FRUGALS, MILITANTS AND THE OIL MARKET

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The issue

Climate change calls for "de-carbonization"

hence

- Attempt to put in place policies...
  ...that aim at reducing GHG emissions *by increasing prices*
  (Carbon tax...)
- Given the relative failure to do so...
  ... Militants take action to oppose some projects...
  ... and contain oil production (Pipelines, Sand tars...)
- **But who does ask to moderate consumption?**

However...

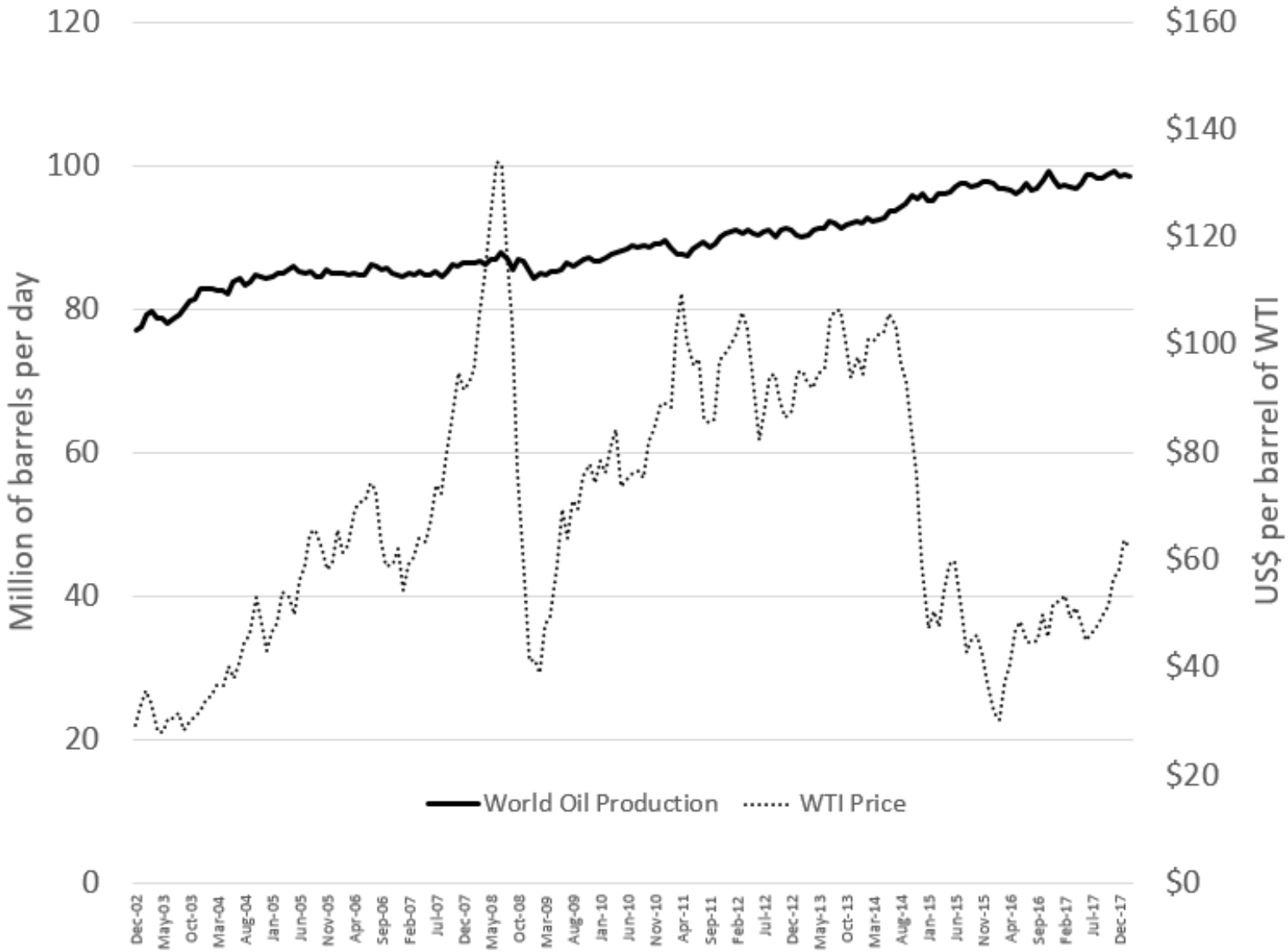


Figure: *World oil production and price, 2002-2018*

The model

N identical individuals endowed with a utility

$$\mathscr{U}(q, s; p, Q) = v(p, q) + b(s) - e(Q),$$

where

- $v(p, q)$: net utility from individual consumption q at price p,
- $b(s)$: benefits from environmental stance s,
- $e(Q)$: individual environmental costs, that increase with total consumption Q.

$q \in \{a; f\}$: Individual consumption q is either *average* or *frugal*
$s \in \{m; \emptyset\}$: Environmental stance is either *militant* or *not*.

Price p and collective consumption Q
are determined by the interplay of supply and demand.

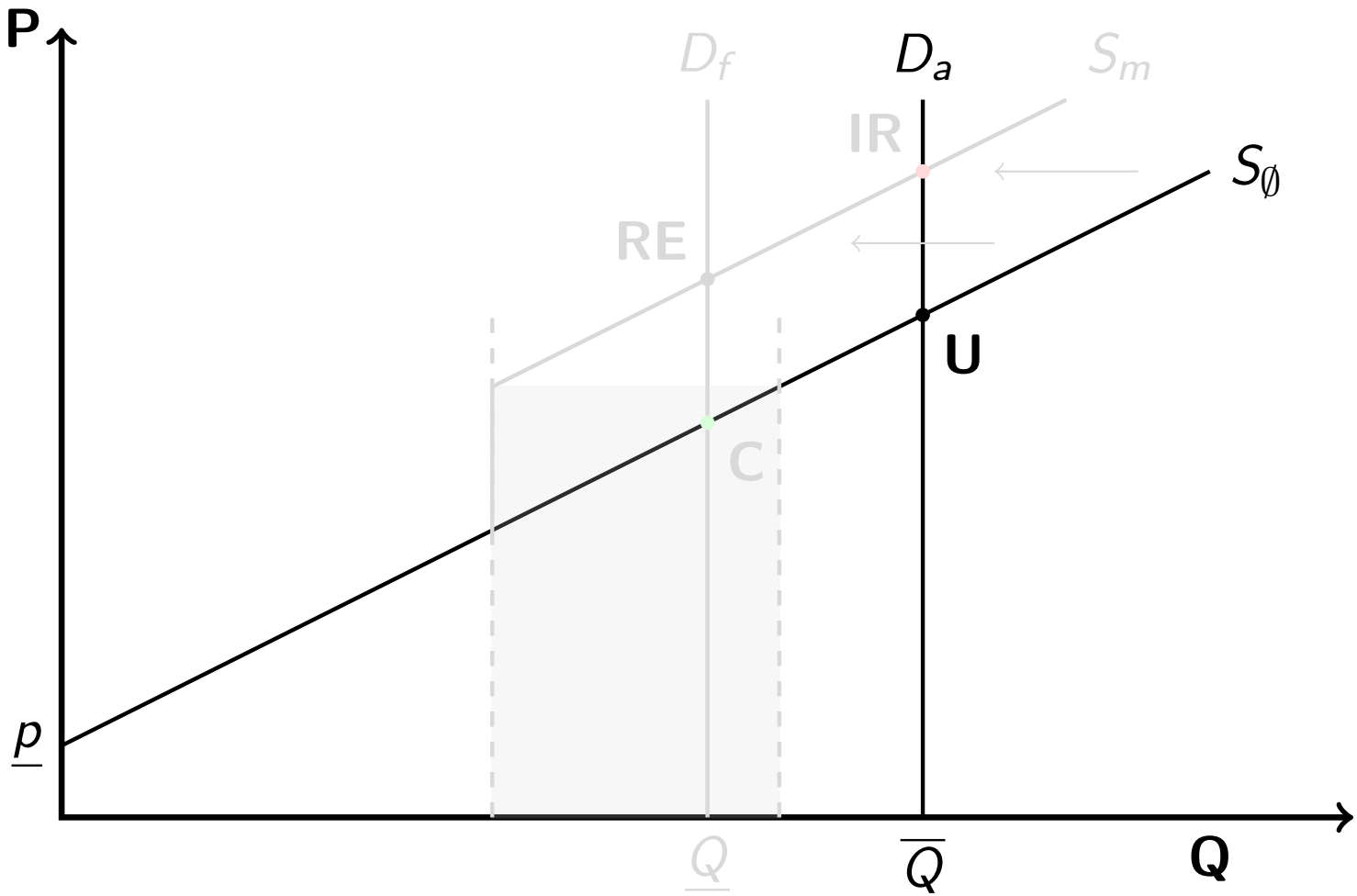
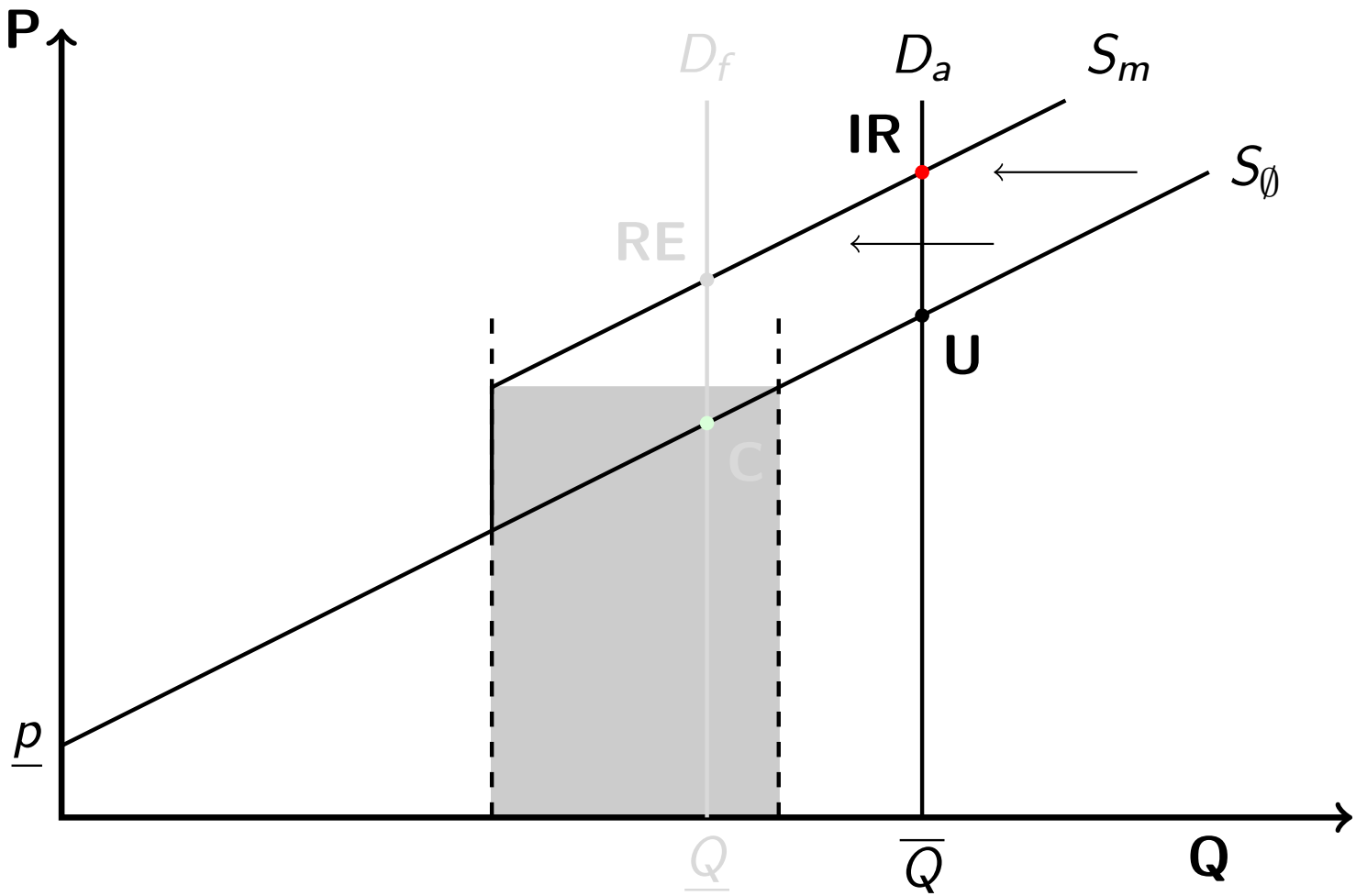


Figure: The four polar collective outcomes: Individually rational (**IR**), Unconcerned (**U**), Cooperative (**C**) and Radical environmentalist (**RE**). When militants manage for the projects associated to the grey area to be cancelled, the subsequent supply curve is shifted to the left.



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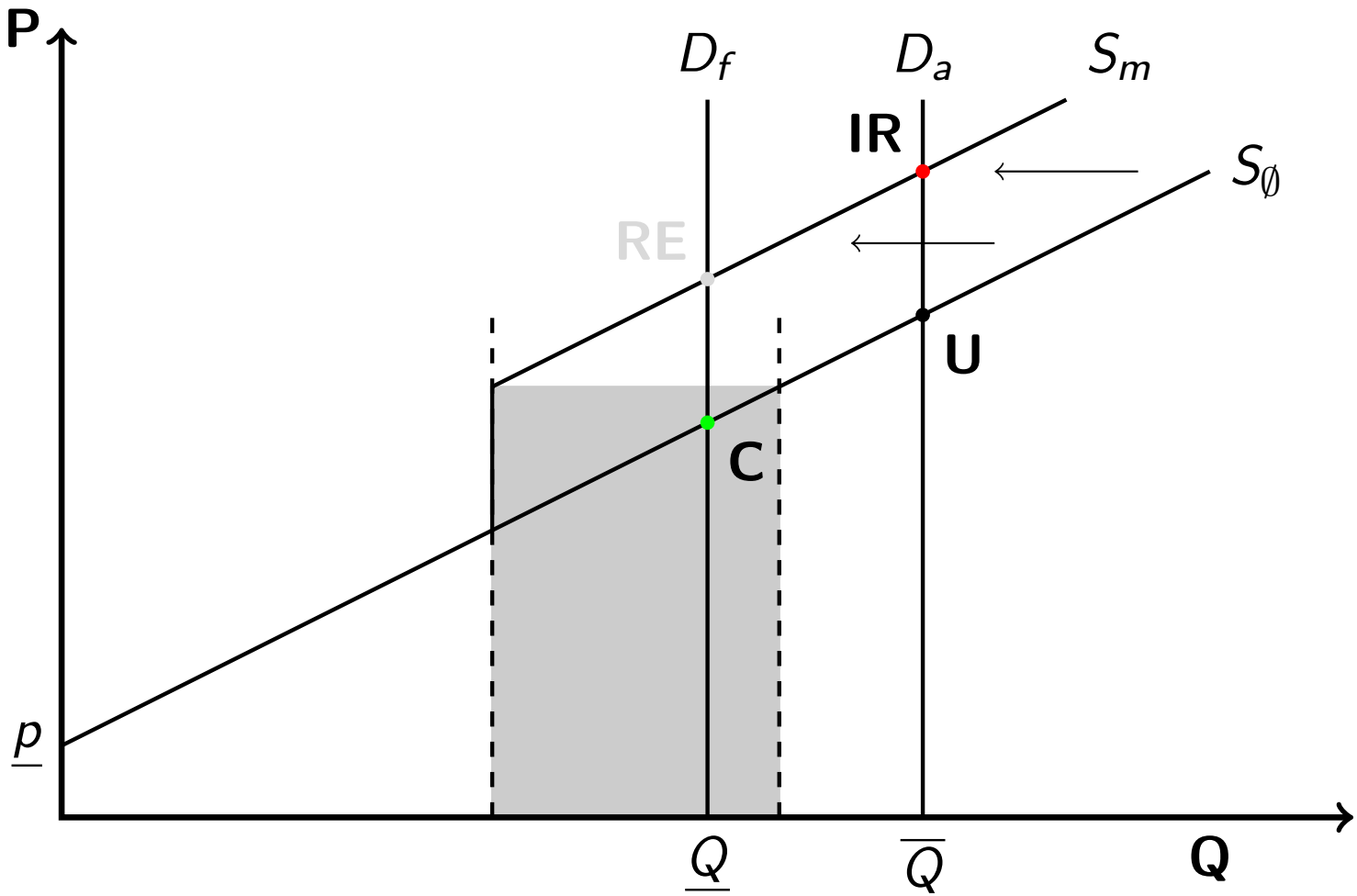

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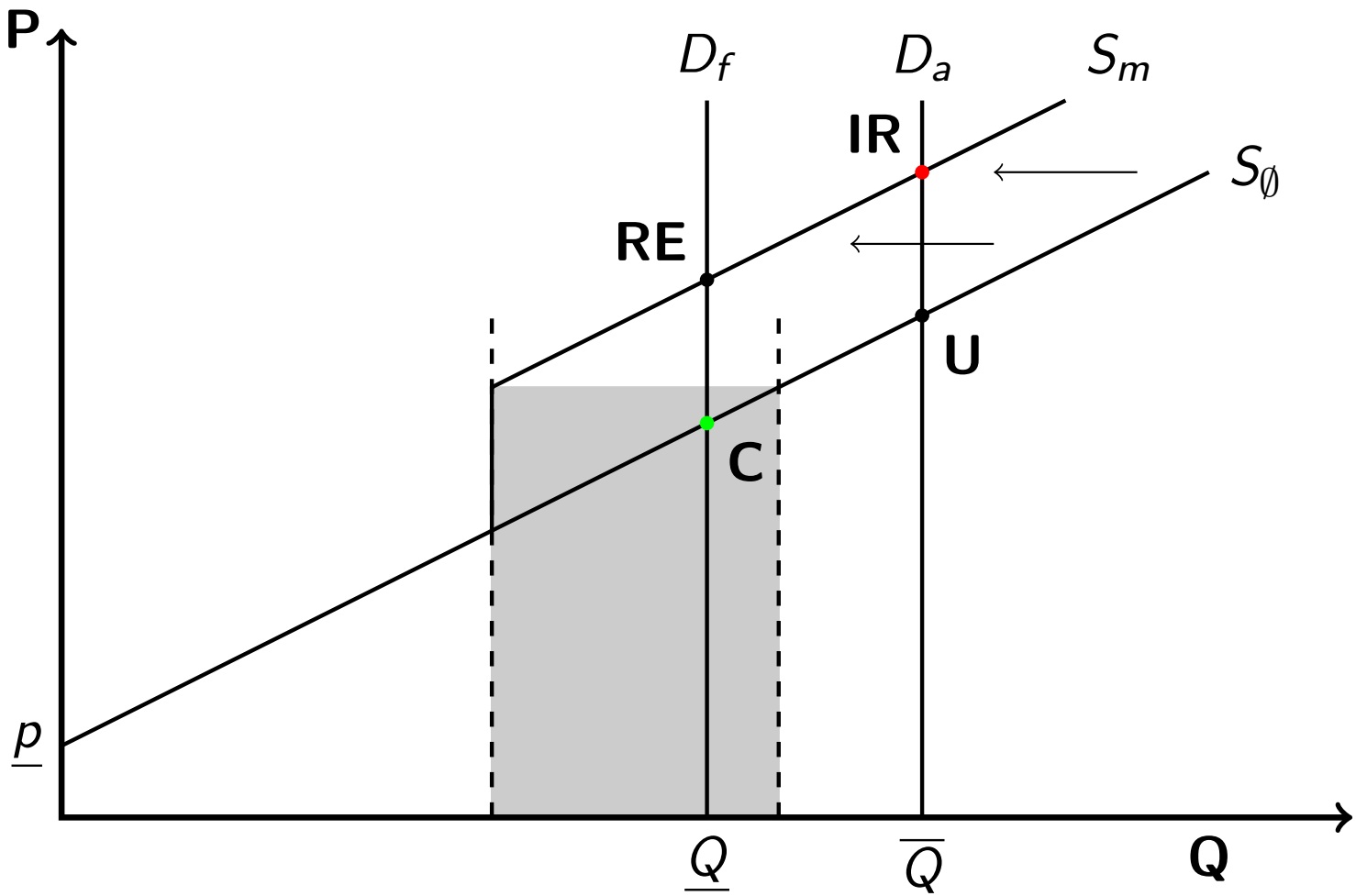

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A double prisoner's dilemma

Equilibrium outcomes:

$$p^* = p\left(N_f, N_m\right) \quad \text{and} \quad Q^* = Q\left(N_f, N_m\right)$$

H1: In regard of their environmental impact, individuals find it individually too costly to adopt a frugal behaviour :

$$\mathscr{U}\left(f, s, Q\left(N_f; N_m\right)\right) < \mathscr{U}\left(a, s, Q\left(N_f - 1; N_m\right)\right),$$

for all $N_f \in \{1; ...; N\}$ and $\forall s \in \left\{m; \emptyset\right\}$ and $\forall N_m \in \{0; ...; N\}$.

H2: Individuals find it individually profitable to adopt a stance of environmental militant:

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Lemma:

Under **H1**, **H2** and **H3** players dominant strategy is:

$$(q; s) = (a, m).$$

However:

$$\mathscr{U}^{IR} < \mathscr{U}^{RE} < \mathscr{U}^{C},$$
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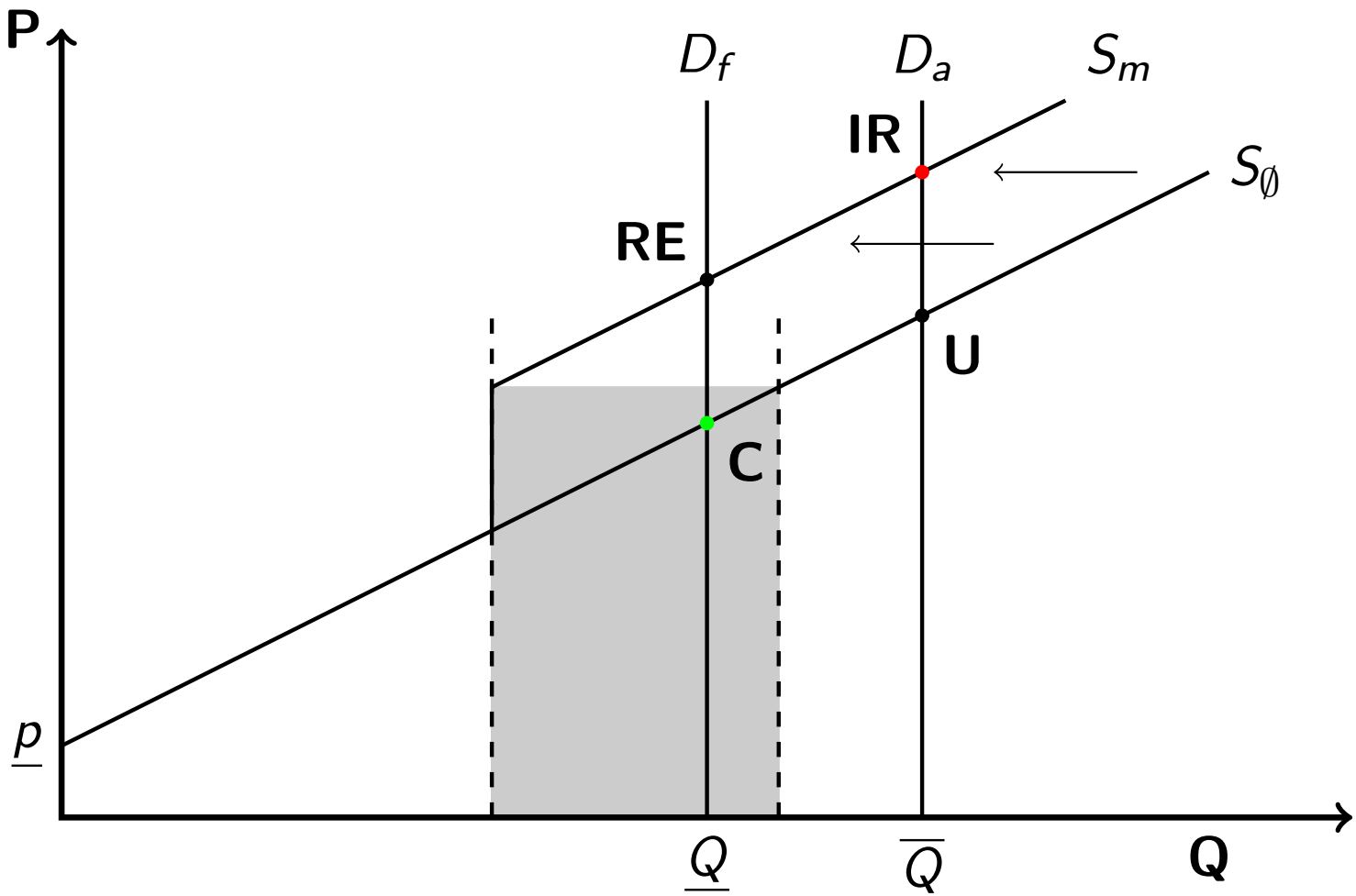

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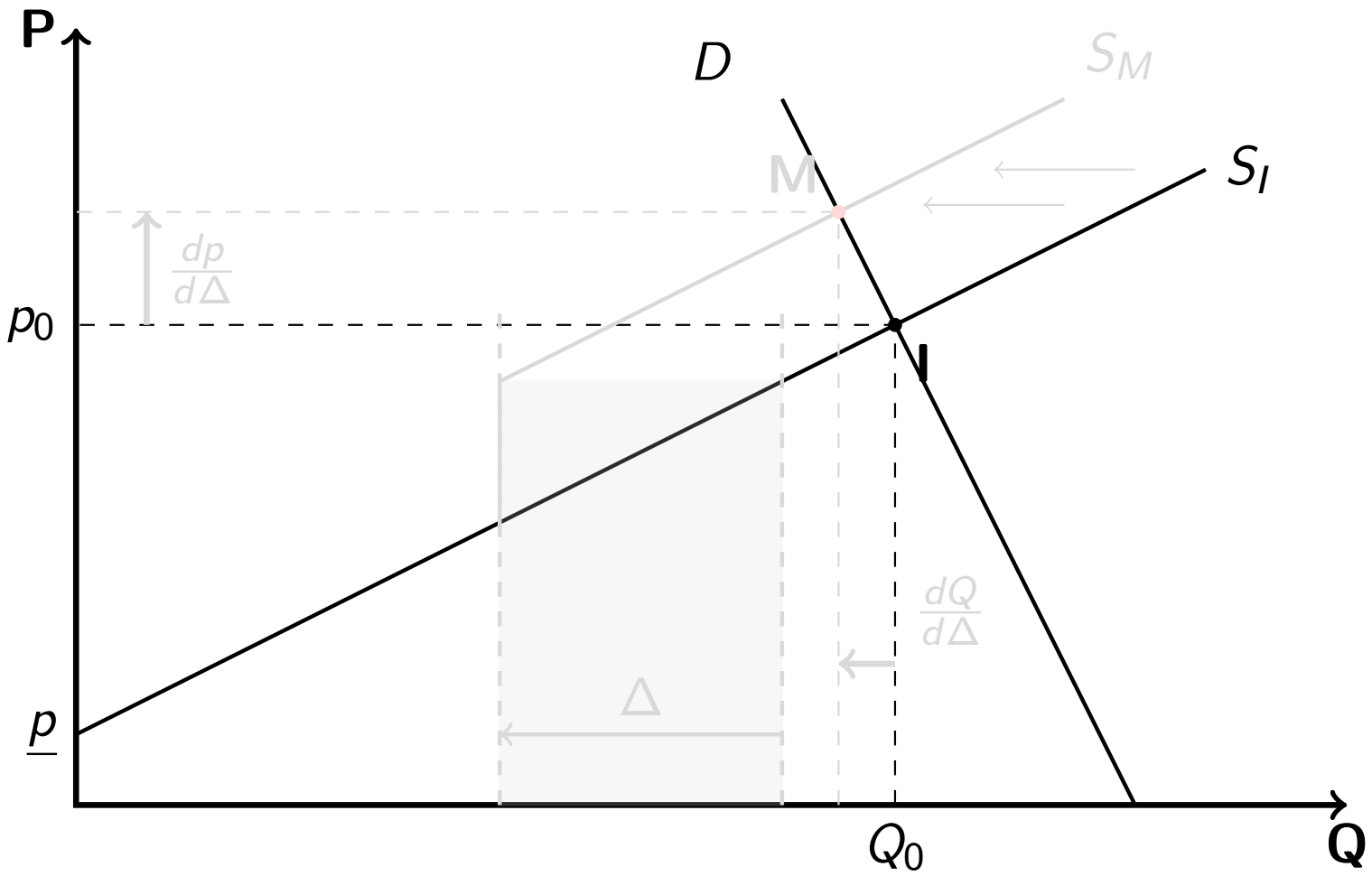
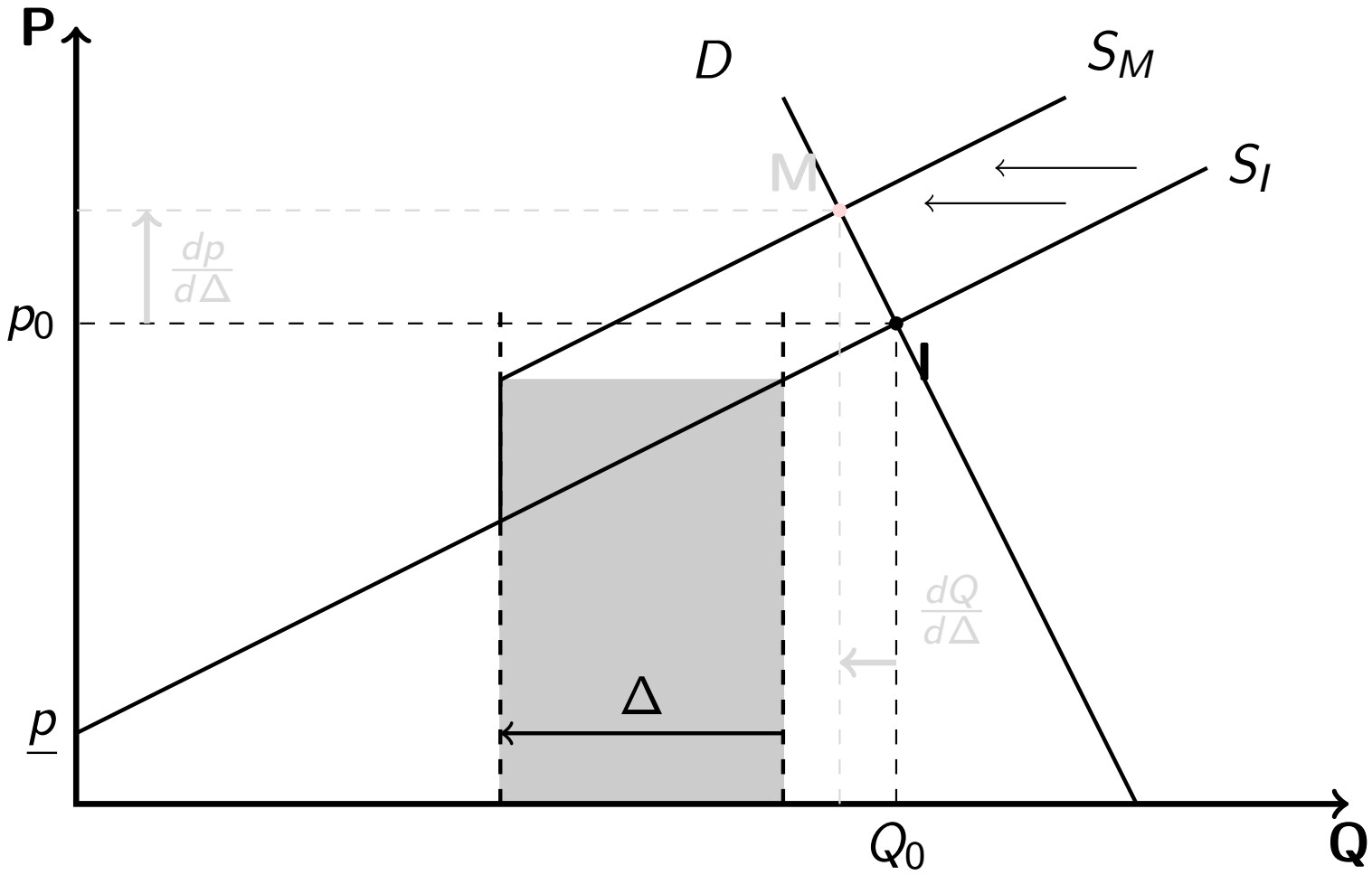


Figure: The initial equilibrium (**I**) is displaced by militant action upon supply (**M**) resulting in a slightly lower demand (a fraction of Δ) yet a substantially higher equilibrium price.



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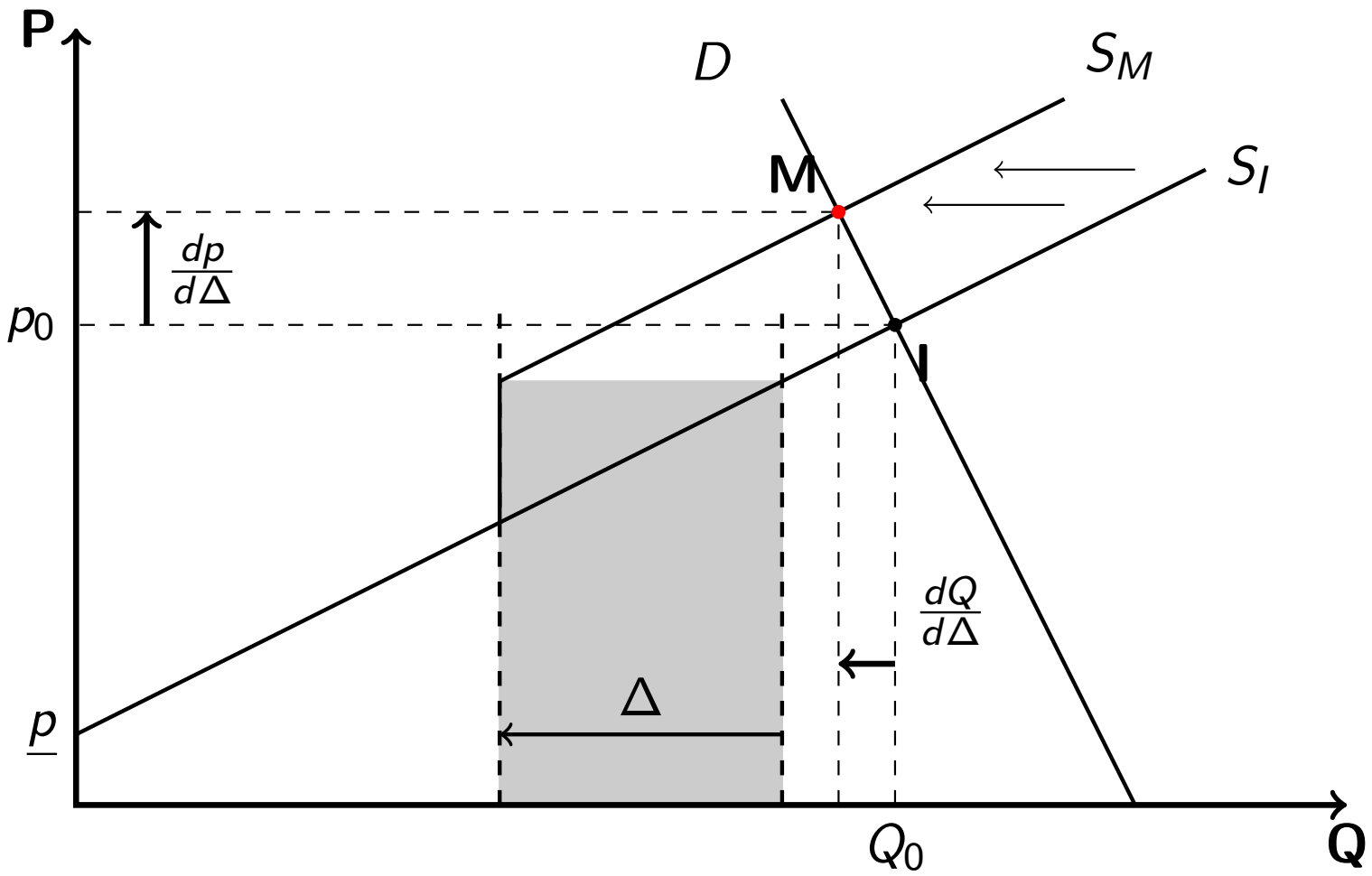

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Consequences of militants' action

Slight impact upon environment

$$\frac{dQ}{d\Delta} = \frac{-\epsilon}{\epsilon + (1 + \Delta/Q)\,\eta};$$

Significant impact upon price *(Consequences for the poor?)*

$$\frac{dp}{d\Delta} = \frac{(p/Q)}{\epsilon + (1 + \Delta/Q)\,\eta};$$

Increase of Industry revenues *(!!!)*

$$\frac{d}{d\Delta}(pQ) = \frac{p\,(1-\epsilon)}{\epsilon + (1 + \Delta/Q)\,\eta}.$$

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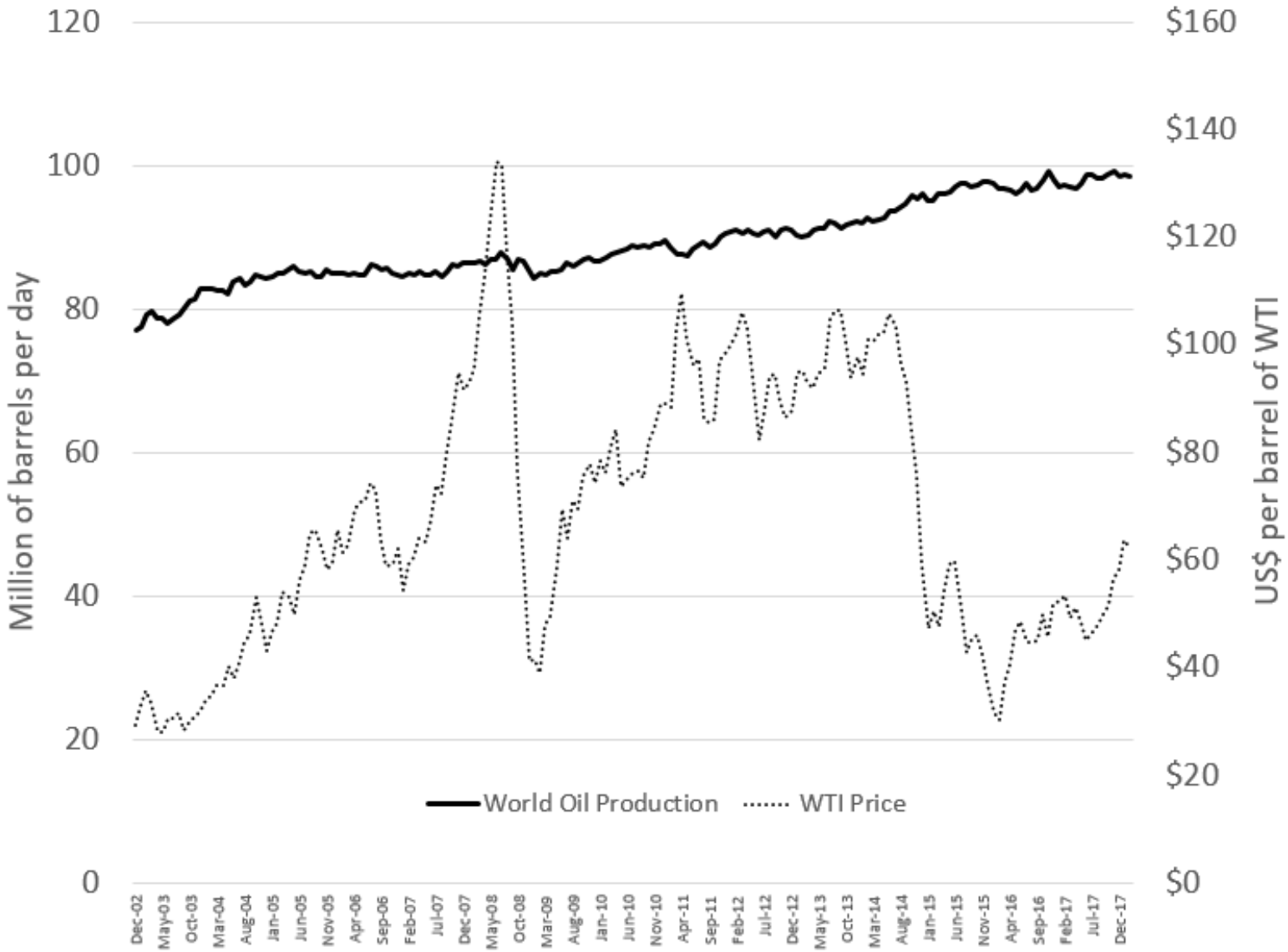
Is pricing really the problem?



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