

An Economic Theory Masterclass

Part VI: Price or Quantity Controls

Lones Smith

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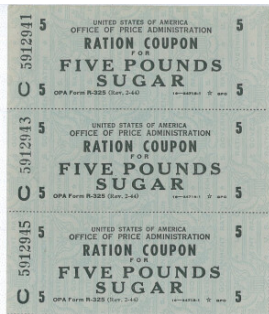
Price and Quantity Constraints Create New Markets

- ▶ Big Idea: markets happen and currencies emerge to transfer utility or even burn utility
- ▶ Price or quantity constraints mean that market clear due to
 - ▶ inefficient means (queues, bribery, or crime) or
 - ▶ efficient means (coupons, key prices)
- ▶ This chapter reflects George Stigler's Regulation course.



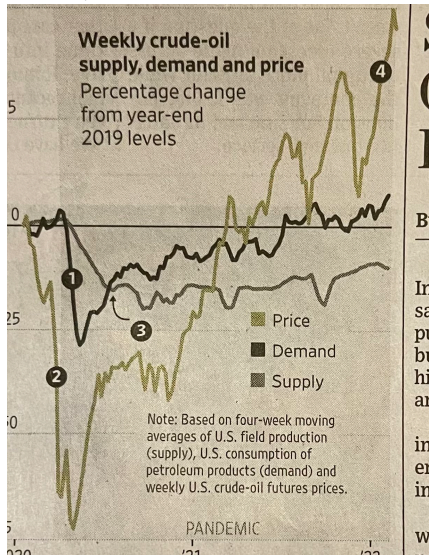
Quantity Ceilings: Officially Sanctioned Demand

- ▶ Some token or record must be kept of quantity
- ▶ Example: ration coupons in WWII for clothing, shoes, coffee, gasoline, fuel oil, etc.
- ▶ Example: fewer NYC taxi medallions than 1937



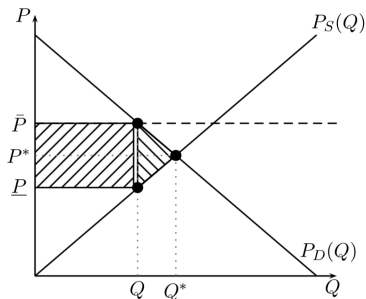
Embellishing the Supply and Demand Paradigm

- ▶ Plotting demand \neq supply is usually nonsense (WSJ!)



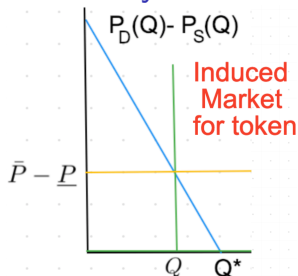
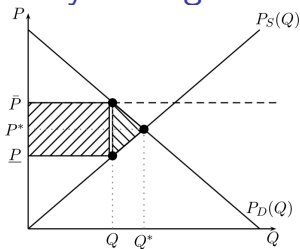
- ▶ But with price or quantity constraints, it happens

Binding Quantity Ceilings as Binding Price Ceilings



- ▶ Assume a binding quantity ceiling $\underline{Q} < Q^*$.
 - ▶ Demand price exceeds supply price at that quantity
 - ▶ Marshallian quantity adjustment is blocked
- ▶ Then supply is on the **short side of the market**
- ▶ Efficient trades don't happen \Rightarrow triangular deadweight loss

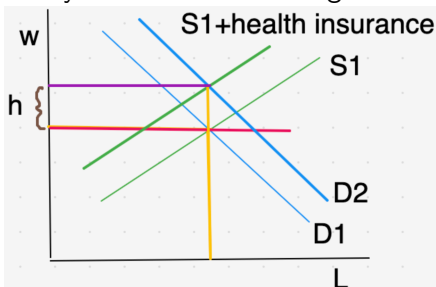
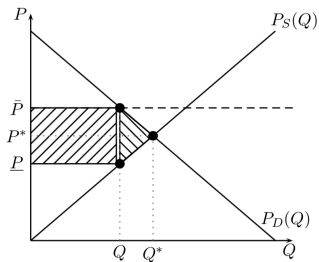
Quantity Ceilings and Induced Secondary Markets



- ▶ Binding price or quantity constraints induce secondary markets that help clear the market (as with Arrow's missing markets)
- ▶ A binding quantity ceiling $\underline{Q} < Q^*$ induces a token market
 - ⇒ token has value $P_D(\underline{Q}) - P_S(\underline{Q}) = \bar{P} - \underline{P} > 0$
 - ▶ A price floor \bar{P} is equivalent to the quantity ceiling \underline{Q}
 - ▶ *Demand is the short side of the market*
 - ▶ A price ceiling $\underline{P} < P^*$ is equivalent to quantity ceiling \underline{Q}
 - ▶ Example: rent control with a "key price" to transfer money
 - ▶ *Supply is the short side of the market*
 - ▶ Both original and token markets must clear at the same time
 - ⇒ This is an early taste of general equilibrium!

Price Ceilings, Side Payments, and the Secondary Market

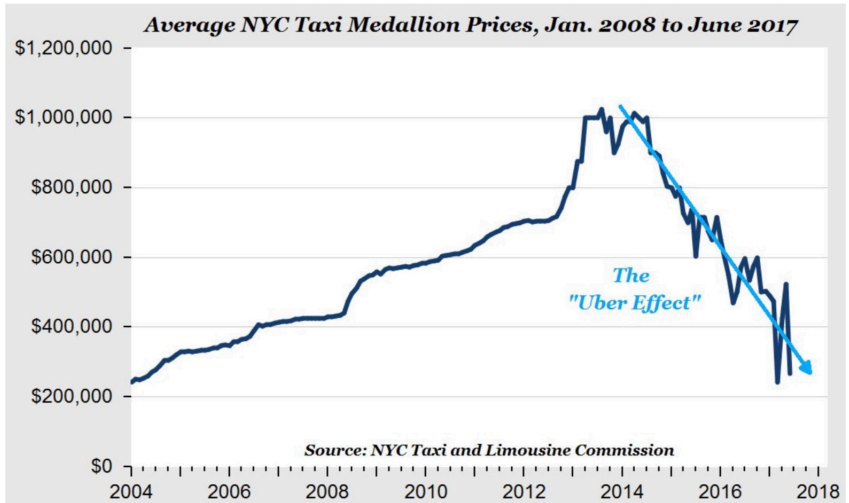
- ▶ Usury laws: interest rate capped at zero (Catholic Church)
 - ▶ WTF: “Payday loans” can have effective interest rates $> 500\%$
- ▶ Rent control
 - ▶ an apartments key can sell for the present value of $P^* - \underline{P}$
- ▶ “Fixing” inflation with price controls
 - ▶ Currently: Supply Crisis — should anything be done? 😊
 - ▶ After all, inflation is caused by “corporate greed”
 - ▶ WW2: labor supply \downarrow (ignored below) & demand rose ($D_1 \uparrow D_2$)
 - ▶ The War Labor Board established wage controls
 - ▶ Result: Employer provided health insurance, valued at h
- ▶ Binding price ceiling is formally like a demand ceiling



Taxi Medallion Secondary Market with Capped Quantity

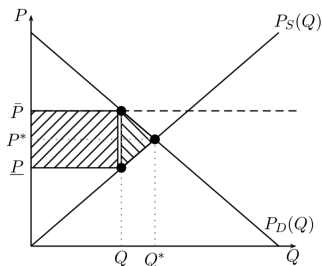
- ▶ 1937 Demand $P_D(Q) = 28,000 - Q$.
- ▶ Supply $P_S(Q) = Q$
- ▶ Competitive quantity of taxis: $Q^* = 14,000$
- ▶ Assume demand in year t is $P_D(Q|t) = 28,000 + 100t - Q$
- ▶ $M(t) =$ annual medallion rental cost
- ▶ Year t supply: $P_S(Q) = Q + M(t)$
 - ▶ Clear the market for taxi plus medallion: $P_D(Q^*|t) = P_S(Q^*)$
 - ⇒ $28,000 + 100t - Q^* = Q^* + M(t)$
 - ⇒ $M(t) = 100t$

Medallion Value in the Uber Era (2009–)



Inefficient Secondary Markets: Queues, Crime, etc.

- ▶ 1970s Oil Crisis \Rightarrow gas queues: Why not raise the price of gas?
 - ▶ Answer? Lineups cost more for the richer (higher hourly cost)
- ▶ Queuing costs = NE shaded region (deadweight loss *rectangle*)
 - ▶ Example: Why Black Friday lineups clear the market



- ▶ Apartment destruction can clear the market with rent control
 - ▶ Tradable key equilibrium might not arise with sub-cost rents
 - ▶ Rectangular loss of apartment value: Rent control is “the most efficient technique presently known to destroy a city—except for bombing.” – Assar Lindbeck (Swedish economist)

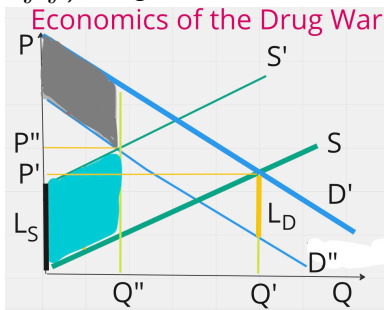
Review of Public Goods and Price/Quantity Constraints



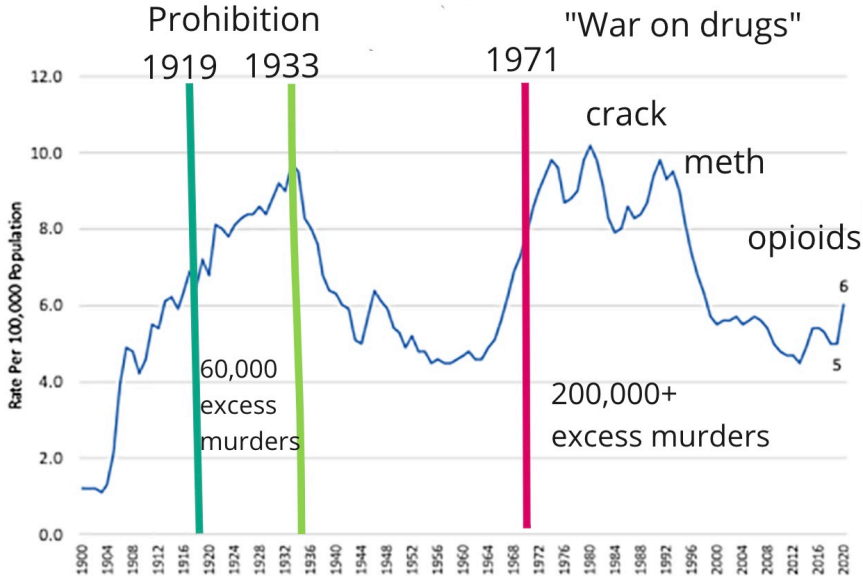
- ▶ Lindahl equilibrium is a personal price implementation of the Samuelson condition. Is this how property tax works?
 - ▶ It focuses on the margin, like Pigou (given an interior solution)
- ▶ Efficient policy aligns private & social incentives *at the margin*
- ▶ Govts like to constrain price & quantity, ignoring the margin.
 - ▶ With a token to transfer utility, and assuming a secondary market for the token, it creates deadweight loss triangles
 - ▶ With no token to transfer utility, some nontransferable currency emerges (queues, rent-seeking (grants!), violence). This creates deadweight loss triangles and rectangles.
 - ▶ Model is “wronger” than usual — it’s a reduced form game!

Prohibition and the Alcohol and Drug Wars

- ▶ Chicago price theory skips game (a useful “wrong” model)
- ▶ People consume something causing harm $H > 0$, like heroin.
- ▶ So society imposes legal penalty that raises supply costs in expectation by $L_S > 0$ and lowers inverse demand by $L_D > 0$
- ▶ Assume people face a binary yes/no trade decision.
 - ▶ Then this diagram describes optimal choices: value v buyer buys if $P - L_D < v$ and cost c seller sells if $P > c + L_S$
- ▶ New $Q'' < Q'$ and total price $P'' + L_D$ rises in L_S and L_D .
- ▶ How does market price P' respond? Unclear.
- ▶ Areas (double $\int \int$) are gains from trade, deadweight losses



US Homicide Rates 1900-2020



Economics Magic Recipe



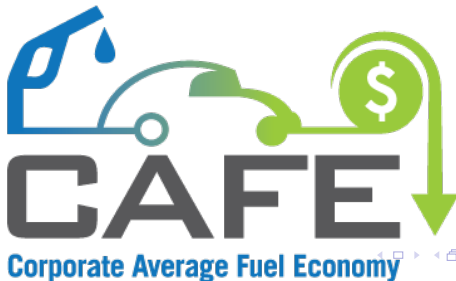
- ▶ Find equilibrium
 1. Suppose *arbitrary* price p or prices p_D, p_S
 - ▶ Prices p_D, p_S simply move in lockstep in that example
 2. Deduce *hypothetical* firm and consumer behavior (quantity q)
 3. Deduce aggregate demand and supply Q_S and Q_D via \int
 4. Walrasian price adjustment until market clears at p^* and Q^*
 5. Given p^* , deduce *actual* individual quantities q
- ▶ Do comparative statics in parameters
- ▶ Find gains from trade, or deadweight losses as areas

Corporate Average Fuel Economy: A Car/Truck Ratio

- ▶ Economist's efficient solution: pick an optimal Pigouvian gas tax and let people decide what cars and vehicles to drive
- ▶ Corporate Average Fuel Economy (CAFE) standards
 - ▶ 1985-2011: Car companies must average 27.5MPG for cars
 - ▶ Formally, this created a quantity floor for economy cars
 - ▶ Firms discounted fuel efficient sedans, sold trucks at a premium
 - ▶ Profit maximization over sedans s and trucks t becomes:

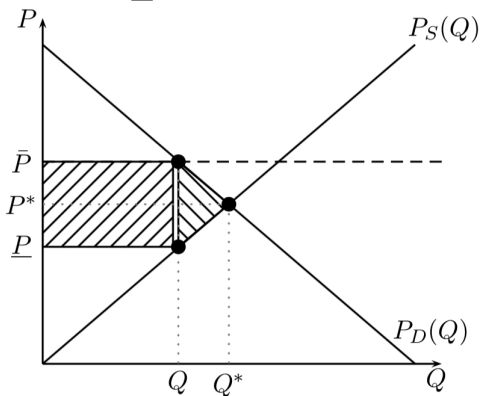
$$\max_{x,y} [sP_S(s, t) - C_S(s)] + [tP_T(t, s) - C_T(t)] \text{ s.t. } s \geq \alpha t$$

- ▶ What is the efficient Pigouvian tax approach?
- ▶ *This is an open research question!*

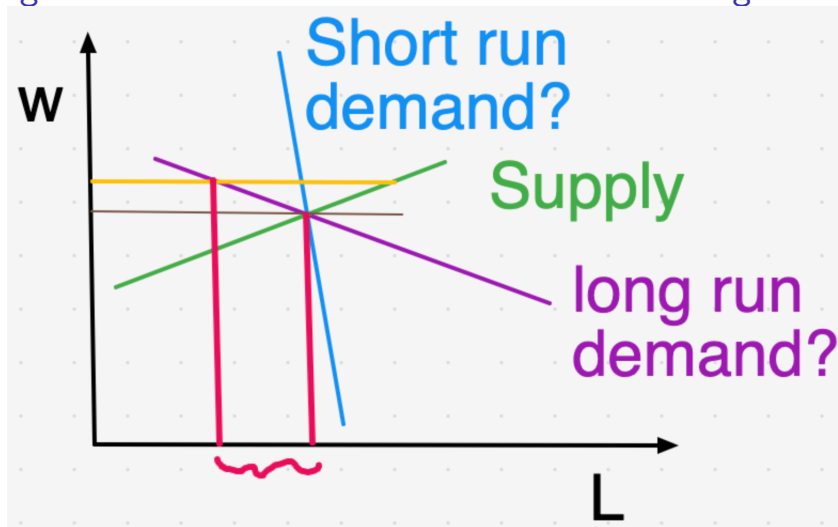


The Minimum Wage: Price Floors with Tokens

- ▶ A price ceiling might be escaped by a side payment.
- ▶ It has proved practically harder to avoid a price floor.
- ▶ Assume a binding price floor $\bar{P} > P^*$
- ⇒ Quantity supplied exceeds that demanded
- ⇒ Assume a costly token clears the market
- ⇒ **Short side of the market** (demand) determines quantity \underline{Q} traded, via $\underline{P} = P_S(\underline{Q})$.

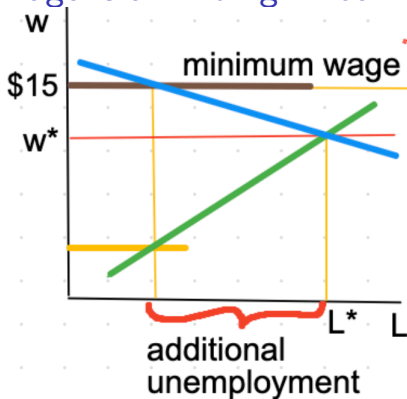


Long run vs Short Run Effects of a Minimum Wage



- ▶ Supply and demand are more elastic in the long run
- ⇒ Minimum Wage might have no short run employment impact, but in the long run, lead to a large employment reduction

The Minimum Wage is a Binding Price Floor



- ▶ A minimum wage leads to job losses **with competitive demand**
 - ▶ *Job losses are higher the more elastic is labor demand*
 - ▶ As depicted, total wage revenue falls *to employed workers*
 - ▶ High demand elasticity \Rightarrow total wage revenue \downarrow (2019 prelim)
 - ▶ **Minimum wage has a bigger impact in the longer run, since demand is more elastic (Le Chetelier)**
 - ▶ Job losses are unaffected by the supply elasticity

NYC Fast-Food Workers Stunned Some Are Being Fired after \$15 Minimum Wage Hike

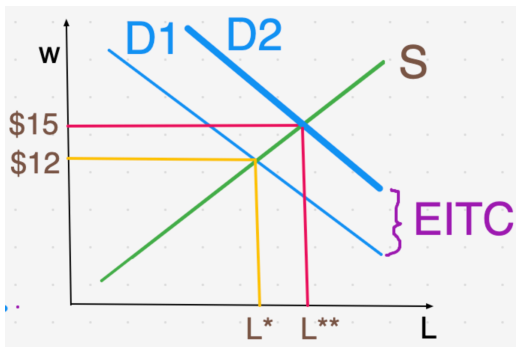
Serving as ground zero for the \$15 minimum wage battle, New York City saw its fast-food workers also serve as the subjects in an experiment that completely ignored the laws of economics.

Wednesday, February 20, 2019

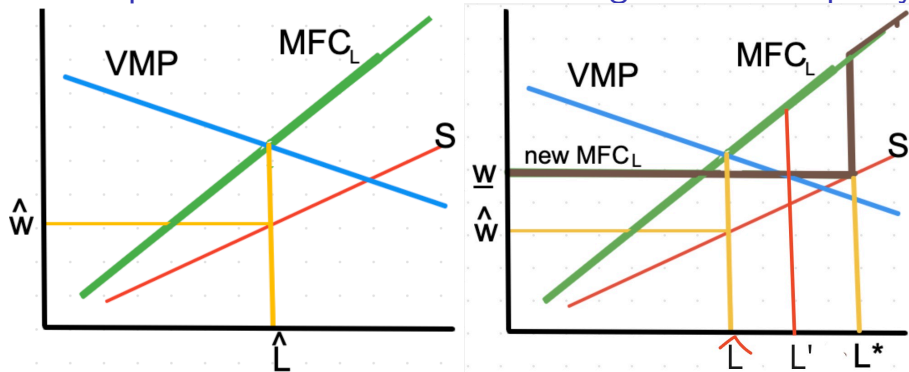


- ▶ Post pandemic: the constraint no longer binds so much on competitive equilibrium

- ▶ Governments could at cost institute either a specific or percentage a wage subsidy.
- ▶ Firms profit from the EITC too!
- ▶ This entails a deadweight loss too, but by encouraging too much work (find it in the picture below).
- ▶ Maybe that's a good loss for us to bear!



Noncompetitive Proviso: Minimum Wage with Monopsony



- ▶ VMP_L equals marginal factor cost $MFC_L = (w(L)L)' > w(L)$.
- ⇒ A monopsonist hires fewer workers $\hat{L} < L^*$ than efficient
- ▶ If the minimum wage binds (so $\underline{w} > w(L)$), then monopsonist hires workers at a constant marginal factor cost $MFC_L = \underline{w}$.
- ⇒ If the minimum wage is low enough (how low?), employment increases to $L' \in (\hat{L}, L^*)$ and the wage rises