background : 5 (stylized) tools can be applied to regulate Energy Transmission System Operators (TSO)



Starting point: a mismatch between theory and practice

What does theory recommend (e.g., Laffont and Tirole 1983, Shleifer 1985)?

Menu or Yardstick



Our point

- **The assumptions of the textbook model of regulation**
- The regulator always has the required powers, resources and abilities to implement any regulatory scheme
- The regulator incentivises a TSO as a whole with a single tool

- **The reality for regulator**
- She does not always have as many powers, resources and abilities as the textbook model assumes
- The regulator applies distinct regulatory tools to different TSO's tasks

An analytical framework to choose in practice between the incentive regulation tools

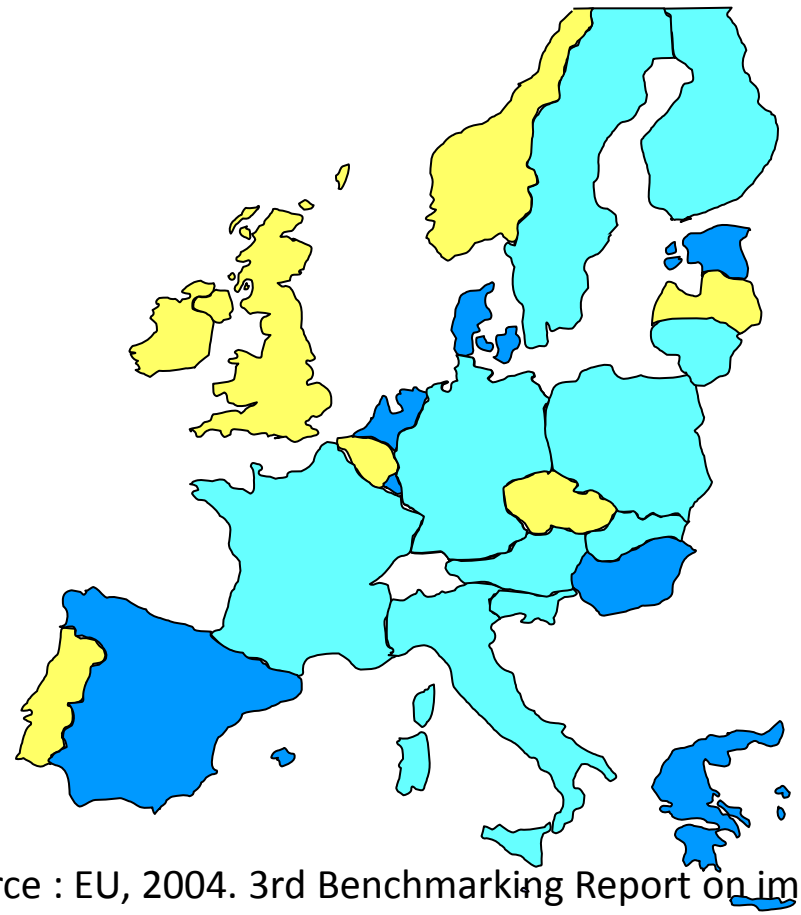
- How to align the regulatory tools, the regulator abilities and the targeted costs?
- The textbook model of incentive regulation proposes no solution to choose the regulatory tools considering
  - The regulator's abilities to implement it
  - And the targeted network costs and their characteristics
- We propose one way to choose the regulatory tools in practice, considering and combining
  - The real bounded regulators' abilities
  - And the real characteristics of the network operator's tasks

The real regulators are not as able as the textbook one is

- In the economic literature proposing and building regulatory tools, regulator is always thought to have all the desired cognitive, computational and judicial abilities to use any tool easily and efficiently
  - In particular, She knows ex nihilo how to choose the most efficient regulatory tools and She has all the desirable abilities to implement it
- But in reality, the regulators were endowed with tight resources (budget, staff, skills and judicial powers) which are likely to hamper their abilities to do their job efficiently

The real regulators are not always endowed with a full range of judicial powers
The European example before the 3rd directive

An example of evaluation of the European regulators' abilities



5

4 or 4½

3 or 3½

0 or 2

Ex ante Regulation (=1)

Independency from government (= 1 or ½ or 0)

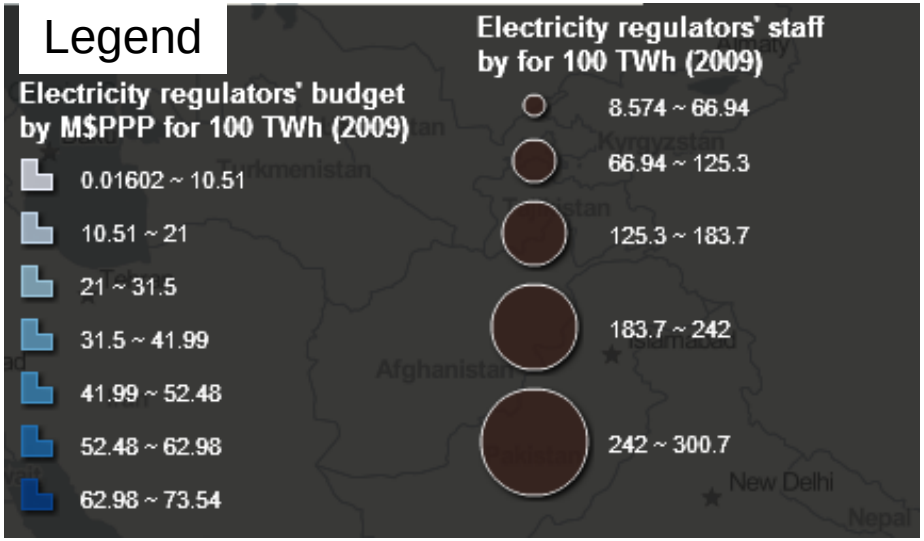
TPA setting (=1)

Ability to solve conflicts (=1)

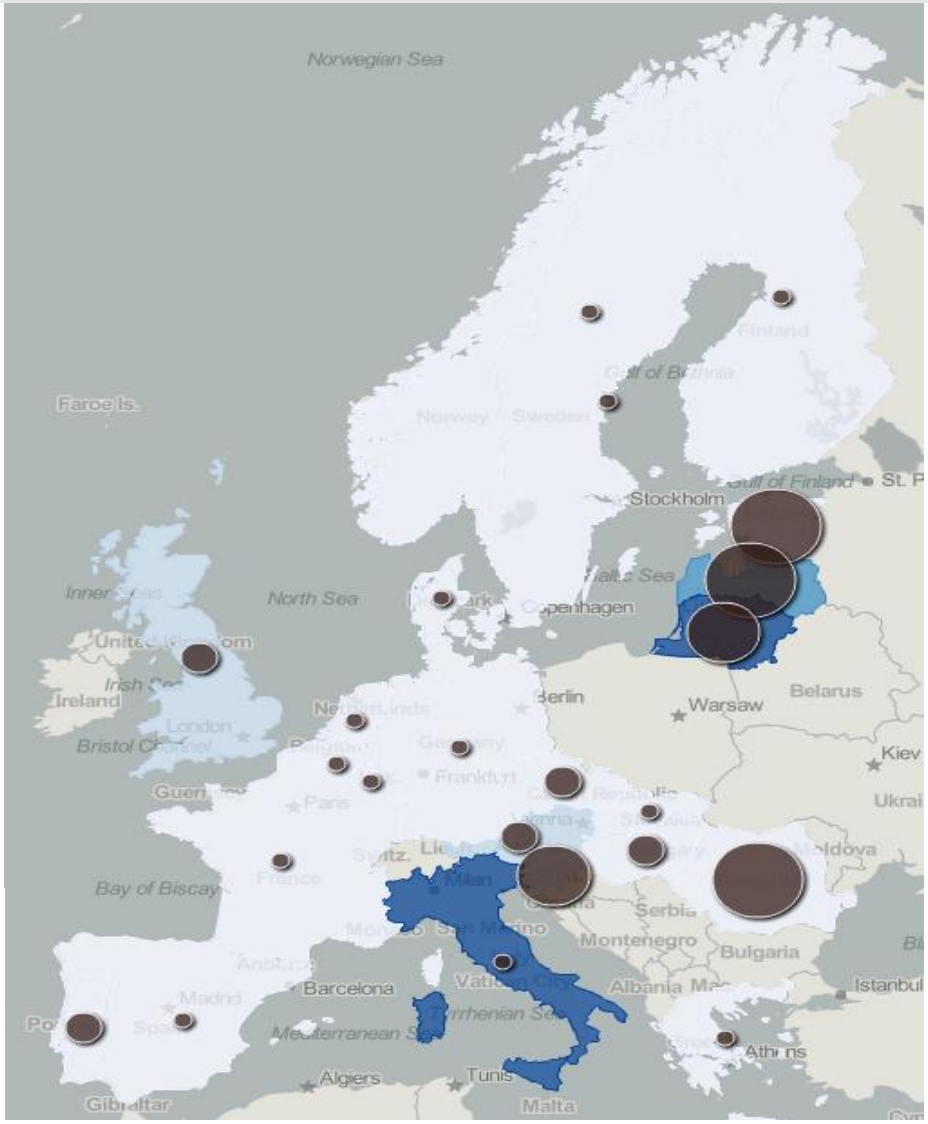
Ability to acquire information (=1)

Source : EU, 2004. 3rd Benchmarking Report on implementation of electricity and gas internal market.
N.B.: Information for Germany is up to date and taken from the German regulator's website

The real regulators are not always endowed with the highest amount of ressources
The example of budget and staff in 2009 (for 100 TWh)



Sources: Own calculus and
•Budget & staff from www.iern.net
•Annual load from http://epp.eurostat.ec.europa.eu/portal/page/portal/energy/data/main_tables#
•Power Purchase Parity from http://data.worldbank.org/indicator/PA.NUS.PRVT.PP



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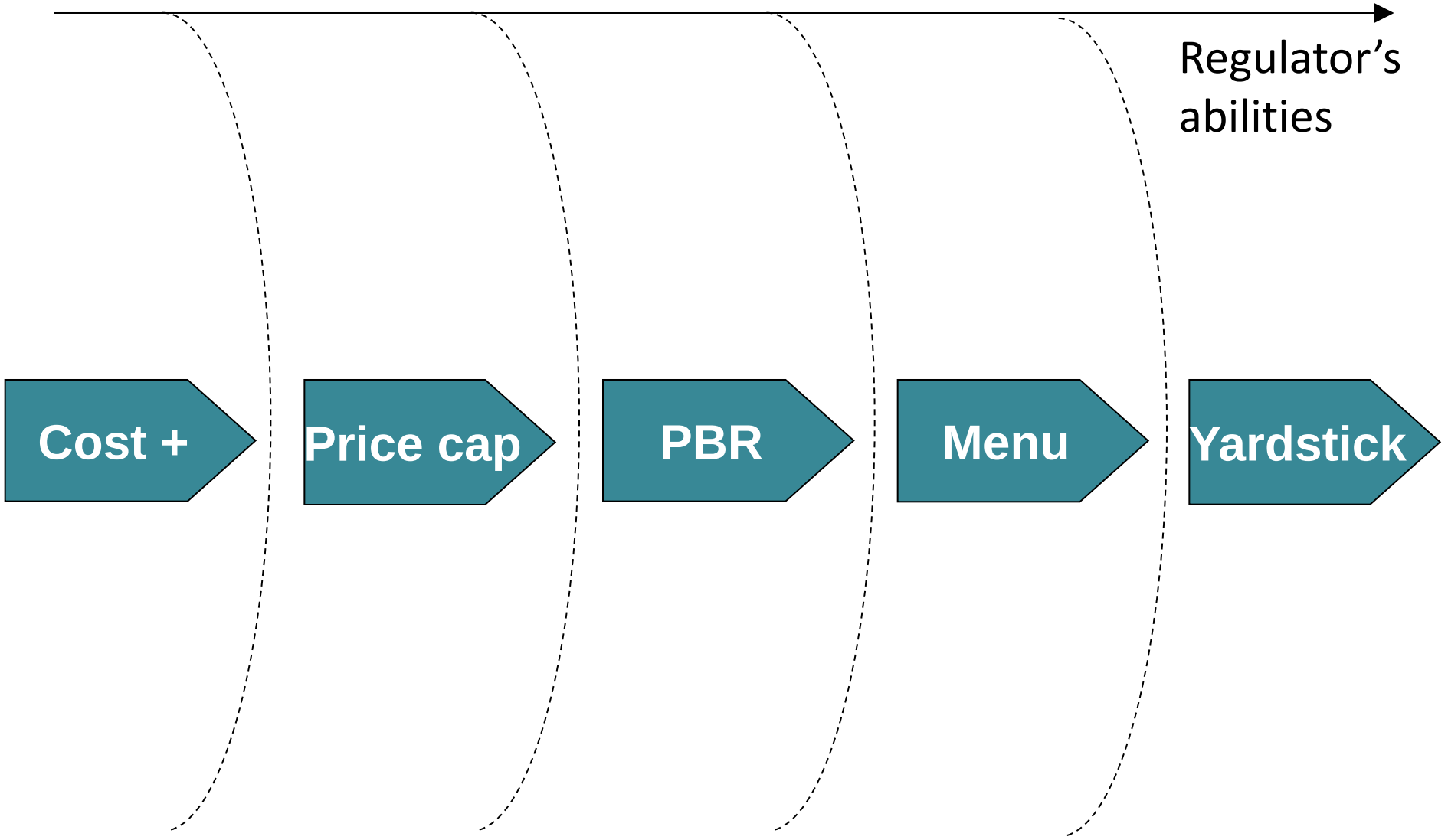
  - In particular, she knows ex nihilo how to choose the most efficient regulatory tools and she has all the desirable abilities to implement it
- But in reality, the regulators were endowed with tight resources (budget, staff, skills and judicial powers) which are likely to hamper their abilities to do their job efficiently
- Meanwhile regulators learn from experience how to use the different regulatory tools provided by theory
  - To reduce their information asymmetry
  - To adapt tools to uncertainty and risk
  - To gain computational skills needed to design the regulatory tools

The regulatory tools require minimum abilities to be efficiently implemented



The regulator regulates the network operator on separate tasks not as a whole

- The textbook regulator controls the TSO's cost as a whole while it is the outcome of different tasks with different characteristics
- The conventional tasks for a TSO are
  - System operation: Balancing + Reserves + Internal congestion + Losses + Market operation
  - Maintenance
  - Investment and connection: Planning + Construction
  - Customer relationship management
- The network operator may have to realise new or renewed tasks (with characteristics changed) because of new regulatory objectives from
  - The climate change policy
    - With the integration of renewables mainly in electricity
  - The concerns about security of supply
    - Mainly in gas
  - And the Europeanization of market building with their role of market architects
  - + RD&D in infrastructures and services

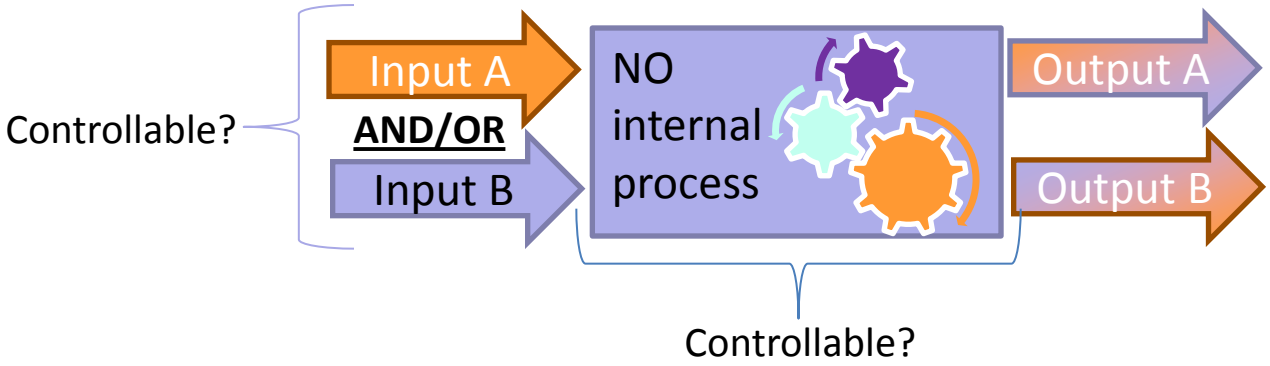
The controllability, predictability, and observability of a task/cost determines the appropriate regulatory tool

- Considering the diversity of tasks, costs and situations that the different TSOs may encounter, they should be targeted with distinct regulatory tools in a building block approach

- Other things being equal, that is to say with a regulator having all the desired abilities to use any tool, the appropriate regulatory tool to choose for a given task/cost depends on the tasks' characteristics being
  - Controllability
  - Predictability
  - Observability

I° The regulator incentivises the TSO on tasks/costs that the TSO can control

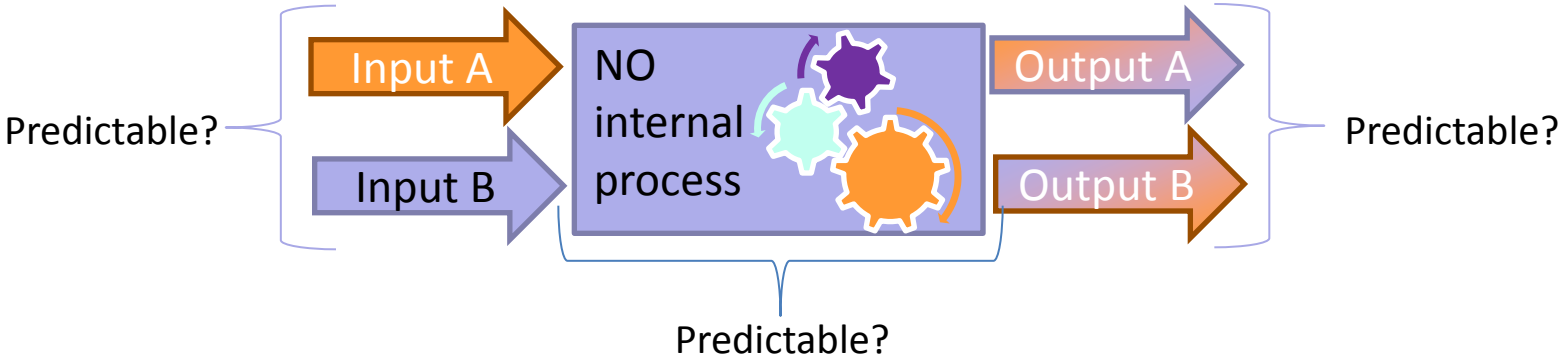
- Controllability measures the TSO's ability to act on a cost/task or a combination of costs/tasks for a given output



- If the task/cost is not controllable, the regulator should implement a cost plus scheme
- If the task/cost is controllable, the regulator could incentivise the TSO
  - Under the constraints relative to predictability and observability

2° The regulator can only incentivise the TSO on tasks/costs that are predictable

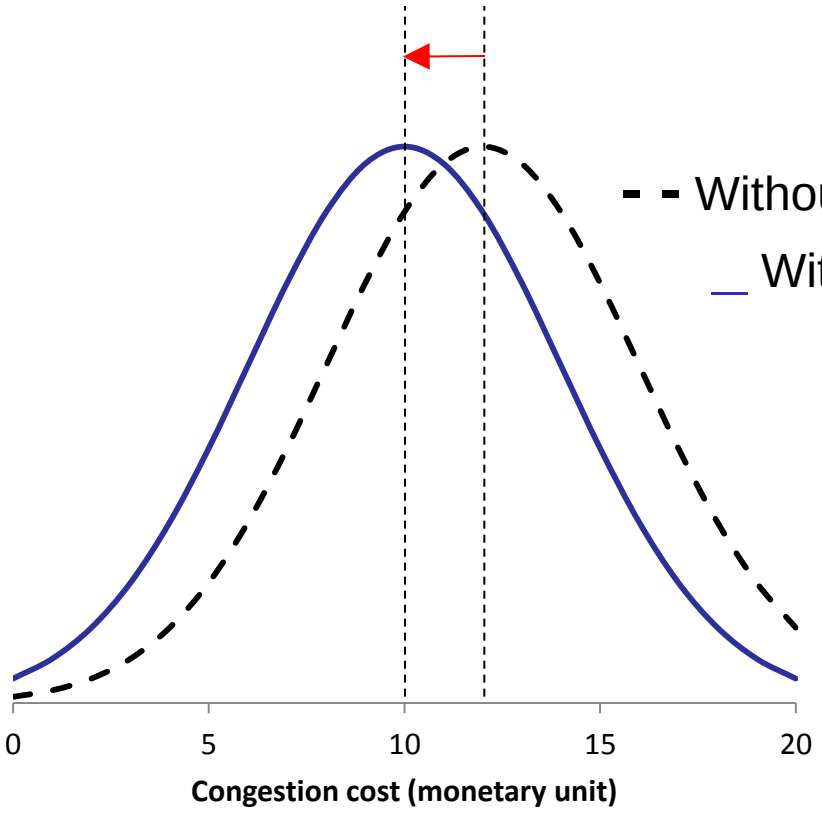
- Predictability measures the possibility to catch the influence of external factors on costs/tasks and the relationship between the costs/tasks and the outputs



- If the task/cost and its relationship with the outputs are not enough predictable, the regulator should implement a cost plus scheme

The regulator might be unable to distinguish between the effect of the network operator's effort and the effect of uncertainty

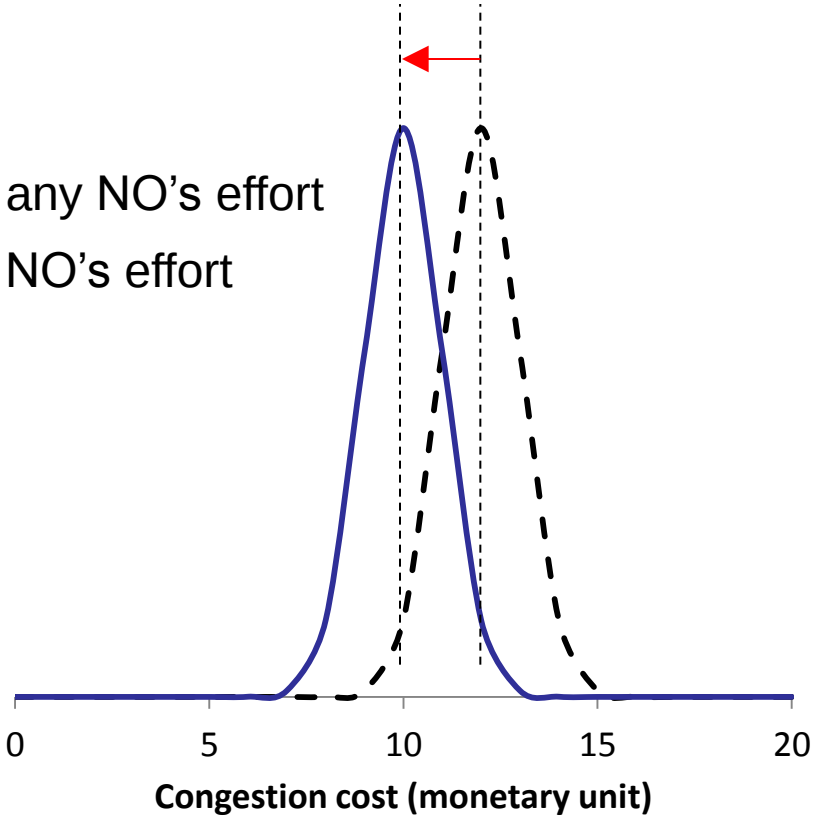
Effect on congestion cost of the effort by the network operator NOT detectable by the regulator in presence of high uncertainty



Without any NO's effort

With NO's effort

Effect on congestion cost of the effort by the network operator detectable by the regulator in presence of low uncertainty



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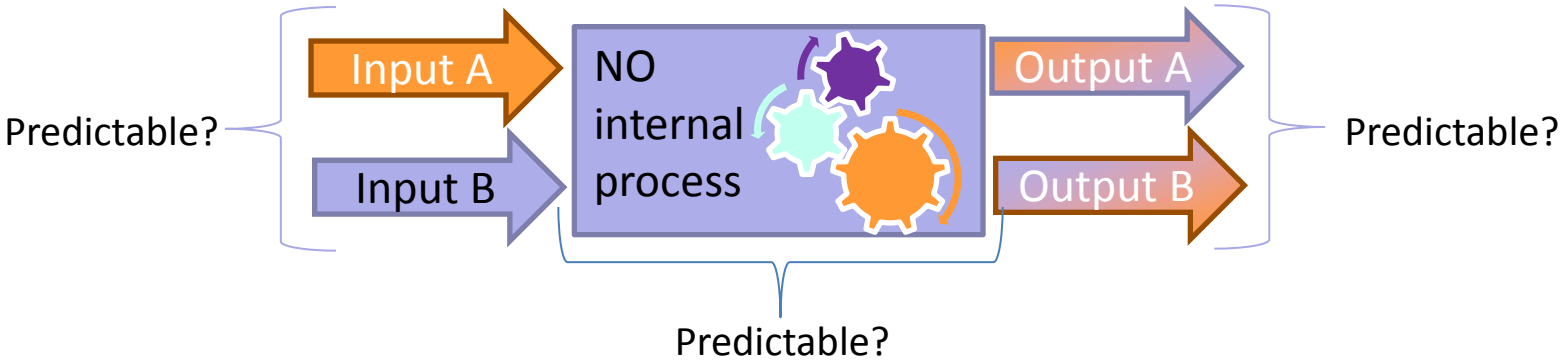


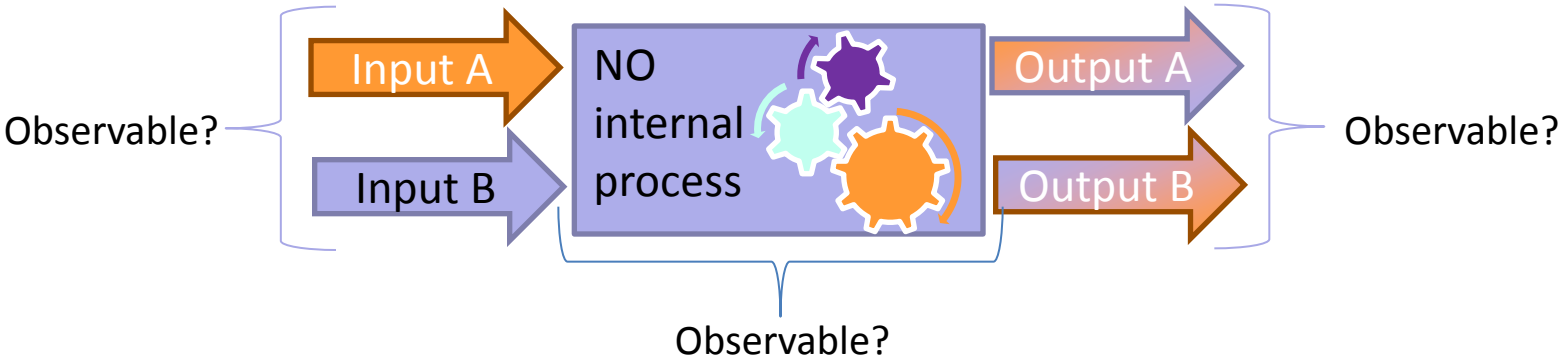
- If the task/cost and its relationship with the outputs are not enough predictable, the regulator should implement a cost plus scheme

- Otherwise the regulator can implement an incentive scheme whose risk (for the regulator to build it and to make mistakes and for the network companies to respond it) depends on the degree of predictability

  - Low predictability implies high risk
  - High predictability implies low risk

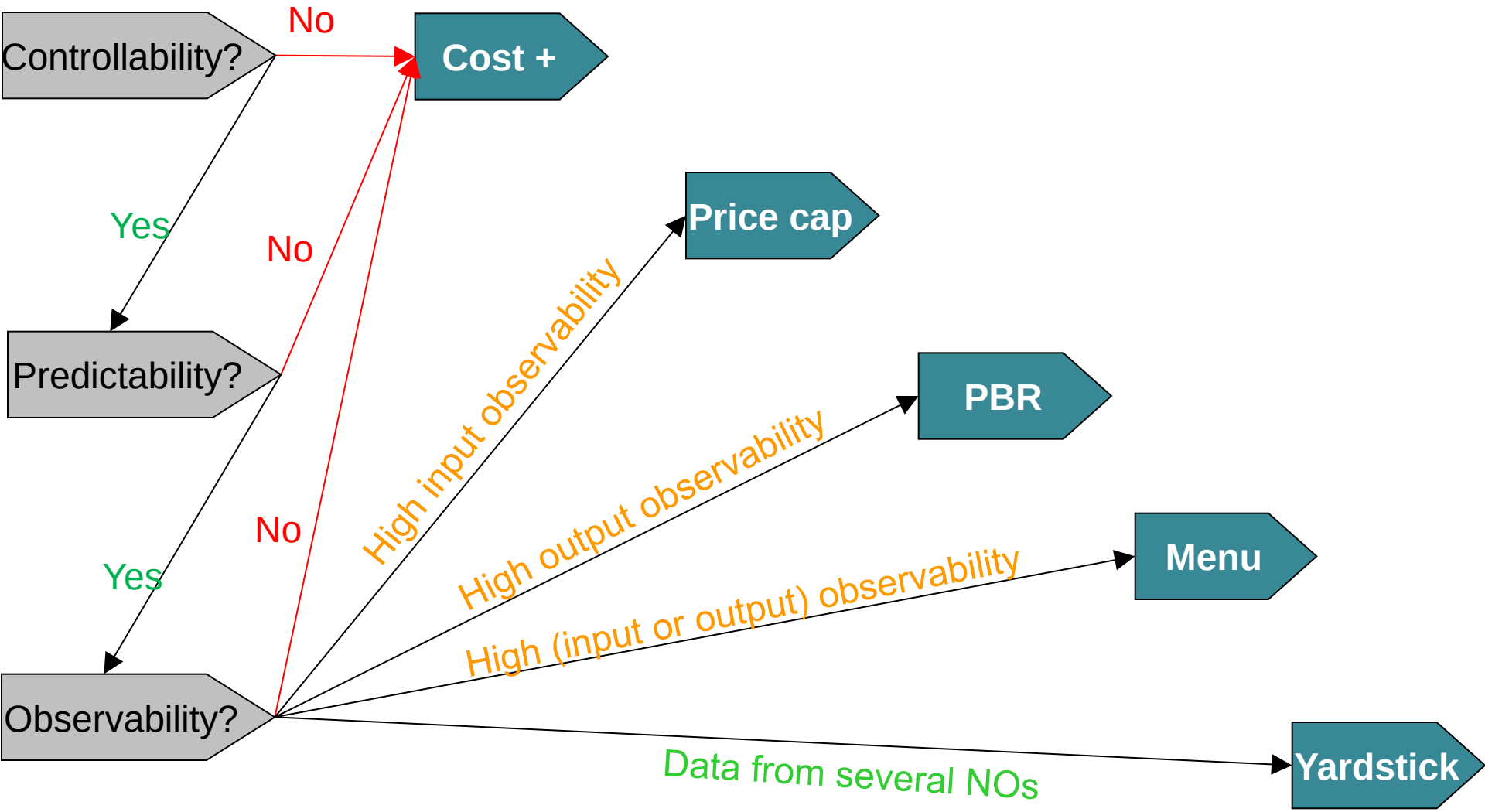
3° The regulator can only incentivise the TSO on tasks/costs that are observable

- Observability measures the quantity of available information to the regulator about efficiency gains on tasks, either in terms of tasks themselves, or inputs or outputs

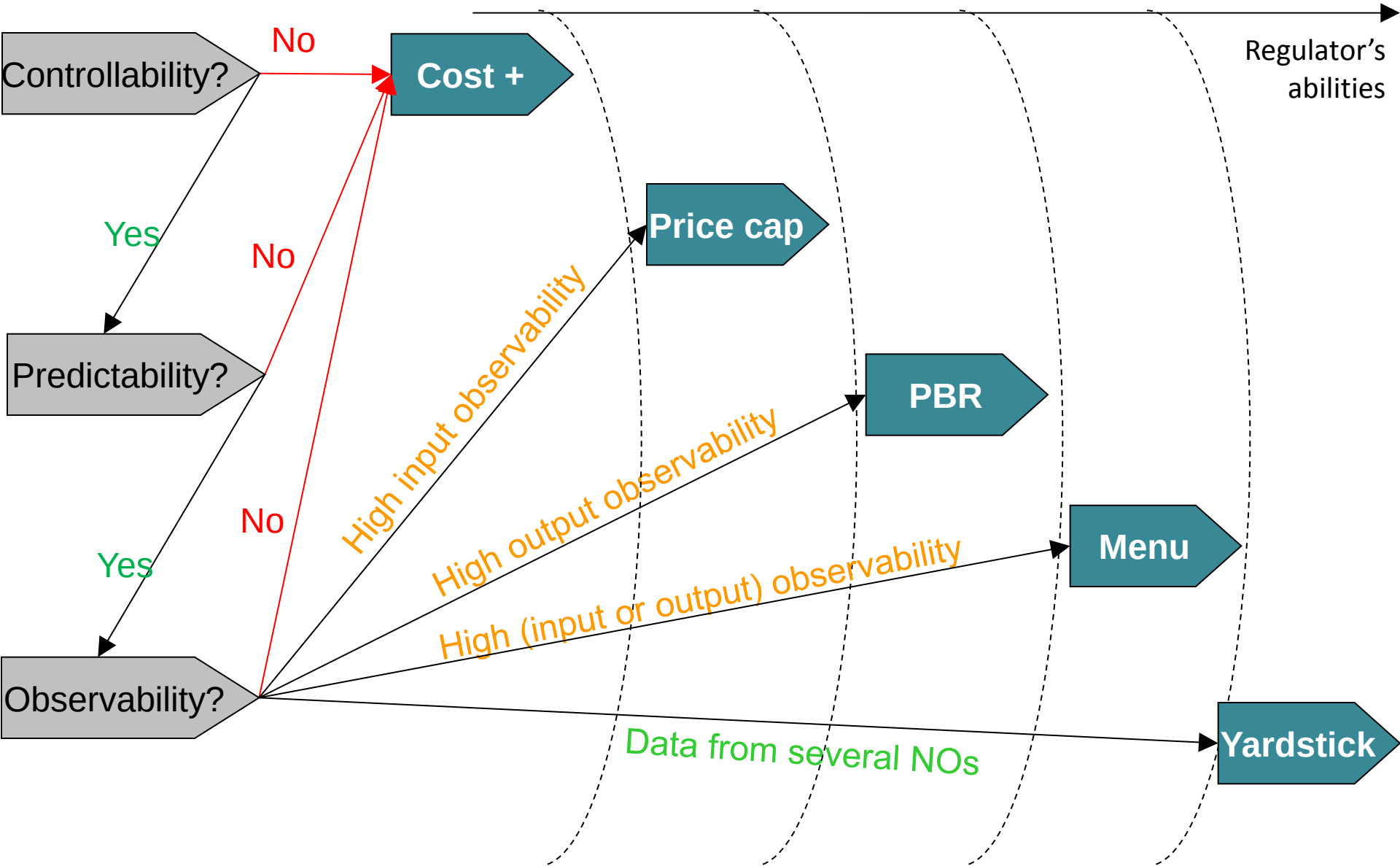


- The regulatory tool should then be chosen depending on the level of observability
  - When there is no observability, cost plus should be implemented
  - When input is observable, price cap or a menu of contracts should be implemented
  - When output is observable, performance based regulation or a menu of contracts should be implemented
  - When information is available from several network operators that can be compared, she should implement yardstick competition

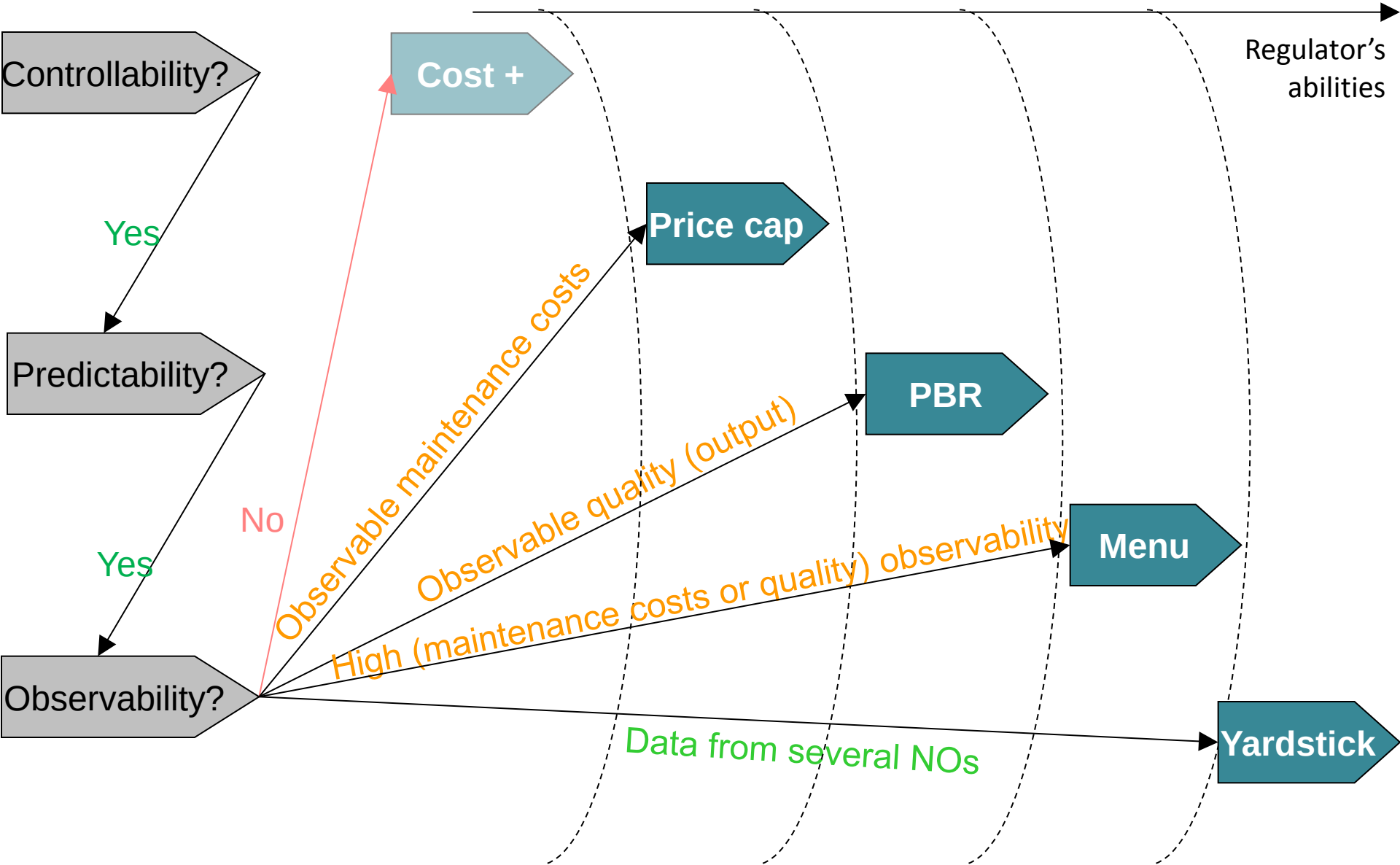
A decision tree to choose your (combination of) regulatory tool



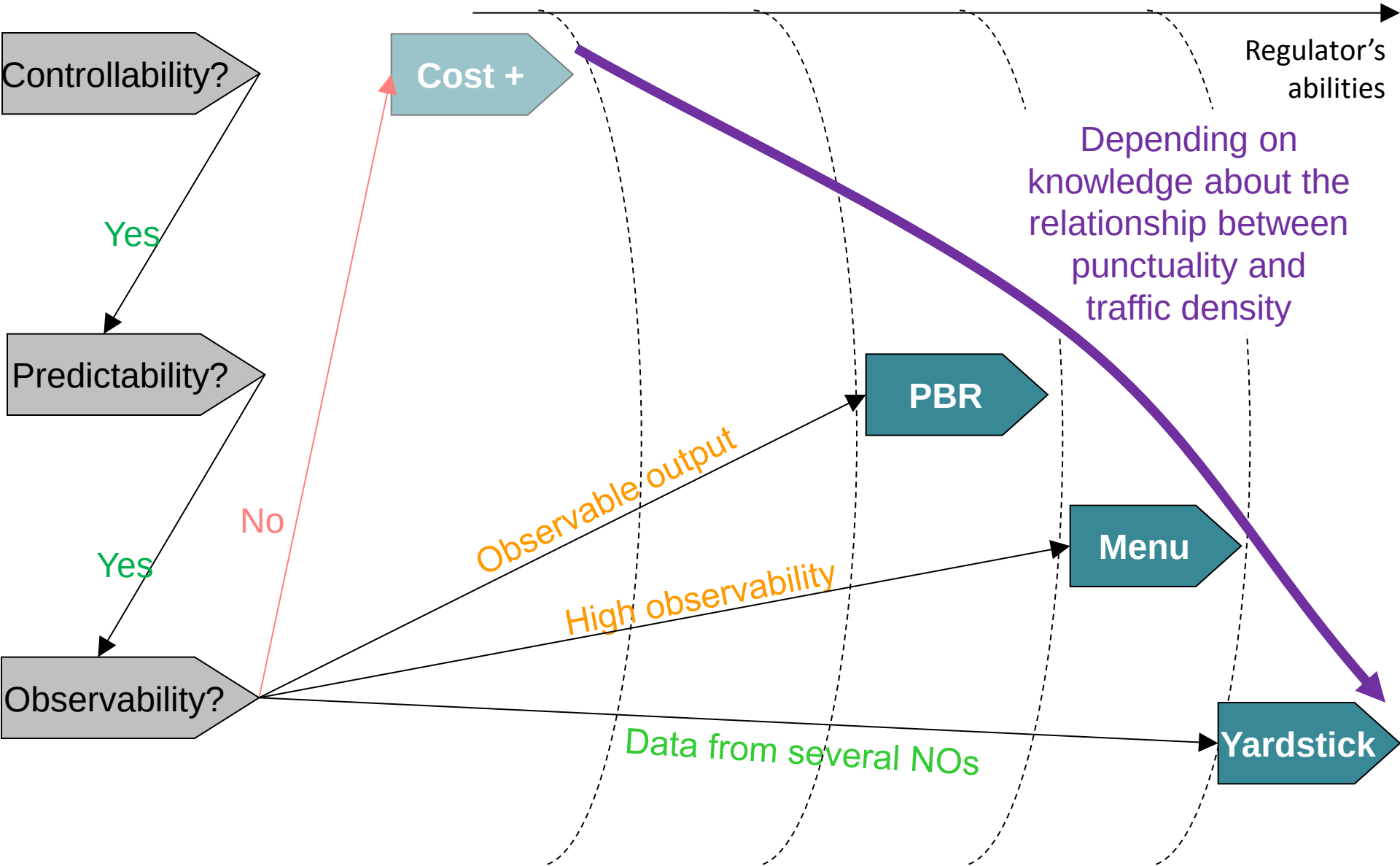
The regulatory tool to implement depends on the characteristics of the targeted cost/task and the regulator's abilities



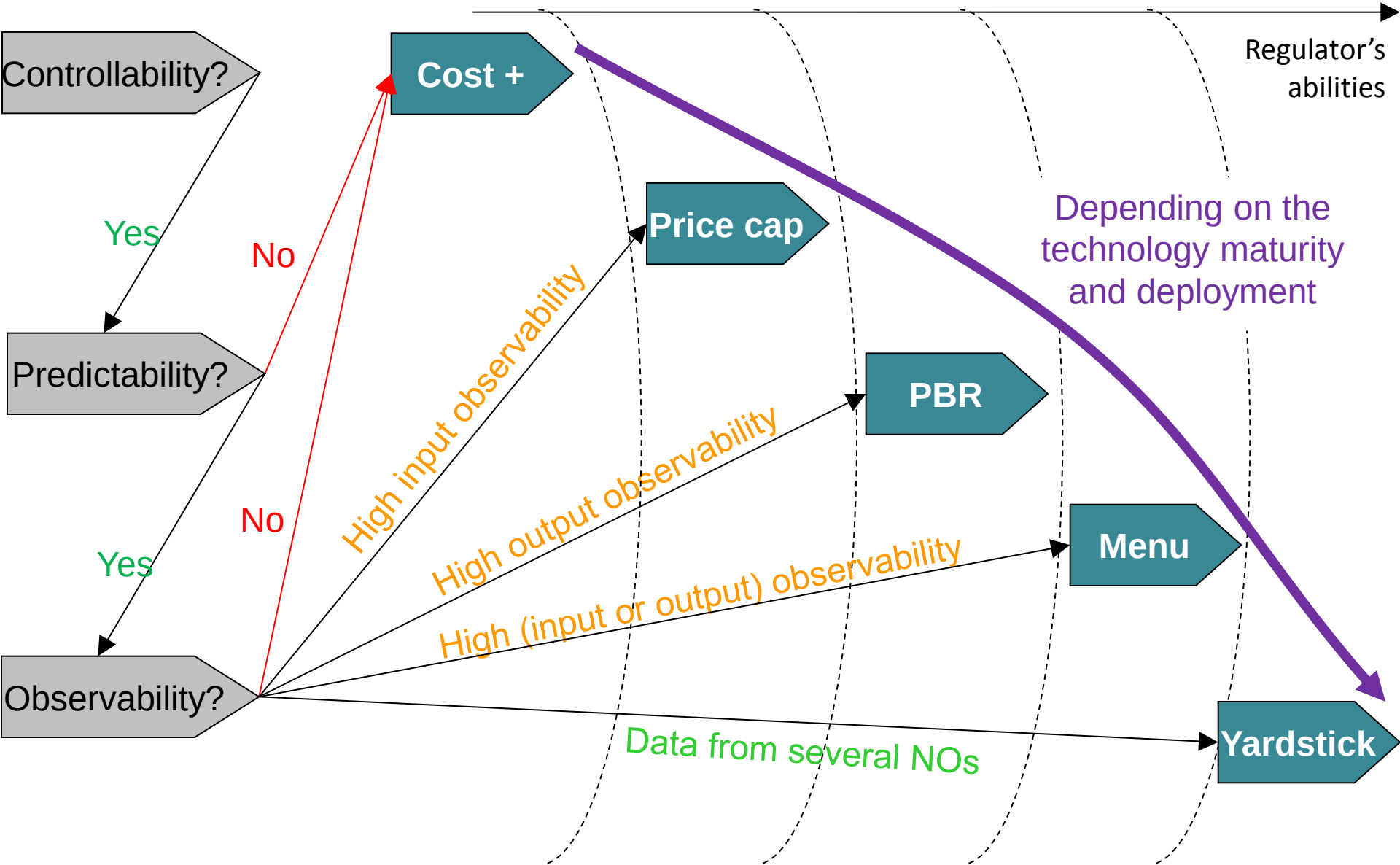
Example #1 Regulatory tool for maintenance



Example #2 Regulatory tool for punctuality incentives on railway operator



Example #3 Regulatory tool for RD&D
e.g. Magnetic Very High Speed Train



Conclusion

- Textbook regulation suppose an “unlimiditedly endowed” regulator targeting the total TSO’ targeting the total TSO’s cost
  - The practical successes of incentive regulation realised when the regulator mimicked her expected theoretical behaviour
- More generally reality is not with unlimited power or resources
  - Regulator may have tight resources and only limited abilities
  - Distinct regulatory tools are applied to different targeted costs/tasks
- Regulatory tools should be adequately adapted
  - To the characteristics of the targeted costs (controllability, predictability and observability)
  - And the regulator endowment

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Thank you for your attention!

Comments and questions are welcome

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A reminder of the 5 standard regulatory tools

- Cost +
  - The network operator is then paid based on its cost-of-service
- Price cap
  - The network operator has then a maximum allowed tariff level
- Performance (Output) regulation
  - The network operator has then an efficiency target and is rewarded or penalised depending on its over- or under-performance
- Menu of contracts
  - The regulator proposes different regulatory contracts to the network operator with different degrees of incentives
- Yardstick or benchmarking techniques
  - These techniques can only be applied if the regulator controls the cost of several homogeneous network companies
  - The regulator sets the efficiency target to a network company as a function of its performance relative to the other network companies' performance

References

- Laffont JJ., Tirole J., 1993. A Theory of incentives in procurement and regulation. The MIT Press.

- Shleifer A., 1985. A theory of yardstick competition. Rand Journal of Economics 16 (3), 319-327.