

Collusion and Misallocation

- Collusion raises price allowing a high cost fringe to produce
- What can we learn about the costs of collusion?
 - ① We might be understating the costs of collusion when considering only DWL
 - ② There is another triangle (or rectangle)

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- What can we learn about the costs of collusion?
 - ① We might be understating the costs of collusion when considering only DWL
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- What is the benchmark?
- Does the presence or expansion of high cost fringe make it worse?

Full dynamic model: results

Table 6: Dynamic counterfactual results
(NPV of costs in billions of 2014 dollars)

	Timespan			
	1970-2014		1970-2100	
Actual (A)	2184	(125)	2499	(130)
Counterfactual (C)	1268	(76)	1756	(79)
Total distortion (A - C)	916	(124)	744	(112)
Decomposition of total distortion				
Within country (non-OPEC)	329	(80)	284	(41)
Within country (OPEC)	192	(46)	157	(72)
Across country (within non-OPEC)	163	(18)	139	(17)
Across country (within OPEC) (X)	85	(22)	58	(21)
Between OPEC and non-OPEC (Y)	148	(29)	105	(25)
Production distortion due to OPEC market power				
Upper bound (X+Y)	233	(42)	163	(38)
Lower bound (Y only)	148	(29)	105	(25)

The Benchmark

- Efficient allocation vs non-collusive outcome
- Cournot equilibrium also has misallocation

$$\frac{p - c_i}{p} = \frac{s_i}{\eta}$$

- Would misallocation within cartel decrease?
- How much of fringe output replaced?

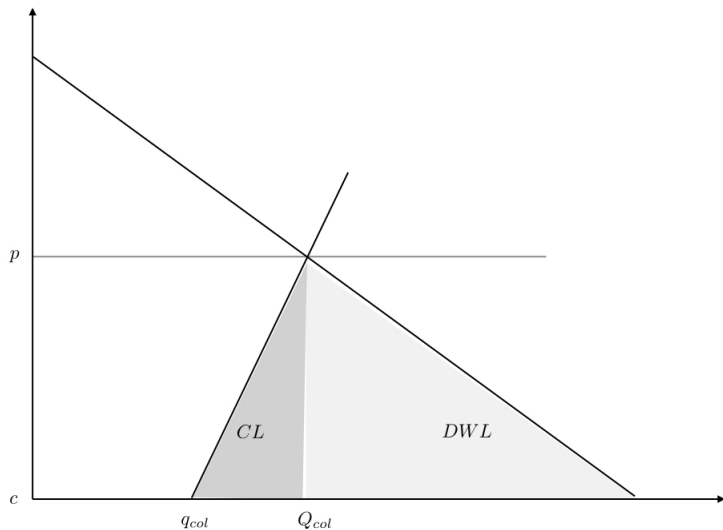
Cartel Distribution

Country	Actual Share	Counterfactual
Persian Gulf		
Iran	13.0%	11.1%
Iraq	6.6%	8.4%
Kuwait	6.9%	18.9%
Qatar	2.1%	1.8%
Saudi Arabia	30.4%	50.5%
UAE	10.1%	3.8%
Others		
Algeria	4.8%	1.8%
Indonesia	4.6%	0.2%
Libya	5.7%	1.5%
Nigeria	6.4%	0.7%
Venezuela	9.4%	1.1%
	100%	100%

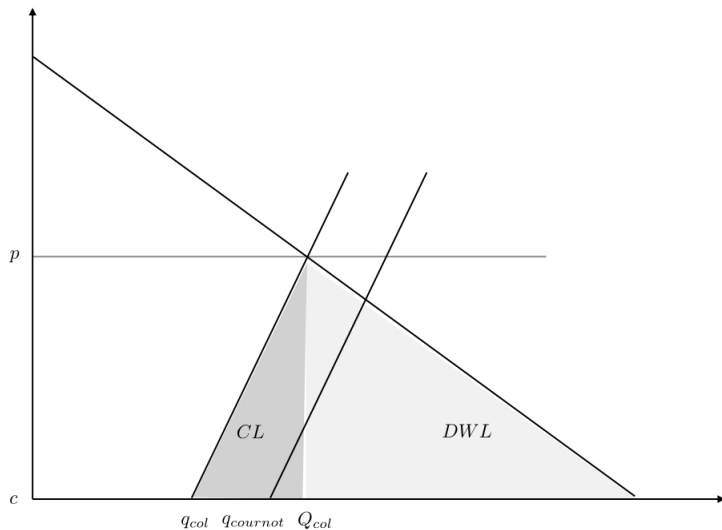
Counterfactual

- Cartel output increases to Cournot equilibrium
- Price decreases, but higher than marginal cost!
- Output of fringe decreases
- Magnitudes?

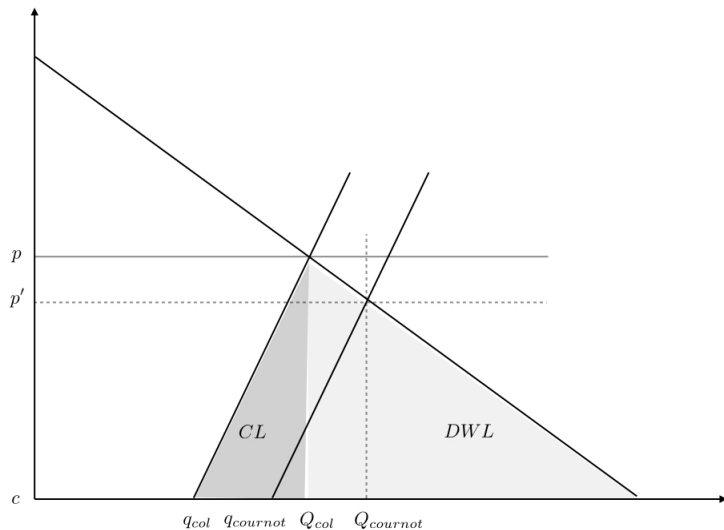
From Cartel to Cournot



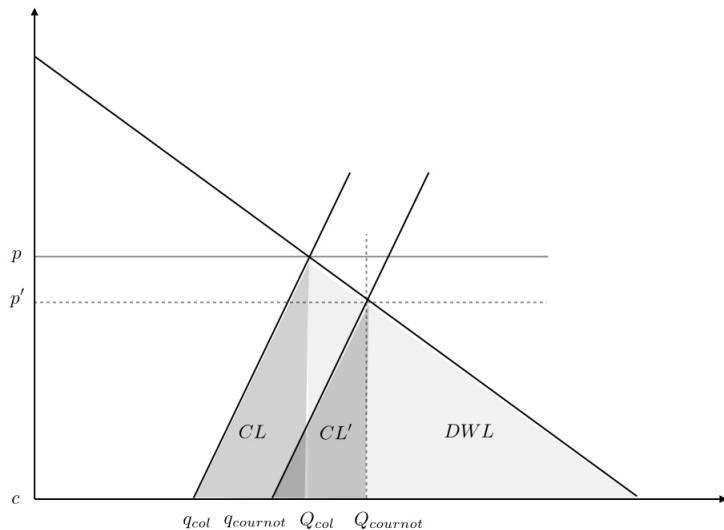
From Cartel to Cournot



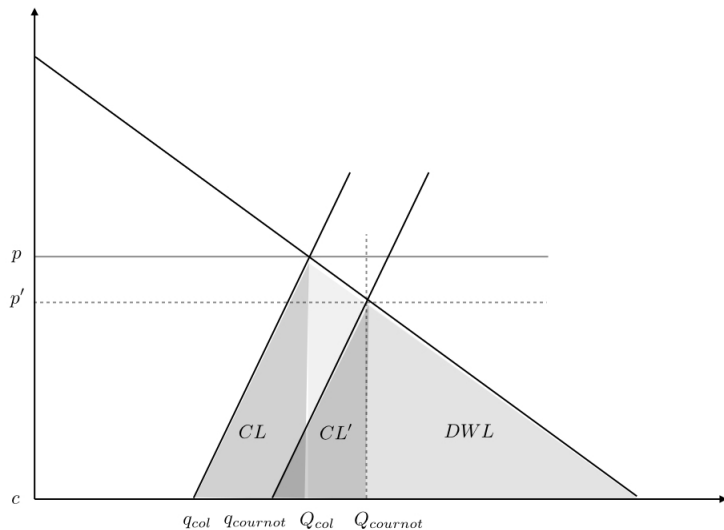
From Cartel to Cournot



From Cartel to Cournot



From Cartel to Cournot



Fringe: Misallocation and Welfare

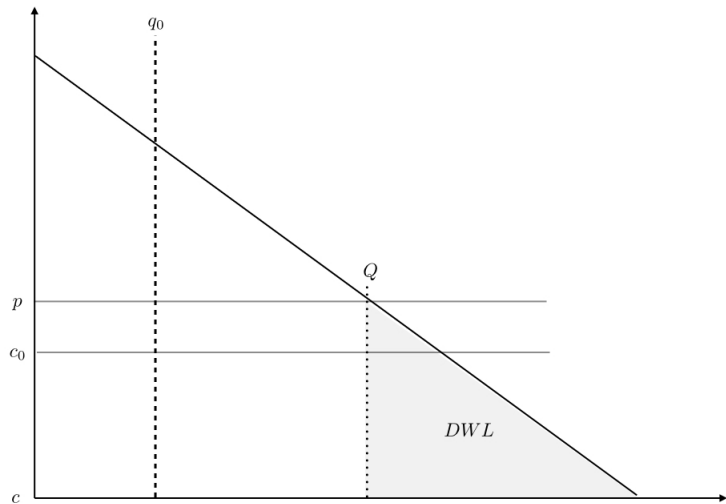
- Existence of fringe leads to more misallocation with cartel
- But does it hurt welfare?

Fringe: Misallocation and Welfare

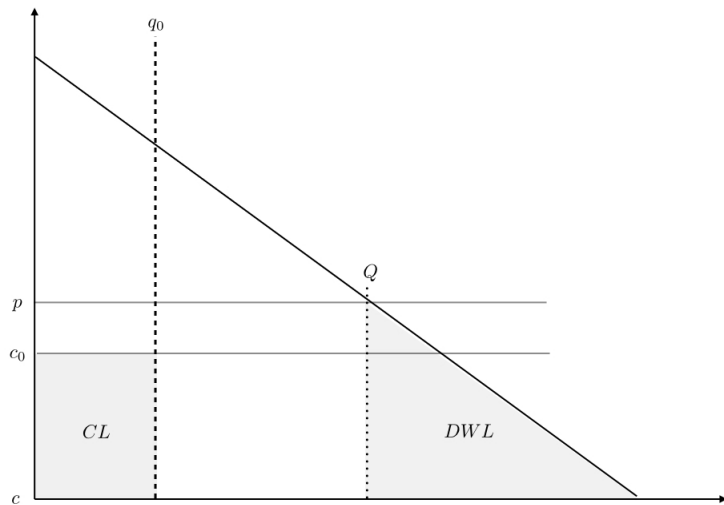
- Existence of fringe leads to more misallocation with cartel
- But does it hurt welfare?

- Fringe expanded considerably during this period
- Can hurt welfare if prevented cartel from expanding

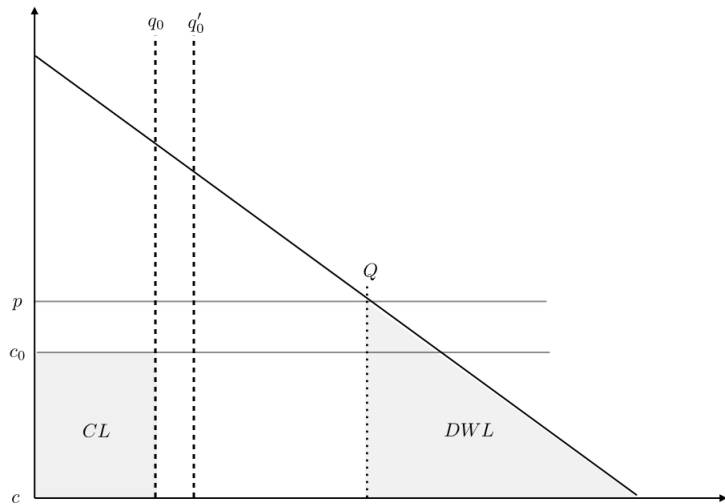
Expansion of Fringe can Decrease Welfare



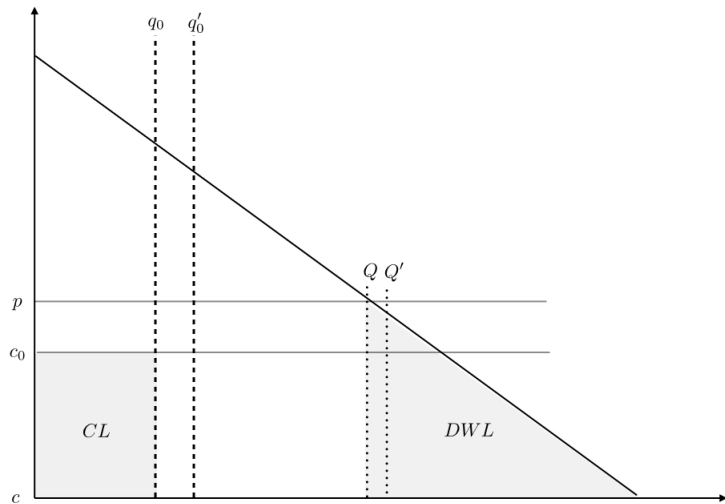
Expansion of Fringe can Decrease Welfare



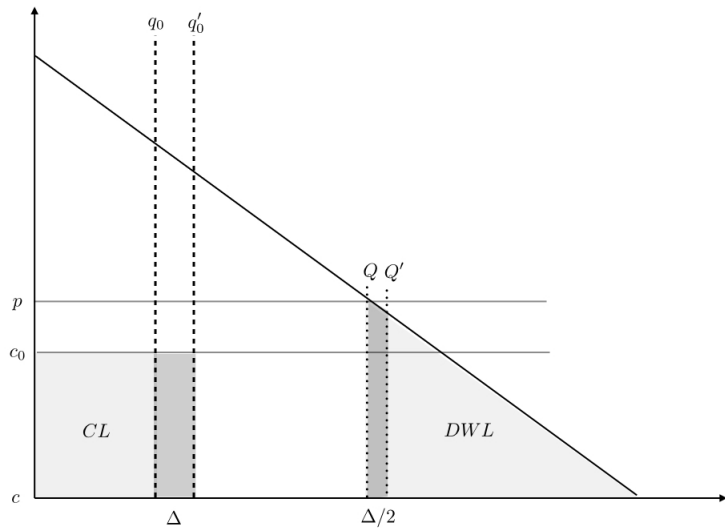
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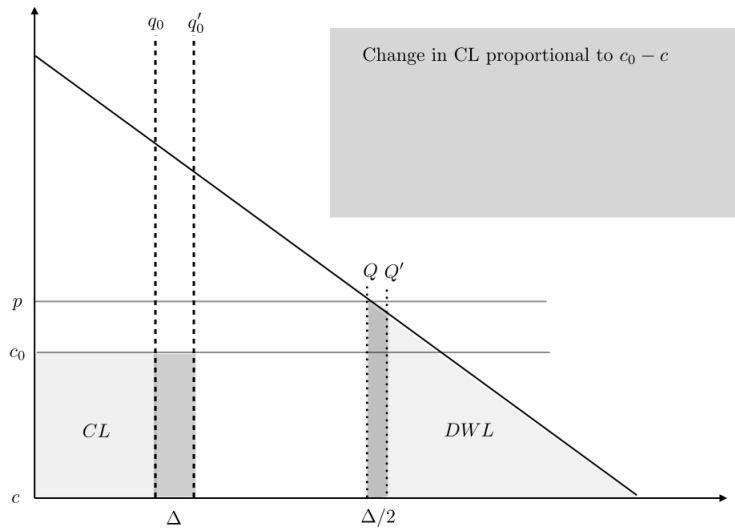
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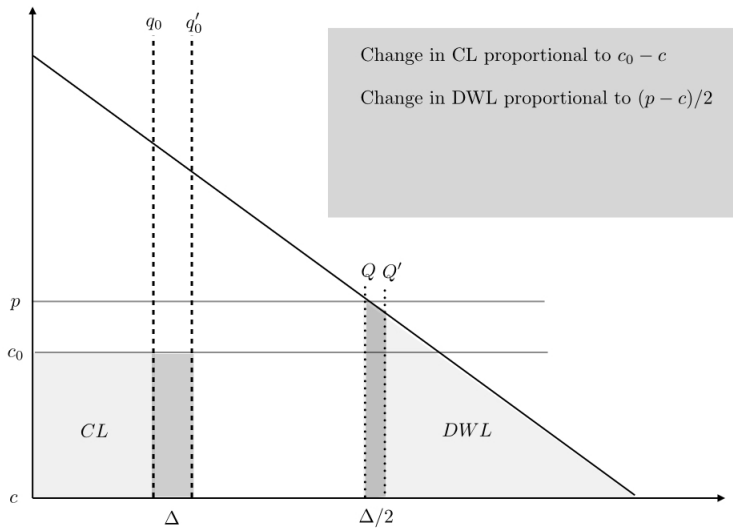
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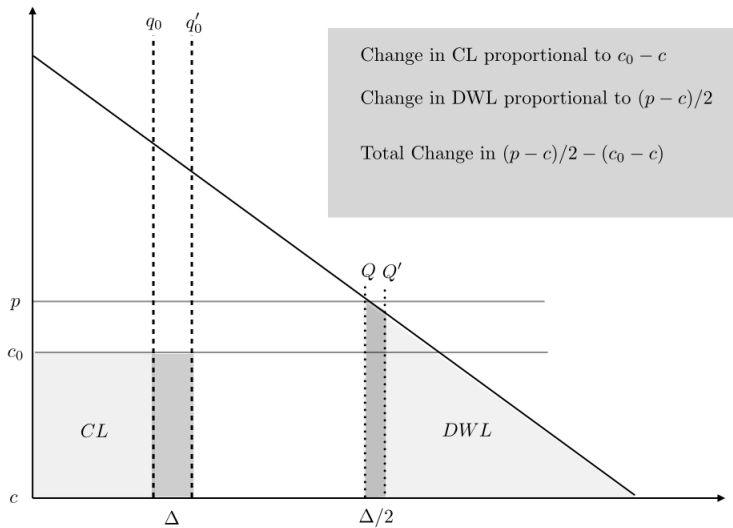
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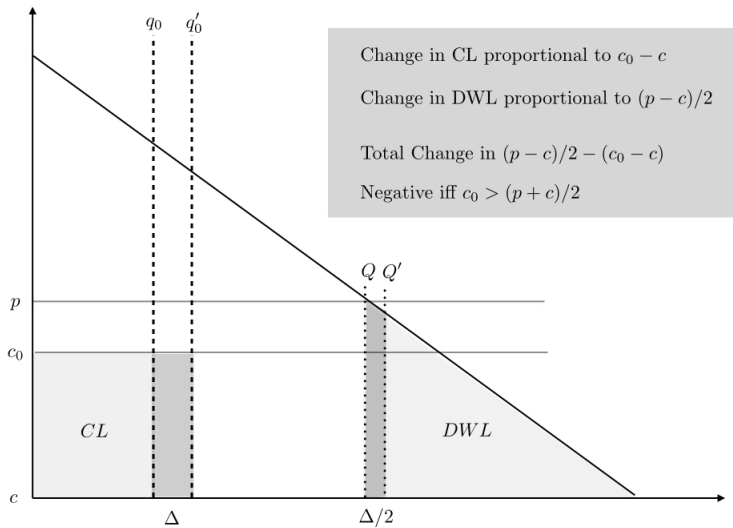
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Expansion of Fringe can Decrease Welfare



Conclusions

- Great paper
 - points to a missed component of welfare losses
 - careful empirical analysis
 - careful modeling of dynamic allocation
- What is the correct benchmark?
- For misallocation: efficient allocation
- For antitrust: Non-collusive equilibrium
 - Losses from misallocation could be considerably smaller
- How is ML compared to DWL?