

# Access to Citizenship & Migrant Saving Choices

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# Migrants hold less wealth than natives in most Western countries.

- **Substantial migrant/native wealth inequality:** 150 000€ gap in Germany.
  - Main determinant: housing and pension wealth gap.
  - Consequences: higher risk of poverty in old age.
- One of the most important drivers: **differences in saving behaviour.**
  - Migrants planning to stay long term save at 50% the rate of natives.
  - 25% of this gap is unexplained.
- This paper: **Uncertainty about their future keeps migrants from saving.**

# Migrants face higher levels of uninsurable uncertainty.

- Labour market, income uncertainty: ↑ precautionary savings.
- ≠ Uncertainty about future right to stay, quality of life: ↓ preparatory savings.
- ⇒ Most effective way to lower both: **access to citizenship**.

## Research Questions

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- II. What are the channels through which the effect operates?

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  - Greater willingness to invest long term.
  - **Greater certainty raises valuation of retirement consumption.**

# Life cycle model with uncertain retirement location.

$$\begin{aligned} \max V(c_1, c_2, c_3) = & \underbrace{u^l(c_1^l) + \beta E[u^l(c_2^l)]}_{\text{Working Age Utility}} + \beta^2 \underbrace{((1 - \theta) * \max \{E[u^l(c_3^l; s = 1)], E[u^H(c_3^H; s = 0)]\}}_{\text{Retirement Utility in Country of Choice}} \\ & + \underbrace{\theta E[u^H(c_3^H; s = 0/1)]}_{\text{Retirement Utility When Having to Leave}} \end{aligned}$$

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**Location dependent consumption:** different rate of returns + liquidation penalty



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**Location dependent consumption:** different rate of returns + liquidation penalty

**Uncertainty:** persistent shocks to income & preference + risky right to stay

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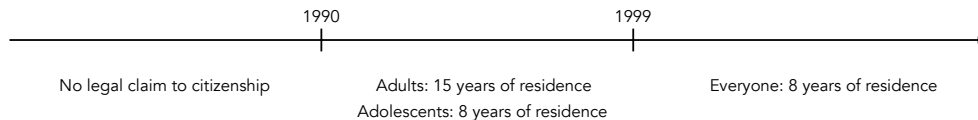
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- 2 Access to citizenship raises only **country specific saving**, if liquidation cost is main driver.
- 3 Access to citizenship raises **intent to stay**, if it shifts pref / returns in host country are higher.

# Identify causal impact through natural experiment in Germany.

- Quasi-experimental variation:

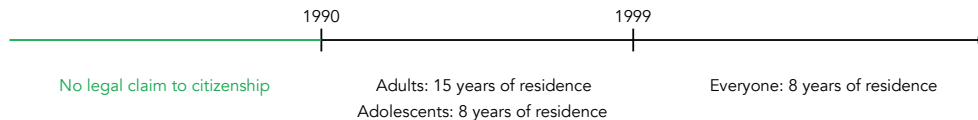


- Focus on migrants living in Germany prior to the reforms: **no changes in composition.**
- Unexpected changes in legislation: **no strategic selection into access to citizenship.**

Examples

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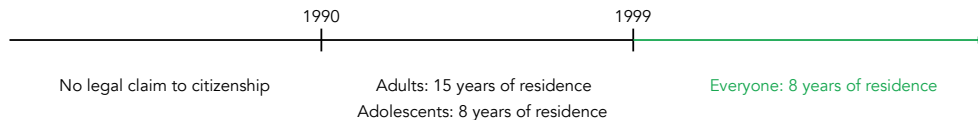
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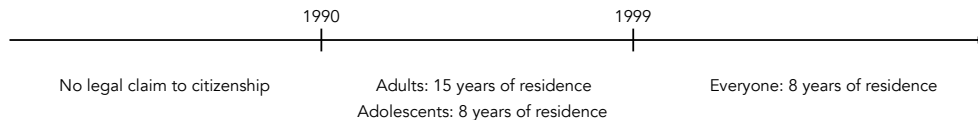


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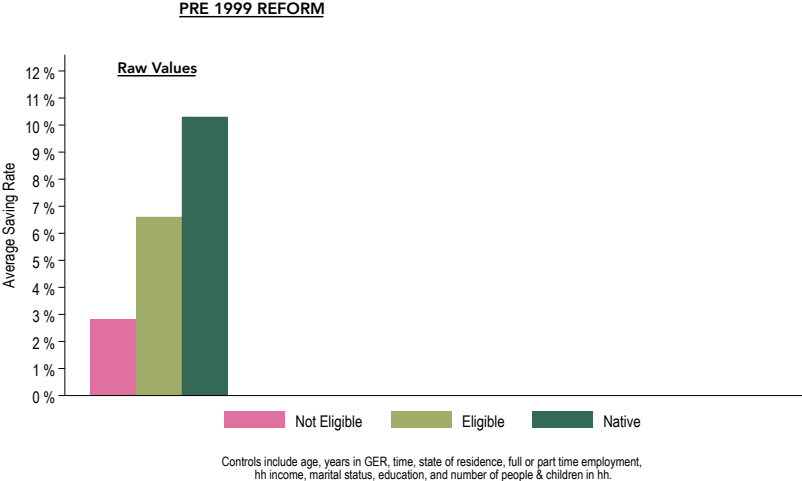
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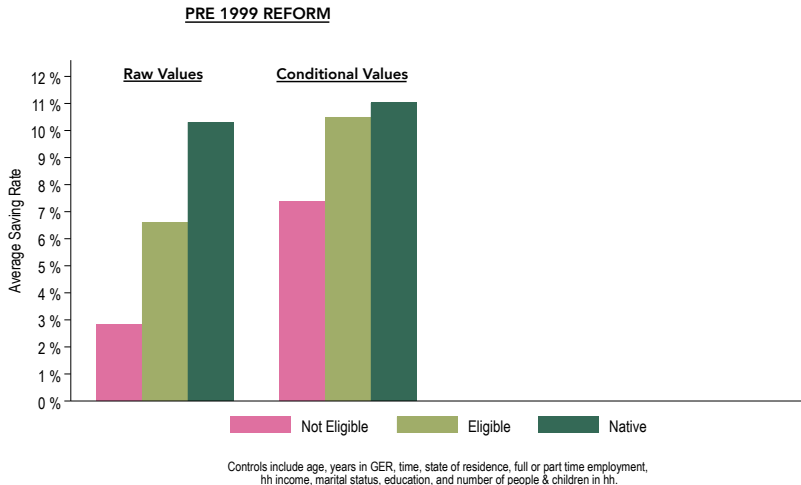
- Data: [German Socioeconomic Panel](#)
  - Saving and remittance data + detailed information on migration background.
- Two complementary double difference strategies:
  - 1 [Difference-in-difference around 1999 reform](#) [Details](#)
    - Document pre-existing gaps, isolate main policy relevant effect.
  - 2 [Expected/unexpected eligibility shifts over time](#) [Details](#)
    - Disentangle anticipation and immediate effects, exploit longer time horizon.

# Access to citizenship crucially shapes migrants' saving choices.



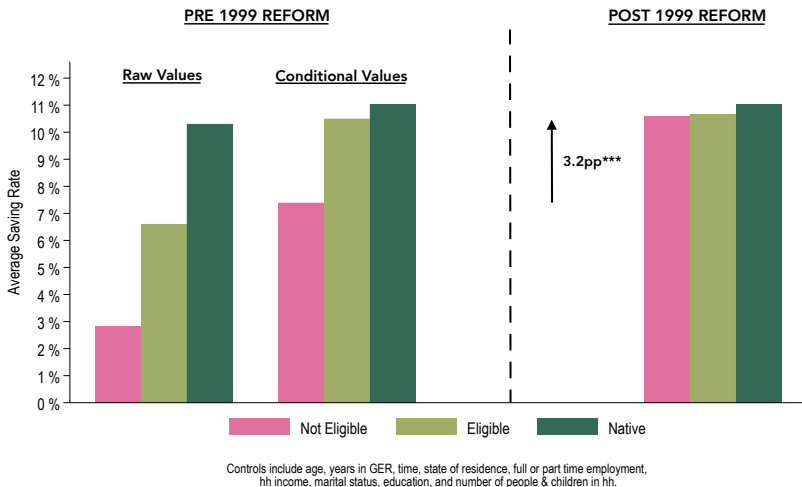
- **Raw saving rate gap:** 70% lower saving rate.

...even after conditioning on observables.



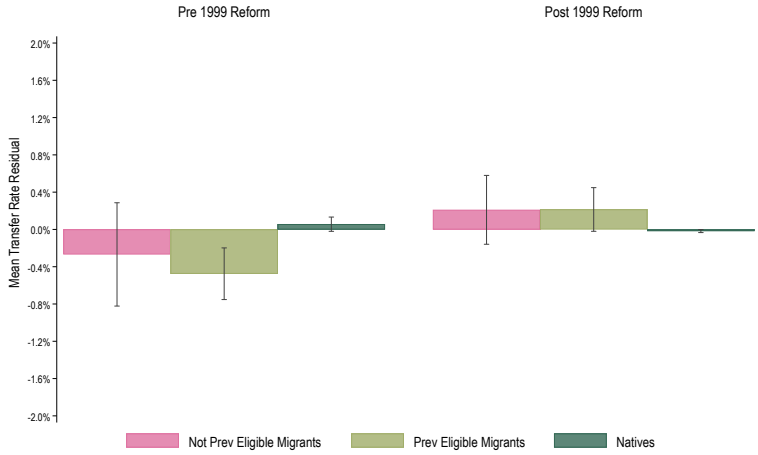
- **Conditional saving rate gap:** 30% lower saving rate.

Gaining access to citizenship causally increases saving rate by **40%**.



- o **Causal effect of access to citizenship:** saving rate gap **fully closed**.

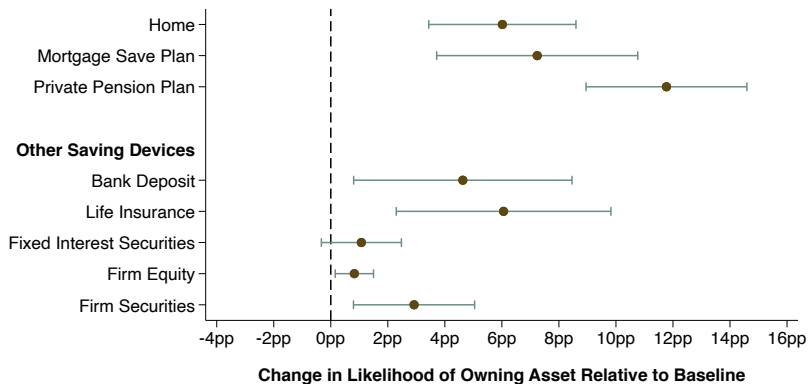
Transfers to people residing in the country of origin are unaffected.



- o Saving effect not offset by transfers, but small shift in where migrants save. 1990 Reform

# Access to citizenship raises propensity to invest long term.

## Effect of Eligibility on Propensity to Own...



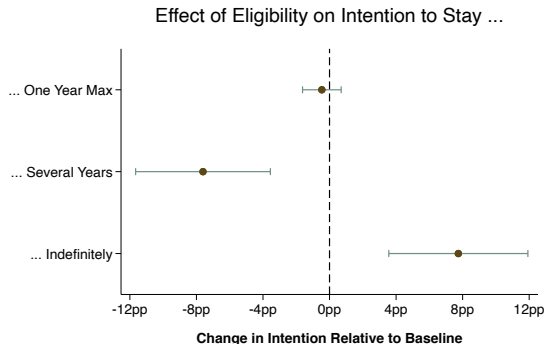
Coefficients represent the effect of becoming eligible for citizenship, holding constant the impact of age, years in GER, time, state of residence, full or part time employment, hh income, marital status, education, and number of people & children in hh. Caps represent 95% confidence intervals.

- Effects especially pronounced when eligibility is anticipated. Exp/Unexp Effects



# Lower uncertainty increases willingness to commit long term.

- No significant impact on migrants from EU EU Assets EU Saving
- Greater willingness, rather than capacity to save.
  - Limited effect on labour market outcomes, no effect on credit uptake.
  - Increased willingness to stay indefinitely:



Coefficients represent the effect of becoming eligible for citizenship, controlling for age, years in GER, full or part time employment, hh income marital status, education, num of people & children in hh, and state, year & individual FE. Caps represent 95% confidence intervals

# Summary

- Access to citizenship crucially determines migrants' saving rate.
  - 40% increase, fully closing unexplained gap.
  - **Policy implications:** – Under direct government control.
    - Especially important amidst demographic change.

# Summary

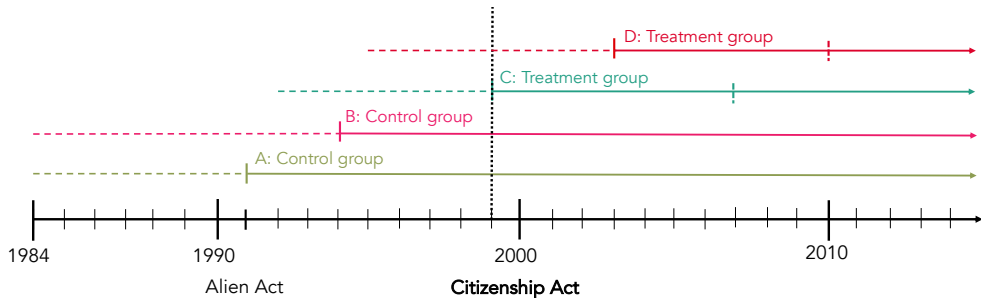
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- Effect driven by change in uncertainty about future.
  - Non-EU migrants more willing to invest long term.
  - **Conceptual implications:** Uninsurable uncertainty about future paths can impede preparatory behaviour; effect rises in preference.
    - ⇒ Quantify exact channels using theory driven survey instruments.

- **Antonio: born in 1929, migrated 1975**
  - 62 years old & living in Germany for 16 years when the Alien Act came into effect.
  - Becomes eligible *unexpectedly* in 1991.
- **Boris: born in 1929, migrated 1980**
  - 62 years old & living in Germany for 11 years when the Alien Act came into effect.
  - Becomes eligible *expectedly* in 1995 with 15 years of residence.
- **Claire: born in 1962, migrated 1992**
  - Moved to Germany at age 30 with the expectation of becoming eligible in 2007.
  - Becomes eligible *unexpectedly* in 2000 with only 8 years of residence.
- **Dolores: born in 1962, migrated 1995**
  - Moved to Germany at age 33 with the expectation of becoming eligible in 2010.
  - Becomes eligible *expectedly* in 2003 with only 8 years of residence.

# Difference-in-difference using the Staatsangehörigkeitsgesetz. Return

Compare the impact of the reform passing parliament on migrants who were ineligible to naturalise before (*treatment group*) to its impact on already eligible migrants as well as natives (*control groups*):

$$Y_{it} = \alpha + \beta_1 * MigTreat_i * PostRef_t + \beta_2 * MigControl_i * PostRef_t + \theta * X_{it} + Year_t + State_s + HH_i + \epsilon_{it}$$

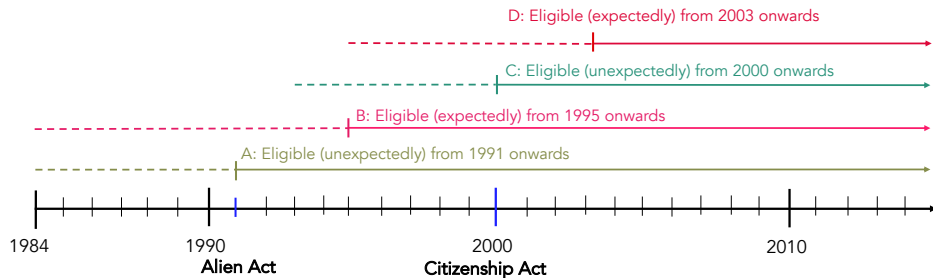


# Test predictions using changes in migrants' legal status over time. Return

Estimate the impact of (un-)expectedly becoming eligible:

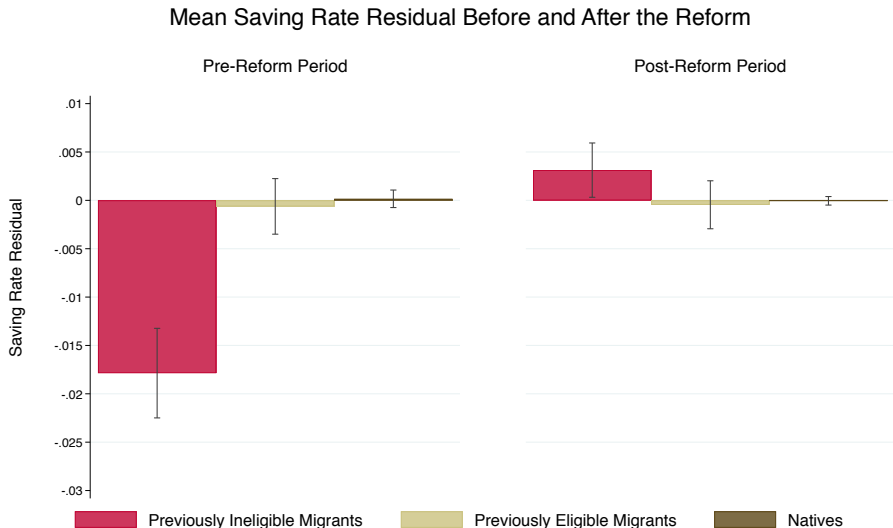
$$Y_{it} = \alpha + \gamma * \text{Eligible}_{it} + \theta * X_{it} + \text{Year}_t + \text{State}_s + \text{HH}_i + \epsilon_{it}$$

$$= \alpha + \gamma_1 * \text{EligibleExp}_{it} + \gamma_2 * \text{EligibleUnexp}_{it} + \theta * X_{it} + \text{Year}_t + \text{State}_s + \text{HH}_i + \epsilon_{it}$$



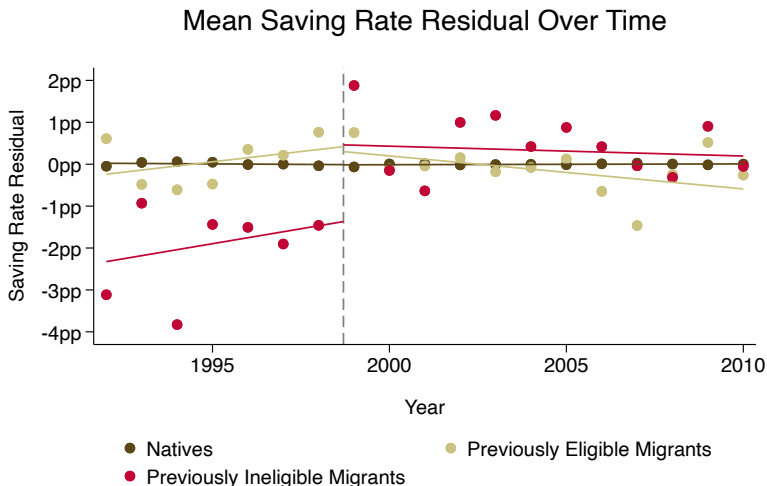
# Does access to citizenship affect migrants' saving choices?

Fixed Effect Difference in Difference. [Return](#)



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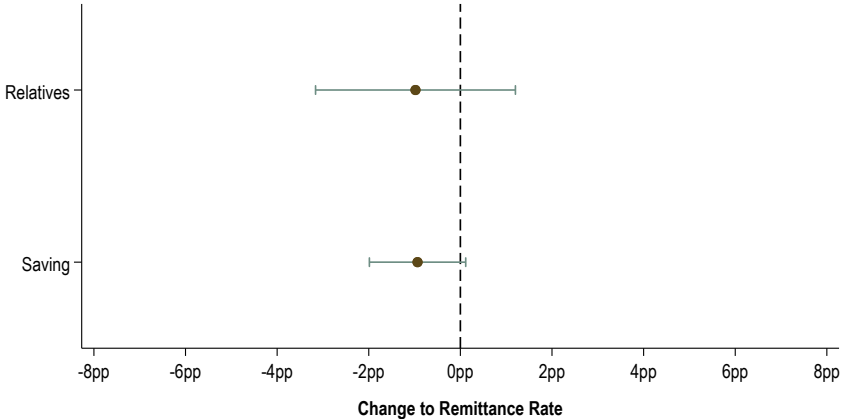
Residuals calculated by regression the saving rate onto age, years in GER, full or part time employment, hh income, marital status, education, num people & children in hh, and FE for year, state & individual.



# Saving in the country of origin weakly decreases. Return

Extensive Margin

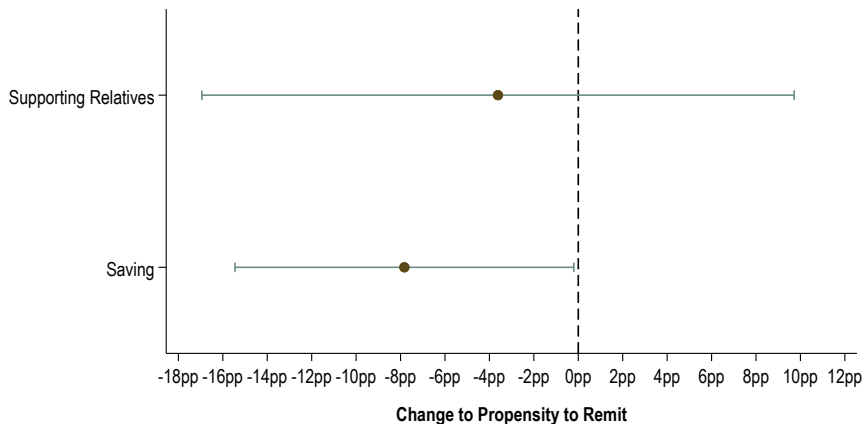
## Effect of Eligibility on Remittance Rate



Coefficients represent the effect of becoming eligible for citizenship, holding constant the impact of age, years in GER, time, state of residence, full or part time employment, hh income, marital status, education, number of people & children in hh, and year, state and HH FE. Caps represent 95% confidence intervals

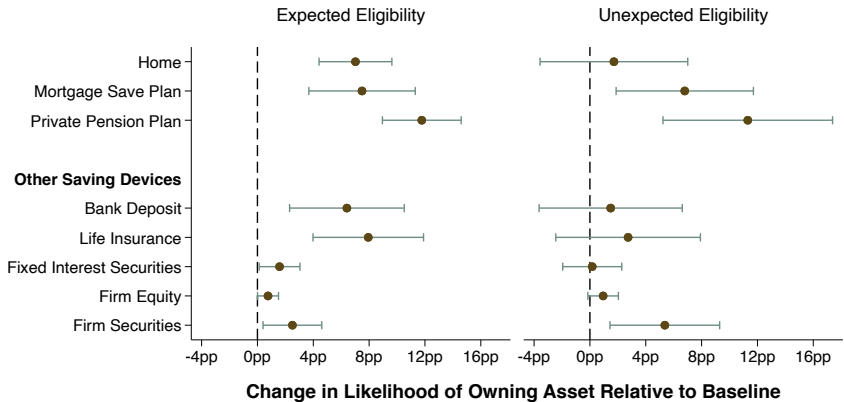
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### Effect of Eligibility on Propensity to Remit



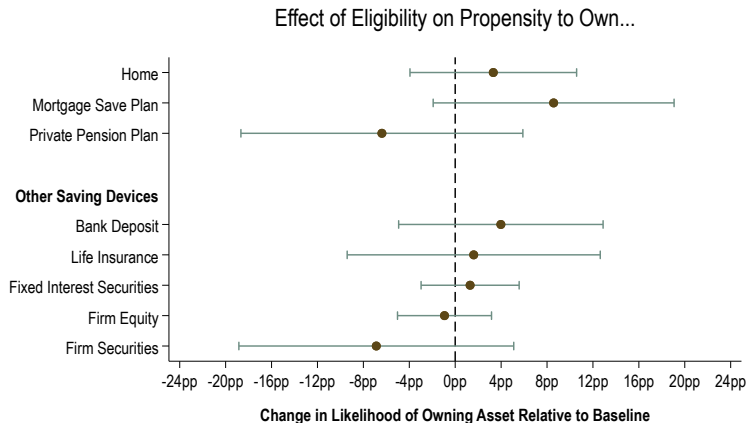
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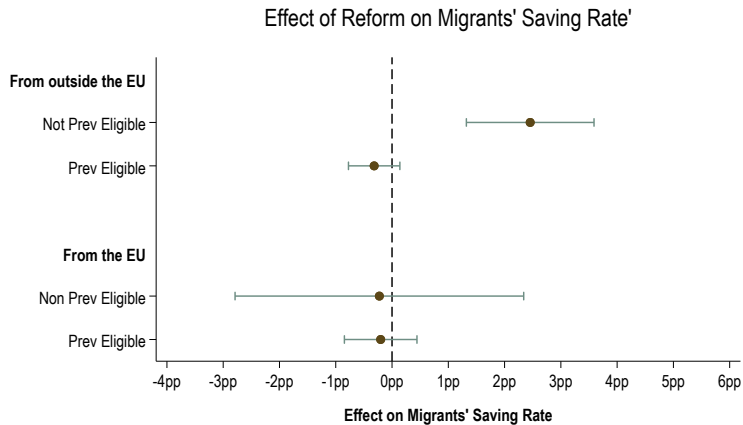
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# No significant impact on EU migrants' saving choices. [Return](#)



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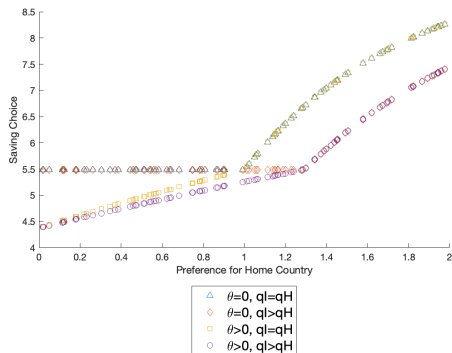
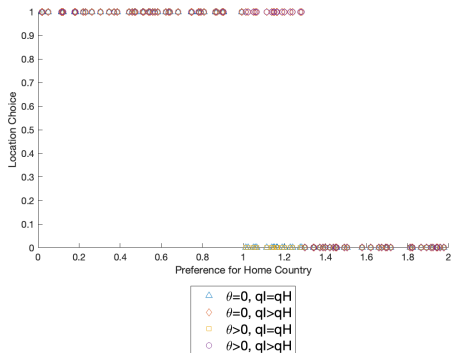


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# Theoretical Framework [Return](#)

## Simulation

- Simulated location and saving choices of 100 migrants with CRRA utility for  $\theta = 0.2$ ,  $\sigma = 0.5$ ,  $y = 10$ ,  $q_2^I = 1.5$  and  $q_2^H = 1.5/0.9$ :



- Two period life cycle model

- First period: all migrants work and consume in the immigration country.
- Second period: migrants retire and live off their savings, either in the immigration or their home country.

⇒ Where migrants spend their retirement depends on **personal preference** as well as their **legal right to stay**:

$$\begin{aligned}
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$$V(c_1, c_2) = u^I(c_1) + \beta [(1 - \theta) * \max \{u^I(c_2^I; s = 1), u^H(c_2^H; s = 0)\} + \theta * u^H(c_2^H; s = 0/1)]$$

### Variation in preference for the home relative to the immigration country:

- Random draw of  $\eta \in [0; 2]$  at the beginning of their working age determines migrants' attachment to their home country – and thus the utility they gain from consumption in either location:

$$u^H(\cdot) = \eta * u(\cdot)$$

$$u^I(\cdot) = (2 - \eta) * u(\cdot)$$

$$\Rightarrow u^H(\cdot) = \frac{\eta}{2 - \eta} * u^I(\cdot) = \gamma * u^I(\cdot)$$

$\Rightarrow$  If  $\eta > 1$  ( $\gamma = \frac{\eta}{2 - \eta} > 1$ ), migrant gains more utility from a given level of consumption in the home country. If  $\eta < 1$  ( $\gamma < 1$ ), the reverse is true.

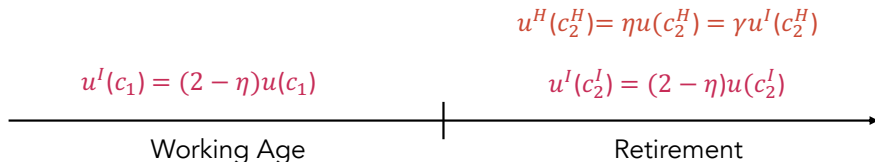
## Utility

$$V(c_1, c_2) = u^I(c_1) + \beta [(1 - \theta) * \max \{u^I(c_2^I; s = 1), u^H(c_2^H; s = 0)\} + \theta * u^H(c_2^H; s = 0/1)]$$

**Variation in preference for the home relative to the immigration country:**

Home  
Country

Immigration  
Country



$$V(c_1, c_2) = u^l(c_1) + \beta [(1 - \theta) * \max \{u^l(c_2^l; s = 1), u^H(c_2^H; s = 0)\} + \theta * u^H(c_2^H; s = 0/1)]$$

### Budget Constraint

- Migrants earn an exogenous income that they can consume or invest in a weakly country specific asset:

$$\begin{array}{l} c_1 + a_1 = y_1^l \\ \left. \begin{array}{l} c_2^l = q_2^l a_1 \quad \text{if } S = 1 \\ c_2^H = q_2^H a_1 \quad \text{if } S = 0 \end{array} \right\} \text{where } q_2^l \geq q_2^H \end{array}$$

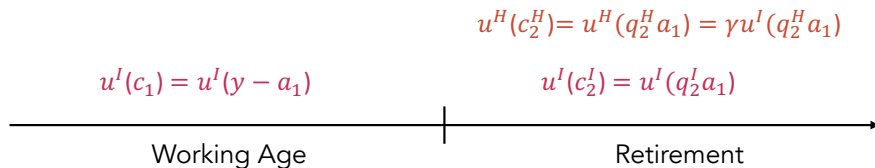
→ Migrants cannot go into debt; rate of returns subsume price level differences.

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### Budget Constraint

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Country

Immigration  
Country

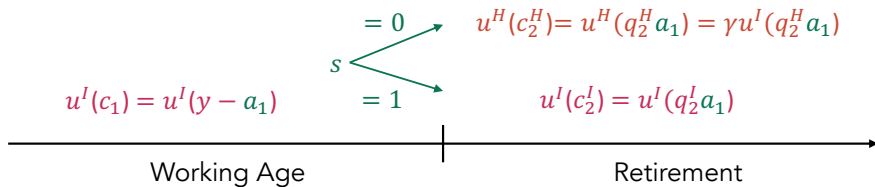


$$V(c_1, c_2) = u^l(y - a_1) + \beta [(1 - \theta) * \max \{u^l(q_2^l a_1; s = 1), u^H(q_2^H a_1; s = 0)\} + \theta * u^H(q_2^H a_1; s = 0/1)]$$

**Migrants choose the saving amount and location that maximises their lifetime utility.**

Home  
Country

Immigration  
Country



$$V(c_1, c_2) = u'(y - a_1) + \beta [(1 - \theta) * \max \{u'(q_2^L a_1; s = 1), u^H(q_2^H a_1; s = 0)\} + \theta * u^H(q_2^H a_1; s = 0/1)]$$

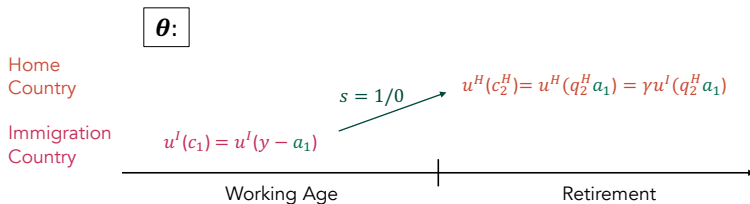
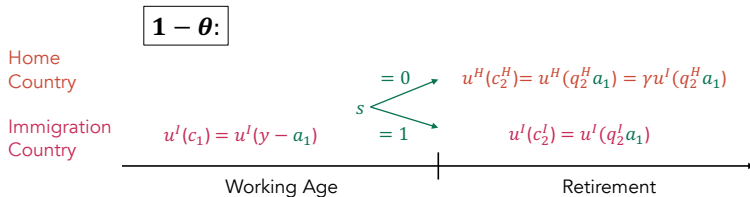
### Uncertainty in right to stay during retirement

- Migrants can always decide to leave the immigration country with certainty:  
 $P(S = 0|s = 0) = P(S = 1|s = 1) = 1$ .
- But with probability  $\theta > 0$ , migrants have to leave the immigration country in retirement – even if they would have chosen to stay:  
 $P(S = 0|s = 1) = (1 - \theta), P(S = 1|s = 1) = (1 - \theta)$ .
- $\theta$  can also be interpreted as **perceived** uncertainty.

## Uncertainty

$$V(c_1, c_2) = u'(y - a_1) + \beta [(1 - \theta) * \max \{u'(q_2^I a_1; s = 1), u^H(q_2^H a_1; s = 0)\} + \theta * u^H(q_2^H a_1; s = 0/1)]$$

### Uncertainty in right to stay during retirement

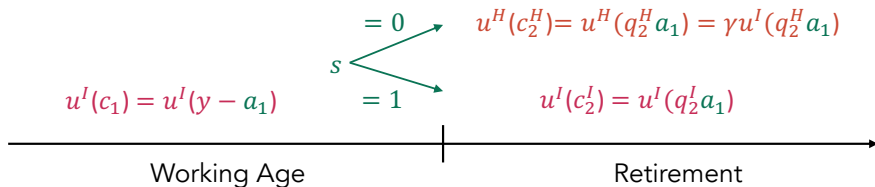


$$V(c_1, c_2) = u^I(y - a_1) + \beta \max \{u^I(q_2^I a_1; s = 1), u^H(q_2^H a_1; s = 0)\}$$

**Access to citizenship eliminates the risk of having to leave the immigration country.**

Home  
Country

Immigration  
Country

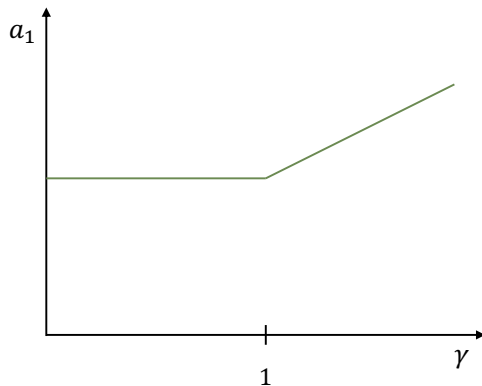
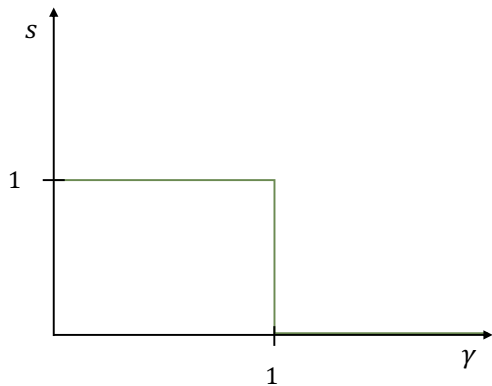




## Solution Return

Equal rate of returns:  $q_2^I = q_2^H$  and no risk:  $\theta = 0$  Proof

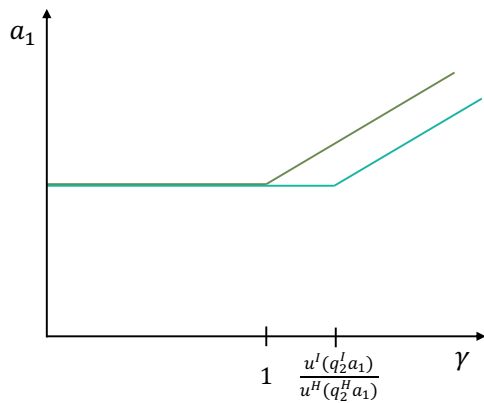
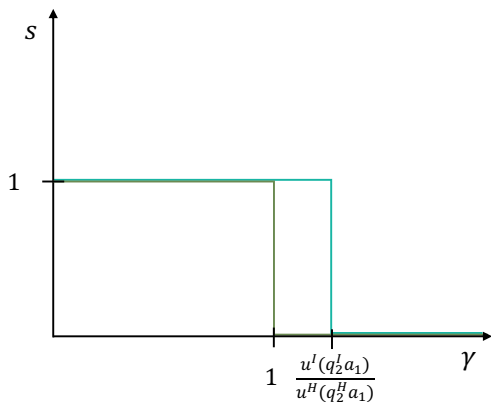
- Migrants stay in the immigration country only if they have a preference for it, i.e. if:  $\gamma \leq 1$
- Migrants intending to leave save more than migrants intending to stay.



# Solution Return

Higher rate of return in immigration country:  $q_2^I > q_2^H$  and no risk:  $\theta = 0$  Proof

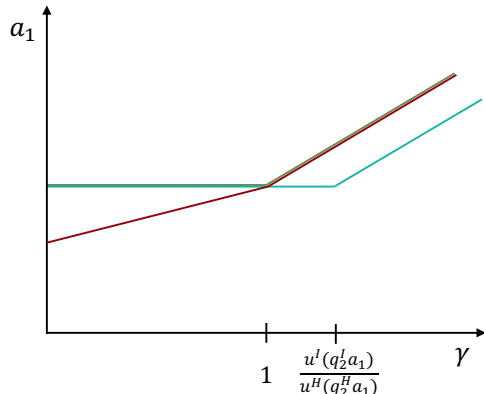
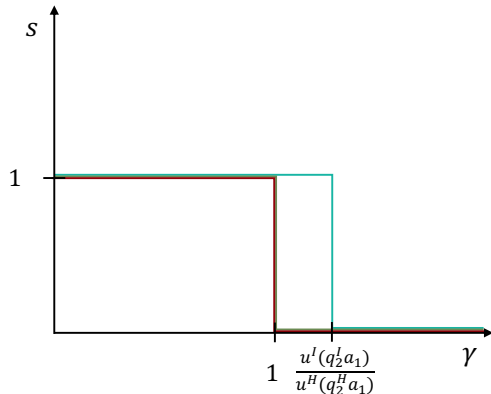
- Migrants stay if economic incentives outweigh country preference, i.e. if:  $\gamma \leq \frac{u(q_2^I a_1)}{u(q_2^H a_1)}$
- Migrants intending to leave save more than migrants intending to stay.



# Solution Return

Equal rate of returns:  $q_2^L = q_2^H$  and positive risk:  $\theta > 0$  Proof

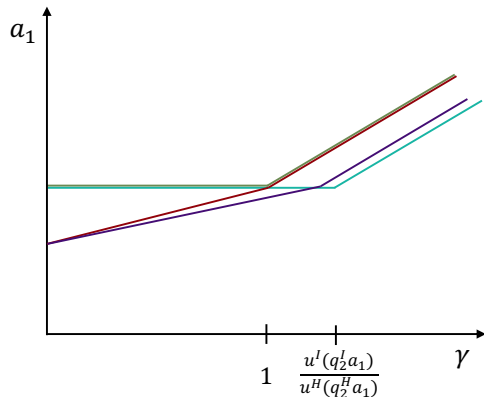
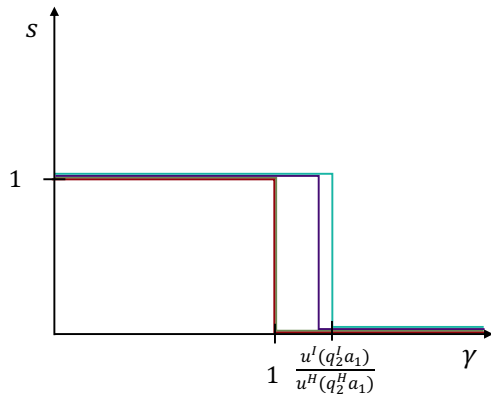
- Migrants' location choices are unchanged.
- Migrants intending to stay save less, migrants intending to leave are unaffected.



# Solution Return

Higher rate of return in immigration country:  $q_2^I > q_2^H$  and positive risk:  $\theta > 0$  Proof

- Weakly fewer migrants' choose to stay in the immigration country.
- Migrants intending to stay save less, migrants intending to leave are unaffected.



# Solution

Equal rate of returns:  $q_2^I = q_2^H$  and no risk:  $\theta = 0$  [Return](#)

## I Location Choice

- Migrants can consume the same stock of wealth in either country:  $c_2^I = c_2^H = c_2$ .
- Migrants with a preference for the immigration country gain more utility from consuming there, for migrants with a preference for the home country the reverse is true:

$$u^I(c_2) > u^H(c_2) \text{ if } \gamma < 1$$

$$u^H(c_2) > u^I(c_2) \text{ if } \gamma > 1$$

⇒ Migrants with a preference for the immigration country always try to stay. Migrants with a preference for the home country always choose to leave.

# Solution

Equal rate of returns:  $q_2^I = q_2^H$  and no risk:  $\theta = 0$  Return

## II Saving Choice

- Optimal saving amounts hinge on preference for the immigration versus home country:

1 Migrants who want to stay,  $s = 1$  :

$$\frac{\delta V(\cdot)}{\delta a_1^I} = -u'(c_1^I) + \beta q_2^I u'(c_2^I) \stackrel{!}{=} 0$$
$$\Leftrightarrow \frac{u'(c_2^I)}{u'(c_1^I)} = \frac{1}{\beta q_2^I} \Leftrightarrow \frac{u'(c_2^I)}{u'(c_1^I)} = \frac{1}{\beta q_2^I}$$

→ Save more, the higher the rate of return  $q_2^I$  and the patience  $\beta$ .

2 Migrants who want to leave,  $s = 0$  :

$$\frac{\delta V(\cdot)}{\delta a_1^H} = -u'(c_1^I) + \beta q_2^H u'(c_2^H) \stackrel{!}{=} 0$$
$$\Leftrightarrow \frac{u'(c_2^H)}{u'(c_1^I)} = \frac{1}{\beta q_2^H} \Leftrightarrow \frac{u'(c_2^H)}{u'(c_1^I)} = \frac{1}{\gamma \beta q_2^H}$$

→ Save more, the higher the rate of return  $q_2^H$ , the patience  $\beta$ , and the home country preference  $\gamma$ .

# Solution

Equal rate of returns:  $q_2^I = q_2^H$  and no risk:  $\theta = 0$  Return

## II Saving Choice

- Migrants who plan to leave, save more (in line with literature):

$$\begin{aligned} q_2^I = q_2^H &\Leftrightarrow \frac{1}{\beta q_2^I} = \frac{1}{\beta q_2^H} \\ \Rightarrow \frac{u'(c_2^I)}{u'(c_1^I)} = \frac{u'(c_2^H)}{u'(c_1^I)} &\Leftrightarrow \frac{u'(c_2^I)}{u'(c_1^I)} = \gamma \frac{u'(c_2^H)}{u'(c_1^I)} \\ \Leftrightarrow \frac{u'(q_2^I a_1^I)}{u'(y - a_1^I)} = \gamma \frac{u'(q_2^H a_1^H)}{u'(y - a_1^H)} &\Leftrightarrow \frac{u'(q_2 a_1^I)}{u'(y - a_1^I)} = \gamma \frac{u'(q_2 a_1^H)}{u'(y - a_1^H)} \end{aligned}$$

since  $\gamma > 1$  for migrants choosing to return, this implies:

$$\frac{u'(q_2 a_1^I)}{u'(y - a_1^I)} > \frac{u'(q_2 a_1^H)}{u'(y - a_1^H)} \Rightarrow a_1^H > a_1^I$$

# Solution

Higher rate of return in immigration country:  $q_2^I > q_2^H$  and no risk:  $\theta = 0$  Return

## I Location Choice

- Migrants can consume *more* in the immigration than in their home country during retirement:  $c_2^I = q_2^I a_1 > c_2^H = q_2^H a_1$
- Migrants with a preference for the immigration country still always want to stay.
- Migrants with a (weak) preference for the home country now want to stay if the consumption utility in the immigration country is sufficiently greater:

$$\begin{aligned} \text{stay if:} \quad & u^I(c_2^I) \geq u^H(c_2^H) \\ \Leftrightarrow & (2 - \xi) u(q_2^I a_1) \geq \xi u(q_2^H a_1) \\ \Leftrightarrow & \gamma = \frac{\xi}{(2 - \xi)} \leq \frac{u(q_2^I a_1)}{u(q_2^H a_1)} \end{aligned}$$

⇒ Depending on the utility function, inequality relation hinges only on the rates of return, or also the saving amount  $a_1$ .



# Solution

Higher rate of return in immigration country:  $q_2^I > q_2^H$  and no risk:  $\theta = 0$  Return

## I Location Choice

- For utility functions where rates of return and wealth level are multiplicatively separable, stay/leave decision hinges solely on the rate of return differential, for example:

Cobb Douglas Utility,  $u(c) = c^\alpha$  where  $0 < \alpha < 1$ :

$$\text{stay if: } \gamma = \frac{\xi}{(2 - \xi)} < \frac{u(q_2^I a_1)}{u(q_2^H a_1)} \Leftrightarrow \gamma < \left(\frac{q_2^I}{q_2^H}\right).$$

- For utility functions where  $q_2^I$  &  $q_2^H$  are not separable from  $a_1$ , the stay/leave decision hinges on the level of wealth (and vice versa), for example:

Log Utility:  $u(c) = \ln(c)$ :

$$\text{stay if: } \gamma = \frac{\xi}{(2 - \xi)} < \frac{u(q_2^I a_1)}{u(q_2^H a_1)} \Leftrightarrow \gamma < \frac{\ln(q_2^I a_1)}{\ln(q_2^H a_1)}$$

# Solution

Higher rate of return in immigration country:  $q_2^I > q_2^H$  and no risk:  $\theta = 0$  Return

## I Location Choice

- $\frac{u(q_2^I a_1)}{u(q_2^H a_1)}$  increases in  $a_1$ . So, if migrants own more than cutoff wealth  $\bar{a}_1$ , defined by  $\gamma = \frac{u(q_2^I \bar{a}_1)}{u(q_2^H \bar{a}_1)}$ , they want to stay in the immigration country, even if they (weakly) prefer their home country.  
 $\Rightarrow \bar{a}_1$  will be lower, the higher  $q_2^I$ , the lower  $q_2^H$  or the lower  $\gamma$  is.

- Two optimisation problems:

- 1  $\tilde{a}_1 \geq \bar{a}_1$  is the optimal saving amount if migrant decides to (try to) stay in the immigration country:

$$\begin{aligned}\max V(c_1, c_2) &= u^I(c_1^I) + \beta [(1 - \theta) u^I(c_2^I) + \theta u^H(c_2^H)] \\ &= u^I(y - a_1) + \beta [(1 - \theta) u^I(q_2^I a_1) + \theta u^H(q_2^H a_1)]\end{aligned}$$

- 2  $a_1 < \bar{a}_1$  is the optimal saving amount if migrant decides to return to their home country:

$$\begin{aligned}\max V(c_1, c_2) &= u^I(c_1^I) + \beta u^H(c_2^H) \\ &= u^I(y - a_1) + \beta u^H(q_2^H a_1)\end{aligned}$$

# Solution

Higher rate of return in immigration country:  $q_2^I > q_2^H$  and no risk:  $\theta = 0$  Return

## I Location Choice

- Migrants choose the saving amount that maximises their lifetime utility. That is, they choose to stay, in the case without uncertainty, if:

$$\begin{aligned} u^I(y - \tilde{a}_1) + \beta u^I(q_2^I \tilde{a}_1) &\geq u^I(y - a_1) + \beta u^H(q_2^H a_1) \\ \Leftrightarrow \underbrace{u(y - a_1) - u(y - \tilde{a}_1)}_{\text{Cons utility in working age}} &\leq \underbrace{\beta [u(q_2^I \tilde{a}_1) - \gamma u(q_2^H a_1)]}_{\text{Cons utility in retirement}} \end{aligned}$$

## II Saving Choice

- By the same logic as in the case of equal returns, those migrants who plan to leave (i.e. for whom  $\gamma > \frac{u(q_2^I a_1^I)}{u(q_2^H a_1^H)}$ ), save more than migrants planning to stay.

# Solution

Equal rate of returns:  $q_2^L = q_2^H$  and positive risk:  $\theta > 0$  Return

## I Saving Choice

- Optimal saving amounts of migrants intending to stay are affected, while the choice problem of migrants intending to leave is unchanged:

1 Migrants who want to stay,  $s = 1$ :

$$\begin{aligned} \frac{\delta V(\cdot)}{\delta a_1^L} &= -u'(c_1^L) + \beta [(1 - \theta)q_2^L u'(c_2^L) + \theta q_2^H u^H(c_2^H)] \stackrel{!}{=} 0 \\ \Leftrightarrow \frac{u'(c_2^L)}{u'(c_1^L)} &= \underbrace{\frac{1}{(1 - \theta)} \frac{1}{\beta q_2^L}}_A - \underbrace{\frac{\theta}{(1 - \theta)} \frac{q_2^H}{q_2^L} \frac{u^H(c_2^H)}{u'(c_1^L)}}_B \end{aligned} \quad (1)$$

→ A: Risk discounted t=2 consumption utility in immigration country.

→ B: Risk discounted t=2 consumption utility in home country (in immigration country utils).

2 Migrants who want to leave,  $s = 0$ :

$$\frac{\delta V(\cdot)}{\delta a_1^L} = -u'(c_1^L) + \beta [(1 - \theta)q_2^H u^H(c_2^H) + \theta q_2^H u^H(c_2^H)] \stackrel{!}{=} 0 \Leftrightarrow \frac{u^H(c_2^H)}{u'(c_1^L)} = \frac{1}{\beta q_2^H} \quad (2)$$

# Solution

Equal rate of returns:  $q_2^L = q_2^H$  and positive risk:  $\theta > 0$  Return

## I Saving Choice

- To learn whether migrants intending to stay in the immigration country save more or less under risk, compare the Euler Equations in the two situations:

1 No risk: 
$$\frac{u'(c_2^L)}{u'(c_1^L)} = \frac{u'(q_2^L a_1^L)}{u'(y - a_1^L)} = \frac{1}{\beta q_2^L}$$

2 Risk: 
$$\begin{aligned} \frac{u'(c_2^L)}{u'(c_1^L)} &= \frac{u'(q_2^L a_1^L)}{u'(y - a_1^L)} = \frac{1}{(1-\theta)} \frac{1}{\beta q_2^L} - \frac{\theta}{(1-\theta)} \frac{q_2^H}{q_2^L} \frac{u^H(c_2^H)}{u^L(c_1^L)} \\ &= \frac{1}{(1-\theta)} \frac{1}{\beta q_2^L} - \frac{\theta}{(1-\theta)} \frac{q_2^H}{q_2^L} \frac{u^H(q_2^H a_1^L)}{u^L(y - a_1^L)} \end{aligned}$$

→  $a_1^L$ ,  $c_1^L$  &  $c_2^L$ : migrants' *optimal* saving and consumption levels (i.e. the ones they choose if they can choose freely)

→  $a_1^L$ ,  $c_1^L$  &  $c_2^L$ : the respective levels when the migrants have to account for risk

⇒ Migrants save less under uncertainty if  $a_1^L < a_1^L$ .

# Solution

Equal rate of returns:  $q_2^L = q_2^H$  and positive risk:  $\theta > 0$  Return

## I Saving Choice

- To learn whether migrants intending to stay in the immigration country save more or less under risk, compare the Euler Equations in the two situations:
  - i. Equation (6) can be rearranged in terms of  $\frac{1}{\beta q_2^L}$ , which is independent of risk:

$$\frac{1}{\beta q_2^L} = (1 - \theta) \frac{u'(q_2^L a_1^L)}{u'(y - a_1^L)} + \theta \frac{q_2^H}{q_2^L} \frac{u^H(q_2^H a_1^L)}{u'(y - a_1^L)}$$

- ii. The rearranged equations (4) and (6) can now be equated:

$$\frac{u'(q_2^L a_1^{*L})}{u'(y - a_1^{*L})} = (1 - \theta) \frac{u'(q_2^L a_1^L)}{u'(y - a_1^L)} + \theta \frac{q_2^H}{q_2^L} \frac{u^H(q_2^H a_1^L)}{u'(y - a_1^L)}$$

- iii. Can rearrange to isolate difference in utility differentials on the LHS:

$$\frac{u'(q_2^L a_1^{*L})}{u'(y - a_1^{*L})} - \frac{u'(q_2^L a_1^L)}{u'(y - a_1^L)} = \theta \underbrace{\left[ \frac{q_2^H}{q_2^L} \frac{u^H(q_2^H a_1^L)}{u'(y - a_1^L)} - \frac{u'(q_2^L a_1^L)}{u'(y - a_1^L)} \right]}_{m(\theta)}$$

# Solution

Equal rate of returns:  $q_2^I = q_2^H$  and positive risk:  $\theta > 0$  [Return](#)

## I Saving Choice

- $a_1^I < a_1^{*I}$  if  $m(\theta) < 0$ , that is if  $\frac{q_2^H}{q_2^I} \frac{u^H(q_2^H a_1^I)}{u^H(y - a_1^I)} < \frac{u^I(q_2^I a_1^I)}{u^I(y - a_1^I)}$ .

$$\Rightarrow \text{If } q_2^I = q_2^H: u^H(q_2^H a_1^I) < u^I(q_2^I a_1^I) \Leftrightarrow \xi u'(q_2 a_1^I) < (2 - \xi) u'(q_2 a_1^I) \Leftrightarrow \gamma < 1$$

→ Always holds for migrants with a preference for the immigration country (who are the only migrants intending to stay if  $q_2^I = q_2^H$ ).

## II Location Choice

- Migrants decision does not change if  $\theta > 0$ :

$$(1 - \theta)u^I(c_2) + \theta u^H(c_2) > u^H(c_2) \text{ if } \gamma < 1$$

$$u^H(c_2) > (1 - \theta)u^I(c_2) + \theta u^H(c_2) \text{ if } \gamma > 1$$

# Solution

Higher rate of return in immigration country:  $q_2^I > q_2^H$  and positive risk:  $\theta > 0$  Return

## I Location Choice

⇒ Rates of return and level of wealth are separable in the utility function:

- Migrants' decision does not change if  $\theta > 0$ :

$$\text{stay if:} \quad (1 - \theta)u'(c_2^I) + \theta u^H(c_2^H) \geq u^H(c_2^H)$$

$$\Leftrightarrow (1 - \theta)(2 - \xi)u(q_2^I a_1) + \theta \xi u(q_2^H a_1) \geq \xi u(q_2^H a_1)$$

$$\Leftrightarrow (1 - \theta)(2 - \xi)u(q_2^I a_1) \geq (1 - \theta) \xi u(q_2^H a_1)$$

$$\Leftrightarrow \gamma = \frac{\xi}{(2 - \xi)} \leq \frac{u(q_2^I a_1)}{u(q_2^H a_1)}$$



# Solution

Higher rate of return in immigration country:  $q_2^I > q_2^H$  and positive risk:  $\theta > 0$  Return

## I Location Choice

⇒ Rates of return and level of wealth are non-separable in the utility function:

- For a given set of parameters,  $\theta > 0$  decreases the number of migrants who would like to stay compared to the case where  $\theta = 0$ . This is because, for a given rate of return differential  $\frac{q_2^I}{q_2^H}$ , the cutoff value of  $\gamma$  beyond which migrants choose to return decreases:

$$u'(y - \tilde{a}_1) + \beta [(1 - \theta) u'(q_2^I \tilde{a}_1) + \theta u^H(q_2^H \tilde{a}_1)] \geq u'(y - a_1) + \beta u^H(q_2^H a_1)$$
$$\Leftrightarrow \underbrace{u(y - a_1) - u(y - \tilde{a}_1)}_{\text{Cons utility in working age}} \leq \underbrace{\beta [(1 - \theta) u(q_2^I \tilde{a}_1) + \theta \gamma u(q_2^H \tilde{a}_1) - \gamma u(q_2^H a_1)]}_{\text{Cons utility in retirement}}$$

and:  $u(q_2^I \tilde{a}_1) - \gamma u(q_2^H a_1) \geq (1 - \theta) u(q_2^I \tilde{a}_1) + \theta \gamma u(q_2^H \tilde{a}_1) - \gamma u(q_2^H a_1)$ .

- Migrants are more likely to stay, the higher  $q_2^I$ , the lower  $q_2^H$ , the lower  $\gamma$  and the lower  $\theta$ .
- During their working age stay in the immigration country, more migrants choose to save less when  $\theta > 0$ .

# Solution

Higher rate of return in immigration country:  $q_2^I > q_2^H$  and positive risk:  $\theta > 0$  Return

## II Saving Choice

- $a_1^I < a_1^{*I}$  if  $m(\theta) < 0$ , that is if 
$$\frac{q_2^H}{q_2^I} \frac{u^H(q_2^H a_1^I)}{u^H(y - a_1^I)} < \frac{u^I(q_2^I a_1^I)}{u^I(y - a_1^I)}$$

$$\Rightarrow \text{If } q_2^I > q_2^H: \quad \frac{q_2^H}{q_2^I} u^H(q_2^H a_1^I) < u^I(q_2^I a_1^I) \quad \Leftrightarrow \quad \frac{q_2^H}{q_2^I} \xi u^H(q_2^H a_1^I) < (2 - \xi) u^I(q_2^I a_1^I)$$

$$\Leftrightarrow \quad \frac{q_2^H}{q_2^I} \gamma u^H(q_2^H a_1^I) < u^I(q_2^I a_1^I) \quad \Leftrightarrow \quad \gamma < \underbrace{\frac{q_2^I}{q_2^H} \frac{u^I(q_2^I a_1^I)}{u^H(q_2^H a_1^I)}}_{>1}$$

→ Always holds for migrants who prefer the immigration country, as well as some migrants who prefer their home country (who might now also stay in the immigration country).

# References