Household Labor Supply Insurance Around the World

Annika Bacher	Kevin Donovan	Philipp Grübener	Lukas Nord	Todd Schoellman
BI Oslo	Yale SOM	Wash U	Penn	Mpls. Fed

The views expressed herein are those of the authors and not necessarily those of the Federal Reserve Bank of Minneapolis, the Federal Reserve System, or any data providers. This work was supported by computational resources provided by the BigTex High Performance Computing Group at the Federal Reserve Bank of Dallas and by the FUCHS-CSC cluster at Goethe University Frankfurt.

Motivation: Intra-Household Insurance and Development

Household labor supply provides potential insurance against economic shocks

- E.g., non-working members enter labor force in response to unemployment of head
- Literature: small effects in U.S., Europe (Ellieroth, 2019)
  - Possibly due to public benefits & savings (Birinci, 2021)

Motivation: Intra-Household Insurance and Development

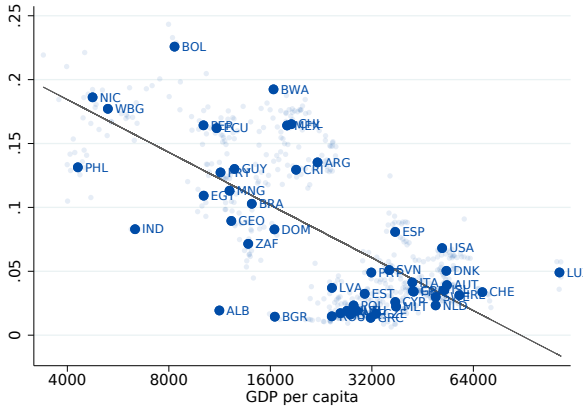
Household labor supply provides potential insurance against economic shocks

- E.g., non-working members enter labor force in response to unemployment of head
- Literature: small effects in U.S., Europe (Ellieroth, 2019)
  - Possibly due to public benefits & savings (Birinci, 2021)

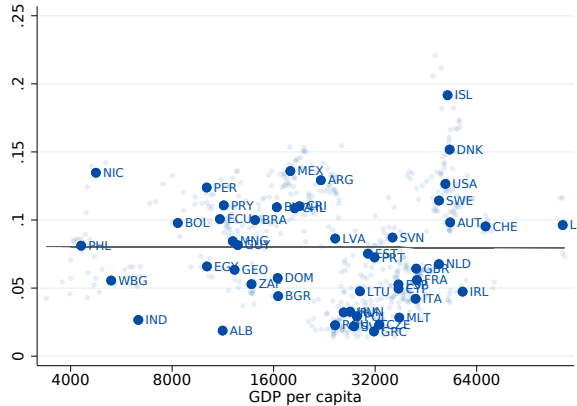
We study household labor supply around the world

- Diverse range of countries in terms of geography, labor market institutions, income

Motivation: Wage Employment Risk and Development

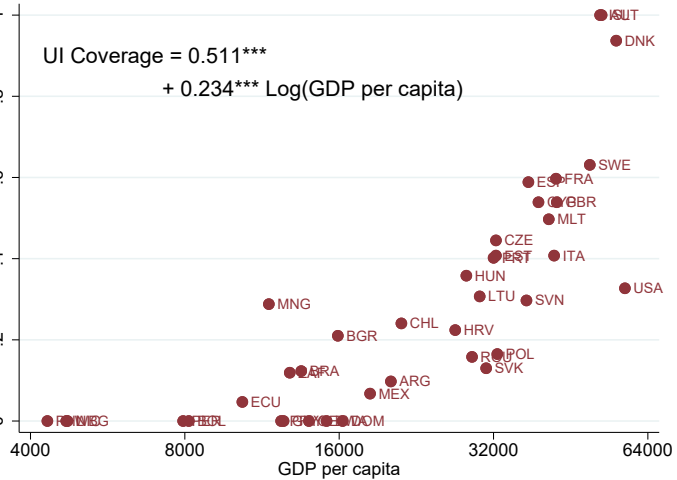


Work Work Exit Rate



Work Work Finding Rate

Motivation: Share of Unemployed Receiving Benefits



Spousal Insurance Around the World

Empirics: harmonized LFSs with household links for 46 countries

- Little evidence household labor supply acts as insurance
- Evidence of assortative matching / correlated shocks

Spousal Insurance Around the World

Empirics: harmonized LFSs with household links for 46 countries

- Little evidence household labor supply acts as insurance
- Evidence of assortative matching / correlated shocks

Theory: quantitative life-cycle model of household labor supply

- Key ingredients: search, public insurance, asset accumulation, human capital formation
- Use model to understand importance of various forces
- Understand factors that limit household labor supply, welfare implications
  - Missing: consumption, asset data (Townsend, 1994; Santaeulalia-Llopis and co-authors, work in progress)

[related literature]

Outline

1. **Empirics**
2. Model
3. Calibration
4. Understanding Variation in Spousal Transitions

Dataset

Microdata from rotating panel labor force surveys of 46 countries

- Update of Donovan et al., 2023; population aged 16–65 + household members
- Match people for two consecutive quarters → quarterly transitions
- GDP per capita $4,000 – $100,000

LFSs survey dwellings, link households

- Married couples *or* household heads–others
- Household size, composition

Harmonize key variables across countries

- Wage employment (**W**), self-employment (**S**), non-employment (**N**)

[vs. IPUMS cross-section] [more details on dataset] [employment definitions]

Added Worker Effect

AWE: Wife finds work in response to husband's separation

For sample of employed husbands with non-employed wives, estimate:

$$WifeEntry_{iqt} = \alpha + \gamma HusbandExit_{iqt} + \beta X_{iqt} + \varepsilon_{iqt}$$

- Controls: country-quarter-year FE, number of kids < 4, age & education of head & partner
- Restrict to countries with ≥ 50 observations with $HusbandExit = 1$

Added Worker Effect Around the World

	(1) Added	(2) Added
Husband Exits	0.012 (0.009)	0.021* (0.008)
Exits x Log GDP p.c.	-0.006 (0.006)	-0.002 (0.009)
Exits x Gender Norms		-0.004 (0.012)
R-squared	0.047	0.046
N	7,526,335	7,286,002
Countries	46	31

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Persisting Worker Effect

PWE: Wife remains employed in response to husband's separation

For sample of employed wives with employed husbands, estimate:

$$WifeExit_{iqt} = \alpha + \gamma HusbandExit_{iqt} + \beta X_{iqt} + \varepsilon_{iqt}$$

- Controls: household size, indicator for kids $<$ age 4, education, quarter & year FE
- Restrict to countries with ≥ 50 observations with $HusbandExit = 1$

PWE Around the World

	(1)
Wife remains in E:	All
Husband Exits	-0.076***
	(0.013)
× Log GDP p.c.	0.006
	(0.014)
Log GDP per capita	0.126***
	(0.028)
Observations	2,558,479
R^2	0.071

PWE Around the World

Wife remains in E:	(1) All	(2) Same Industry	(3) Diff. Industry
Husband Exits	-0.076***	-0.234***	-0.031***
	(0.013)	(0.032)	(0.011)
× Log GDP p.c.	0.006	-0.051	-0.004
	(0.014)	(0.030)	(0.010)
Log GDP per capita	0.126***	0.135***	0.098***
	(0.028)	(0.032)	(0.021)
Observations	2,558,479	726,305	1,638,046
R^2	0.071	0.086	0.069

Interpretation: Correlated shocks

Precautionary Labor Supply

Wives of husbands with risky jobs more likely to work ex-ante?

For sample of wives with employed husbands, estimate:

$$WifeWorks_{iqt} = \alpha + \gamma HusbandWillExit_{iqt} + \beta X_{iqt} + \varepsilon_{iqt}$$

- Controls: country-quarter-year FE, number of kids < 4, age & education of head & partner
- Alternative: exit probability

$$WifeWorks_{iqt} = \alpha + \gamma ProbHusbandWillExit_{iqt} + \beta X_{iqt} + \varepsilon_{iqt}$$

Precautionary Labor Supply Around the World

	(1) Baseline	(2) Prime Age
Husband Exits	-0.061**	-0.055*
	(0.018)	(0.024)
x Log GDP p.c.	-0.040**	-0.038*
	(0.013)	(0.015)
x Gender Norms	0.039*	0.043*
	(0.017)	(0.020)
R-squared	0.148	0.147
N	16,286,075	11,734,482
Countries	31	31

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	(1) Baseline	(2) Prime Age
P(Husband Exits)	-0.279*	-0.340*
	(0.098)	(0.118)
x Log GDP p.c.	-0.155***	-0.189***
	(0.037)	(0.045)
x Gender Norms	0.090*	0.153**
	(0.040)	(0.045)
R-squared	0.127	0.127
N	12,274,960	8,832,519
Countries	17	17

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

More generally, spousal labor supply is correlated at all ages

Extensive Margin of Household Labor Supply

What is the pass-through of changes in head's employment to total household employment?

- Extends idea of AWE to all household members

For sample of employed heads, estimate:

$$\Delta HHEmp_{iqt} = \alpha + \gamma HeadExit_{iqt} + \beta X_{iqt} + \varepsilon_{iqt}$$

- Controls: country-quarter-year FE, number of kids < 4, age & education of head

Extensive Margin Passthrough Around the World

	(1) ΔHHEmp	(2) ΔHHEmp
Head Exits	-1.029***	-1.035***
	(0.014)	(0.012)
Exits x Log GDP p.c.	0.019*	0.012
	(0.007)	(0.010)
Exits x Gender Norms		0.014
		(0.016)
R-squared	0.170	0.169
N	17,295,481	17,142,603
Countries	25	18

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Intensive Margin Passthrough

What is the pass-through of changes in head's earnings to total household earnings?

- Also checked hours

For sample of heads, estimate:

$$\Delta HHEarn_{iqt} = \alpha + \gamma \Delta HeadEarn_{iqt} + \beta X_{iqt} + \varepsilon_{iqt}$$

- Controls: country-quarter-year FE, number of kids < 4, age & education of head

Intensive Margin Passthrough Around the World

	(1) Log HH Inc	(2) Log HH Inc	(3) HH Inc	(4) HH Inc
Change in Log Head Income	0.780***	0.838***		
	(0.056)	(0.033)		
Change x Log GDP p.c.	-0.003	0.057**		
	(0.025)	(0.018)		
Change x Gender Norms		-0.086***		
		(0.014)		
Change in Head Income			0.274	1.154***
			(0.420)	(0.066)
Change x Log GDP p.c.			-0.384*	-0.057
			(0.178)	(0.070)
Change x Gender Norms				0.142
				(0.096)
R-squared	0.639	0.643	0.705	0.753
N	7,968,680	7,833,234	8,423,163	8,282,124
Countries	22	16	22	16

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Empirics: Summing Up

Key empirical findings

- Little evidence of extensive margin household labor supply insurance
- Evidence of correlated shocks and/or assortative matching

Questions for theory

- Understand factors that limit household labor supply
- What are the welfare implications

Outline

1. Empirics
2. **Model**
3. Calibration
4. Understanding Variation in Spousal Transitions

Households

Two-member households **(one man and one woman)** with four states: (t, jk, h, a)

1. **Age t:**
   - T periods: work for $T_W < T$, retired for $T - T_W$

Households

Two-member households **(one man and one woman)** with four states: (t, jk, h, a)

1. **Age t:**
   - T periods: work for $T_W < T$, retired for $T - T_W$
2. **Joint Labor Market Status jk:**
   - wage-employed (W), self-employed (S),
     non-employed with benefits (B), non-employed with no benefits (N)
   - joint labor status $jk \in \mathcal{J} = \{W, S, B, N\} \times \{W, S, B, N\}$

Households

Two-member households **(one man and one woman)** with four states: (t, jk, h, a)

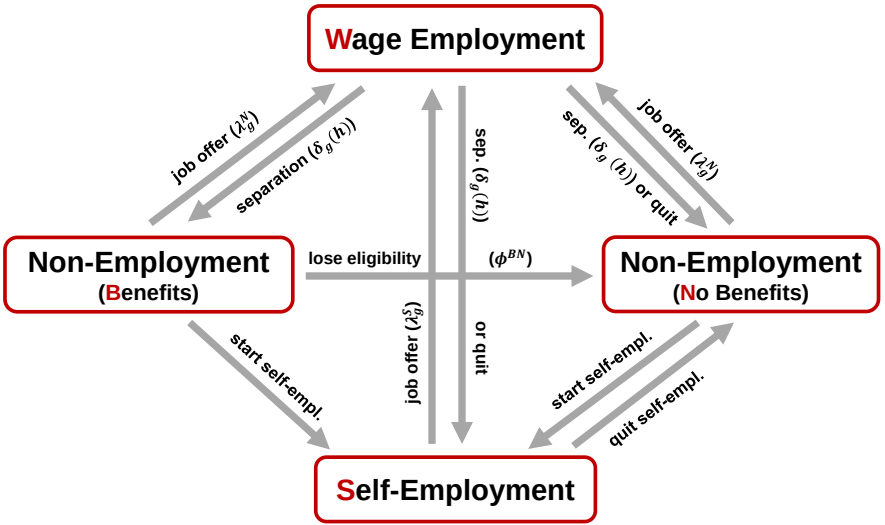
1. **Age t:**
   - T periods: work for $T_W < T$, retired for $T - T_W$
2. **Joint Labor Market Status jk:**
   - wage-employed (W), self-employed (S),
     non-employed with benefits (B), non-employed with no benefits (N)
   - joint labor status $jk \in \mathcal{J} = \{W, S, B, N\} \times \{W, S, B, N\}$
3. **Human Capital** $(h = (h_m, h_w))$**:**
   - accumulate while W (with PB $\phi_g^{up}(h)$), de-cumulate while S, B, N (with PB $\phi_g^{down}(h)$)
   - in W: wages determined by human capital $(w(h_g) = h_g)$

Households

Two-member households **(one man and one woman)** with four states: (t, jk, h, a)

1. **Age t:**
   - T periods: work for $T_W < T$, retired for $T - T_W$
2. **Joint Labor Market Status jk:**
   - wage-employed (W), self-employed (S),
     non-employed with benefits (B), non-employed with no benefits (N)
   - joint labor status $jk \in \mathcal{J} = \{W, S, B, N\} \times \{W, S, B, N\}$
3. **Human Capital** $(h = (h_m, h_w))$**:**
   - accumulate while W (with PB $\phi_g^{up}(h)$), de-cumulate while S, B, N (with PB $\phi_g^{down}(h)$)
   - in W: wages determined by human capital $(w(h_g) = h_g)$
4. **Assets a:**
   - risk free bond at interest rate r

Labor Market Transitions



Timing

Receive wage income, UI benefits, and asset income

↓

Consumption-savings choice & self-employment hours

↓

Separation shocks realized

↓

Job offers realized; none for newly separated workers

↓

Human capital transitions realized

↓

Choose joint future labor market state from feasible subset of $\mathcal{J}$

Consumption, Savings, Self-Employment

$$V_t^{jk}(h_m, h_w, a) = \max_{a', s_m, s_w} u(c^{jk}(h_m, h_w, a, a')) + \psi_t^{jk} - v_m(s_m) - v_w(s_w) + \beta \Theta_{t+1}^{jk}(h_m, h_w, a')$$

Consumption, Savings, Self-Employment

$$V_t^{jk}(h_m, h_w, a) = \max_{a', s_m, s_w} u(c^{jk}(h_m, h_w, a, a')) + \psi_t^{jk} - v_m(s_m) - v_w(s_w) + \beta \Theta_{t+1}^{jk}(h_m, h_w, a')$$

- Value pooled consumption $u(c)$

$$c^{jk}(h_m, h_w, a, a') = (1-\tau)\Big[\underbrace{(\mathbb{I}_{j=W} w_m(h_m) + \mathbb{I}_{k=W} w_w(h_w))}_{\text{wage income}} + \underbrace{\mathbb{I}_{j=S} \hat{w}_m s_m + \mathbb{I}_{k=S} \hat{w}_w s_w}_{\text{income from self-employment}} + \underbrace{(\mathbb{I}_{j=B} b(h_m) + \mathbb{I}_{k=B} b(h_w))}_{\text{unemployment benefits}}\Big] - \underbrace{(a' - (1+r)a)}_{\text{net savings}}$$

Consumption, Savings, Self-Employment

$$V_t^{jk}(h_m, h_w, a) = \max_{a', s_m, s_w} u(c^{jk}(h_m, h_w, a, a')) + \psi_t^{jk} - v_m(s_m) - v_w(s_w) + \beta \Theta_{t+1}^{jk}(h_m, h_w, a')$$

- Value pooled consumption $u(c)$

$$c^{jk}(h_m, h_w, a, a') = (1-\tau)\Big[\underbrace{(\mathbb{I}_{j=W} w_m(h_m) + \mathbb{I}_{k=W} w_w(h_w))}_{\text{wage income}} + \underbrace{\mathbb{I}_{j=S} \hat{w}_m s_m + \mathbb{I}_{k=S} \hat{w}_w s_w}_{\text{income from self-employment}} + \underbrace{(\mathbb{I}_{j=B} b(h_m) + \mathbb{I}_{k=B} b(h_w))}_{\text{unemployment benefits}}\Big] - \underbrace{(a' - (1+r)a)}_{\text{net savings}}$$

- Additional utility ψ_t^{jk} of employment status

Consumption, Savings, Self-Employment

$$V_t^{jk}(h_m, h_w, a) = \max_{a', s_m, s_w} u(c^{jk}(h_m, h_w, a, a')) + \psi_t^{jk} - v_m(s_m) - v_w(s_w) + \beta \Theta_{t+1}^{jk}(h_m, h_w, a')$$

- Value pooled consumption $u(c)$

$$c^{jk}(h_m, h_w, a, a') = (1-\tau)\Big[\underbrace{(\mathbb{I}_{j=W} w_m(h_m) + \mathbb{I}_{k=W} w_w(h_w))}_{\text{wage income}} + \underbrace{\mathbb{I}_{j=S} \hat{w}_m s_m + \mathbb{I}_{k=S} \hat{w}_w s_w}_{\text{income from self-employment}} + \underbrace{(\mathbb{I}_{j=B} b(h_m) + \mathbb{I}_{k=B} b(h_w))}_{\text{unemployment benefits}}\Big] - \underbrace{(a' - (1+r)a)}_{\text{net savings}}$$

- Additional utility ψ_t^{jk} of employment status
- Disutility from self-employment hours $v_g(s_g) = \eta_g \frac{s^{1+\nu}}{1+\nu}$

Consumption, Savings, Self-Employment

$$V_t^{jk}(h_m, h_w, a) = \max_{a', s_m, s_w} u(c^{jk}(h_m, h_w, a, a')) + \psi_t^{jk} - v_m(s_m) - v_w(s_w) + \beta\Theta_{t+1}^{jk}(h_m, h_w, a')$$

- Value pooled consumption $u(c)$

$$c^{jk}(h_m, h_w, a, a') = (1-\tau)\Big[\underbrace{(\mathbb{I}_{j=W} w_m(h_m) + \mathbb{I}_{k=W} w_w(h_w))}_{\text{wage income}} + \underbrace{\mathbb{I}_{j=S}\hat{w}_m s_m + \mathbb{I}_{k=S}\hat{w}_w s_w}_{\text{income from self-employment}} + \underbrace{(\mathbb{I}_{j=B} b(h_m) + \mathbb{I}_{k=B} b(h_w))}_{\text{unemployment benefits}}\Big] - \underbrace{(a' - (1+r)a)}_{\text{net savings}}$$

- Additional utility ψ_t^{jk} of employment status
- Disutility from self-employment hours $v_g(s_g) = \eta_g \frac{s^{1+\nu}}{1+\nu}$
- Continuation value $\Theta_t^{jk}(h_m, h_w, a')$ `[continuation value] [choice sets]`

Outline

1. Empirics
2. Model
3. **Calibration**
4. Understanding Variation in Spousal Transitions

Calibration Strategy

US calibration as a starting point for counterfactuals

Fix some parameters exogenously [exogenous parameters]

- Model period is a quarter $\Rightarrow$ 40 years of working life $= 160$ periods
- Risk aversion, interest rate, taxes, benefits, pension, returns to self-employment …

Calibrate remaining parameters jointly

- Asset profiles $\Rightarrow$ discount factor β [assets]
- Income profiles $\Rightarrow$ grid and appreciation of human capital h [income]
- Earnings losses after non-employment spells $\Rightarrow$ depreciation of h [earnings loss]
- Distribution over joint labor market states $\Rightarrow$ utility shifters ψ_t^{jk} [LM shares]
- Hours of self-employed $\Rightarrow$ dis-utility η_g [self-employment]
- Separations by income level $\Rightarrow$ $\delta_g(h)$ [separations]
- Average labor market transitions $\Rightarrow$ arrival rates λ_g^S, λ_g^B, λ_g^N [transitions]

Outline

1. Empirics
2. Model
3. Calibration
4. **Understanding Variation in Spousal Transitions**

Constructing Counterfactuals

What factors can generate heterogeneity in the AWE & SWE across countries?

- Baseline model produces AWE of 1.7pp (relative to 1.6pp in data)
- Baseline model produces SWE of 1.3pp (relative to 1.3pp in data)

Counterfactuals: study effect on AWE & SWE of changing:

1. Income levels (TFP) $\rightarrow$ scale labor, pension, and benefit income
2. Asset markets $\rightarrow$ reduce interest rate to 0%
3. Gender norms $\rightarrow$ increase ψ_f^N to lower FLFP
4. Gender wage gap $\rightarrow$ decrease female wages to lower FLFP
5. Public insurance $\rightarrow$ take away unemployment benefits

Spousal Transitions in the Model

	AWE	FLFP
USA (data)	1.6%	70%
Baseline model	1.7%	65%
Income levels (GDP 10%)		
Asset markets ($r = 0\%$)		
Benefits (75%)		
Benefits (none)		
Gender norms ($\psi_f^N + 1.5$)		
Female wages (35%)		

Spousal Transitions in the Model

	AWE	FLFP
USA (data)	1.6%	70%
Baseline model	1.7%	65%
Income levels (GDP 10%)	10.6%	89%
Asset markets ($r = 0\%$)	7.7%	67%
Benefits (75%)		
Benefits (none)		
Gender norms ($\psi_f^N + 1.5$)		
Female wages (35%)		

Spousal Transitions in the Model

	AWE	FLFP
USA (data)	1.6%	70%
Baseline model	1.7%	65%
Income levels (GDP 10%)	10.6%	89%
Asset markets ($r = 0\%$)	7.7%	67%
Benefits (75%)	2.0%	65%
Benefits (none)	-3.0%	65%
Gender norms ($\psi_f^N + 1.5$)		
Female wages (35%)		

Spousal Transitions in the Model

	AWE	FLFP
USA (data)	1.6%	70%
Baseline model	1.7%	65%
Income levels (GDP 10%)	10.6%	89%
Asset markets ($r = 0\%$)	7.7%	67%
Benefits (75%)	2.0%	65%
Benefits (none)	-3.0%	65%
Gender norms ($\psi_f^N + 1.5$)	9.6%	26%
Female wages (35%)	-2.2%	25%

Conclusion

Empirics: Harmonized LFSs with spousal links for 46 countries

- Little evidence of extensive margin household labor supply insurance
- Evidence of correlated shocks and/or assortative matching

Theory: Quantitative life-cycle model of spousal labor supply

- Use model to understand channels that account for heterogeneity in spousal insurance
- So far: no UI pushes in the right direction

Related Literature

Empirical work on the added worker effect

- **Lundberg (1985)**, Blundell et al. (2016), Bredtmann et al. (2018), Guner et al. (2021), Mankart et al. (2022) …

Quantitative search models with two-member households

- **Guler et al. (2012)**, Mankart and Oikonomou (2017), Choi and Valladares-Esteban (2020), Birinci (2021), Bardóczy (2022), Fernández-Blanco (2022), Ellieroth (2023), Casella (2023), Ellieroth and Michaud (2024), Bacher et al. (2024) …

Labor market patterns across countries

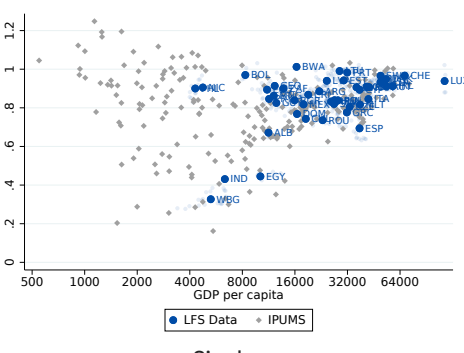
- Goldin (1995), Olivertti and Petrongolo (2014), Poschke (2019), Bick et al. (2018), De Magalhaes et al. (2022), **Donovan et al. (2023)**, Doss et al. (2023), Chiplunkar and Kleinberg (2023) Feng et al. (2024) …

Importance of informal insurance in developing countries

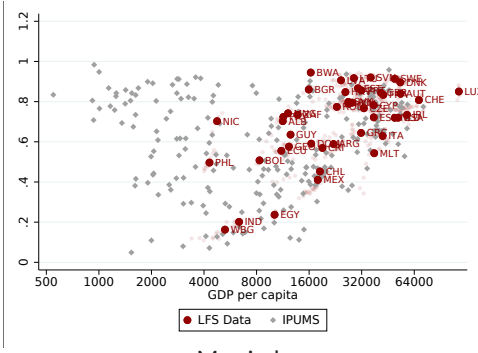
- Rosenzweig (1988), Townsend (1994), Udry (1994), Gertler and Gruber (2002), Fafchamps and Lund (2003), Angelucci et al. (2018), Corno and Voena (2023) …

[back]

Labor Force Participation: Our Sample vs. IPUMS



Single



Married

[back]

More Details on the Dataset (www.lfsdata.com)

Consider all countries with rotating panel labor force surveys that:

- have consistent household/personal identifiers across quarters
- have rotation scheme which allows to follow same individual for (at least) two quarters
- make data available to (foreign) researchers

Keep observations that can be linked to spouse and details on their children

Post-stratify original weights s.th. matched and original data have same distribution:

- across age, sex, education, labor force status

De-seasonalize all data on labor market flows before aggregating to the country-year level

[back]

Employment Definitions

Wage Employed: anyone who:

- Worked in reference week for pay for an employer
- Temporarily absent from job with defined return period (vacation, sick)

Self-Employed: anyone who:

- Worked in reference week for pay as self-employed
- Worked $\geq$ 15 hours as unpaid family worker

Non-employed: anyone left over

[back]

Continuation Value

Continuation value if WW today can be defined in two steps:

1. Expectation over separations and resulting choice sets:

$$
\begin{aligned}
\bar{V}_{t+1}^{WW}(h_m, h_w, a') = \\
&(1-\delta_m(h_m))(1-\delta_w(h_w))\ \widetilde{V}_{t+1}(h_m, h_w, a', \mathcal{J}_{XX}^{WW}) \\
&+\delta_m(h_m)(1-\delta_w(h_w))\ \widetilde{V}_{t+1}(h_m, h_w, a', \mathcal{J}_{BX}^{XW}) \\
&+(1-\delta_m(h_m))\delta_w(h_w)\ \widetilde{V}_{t+1}(h_m, h_w, a', \mathcal{J}_{XB}^{WX}) \\
&+\delta_m(h_m)\delta_w(h_w)\ \widetilde{V}_{t+1}(h_m, h_w, a', \mathcal{J}_{BB}^{XX})
\end{aligned}
$$

[back]

Continuation Value

Continuation value if WW today can be defined in two steps:

2. Exogenous processes and labor supply decision:

$$\begin{aligned}
&\widetilde{V}_{t+1}(h_m, h_w, a, \mathcal{J}_{QR}^{OP}) = \\
&\quad \phi_m^{up}(h_m)\phi_w^{up}(h_w)\, \mathbb{E}_\epsilon \max_{\widehat{jk} \in \mathcal{J}_{QR}^{OP}} \left\{ V_{t+1}^{\widehat{jk}}(h_m, h_w, a) + \sigma \epsilon^{\widehat{jk}} \right\} \\
&+\phi_m^{up}(h_m)(1 - \phi_w^{up}(h_w))\, \mathbb{E}_\epsilon \max_{\widehat{jk} \in \mathcal{J}_{QR}^{OP}} \left\{ V_{t+1}^{\widehat{jk}}(h_m, h_w, a) + \sigma \epsilon^{\widehat{jk}} \right\} \\
&+(1 - \phi_m^{up}(h_m))\phi_w^{up}(h_w)\, \mathbb{E}_\epsilon \max_{\widehat{jk} \in \mathcal{J}_{QR}^{OP}} \left\{ V_{t+1}^{\widehat{jk}}(h_m, h_w, a) + \sigma \epsilon^{\widehat{jk}} \right\} \\
&+(1 - \phi_m^{up}(h_m))(1 - \phi_w^{up}(h_w))\, \mathbb{E}_\epsilon \max_{\widehat{jk} \in \mathcal{J}_{QR}^{OP}} \left\{ V_{t+1}^{\widehat{jk}}(h_m, h_w, a) + \sigma \epsilon^{\widehat{jk}} \right\}
\end{aligned}$$

where $\epsilon \in \mathbb{R}^{|\mathcal{J}_{nm}^{jk}|}$ is a vector of i.i.d., mean zero extreme value shocks.

[back]

Labor Supply Choice Sets

Benefit Eligibility	**Job (Offer)** Both	Man (m)	Woman (w)	None
Both	$\mathcal{J}_{BB}^{WW} = \{W,S,B,N\} \times \{W,S,B,N\}$	$\mathcal{J}_{BB}^{WX} = \{W,S,B,N\} \times \{S,B,N\}$	$\mathcal{J}_{BB}^{XW} = \{S,B,N\} \times \{W,S,B,N\}$	$\mathcal{J}_{BB}^{XX} = \{S,B,N\} \times \{S,B,N\}$
Man (m)	$\mathcal{J}_{BX}^{WW} = \{W,S,B,N\} \times \{W,S,N\}$	$\mathcal{J}_{BX}^{WX} = \{W,S,B,N\} \times \{S,N\}$	$\mathcal{J}_{BX}^{XW} = \{S,B,N\} \times \{W,S,N\}$	$\mathcal{J}_{BX}^{XX} = \{S,B,N\} \times \{S,N\}$
Woman (w)	$\mathcal{J}_{XB}^{WW} = \{W,S,N\} \times \{W,S,B,N\}$	$\mathcal{J}_{XB}^{WX} = \{W,S,N\} \times \{S,B,N\}$	$\mathcal{J}_{XB}^{XW} = \{S,N\} \times \{W,S,B,N\}$	$\mathcal{J}_{XB}^{XX} = \{S,N\} \times \{S,B,N\}$
None	$\mathcal{J}_{XX}^{WW} = \{W,S,N\} \times \{W,S,N\}$	$\mathcal{J}_{XX}^{WX} = \{W,S,N\} \times \{S,N\}$	$\mathcal{J}_{XX}^{XW} = \{S,N\} \times \{W,S,N\}$	$\mathcal{J}_{XX}^{XX} = \{S,N\} \times \{S,N\}$

[back]

Calibration – Exogenous Parameters

Parameter	Interpretation	Value
γ	Risk aversion	2
r	Interest rate	0.5 (2% annually)
ν	Frisch elasticity	0.5
τ	Labor income tax	0.28
b(h)	Ind. unemployment benefit	$\min\{0.5 w_g(h), \$7500\}$
ϕ^{US}	Probability of losing benefits	0.5
p	Ind. pension level	$\min\{\$3000+0.25 w_g(h), \$12000\}$
$\hat{w}_m$, $\hat{w}_f$	Return to self-employment	\$6000, \$4200
σ_ϵ	Gumbel shock	0.1

[back]

Calibration – Asset Levels

Key parameter: discount factor ($\beta = 0.986$)

Median Asset Levels (in 000s US$)

	Data	Model
Aggregate	44	60
Age 25-35	4	31
Age 35-45	40	60
Age 45-55	84	83
Age 55-65	146	121

Target: Median net financial wealth in SIPP (net worth minus home and vehicle equity)

- Winsorize at 5^{th} and 95^{th} percentile
- In model: scaled by GDP/capita (ca. $67,000)

[back]

Calibration – Human Capital Accumulation

HC appreciation: $\phi_m^{up}(h) = 0.3 \times h^{-2}$ and $\phi_f^{up}(h) = 0.25 \times h^{-2}$

Average Labor Income (in 000s US$)

	Men		Women	
	Data	Model	Data	Model
Aggregate	19.8	19.0	13.3	10.9
Age 25-35	17.6	17.0	12.9	10.8
Age 35-45	20.6	18.7	13.5	10.8
Age 45-55	20.8	19.8	13.7	11.0
Age 55-65	19.8	20.5	13.0	10.9

Target: Mean earned income of employees from SIPP Data

- In model: scaled by GDP/capita (ca. \$67,000)
- Conditional on working ≥ 240 hours and earning $>$ \$0 per quarter

[back]

Calibration – Human Capital Depreciation

Linear depreciation: $\phi_m^{down}(h) = 0.1$ and $\phi_w^{down}(h) = 0.15$

Table: Men

	Data	Model
Δwage_{1q}	-2.6%	-1.6%
$\Delta \text{wage}_{2-4q}$	-10.3%	-6.7%
$\Delta \text{wage}_{5-8q}$	-15.2%	-15.8%

Table: Women

	Data	Model
Δwage_{1q}	-2.6%	-2.3%
$\Delta \text{wage}_{2-4q}$	-12.0%	-10.4%
$\Delta \text{wage}_{5-8q}$	-22.6%	-24.6%

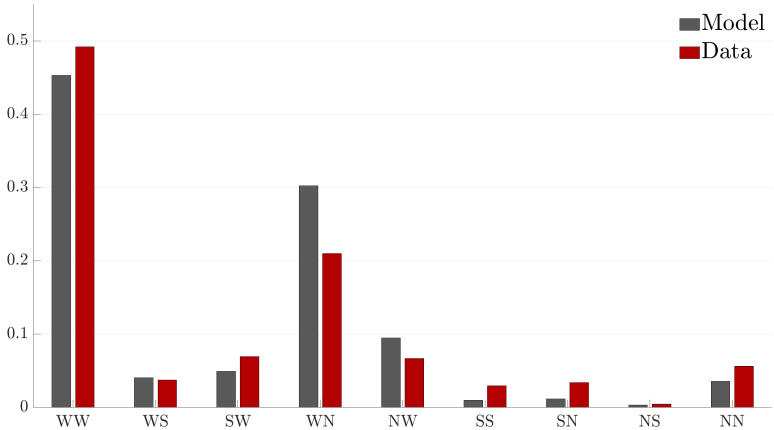
[back]

Calibration – Labor Market Shares

Governed by parameter ψ_t^{jk}

- Data target: joint distribution of couples across labor market states
- To impose structure, we specify utility by gender and individual labor market state
- Household utility is sum of gender-specific terms:
  - Normalize $\psi_f^W = \psi_m^W = 0$
  - $\psi_m^S = 2.175 \quad \psi_f^S = 1.15$
  - $\psi_m^B = \psi_m^N = 3$
  - $\psi_f^B = \psi_f^N$ is age-dependent: $2.4 + \frac{1.6-2.4}{1+e^{-0.15(t-33)}}$
  - Additional utility if both spouses are non-employed: $\psi^{add} = 0.8$

Calibration – Labor Market Shares



[calibration overview]

Calibration – Self-Employment

Key parameters: (dis)utility level of self-employment $\eta_m = 1.8$ and $\eta_f = 2.2$

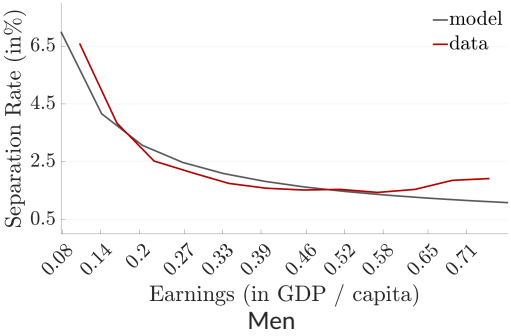
- Weekly hours worked in self-employed (CPS data, contingent worker supplement)

	Data	Model
Women	33	33
Men	46	51

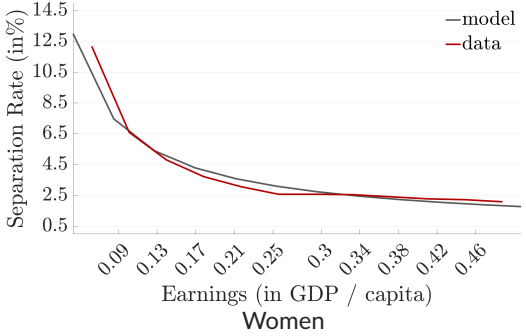
[back]

Calibration – Separation Rates

Key parameters: separation rates $\delta_m(h) = 0.07 \times h^{-0.75}$ and $\delta_f(h) = 0.13 \times h^{-0.8}$



Men



Women

[back]

Calibration – Individual Labor Market Transition Rates

Key parameters are exogenous job arrival rates:
$\lambda_m^B = \lambda_m^N = 0.15 \quad \lambda_m^S = 0.07 \quad \lambda_f^B = \lambda_f^N = 0.21 \quad \lambda_f^S = 0.09$

	Data			Model		
	W	S	N	W	S	N
Panel I: Men						
W	0.96	0.01	0.03	0.97	0.00	0.03
S	0.05	0.92	0.03	0.06	0.75	0.18
N	0.14	0.03	0.84	0.12	0.13	0.74
Panel II: Women						
W	0.95	0.01	0.05	0.94	0.01	0.06
S	0.06	0.85	0.09	0.05	0.45	0.51
N	0.09	0.02	0.90	0.09	0.08	0.83

[back]

References

Angelucci, Manuela, Giacomo De Giorgi, and Imran Rasul, "Consumption and investment in resource pooling family networks," *The Economic Journal*, 2018, *128* (615), 2613–2651.

Bacher, Annika, Philipp Grübener, and Lukas Nord, "Joint Search over the Life Cycle," 2024.

Bardóczy, Bence, "Spousal Insurance and the Amplification of Business Cycles," 2022. Working Paper.

Bick, Alex, Nicola Fuchs-Schundeln, and David Lagakos, "How Do Hours Worked Vary with Income? Cross Country Evidence and Implications," *American Economic Review*, 2018, *108* (1), 170–199.

Birinci, Serdar, "Spousal labor supply response to job displacement and implications for optimal transfers," 2021.

Blundell, Richard, Luigi Pistaferri, and Itay Saporta-Eksten, "Consumption Inequality and Family Labor Supply," *American Economic Review*, 2016, *106* (2), 387–435.

Bredtmann, Julia, Sebastian Otten, and Christian Rulff, "Husbands unemployment and wifes labor supply: the added worker effect across Europe," *Ilr Review*, 2018, *71* (5), 1201–1231.

Casella, Sara, "Women's Labor Force Participation and the Business Cycle," 2023. Working Paper.

Chiplunkar, Gaurav and Tatjana Kleinberg, "Gender Barriers, Structural Transformation, and Economic Development," 2023. Working Paper.

Choi, Sekyu and Arnau Valladares-Esteban, "On households and unemployment insurance," *Quantitative Economics*, 2020, *11* (1), 437–469.

Corno, Lucia and Alessandra Voena, "Child marriage as informal insurance: Empirical evidence and policy simulations," *Journal of Development Economics*, 2023, *162*, 103047.

Donovan, Kevin, Will Jianyu Lu, and Todd Schoellman, "Labor Market Dynamics and Development," *Quarterly Journal of Economics*, 2023. forthcoming.

Doss, Cheryl, Douglas Gollin, Charles Gottlieb, and Markus Poschke, "Gender, Work, and Structural Transformation," 2023. Working Paper.

Ellieroth, Kathrin, "Spousal Insurance, Precautionary Labor Supply, and the Business Cycle," *Working Paper*, 2023.

__ **and Amanda Michaud**, "From Trend to Cycle: the Changing Careers of Married Women and Business Cycle Risk," *Working Paper*, 2024.

Fafchamps, Marcel and Susan Lund, "Risk-sharing networks in rural Philippines," *Journal of development Economics*, 2003, *71* (2), 261–287.

Feng, Ying, David Lagakos, and James E Rauch, "Unemployment and development," *The Economic Journal*, 2024, *134* (658), 614–647.

Fernández-Blanco, Javier, "Unemployment risks and intra-household insurance," *Journal of economic theory*, 2022, *203*, 105477.

Gertler, Paul and Jonathan Gruber, "Insuring consumption against illness," *American economic review*, 2002, *92* (1), 51–70.

Goldin, Claudia, in T.P. Shultz, ed., *The U-Shaped Female Labor Force Function in Economic Development and Economic History*, Investment in Womens Human Capital and Economic Development, 1995, pp. 61–90.

Guler, Bulent, Fatih Guvenen, and Giovanni L Violante, "Joint-search theory: New opportunities and new frictions," *Journal of Monetary Economics*, 2012, *59* (4), 352–369.

Guner, Nezih, Yuliya A. Kulikova, and Arnau Valladares-Esteban, "Does the Added Worker Effect Matter?," 2021. Working Paper.

Lundberg, Shelly, "The added worker effect," *Journal of Labor Economics*, 1985, *3* (1, Part 1), 11–37.

Magalhaes, Leandro De, Enric Martorell, and Raül Santaeulalia-Llopis, "Transfer Progressivity and Development," 2022.

Mankart, Jochen and Rigas Oikonomou, "Household Search and the Aggregate Labor Market," *Review of Economic Studies*, 2017, *84* (4), 1735–1788.

_ , _ , and Francesco Pascucci, "The rise of household insurance," Technical Report, Working Paper 2022.

Olivertti, Claudia and Barbara Petrongolo, "Gender gaps across countries and skills: demand, supply and the industry structure," *Review of Economic Dynamics*, 2014, *17* (4), 842–859.

Poschke, Markus, "Wage Employment, Unemployment and Self-Employment across Countries," 2019. Mimeo, McGill University.

Rosenzweig, Mark R., “Risk, Implicit Contracts and Family in Rural Areas of Low-income Countries,” *Economic Journal*, December 1988, *98* (393), 1148–70.

Townsend, Robert M, “Risk and insurance in village India,” *Econometrica: journal of the Econometric Society*, 1994, pp. 539–591.

Udry, Christopher, “Risk and insurance in a rural credit market: An empirical investigation in northern Nigeria,” *The Review of Economic Studies*, 1994, *61* (3), 495–526.