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 equilibrium prices reflect average costs (Akerlof 1970)
  - Generates deadweight loss (DWL) from foregone efficient trades

- Recent literature quantifies these inefficiencies

- Proposes comparing demand and cost curves (DWL) for thinking about optimal policy (e.g. subsidies/mandates)
But DWL is Not the Only Measure of Welfare

- 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)

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

- Begin with simple example to illustrate issue and a solution

- 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 $[20, 30]$
  - Would be “efficient” for everyone to have $25 with certainty
    - Value of insurance market is $0.50

- How does this map to demand and cost curves?
Ex-Ante Demand and Cost

Fraction Insured (s)

Demand

Cost
Ex-Ante Demand and Cost

\[ S^{CE} = 1 \]
Ex-Ante Demand and Cost

\[ W^{Ex-Ante} = \$0.50 \]
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, \( D(s) = m(s) \)
Observe Demand and Cost

Fraction Insured (s)

Observed Demand
Marginal Cost
Observe Demand and Cost

Fraction Insured (s)

- Observed Demand
- Marginal Cost
- Average Cost
Observe Demand and Cost

\[ s^{CE} = 0 \]
Observe Demand and Cost

What are the welfare implications of this unraveling?

\[ s^{CE} = 0 \]

Fraction Insured (s)

- Observed Demand
- Marginal Cost
- Average Cost
Observe Demand and Cost

\[ DWL = 0 \]

No lost surplus from foregone trades

\[ s^{CE} = 0 \]

Fraction Insured (s)

- Observed Demand
- Marginal Cost
- Average Cost
Motivating Example

- Observed demand does not capture the value of insurance against learning about your risk prior to demand measurement
  - Adverse selection implies a divergence between DWL and Ex-Ante Welfare
Motivating Example

- Observed demand does not capture the value of insurance against learning about your risk prior to demand measurement
  - Adverse selection implies a divergence between DWL and Ex-Ante Welfare

- **This paper:** Derive new “ex-ante” demand curve to facilitate welfare analysis from behind the veil of ignorance
  - Combine Einav, Finkelstein, and Cullen (2010) with Baily-Chetty
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
Deriving the Ex-Ante Demand 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 $sp_I + (1 - s)p_U = sAC(s)$
From Observed Demand to Ex-Ante Demand

\[ p_I - p_U = \$5 \]
From Observed Demand to Ex-Ante Demand

![Graph showing the relationship between Marginal Price and Fraction Insured (s). The graph illustrates the demand curve and the marginal cost curve, with a notation for $ds$.](image-url)
From Observed Demand to Ex-Ante Demand

\[ d s \]

Lowers \( p_I - p_U \) by \( D'(s)ds \)

Marginal Price

Fraction Insured (s)

Demand

Marginal Cost
From Observed Demand to Ex-Ante Demand

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

1-s pay higher prices

\[ d \]

\[ s \]

\[ ds \]

Fraction Insured (s)

Marginal Price

Demand

Marginal Cost
From Observed Demand to Ex-Ante Demand

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

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

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

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

\[ dW = s (1 - s) D'(s) ds \cdot E[u'|\text{Insured}] \]

\[ dW = -(1 - s) s D'(s) ds \cdot E[u'|\text{Unins}] \]
From Observed Demand to Ex-Ante Demand

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

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

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

- s pay lower prices
- (1-s) pay higher prices

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

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

$$EA(s) = \frac{E[u' | \text{Insured}] - E[u' | \text{Unins}]}{E[u' | \text{Insured}]} \cdot \frac{[(1 - s)sD'(s)]}{\text{Size of Transfer}}$$

$$u(s) = u(y - p)$$

$$u(s) = u(y - m(s) - p)$$

- Insured
- Uninsured
From Observed Demand to Ex-Ante Demand

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

Utility ‘as if’ type \( s \) is insured

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

\[ u(s) = u(y - D(s) - p_U) \]
From Observed Demand to Ex-Ante Demand

\[ EA(s) = \frac{E[u'|\text{Insured}] - E[u'|\text{Unins}]}{E[u'|\text{Insured}]} \frac{((1-s)sD'(s))}{\text{Size of Transfer}} \]

\[ u_c(s) = u_c(y - p_1) \]

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

Marginal Price

Fraction Insured (s)

Demand

Marginal Cost
From Observed Demand to Ex-Ante Demand

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

Assumptions:
1. State independence
2. Common risk aversion

\[ u_c(s) = u_c(y - p_I) \]
\[ u_c(s) = u_c(y - D(s) - p_U) \]
From Observed Demand to Ex-Ante Demand

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

Marginal Price

\[ u_c(s) = u_c(y - p_1) \]

\[ u_c(s) \approx u_c(s') + u_{cc}(s')(D(s) - D(s')) \]

Fraction Insured (s)

Marginal Cost

Demand

Insured

Uninsured
From Observed Demand to Ex-Ante Demand

$$EA(s) = \left( (1 - s) s D'(s) \right) \frac{u_{cc}}{u_c} \begin{array}{c} \text{Size of Transfer} \\ \text{Marginal Utility Difference} \end{array} E \left[ D(s) - D(s') \mid s' > s \right]$$

$$u_c(s) = u_c(y - p_I)$$

$$u_c(s) \approx u_c(s') + u_{cc}(s')(D(s) - D(s'))$$

Marginal Price

Fraction Insured (s)

Insured

Uninsured

Demand

Marginal Cost
From Observed Demand to Ex-Ante Demand

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

Size of Transfer
Marginal Utility Difference

\[
EA(0.5) = 0.5 \times 0.5 \times (-10) \times (-3/25) \times (-2.5) = 0.75
\]
From Observed Demand to Ex-Ante Demand

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

$0.75$ Ex-ante surplus from larger insurance market
From Observed Demand to Ex-Ante Demand

Marginal Price vs. Fraction Insured (s)

- Demand
- 'Ex-ante' Demand, $D(s)+EA(s)$
- Marginal Cost
From Observed Demand to Ex-Ante Demand

EA(0.3) = $0.88

Marginal Price

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

Fraction Insured (s)

Marginal Price

EA(0.7) = $0.38

Demand

'Mex-ante' Demand, D(s) + EA(s)

Marginal Cost
From Observed Demand to Ex-Ante Demand

\[ \int_{0}^{1} EA(s) \, ds = $0.50 \]
From Observed Demand to Ex-Ante Demand

\[ \int_0^1 EA(s) \, ds = 0.50 = W_{Ex-Ante} \]
DWL versus Ex-Ante WTP

- Ex-ante demand curve facilitates ex-ante/utilitarian welfare analysis
  - Even though demand is measured after information is revealed

- Ex-ante (ex-post utilitarian) surplus can lead to different conclusions about the value of insurance
  - Ex-ante efficient to have full insurance
  - No value to insurance market after info is revealed
    - (Strictly positive DWL if there was moral hazard)
Outline

- Simple Example
- General Model
- Illustration with Optimal Health Insurance
- Optimal open enrollment periods
Outline

- Simple Example

- General Model

- Illustration with Optimal Health Insurance

- Optimal open enrollment periods
General Model

- Goal: Nest demand and cost curves into general utility setup
- Use underlying utility function structure to derive sufficient statistics to measure ex-ante/utilitarian value of insurance
- Use language of health insurance
  - Paper illustrates how to nest into other settings (e.g. UI)
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 $m$
  - Prices $p_I$ and $p_U$ of being insured and uninsured s.t. resource constraint
  - Learn signal about $\theta$ at time of measuring demand
  - Let $s$ denote fraction purchasing insurance
  - Fraction insured solves: $D(s) = p_I - p_U$

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

- Marginal Cost: $MC(s) = \frac{d}{ds}\left[sAC(s)\right] = AC(s) + sAC'(s)$.
General Model

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

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

- Ex-ante/Utilitarian welfare when fraction $s$ has insurance
  \[ W(s) = E[u(c(s;\theta),m(s;\theta);\theta)] \]

- Ex-ante WTP for larger insurance market:
  \[
  \frac{W'(s)}{E[u'|\text{Insured}]} = \frac{D(s) - MC(s) + EA(s)}{\text{Ex-Post Surplus}}
  \]
  where
  \[
  EA(s) = (1 - s) \left( \frac{MDWL(s) - s \frac{\partial D}{\partial s}}{\text{Size of Transfer}} \right) \frac{E[u'(s)|\text{Insured}] - E[u'(s)|\text{Uninsured}]}{E[u'(s)|\text{Insured}]} \]
  Marginal Utility Difference

- Adjust size of transfer for $MDWL=MC(s)-D(s)$
Implementation

- Use common assumptions to approximate difference in marginal utilities between insured and uninsured:
  - State independence: $u_c$ only depends on $c$
  - Income doesn’t vary with $s$
  - Common risk aversion (Andrews and Miller, 2013)

- Implies:

$$EA(s) = (1 - s) \left( MDWL(s) - s \frac{\partial D}{\partial s} \right) \left( \frac{-u_{cc}}{u_c} \right) E \left[ D(s) - D(s') \mid s' > s \right]$$

  - Ex-ante component increasing with the square of demand/cost
    - $D(s) \rightarrow aD(s)$ implies $EA(s) \rightarrow a^2 EA(s)$
Risk Aversion

- Measuring ex-ante demand requires risk aversion

- Can be assumed externally
  - CRRA = 3
  - CARA = 5x10^{-4}

- Or can be estimated internally

\[
\frac{-u_{cc}}{u_c} \approx 2 \frac{\text{Markup}}{\text{Variance Reduction}} \approx 2 \frac{D(s) - MC(s)}{\text{var}(m_U) - \text{var}(x_I)}
\]

- WTP for insurance against remaining risk reveals can proxy for WTP for insurance against realized risk
Outline

- Simple Example
- General Model
- Illustration with Optimal Health Insurance
- Optimal open enrollment periods
Illustration with Three Health Insurance Examples

1. Top-up market for more generous PPO coverage in Alcoa
   - Demand and Cost Curves from Einav, Finkelstein, and Cullen (2010)
   - Average annual cost: $500

2. “Medium risk”
   - 4x Demand and Cost curves from Einav, Finkelstein, and Cullen (2010)
   - Average annual cost: $2,000

3. “Large Risk”: Conservative approx. to insured vs. uninsured
   - 8x Demand and Cost curves from Einav, Finkelstein, and Cullen (2010)
   - Average annual cost: $4,000
   - Smaller than $5,922 (full vs. no insurance) or $5,270 in MA (Hackman, Kolstad, Kowalski, 2015)

- Briefly: hypothetical market for UI from Hendren (2016)
Top-Up Health Insurance (EFC2010)

Fraction Insured

Demand
Marginal Cost
Average Cost
Top-Up Health Insurance (EFC2010)

MDWL = $138
Top-Up Health Insurance (EFC2010)

- Demand
- Marginal Cost

Fraction Insured

- Observed
- CE
- S

0.5 0.6 0.7 0.8 0.9
Top-Up Health Insurance (EFC2010)

DWL = $9.55

Fraction Insured
Top-Up Health Insurance (EFC2010)

What about ex-ante demand?
Top-Up Health Insurance (EFC2010)

\[ EA(s) = (1 - s) \left( MDWL(s) - s \frac{\partial D}{\partial s} \right) \frac{E[u'(s) | Insured] - E[u'(s) | Uninsured]}{E[u'(s) | Insured]} \]

Size of Transfer
Marginal Utility Difference

Fraction Insured
Top-Up Health Insurance (EFC2010)

\[ EA(s) = (1 - s) \left( MDWL(s) - s \frac{\partial D}{\partial s} \right) \left( \frac{-u_{cc}}{u_c} \right) E \left[ D(s) - D(s) \mid s > s \right] \]
Top-Up Health Insurance (EFC2010)

\[ EA(s) = (1 - s) \left( MDWL(s) - s \frac{\partial D}{\partial s} \right) \left( \frac{-u_{cc}}{u_c} \right) E \left[ D(s) - D(\bar{s}) | \bar{s} > s \right] \]

\[ \approx 5 \times 10^{-4} \] Handel, Hendel, Whinston (2015)
Top-Up Health Insurance (EFC2010)

\[ EA(s) = (1 - s) \left( MDWL(s) - s \frac{\partial D}{\partial s} \right) \left( 5 \times 10^4 \right) E \left[ D(s) - D(\bar{s}) \mid \bar{s} > s \right] \]

Size of Transfer

Marginal Utility Difference

Demand

Marginal Cost
Top-Up Health Insurance (EFC2010)

Fraction Insured

Demand
Marginal Cost
'Ex-ante' Demand
Ex-Ante Optimal Insurance Markets Generate DWL

- Ex-ante optimal size of the insurance market solves:

\[
\frac{W'(s_{\text{Ex-Ante}})}{E[u' \mid \text{Insured}]} = \frac{D(s_{\text{Ex-Ante}}) - MC(s_{\text{Ex-Ante}})}{\text{Ex-Post Surplus}} + EA(s_{\text{Ex-Ante}}) = 0
\]

- Yields a “Baily-Chetty” condition:

\[
EA(s_{\text{Ex-Ante}}) = MDWL(s_{\text{Ex-Ante}})
\]

- **Corollary:** The ex-ante optimal allocation generally involves (ex-post) deadweight loss
  - Easy to show that MDWL(s)=0 implies EA(s)>0 whenever marginal utilities are higher for the insured than uninsured
  - MDWL is a cost we’re willing to accept for ex-ante insurance
Top-Up Health Insurance (EFC2010)

\[ W^{\text{Ex-Ante}} = \$14.25 \]
Top-Up Health Insurance (EFC2010)

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

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

Fraction Insured

Demand

Marginal Cost

'Ex-ante' Demand
DWL captures 67% of ex-ante welfare cost of adverse selection

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

\[ \text{DWL} = \$9.55 \]
Medium Risk (4x EFC2010)

- Observed
- CE
- 0
- 1000
- 2000
- 3000

Fraction Insured

Medium Risk (4x EFC2010)
Medium Risk (4x EFC2010)

\[ W_{\text{Ex-Ante}} = \$120.62 \]
Medium Risk (4x EFC2010)

DWL captures 32% of ex-ante welfare cost of adverse selection

$W^{\text{Ex-Ante}} = \$120.62$

$\text{DWL} = \$38.26$

Fraction Insured

Demand

Marginal Cost

'Ex-ante' Demand
Large Risk (8x EFC2010)

DWL captures 18% of ex-ante welfare cost of adverse selection

\[ W^{\text{Ex-Ante}} = \$427 \]

DWL = $77

Fraction Insured

- Demand
- Marginal Cost
- Ex-Ante Demand
Ex-ante Insurance Value Increasing in Premium

- Divergence between Observed and Ex-ante value of insurance is increasing in the size/importance of the risk

  - DWL captures 67% of the ex-ante welfare cost of adverse selection for baseline specification in Einav, Finkelstein, and Cullen (2010)

  - Only 18% if risks are 8x as large

- More important for risks where the premiums are a significant share of people’s incomes

  - Health, life, disability, unemployment insurance
  - Less important for iPhone insurance...
Competitive Markets vs. Mandates

- Are competitive markets better or worse than govt mandates?
  - Competitive markets suffer adverse selection
  - Mandates may require some to buy insurance that don’t want it
Markets vs. Mandates: Medium Risk (4x EFC2010)

DWL = $38.26

DWL prefers markets

DWL = $117.84

Fraction Insured

Demand
Marginal Cost

CE
Ex-Post
S
S

3000
2000
1000
0
-1000

.5
.6
.7
.8
.9
1

5000
4000
3000
2000
1000
0
-1000
Markets vs. Mandates: Medium Risk (4x EFC2010)

\[ W^{\text{Ex-Ante}} = $120.62 \]

\[ W^{\text{Ex-Ante}} = $94.7 \]

Fraction Insured

Demand

Marginal Cost

'Ex-ante' Demand
Markets vs. Mandates: Medium Risk (4x EFC2010)

Ex-Ante Welfare prefers mandate

$W_{Ex-Ante}^{Ex-Ante} = $120.62

$W_{Ex-Ante}^{Ex-Ante} = $94.7
For the medium and large risk specifications, ex-ante and ex-post (DWL) welfare measures generate different conclusions.

- DWL perspective prefers markets
- Ex-ante/utilitarian perspective prefers mandates
Outline

- Simple Example
- General Model
- Illustration with Optimal Health Insurance
- Optimal open enrollment periods
Optimal Open Enrollment Periods

- When should markets exist?
  - E.g. should open enrollment for 2017 ACA coverage be in:

- Each of these timing of open enrollment generates different demand/cost curves
  - As information is revealed, demand curve tends to:
    - Rotate
    - Fall in levels

- Can use ex-ante demand curve to characterize optimal open enrollment period
  - Paper provides stylized calibration of this process to the EFC2010 setting
Optimal Open Enrollment Period

No Information Revealed

\[ D^{Ex-Ante} = \$615 \]

\[ AC(1) = \$378 \]

\[ \Delta = \$237 \]
Optimal Open Enrollment Period

Some Information Revealed (EFC2010)
Optimal Open Enrollment Period

More Information Revealed (EFC2010 x2)
Optimal Open Enrollment Periods

- Choice of optimal open enrollment period is a choice of which demand curve to face
  - Combined with choices of prices/subsidies for insurance

- Key: Average value of ex-ante demand curve is stable
Optimal Open Enrollment Period
No Information Revealed

Maximum welfare is \( W^{Ex-Ante} = 615 - 378 = 237 \)
Optimal Open Enrollment Period

Some Information Revealed (EFC2010)

Fraction Insured

Demand

Marginal Cost

'Ex-ante' Demand
Optimal Open Enrollment Period

Some Information Revealed (EFC2010)

Ex-ante optimal for 22% not to buy insurance
Set prices to exclude them

Ex-ante optimal for 22% not to buy insurance
Optimal Open Enrollment Period

Some Information Revealed (EFC2010)

$W_{\text{Choice}} = 28$
Optimal Open Enrollment Period

Some Information Revealed (EFC2010)

Maximum welfare from allowing choice is $237 + $28 = $265

$W_{Choice} = 28$
Some Information Revealed (EFC2010)

Result: Optimal open enrollment period maximizes $W_{\text{choice}}$

Screens out low-demand high moral hazard cost types
Maximum welfare from allowing choice is $237 + $155 = $391

$W^{Choice} = $155$
Optimal Open Enrollment Periods

- Optimal open enrollment periods maximize quantity of low-demand high moral hazard types
  - Maximize area between marginal cost curve and ex-ante demand curve
  - May be optimal / preferred to allow contracting in presence of adverse selection

- But low-demand high moral hazard types not always present
Demand and Cost for UI
Demand from Hendren (2016); MH elasticity of 20%

No ability to screen out low-demand high moral hazard types
Mandates versus Subsidized Choice

- Rationale for mandated UI but choice in health insurance?

- Are there no “low demand high moral hazard types” in UI?
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

- DWL and Ex-ante welfare can differ in conclusions about:
  - Optimal size of insurance market
  - Welfare cost of adverse selection
  - Competitive markets vs. mandates
  - Difference between DWL and Ex-ante welfare increasing in size of risk

- Opens new questions like optimal open-enrollment periods
  - Screen out low-demand high moral hazard types
Appendix
From Observed Demand to Ex-Ante Demand

\[ p_I + p_U = $7.50 \]

Marginal Price

Fraction Insured (s)

Buy Insurance

Demand

Marginal Cost

Average Cost
From Observed Demand to Ex-Ante Demand

\[ p_I + p_U = \$7.50 \]

\[ p_I - p_U = \$5 \]

Buy Insurance

Marginal Price

Fraction Insured (s)

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

$p_I = $6.25
$p_U = $1.25

Demand
Marginal Price
Marginal Cost
Average Cost

Buy Insurance
Unemployment Insurance

- Ex-ante and observed demand also differ for UI

- Consider hypothetical annual contract to replace $2,700 consumption drop if lose job in subsequent 12 months
  
  - Take demand parameters from Hendren (2016) + 20% moral hazard elasticity
  
  - Private market would unravel
  
  - Small fraction of market has high risk of losing job
Demand and Cost for UI
Demand from Hendren (2016); MH elasticity of 20%
Demand and Cost for UI
Demand from Hendren (2016); MH elasticity of 20%

Mandated additional UI generates deadweight loss

\[ \text{DWL} = -1.54 \]
Demand and Cost for UI

Demand from Hendren (2016); MH elasticity of 20%
Mandated additional UI generates ex-ante welfare gain

\[ W^{\text{Ex-Ante}} = $3.74 \]