## When theory is much ahead of measurement

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<sup>1</sup>The views expressed are those of individual authors and do not necessarily reflect official positions of the Federal Reserve Bank of St. Louis, the Federal Reserve System, or the Board of Governors.

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## The criticism

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Plus I Plug II Plug III Conclusion The criticism The reality There is more potential

## The criticism

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### DSGE is not close to the data

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## The criticism

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### DSGE is not close to the data

lack of predictive power, of rigorous test

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## The criticism

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### DSGE is not close to the data lack of predictive power, of rigorous test DSGE is too simple

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## The criticism

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### DSGE is not close to the data

lack of predictive power, of rigorous test  $\ensuremath{\textbf{DSGE}}$  is too simple

representative agent

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## The criticism

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### DSGE is not close to the data lack of predictive power, of rigorous test DSGE is too simple representative agent DSGE is too theoretical

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## The criticism

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### DSGE is not close to the data lack of predictive power, of rigorous test DSGE is too simple representative agent DSGE is too theoretical empirics can be misleading

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## The reality

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## The reality

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### Just looking at data is not sufficient

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# The reality

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### Just looking at data is not sufficient History is not always useful

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# The reality

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Just looking at data is not sufficient History is not always useful We need theory

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# The reality

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Just looking at data is not sufficient History is not always useful We need theory Data is of poor quality anyway

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## There is more potential

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Plus I Plug II Plug III Conclusion

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## There is more potential

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Theory can help is data-poor environments

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## There is more potential

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Theory can help is data-poor environments Organize the data

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## There is more potential

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Theory can help is data-poor environments Organize the data Poor measurement

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## There is more potential

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Theory can help is data-poor environments Organize the data Poor measurement No history

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Conclusion	

And now: shameless plugs

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# With Douglas Gollin (Oxford)

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### What determines malaria prevalence?

# With Douglas Gollin (Oxford)

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What determines malaria prevalence? Epidemiology: mosquito density, ecological factors

## With Douglas Gollin (Oxford)

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What determines malaria prevalence? Epidemiology: mosquito density, ecological factors Jeffrey Sachs: malaria costs 40% of GDP

# With Douglas Gollin (Oxford)

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What determines malaria prevalence? Epidemiology: mosquito density, ecological factors Jeffrey Sachs: malaria costs 40% of GDP Policy response: change both. Difficult.

# With Douglas Gollin (Oxford)

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What determines malaria prevalence? Epidemiology: mosquito density, ecological factors Jeffrey Sachs: malaria costs 40% of GDP Policy response: change both. Difficult. Distribute bednets.

# With Douglas Gollin (Oxford)

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What determines malaria prevalence? Epidemiology: mosquito density, ecological factors Jeffrey Sachs: malaria costs 40% of GDP Policy response: change both. Difficult. Distribute bednets. Is this the best we can do?

### What theory tells us

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What theory tells us

• Humans respond to incentives

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What theory tells us

- Humans respond to incentives
- Why do they not take bednets without incentives?

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What theory tells us

- Humans respond to incentives
- Why do they not take bednets without incentives?
- Is this a trap?

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### Empirics do not have an answer

### Empirics do not have an answer

• Blood test is needed

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Empirics do not have an answer

- Blood test is needed
- Often confused with influenza (flu)

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Empirics do not have an answer

- Blood test is needed
- Often confused with influenza (flu)
- Prevalence data is literally made up

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Empirics do not have an answer

- Blood test is needed
- Often confused with influenza (flu)
- Prevalence data is literally made up
- Endogeneity issues of gigantic proportions (data construction, income)

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Theory to the rescue!

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Theory to the rescue!

• Maximizing agent

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Theory to the rescue!

- Maximizing agent
- Borrowing constraint

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Theory to the rescue!

- Maximizing agent
- Borrowing constraint
- Idiosyncratic productivity and health shocks

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Theory to the rescue!

- Maximizing agent
- Borrowing constraint
- Idiosyncratic productivity and health shocks
- Option to buy full protection from malaria

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Theory to the rescue!

- Maximizing agent
- Borrowing constraint
- Idiosyncratic productivity and health shocks
- Option to buy full protection from malaria
- Endogenous infection rate

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Theory to the rescue!

- Maximizing agent
- Borrowing constraint
- Idiosyncratic productivity and health shocks
- Option to buy full protection from malaria
- Endogenous infection rate
- Malaria lowers productivity and increases mortality

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# High-cost prevention

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Endogenously determined fertility rate	0.0690	0.0150
Proportion sick	0.9007	0.0000
Proportion protected from disease	0.0000	0.0000
Average assets	2.9596	12.0797
Average output	1.3913	2.4521
Average consumption	1.1565	2.2668

#### Reasonable cost of protection

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Endogenously determined fertility rate	0.0150	0.0150
Proportion sick	0.0006	0.0000
Proportion protected from disease	0.9770	0.0000
Average assets	12.0631	12.0797
Average output	2.4488	2.4521
Average consumption	2.2553	2.2668

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# With Stéphane Pallage (UQAM)

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Alternative unemployment insurance schemes Unemployment saving accounts Universal basic income

# Unemployment insurance

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Christian Zimmermann, St. Louis Fed When theory is much ahead of measurement

### Unemployment insurance

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• Moral hazard problem (common pool)

# Unemployment insurance

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- Moral hazard problem (common pool)
- Tax distortion

# Unemployment insurance

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- Moral hazard problem (common pool)
- Tax distortion
- Discourages savings

### Unemployment savings accounts

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Christian Zimmermann, St. Louis Fed When theory is much ahead of measurement

#### Unemployment savings accounts

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• Minimum payment into personal account

### Unemployment savings accounts

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- Minimum payment into personal account
- Maximum withdrawal from account

## Unemployment savings accounts

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- Minimum payment into personal account
- Maximum withdrawal from account
- Cap on mandatory account

# Unemployment savings accounts

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- Minimum payment into personal account
- Maximum withdrawal from account
- Cap on mandatory account
- Supplemental unemployment insurance for empty accounts

# Unemployment savings accounts

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- Minimum payment into personal account
- Maximum withdrawal from account
- Cap on mandatory account
- Supplemental unemployment insurance for empty accounts
- Residual fully available at retirement

# Unemployment savings accounts

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- Minimum payment into personal account
- Maximum withdrawal from account
- Cap on mandatory account
- Supplemental unemployment insurance for empty accounts
- Residual fully available at retirement

How to optimize this?

# Unemployment savings accounts

- Minimum payment into personal account
- Maximum withdrawal from account
- Cap on mandatory account
- Supplemental unemployment insurance for empty accounts
- Residual fully available at retirement

How to optimize this? Is this feasible?

# Unemployment savings accounts

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- Minimum payment into personal account
- Maximum withdrawal from account
- Cap on mandatory account
- Supplemental unemployment insurance for empty accounts
- Residual fully available at retirement

How to optimize this? Is this feasible? No data to draw from

## Theory to the rescue!

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Christian Zimmermann, St. Louis Fed When theory is much ahead of measurement

### Theory to the rescue!

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#### A minimal model

Christian Zimmermann, St. Louis Fed When theory is much ahead of measurement

### Theory to the rescue!

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#### A minimal model

• Incomplete markets

# Theory to the rescue!

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- Incomplete markets
- Idiosyncratic labor history

# Theory to the rescue!

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- Incomplete markets
- Idiosyncratic labor history
- Utility for leisure

# Theory to the rescue!

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- Incomplete markets
- Idiosyncratic labor history
- Utility for leisure
- Retirement

# Theory to the rescue!

(4) (2) (4) (3) (4)

- Incomplete markets
- Idiosyncratic labor history
- Utility for leisure
- Retirement
- Calibrate to particular labor market risk





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• Criterion: expected value of newborn





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- Criterion: expected value of newborn
- *θ* = 0.3

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- Criterion: expected value of newborn
- $\theta = 0.3$
- <u>a</u> = 0.02

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- Criterion: expected value of newborn
- θ = 0.3
- <u>a</u> = 0.02
- $\bar{b} = 0.5$



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- Criterion: expected value of newborn
- θ = 0.3
- <u>a</u> = 0.02
- $\bar{b} = 0.5$
- $\bar{k} = 5$



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- Criterion: expected value of newborn
- θ = 0.3
- <u>a</u> = 0.02
- $\bar{b} = 0.5$
- $\bar{k} = 5$
- $\tau = 0.1393$



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- Criterion: expected value of newborn
- θ = 0.3
- <u>a</u> = 0.02
- $\bar{b} = 0.5$
- $\bar{k} = 5$
- $\tau = 0.1393$
- shirkers: 1.17%



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- Criterion: expected value of newborn
- θ = 0.3
- <u>a</u> = 0.02
- $\bar{b} = 0.5$
- $\bar{k} = 5$
- $\tau = 0.1393$
- shirkers: 1.17%
- UI beneficiaries: 0.9%



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- Criterion: expected value of newborn
- θ = 0.3
- <u>a</u> = 0.02
- $\bar{b} = 0.5$
- $\bar{k} = 5$
- $\tau = 0.1393$
- shirkers: 1.17%
- UI beneficiaries: 0.9%
- unemployed: 7.5%



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- Criterion: expected value of newborn
- θ = 0.3
- <u>a</u> = 0.02
- $\bar{b} = 0.5$
- $\bar{k} = 5$
- $\tau = 0.1393$
- shirkers: 1.17%
- UI beneficiaries: 0.9%
- unemployed: 7.5%
- mean assets: 3.3

## Consumption equivalence

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#### • $\pi = 0, \theta^* = 0.55, \lambda = -0.42\%$

## Consumption equivalence

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•  $\pi = 0, \theta^* = 0.55, \lambda = -0.42\%$ 

• 
$$\pi = 0.05, \theta^* = 0.20, \lambda = 0.50\%$$

## Consumption equivalence

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• 
$$\pi = 0, \theta^* = 0.55, \lambda = -0.42\%$$

• 
$$\pi = 0.05, \theta^* = 0.20, \lambda = 0.50\%$$

• 
$$\pi = 0.05, \theta = 0.55, \lambda = 1.18\%$$

## Consumption equivalence

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$$\pi = 0, \theta^* = 0.55, \lambda = -0.42\%$$

• 
$$\pi = 0.05, \theta^* = 0.20, \lambda = 0.50\%$$

• 
$$\pi = 0.05, \theta = 0.55, \lambda = 1.18\%$$

• 
$$\pi = 0.2, \theta^* = 0.10, \lambda = 1.10\%$$

## Consumption equivalence

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• 
$$\pi = 0, \theta^* = 0.55, \lambda = -0.42\%$$

• 
$$\pi = 0.05, \theta^* = 0.20, \lambda = 0.50\%$$

• 
$$\pi = 0.05, \theta = 0.55, \lambda = 1.18\%$$

• 
$$\pi = 0.2, \theta^* = 0.10, \lambda = 1.10\%$$

• 
$$\pi = 0.2, \theta = .40, \lambda = 3.90\%$$



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#### • *θ* = 0.4

Christian Zimmermann, St. Louis Fed When theory is much ahead of measurement



- *θ* = 0.4
- <u>a</u> = 0

Christian Zimmermann, St. Louis Fed When theory is much ahead of measurement

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- *θ* = 0.4
- <u>a</u> = 0
- $\overline{b} = 0$



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- *θ* = 0.4
- <u>a</u> = 0
- $\bar{b} = 0$
- $\bar{k} = NA$

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- *θ* = 0.4
- <u>a</u> = 0
- $\bar{b} = 0$
- $\bar{k} = NA$
- $\tau = 0.3377$

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- *θ* = 0.4
- <u>a</u> = 0
- $\bar{b} = 0$
- $\bar{k} = NA$
- $\tau = 0.3377$
- shirkers: 0%

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- *θ* = 0.4
- <u>a</u> = 0
- $\bar{b} = 0$
- $\bar{k} = NA$
- τ = 0.3377
- shirkers: 0%
- UI beneficiaries: 0.38%



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- *θ* = 0.4
- <u>a</u> = 0
- $\bar{b} = 0$
- $\bar{k} = NA$
- τ = 0.3377
- shirkers: 0%
- UI beneficiaries: 0.38%
- unemployed: 5.0%



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- *θ* = 0.4
- <u>a</u> = 0
- $\bar{b} = 0$
- $\bar{k} = NA$
- $\tau = 0.3377$
- shirkers: 0%
- UI beneficiaries: 0.38%
- unemployed: 5.0%
- mean assets: 0

# Universal Basic Income

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(With Alice Fabre (Aix-Marseille) and Stéphane Pallage (UQAM)) Often proposed Rarely implemented No good data Very politicized

## A good replacement for unemployment insurance?

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## A good replacement for unemployment insurance?

moral hazard

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## A good replacement for unemployment insurance?

- moral hazard
- administrative costs

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# A good replacement for unemployment insurance?

- moral hazard
- administrative costs
- "fairness"

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# A good replacement for unemployment insurance?

- moral hazard
- administrative costs
- "fairness"
- "capabilities"

A B K A B K

# A good replacement for unemployment insurance?

- moral hazard
- administrative costs
- "fairness"
- "capabilities"
- Data? No!

A B K A B K

## Theory to the rescue!

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#### A minimal model

- Incomplete markets
- Idiosyncratic labor history
- Utility for leisure
- Calibrate to particular labor market risk
- UI, UBI, self-insurance

## Oregon 1990

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	$ heta$ or $\omega$	au	$\bar{V}$	u	u+	а
Opt UBI	0.0125	0.0131	-110.7581	0.06	0.0018	2.58
Opt UI ( $\pi$ =0)	0.70	0.0431	- 110.0127	0.06	0	0.00
Opt UI ( $\pi$ =0.1)	0.30	0.0206	- 110.5311	0.06	0.0259	0.72
Opt UI ( $\pi$ =0.2)	0.15	0.0108	-110.6909	0.06	0.0209	1.46
Opt UI ( $\pi$ =0.3)	0.05	0.0036	- 110.7456	0.06	0.0043	2.20
Opt UI ( $\pi$ =0.5)	0.0250	0.0019	-110.7765	0.06	0.0019	2.44
Opt UI $(\pi=1)$	0.01	0.0009	- 110.7952	0.06	0	2.61
Self-insurance	n.a.	0	-110.7749	0.06	0	2.82

## Oregon 2011

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Opt UBI	0.0225	0.0244	-112.7626	0.09	0.0102	6.11
Opt UI ( $\pi$ =0)	0.65	0.0608	- 110.2378	0.09	0	0
Opt UI ( $\pi$ =0.1)	0.55	0.0608	-111.2316	0.09	0.0716	0.25
Opt UI ( $\pi$ =0.2)	0.25	0.0292	-112.0963	0.09	0.0519	1.70
Opt UI ( $\pi$ =0.3)	0.15	0.0180	-112.4240	0.09	0.0405	3.12
Opt UI ( $\pi$ =0.5)	0.0750	0.0093	-112.6666	0.09	0.0260	4.64
Opt UI $(\pi=1)$	0.02	0.0027	-112.8323	0.09	0.0093	6.24
Self-insurance	n.a.	0	-112.8519	0.09	0	7.27

## Conclusion

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Christian Zimmermann, St. Louis Fed When theory is much ahead of measurement

#### Conclusion

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• DSGE theory is useful

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## Conclusion

- DSGE theory is useful
- DSGE theory is innovative

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## Conclusion

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- DSGE theory is useful
- DSGE theory is innovative
- DSGE theory is essential

## Conclusion

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- DSGE theory is useful
- DSGE theory is innovative
- DSGE theory is essential
- DGSE theory is exciting!