Measuring Ex-Ante Welfare in Insurance Markets

Nathaniel Hendren
Harvard University
Measuring Welfare in Insurance Markets

- Insurance markets with adverse selection can be inefficient
  - People may be willing to pay their cost of insurance
  - But even competitive prices may not equal marginal costs (Akerlof 1970)
  - Generates deadweight loss (DWL) from foregone efficient trades

- What are the welfare implications of inefficient equilibriums?

- What are the optimal subsidies, mandates, or regulation on contract design?
Measuring Welfare in Insurance Markets

- Recent literature uses “reduced form” variation in insurance prices to quantify these inefficiencies [Einav, Finkelstein, and Cullen (2010), Hackman, Kolstad, and Kowalski (2015), Handel, Kolstad, and Spinnewijn (2016), Cabral and Cullen (2016), Mahoney and Weyl (Forthcoming)]

- Provides a revealed preference to measure of welfare:
  - Compare WTP to an individual’s own cost
  - Measure deadweight loss from foregone trades where WTP > Cost
  - Use as input into optimal policy (e.g. subsidies/mandates)

- In general, directly observing preferences / WTP is the gold standard for measuring market surplus and welfare

- But?....
Insurance Markets Are Different…

- Insurance demand depends on knowledge/beliefs of risk

- Individuals often have some knowledge about risk when measuring demand, generating adverse selection
  - LTC, Disability, Life insurance (Hendren, 2013)
  - Dental Insurance (Cabral, 2017)
  - Unemployment insurance (Hendren, 2016)

- Observed market surplus is an unstable measure of welfare (Hirshleifer, 1971)
  - Value of foregone trades can be misleading for optimal policy analysis
  - Propose modification to this framework to conduct welfare analysis
Motivating Example

- Individuals have $30

- Face a risk of losing $m, uniformly distributed between 0 and 10

- Willing to pay $0.50 markup for full insurance if CRRA is 3
  - Indifferent between roughly $24.50 versus uniformly distributed consumption on [20, 30]

- How does this map to willingness to pay and cost curves?
Ex-Ante Willingness to Pay and Cost

Fraction Insured (s)

WTP

Cost
Ex-Ante Willingness to Pay and Cost

\[ S^{CE} = 1 \]
Ex-Ante Willingness to Pay and Cost

\[ W^{\text{Ex-Ante}} = \$0.50 \]

\[ S^{CE} = 1 \]
Motivating Example

- What if people have information about their risk when we measure demand?

- Begin with extreme case: suppose individuals learn their loss
  - Willingness to pay equals cost, \( D(s) = m(s) \)
Observed Willingness to Pay and Cost

Fraction Insured (s)

- WTP
- Cost
Observed Willingness to Pay and Cost

Fraction Insured (s) vs. Observed Willingness to Pay (WTP) and Average Cost:

- **WTP** (solid line)
- **Cost** (dashed line)
- **Average Cost** (dashed line)

The graph shows a clear downward trend as the fraction insured increases, indicating a decrease in observed willingness to pay and average cost.
Observed Willingness to Pay and Cost

\[ s^{CE} = 0 \]

Fraction Insured (s)

WTP
Cost
Average Cost
What are the welfare implications of this unraveling?
Observed Willingness to Pay and Cost

\[ s^{CE} = 0 \]

No lost surplus from foregone trades
Timeline of Information Revelation and Insurance Purchase

E[u(c)]

Knowledge

Ex-Ante

Event Occurs

u(c)
Timeline of Information Revelation and Insurance Purchase

If choices are made prior to info revelation, revealed preference measures ex-ante utility, $E[u(c)]$.

---

Expected Utility / WTP

---

Ex-Ante

---

Knowledge

---

Event Occurs

---

$E[u(c)]$

---

$u(c)$
Timeline of Information Revelation and Insurance Purchase

Ex-Ante Expected Utility / WTP

Ex-Ante

Knowledge

Event Occurs

Observed WTP

Choice

E[u(c)]

WTP
Timeline of Information Revelation and Insurance Purchase

If choices are made after info revelation, revealed preference does **not** measure ex-ante utility, $E[u(c)]$.
Timeline of Information Revelation and Insurance Purchase

Knowledge

Event Occurs

Revealed preference measures WTP for insurance against remaining risk

E[u(c)]

Ex-Ante

Expected Utility / WTP

Ex-Ante

Choice

Observed WTP
Timeline of Information Revelation and Insurance Purchase

\[ E[u(c)] \]

**Ex-Ante**

**Knowledge**

Does not capture value of insurance against risk known at time of making choice

**Event Occurs**

\[ u(c) \]

**Expected Utility / WTP**

**Observed WTP**
Timeline of Information Revelation and Insurance Purchase

Ex-Ante Expected Utility / WTP

E[u(c)]

Knowledge

Event Occurs

u(c)

> Avg[Observed WTP]
Market Surplus is Unstable Measure of Welfare

\[ \text{E}[u(c)] \quad \text{Knowledge} \quad u(c) \]

Ex-Ante

Event Occurs

Choice 0

\[ \text{WTP}_{\text{Ex-Ante}} \]
Market Surplus is Unstable Measure of Welfare

\[ \text{WTP}_{\text{Ex-Ante}} \geq \text{E}[\text{WTP}_1] \]
Market Surplus is Unstable Measure of Welfare

\[ E[u(c)] \]

Ex-Ante

Knowledge

Event Occurs

\[ WTP_{\text{Ex-Ante}} \geq E[WTP_1] \geq E[WTP_2] \]
Market Surplus is Unstable Measure of Welfare

\[ \text{WTP}_{\text{Ex-Ante}} \geq \text{E}[\text{WTP}_1] \geq \text{E}[\text{WTP}_2] \geq \text{E}[\text{WTP}_3] = \text{Cost} \]
**Problem:** Revealed preference does not deliver a stable welfare metric corresponding to expected utility

- Depends on amount of information that happens to be revealed when insurance choices are made
- Same insurance policies (e.g. value of a mandate) may have different welfare properties simply because of when the econometrician chooses to measure WTP!
Measuring Ex-Ante Welfare in Insurance Markets

**Goal of Paper:** Evaluate policies in markets where information has been revealed when measuring WTP (i.e. adverse selection)

- Use stable welfare criteria corresponding to ex-ante expected utility
- Condition on observables (e.g. income) to isolate redistribution
Timeline of Information Revelation and Insurance Purchase

Goal of Paper

Ex-Ante Expected Utility / WTP

Knowledge

Event Occurs

Ex-Ante $E[u(c)]$

Expected Utility / WTP

Choice

Observed WTP
Timeline of Information Revelation and Insurance Purchase

<table>
<thead>
<tr>
<th>Event Occurs</th>
<th>Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex-Ante</td>
<td>E[u(c)]</td>
</tr>
<tr>
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<td>u(c)</td>
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**Goal of Paper**
Evaluate policies in this market

Ex-Ante Expected Utility / WTP

Observed WTP

Choice
Timeline of Information Revelation and Insurance Purchase

Ex-Ante

E[u(c)]

Expected Utility / WTP

Observed WTP

Knowledge

u(c)

Event Occurs

Goal of Paper

Evaluate policies in this market

From ex-ante welfare perspective before learning WTP

Choice

Ex-Ante

WTP

WTP

from before learning WTP

before learning WTP
Approach: Combine Market Surplus with Sufficient Statistics

\[
E[u(c)] \quad \text{Ex-Ante} \quad \text{Knowledge} \quad u(c) \\
\text{Ex-Ante} \quad \text{Expected Utility / WTP} \\
\text{Event Occurs} \\
\text{Choice} \\
\text{Observed WTP}
\]
Approach: Combine Market Surplus with Sufficient Statistics

- Ex-Ante Expected Utility / WTP
- Observed Revealed Preference WTP-Cost (EFC2010)

Knowledge

Event Occurs

- E[u(c)]
- u(c)
Approach: Combine Market Surplus with Sufficient Statistics

- Expected Utility / WTP
- Difference in marginal utilities between insured and uninsured ("Sufficient Statistics")
- Revealed Preference WTP-Cost (EFC2010)
- Event Occurs

\[ \text{E}[u(c)] \quad \text{Ex-Ante} \]

\[ u(c) \quad \text{Knowledge} \]

\[ \text{Difference in marginal utilities between insured and uninsured ("Sufficient Statistics")} \]

\[ \text{Choice} \]

\[ \text{Ex-Ante} \quad \text{Expected Utility / WTP} \]

\[ \text{Observed WTP} \]
Approach: Combine Market Surplus with Sufficient Statistics

E[u(c)]

Ex-Ante

Difference in marginal utilities between insured and uninsured ("Sufficient Statistics")

Benchmark implementation using:
1. Market WTP + Cost Curves
2. Measure of risk aversion

Ex-Ante Expected Utility / WTP

Knowledge

Event Occurs

WTP

Revealed Preference WTP-Cost (EFC2010)

Observed
Approach: Combine Market Surplus with Sufficient Statistics

Ex-Ante

Knowledge

Event Occurs

Difference in marginal utilities between insured and uninsured ("Sufficient Statistics")

Benchmark implementation using:
1. Market WTP + Cost Curves
2. Measure of risk aversion

Observed WTP

Revealed Preference WTP-Cost (EFC2010)
Outline

- Characterize “Ex-Ante” WTP in Simple Example
- Characterize “Ex-Ante” WTP in General Model
- Implementation with WTP/Cost Curves + Risk Aversion
- Application to Low-Income Health Insurance Subsidies
Deriving the Ex-Ante WTP Curve

- Return to example in which \( D(s) = m(s) \)

- Suppose \( s = 50\% \) of the population has insurance

- Obtained by setting prices subject to a resource constraint:
  - Price of insurance, \( p_I \)
  - Price/penalty of being uninsured, \( p_U \)
  - Set so that \( sp_I + (1-s)p_U = sAC(s) \)

- Later: Consider non-budget neutral policies
  - Impact on MVPF in Hendren (2016)
From Observed WTP to Ex-Ante WTP

\[ p_I - p_U = \$5 \]
Marginal Price vs. Fraction Insured (s) for WTP and Cost.
From Observed WTP to Ex-Ante WTP

Lowers $p_I - p_U$ by $D'(s) ds$
From Observed WTP to Ex-Ante WTP

Marginal Price vs. Fraction Insured (s)

1-s pay higher prices

\[ dp_U = -sD'(s)ds \]
From Observed WTP to Ex-Ante WTP

\[ dp_i = (1 - s) D'(s) ds \]

\[ dp_u = -s D'(s) ds \]

s pay lower prices

1-s pay higher prices
From Observed WTP to Ex-Ante WTP

\[ dp_i = (1-s)D'(s)ds \]
\[ dp_U = -sD'(s)ds \]

\[ dW = -s(1-s)D'(s)dsE[u_c|Insured] \]
\[ dW = (1-s)sD'(s)dsE[u_c|Unins] \]
From Observed WTP to Ex-Ante WTP

\[ EA(s) = \left( (1 - s) s (-D'(s)) \right) \]

Size of Transfer

\[ \frac{E[u_c|Insured] - E[u_c|Unins]}{E[u_c]} \]

Marginal Utility Difference

\[ dp_i = (1 - s) D'(s) ds \]

s pay lower prices

\[ dp_U = -s D'(s) ds \]

1-s pay higher prices

\[ dW = -s (1 - s) D'(s) ds E[u_c|Insured] \]

\[ dW = (1 - s) s D'(s) ds E[u_c|Unins] \]

Marginal Price

Fraction Insured (s)
From Observed WTP to Ex-Ante WTP

\[ EA(s) \approx (1 - s) s (-D'(s)) \left( \frac{-u_{cc}}{u_c} \right) (D(s) - E[D(s') | s' > s]) \]

Size of Transfer
Marginal Utility Difference

Marginal Price

Fraction Insured (s)

Insured
Uninsured

WTP
Cost
From Observed WTP to Ex-Ante WTP

\[ EA(s) \approx \left( (1-s) s (-D'(s)) \right) \left( \frac{-u_{cc}}{u_c} \right) (D(s) - E[D(s'|s' > s)]) \]

Size of Transfer
Marginal Utility Difference

Consumption of the insured is $2.5$ higher than avg. uninsured

Marginal Price vs. Fraction Insured (s) graph
From Observed WTP to Ex-Ante WTP

\[
EA(s) \approx \left( (1 - s) s (-D'(s)) \right) \left( \frac{-u_{cc}}{u_c} \right) (D(s) - E[D(s') | s' > s])
\]

Size of Transfer

Marginal Utility Difference

Difference in \( u_c \) is \( \approx 2.5 \times \text{CARA} \)
From Observed WTP to Ex-Ante WTP

\[ EA(s) \approx \left( (1 - s) s (-D'(s)) \right) \left( \frac{-u_{cc}}{u_c} \right) (D(s) - E[D(s') | s' > s]) \]

Size of Transfer  \hspace{2cm} Marginal Utility Difference

EA(0.5) = \( \frac{1}{2} \cdot \frac{1}{2} \cdot (10) \cdot \left( -\frac{3}{25} \right) \cdot (-2.5) \)

= 0.75
From Observed WTP to Ex-Ante WTP

\[ EA(s) \approx ((1 - s)s(-D'(s))) \left( \frac{-u_{cc}}{u_c} \right) (D(s) - E[D(s') | s' > s]) \]

Size of Transfer
Marginal Utility Difference

WTP $0.75 for larger insurance mkt prior to learning s
From Observed WTP to Ex-Ante WTP

**Marginal Price**

**Fraction Insured (s)**

- **WTP**
- 'Ex-ante' WTP, D(s)+EA(s)
- Cost
From Observed WTP to Ex-Ante WTP

EA(0.3) = $0.88
From Observed WTP to Ex-Ante WTP

Marginal Price

Fraction Insured (s)

WTP

'Ex-ante' WTP, D(s)+EA(s)

Cost

EA(0.7) = $0.38
\[ \int_{0}^{1} EA(s) \, ds = $0.50 \]

From Observed WTP to Ex-Ante WTP

- **WTP**
- **Cost**
- 'Ex-ante' WTP, D(s)+EA(s)
\[ \int_0^1 EA(s) \, ds = 0.50 = W^{Ex-Ante} \]
Outline for Rest of the Talk

- Characterize “Ex-Ante” WTP in Simple Example
- Characterize “Ex-Ante” WTP in General Model
- Implementation with WTP/Cost Curves + Risk Aversion
- Application to Low-Income Health Insurance Subsidies
General Model

- Individuals choose consumption, c, and medical spending, m
  - Face (health) shock, $\theta$
  - Income, $y$ (potentially dependent on $\theta$)
  - Utility $u(c, m; \theta)$

- Insurance product allows payment of $x(m)$ instead of $m$
  - Learn signal about $\theta$ at time of measuring demand
  - Let $s$ denote fraction purchasing insurance
  - Fraction insured solves: $D(s) = p_I - p_U$

- Cost of Marginal enrollee: $C(s) = \frac{d}{ds} [sAC(s)] = AC(s) + sAC'(s)$

- Average Cost: $AC(s) = E\left[ m(s'; \theta) - x(m(s'; \theta)) \mid s' \geq s = D^{-1}(p_I - p_U) \right]$
General Model

- Ex-ante/Utilitarian welfare when fraction $s$ has insurance

$$W(s) = E[u(c(s; \theta), m(s; \theta); \theta)]$$

- Net cost of the insurance policy:

$$G(s) = sAC(s) - (p_I(s) + p_U(s))$$
Budget-Neutral Policies: Adjusting the Demand Curve

- Consider case in EFC2010 where $G(s) = 0$
  - Larger insurance market occurs through higher $p_U$ and lower $p_I$
Budget-Neutral Policies: Adjusting the Demand Curve

- Consider case in EFC2010 where $G(s) = 0$
  - Larger insurance market occurs through higher $p_U$ and lower $p_I$

- Ex-ante WTP for larger insurance market:

$$\frac{W'(s)}{E[u_c]} = D(s) - C(s) + EA(s) = D(s) + EA(s) - C(s)$$

- Market Surplus
- "Ex-Ante" WTP
Budget-Neutral Policies: Adjusting the Demand Curve

- Consider case in EFC2010 where $G(s) = 0$
  - Larger insurance market occurs through higher $p_U$ and lower $p_I$

- Ex-ante WTP for larger insurance market:

$$\frac{W'(s)}{E[u_c]} = D(s) - C(s) + EA(s) = D(s) + EA(s) - C(s)$$

where

$$EA(s) = \left(1 - s\right)\left(C(s) - D(s) - sD'(s)\right)\beta(s)$$

and

$$\beta(s) = \frac{E[u_c|Insured] - E[u_c|Unins]}{E[u_c]}$$

Marginal Utility Difference
Non-Budget Neutral Policies: Modified MVPF

- For non-budget neutral policies, consider the marginal WTP per dollar of government revenue (MVPF)
  - Can be compared to the MVPF of alternative policies (e.g. EITC)

\[
MVPF = \frac{\text{Marginal WTP for Beneficiaries}}{\text{Marginal Cost to Govt}}
\]

- How much does it cost to lower premiums by $1 to those with insurance?

\[
1 + \frac{C(s) - D(s)}{sD'(s)}
\]

- Valued by $1 by those who are insured
Non-Budget Neutral Policies: Modified MVPF

- Insured value $1 lower premium at $1

- Implies

\[
MVPF_{Ex-Post} = \frac{1}{1 + \frac{C(s) - D(s)}{sD'(s)}}
\]

- But, prior to learning they will be insured, additional value

\[
MVPF_{Ex-Ante} = \frac{E[u_c|Insured]}{E[u_c]} \cdot \frac{1}{1 + \frac{C(s) - D(s)}{sD'(s)}}
\]

where

\[
\frac{E[u_c|Insured]}{E[u_c]} = 1 - (1 - s) \beta(s)
\]

- Two reasons MVPF > 1
  - C(s) is above D(s)
  - Ex-ante value of insurance
Outline

- Characterize “Ex-Ante” WTP in Simple Example
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Implementation

- Key additional component:

\[
\beta(s) = \frac{E[u_c | Uninsured] - E[u_c | Insured]}{E[u_c]}
\]

- Analogous to literature on optimal unemployment insurance
  - Difference between marginal utilities when employed vs unemployed
  - Classic approach: assume state-dependence, make Taylor approximation, and implement using consumption

- Take similar approach here
  - Warning: as with the UI approach, these assumptions may be violated
  - Provides benchmark implementation without additional parameters aside from risk aversion
  - Case when uninsured have higher marginal utility?
Three Implementation Assumptions

1. No complementarities/substitutability between $c$ and $m$

\[ u_{cm} = 0 \]

2. Common preferences: $u_c$ does not depend on $\theta$.

3. No liquidity/income differences between insured and uninsured

\[ \frac{dE[y|s]}{ds} = 0 \]
Three Implementation Assumptions

1. No complementarities/substitutability between c and m

\[ u_{cm} = 0 \]

2. Common preferences: \( u_c \) does not depend on \( \theta \).

1. No liquidity / income differences between insured and uninsured

\[ \frac{dE[y|s]}{ds} = 0 \]

Implies:

\[ \beta(s) = \gamma \left[ D(s) - E[D(s')|s' \geq s] \right] \]

where \( \gamma = -\frac{u_{cc}}{u_c} \) is the coefficient of absolute risk aversion
Summary

- Marginal Ex-Ante WTP for larger insurance market thru budget-neutral financing is $D(s) + EA(s)$ where

$$EA(s) = (1 - s) \left( C(s) - D(s) - s \frac{\partial D}{\partial s} \right) \gamma [D(s) - E[D(s') | s' \geq s]]$$

Note: Ex-ante component increasing with the square of demand/cost

$$D(s) \rightarrow aD(s) \quad \Rightarrow \quad EA(s) \rightarrow a^2 EA(s)$$

- Marginal value of public funds of non-budget neutral

$$MVPF(s) = \frac{1}{C(s) - D(s)} \left( 1 + (1 - s) \gamma [D(s) - E[D(s') | s' \geq s]] \right)$$

$$1 + \frac{sD'(s)}{sD'(s)}$$

Ex-Ante Adjustment
Characterize “Ex-Ante” WTP in Simple Example

Characterize “Ex-Ante” WTP in General Model

Implementation with WTP/Cost Curves + Risk Aversion

Application to Low-Income Health Insurance Subsidies
Low-Income Health Insurance Subsidies

- Finkelstein, Hendren, and Shepard study subsidized exchange in Massachusetts (pre-ACA)
  - Model for ACA: Similar design, low-income population choosing b/n heavily subsidized coverage vs. uninsurance

- Key feature: Subsidies vary by discrete income bin
  - Creates RD variation in premiums owed by enrollees
  - E.g., 149% poverty person has $0 plan; 151% poverty pays $39/month

- Use price variation to estimate WTP, cost of insurance
Subsidy and Premium Discontinuities (2011)

- **Public Subsidies**
  - $0
  - $39
  - $77
  - $116 (cheapest plan)

- **Enrollee Premium**
  - $0
  - $39
  - $77
  - $116

- **Insurer Price**
  - $0
  - $39
  - $77
  - $116

Income, % of Poverty:
- 135
- 150
- 200
- 250
- 300

$ per month:
- 0
- 100
- 200
- 300
- 400
Share of Eligible Population Insured

RD = -0.24
(0.07)
%Δ = -26%
P_{\text{min}} = $0

RD = -0.20
(0.05)
%Δ = -27%
P_{\text{min}} = $39

RD = -0.14
(0.04)
%Δ = -24%
P_{\text{min}} = $77

P_{\text{min}} = $116
Average Insurer Costs, by Income (2009-2013)

RD = 47.3 (7.7)
%Δ = +15%

RD = 32.4 (8.7)
%Δ = +9%

RD = 6.2 (11.9)
%Δ = +2%
Translate into WTP and Cost Curves

- Use variation in discontinuities to translate into demand and cost curves

- Paper provides details
WTP and Cost Curves

\[ C(s) \]

\[ AC(s) \]

\[ D(s) \]

\[ s_{CE} = 0 \]
Welfare Analysis of Low-Income Health Insurance

- What is the welfare cost of unraveling?
- What are optimal subsidies?
- Should we impose a full mandate?

- Issue: need to deal with uncompensated care

- For simplicity: consider case where government insurer is primary payer of uncompensated care
  - E.g. uncompensated care pools
  - Simplifies analysis here because don’t have to consider 3rd parties
Uncompensated Care Estimate: $C(s)$
AC(s)
Market Surplus Maximizing Allocation

C(s)

D(s)
Market Surplus Maximizing Allocation

\[ s_{ms} = 41\% \]

\[ p_{ms} = \$1581 \]
$p_{ms} = 1581$

$s_{ms} = 41\%$
From Observed to Ex-Ante WTP

- What about ex-ante WTP?

- Requires measure of risk aversion

- Baseline case: $\gamma = 5 \times 10^{-4}$ (Handel, Hendel, and Whinston 2016)
  - Estimated for richer population $\Rightarrow$ lower bound under DARA preferences

- But, implies CRRA of 8 if consumption is 150% FPL
  - Consider alternative scenario of CRRA of 3 (CARA of $1.8 \times 10^{-4}$)
From Observed to Ex-Ante Demand

![Graph showing the relationship between D(s) + EA(s), C(s), and D(s).]
From Observed to Ex-Ante Demand

\[ D(s) + EA(s) \]

\[ p_{ea} = $1089 \]

\[ s_{ea} = 55\% \]
Result #1: Ex-ante optimal insurance prices are $1089 not $1581
Result #1: Ex-ante optimal insurance prices are $1089 not $1581

Ex-Ante Optimal Allocation involves “deadweight loss”
From Observed to Ex-Ante Demand

$228$

$p_{ea} = $1089

$s_{ea} = 55\%$
Result #2: Everyone is WTP $228 to live in a world with marginal price of $1089 for insurance prior to learning $s$. 

$p_{ea} = $1089

$s_{ea} = 55\%$
Welfare Cost of Mandates: Market Surplus

Mandate lowers market surplus by $45

$182

$227
Mandate increases ex-ante welfare by $70.
Welfare Cost of Mandates: Ex-Ante Welfare

Result #3: Mandates are ex-ante optimal, but result in lower market surplus.

$158$

$228$
Summary

- If target population pays for policy via mandate penalty / fees, ex-ante welfare perspective leads to:

  1. Larger insurance market (prices of $1089 vs $1581)
  2. Higher welfare cost of market unraveling ($228 vs. $182)
  3. Mandates increase ex-ante welfare but have lower market surplus than complete unraveling

- But in practice, subsidies are not paid by beneficiaries
  
  - Are the subsidies an efficient provision relative to other uses?

- Calculate MVPF of lower health insurance prices
MVPF for Additional Subsidies
Assumes Govt/Insurer Pays Uncompensated Care

- (1) 30% Insured: 1.28
- (2) 90% Insured: 0.80
MVPF for Additional Subsidies
Assumes Govt/Insurer Pays Uncompensated Care

MVPF $0.50 higher from ex-ante perspective when 30% of market is insured

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<th>90% Insured</th>
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<tr>
<td>(1)</td>
<td>1.28</td>
<td>0.80</td>
</tr>
<tr>
<td>(2)</td>
<td>1.78</td>
<td>0.80</td>
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</table>
MVPF for Additional Subsidies
AssumesGovt/InsurerPaysUncompensatedCare

Not much distinction when large fraction of market insured

(1) 30% Insured

(2) 90% Insured
MVPF for Additional Subsidies
Assumes Govt/Insurer Pays Uncompensated Care

Why? Not much difference between insured and uninsured when most own insurance
Conclusion

- Insurance insures against the realization of risk
  - Adverse selection implies a divergence between DWL and Ex-ante welfare

- Exploit Baily-Chetty logic to create ex-ante demand curve
  - Conduct utilitarian/ex-ante welfare analysis

- Market Surplus and Ex-ante welfare can differ:
  - Optimal size of insurance market
  - Welfare cost of adverse selection
  - Competitive markets vs. mandates
  - Marginal value of public funds for additional subsidies

- Divergence tends to be larger when
  - Fewer people choose insurance
  - Size of insurable risk is large
Appendix
Robustness to Alternative Risk Aversion

CARA = $5 \times 10^{-4}$

CRRA = 3

$69\%$

$132\%$

$96$

$69$

$D(s)$

$C(s)$
Top-up market for more generous PPO coverage in Alcoa

- Demand and Cost Curves from Einav, Finkelstein, and Cullen (2010)
- Average annual cost: $500
Top-Up Health Insurance (EFC2010)

DWL captures 67% of ex-ante welfare cost of adverse selection.

\[ W_{\text{Ex-Ante}} = $14.25 \]

\[ \text{DWL} = $9.55 \]

Graph showing demand, marginal cost, and 'Ex-ante' demand.
Risk Aversion

- Measuring ex-ante demand requires risk aversion

- Can be assumed externally
  - CRRA = 3
  - CARA = 5 \times 10^{-4}

- Or can be estimated internally

  \[ \gamma(\tilde{s}) = 2 \frac{D(\tilde{s}) - C(\tilde{s}) + (1 - p(\tilde{s})) E [m^I - m^U | \tilde{s}]}{V} \]

  where \( p(s) \) is the marginal price of medical spending for the insured
From Observed Demand to Ex-Ante Demand

\[ p_I + p_U = \$7.50 \]

- **Demand**: Marginal Price
- **Marginal Cost**: $p_I + p_U = \$7.50$
- **Average Cost**: $p_I + p_U = \$7.50$

Fraction Insured \((s)\)

Marginal Price
From Observed Demand to Ex-Ante Demand

\[ p_I + p_U = $7.50 \]

\[ p_I - p_U = $5 \]

Buy Insurance

- **Demand**
- **Marginal Cost**
- **Average Cost**
From Observed Demand to Ex-Ante Demand

\[ p_I = \$6.25 \]

\[ p_U = \$1.25 \]

Marginal Price vs. Fraction Insured (s)

Buy Insurance

Demand

Marginal Cost

Average Cost

Back
Motivating Example

- Dual philosophical motivation for using ex-ante demand:
  - **Ex-ante welfare** behind the veil of ignorance
  - **Ex-post welfare** using utilitarian aggregation

- Condition on any ex-ante known X if don’t want redistribution across X

- Paper is primarily about ensuring that we have a consistent measure of welfare that is stable w.r.t. the amount of information people have when measuring demand
From Observed WTP to Ex-Ante WTP

\[ EA(s) = \left( (1-s)sD'(s) \right) \frac{E[u_c | \text{Insured}] - E[u_c | \text{Unins}]}{E[u_c]} \]

Size of Transfer

Marginal Utility Difference

\[ u(s) = u(y - p_I) \]

Insured

\[ u(s) = u(y - m(s) - p_U) \]

Uninsured

Marginal Price

Fraction Insured (s)

WTP

Cost
From Observed WTP to Ex-Ante WTP

\[ EA(s) = \left( (1 - s) sD'(s) \right) \frac{E[u_c | \text{Insured}] - E[u_c | \text{Unins}]}{E[u_c]} \]

Size of Transfer

Marginal Utility Difference

Utility ‘as if’ type s is insured

\[ u(s) = u(y - p_I) \]

\[ u(s) = u(y - D(s) - p_U) \]

WTP

Cost
From Observed WTP to Ex-Ante WTP

\[ EA(s) = \left( (1 - s) sD'(s) \right) \frac{E[u_c | Insured] - E[u_c | Unins]}{E[u_c]} \]

Size of Transfer  
Marginal Utility Difference

\[ u_c(s) = u_c(y - p_I) \]

\[ u_c(s) = u_c(y - D(s) - p_U) \]

Marginal Price

Fraction Insured (s)

WTP  
Cost
Measuring Welfare in Insurance Markets

- Insurance markets with adverse selection can be inefficient
  - People may be willing to pay their cost of insurance
  - But equilibrium prices reflect average costs (Akerlof 1970)
  - Generates deadweight loss (DWL) from foregone efficient trades

- Recent literature quantifies these inefficiencies

- Proposes comparing willingness to pay and cost curves (DWL) for thinking about optimal policy (e.g. subsidies/mandates)
But Defining Welfare in Insurance Markets is Difficult

- Insurance demand depends on knowledge/beliefs of risk

- Individuals often have some knowledge about risk when measuring demand, generating adverse selection
  - LTC, Disability, Life insurance (Hendren, 2013)
  - Dental Insurance (Cabral, forthcoming)
  - Unemployment insurance (Hendren, 2016)

- Markt surplus is unstable measure of welfare (Hirshleifer, 1971)
  - Value of foregone trades can be misleading for optimal policy analysis