University of Luxembourg

Institute of Research on Socio-Economic Inequality

(IRSEI)

Suicide Rates of Mid-Aged and Seniors in 17 Countries APC Models & Cohort-Effect Hysteresis

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→ http://paa2013.princeton.edu/papers/130719

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Agenda

1. **Suicide and cohorts**: Cohort scarring effects and cohort hysteresis relative deprivation versus integration

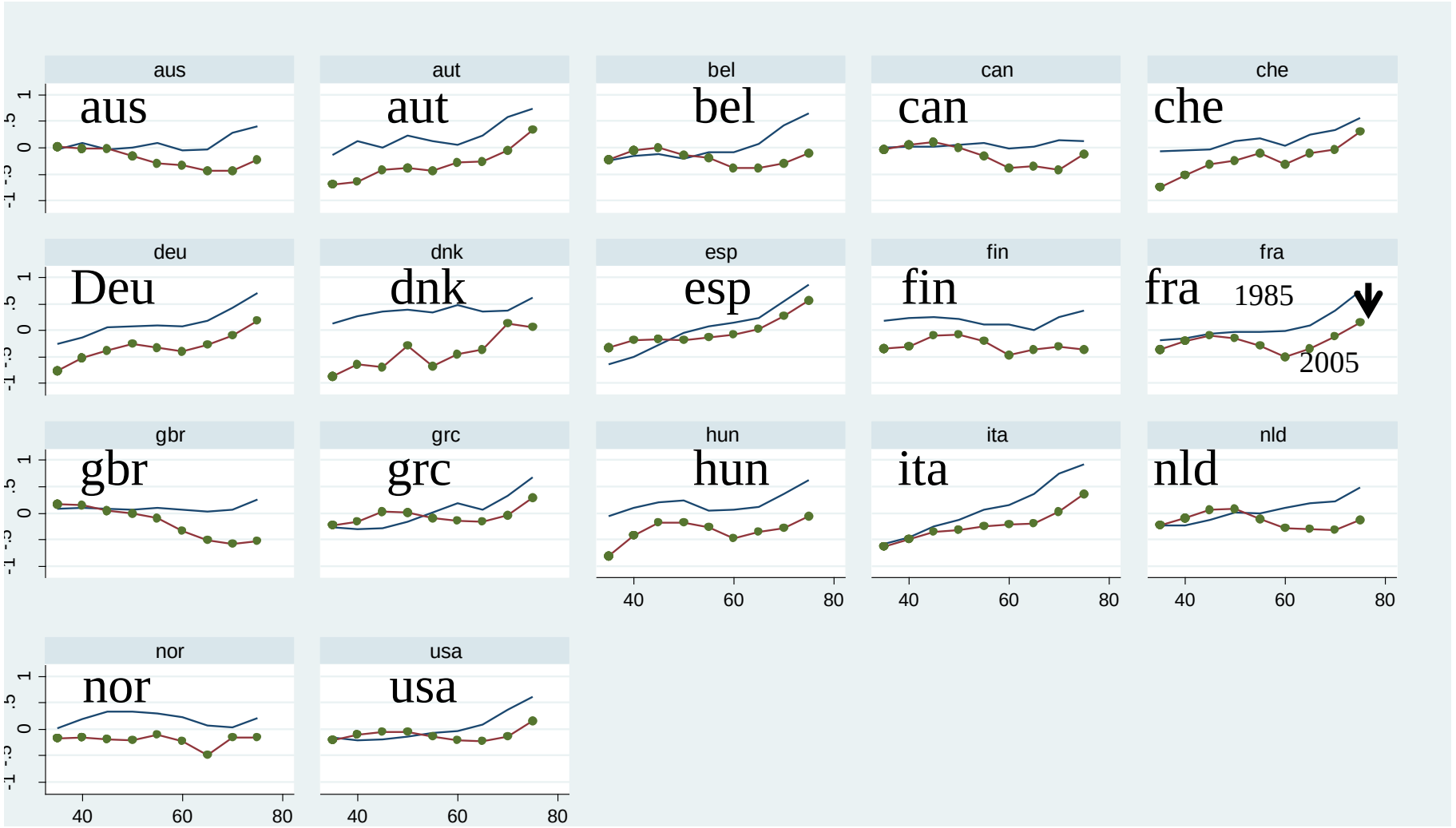
2. **Data, Measurements and Methodology:** The APCD Age-Period-Cohort Detrended model and the stability of cohort effects (cohortality coefficient)

3. **Results I:** Differentials in the intensity of cohort effects. Differentials in the durability of cohort effects

4. **Results II:** Economic explanations / demographic explanations

5. **Discussion:** cohort scars in APC: a birth cohort agenda in population studies

Age transformation of (logged suic rate) male suicide



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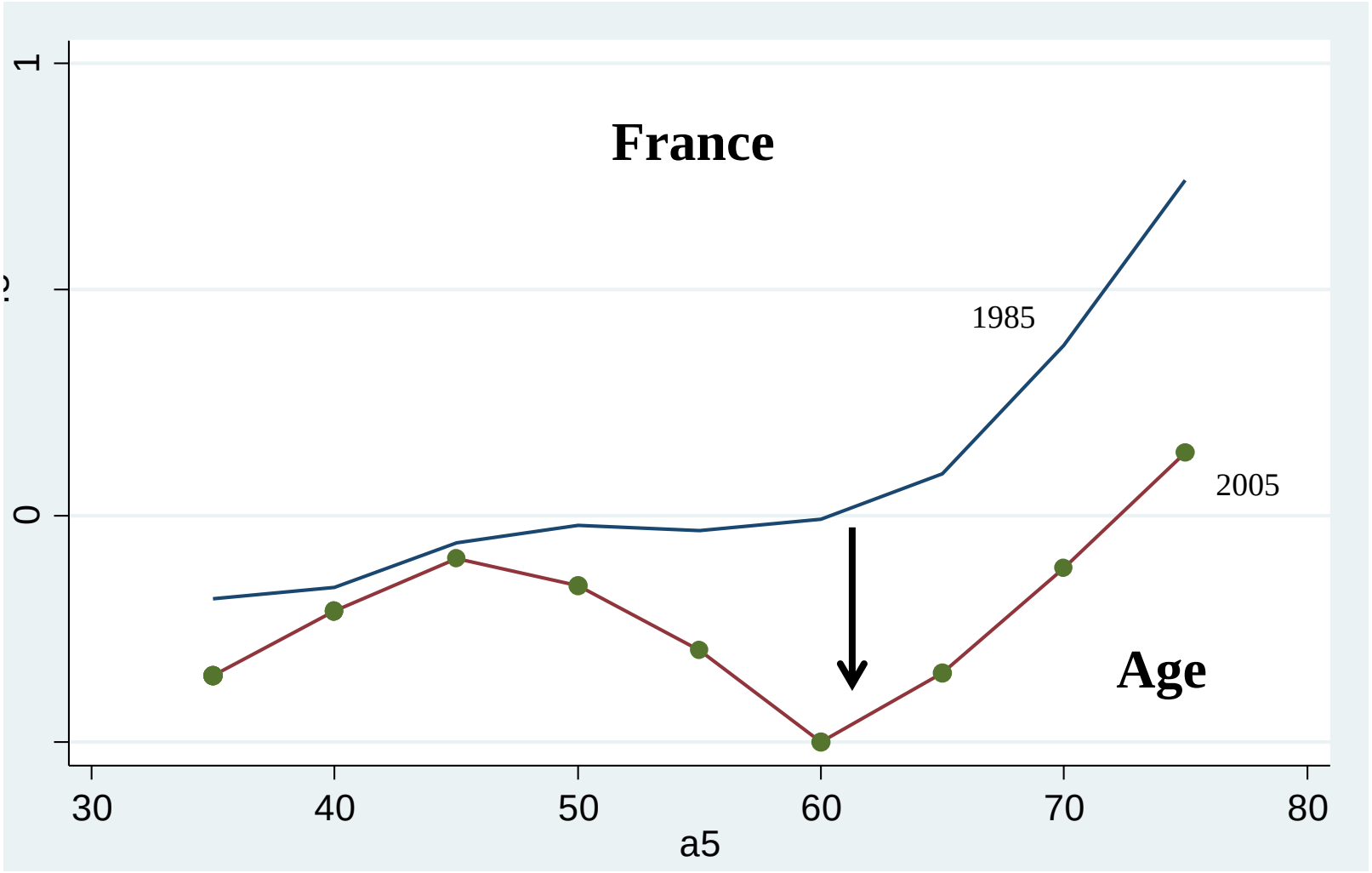

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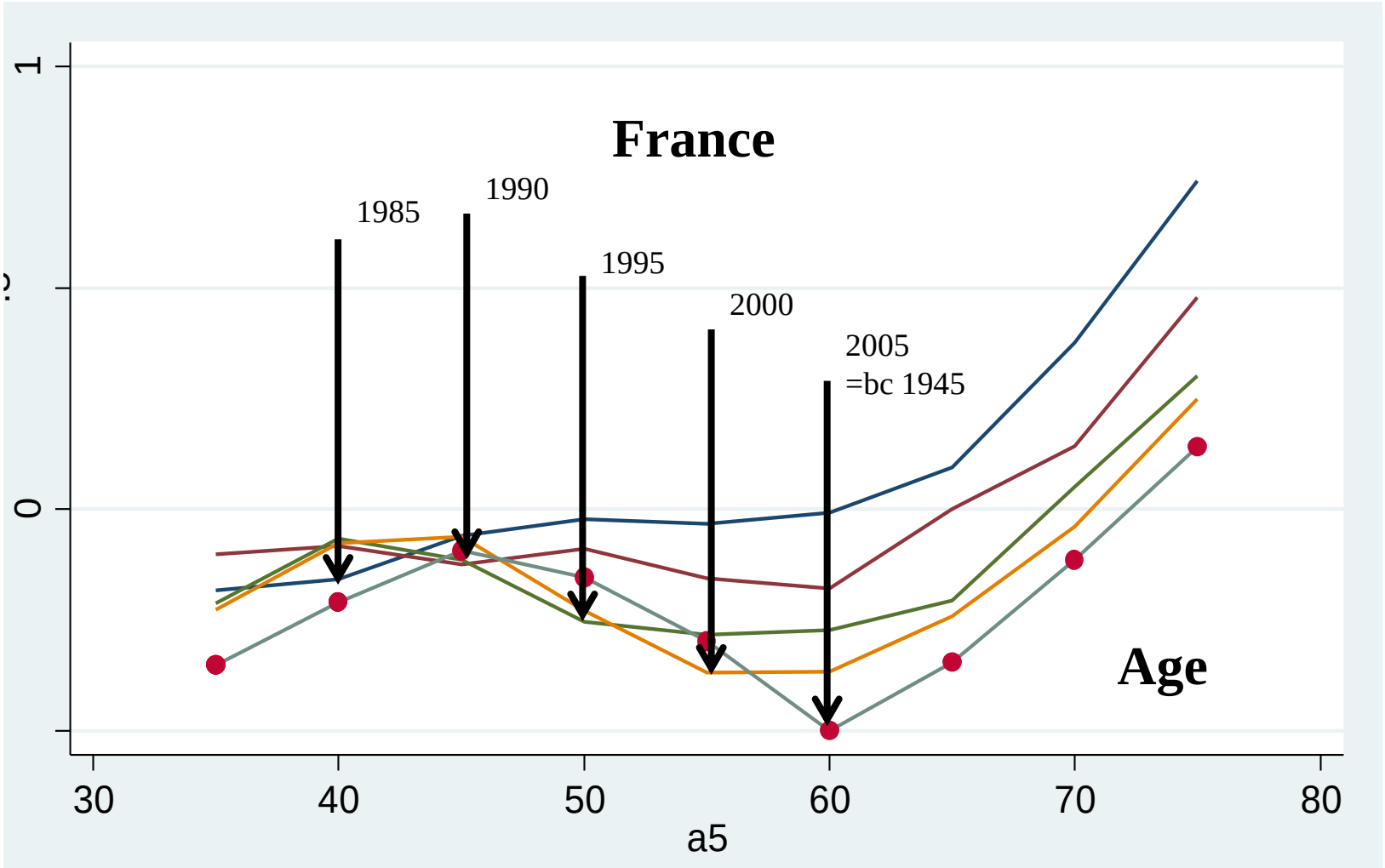

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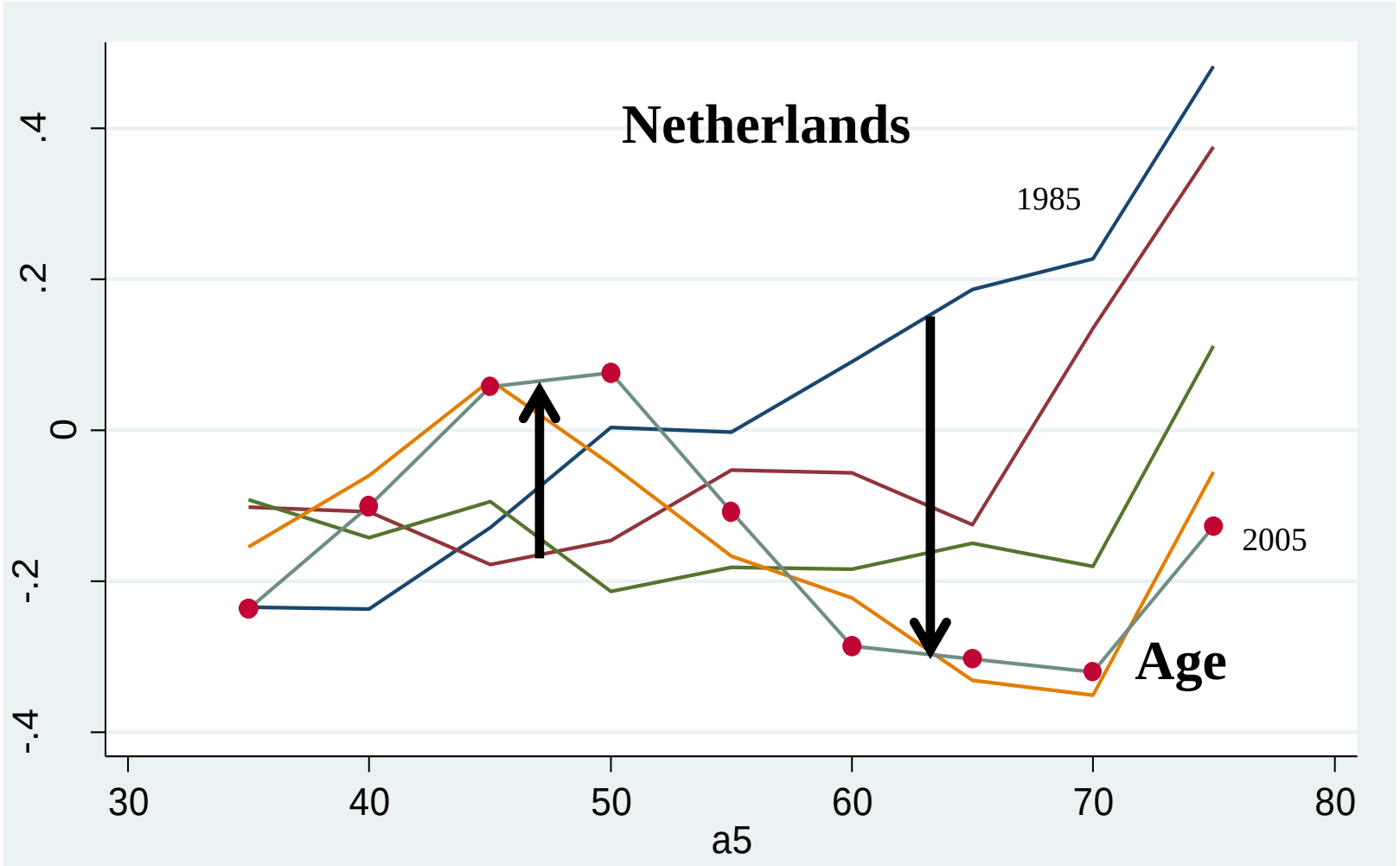

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Cohort mortality "known" = John Wilmoth 1997 2001

Specific cohort suicide changes: "Known" as well?

- "A Changing Epidemiology of Suicide? The Influence of Baby Boomers on Suicide Rates in the United States", Julie A. Phillips PAA 2013 http://paa2013.princeton.edu/abstracts/130974
- Jean Stockard and Robert M. O'Brien, 2006, "Cohort variations in suicide rates among families of nations: an analysis of cohorts born from 1875 through 1985." *International Journal of Comparative Sociology*, 47:5-33.

1-Better models with modern APC age-period-cohort

2-Improve in the "why?" quest

Resilience or lifelong scars of cohorts

- "Scarring effect" → (D. Ellwood 1982, M. Gangl 2004) vulnerability of some cohorts (after trauma or shock)

- Permanence or resilience of initial trauma? Hysteresis of the cohort effect Cumulative advantage/disadvantage (R. Merton 1968, Th. DiPrete 2006)
- Or compensation, resilience (E.Werner 1982, Luthar & al. 2000, Bonanno 2004) effects (incl. « cohort inversion model » (Hobcraft et al., 1982)

Cohort explanation of suicide changes

The old Durkheim explanation:

integration (family + soc ties) *and* regulation (managing frustrations)

1. **„Non-suicide“ overall mortality:** an unhealthy cohort (with higher mortality rates) should suicide more

2. **Marital Status and family ties:** cohorts with lower partnership rates and less children might experience higher prevalence of suicide („Durkheim integration“)

3. **Economic context**: deprived cohorts face economic scarcity and relative frustration over life course („Merton anomie“)

4. **Educational Level**: Lower educated cohorts might be deprived of ressources and opportunities (not simply in economic terms) <for Merton it is ambiguous>

5. **Cohort size :** Larger cohorts might face overcrowded educational system and labor market (the „Easterlin Effect“)

Data and measurements

- **Data:**
  - WHO causes of mortality database (ICD7 to ICD10 + Population)
  - lethal suicides / male population.

- **17 countries:** Australia, Austria, Belgium, Canada, Switzerland, Denmark, Germany, Spain, Finland, France, Hungary, Greece, Italy, Netherlands, Norway, UK, USA

- **Period / Age groups:**
  - 5 year periods 1980 to 2005
  - 5 year age groups 35 to 75 year old

Data and measurements

Macro indicators:

- **WHO:** Cohort relative size

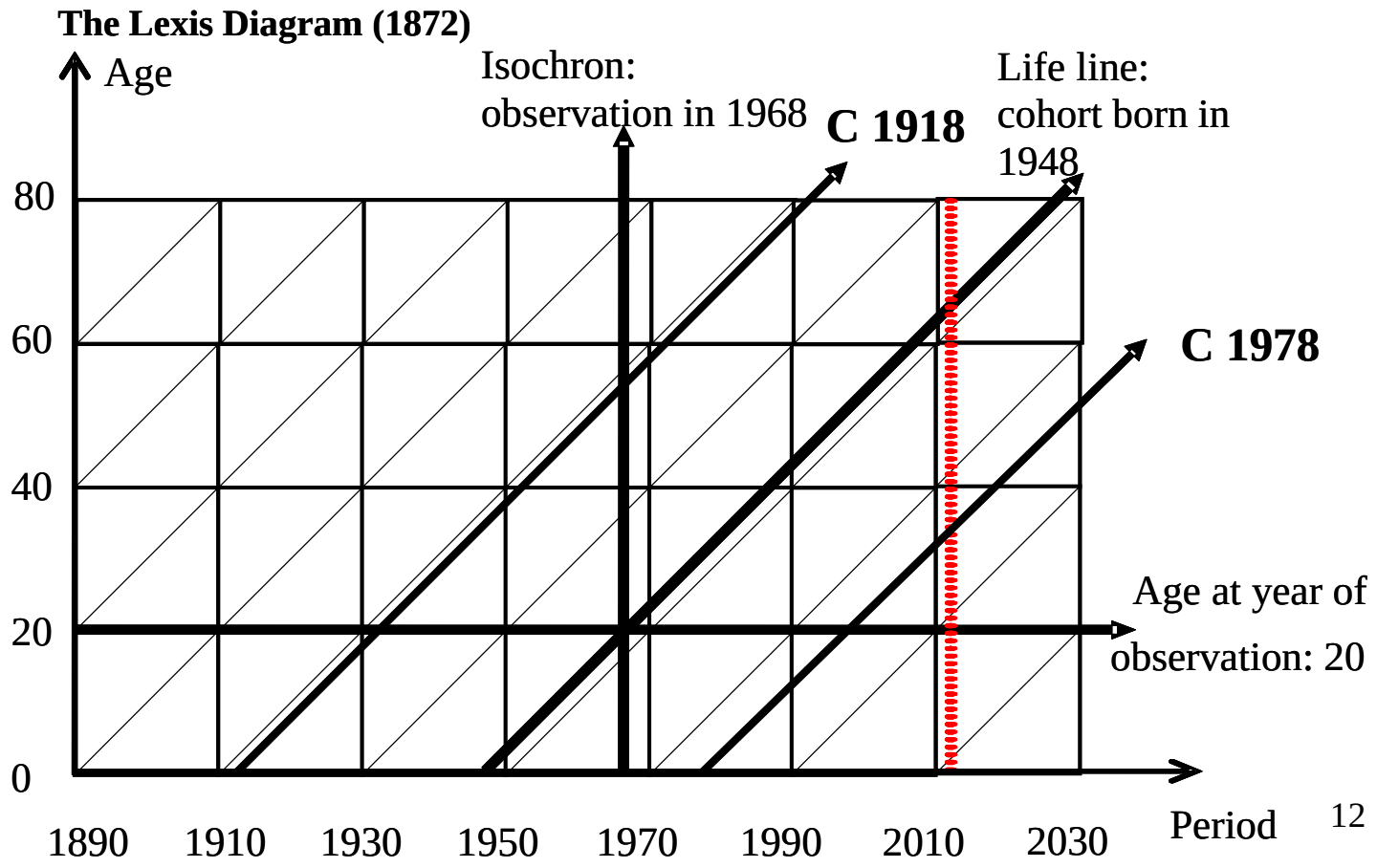
- **Luxembourg Income Study (LIS, same age groups, same periods)**
  - **Educational level:** averaged index of educational level (ISCED level)
  - **Partner:** Percentage of MALE POP with partner
  - **Children:** nb of children in the household (topcoded at 3 and averaged)
  - **Level of living:** post tax & transfers incomes per Consumption Unit (averaged by country / year)

All these indicators are presented as detrended cohort effects (DCE)
(What's that?)

Age Period Cohort- Where's the problem?

→ **Linear Dependency Problem: How to isolate the cohort effect from age and period?**

C= P - A



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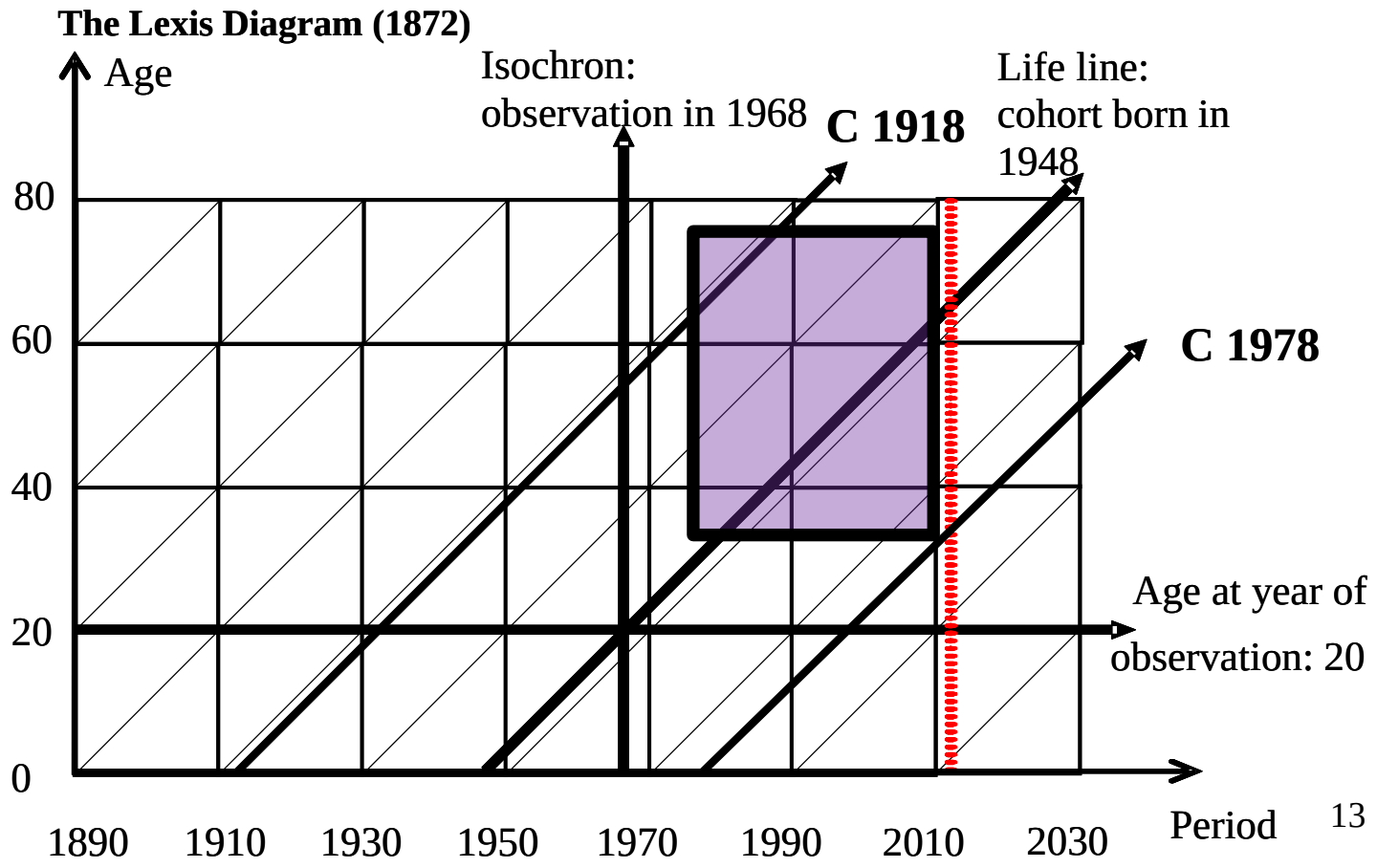

Statistical background: Age Period Cohort models

Separate the effects of age, period of measurement and cohort.

Problematic collinearity:
cohort (date of birth) = period (date of measurement) - age

(Ryder 1965, Mason et al. 1973, 1985, Yang Yang et al. 2006 2008, Pampel 2012)

Yang, Yang, and Kenneth Land. 2013. Age-Period-Cohort Analysis: New Models, Methods, and Empirical Applications. Chapman and Hall/CRC.

PAMPEL F. C., HUNTER L. M., 2012, « Cohort change, diffusion, and support for environmental spending in the United States », American journal of sociology, 118, 2, p. 420-448.

Yang, Yang, Wenjiang J. Fu, and Kenneth C. Land. 2004. "A Methodological Comparison of Age-Period-Cohort Models: The Intrinsic Estimator and Conventional Generalized Linear Models." Sociological Methodology 34(1):75-110.

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Methodology: APC D – detrended coefficients

(zero sum, zero slope cohort coefficients)
"are some cohorts above or below the linear trend?"
APCD is a 'cohort bump detector'

Chauvel and Schröder, to be published 2014, *Social Forces*, "Generational Inequalities and Welfare Regimes".

$$\begin{cases} y^{apc} = \alpha_a + \pi_p + \gamma_c + \alpha_0 rescale(a) + \gamma_0 rescale(c) + \beta_0 + \sum_j \beta_j X_j + \varepsilon_i \\ \begin{cases} p = c + a \\ \sum_a \alpha_a = \sum_p \pi_p = \sum_c \gamma_c = 0 \\ Slope_a(\alpha_a) = Slope_p(\pi_p) = Slope_c(\gamma_c) = 0 \\ \min(c) < c < \max(c) \end{cases} \end{cases} \quad \text{(APCD)}$$

STATA : ssc install apcd => a publicly available ado file
Can handle OLS/Logit/Poisson models (here in this paper = Poisson)
PLZ see more on www.louischauvel.org/apcdex.htm

Methodology: Cohortality coefficient
Is the cohort effect stable over life course?

The cohortality coefficient is the ratio of the

$$C = \frac{R^2\,(APC) - R^2(AP)}{R^2\,(A*P) - R^2(AP)}$$

Where :

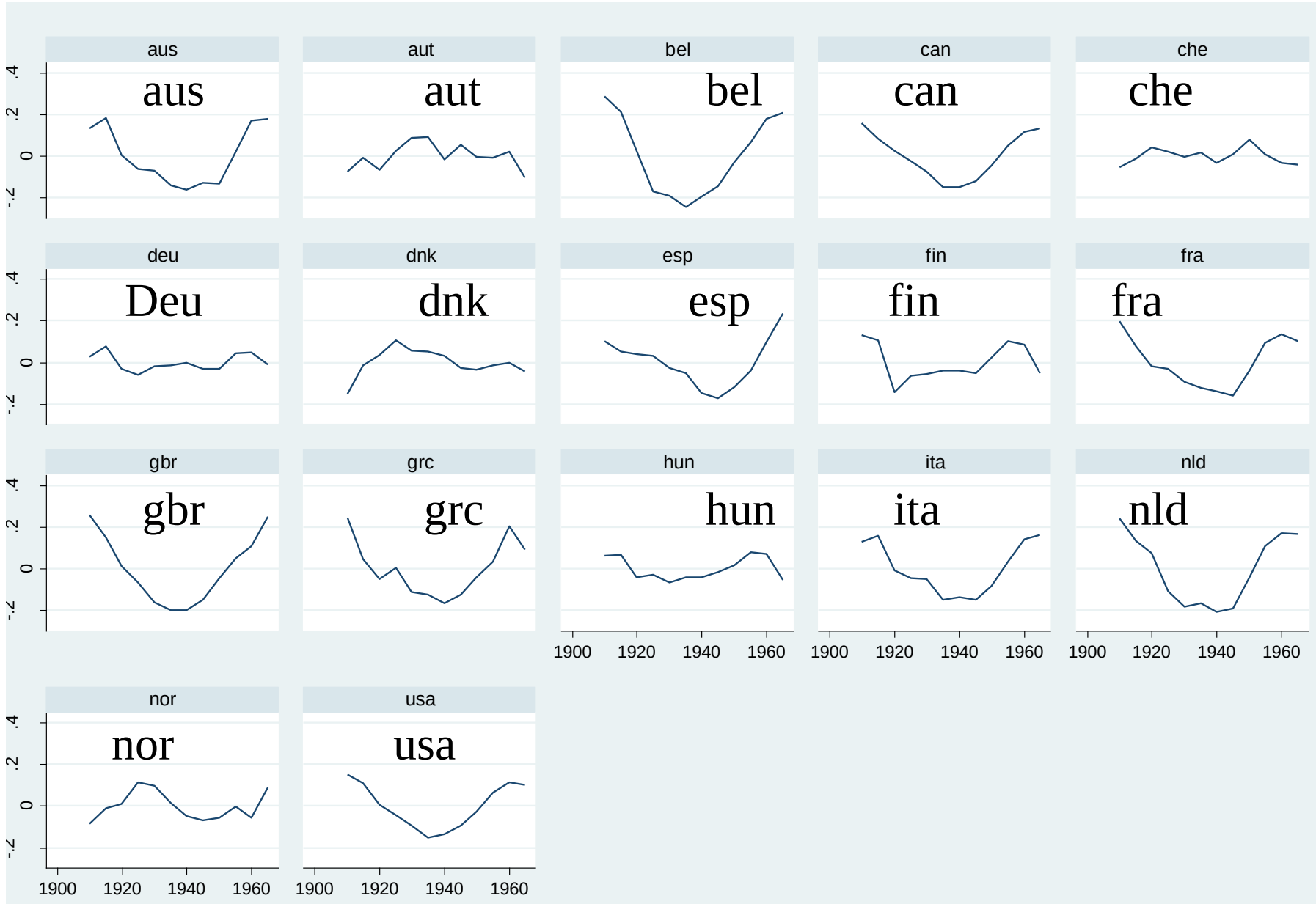
(AP) → absorbs all the age & period effects, with no interaction between A and P

(APC) → (AP) plus the cohort effects (= specific A P interaction)

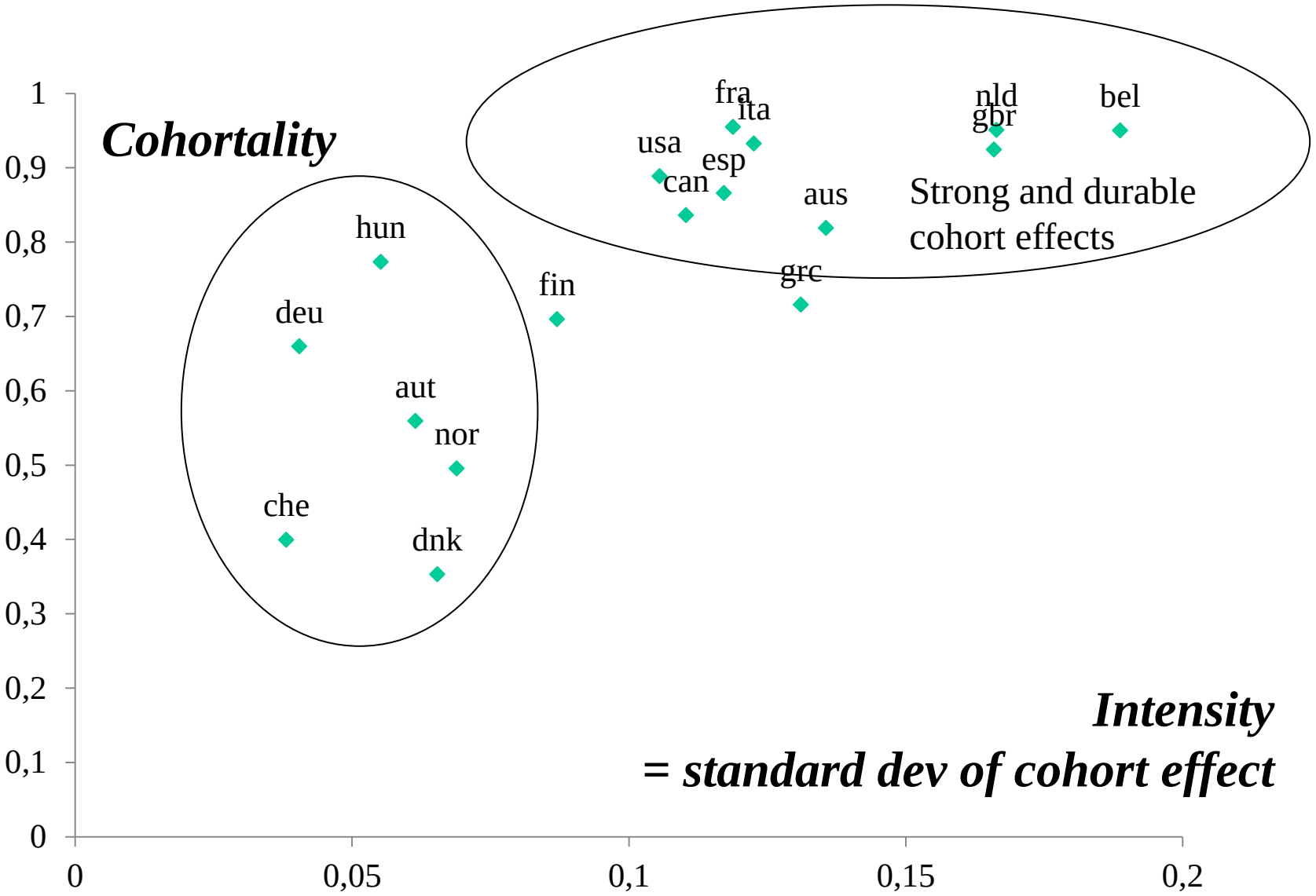
(A*P) → this is the full interaction model ("saturated" model)
with all the interaction coeffs of A and P

C is 100% if the full interaction model is due to the cohort effect

Cohort fluctuations of suicide: intensities of cohort effects



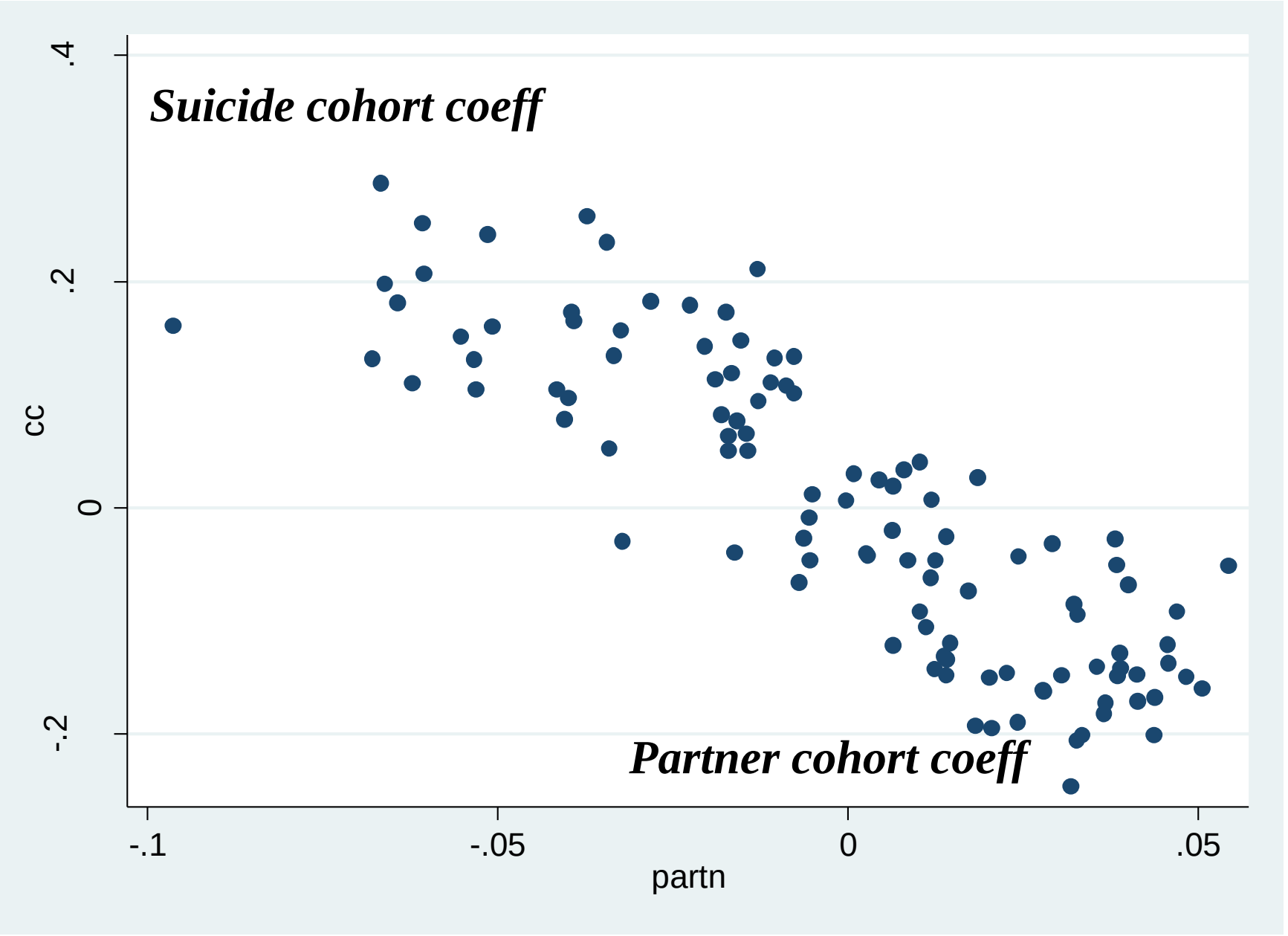
Cohortality and intensities of cohort effects



cc = Detrended cohort effects (DCE) of suicide
dd = DCE of mortality (without suicide)
mpartn= DCE of (% of male population with partner at home)
nchil = DCE of nb of children at home
levliv = DCE of level of living
size = DCE of cohort size
educ = DCE of education attainment

```
pwcorr cc dd mpa nchil lev si ed led

             |       cc       dd   mpartn    nchil   levliv     size     educ
-------------+---------------------------------------------------------------
          cc |   1.0000
          dd |   0.6935   1.0000
      mpartn |  -0.5554  -0.4764   1.0000
       nchil |  -0.4862  -0.3360   0.4919   1.0000
      levliv |  -0.1772  -0.1811   0.2544   0.1419   1.0000
        size |  -0.1137  -0.2793   0.0804  -0.1200   0.0945   1.0000
        educ |   0.0718  -0.1460  -0.1065  -0.2347  -0.0591   0.1400   1.0000
         led |  -0.0761   0.1233   0.1264   0.1755   0.0833  -0.1108  -0.8066
```


Suicide cohort coeff
Partner cohort coeff
cc
.4
.2
0
-.2
-.1
-.05
0
.05
partn

```
      Source |       SS       df       MS              Number of obs =     200
-------------+------------------------------           F(  6,   193) =   44.56
       Model |  1.35517218     6   .22586203           Prob > F      =  0.0000
    Residual |  .978321738   193  .005069025           R-squared     =  0.5807
-------------+------------------------------           Adj R-squared =  0.5677
       Total |  2.33349392   199    .0117261           Root MSE      =   .0712

------------------------------------------------------------------------------
          cc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          dd |    1.092033   .1095796     9.97   0.000      .8759052     1.30816
      mpartn |   -.6130753   .2089478    -2.93   0.004     -1.02519   -.2009608
       nchil |   -.2283707   .0783855    -2.91   0.004    -.3829729   -.0737685
        educ |    .1529428   .0822485     1.86   0.064    -.0092786    .3151641
      levliv |     .009147   .1125609     0.08   0.935    -.2128604    .2311543
        size |    .0545496   .0712387     0.77   0.445    -.0859568     .195056
       _cons |   -.0010229   .0050733    -0.20   0.840    -.0110291    .0089832
------------------------------------------------------------------------------
  +-----------------------------------------------------------+
  |       |          Block  Residual                          Change |
  | Block |       F     df        df    Pr > F       R2      in R2 |
  |-------+---------------------------------------------------------|
  |     1 |  180.85      1       198    0.0000    0.4774            |
  |     2 |   28.57      1       197    0.0000    0.5436    0.0662  |
  |     3 |   12.82      1       196    0.0004    0.5716    0.0280  |
  |     4 |    3.64      1       195    0.0578    0.5794    0.0079  |
  |     5 |    0.02      1       194    0.8875    0.5795    0.0000  |
  |     6 |    0.59      1       193    0.4448    0.5807    0.0013  |
  +-----------------------------------------------------------+
```

Source	SS	df	MS	Number of obs =	200
Model	.218565918	5	.043713184	F(5, 194) =	20.09
Residual	.422148089	194	.002176021	Prob > F =	0.0000
Total	.640714007	199	.003219668	R-squared =	0.3411
				Adj R-squared =	0.3241
				Root MSE =	.04665

dd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
mpartn	-.6507964	.1286809	-5.06	0.000	-.9045895	-.3970034
nchil	-.1351319	.0504329	-2.68	0.008	-.2345992	-.0356647
educ	-.1782786	.0523465	-3.41	0.001	-.2815199	-.0750373
levliv	-.0663363	.0735952	-0.90	0.369	-.2114856	.078813
size	-.1724914	.0450022	-3.83	0.000	-.2612478	-.083735
_cons	-.0030118	.0033169	-0.91	0.365	-.0095537	.00353

Block	F	Block df	Residual df	Pr > F	R2	Change in R2
1	58.14	1	198	0.0000	0.2270	
2	1.91	1	197	0.1680	0.2344	0.0074
3	14.04	1	196	0.0002	0.2856	0.0512
4	1.55	1	195	0.2149	0.2912	0.0056
5	14.69	1	194	0.0002	0.3411	0.0499

Conclusions

1. **Strong cohort effects in suicide in many countries**

2. **Family integration context is important variable**

3. **Economic context not so significant**

4. **Educational cohort fluctuations show protection against death, not against suicide**

To come:

*Changes in values/religious/network specificities
*General / specific types of mortality / drinking habits, addictions...
*Indicators of mental health...
*Gender gap...