# Long-Term Care Across Europe and the U.S.: The Role of Informal and Formal Care

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# Motivation

- **Long-term care (LTC)** is an important and growing concern:
  Some countries (Sweden, Netherlands) already spend 4% of GDP on it.
- Labor-market consequences:
  - Trade-off **work vs. caregiving** for children
  - Increased demand for **long-term-care workers**
- There is **large variation in LTC policies** across rich countries –
  what can we learn from it?
- **Problem:** Lack data on how care arrangements vary by countries
  $\Rightarrow$ especially information on informal care (IC) is scarce

# What we do

- Using **SHARE** (Europe) and **HRS** data (U.S.), . . .
- . . . we provide a **big picture** of how care is provided, . . .
- . . . documenting the importance of different **care arrangements**:
  a. **informal care** (IC),
  b. **formal home care** (FHC),
  c. **nursing-home care** (NHC),
- . . . across **four regions**:
  1. *North* (Sweden, Denmark, Netherlands, Belgium): high provision of formal care by government
  2. *Middle* (Germany, Austria, France): medium gov't provision
  3. *South* (Spain, Italy, Greece): low gov't provision
  4. *U.S.*: low gov't provision (means-tested Medicaid)

# What we find

- **Nursing homes** (NHC) and **informal caregivers** (IC, i.e. family) provide most care, formal home care (FHC) playing limited role.
- Strong **North-South gradient** in informal care (IC)...
  – the **U.S.** falling in between **Middle and South**(!)
  $\Rightarrow$ Suggests that **response to policy is strong**
- **High disability** and **being single** are the most important predictors for being in a **nursing home**.
- Care is highly **concentrated**: Importance of the **most disabled** and **co-residing caregivers** (give most care)
  p

# Literature overview: LTC in Europe

1. Statistics on public LTC spending (source: government agencies)

   European Commission (2015), OECD (2005, 20015)

   What's lacking:

   - Information on informal care (prevalence, situation of caregivers)

2. Literature on nexus informal-care to labor-supply decisions, using SHARE

   Bolin, Lindgren & Lundborg (2007, 2008), Crespo & Mira (2012), Balia & Brau (2013)

   What's lacking:

   - Spousal care
   - Co-residing children (only in Crespo & Mira) – but these likely give most hours of care!

     Barczyk & Kredler, 2016
   - Nursing-home residents

# Data: SHARE

*Survey of Health, Ageing, and Retirement in Europe* (SHARE):
**European** survey of individuals **above 50 years**.

- Panel
- 6 waves, bi-yearly: 2004-2014
- About 1,500 individuals above age 65 per country, per wave.
- Inter-disciplinary: medicine, psychology, economics, sociology,. . .
- Use data on:
  - care received and given: informal, formal at home, nursing home
  - (instrumental) activities of daily living: (I)ADLs
  - memory limitations
  - family status and coresidence: married, children
  - socioeconomic characteristics, also of spouse and children: education, assets, income

# Data: HRS

*Health and Retirement Study* (HRS):
**U.S.** survey of individuals **above 50**

- similar
- Bi-yearly panel: 1992-2012. We use 2000-2010.
- About 20,000 individuals in steady state.
- SHARE was modeled after the HRS $\Rightarrow$
  - Similar variables as in SHARE, . . .
  - . . . but better information on caregiving (especially hours)

# Care data in SHARE

| Type of care | Wave 1 | Wave 2 | Wave 3 | Wave 4 | Wave 5 | Wave 6 | Level |
|---|---|---|---|---|---|---|---|
| nursing home (NHC) | dummy | dummy | dummy | dummy | dummy | dummy | indiv. |
| formal home care (FHC) | hours | hours | – | – | dummy | dummy | indiv. |
| informal from outside hh. (OIC) | hours | hours | – | freq. | freq. | freq. | hh. |
| informal from inside hh. (IIC) | dummy | dummy | – | dummy | dummy | dummy | indiv. |

- Bring OIC information to individual level, assuming that care only goes to persons with (I)ADLs.
- Pool waves as much as possible ($\Rightarrow$ more power), . . .
- . . . but restrict analysis to certain waves, depending on question.

# Nursing-home residents in SHARE

- SHARE:
  - includes nursing-home (NH) residents in initial sample in some countries but not in others,
  - always (try to) track respondents who move into a nursing home,
  - but has higher attrition for nursing-home residents (36%, vs. 25% for community residents).
- We find that
  - % of NH residents increases across waves in all countries,
  - but stays short of what we know from government statistics (OECD) by about 1:2.

$\Rightarrow$ **Re-weigh NH residents** in SHARE to make consistent with OECD statistics.

# Care-needs/disability score: *d*

Regress **total hours of daily care received** on

- 11 (I)ADL dummies,
- dummy for memory limitations,
- age,

for the universe of

- **all individuals with known total care hours**
  ($\Rightarrow$ mostly HRS, but also some from SHARE's Waves 1 and 2),

separating **two samples**:

- those co-residing with the main caregiver
- and those who do not.

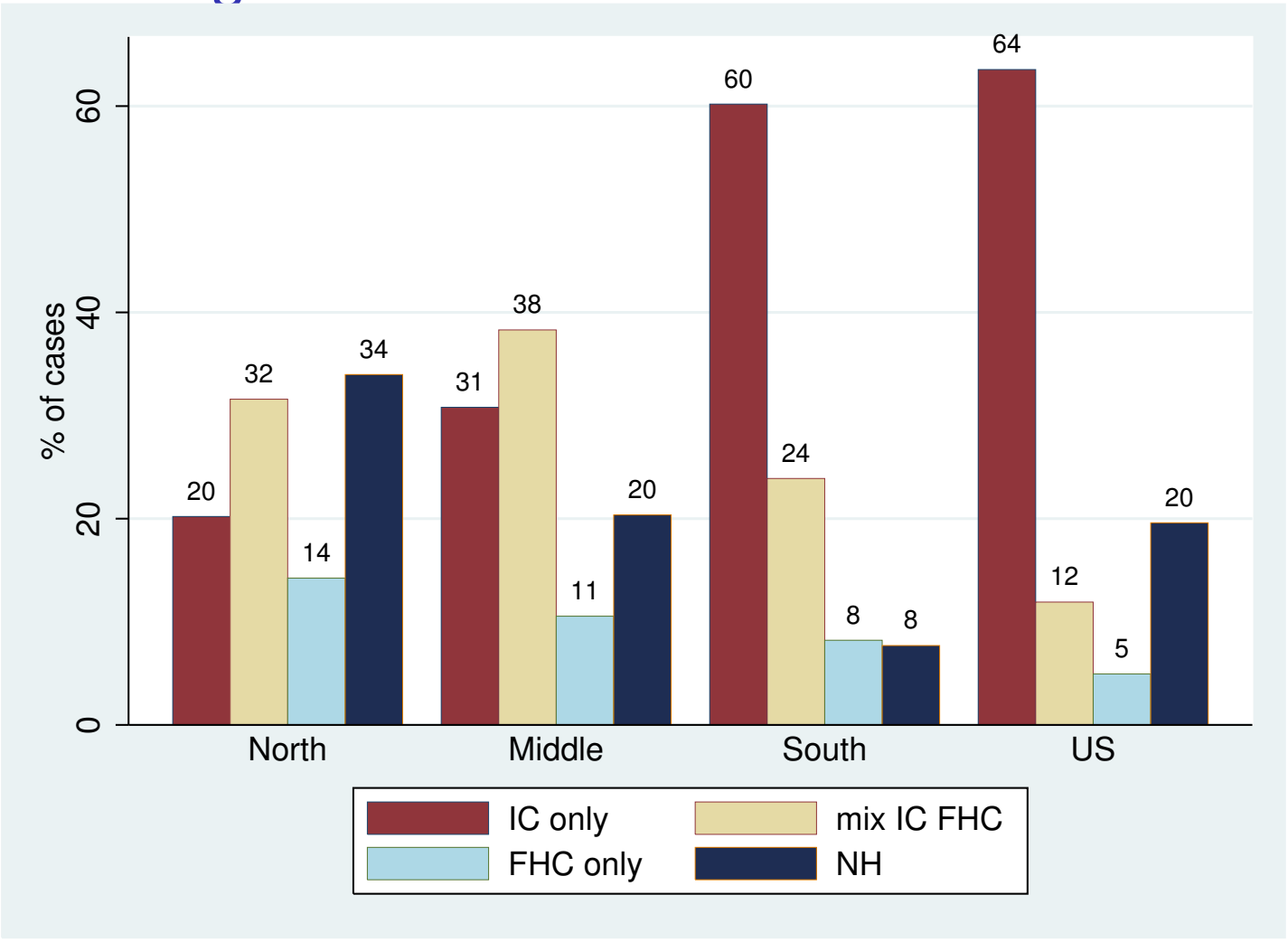
$\Rightarrow$ *d*: **predicted value** from this regression (measured in daily care hours)

# Overview: Demographics, disability, policy

| Region | Country | Dependency ratio in % (65+/20-65) | Disability ratio (% of 65+ with $d \geq 3$) | Gov't LTC spending/GDP |
|---|---|---|---|---|
| North: | Netherlands | 30.2 | 8.5 | 3.7 |
| | Sweden | 33.8 | 9.4 | 3.2 |
| | Denmark | 33.0 | 8.5 | 2.5 |
| | Belgium | 30.6 | 12.6 | 2.3 |
| Middle: | Austria | 30.5 | 8.8 | 1.2 |
| | France | 33.3 | 10.0 | 1.7 |
| | Germany | 34.8 | 10.0 | 1.3 |
| South: | Spain | 30.6 | 13.8 | 0.8 |
| | Italy | 37.8 | 10.4 | 0.7 |
| U.S.: | U.S. | **24.6** | 10.9 | 0.5 |

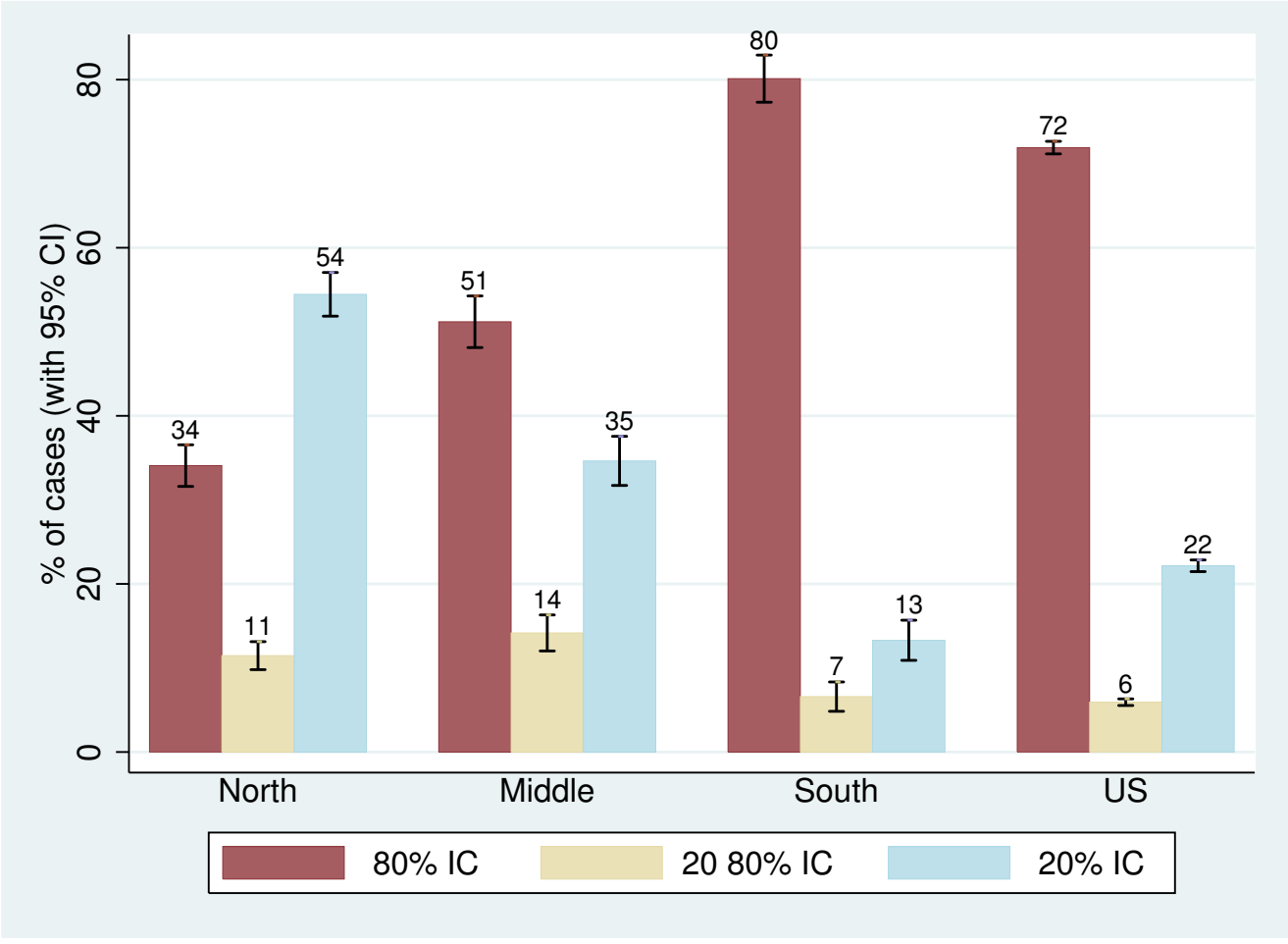
- **European countries similar** in **demographics** and **disability** rates.
- **U.S. is younger**, but has **similar disability** ratio.
- **Large variation** in government **LTC spending**.

# Care arrangements: Case counts



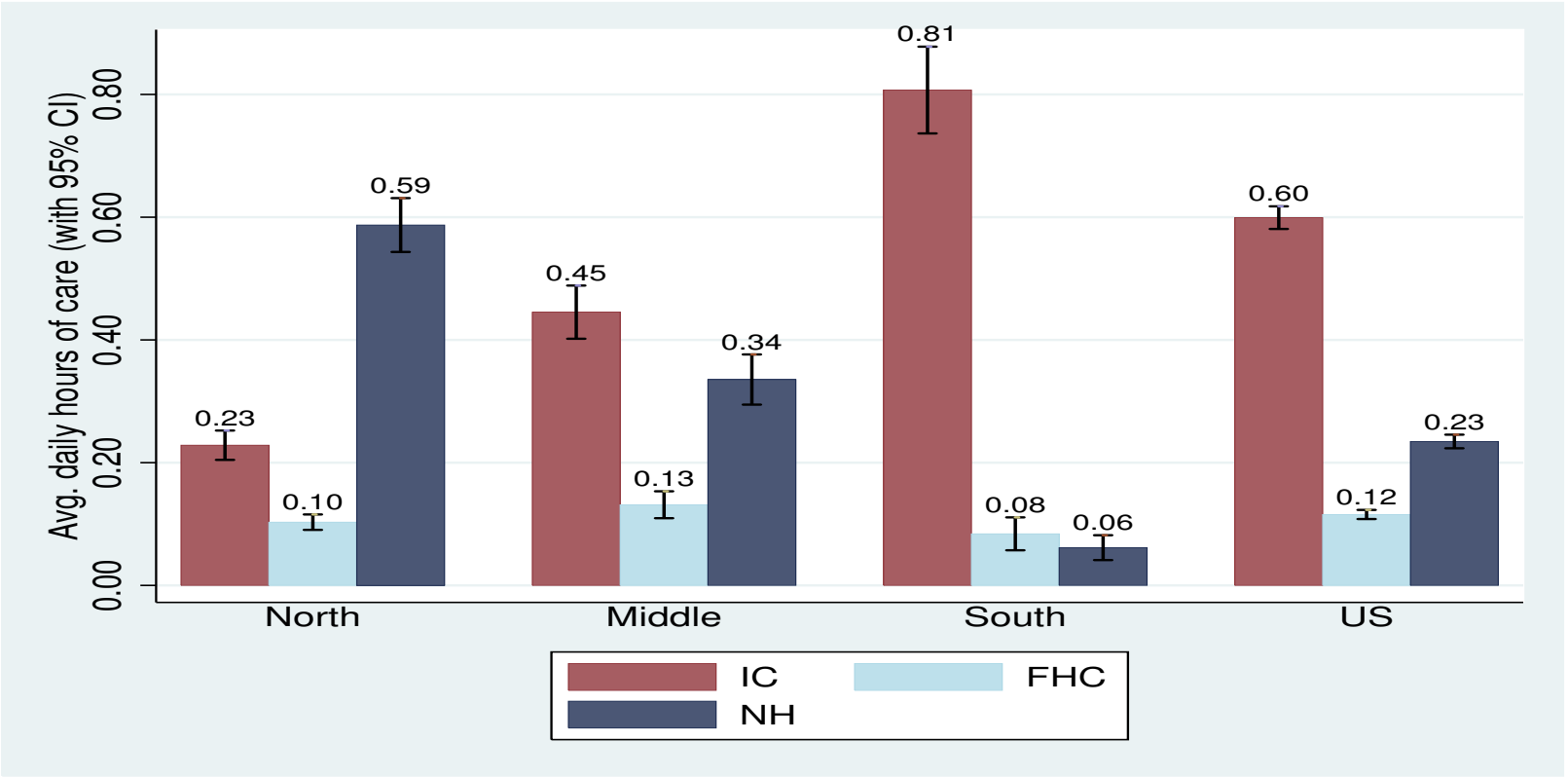

- Countries within regions similar to each other.
- Large **North-South gradient** – **U.S. like South**!
- Pure **formal home care** (FHC) has **limited** role.
- Mixing IC-FHC looks important at first glance, **but**. . .

# What does IC-FHC mixing look like?



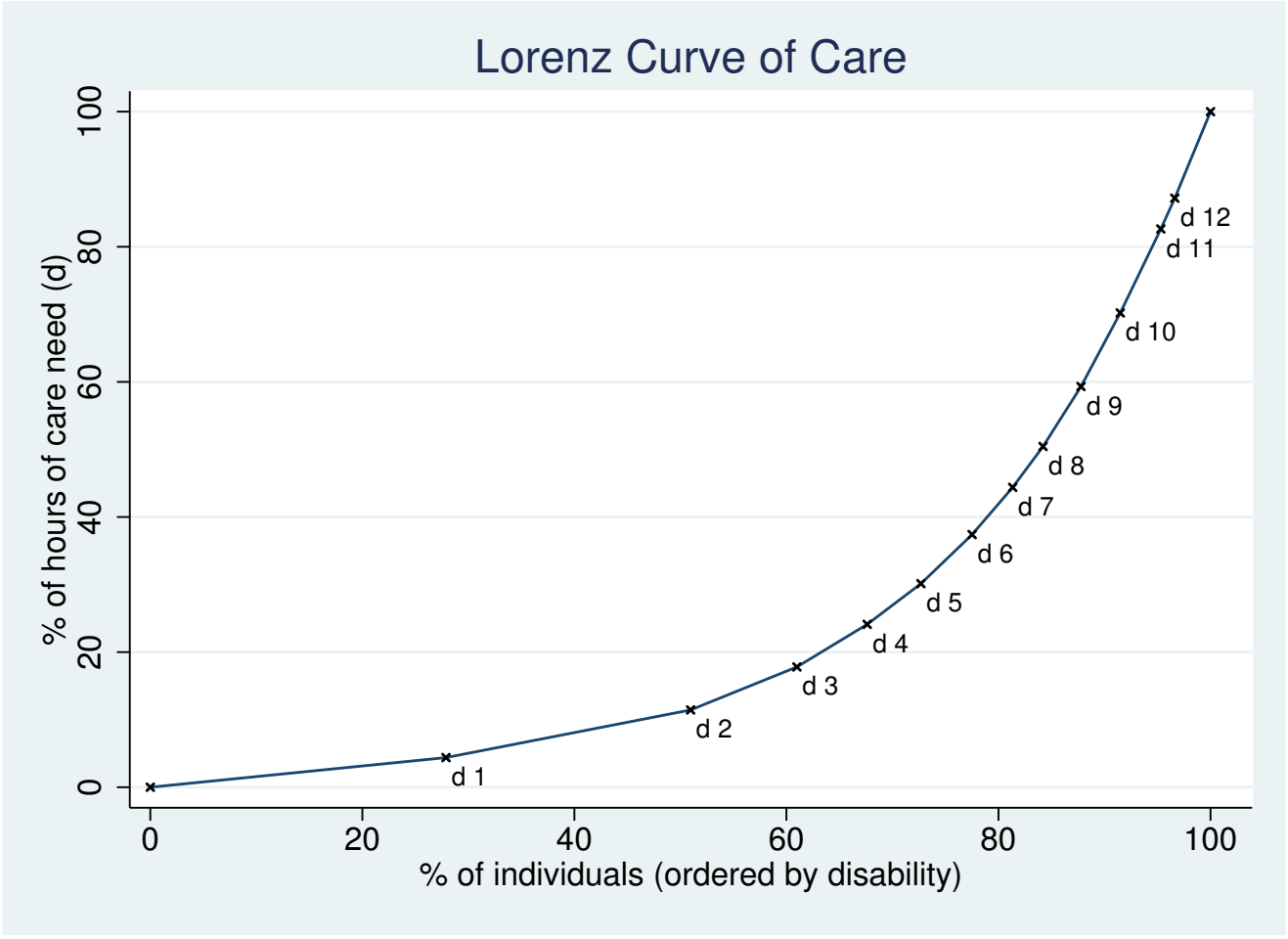

. . . **substantial mixing is rare**

# Accounting for the intensity of care: weigh by *d*



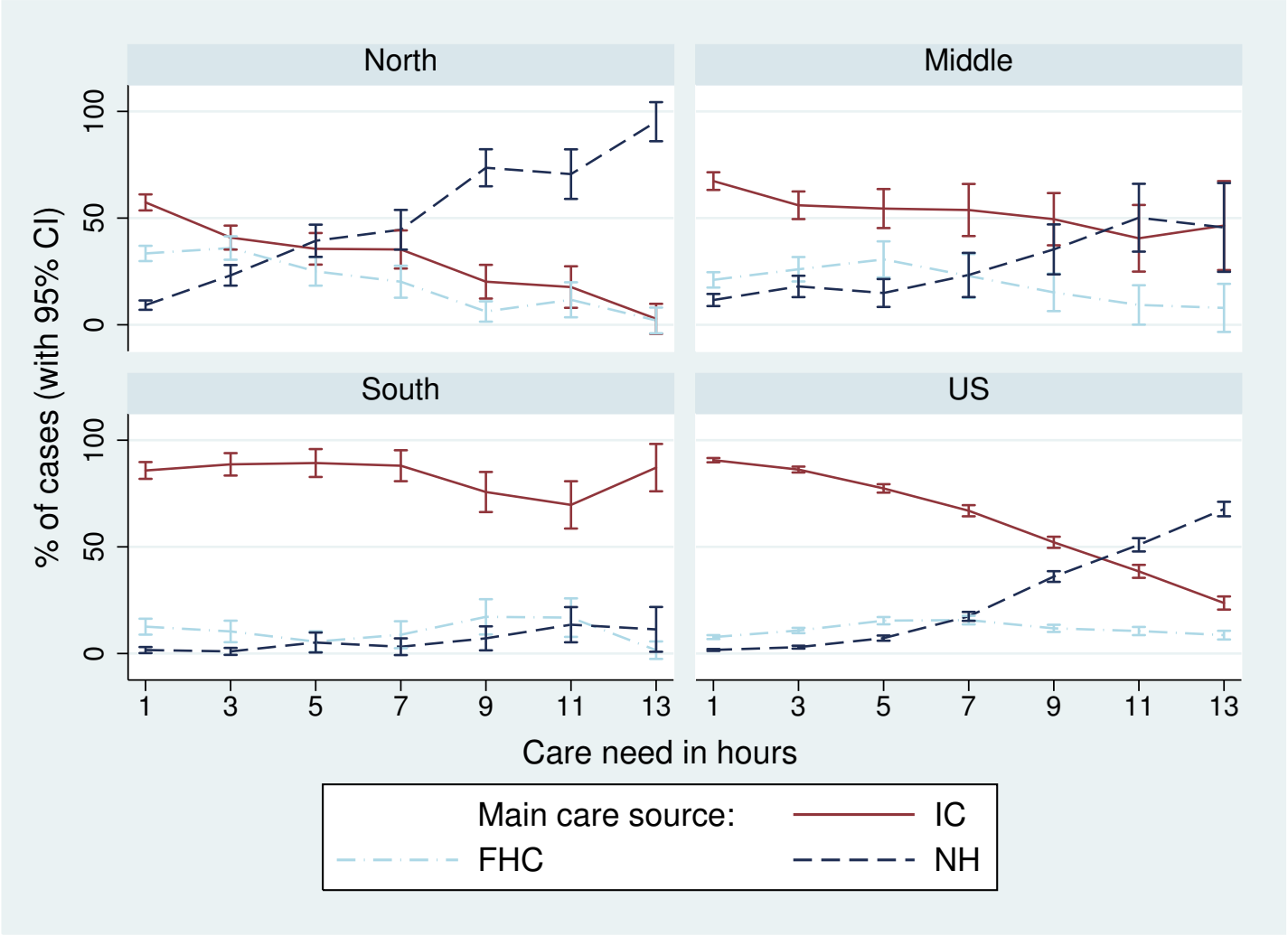

- **Nursing homes** (NH) **gain importance**, . . .
- . . . **informal care** (IC) remaining **large**, . . .
- . . . and **formal home care** (FHC) **oses importance**.
- North-South/US gradient stays.

# The concentration of care among the frailest



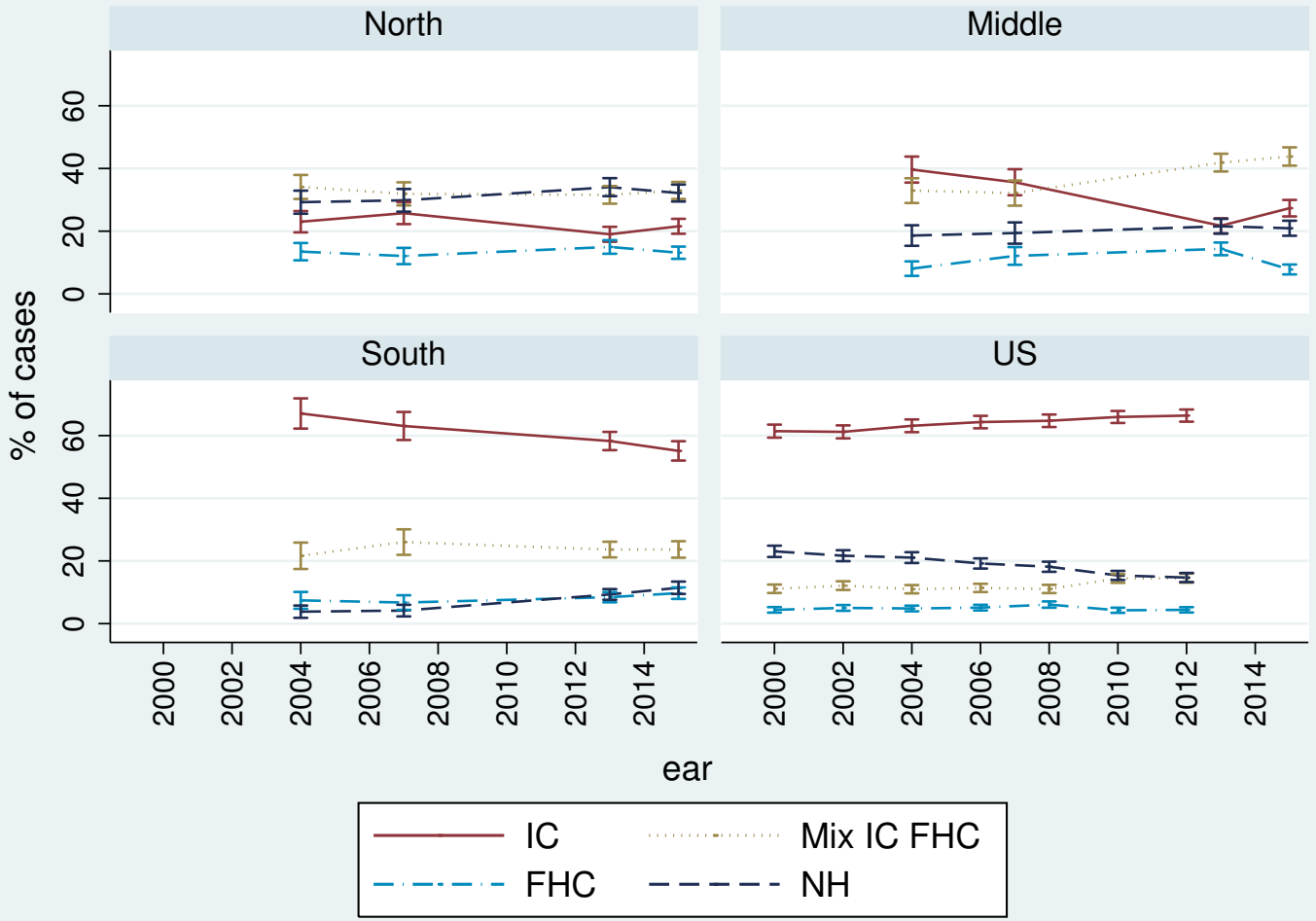

- The *disabled* ($d \geq 3$) make up only 39% of sample, but account for 82% of care hours.

# Disability gradient



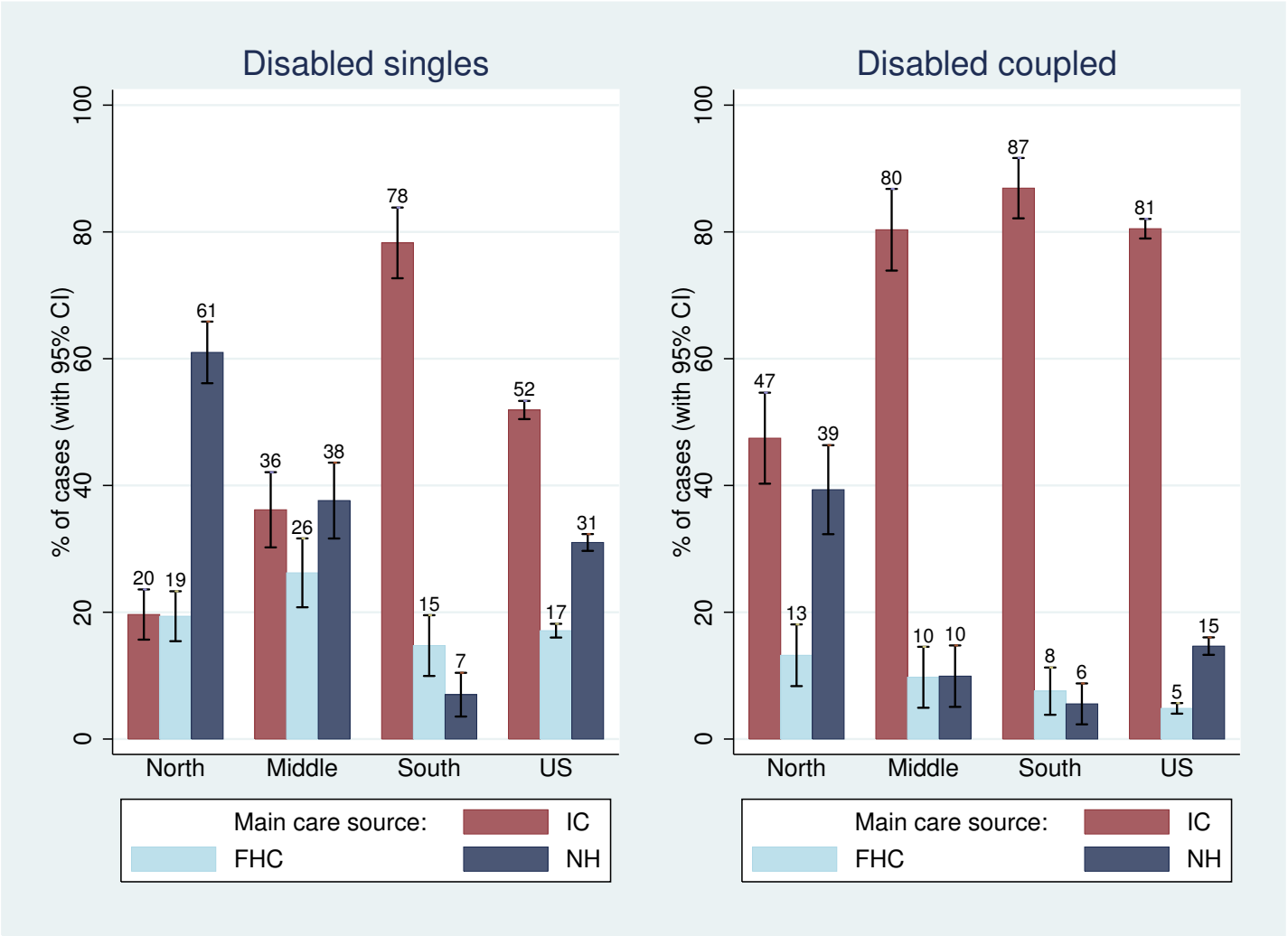

- **IC decreasing** and **NH increasing** in *d*, most so in U.S.

# Time trends



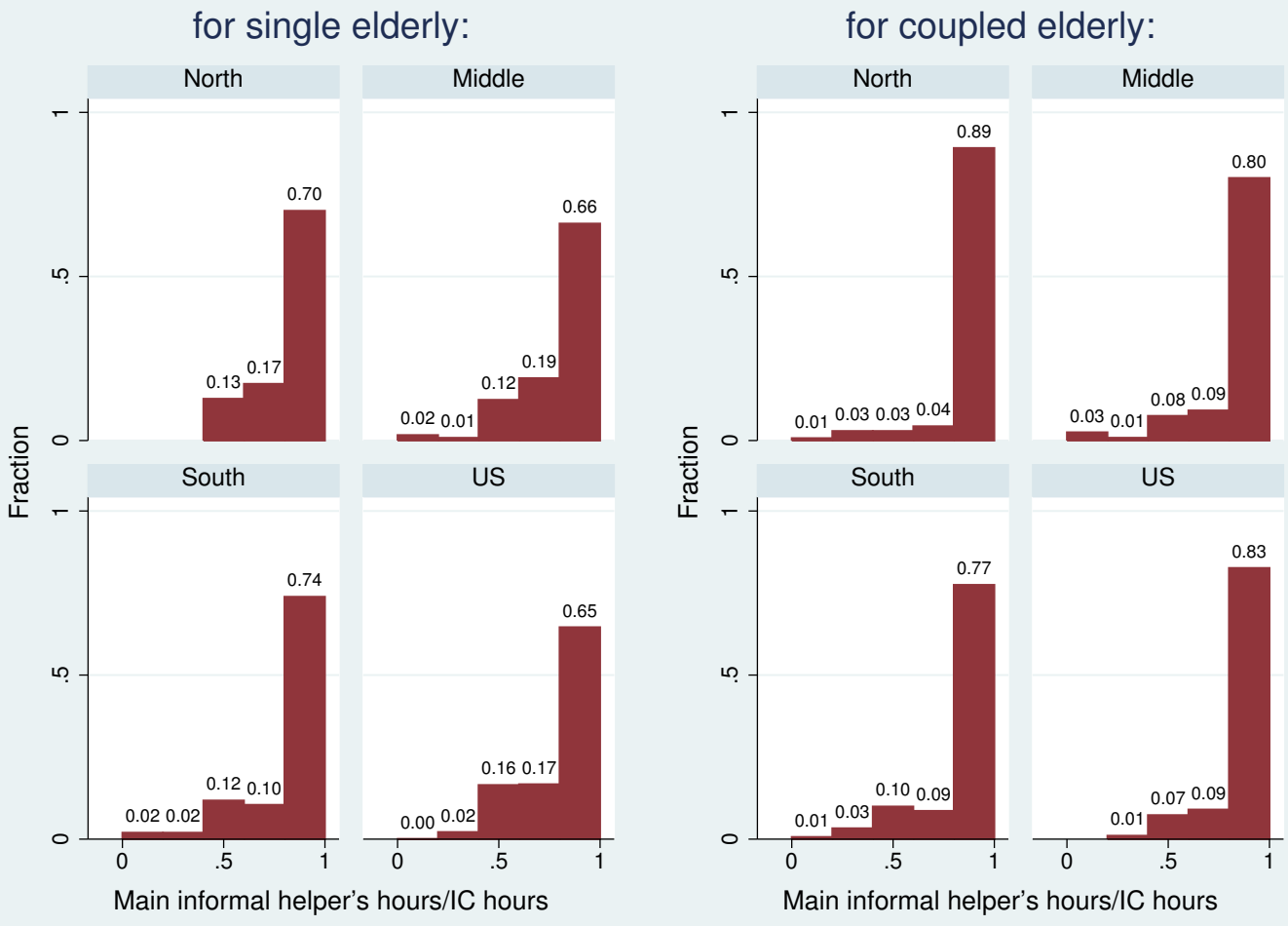

- Trend from **IC to NH** in Europe, . . .
- . . . most so in the **Middle** and the **South** (despite crisis!).
- Weak **opposite trend in the U.S.**

# The role of spouses/partners




- **Coupled** almost always cared for by the **spouse**. . .
- . . . only in North, a substantial number in NH (why??)
- **Singles** are the **important margin** – with familiar patterns.

# Is informal caregiving shared among the family?




⇒ **No**, usually concentrated on one person.

# Who are the main informal helpers?

- *Heavy helper* (HH): Informal caregiver with $\geq$3h/day.

| Variable | Group | North | Middle | South | U.S. |
|---|---|---|---|---|---|
| female | HH spouses | 0.57 | 0.71 | 0.64 | 0.54 |
| | HH kids | 0.85 | 0.72 | 0.81 | 0.74 |
| | Non-HH kids | 0.51 | 0.53 | 0.49 | 0.50 |
| average age | HH spouses | 75.2 | 74.9 | 74.1 | 68.5 |
| | HH kids | 56.1 | 55.0 | 54.0 | 48.6 |
| | Non-HH kids | 56.4 | 56.5 | 55.1 | 52.4 |
| co-residing | HH spouses | 0.97 | 0.99 | 0.96 | 1.00 |
| | HH kids | 0.51 | 0.35 | 0.69 | 0.62 |
| | Non-HH kids | 0.03 | 0.07 | 0.16 | 0.06 |

- Most often **female**.
- **Child** helpers face **care-vs.-work** trade-off.

# Heavy helpers and the labor market

| Variable | Group | North | Middle | South | U.S. |
|---|---|---|---|---|---|
| Full-time | HH kids | 0.20 | 0.23 | 0.26 | 0.39 |
| | Non-HH kids | 0.44 | 0.40 | 0.43 | 0.63 |
| Part-time | HH kids | 0.17 | 0.18 | 0.08 | 0.12 |
| | Non-HH kids | 0.10 | 0.08 | 0.03 | 0.09 |
| Self-empl. | HH kids | 0.13 | 0.09 | 0.03 | – |
| | Non-HH kids | 0.06 | 0.09 | 0.05 | – |
| Retired | HH kids | 0.28 | 0.23 | 0.14 | – |
| | Non-HH kids | 0.22 | 0.29 | 0.16 | – |
| Inactive | HH kids | 0.22 | 0.28 | 0.48 | 0.48 |
| | Non-HH kids | 0.17 | 0.13 | 0.32 | 0.28 |
| Education years | HH kids | 11.98 | 11.21 | 8.84 | 12.8 |
| | Non-HH kids | 11.68 | 11.57 | 8.75 | 13.2 |

- HH are about **half** as likely to work **full-time**, . . .
- . . . working **more often part-time** or being **out of the labor force**.
- Education similar to other children.

# Formal LTC workers

Who will step in if/when the family retreats? **Formal LTC workers**. . .

`OECD (2017)`

- . . . are **a large and growing part of labor force**,
  - About 2% of labor force in OECD.
  - Their number increased by more than 50% in countries with LTC reform (Japan, Korea, Israel: 2005-2015)
  - Sweden/Norway: 12-13 workers per 100 elderly ($\geq$65).

- . . . , being composed by:
  - About one third nurses, the rest having **no formal training**.
  - Mostly **females** (90% in OECD), often **part-time**.
  - Often **immigrants** ($>$25% in U.S.)

$\Rightarrow$ **Policy implications** for

- immigration
- training programs
- tax treatment of unskilled and part-time work

# IC choice and socio-economic characteristics

| | Pooled | North | Middle | South | US |
|---|---|---|---|---|---|
| North | -0.128*** | | | | |
| | (0.0221) | | | | |
| South | 0.340*** | | | | |
| | (0.0174) | | | | |
| US | 0.243*** | | | | |
| | (0.0158) | | | | |
| parent educ. yrs. | -0.0136*** | -0.00593 | -0.0206*** | -0.0174*** | -0.00878*** |
| | (0.00139) | (0.00415) | (0.00443) | (0.00475) | (0.00183) |
| parent log income | 0.0168** | 0.0463** | 0.0324 | 0.0483* | -0.00261 |
| | (0.00631) | (0.0153) | (0.0220) | (0.0198) | (0.00777) |
| kid avg. educ. yrs. | -0.00189** | 0.000761 | -0.00130 | -0.00381* | -0.0169*** |
| | (0.000581) | (0.00117) | (0.00154) | (0.00154) | (0.00316) |
| Observations | 8785 | 1249 | 896 | 658 | 5982 |
| $R^2$ | 0.240 | 0.194 | 0.239 | 0.119 | 0.222 |

Sample: Singles with children. Controls: age, gender (both parent and child avg.); # children, disability, time. Country FE used in region regressions.

- **Region strongly affects IC choice** $\Rightarrow$ importance of policy
- **Opportunity-costs effect** for children **in U.S. and South**, not Middle and North.

# Where to go from here: Models

- Our previous work: `Barczyk & Kredler (2018)`
  - strategic interaction parent-child in continuous-time game
  - rich predictions on inter-generational transfers (care, bequests, inter-vivos) and their timing.
  - Finding: IC reacts strongly to policies.

- Future work: Question: **How much of the difference in care arrangements across countries can be explained by economic incentives (vs. culture?)**
  Cutting down on strategic interactions (e.g. unitary model), could enrich other dimensions:
  - degree of disability
  - continuous choice of (market) labor hours by child caregivers
  - preference heterogeneity for informal vs. formal care

# Conclusions

- **Contribution**: Big picture of care arrangements across regions:
  - Large North-South gradient in informal care
  - U.S. looks most like South.
  - But also large differences between North and Middle
- **Suggests**:
  - **Response to policy is large.**
  - Important to take into account **response of informal care to policy**.

Extra slides

# Policy context

According to European Commission (2015):

- Reforms with large increases in public spending:
  - Netherlands (2003)
  - Sweden (2001)
  - Germany (1995)
  - Spain (2006), but not really...
- Choice between cash and in-kind transfer: Germany, Cyprus, Luxembourg, Malta, the Netherlands, Poland, Romania, Slovenia, Slovakia and Sweden.
- Cash transfers: available in almost all countries
  - Fixed amount: Portugal, Bulgaria, Luxembourg, United Kingdom
  - Income-ceiling constraint: Belgium, Germany, Spain, Ireland, Cyprus, Slovakia, Sweden and the United Kingdom
  - Means test: France, Poland, CZ, IR, RO, SL

# Literature: European Commission (2015)

Lipszyc, Sail & Xavier (2015): “Long-term care: need, use and expenditure in the EU-27”

- Great data on nursing-home and formal-home-care use across Europe
- Great data on use of cash benefits (used for both formal and informal care at home
- Estimate prevalence of care arrangements
  **Problem:** Informal-care/no-care category residually determined (given disability tables). Disadvantages:
  - Don’t know how much is informal and how much is lack of care in residual category
  - Cannot take into account mixed forms of care/overlaps: Cash benefits may mean informal or formal care.
  - Does not take into account intensity of care
  - Numbers don’t add up: Netherlands has informal-care use of -30%

  Disability rates not known for some countries; EU-SILC methodology used to get dependence rates of elderly. Use EU-SILC item “(severe) limitation in activities because of health problems (for at least the last 6 months)”, see page 24. Dependency rates vary unreasonably much by country, based only on population in community, see Table 14. Northern European countries have dependency rates of about 20% for the over-85 population, whereas they are between 40% and 55% for Portugal, Italy, France, Germany. Problem is mentioned in Footnote 87: EU-SILC does not cover nursing-home residents!

# European Commission: Data on dependency

Taken from EU-SILC (*European Union Statistics on Income and Living Conditions*)

- Dependency/disability rates reported in Table 4
  $\Rightarrow$ Vary a lot by country, not credible.
- Paper says EU-SILC is a survey and does not include the institutionalized population (Footnote 34, p. 25).
- Paper remarks that disability self-report may vary between countries due to cultural differences. . .
- . . . but sample-selection bias (only non-institutionalized!) is probably a bigger issue, as the paper admits in Footnotes 77 and 87.

# EU-SILC

`put link Eurostat EU-SILC glossary website here`

- Survey
- Reference population: all private households (collective households and institutional households, which include nursing homes, are excluded)

# Literature: OECD (2015)

OECD web: For subset of OECD countries, have time series on

- number of elderly living in nursing homes
- number of beds in nursing homes
- number of elderly receiving FHC
- SHOULD CHECK FOR MORE???

# Literature: Balia & Brau (2013)

- Use Wave 1 of SHARE: Consider only people living alone at home
  $\Rightarrow$ no co-residing helpers, no nursing-home users.
- Show that proximity to death triggers more IC and FHC use, IC and FHC substitutes (but not doctor visits etc.)
- Do not focus on difference across countries and policy
- Interesting for us:
  - IC is king in their sample: 83% of all needy get IC (45% get FHC), 38 hours monthly IC (12 FHC) – and this without co-residents!
  - Cite evidence that IC is substitute of FC: Van Houtven & Norton (2004, 2008), Bolin et al. (2008), Bonsang (2009).

# Bolin, Lindgren & Lundborg (2007)

- Ask if IC and FHC are substitutes or complements.
  $\Rightarrow$ Using SHARE Wave 1 they find: **substitutes!**
- Only consider individuals living as singles $\Rightarrow$ Neither spousal care, nor co-residing kids

  Say they have hours for informal care, so they must use the outside helpers only.
- Find expected North-South gradient for hours of IC (but not IC dummy)
- Last paragraph on p. 398 argues that recall of hours in SHARE is OK measure.

# Bolin, Lindgren & Lundborg (2008)

- Use SHARE Wave 1 to show that informal caregiving has significant labor-market costs.
  $\Rightarrow$ Use data on caregivers older than 50 who give care to a parent
- Find expected North-South gradient in IC.
- Issues:
  - They argue, but not convincingly, that caregiving to parent inside household is not relevant.
    $\Rightarrow$ Low number co-resides, but these probably give highest number of hours!
  - Don't cover child caregivers below 50 years (55 years is mean age)

# Crespo & Mira (2012)

- Use SHARE, Waves 1 & 2, to study caregiving behavior of women (50-60 years old)
- Find negligible loss of employment in Northern and Central European countries, but large one in Southern countries.
- Labor-supply impact of IC: They show that *extensive* margin (employment) matters, not *intensive* margin (hours).
- Use self-reported health as IV – not (I)ADLS.
- Declare daily care as *intensive*.
- Use also inside-household helpers, but say they are few.

# What was new to me

- OECD (2005), “LTC for Older People”, estimates IC to be 80% of all care (p. 108, cited by Bolin et al., 2007).
- Home LTC: OECD (2015) includes day-care and community centers in this term. Nursing homes, on the contrary, provide “accommodation and care as package”.

# Model: Demographics

2-period OLG model:

- $t = 0, 1, \ldots$
- Continuum of families $j \in [0, 1]$ in the economy
- Unitary model: Family lives forever, discounts utility of future generations.
- Three individuals in each family:
  - Parent: receives pension, may need care.
  - Marginal child: choice between work, caregiving, and leisure.
  - Infra-marginal child: provides $\bar{n}$ units of labor inelastically.
- Families can save at gross interest rate $R$.

# Model: Timing and care decision

1. Family draws:
   - $d_{j,t} \sim F_d$, i.i.d.: care need of elderly (expressed in time),
   - $f_{j,t} \sim F(\mu_{f(,r)}, \sigma_f)$, i.i.d.: utility loss from formal care,
   - $z_{j,t} \sim F_z(\cdot|z_{j,t-1})$: productivity of children.

2. Family decides $h_{j,t} \in \{0,1\}$:
   - Formal care ($h_{j,t} = 0$): Costs $d_{j,t} p_f (1 - s_f)$, where
     - $p_f$: gross price of formal care,
     - $s_f$: government subsidy for formal care.
   - Informal care ($h_{i,t} = 1$), which implies that:
     - Marginal child spends $d_{i,t}$ units of time,
     - family receives subsidy $d_{i,t} s_i$ from government ($s_i$: informal-care subsidy).

# The family's problem

$$V(a;z,d,f) = \max_{c_p,c_k,h,n,a',b\geq 0} \Big\{ u_p(c_p - \underbrace{(1-h)f}_{\text{formal-care u-penalty}}) + u_k(c_k) + v(\underbrace{1-n-dh}_{\text{leisure}}) + \beta \mathbb{E}\big[V(a';z',d'f')|z\big] \Big\},$$

$$\text{s.t.} \quad b = a + \underbrace{(\bar{n}+n)(1-\tau_l)wz}_{\text{kid labor earnings}} + \underbrace{hds_i - (1-h)dp_f(1-s_f)}_{\text{LTC cost/subsidies}} - c_p - c_k,$$

$$a' = Rb + \underbrace{P(z,n;\bar{n})}_{\text{kid's pensions}}.$$

where:

- $a$: start-of-period assets,
- $b$: (non-negative) bequest,
- $c_p, c_k$: parent's and child's consumption.

Can replace $s_f$ by function $X(d)$: Gives private expenditures necessary to obtain care services $d$ – can capture re-distributive features of public LTC insurance.

# Expected mechanisms

- Higher opportunity costs $(z, w, \tau_l) \Rightarrow$ less IC
- Functional form for care preference: $u_p(c_p - (1-h)f)$
  $\Rightarrow$ More formal care in rich families
- The stronger variation in care preference $(\sigma_f)$, the less responsive is care choice to economic incentives $(w, a, z, \tau_l, s_i, s_f)$
- Costs of IC increase in disability $d$, but utility cost of NH does not
  $\Rightarrow$ More nursing homes (NH) at higher disability
  $\Rightarrow$ The more curvature $v(l)$ has, the steeper the disability-NH gradient

# Welfare channels of policies

Two welfare channels induce trade-off for LTC policies $(s_f, s_i)$:

- **Insurance channel**: $(s_f, s_i)$ provide insurance against disability shocks
  $\Rightarrow$ favors $s_i$ since taken up by low-wage families
- **Tax-distortion channel**: $(s_f, s_i)$ enter FOC for labor-care-leisure choice
  $\Rightarrow$ favors $s_f$ since $\tau_l$ already distorts towards leisure
- (Family-commitment channel as in Barczyk & Kredler, 2016: Not operative – unitary model!)

# What we plan to do

1. Estimate some (region-specific) **parameters directly from data**:
   - $z = \mu_{z,r} + \sigma_{z,r}\varepsilon_z$: opportunity costs of potential caregivers
   - $(s_f, s_i; \tau_l)_r$: institutions

2. Estimate **homogeneous-culture model**: $f = \mu_f + \sigma_f \varepsilon_f$.
   Key parameters to be obtained by matching data moments:
   - $\mu_f$: IC prevalence in full sample (all regions)
   - $\sigma_f$: Difference in IC prevalence between high-income and low-income families.
   - utility from leisure: $v(l) = \phi l^{1-\xi}/(1-\xi)$
     - $\phi$: average hours worked of potential caregivers
     - $\xi$: Change in leisure experienced by child whose parent becomes disabled and who starts to give IC (?)

   (Or take from literature on labor supply?)

$\Rightarrow$ Obtain fraction of variation in IC accounted for by economics.

# What we plan to do (II)

3. Estimate **heterogeneous-culture model**: $f = \mu_{f,r} + \sigma_f \varepsilon$.
   Let $\mu_{f,r}$ vary by region to match region's IC prevalence.
   - Could formally test if parameter restrictions ($m_{f,r} = \bar{\mu}_f$) imposed by homogeneous-culture model can be rejected in GMM.
   - Use for policy experiments if better than homogeneous-culture model.

4. Policy experiments:
   - How many elderly would Spaniards send to nursing homes given Swedish policies and Swedish earnings opportunities of women?
   - How much IC would Swedes choose if given Spanish policies and their economic conditions?
   - Study changes to formal- and informal-care subsidies:
     - elasticity of care arrangements
     - government-budget implications
     - welfare implications (by socio-economic condition and IC preference)

# Alternative modeling choices

1. **Finer time structure**: $2T$-period OLG
   - \+ Easier to map to data, e.g. for wealth $a$, need of care $d$
   - \+ More realistic resolution of uncertainty: may matter for welfare analysis
   - \- more complex
2. **Non-cooperative model** à la Barczyk & Kredler (2016):
   - \+ Can model means-tested insurance (U.S.) seriously
   - \+ Can capture effects going through family commitment channel.
   - \- Fully-dynamic version: would have to strip out some heterogeneity.
   - \- 2-period: Not clear by which parameter should capture cultural differences

# To do

- Empirical:
  - Calculate disability ratio using our disability index $d$.
  - Restrict the evidence on mixing IC-FHC to hours we really know.