Comments on "Pay for performance: the essential ingredient in capacity markets" by Peter Cramton

Thomas-Olivier Léautier[1]

[1]Toulouse School of Economics
thomas.leautier@tse-fr.eu

September 8, 2015

Why do we need capacity mechanisms?

- "Energy-only" markets follow peak-load pricing theory:
  - off peak, when demand is lower than installed capacity, price covers the short-term variable cost
  - on-peak, when demand is at (or near) installed capacity (scarcity hours), price rises to also cover fixed cost
  - if demand response is insufficient to clear the market during scarcity hours, the System Operator sets the price at the Value of Lost Load (VoLL), and sheds demand to meet supply
- This raises two concerns for policy makers
  1. Prices are very high (thousands of $/MWh) during scarcity hours
  2. There is no guarantee that an energy-only market delivers the desired capacity adequacy level

Why do we need capacity mechanisms?

- "Energy-only" markets follow peak-load pricing theory:
  - off peak, when demand is lower than installed capacity, price covers the short-term variable cost
  - on-peak, when demand is at (or near) installed capacity (scarcity hours), price rises to also cover fixed cost
  - if demand response is insufficient to clear the market during scarcity hours, the System Operator sets the price at the Value of Lost Load (VoLL), and sheds demand to meet supply
- This raises two concerns for policy makers
  1. Prices are very high (thousands of $/MWh) during scarcity hours
  2. There is no guarantee that an energy-only market delivers the desired capacity adequacy level

Why do we need capacity mechanisms?

- "Energy-only" markets follow peak-load pricing theory:
  - off peak, when demand is lower than installed capacity, price covers the short-term variable cost
  - on-peak, when demand is at (or near) installed capacity (scarcity hours), price rises to also cover fixed cost
  - if demand response is insufficient to clear the market during scarcity hours, the System Operator sets the price at the Value of Lost Load (VoLL), and sheds demand to meet supply
- This raises two concerns for policy makers
  1. Prices are very high (thousands of $/MWh) during scarcity hours
  2. There is no guarantee that an energy-only market delivers the desired capacity adequacy level

Why do we need capacity mechanisms?

- "Energy-only" markets follow peak-load pricing theory:
  - off peak, when demand is lower than installed capacity, price covers the short-term variable cost
  - on-peak, when demand is at (or near) installed capacity (scarcity hours), price rises to also cover fixed cost
  - if demand response is insufficient to clear the market during scarcity hours, the System Operator sets the price at the Value of Lost Load (VoLL), and sheds demand to meet supply
- This raises two concerns for policy makers
  1. Prices are very high (thousands of $/MWh) during scarcity hours
  2. There is no guarantee that an energy-only market delivers the desired capacity adequacy level

Why do we need capacity mechanisms?

- "Energy-only" markets follow peak-load pricing theory:
  - off peak, when demand is lower than installed capacity, price covers the short-term variable cost
  - on-peak, when demand is at (or near) installed capacity (scarcity hours), price rises to also cover fixed cost
  - if demand response is insufficient to clear the market during scarcity hours, the System Operator sets the price at the Value of Lost Load (VoLL), and sheds demand to meet supply
- This raises two concerns for policy makers
  1. Prices are very high (thousands of $/MWh) during scarcity hours
  2. There is no guarantee that an energy-only market delivers the desired capacity adequacy level

Why do we need capacity mechanisms?

- "Energy-only" markets follow peak-load pricing theory:
  - off peak, when demand is lower than installed capacity, price covers the short-term variable cost
  - on-peak, when demand is at (or near) installed capacity (scarcity hours), price rises to also cover fixed cost
  - if demand response is insufficient to clear the market during scarcity hours, the System Operator sets the price at the Value of Lost Load (VoLL), and sheds demand to meet supply
- This raises two concerns for policy makers
  1. Prices are very high (thousands of $/MWh) during scarcity hours
  2. There is no guarantee that an energy-only market delivers the desired capacity adequacy level

Why do we need capacity mechanisms?

- "Energy-only" markets follow peak-load pricing theory:
  - off peak, when demand is lower than installed capacity, price covers the short-term variable cost
  - on-peak, when demand is at (or near) installed capacity (scarcity hours), price rises to also cover fixed cost
  - if demand response is insufficient to clear the market during scarcity hours, the System Operator sets the price at the Value of Lost Load (VoLL), and sheds demand to meet supply
- This raises two concerns for policy makers
  1. Prices are very high (thousands of $/MWh) during scarcity hours
  2. There is no guarantee that an energy-only market delivers the desired capacity adequacy level

High prices are not an issue per se for economists

- Economists
  - believe and argue that high prices during scarcity hours are required to send appropriate signal to consumers and producers, but
  - are concerned about exercise of market power during scarcity hours, resulting in "too high" prices or "too many" scarcity hours (remember Enron?), and advocate market monitoring
- However, policy makers and voters are more sanguine than economists about high prices during scarcity hours
- This has lead to the imposition of price caps, leading to the "missing money" problem (Joskow, 2007), leading to under-investment
- Note that under imperfect competition, a price cap does not necessarily lead to under-investment (Zoettl, 2011)

High prices are not an issue per se for economists

- Economists
  - believe and argue that high prices during scarcity hours are required to send appropriate signal to consumers and producers, but
  - are concerned about exercise of market power during scarcity hours, resulting in "too high" prices or "too many" scarcity hours (remember Enron?), and advocate market monitoring
- However, policy makers and voters are more sanguine than economists about high prices during scarcity hours
- This has lead to the imposition of price caps, leading to the "missing money" problem (Joskow, 2007), leading to under-investment
- Note that under imperfect competition, a price cap does not necessarily lead to under-investment (Zoettl, 2011)

High prices are not an issue per se for economists

- Economists
  - believe and argue that high prices during scarcity hours are required to send appropriate signal to consumers and producers, but
  - are concerned about exercise of market power during scarcity hours, resulting in "too high" prices or "too many" scarcity hours (remember Enron?), and advocate market monitoring
- However, policy makers and voters are more sanguine than economists about high prices during scarcity hours
- This has lead to the imposition of price caps, leading to the "missing money" problem (Joskow, 2007), leading to under-investment
- Note that under imperfect competition, a price cap does not necessarily lead to under-investment (Zoettl, 2011)

High prices are not an issue per se for economists

- Economists
  - believe and argue that high prices during scarcity hours are required to send appropriate signal to consumers and producers, but
  - are concerned about exercise of market power during scarcity hours, resulting in "too high" prices or "too many" scarcity hours (remember Enron?), and advocate market monitoring
- However, policy makers and voters are more sanguine than economists about high prices during scarcity hours
- This has lead to the imposition of price caps, leading to the "missing money" problem (Joskow, 2007), leading to under-investment
- Note that under imperfect competition, a price cap does not necessarily lead to under-investment (Zoettl, 2011)

High prices are not an issue per se for economists

- Economists
  - believe and argue that high prices during scarcity hours are required to send appropriate signal to consumers and producers, but
  - are concerned about exercise of market power during scarcity hours, resulting in "too high" prices or "too many" scarcity hours (remember Enron?), and advocate market monitoring
- However, policy makers and voters are more sanguine than economists about high prices during scarcity hours
- This has lead to the imposition of price caps, leading to the "missing money" problem (Joskow, 2007), leading to under-investment
- Note that under imperfect competition, a price cap does not necessarily lead to under-investment (Zoettl, 2011)

High prices are not an issue per se for economists

- Economists
  - believe and argue that high prices during scarcity hours are required to send appropriate signal to consumers and producers, but
  - are concerned about exercise of market power during scarcity hours, resulting in "too high" prices or "too many" scarcity hours (remember Enron?), and advocate market monitoring
- However, policy makers and voters are more sanguine than economists about high prices during scarcity hours
- This has lead to the imposition of price caps, leading to the "missing money" problem (Joskow, 2007), leading to under-investment
- Note that under imperfect competition, a price cap does not necessarily lead to under-investment (Zoettl, 2011)

Administrative capacity adequacy level is a relic of regulation

- Under the regulated monopoly industry structure, prices were set at average cost, hence there was no price signal during scarcity hours
- Since no price signal was available, engineers and policy makers used physical reliability criteria to determine generation capacity (e.g., expected outage duration of three hours per year, or one day every ten years)
- There is no guarantee that the market equilibrium investment will lead to the administrative reliability criterion
  - different economic and administrative reliability criteria
  - investors risk aversion combined with highly uncertain returns
  - strategic under-investment
- On the other hand, there is no reason why the old physical reliability criterion should be used in the restructured industry. Instead an economic concept, such as the VoLL, could/should be used

Administrative capacity adequacy level is a relic of regulation

- Under the regulated monopoly industry structure, prices were set at average cost, hence there was no price signal during scarcity hours
- Since no price signal was available, engineers and policy makers used physical reliability criteria to determine generation capacity (e.g., expected outage duration of three hours per year, or one day every ten years)
- There is no guarantee that the market equilibrium investment will lead to the administrative reliability criterion
  - different economic and administrative reliability criteria
  - investors risk aversion combined with highly uncertain returns
  - strategic under-investment
- On the other hand, there is no reason why the old physical reliability criterion should be used in the restructured industry. Instead an economic concept, such as the VoLL, could/should be used

Administrative capacity adequacy level is a relic of regulation

- Under the regulated monopoly industry structure, prices were set at average cost, hence there was no price signal during scarcity hours
- Since no price signal was available, engineers and policy makers used physical reliability criteria to determine generation capacity (e.g., expected outage duration of three hours per year, or one day every ten years)
- There is no guarantee that the market equilibrium investment will lead to the administrative reliability criterion
  - different economic and administrative reliability criteria
  - investors risk aversion combined with highly uncertain returns
  - strategic under-investment
- On the other hand, there is no reason why the old physical reliability criterion should be used in the restructured industry. Instead an economic concept, such as the VoLL, could/should be used

Administrative capacity adequacy level is a relic of regulation

- Under the regulated monopoly industry structure, prices were set at average cost, hence there was no price signal during scarcity hours
- Since no price signal was available, engineers and policy makers used physical reliability criteria to determine generation capacity (e.g., expected outage duration of three hours per year, or one day every ten years)
- There is no guarantee that the market equilibrium investment will lead to the administrative reliability criterion
  - different economic and administrative reliability criteria
  - investors risk aversion combined with highly uncertain returns
  - strategic under-investment
- On the other hand, there is no reason why the old physical reliability criterion should be used in the restructured industry. Instead an economic concept, such as the VoLL, could/should be used

Administrative capacity adequacy level is a relic of regulation

- Under the regulated monopoly industry structure, prices were set at average cost, hence there was no price signal during scarcity hours
- Since no price signal was available, engineers and policy makers used physical reliability criteria to determine generation capacity (e.g., expected outage duration of three hours per year, or one day every ten years)
- There is no guarantee that the market equilibrium investment will lead to the administrative reliability criterion
  - different economic and administrative reliability criteria
  - investors risk aversion combined with highly uncertain returns
  - strategic under-investment
- On the other hand, there is no reason why the old physical reliability criterion should be used in the restructured industry. Instead an economic concept, such as the VoLL, could/should be used

Administrative capacity adequacy level is a relic of regulation

- Under the regulated monopoly industry structure, prices were set at average cost, hence there was no price signal during scarcity hours
- Since no price signal was available, engineers and policy makers used physical reliability criteria to determine generation capacity (e.g., expected outage duration of three hours per year, or one day every ten years)
- There is no guarantee that the market equilibrium investment will lead to the administrative reliability criterion
  - different economic and administrative reliability criteria
  - investors risk aversion combined with highly uncertain returns
  - strategic under-investment
- On the other hand, there is no reason why the old physical reliability criterion should be used in the restructured industry. Instead an economic concept, such as the VoLL, could/should be used

Administrative capacity adequacy level is a relic of regulation

- Under the regulated monopoly industry structure, prices were set at average cost, hence there was no price signal during scarcity hours
- Since no price signal was available, engineers and policy makers used physical reliability criteria to determine generation capacity (e.g., expected outage duration of three hours per year, or one day every ten years)
- There is no guarantee that the market equilibrium investment will lead to the administrative reliability criterion
  - different economic and administrative reliability criteria
  - investors risk aversion combined with highly uncertain returns
  - strategic under-investment
- On the other hand, there is no reason why the old physical reliability criterion should be used in the restructured industry. Instead an economic concept, such as the VoLL, could/should be used

Capacity mechanisms have experienced growing pains

- Capacity mechanisms are policy makers' attempt to lead markets to produce the regulated outcome of yore
- They have inherited numerous flaws from regulatory mechanisms
  - Historical or theoretical availability used instead of performance
  - Multiple exemptions for different asset classes
  - Absence of price signal during scarcity hours
- "Pay for performance" design incorporates many lessons learnt, and relies on forward obligations
  - The SO determines the adequate capacity, then administers a Forward Capacity Auction (FCA)
  - In exchange for a capacity payment, producers winning the auction commit to deliver their share of the energy and reserves required during a scarcity event
  - Deviations from their commitment are settled at a administratively determined Performance Payment Rate (PPR), close to 5,500 €/MWh

Capacity mechanisms have experienced growing pains

- Capacity mechanisms are policy makers' attempt to lead markets to produce the regulated outcome of yore
- They have inherited numerous flaws from regulatory mechanisms
  - Historical or theoretical availability used instead of performance
  - Multiple exemptions for different asset classes
  - Absence of price signal during scarcity hours
- "Pay for performance" design incorporates many lessons learnt, and relies on forward obligations
  - The SO determines the adequate capacity, then administers a Forward Capacity Auction (FCA)
  - In exchange for a capacity payment, producers winning the auction commit to deliver their share of the energy and reserves required during a scarcity event
  - Deviations from their commitment are settled at a administratively determined Performance Payment Rate (PPR), close to 5,500 €/MWh

Capacity mechanisms have experienced growing pains

- Capacity mechanisms are policy makers' attempt to lead markets to produce the regulated outcome of yore
- They have inherited numerous flaws from regulatory mechanisms
  - Historical or theoretical availability used instead of performance
  - Multiple exemptions for different asset classes
  - Absence of price signal during scarcity hours
- "Pay for performance" design incorporates many lessons learnt, and relies on forward obligations
  - The SO determines the adequate capacity, then administers a Forward Capacity Auction (FCA)
  - In exchange for a capacity payment, producers winning the auction commit to deliver their share of the energy and reserves required during a scarcity event
  - Deviations from their commitment are settled at a administratively determined Performance Payment Rate (PPR), close to 5,500 €/MWh

Capacity mechanisms have experienced growing pains

- Capacity mechanisms are policy makers' attempt to lead markets to produce the regulated outcome of yore
- They have inherited numerous flaws from regulatory mechanisms
  - Historical or theoretical availability used instead of performance
  - Multiple exemptions for different asset classes
  - Absence of price signal during scarcity hours
- "Pay for performance" design incorporates many lessons learnt, and relies on forward obligations
  - The SO determines the adequate capacity, then administers a Forward Capacity Auction (FCA)
  - In exchange for a capacity payment, producers winning the auction commit to deliver their share of the energy and reserves required during a scarcity event
  - Deviations from their commitment are settled at a administratively determined Performance Payment Rate (PPR), close to 5,500 €/MWh

Capacity mechanisms have experienced growing pains

- Capacity mechanisms are policy makers' attempt to lead markets to produce the regulated outcome of yore
- They have inherited numerous flaws from regulatory mechanisms
  - Historical or theoretical availability used instead of performance
  - Multiple exemptions for different asset classes
  - Absence of price signal during scarcity hours
- "Pay for performance" design incorporates many lessons learnt, and relies on forward obligations
  - The SO determines the adequate capacity, then administers a Forward Capacity Auction (FCA)
  - In exchange for a capacity payment, producers winning the auction commit to deliver their share of the energy and reserves required during a scarcity event
  - Deviations from their commitment are settled at a administratively determined Performance Payment Rate (PPR), close to 5,500 €/MWh

Capacity mechanisms have experienced growing pains

- Capacity mechanisms are policy makers' attempt to lead markets to produce the regulated outcome of yore
- They have inherited numerous flaws from regulatory mechanisms
  - Historical or theoretical availability used instead of performance
  - Multiple exemptions for different asset classes
  - Absence of price signal during scarcity hours
- "Pay for performance" design incorporates many lessons learnt, and relies on forward obligations
  - The SO determines the adequate capacity, then administers a Forward Capacity Auction (FCA)
  - In exchange for a capacity payment, producers winning the auction commit to deliver their share of the energy and reserves required during a scarcity event
  - Deviations from their commitment are settled at a administratively determined Performance Payment Rate (PPR), close to 5,500 €/MWh

Capacity mechanisms have experienced growing pains

- Capacity mechanisms are policy makers' attempt to lead markets to produce the regulated outcome of yore
- They have inherited numerous flaws from regulatory mechanisms
  - Historical or theoretical availability used instead of performance
  - Multiple exemptions for different asset classes
  - Absence of price signal during scarcity hours
- "Pay for performance" design incorporates many lessons learnt, and relies on forward obligations
  - The SO determines the adequate capacity, then administers a Forward Capacity Auction (FCA)
  - In exchange for a capacity payment, producers winning the auction commit to deliver their share of the energy and reserves required during a scarcity event
  - Deviations from their commitment are settled at a administratively determined Performance Payment Rate (PPR), close to 5,500 €/MWh

Capacity mechanisms have experienced growing pains

- Capacity mechanisms are policy makers' attempt to lead markets to produce the regulated outcome of yore
- They have inherited numerous flaws from regulatory mechanisms
  - Historical or theoretical availability used instead of performance
  - Multiple exemptions for different asset classes
  - Absence of price signal during scarcity hours
- "Pay for performance" design incorporates many lessons learnt, and relies on forward obligations
  - The SO determines the adequate capacity, then administers a Forward Capacity Auction (FCA)
  - In exchange for a capacity payment, producers winning the auction commit to deliver their share of the energy and reserves required during a scarcity event
  - Deviations from their commitment are settled at a administratively determined Performance Payment Rate (PPR), close to 5,500 €/MWh

Capacity mechanisms have experienced growing pains

- Capacity mechanisms are policy makers' attempt to lead markets to produce the regulated outcome of yore
- They have inherited numerous flaws from regulatory mechanisms
  - Historical or theoretical availability used instead of performance
  - Multiple exemptions for different asset classes
  - Absence of price signal during scarcity hours
- "Pay for performance" design incorporates many lessons learnt, and relies on forward obligations
  - The SO determines the adequate capacity, then administers a Forward Capacity Auction (FCA)
  - In exchange for a capacity payment, producers winning the auction commit to deliver their share of the energy and reserves required during a scarcity event
  - Deviations from their commitment are settled at a administratively determined Performance Payment Rate (PPR), close to 5,500 €/MWh

Observations and questions

- A much smarter design than the original capacity market
- How does demand participate in the market?
  - Can active demand response operators participate? How is effective demand reduction computed a year or more ahead?
  - What are the incentives for demand reduction during scarcity events? How are customers incentivized to reduce demand?
- This design "feels" like a standard energy-only market, except that (i) the ISO sets the capacity target and the capacity price, and (ii) participation in the forward market is strongly recommended
  - why hold on to the administrative reliability criterion and an administratively determined price, as opposed to using solely the VoLL?
  - why is there a need to organize a forward market? what leads us to believe that producers and retailers/large customers will not naturally engage in a forward market to hedge scarcity pricing risk?

Observations and questions

- A much smarter design than the original capacity market
- How does demand participate in the market?
  - Can active demand response operators participate? How is effective demand reduction computed a year or more ahead?
  - What are the incentives for demand reduction during scarcity events? How are customers incentivized to reduce demand?
- This design "feels" like a standard energy-only market, except that (i) the ISO sets the capacity target and the capacity price, and (ii) participation in the forward market is strongly recommended
  - why hold on to the administrative reliability criterion and an administratively determined price, as opposed to using solely the VoLL?
  - why is there a need to organize a forward market? what leads us to believe that producers and retailers/large customers will not naturally engage in a forward market to hedge scarcity pricing risk?

Observations and questions

- A much smarter design than the original capacity market
- How does demand participate in the market?
  - Can active demand response operators participate? How is effective demand reduction computed a year or more ahead?
  - What are the incentives for demand reduction during scarcity events? How are customers incentivized to reduce demand?
- This design "feels" like a standard energy-only market, except that (i) the ISO sets the capacity target and the capacity price, and (ii) participation in the forward market is strongly recommended
  - why hold on to the administrative reliability criterion and an administratively determined price, as opposed to using solely the VoLL?
  - why is there a need to organize a forward market? what leads us to believe that producers and retailers/large customers will not naturally engage in a forward market to hedge scarcity pricing risk?

Observations and questions

- A much smarter design than the original capacity market
- How does demand participate in the market?
  - Can active demand response operators participate? How is effective demand reduction computed a year or more ahead?
  - What are the incentives for demand reduction during scarcity events? How are customers incentivized to reduce demand?
- This design "feels" like a standard energy-only market, except that (i) the ISO sets the capacity target and the capacity price, and (ii) participation in the forward market is strongly recommended
  - why hold on to the administrative reliability criterion and an administratively determined price, as opposed to using solely the VoLL?
  - why is there a need to organize a forward market? what leads us to believe that producers and retailers/large customers will not naturally engage in a forward market to hedge scarcity pricing risk?

Observations and questions

- A much smarter design than the original capacity market
- How does demand participate in the market?
  - Can active demand response operators participate? How is effective demand reduction computed a year or more ahead?
  - What are the incentives for demand reduction during scarcity events? How are customers incentivized to reduce demand?
- This design "feels" like a standard energy-only market, except that (i) the ISO sets the capacity target and the capacity price, and (ii) participation in the forward market is strongly recommended
  - why hold on to the administrative reliability criterion and an administratively determined price, as opposed to using solely the VoLL?
  - why is there a need to organize a forward market? what leads us to believe that producers and retailers/large customers will not naturally engage in a forward market to hedge scarcity pricing risk?

Observations and questions

- A much smarter design than the original capacity market
- How does demand participate in the market?
  - Can active demand response operators participate? How is effective demand reduction computed a year or more ahead?
  - What are the incentives for demand reduction during scarcity events? How are customers incentivized to reduce demand?
- This design "feels" like a standard energy-only market, except that (i) the ISO sets the capacity target and the capacity price, and (ii) participation in the forward market is strongly recommended
  - why hold on to the administrative reliability criterion and an administratively determined price, as opposed to using solely the VoLL?
  - why is there a need to organize a forward market? what leads us to believe that producers and retailers/large customers will not naturally engage in a forward market to hedge scarcity pricing risk?

Observations and questions

- A much smarter design than the original capacity market
- How does demand participate in the market?
  - Can active demand response operators participate? How is effective demand reduction computed a year or more ahead?
  - What are the incentives for demand reduction during scarcity events? How are customers incentivized to reduce demand?
- This design "feels" like a standard energy-only market, except that (i) the ISO sets the capacity target and the capacity price, and (ii) participation in the forward market is strongly recommended
  - why hold on to the administrative reliability criterion and an administratively determined price, as opposed to using solely the VoLL?
  - why is there a need to organize a forward market? what leads us to believe that producers and retailers/large customers will not naturally engage in a forward market to hedge scarcity pricing risk?