MIGRATION ECONOMICS

Development impacts of migration and challenges in global labor markets

June 24 – June 28

Migration and Ageing

Hippolyte d'Albis

The lecture

- Migration economics in host countries: impacts on the labor market.
- This course: macroeconomic effects (GDP per capita, fiscal balance, etc)

$\Rightarrow$On the search for a “macroeconomic model” of migration

- Migration is <u>first</u> a demographic variable; this lectore is more on the macroeconomics of population.
- Two concerns in Europe: Aging and Immigration; would be nice to have a single framework to analyze them.

Overview of the lecture

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- A little introduction to aging and to its possible links to migration.
- Population models, without and with migration
- Population and economics : accounting methods (fiscal impact)
- Migration in simple economic models (Solow)
- Macro-evidence of migration in host countries
- OLG model with migration
- Further evidence
- A RA model with migration

Aging: some “facts” thanks to the UN

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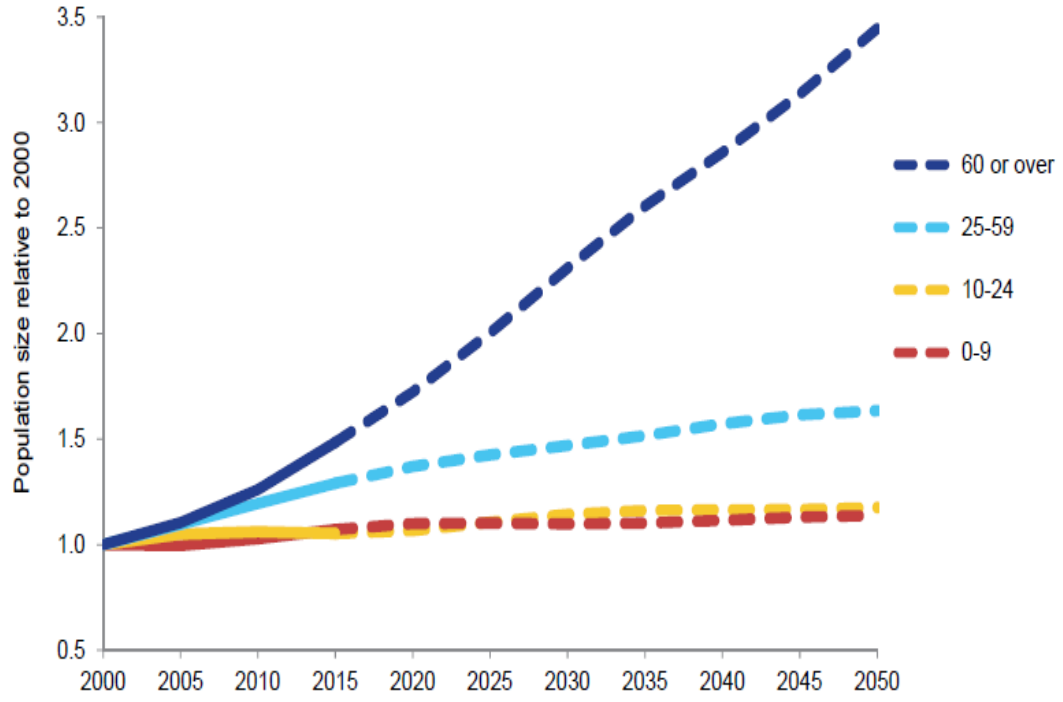
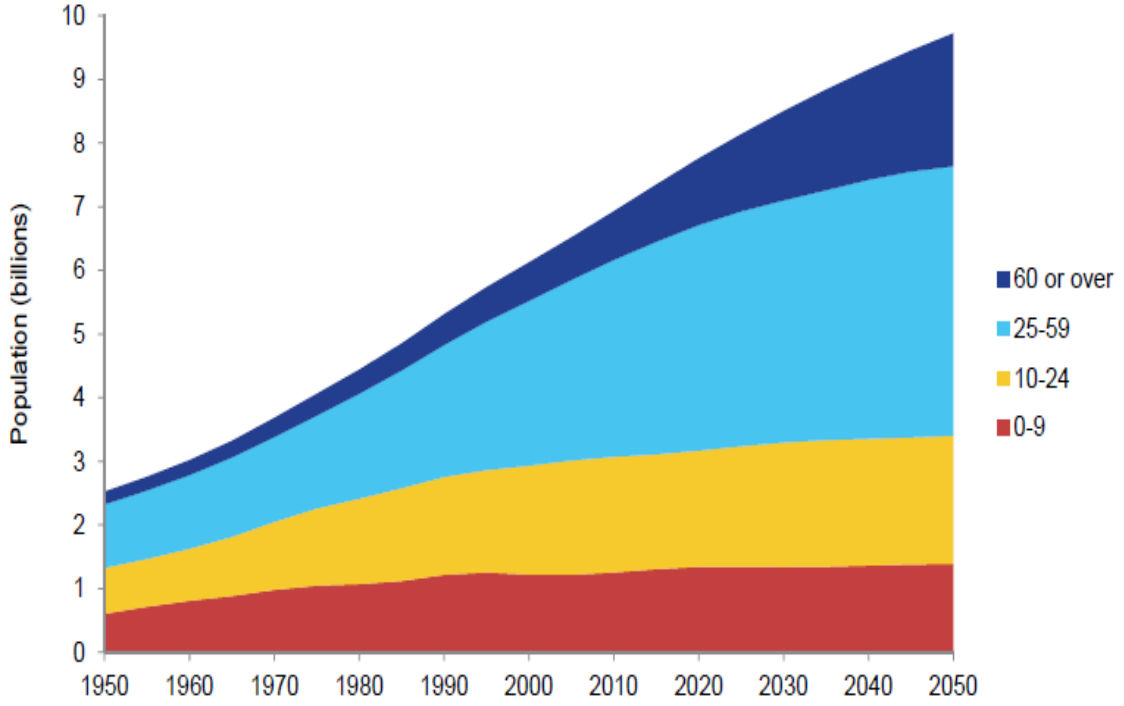
- Simple measures: share of 60+ within population

Increase in world population relative to 2000, by broad age group, 2000-2050



Data source: United Nations (2015). *World Population Prospects: The 2015 Revision.*

Global population by broad age group, 1950-2050



Data source: United Nations (2015). *World Population Prospects: The 2015 Revision.*

An unequal distribution

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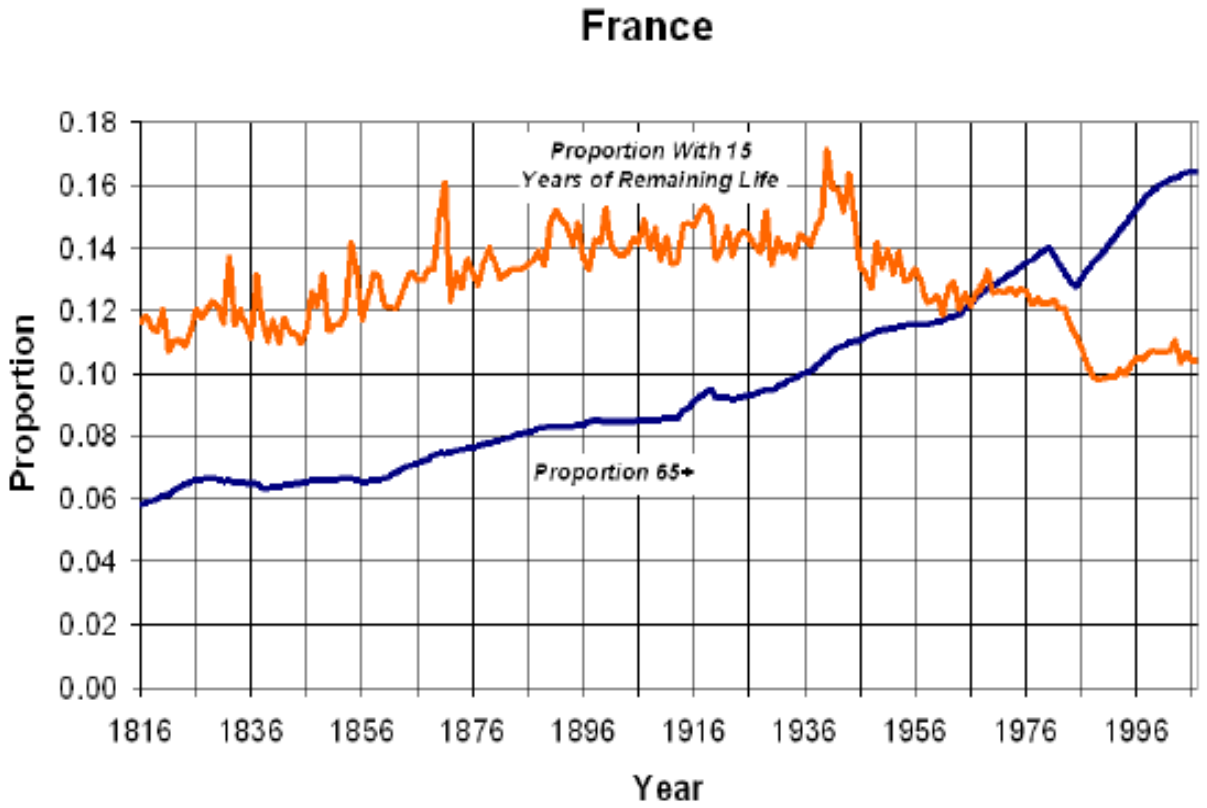
	Percentage aged 60 years or over			
	2000	2015	2030	2050
World	9.9	12.3	16.5	21.5
Development groups				
More developed regions	19.5	23.9	29.2	32.8
Less developed regions	7.6	9.9	14.2	19.8
Other less developed countries	8.0	10.7	15.9	22.7
Least developed countries	5.1	5.5	6.7	9.8
Regions				
Africa	5.2	5.4	6.3	8.9
Asia	8.6	11.6	17.2	24.6
Europe	20.3	23.9	29.6	34.2
Latin America and the Caribbean	8.1	11.2	16.8	25.5
Oceania	13.4	16.5	20.2	23.3
Northern America	16.2	20.8	26.4	28.3
Income groups				
High-income countries	18.0	22.1	27.7	31.9
Upper-middle-income countries	9.2	13.4	21.2	30.5
Lower-middle-income countries	6.9	8.1	11.2	16.5
Low-income countries	5.0	5.2	5.8	8.3

Population ageing?

- From a demographic view point it is not so simple to assess!
  - What is the proportion of old people in a population where life expectancy is increasing?
  - Fixed cut-offs mean nothing!
  - In 1966, LE at age 65 was 15

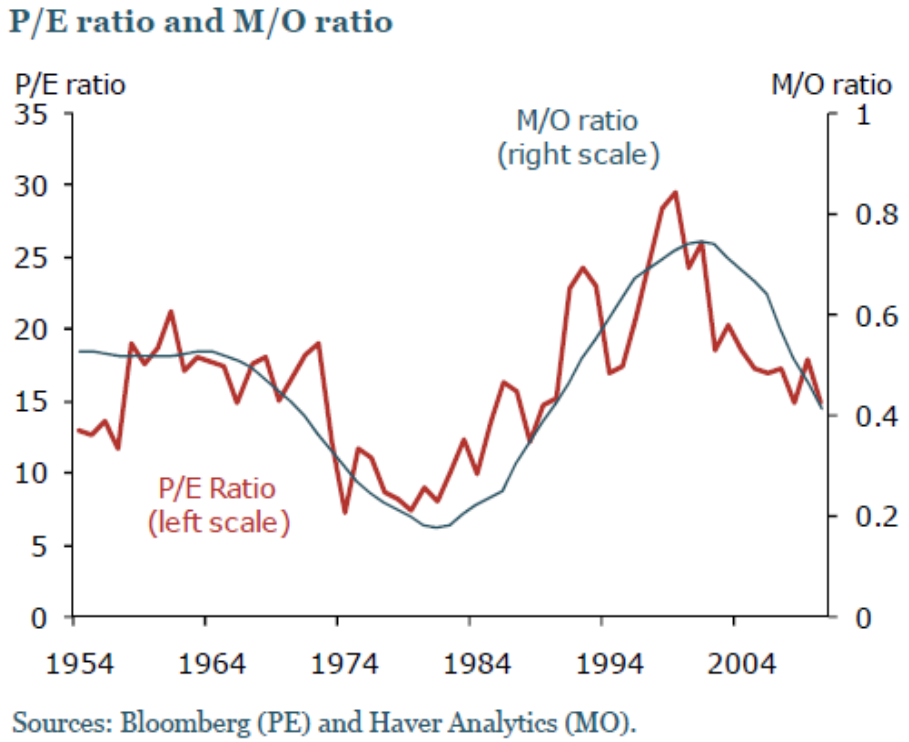
  years; in orange, you have the proportion of people with less than 15 years to live

  (see Sanderson and Scherbov)



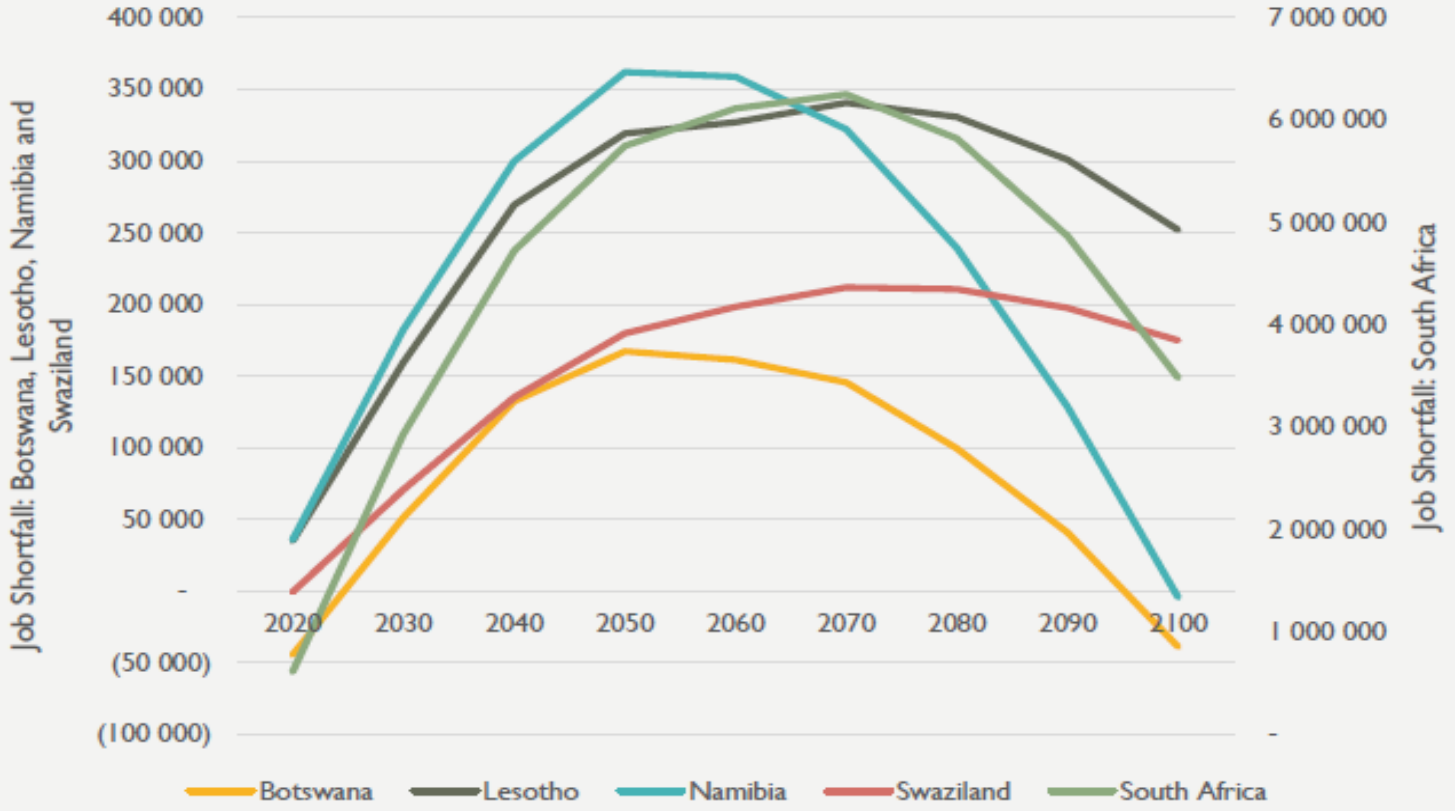
Ageing: is it an (economic) issue?

- Possible issues:
  - Social security cost (public pensions; public health expenditures)
  - Asset meltdown, like in Liu and Spiegel, 2011, (also impacting real estate markets); private health
  - Innovation; attitudes toward risks



- At the same time, there might be too many young persons elsewhere:
  - 1/3 of the world youth in SSA by 2050!

Job Shortfall in "Southern" SSA (Margolis and Yassine for the WB).



- If job creation continues at historical rates, no country would create enough jobs to employ all of the new workers
- The problem is quantitatively smallest in Botswana: only missing 167,000 jobs at the peak
- South Africa, the largest country in the region, would need 6.25 million more jobs than would normally be created, just to keep unemployment at current levels
- Clearly, there is a need to spur job creation in the medium term

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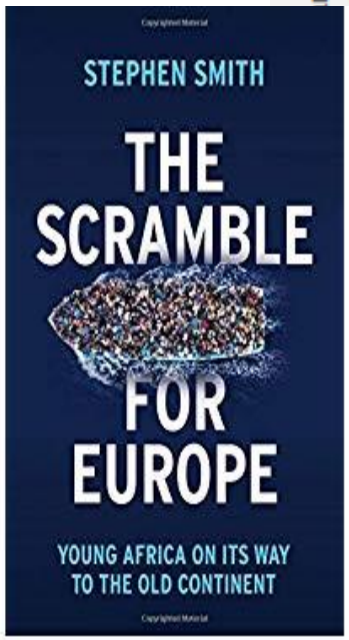

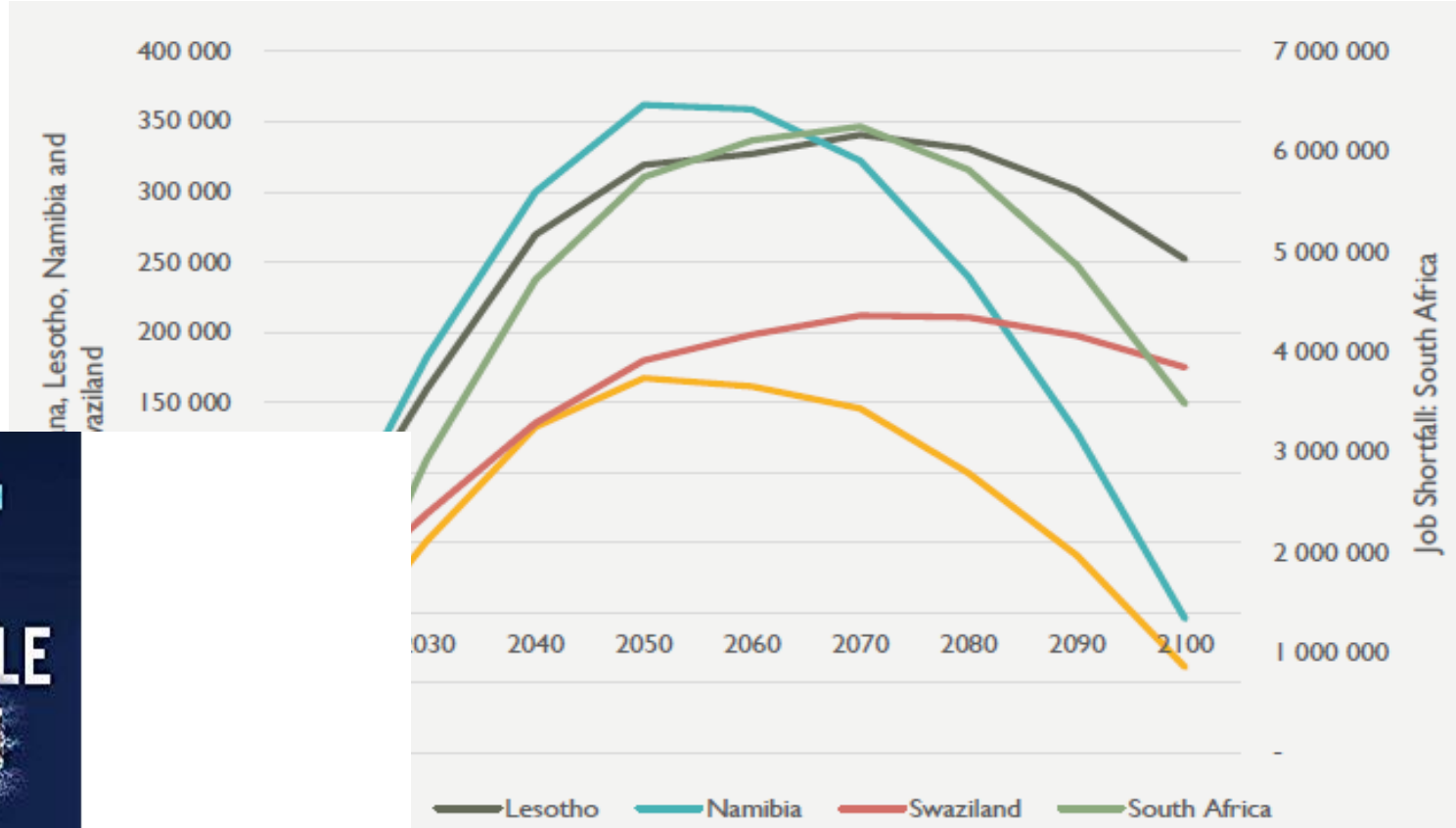

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Replacement migration

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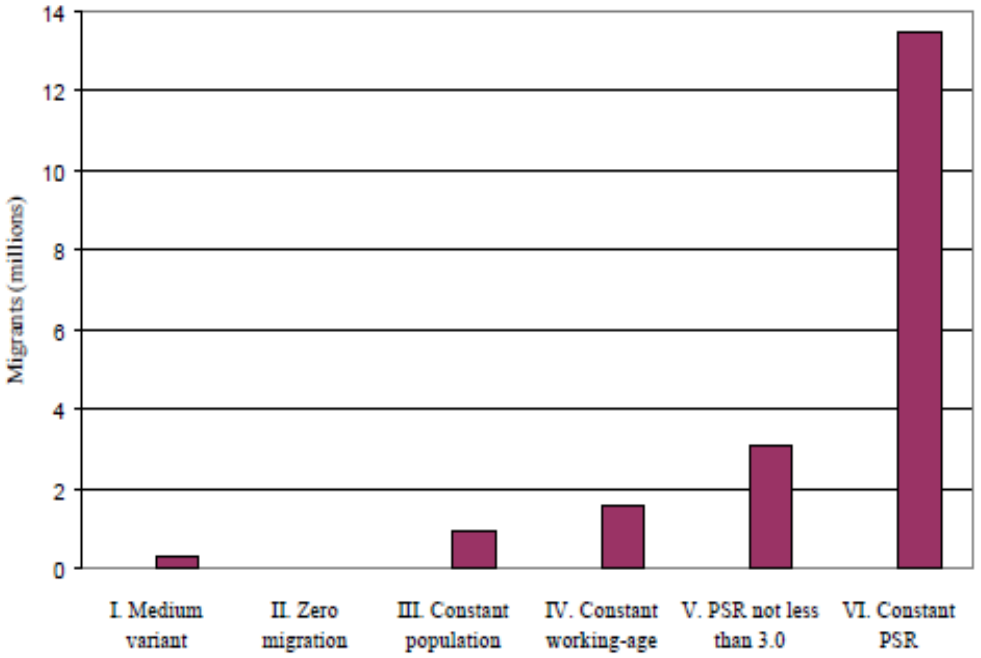
- The UN report in 2001. Available at:

http://www.un.org/en/development/desa/population/publications/ageing/replacement-migration.shtml

- A lot of success! (and some political exploitation, including fans of conspiracy theories as those of R. Camus)
- Various scenarios are here:
  - S1 Population projection of the UN ;
  - S2 is without migration.
  - S3 Maintain Pop at it's max size
  - S4 Maintain size of 15-64 at max size
  - S5 PSR (15-64/65+) at minimum of 3
  - S6 Maintain PSR at max level

Figure 7. Average annual net number of migrants between 2000 and 2050 by scenario for the European Union



Replacement migration

- The UN report was interpreted as: “it’s too many”!
  - In 2015, there were an estimated 2.7 million immigrants to the EU-28 from non-member countries (Eurostat)
  - Of course, one should also subtract emigrants
- So it’s possible. The idea: Immigrants are young adults (then, they age)
- Issues:
  - It is not as if countries could “choose” the number of immigrants; should be interpreted as a benchmark.
  - Population projections are not easy to do (we may discus methodological issue below); plus the fact that you need some information on immigrants (age structure, fertility and mortality patterns),
  - Choice of indicators is difficult: why not having the 15- in the picture? Share of 15-64 within the population is about 2/3 in most developed countries.
  - What would be the optimal ratios? (we may also discuss this below).

The contribution to population of immigration

- Retrospective evaluations (for Europe)
  - Philipov and Schuster (2010): For 21 EU countries observed btw 1947 and 2007. What would be the demographic structure with no migration?
  - No so easy: it depends on the definition of an immigrant; this is due to data limitations; There is no perfect method.

  - Murphy (2016): for England&wales and Scotland, over a long period (1855-2013). He notably points out that the starting date (at which net migration is 0) for evaluation is key.

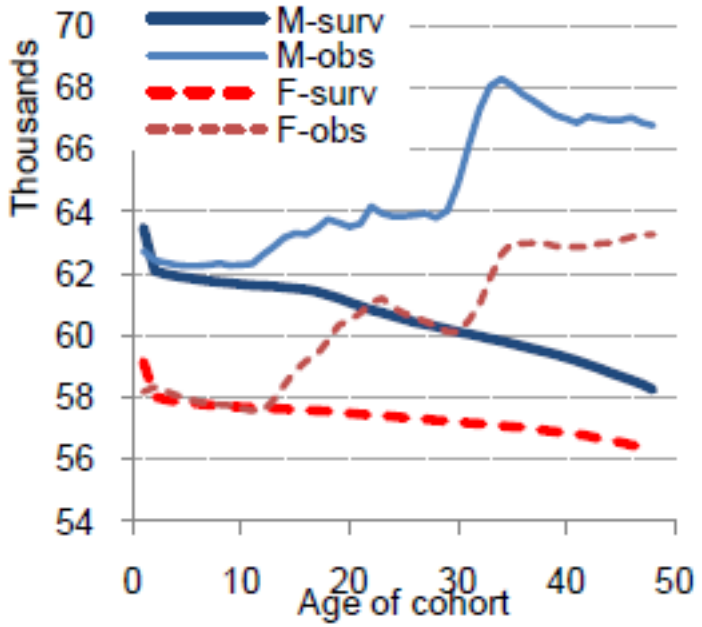
Philipov and Schuster (2010)

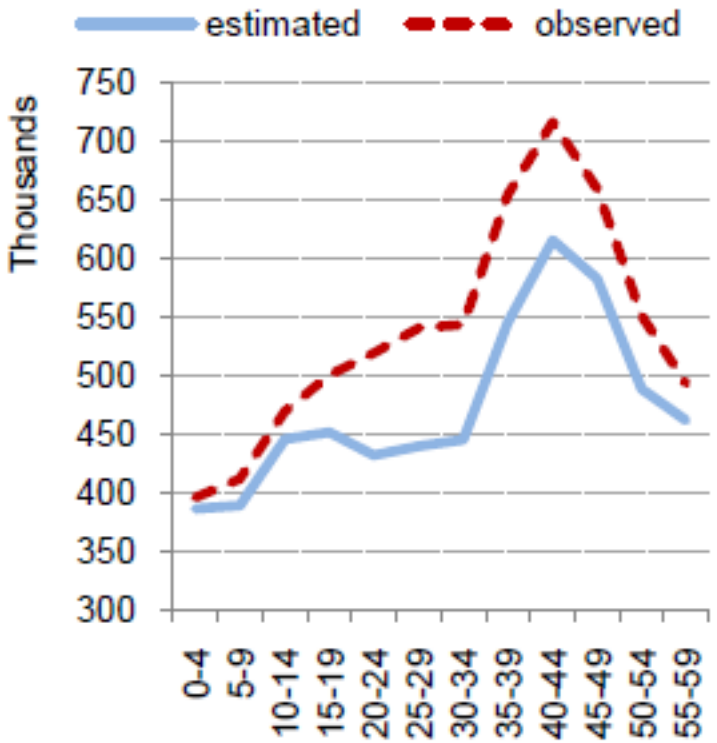
- Method 1: an immigrant is someone who is a foreign-born (after 1947)
  - Start with the births of 1947 and apply (cohort when available) mortality rates (HMD): observe the size of the cohort in 2007;
  - Implicity assumption: no differential mortality btw natives and immigrants
  - Redo it for each cohort; example for Cohort

1960 in Austria (Left)

- Difference in the

age structure of the Population in 2008 (Right)





Philipov and Schuster (2010)

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- Method 2. Suppose that the borders were closed in 1960. Then do a population projection. An immigrant is someone who was not in the country in 1960!
  - Here, one has to impose a differential fertility
  - But you have few informanion (no age distributions; TFR for some dates only =>
  - Many assumptions are needed
  - Then, one could compare the projected Population with the actual one
  - One could also compare the age distribution

	Year	Total population	Nationals	Foreigners
AT	1986	1.47	1.41	2.56
	2008	1.41	1.31	2.01
BE	1985	1.49	1.48	1.82
	1995	1.56	1.49	2.13
E&W	1986	1.8	1.7	2.4
FR	1985	1.82	1.75	3.05
	1999	1.79	1.72	2.8
	2004	1.9	1.8	3.29
DE	1985	1.28	1.25	1.67
	1990	1.45	1.37	2.18
	2006	1.34	1.29	1.66
DK	1999-2003	1.75	1.69	2.43
	2004-2008	1.83	1.82	1.9
NE	1985	1.51	1.48	2.43
	1997	1.56	1.49	2.19
	2008	1.77	1.78	1.87
SE	1986	1.79	1.76	2.24
	2008	1.91	1.85	2.55
ES	1998	1.16	1.12	2.42
	2006	1.38	1.3	1.7
IT	2008	1.41	1.33	2.12

Source: Sobotka (2010, Table 2) for the years beyond 1986 for immigrants of foreign nationality, and OECD (1991, Table III.3) for 1985 and 1986 for foreigners.

Philipov and Schuster (2010)

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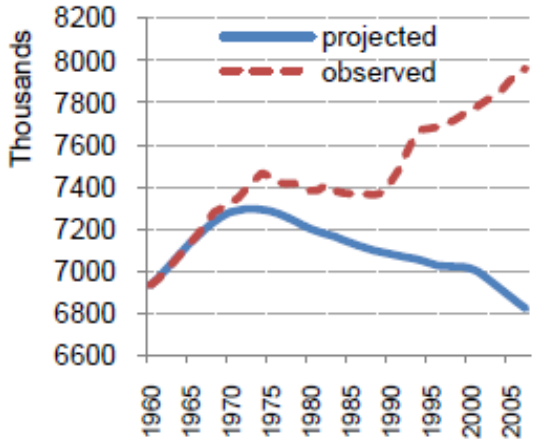
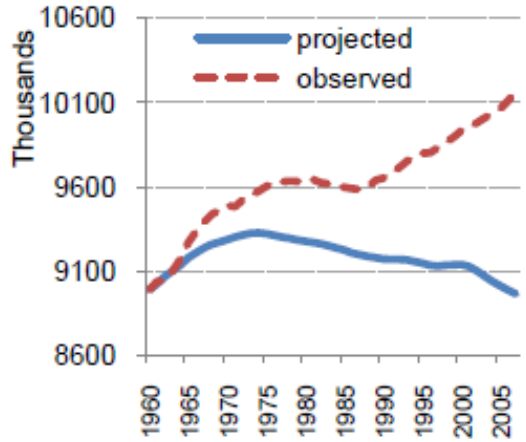
Figure II.1 Projected and observed population change from the initial year indicated in table II.A to January 1, 2007.

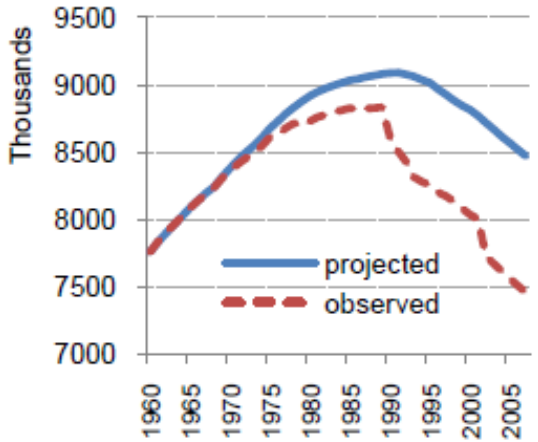
Austria



Belgium



Bulgaria



Czech Republic

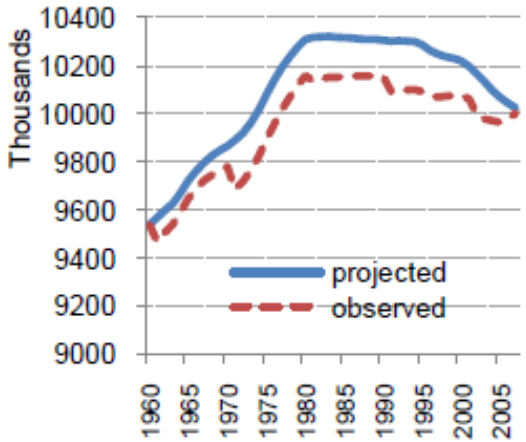
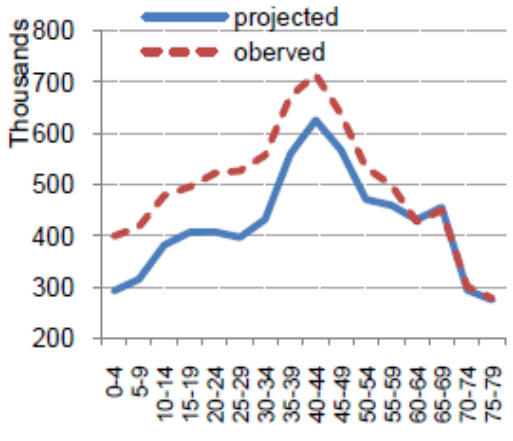


Figure II.2 Projected and observed population on January 1st 2007, by age group.

Austria



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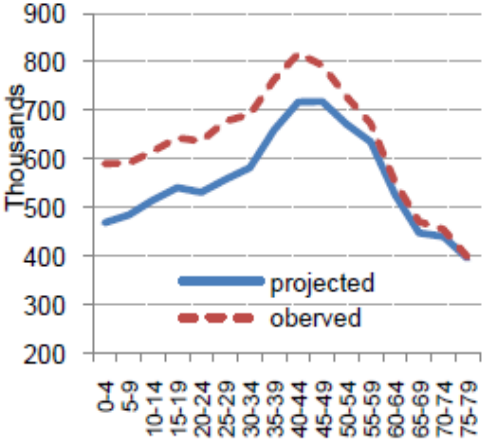

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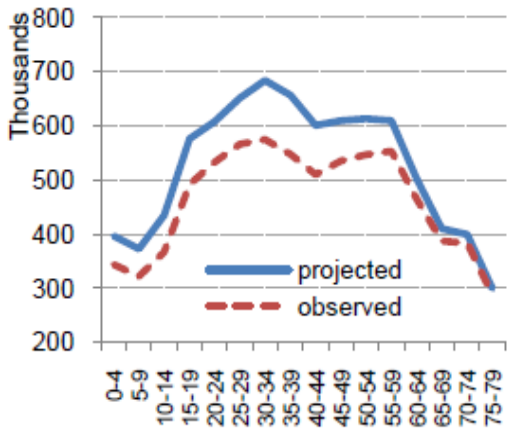

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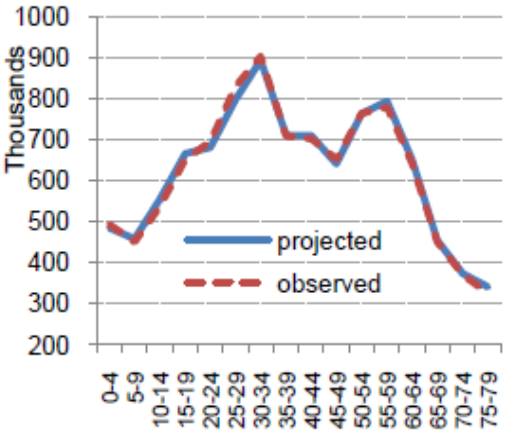


Philipov and Schuster (2010)

- Immigration led to a decline in

Old age dependency ratio by:

- 2.6 pts in Germany
- 0.6 pts in France

This can be explain by the flow that were more important in F. in the 60's. Immigrants are now old

Table 6 Dependency ratios in observed populations and difference between observed and projected populations towards 1.1.2007, age span 0-79, in percent.

	Initial	Old-age		Young-age		Total	
Country	year of proj.	Observed	Diff	Observed	Diff	Observed	Diff
AT	1960	18.4	-2.8	23.2	1.5	41.6	-1.3
BE	1960	19	-1.7	25.8	1	44.8	-0.7
BG	1960	19.9	1.7	19.4	-0.3	39.3	1.4
CZ	1960	15.7	-0.3	20.2	-0.3	35.9	-0.6
DE	1960	22.9	-2.6	21	0.8	43.9	-1.8
DK	1960	17	-0.7	28.2	0.9	45.1	0.1
EE	1960	20	-0.4	21.9	-0.4	41.9	-0.8
FI	1960	18.5	0.3	25.7	0	44.2	0.2
FR	1960	17.7	-0.6	28.4	0.4	46.1	-0.2
HU	1960	17.9	0.4	22.1	-0.2	40	0.2
IE	1986	11.9	-0.3	29.7	-2.2	41.6	-2.5
IT	1960	22.2	-0.8	21.3	0.5	43.5	-0.3
LT	1960	18.2	0.4	23.2	0.2	41.4	0.6
NL	1960	16	-1.3	26.8	1	42.8	-0.2
PL	1961	14.9	0.4	22.3	-0.2	37.2	0.2

Murphy (2016): Impact on size

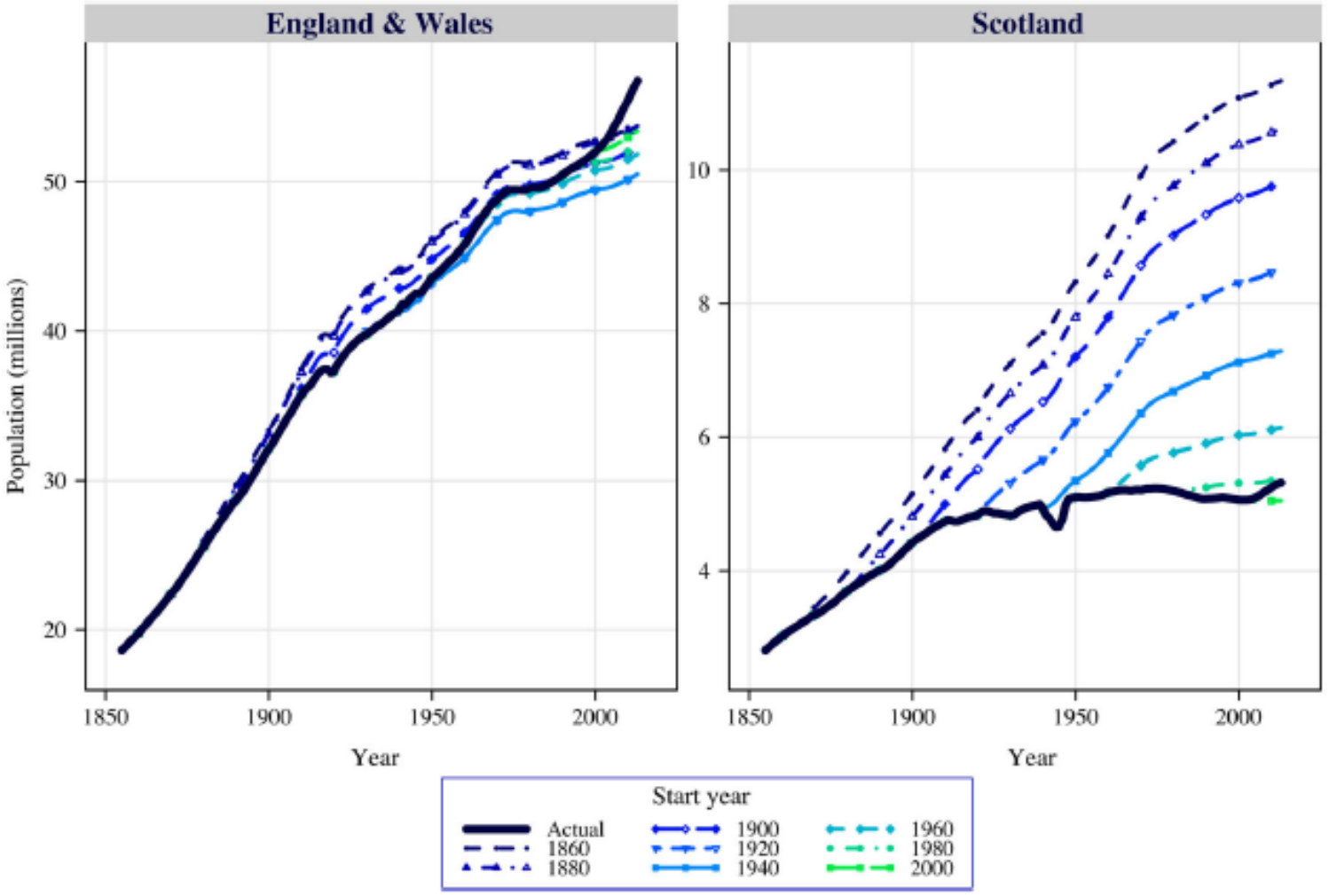
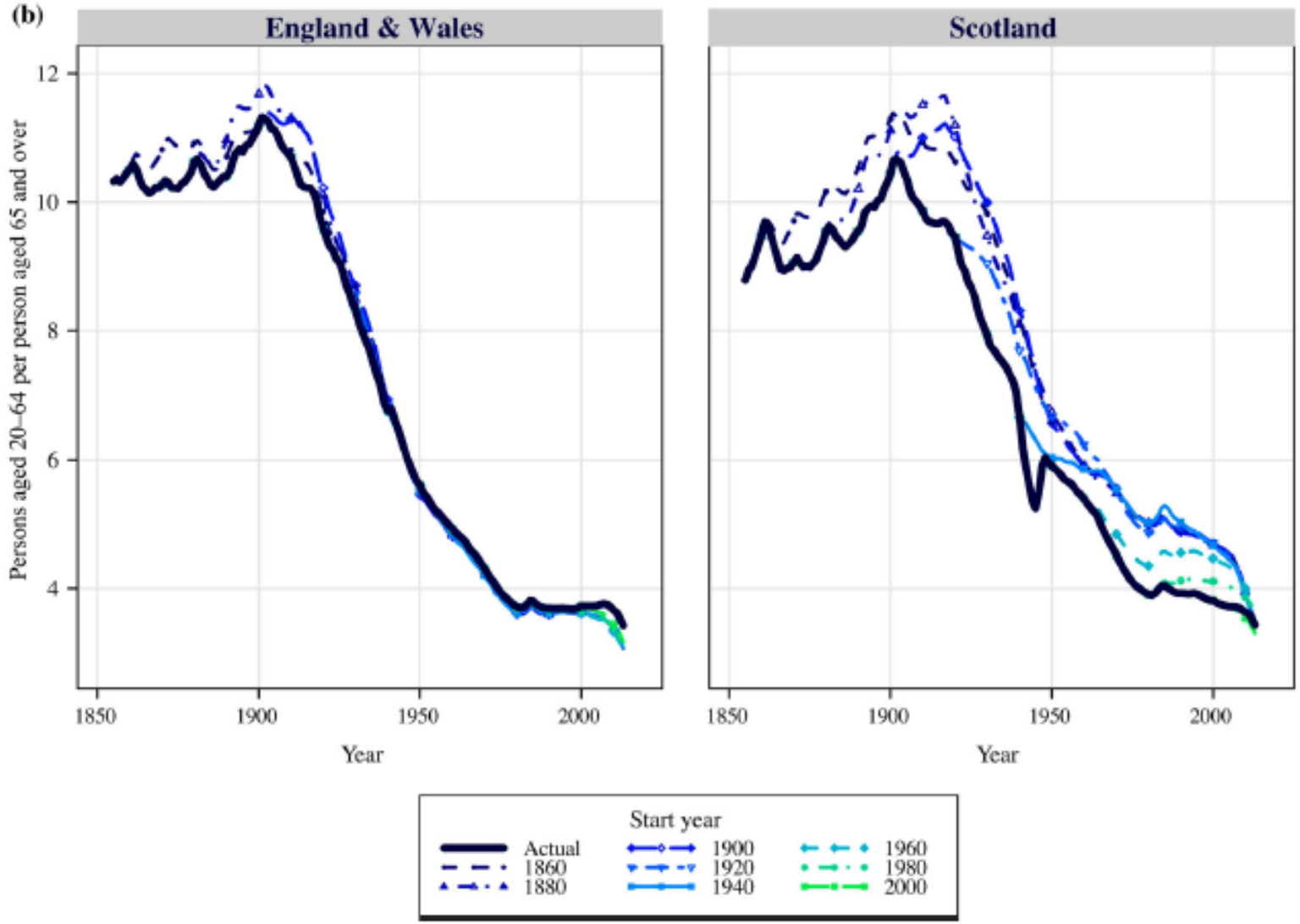


Figure 1 Population to 2013 by year net migration becomes zero, England & Wales and Scotland, 1855–2013

Murphy (2016) Impact on age structure



Some political implications

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- Vladimir Putin (2012): *we will definitely need a smart migration policy based on clear-cut standards and criteria, which would prevent the risks of ethnic or cultural clashes. We will need to maintain the inflow of migrants at 300,000 persons a year. We will primarily aim to extend the invitation for permanent residence in Russia to our compatriots living in other countries, as well as skilled professionals and promising young people.*
- Jack McConnel (Labor Scottish Executive First Minister, 2004): *The single biggest challenge facing Scotland as we move further in the 21th century is our falling population.*
- But still the issue about ageing is discussed. For Murphy, migration is not sufficient as soon as there is no continuous increase in migration rates,

Introduction to demographic models

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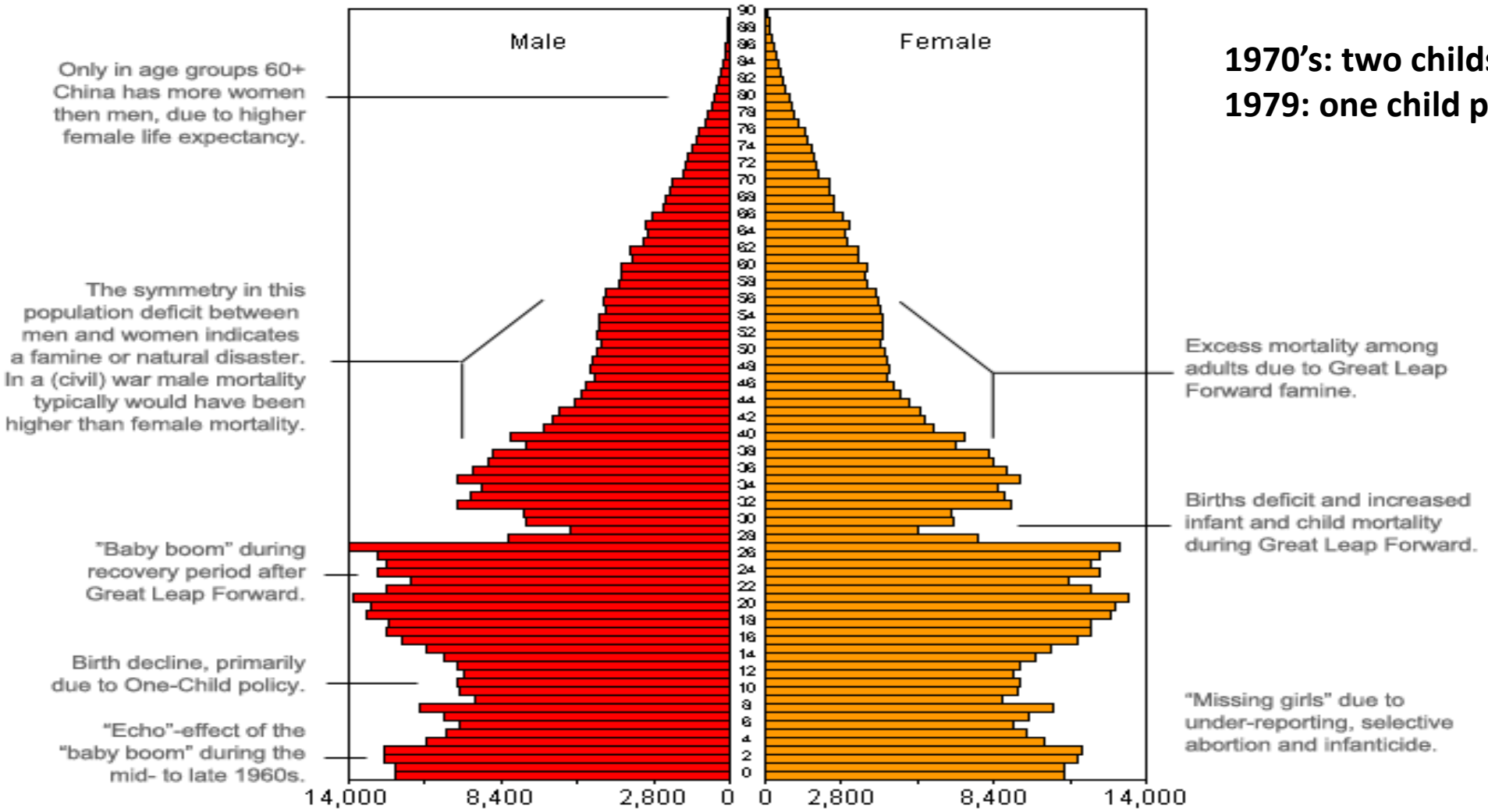
- Suppose a population with 3 age groups and no migration:
  - The fertility rate is f_2 at age 2 and zero otherwise,
  - The survival rate is p_1 between ages 1 and 2 and p_2 between ages 2 and 3.

- What is the dynamics of the population?
- What happen if the fertility rate at age 3 is f_3 rather than 0?
- What is the impact of a permanent increase in longevity or fertility?
- How can immigration be introduced? What is the impact of an immigration shock/permanent increase?

Echoes effects: an example with China's age distribution in 1990



1970's: two childs policy
1979: one child policy

First messages and next steps

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- Immigration increases population ☺
- Immigration modifies aging ratios in a less impressive (but might be significant) way
  - Immigration has an effect on aging ratios
  - Permanent immigration is necessary to maintain the process

- Objective : Linking demographic trends to the economy.

Linking demographic trends to the economy

- A starting point relies on “simple” accounting exercises.
- A life-cycle approach is useful for e.g. taking into account that immigrants arrives at about age 20, and that there is no expenses needed to finance their education
- The NTA project (Mason and Lee): initially done to evaluate the impact of demographic changes on the macro economy, can be useful.
- Some applications were proposed to the issue of migration.

The NTA project (www.ntaccounts.org)

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- An accounting exercise that is consistent with National Accounts but
  - Break down of variables by age (and sex)
  - Transfers within family and households
  - A unique international methodology
- Impact of population age distributions on economic development as economic needs and behaviors vary with age.
- A simple flow equation:

$$\underbrace{C(x) - Y^{l}(x)}_{\text{Lifecycle deficit}} = \underbrace{\underbrace{\tau^{+}(x) - \tau^{-}(x)}_{\text{Net transfers}} + \underbrace{Y^{A}(x) - S(x)}_{\text{Asset-based reallocations}}}_{\text{Age reallocations}}$$

Profiles for France and the 3 ages of life

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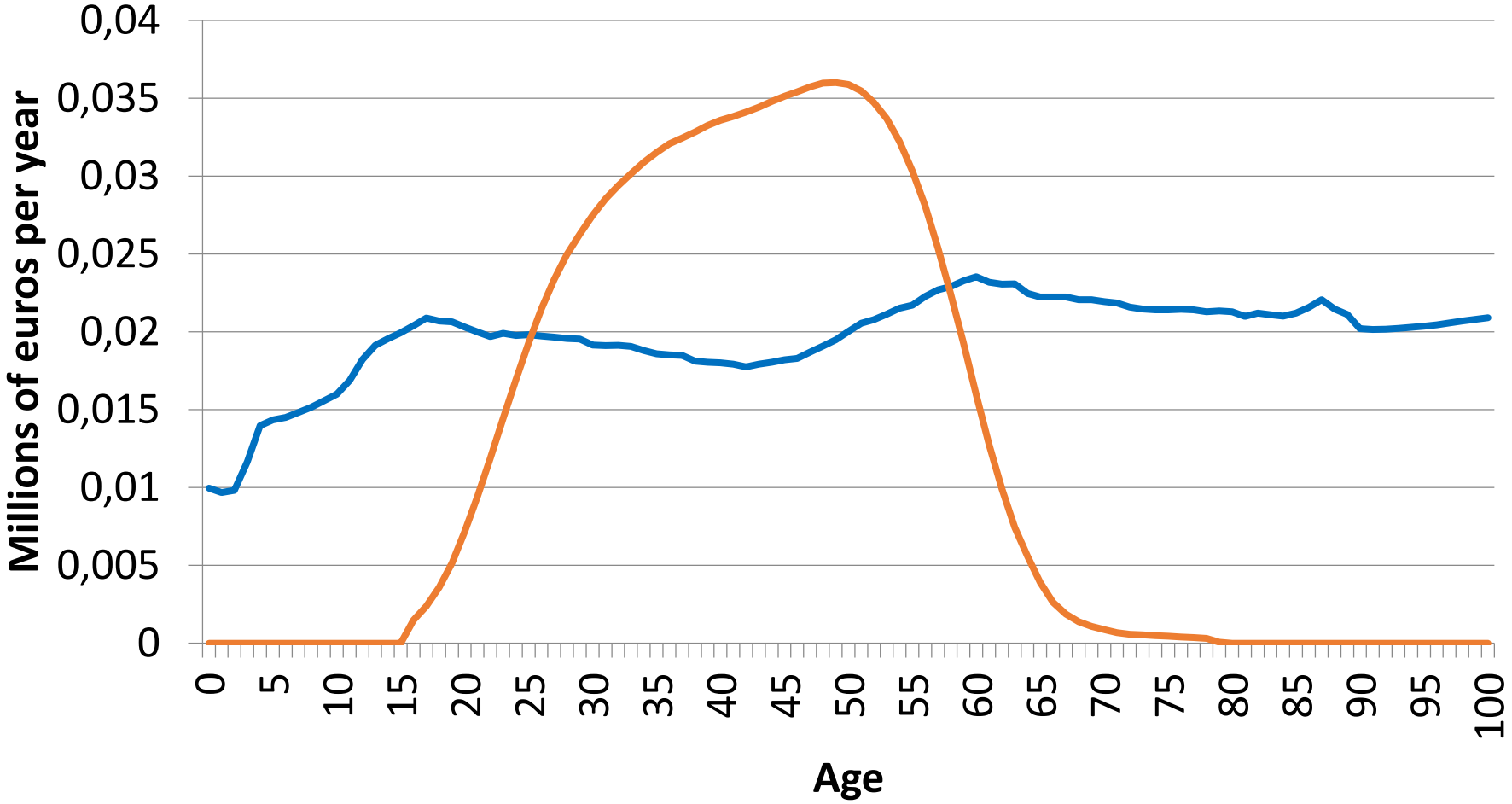
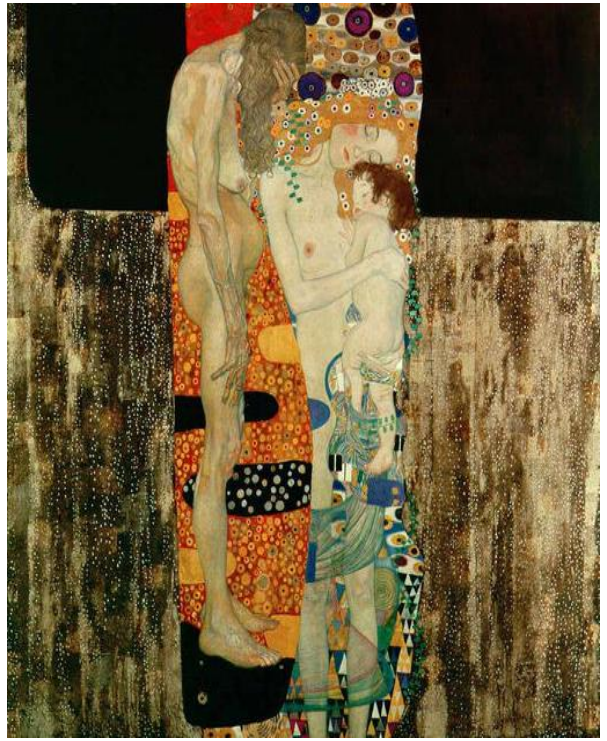
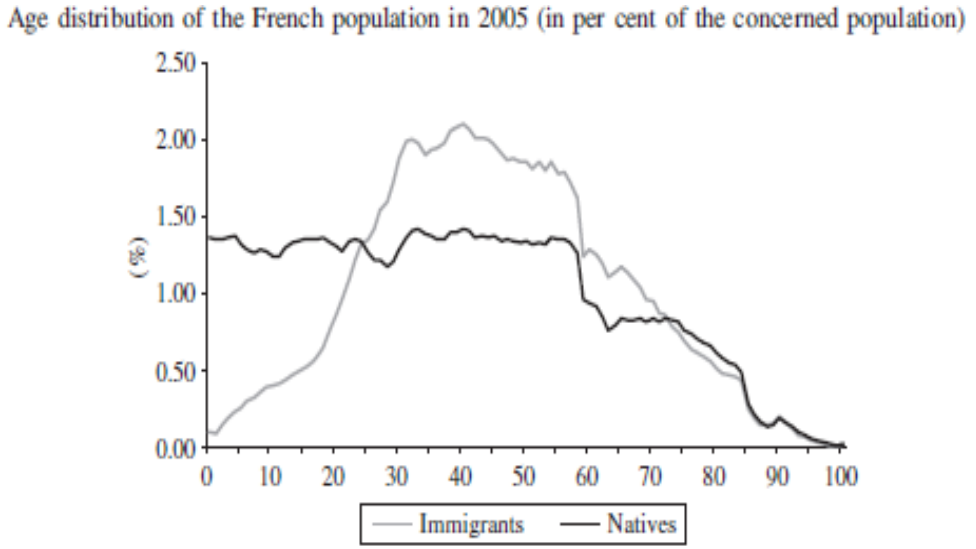
Consumption and labor income: age profiles in 2005





NTA applied to immigration

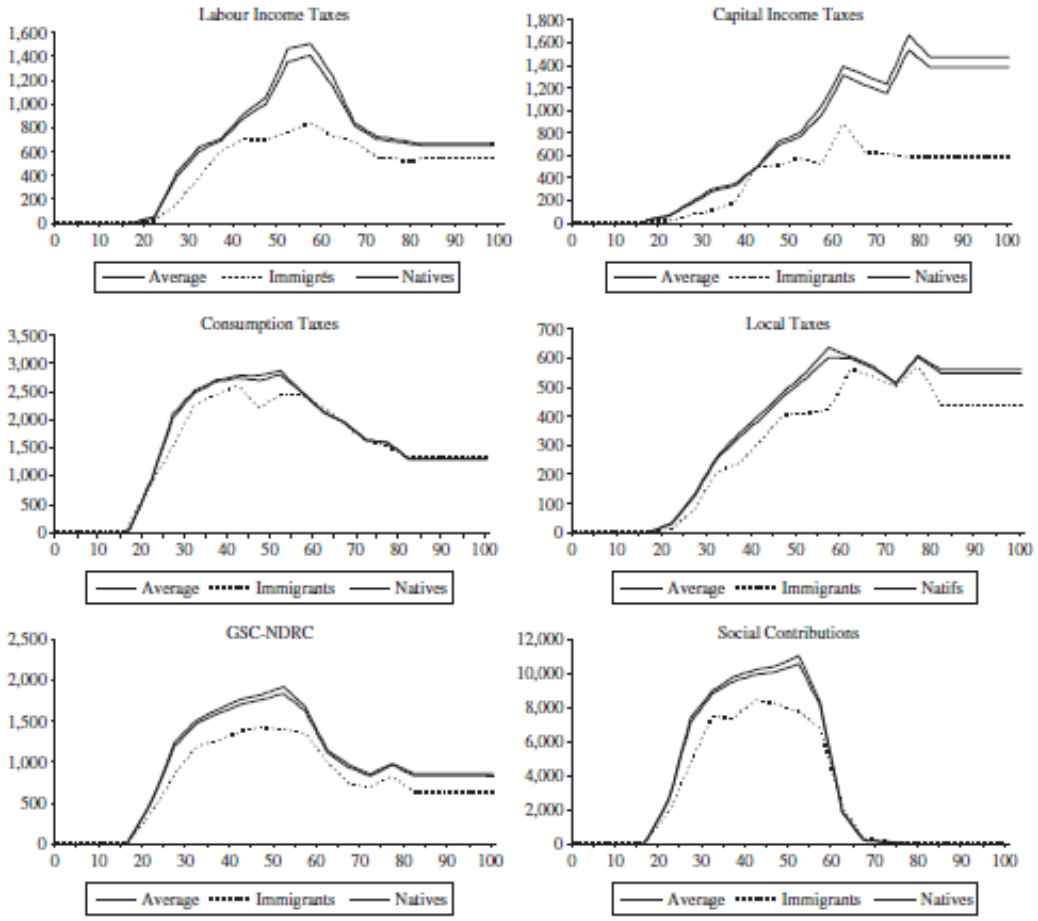
- Chojnicki (2013) proposes an evaluation of the fiscal impact of immigration in France
  - Profiles for 2005
  - Static approach: compares the net contributions of immigrants and natives; the net contribution of immigrants is found to be positive (due to the age structure effect on pensions)



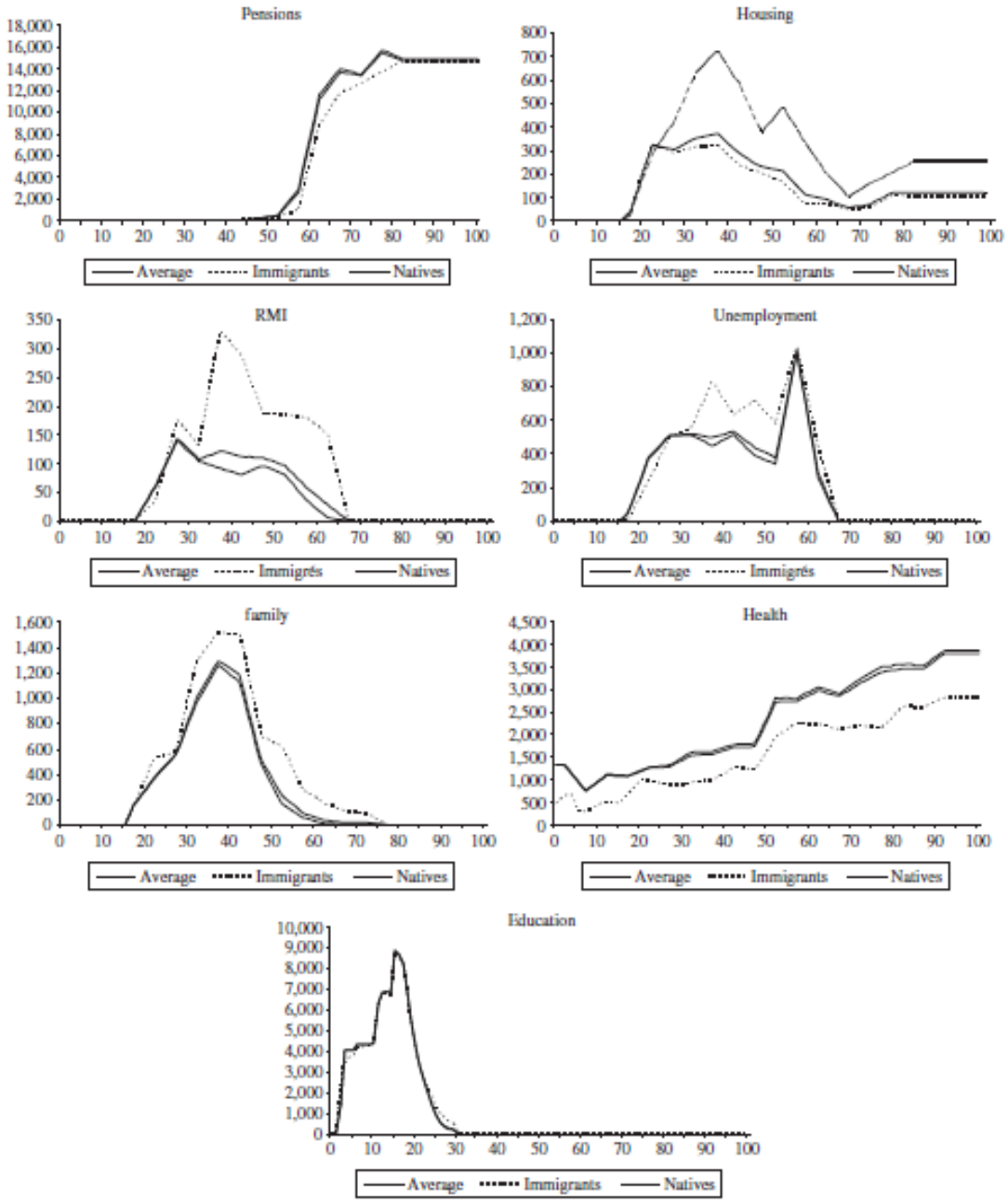
  - Issues: 1/ one has to relies on good data (for immigrants; and relative ages profiles; in the survey there is 19,000 persons of whom 2,300 immigrants) 2/ there is no rescaling of micro-data on National Accounts 3/ No confidence intervals
  - Possibility to do dynamic exercises with generational accounting methods as in Auerbach and Oreopoulos (2000) but there are so many key assumptions (growth, discount, behaviors) that they are difficult to interpret.

Chojnicki (2013): taxes and benefits

FIGURE 4
Average Transfers Profile per Age and Origin (in Euros)



Average transfers profile per age and origin (in euros)



Chojnicki (2013): Net fiscal impact

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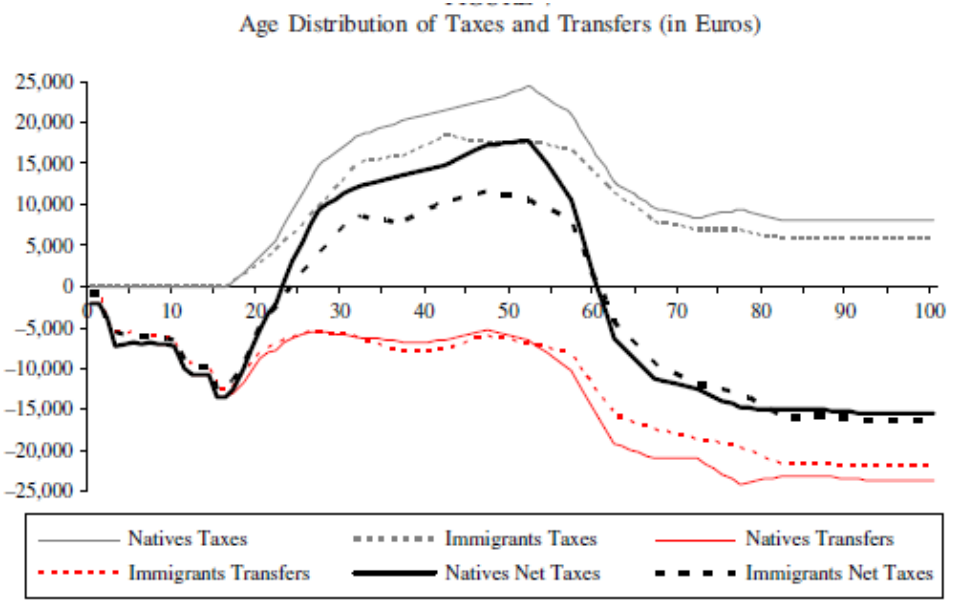
Fiscal Impact of Immigration in 2005

Taxes	*Annual Amounts (in Million of €)*	*% of Total*	*Transfers*	*Annual Amounts (in Million of €)*	*% of Total*
Labour income taxes	3,414	6.9	Pension	16,365	7.4
Capital income taxes	3,350	5.7	Housing	2,593	18.8
Consumption taxes	18,335	9.3	RMI	1,740	21.9
Property taxes	2,541	8.1	Unemployment	5,047	13.0
GSC-NDRC	6,215	8.1	Familly	6,724	14.5
Social contributions	26,457	8.5	Health	11,154	6.2
Other taxes	11,714	8.1	Education	4,222	3.6
			Other spending	20,295	8.1
Total	72,026		Total	68,140	
Net fiscal impact	3,885				

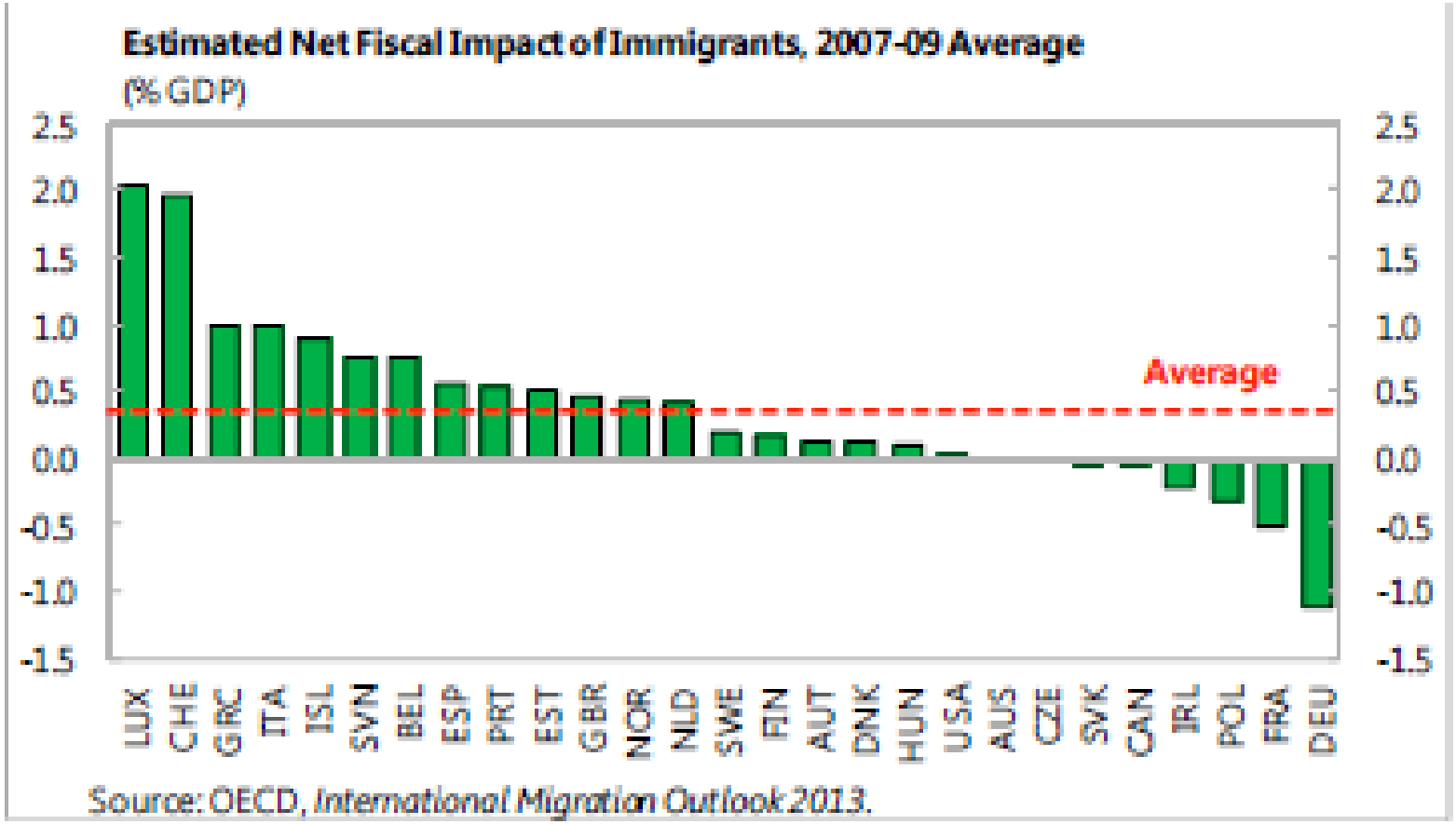
Note:
(i) GSC, generalised social contribution; NDRC, national debt repayment contribution; RMI, minimum income.

Dynamic effects with generational accounting exercises



- Intuitive implications:
  - As the current population of immigrants ages its fiscal impact becomes negative,
  - Since they use the current age profile for their forecasts, authors obtain a positive impact of immigration in the future.
  - Since the proportion of migrants in the Population remains small, the aggregate fiscal impact is small.
  - Auerbach and Oreopoulos (2000) are using Lee and Miller (1997) profiles for migration, and modify them in order to further decompose them by gender.

Accounting methods have fan, like the OECD



A (bit) more sophisticated methods

IMF: Asylum seekers constitutes a fiscal cost

Fiscal Cost of Asylum Seekers, 2014-16[1]
(Percent of GDP)

	2014	2015	2016
Austria	0.08	0.16	0.31
Belgium	0.07	0.09	0.11
Croatia	0.002	0.09	0.11
Cyprus	0.003	0.012	0.012
Czech Rep.	0.0	0.0	0.02
Denmark	0.24	0.47	0.57
Finland	0.09	0.13	0.37
France	0.05	0.05	0.06
Germany	0.08	0.20	0.35
Greece	n.a.	0.17	n.a.
Hungary	0.0	0.1	0.0
Ireland	0.03	0.04	0.05
Italy	0.17	0.20	0.24
Luxembourg	0.05	0.09	0.09
Netherlands	0.10	0.18	0.23
Serbia	0.00	0.06	0.1
Spain	0.006	0.006	0.03
Sweden	0.3	0.5	1.0
U.K.	0.015	0.016	n.a.
Simple average	0.07	0.14	0.22
GDP-weighted average	0.08	0.13	0.19

Source: IMF staff estimates based on authorities' information and/or other sources.

A (bit) more sophisticated methods

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Microsimulation models, like ECOMOD used by
the IMF to evaluate the cost/benefits of the refugee crisis
in Europe:

57. **The inflow of asylum seekers is likely to have an immediate expansionary effect on the economy.** In the short term, additional public spending will increase domestic demand and GDP. IMF staff estimate that this effect will be modest for the EU as a whole (raising the level of GDP by some 0.1 percent in 2017), but more pronounced in the main asylum seeker destination countries. GDP per capita will be lower, reflecting the weaker labor market performance of refugees and restrictions on labor market access to asylum seekers in some countries. In the long run, the economic impact will depend on the speed of integration of refugees into the labor market.

Macro-models

Static or dynamic computable OLG models for prospective evaluations as in Storesletten (2000, 2003), Schou (2006).

Models take into account interactions between variables and help:

- to understand the mechanisms and evaluate the possible channels.
- to perform welfare analysis.

However:

- most models are not estimated (we don't know whether they do reproduce the past) and robustness analysis are not so easy to perform.
- it's difficult to apprehend the key mechanisms with those large models.

Back to the basics

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Capital dilution effect of migration:

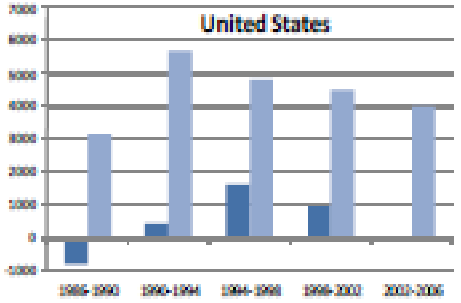
=> How to introduce migration in the Solow model?

=> How shall we model lower participation/complementarities ?

=> Migrants bring physical/human capital

Migrants brings capital

- Physical *vs* human capital: is the reasoning different?
  - If migrants brings more human capital, then GDP per capita may increase.
  - The initial idea is in Dolado et al, 1994.
  - More recently, Boubtane et al., 2013, use the OECD database for 22 countries over the period 1986-2006



Net migration rate of native-born (thousands)

Net migration rate of foreign-born (thousands)

share of tertiary educated among native born emigrants to other OECD countries (percentage)

share of teriary educated among immigrants (percentage)

Table A.1 Main data sources for net migration data and the educational attainment of recent foreign-born migrants

Country	Period	Foreign-born and native-born net migration	Education of recent foreign-born migrants
AT	1994-2006	LFS	LFS
AU	1986-2006	Department of Immigration and Citizenship	Census
BE	1986-1990	Census	LFS
	1990-2006	Register	LFS
CA	1986-2006	Census	Census
CH	1986-1998	Census	LFS
	1998-2006	Federal Statistical Office (FSO).	LFS
DE	1986-2006	Federal Statistical Office (Destatis)	LFS
DK	1986-1990	Census	LFS
	1990-2006	Register	LFS
ES	1986-2002	Census	LFS
	2002-2006	Register	LFS
FI	1986-1990	Census	LFS
	1990-2006	Register	LFS
FR	1986-2006	Census	LFS
GR	1994-2006	LFS	LFS
IE	1986-2006	Census	LFS
IS	1986-2006	Register	LFS
IT	1986-2002	Census	LFS
LU	1986-2002	Census	LFS
LU	2002-2006	LFS	LFS
NL	1986-2006	CBS	LFS
NO	1986-2006	Register	LFS
NZ	1986-2006	Statistics New Zealand	Census
PT	1986-2002	Census	LFS
	2002-2006	LFS	LFS
SE	1986-1990	Census	LFS
	1990-2002	Register	LFS
	2002-2006	Statistics Sweden	LFS
UK	1986-1990	Census	DIOC
	1990-2006	Office for National Statistics	LFS
USA	1986-2006	Census	LFS

LFS : Labour Force Survey Eurostat for European countries and Current population survey for the United States.
DIOC: Database on immigrants in OECD countries

Estimation of the parameter associated to human capital of migrants

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Table 4. estimated impact of increases in net migration of the foreign-born and selectivity of migration on productivity growth

	Key structural variables			Impact on productivity growth, percentage points		
Country	Average annual net foreign-born migration rate, % (m)	Share of tertiary educated foreign-born migrants, % (hi)	κ^j	+1 percentage point in net migration	50% increase in net migration	10% increase in κ^j the relative share of highly skilled migrants
AT	0.47	18.9	2.0	0.25	0.060	0.18
AU	0.56	36.6	1.8	0.10	0.029	0.16
BE	0.44	33.6	1.7	0.11	0.024	0.14
CA	0.76	49.5	1.7	0.05	0.017	0.21
CH	0.97	34.2	1.9	0.14	0.070	0.33
DE	0.58	20.3	1.1	-0.14	-0.040	0.11
DK	0.33	28.4	1.4	-0.02	-0.004	0.09
ES	0.56	24.1	1.4	-0.06	-0.017	0.14
FI	0.17	24.0	1.2	-0.08	-0.007	0.04
FR	0.32	27.8	1.8	0.16	0.026	0.11
GR	0.32	13.5	1.0	-0.27	-0.044	0.06
IE	0.81	43.6	2.7	0.46	0.184	0.35
IS	0.55	34.7	2.3	0.33	0.090	0.21
IT	0.29	10.9	1.6	0.11	0.016	0.10
LU	1.24	35.5	2.1	0.13	0.083	0.43
NL	0.35	22.8	1.3	-0.04	-0.008	0.09
NO	0.36	29.4	1.3	-0.08	-0.015	0.08
NZ	0.79	35.2	1.8	0.12	0.048	0.23
PT	0.09	18.3	2.6	0.54	0.025	0.04
SE	0.50	36.6	1.6	0.06	0.016	0.15
UK	0.37	39.6	2.0	0.25	0.046	0.14
US	0.51	26.7	1.0	-0.21	-0.053	0.08
EU15	0.46	26.5	1.7	0.10	0.02	0.14

Note: κ^j is the relative human capital of foreign-born (resp. native-born) migrants compared to the average human capital per worker in the host economy. On average over the period considered κ^j is slightly below 1 only for two countries, the United States and Greece.

Scale effects

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- Models of endogenous growth are well-known to generate scale effects.
- Exercise: compute the impact of population changes in a Solow model with increasing returns to scale.
  - A simple way is Arrow/Romer's capital externalities.
  - More complicated ways leads to similar results (debate between endogenous and semi-endogenous growth).
- Application: Aubry and al. 2016 use a model of endogenous growth with Taste for Variety:
  - Immigration causes an increase in the aggregate mass of varieties (the equilibrium number of firms is proportional to the size of the countries).
  - For a review of scale effect in endogenous growth models see: Dinopulos 1999

More sophisticated macro analysis

Estimation of the effects on GDP per capita, fiscal balance and inequalities.

Developing modern macro models to analyze them

D'Albis, Boubtane and Coulibaly (2019)

Provide a macroeconomic analysis of the consequences of net flow of migrants in some OECD countries with a focus on:

- Fiscal variables (Government spending and revenues),
- Controlling for macro variables (GDP per capita and unemployment),

Evidence using a panel of 19 countries (countries members of the OECD since the 1970s; fiscal data availability in Economic outlook database) over 1980-2015:

- Average economic response to migration shock (not a country specific analysis),
- No distinction btw natives and foreign-born in the flows nor in the effects.

=> A macro-dynamic perspective using yearly data.

Empirical methodology

Data based analysis using panel VAR models

=> A strategy that allows to address the issue of reverse causality;

=> A strategy that used for the evaluation of the macro effects of shocks on public spending (the “Keynesian multiplier”) since Blanchard and Perotti (2002), Alesina et al (2002), Perotti (2005), Beetsma et al (2006, 2008, 2011), Monacelli et al (2010);

=> We replicate their findings in an model that includes migration.

Data coverage

Estimation of a structural VAR model on a panel of 19 countries:

Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Iceland, Italy, Japan, Netherlands, Norway, Spain, Sweden, Portugal, UK, US.

Yearly observations from 1980 to 2015 (balanced panel)

Fiscal variables are obtained from the *OECD Economic Outlook database*.

Demographic variables are taken from *Eurostat, OECD Population and Vital Statistics*

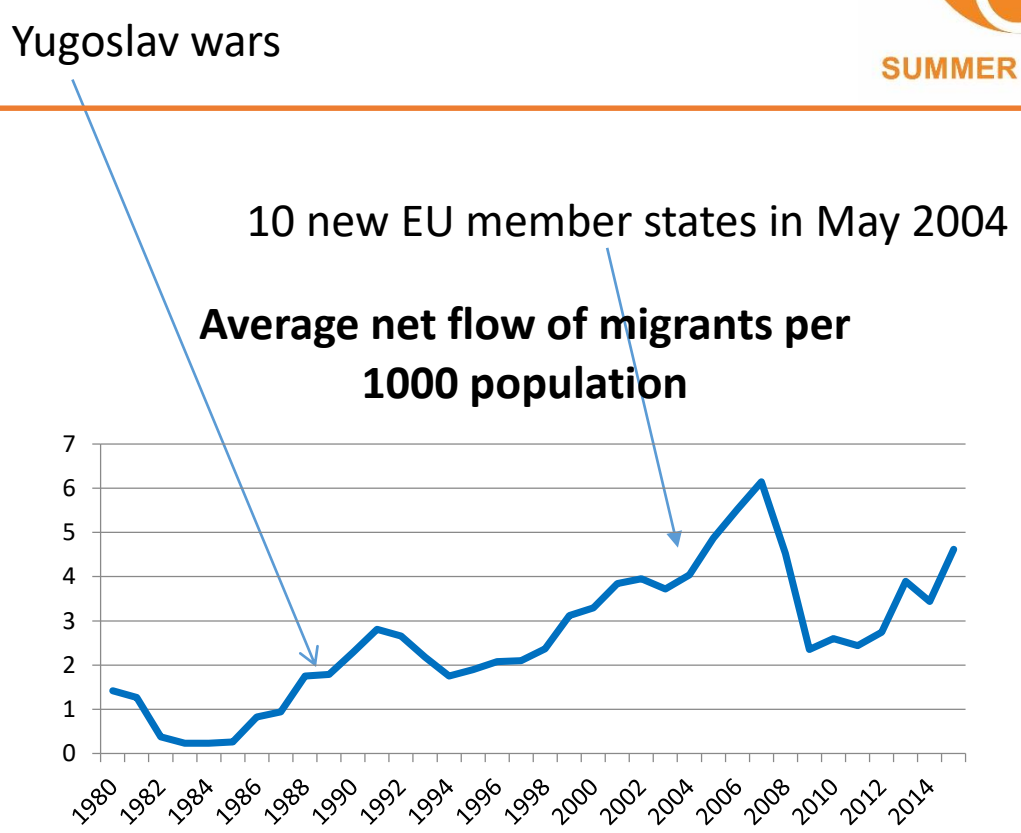
Main variables expressed using average population:

in per 1.000 population: net flow of migrants.

in per capita : real GDP, real gov. purchases, real transfers, real tax revenues.

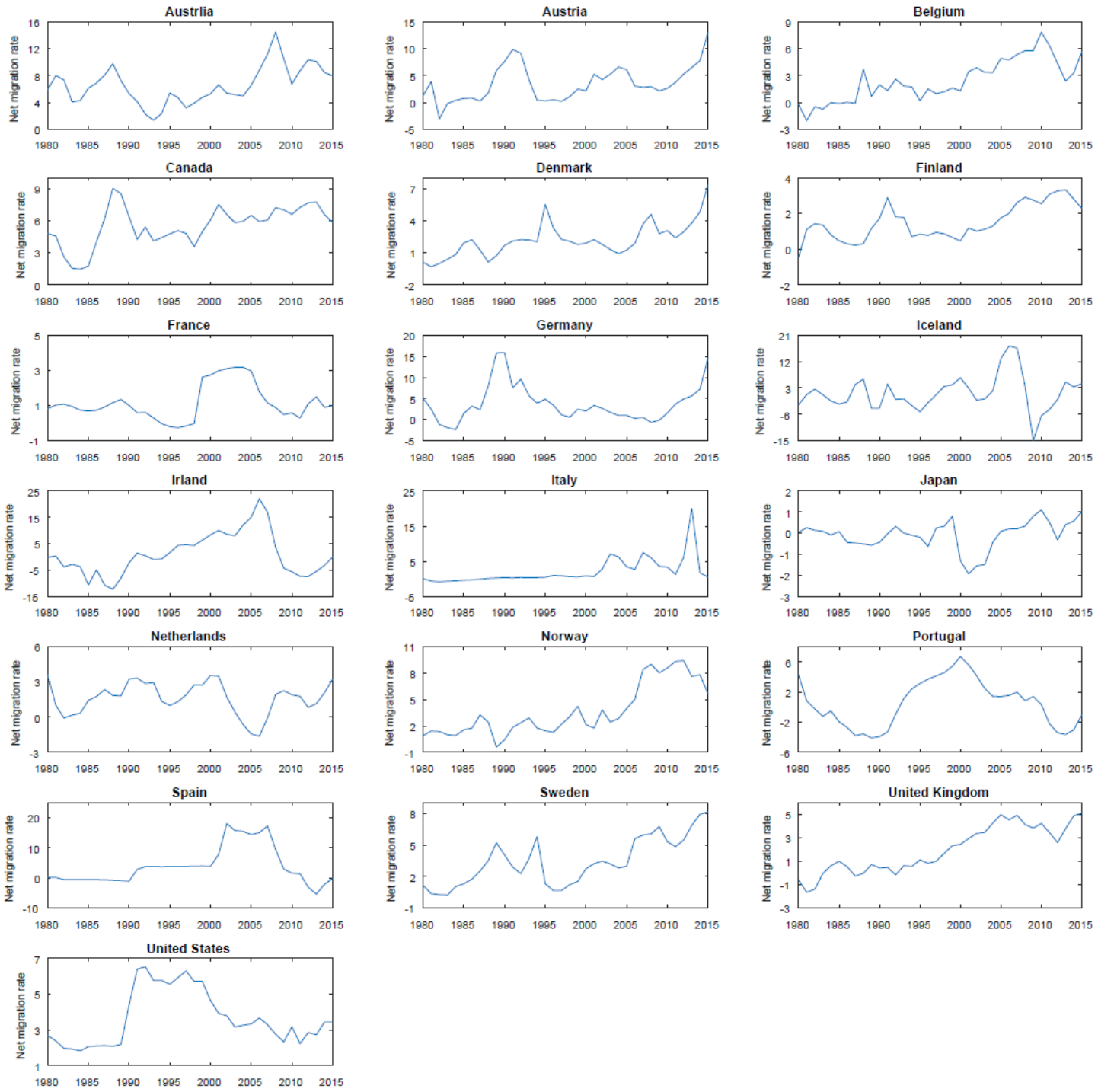
Net flow of migrants

- Net migration = total increase in the resident population – natural increase
  - Include nationals (and EU citizens)
  - Per 1,000 population
- No other (consistent) sources providing annual data for all countries since 1980
  - Flow of entries are at best computed since 1990 (when they are)
  - Flow of exits are not computed
- No decomposition of the flow



Net flow of migrants

Heterogeneity across countries



Public finance variables

Fiscal balance = Tax Revenues – Transfers – Gvt. Purchases

Revenues

- Direct and indirect taxes
- Social security contributions received by Gen.Gvt
- Property income and other current receipts, received by Gen.Gvt

Transfers

- Social security benefits paid by Gen.Gvt
- Property income and other current outlays (e.g. subsidies), paid by Gen.Gvt

Gvt. Purchases

- Gen.Gvt final consumption
- Gen.Gvt gross fixed capital formation

Public finance variables

Net Taxes (used in the fiscal multiplier literature)

Fiscal balance = Tax Revenues – Transfers – Gvt. Purchases

Revenues

- Direct and indirect taxes
- Social security contributions received by Gvt
- Property income and other current receipts, received by Gvt

Transfers

- Social security benefits paid by Gvt
- Property income and other current outlays (e.g. subsidies), paid by Gvt

Gvt. Purchases

- Gvt final consumption
- Gvt gross fixed capital formation

Public finance variables

Fiscal balance = Tax Revenues –Transfers – Gvt. Purchases

Revenues

- Direct and indirect taxes
- Social security contributions received by Gvt
- Property income and other current receipts, received by Gvt

Transfers

- Social security benefits paid by Gvt
- Property income and other current outlays (e.g. subsidies), paid by Gvt

Gvt. Purchases

- Gvt. final consumption
- Gvt. gross fixed capital formation

Public spending. Useful in order to decompose spending dedicated to old or young

Average Fiscal Balance to GDP (in %)

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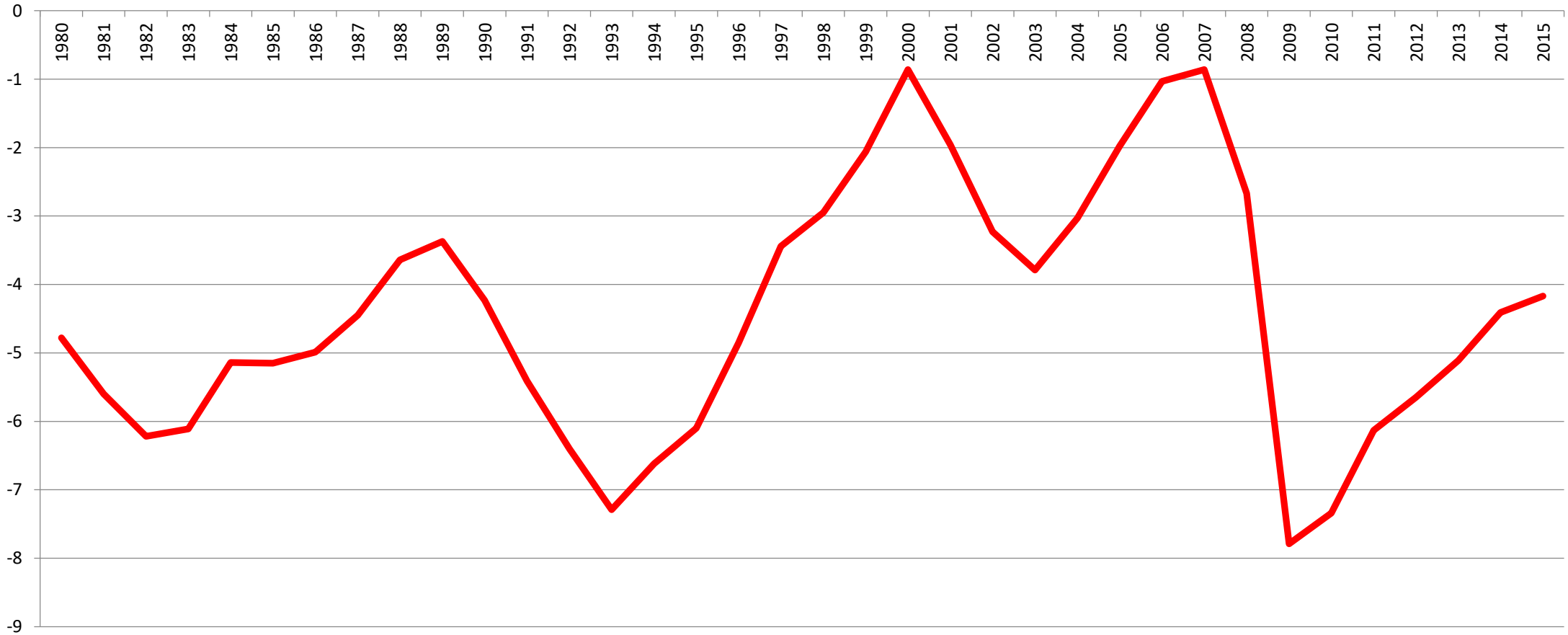

VAR models for (fiscal) policy evaluation

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Blanchard and Perotti (2002) use VAR for U.S. to estimate multipliers of government purshase and taxes.

=> initiated a large literature.

The closest to us are Alesina et al. (2002) and Beetsma et al. (2006, 2008, 2011) who use a panel of OECD countries with annual data.

- No quarterly data for migration (as for fiscal variables in most countries).
- Identification of fiscal shocks is more accurate with annual data.

The structural VAR model

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Two-step procedure:

1/ Estimate a model that writes: $Z_{it} = \sum_{s=1}^{p} A_s Z_{it-s} + v_i + \varepsilon_{it},\ i = 1,\ldots,N$ and $t = 1,\ldots,T$

where *Z* is the vector of endogenous variables, *N=19*, *T=36* (and after tests *p=2*). There is also country-fixed effects, year-specific effects and country specific time trends (to mitigate heterogeneity in the panel, upon existence).

2/ Identify structural shocks and compute Impulse-response functions (*i.e. the response of the variable to an exogenous shock*).

Strategy:

1/ Reproduce the results of the fiscal literature in a model with migration

2/ Evaluate the impact of a migration shock

Identification

Identification is based on a Choleski decomposition (*variables can impact contemporaneously the variables that are ordered after them)*.

Our benchmark model uses the following order:

1. Net flow of migrants,
2. Real per capita public spending (or gvt purchase),
3. Real per capita tax revenues (or net taxes), (*not cyclically adjusted*)
4. Real per capita GDP.

All variables are in natural logarithms (or ln(1+x)).

Discussion on identification

=> Net flow of migrants is placed first as decisions are taken before the date of arrival.

The potential issue of expectation is addressed as a robustness check.

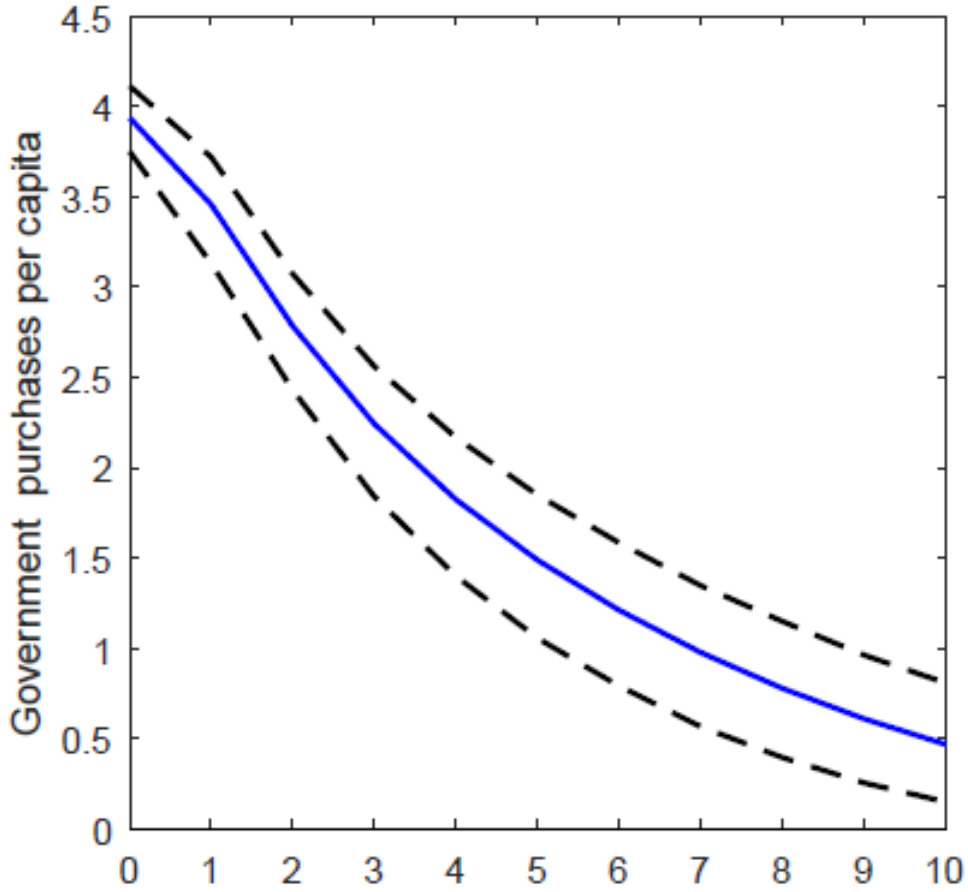
=> Fiscal and economic variables: the ordering is the one of the literature. Decisions on public spending are made the year before (during the Budget Act) while taxes can include discretionary or cyclically-sensitive components.

Results are robust to another identification strategy that uses sign restrictions

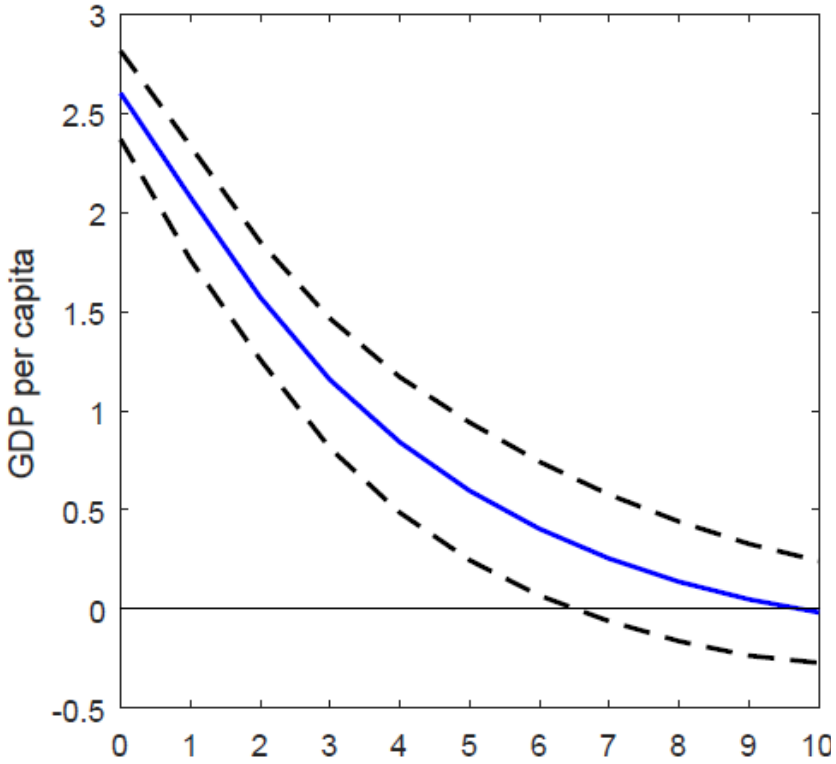
Replication of the fiscal policy literature: a shock on government purchases

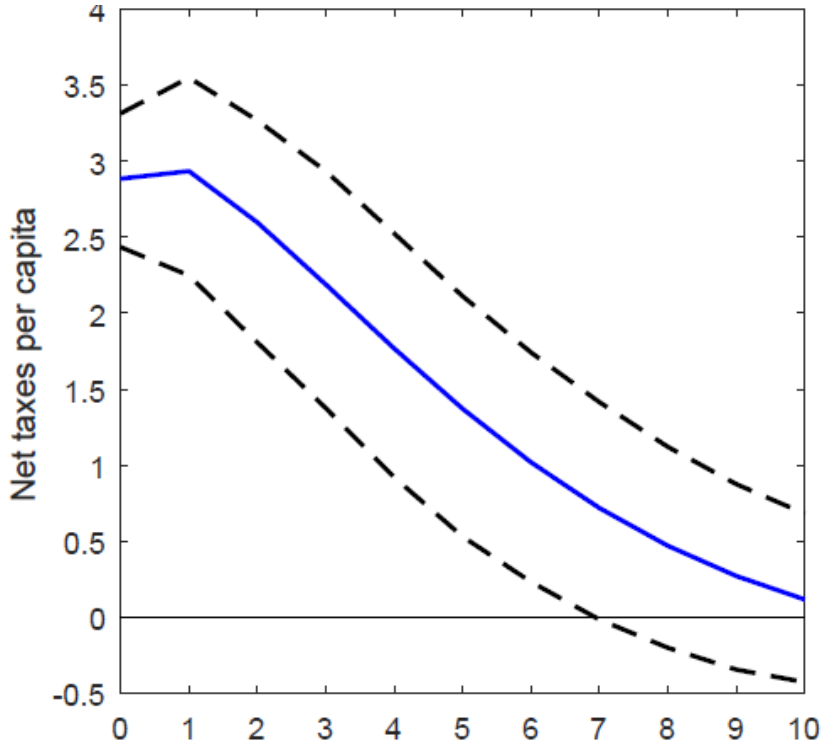
- The estimated impulse response to an exogenous shock is given by the blue line;
- 90% confidence interval given by dashed lines;

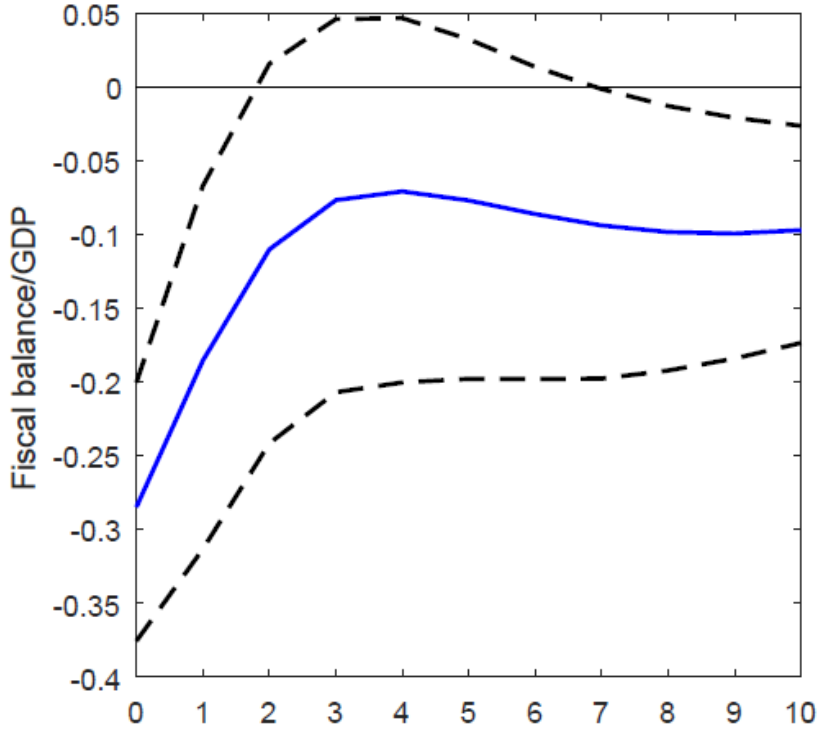
A shock on gov. purchases of 1% of GDP increase gov. purchases per capita of about 4%, and then there is some persistence.



Responses to a shock on government purchases







Shock on government purchase - Comparison

Beetsma and Guiliodori on 14 European countries (with Greece but without Island and Norway) over 1970-2004.

(a) Baseline on 19 OECD Countries

	Year 0	Year 1	Year 2	Year 3	Year 5	Year 10
Gov purchases per capita	3.94*	3.46*	2.78*	2.24*	1.49*	0.47*
Net taxes per capita	2.89*	2.94*	2.60*	2.19*	1.37*	0.11
GDP per capita	2.60*	2.08*	1.57*	1.16*	0.60*	-0.02
Fiscal balance/GDP	-0.28*	-0.19*	-0.11	1.16	-0.08	-0.10*

(b) Baseline on 15 Western European Countries

	Year 0	Year 1	Year 2	Year 3	Year 5	Year 10
Gov purchases per capita	3.88*	3.18*	2.14*	1.39*	0.59*	0.00
Net taxes per capita	2.36*	2.10*	1.54*	1.04	0.36	-0.16
GDP per capita	2.23*	1.77*	1.11*	0.64	0.16	-0.09
Fiscal balance/GDP	-0.40*	-0.30*	-0.18	-0.18	-0.07	-0.04

(c) From Beetsma and Guiliodori (2011) Table 4 panel (d)

	Year 0	Year 1	Year 2	Year 3	Year 5	Year 10
Gov purchases per capita	4.15*	4.45*	-	3.26*	2.13*	-
Net taxes per capita	1.16*	2.34	-	1.83*	0.57*	-
GDP per capita	1.18*	1.52*	-	1.25	0.73*	-
Fiscal balance/GDP	-0.78*	-0.60*	-	-0.42*	-0.41*	-

Responses to a migration shock (of 1 person per 1,000 inhabitar

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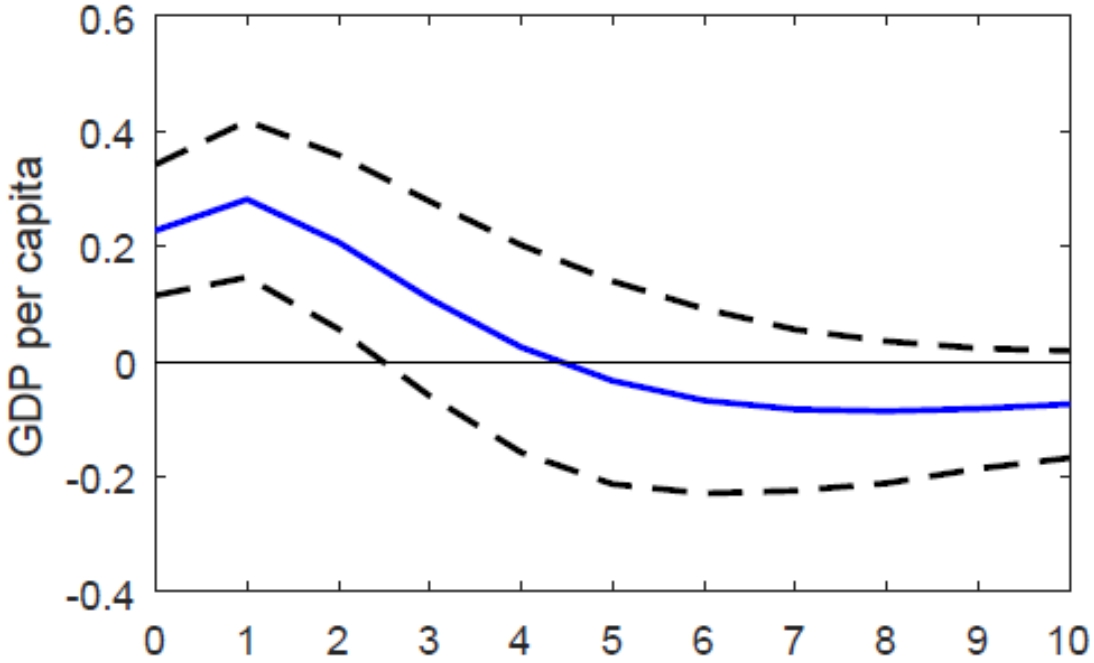
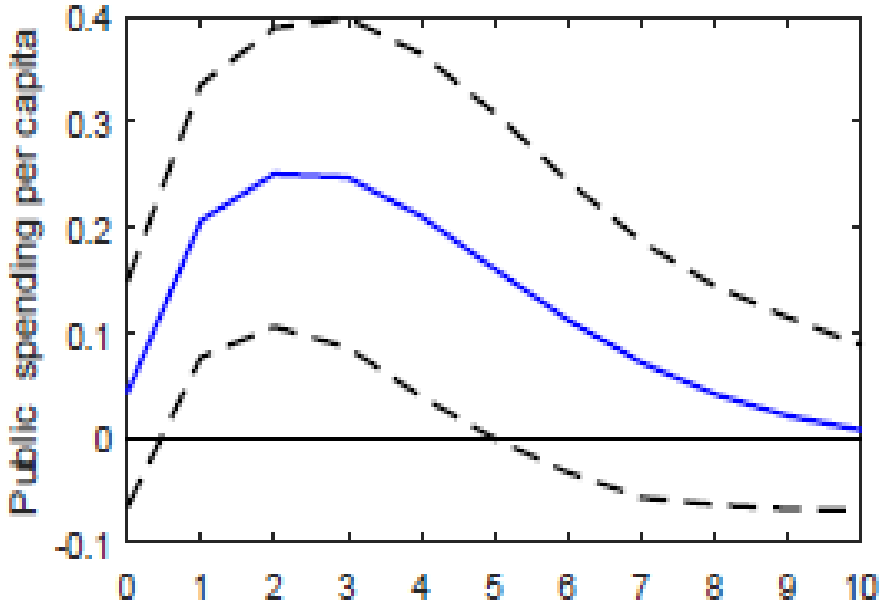
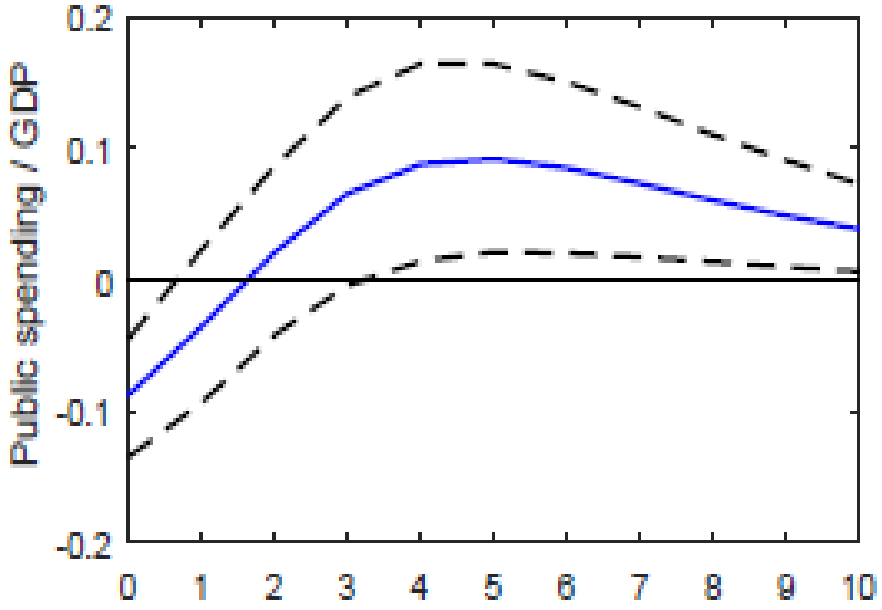
- A positive impact on GDP per capita
  - Elasticity of 0.3% at the peak.
  - Significant for years 0, 1 and 2
- Consistent with:
  - Ager and Bruckner(2013),
  - Ortega and Peri (2014),
  - d'Albis and al. (2016, 2018),
  - Furlanetto and Robstat (2017).



Responses to a migration shock

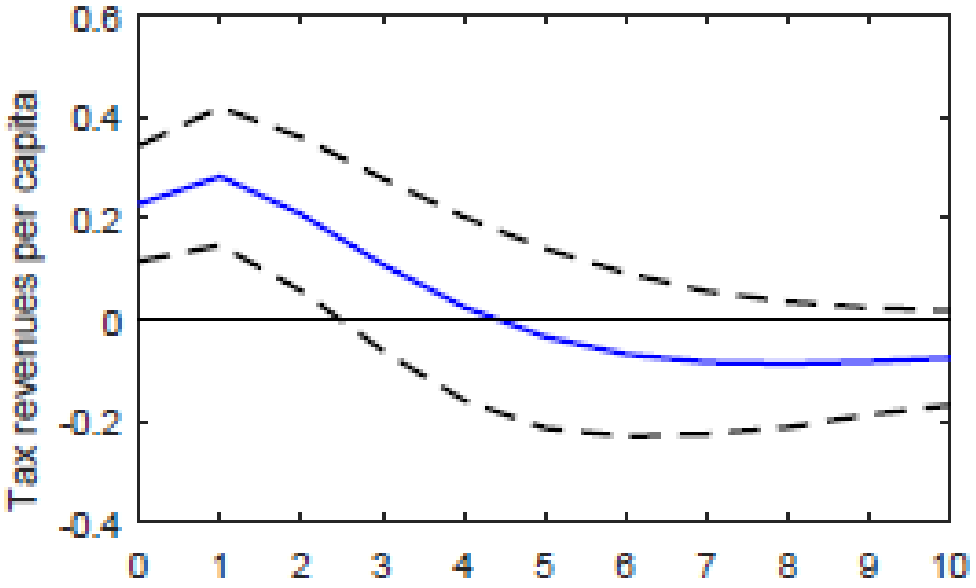
- Spending (Gov. Purchase + Transfers) increase by 0,25% at the peak (2 year after the shock) as a share of population …
- But decrease initially when expressed as a share of GDP.

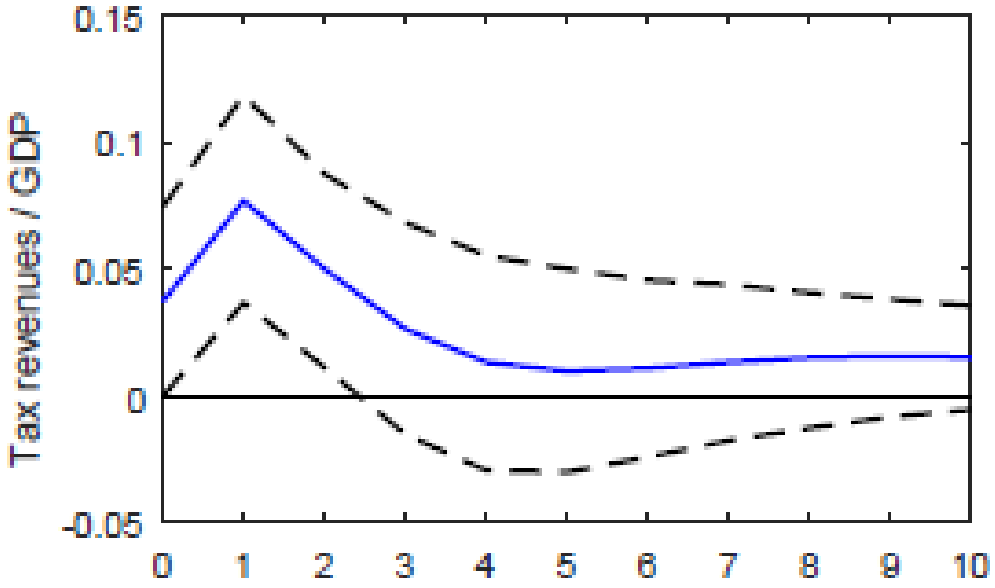




Responses to a migration shock

- Tax revenues increase in per capita and per GDP terms
- The fiscal balance as a share of GDP is significantly improved: A shock to the net flow of migrants that amounts to one percent of the population improves the fiscal balance to GDP ratio by about 0.3 percent points over 10 years (similar to Dustman and Frattini, 2014).





Investigating the initial decrease of spending as a share of GDP

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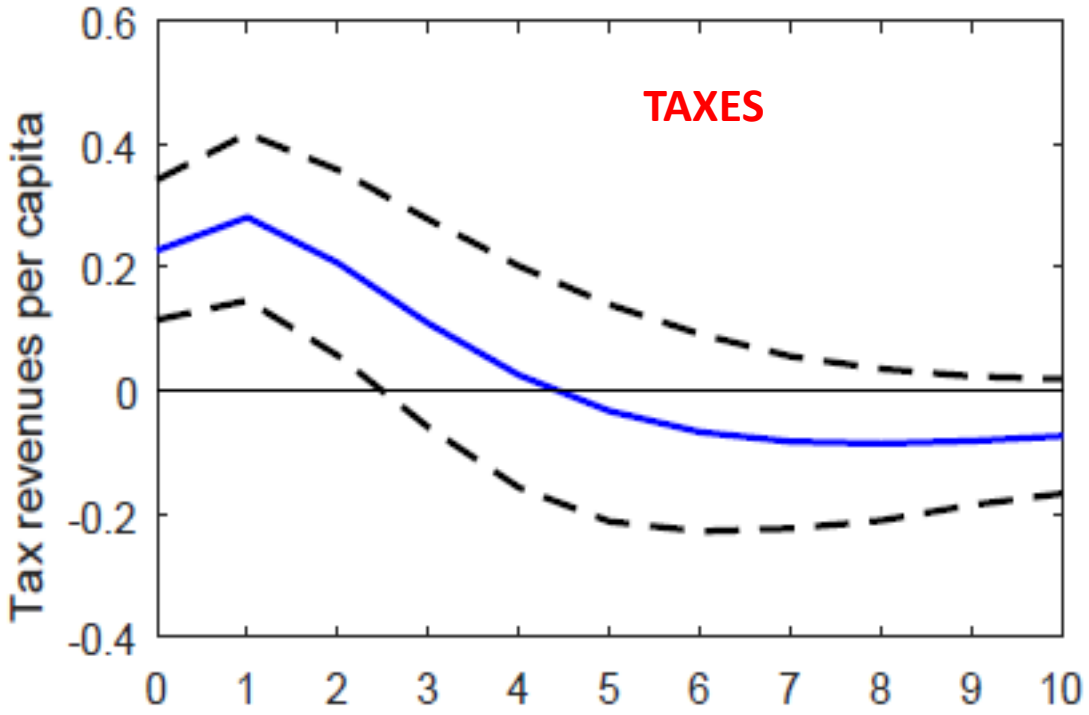
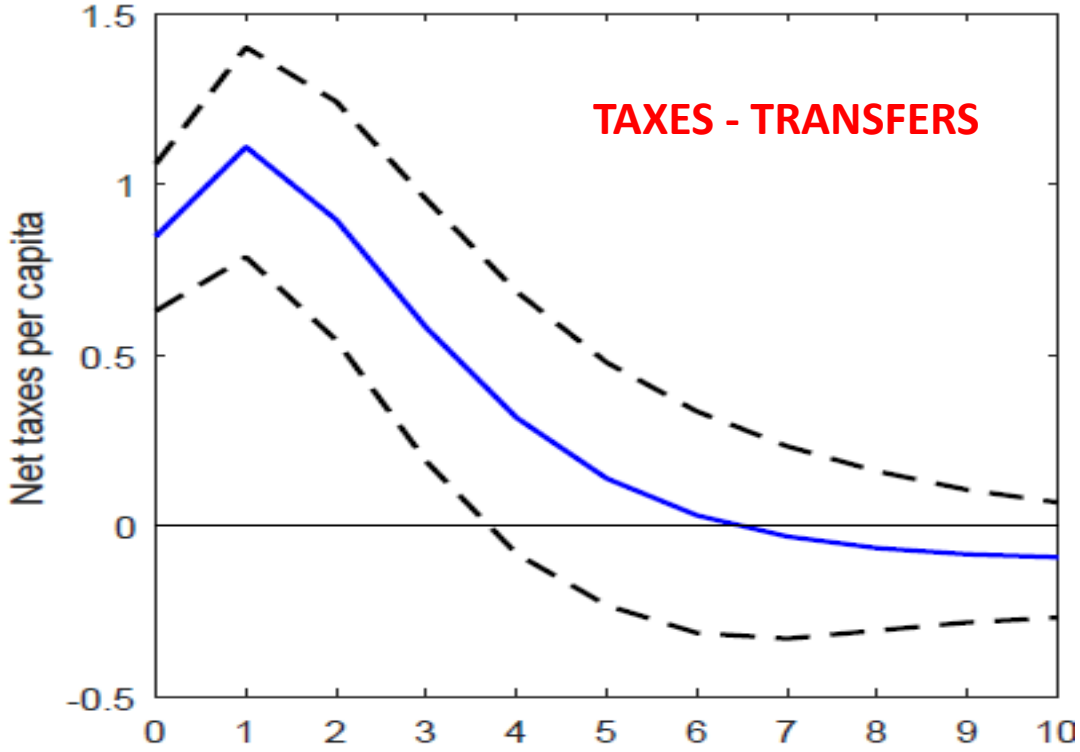
Mostly driven by a decrease in transfers





Investigating the initial decrease of spending as a share of GDP

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We estimated additional models including family public spending and old age public spending. Data on social spending at branch level are from OECD Social Expenditure Database.

Investigating the initial decrease of spending as a share of GDP

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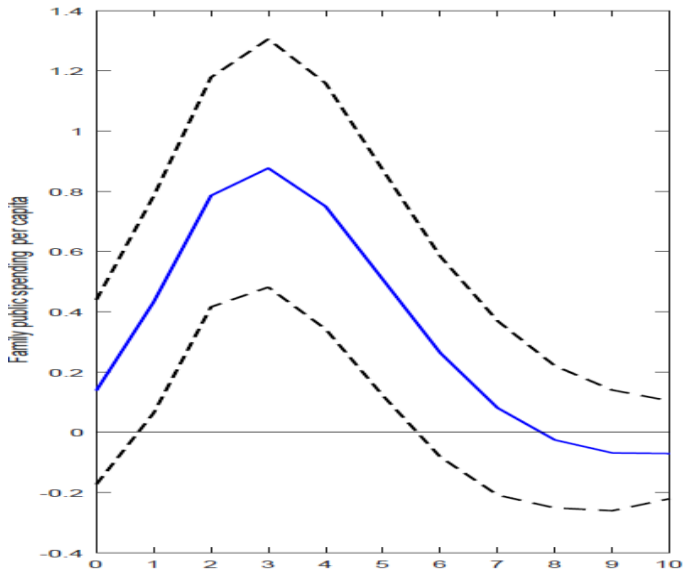
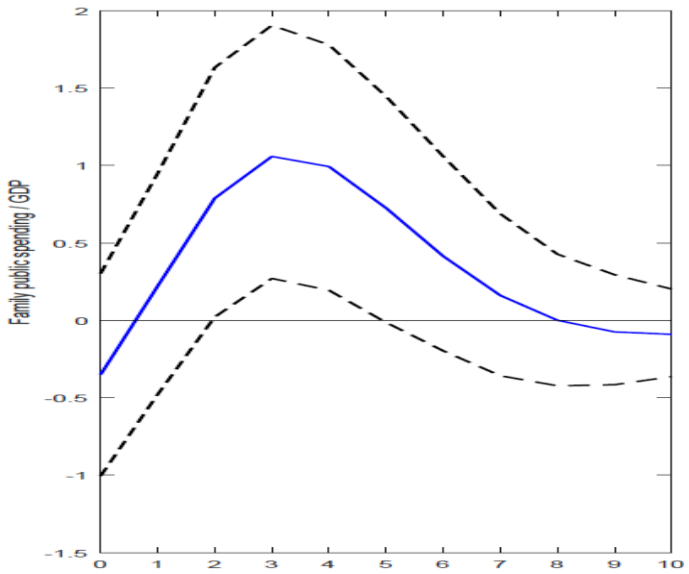
We estimated additional models including family public spending and old age public spending. Data on social spending at branch level are from OECD Social Expenditure Database.

Family Public Spending <u>increases</u> after a migration shock



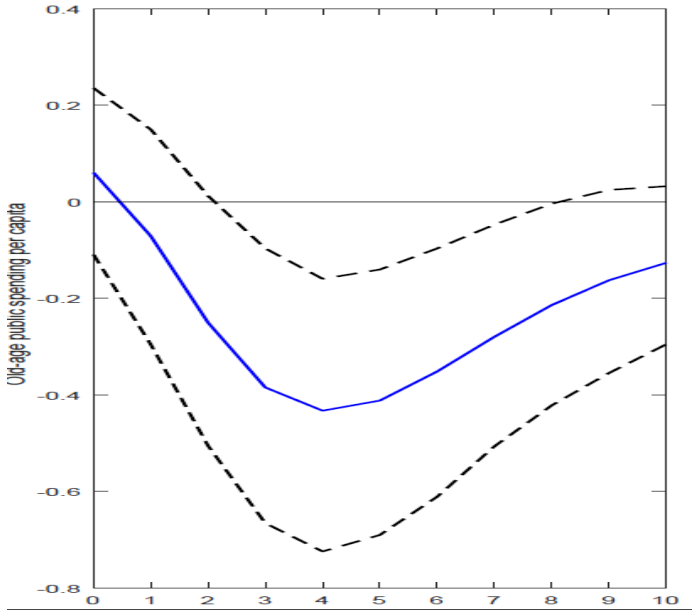


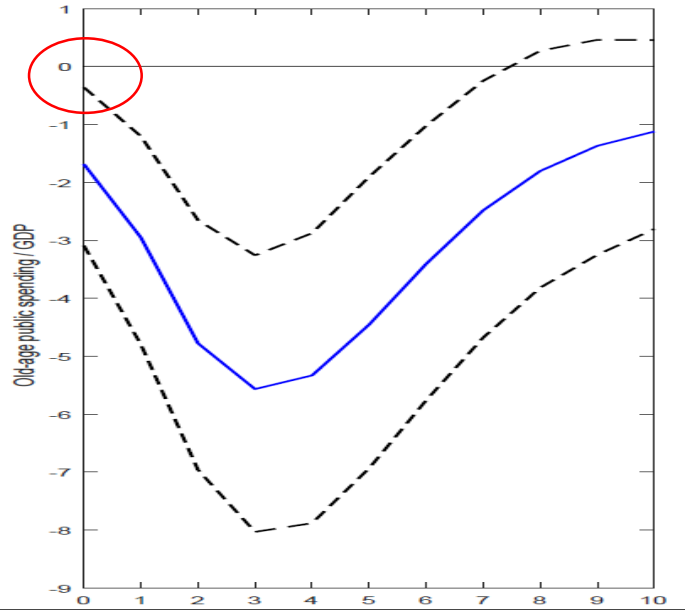
Investigating the initial decrease of spending as a share of GDP

SUMMER SCHOOL

We estimated additional models including family public spending and old age public spending. Data on social spending at branch level are from OECD Social Expenditure Database.

Old-age Public Spending <u>decreases</u> after a migration shock





The issue

Complicate within a neoclassical framework (ie with constant return to scale)

K: Capital; L: Labor; P: Population

- F(K,L) will increase with L
- F(K,L)/L will decrease with L
- F(K,L)/P will depend

A simple model

We consider an OLG model where agents live for 3 periods (young, adult, old):

- The growth rate of the population depends on the fertility rate and the migration rate (mortality is not studied);
- A careful attention is devoted to stocks and flows: all macro variables are divided by the average population of the considered period;
- The production is neoclassical: constant returns-to-scale, no exogenous growth, and perfect substitutability btw natives and migrants => a benchmark model;
- Taxes on wages to finance public education and a PAYG pension system;
- Saving choices are obtained assuming logarithmic preferences and no altruism.

Modelling the population dynamics

Labor force is equal to native adults and immigrants: $L_t \coloneqq N_{at} + I_t = (1 + \lambda_t)N_{at}.$

Fertility rate is the same for natives and immigrants: $N_{at+1} = \beta_t(1 + \lambda_t)N_{at},$

Deterministic lifetime: $N_{ot+1} = (1 + \lambda_t)N_{at}.$

Average population at date *t* is thus:

$$P_t \coloneqq \frac{N_{at} + N_{ot} + N_{at+1} + N_{ot+1}}{2} = \frac{[1 + (1 + \beta_t)(1 + \lambda_t)]N_{at} + N_{ot}}{2}.$$

Key indicators

Labor share in population: $$\frac{N_{at}+I_t}{P_t}=\frac{2(1+\lambda_t)}{1+(1+\beta_t)(1+\lambda_t)+\frac{1}{\beta_{t-1}}}.$$

Notice the differential impact of migration and fertility.

Population growth rate: $$1+n_t \coloneqq \frac{N_{at+1}+N_{ot+1}}{N_{at}+N_{ot}}=\beta_t(1+\lambda_t)\frac{1+\frac{1}{\beta_t}}{1+\frac{1}{\beta_{t-1}}}.$$

Both migration and fertility increase the population growth rate.

Income per capita: $$y_t \coloneqq \frac{F(K_t,(1+\lambda_t)N_{at})}{P_t}=\frac{2F(k_t,(1+\lambda_t))}{[1+(1+\beta_t)(1+\lambda_t)]+\frac{1}{\beta_{t-1}}},$$

where $k_t \coloneqq K_t/N_{at}$ does not depend on the migration rate in t.

Contemporaneous effects of migration

We first consider a migration shock when the capital stock per worker is given.

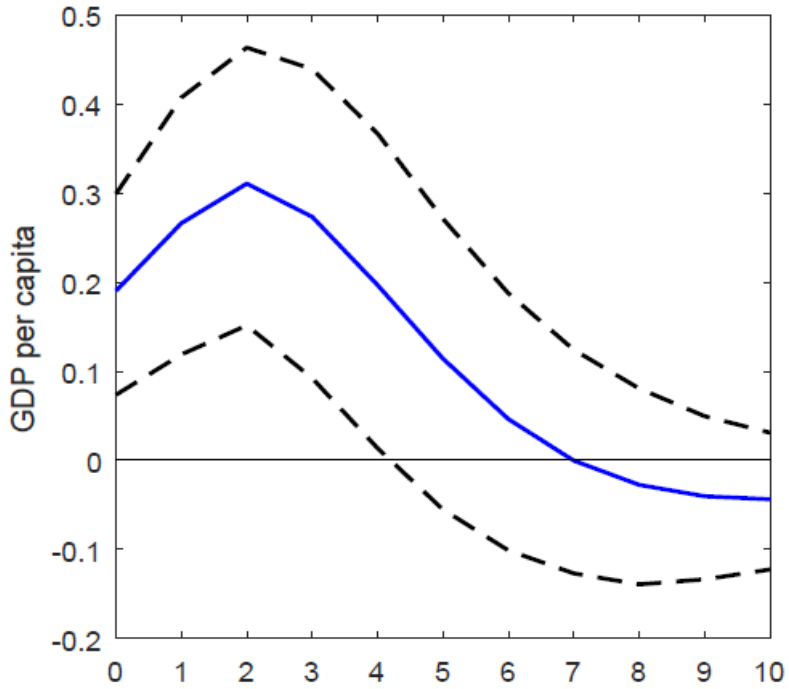
Proposition 1. *An migration shock in t increases income per capita in t if and only if:*

$$\frac{L_t F'_L(K_t, L_t)}{K_t F'_K(K_t, L_t)} \geq 1 + n_t.$$

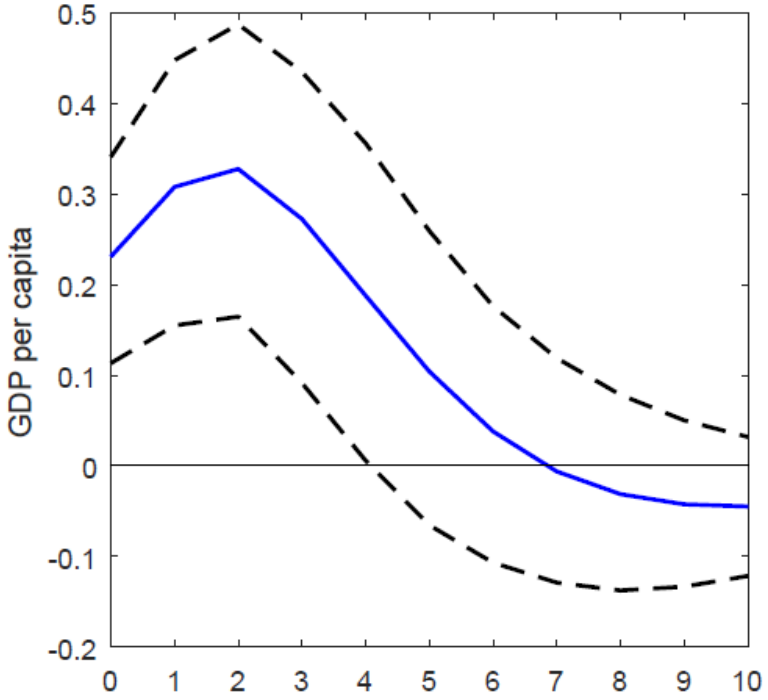
- This result hinges on no specific assumptions (except those presented above);
- Dilution effect induced by Constant Return-to-Scale vs timing of migration flows;
- The effect on wages and interest rate in *t* is always monotonic:

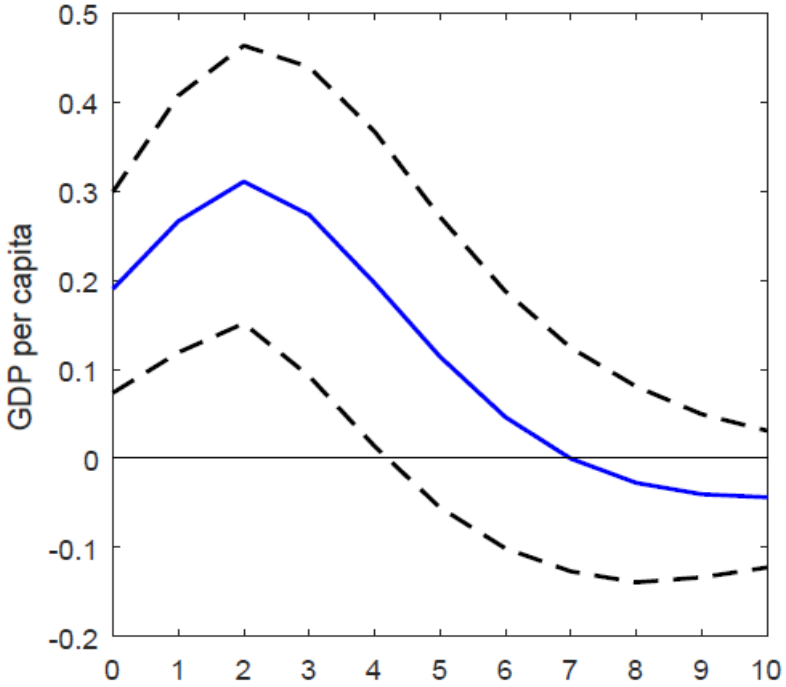
$$w_t = F'_L(k_t, (1 + \lambda_t)) \quad \text{and} \quad F'_K(k_t, (1 + \lambda_t))$$

Migration on contemporaneous GDP per capita: the role of the convention when defining the population: midyear,

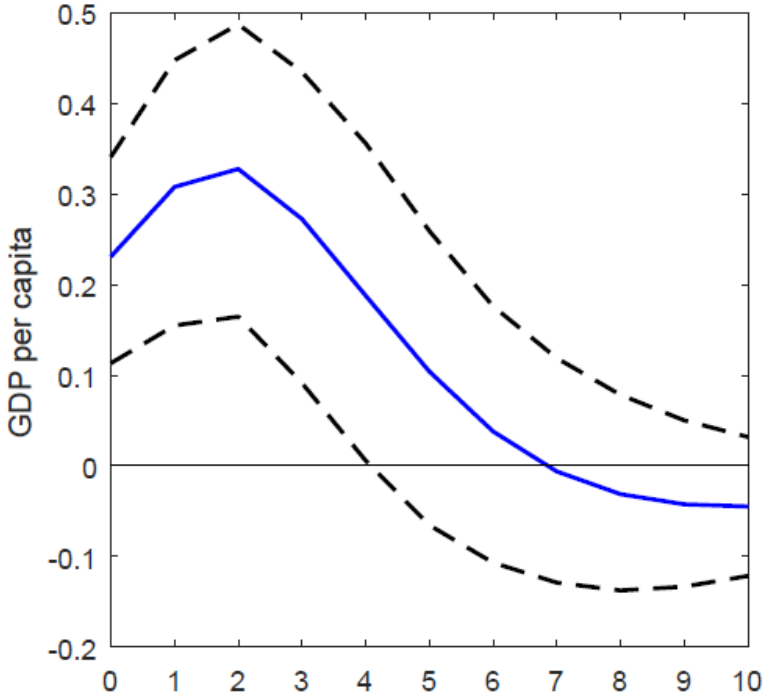


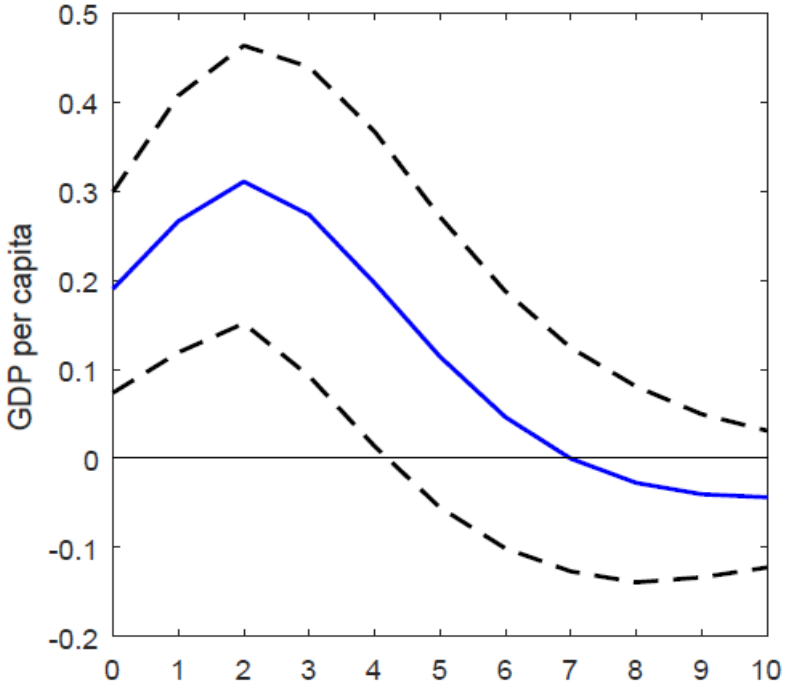
Migration on contemporaneous GDP per capita: the role of the convention when defining the population: midyear, beginning of the year,

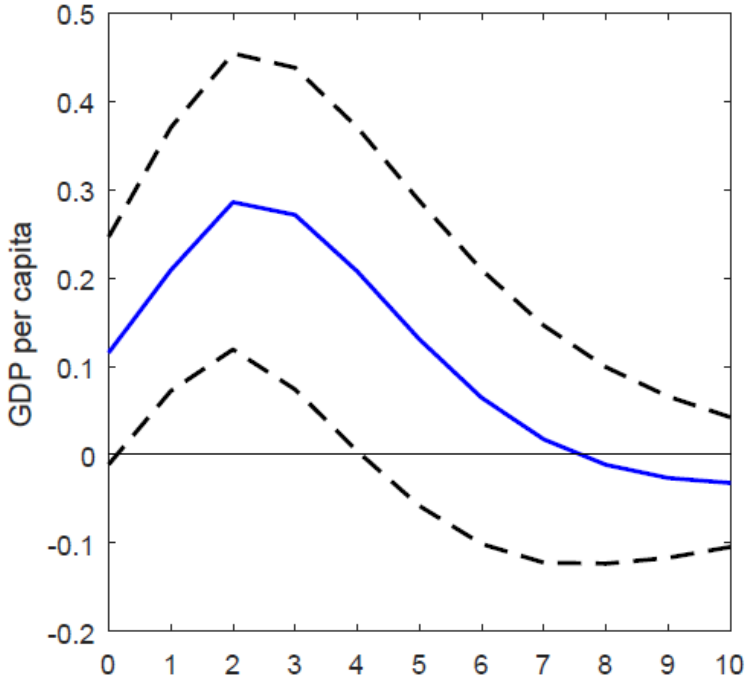




Migration on contemporaneous GDP per capita: the role of the convention when defining the population: midyear, beginning of the year, end of the year







The government budget

Taxes on labor finance expenses intended to the young and the old:

$$\tau_t w_t (1+\lambda_t) N_{at} = \pi_t N_{ot} + \kappa_t \beta_t (1+\lambda_t) N_{at}.$$

We assume that expenses per person are proportional to wages.

Taxes are chosen in order to balance the budget:

$$\tau_t = \frac{\pi}{(1+\lambda_t)\beta_{t-1}} + \kappa\beta_t.$$

Net taxes (tax revenues minus transfers) are: $\dfrac{\kappa w_t \beta_t (1+\lambda_t) N_{at}}{P_t} = \dfrac{2\kappa w_t \beta_t}{\frac{(1+\beta_{t-1})}{\beta_{t-1}(1+\lambda_t)} + (1+\beta_t)}.$

Immigration has:

- a direct positive effect (demographic effect)
- a negative effect through wages

Dynamic effects

The key variable will be here that savings (that determines capital per capita)

$$\max_{\{c_{at},c_{ot+1}\}} \ln c_{at} + \theta \ln c_{ot+1},$$

$$s.t. \left| \begin{array}{l} c_{at} = (1-\tau_t)w_t - s_t, \\ \\ c_{ot+1} = R_{t+1}s_t + \pi_{t+1}, \end{array} \right.$$

Then:

$$s_t = \frac{1}{1+\theta}\left[\theta\left(1 - \frac{\pi}{(1+\lambda_t)\beta_{t-1}} - \kappa\beta_t\right)w_t - \frac{\pi w_{t+1}}{R_{t+1}}\right].$$

and, with a CD production:

$$k_{t+1} = \frac{\theta\left(1 - \frac{\pi}{(1+\lambda_t)\beta_{t-1}} - \kappa\beta_t\right)(1-\alpha)}{\left[\beta_t(1+\theta) + \frac{\pi(1-\alpha)}{\alpha(1+\lambda_t)}\right](1+\lambda_t)^{\alpha}}k_t^{\alpha},$$

Dynamic effects

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They are summarized by the dynamics followed by the capital per worker.

Proposition 2. *An migration shock in t has a positive impact on the capital per worker in t+1, if the size of the public sector is sufficiently large.*

- Immigration increases the share of workers within the population, which makes the financing of pension system easier (less taxes per worker), and therefore increases the saving rate.
- This increase compensates the dilution effect if the system is “large enough”.

Dynamic effects

They are summarized by the dynamics followed by the main variables of the model if conditions in Propositions 2 and 3 are satisfied.

Proposition 3. *A (non persistent) migration shock induces:*

(i) an increase in income per capita for all t = 0, 1, …

(ii) a decrease in wages at date t = 0, followed by an increase for all t = 1, 2, …

(iii) an increase in net taxes for all t = 0, 1,…

Moreover, as of date t = 2; income per capita, wages and net taxes converge back to their steady-state values.

Take home messages from the model

In a neoclassical framework with no difference between natives and immigrants, the dilution effect induced by a migration shock can be overcompensated by:

- an increase in the age dependency ratio (static effect),
- an increase in the saving rate (dynamic effect).

OECD countries are characterized by a low population growth and large public education and pension system benefited from net flow of migrants over the last 30 years.

Of course, other mechanisms can also take place:

- increasing returns-to-scale,
- complementarities between migrants and natives,
- etc.

Robustness checks

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- Unemployment rates can be introduced in the model (after GDP).
- Potential sample heterogeneity with the “migration crisis”. Estimation for 1980-2010. Estimation for Continental Europe only.
- Anticipations of migrants: we include two “forward-looking” variables in the VAR (GDP deflator, short run nominal interest) that should contain information about the future effects of shocks.

Robustness: Unemployment

Some European economies are characterized by high unemployment.

Including unemployment rates (given by Eurostat) in the estimation does not change our main findings.

	Year 0	Year 1	Year 2	Year 5	Year 10
Spending per capita	0.29*	0.50*	0.59*	0.33*	-0.01
Net taxes per capita	0.92*	1.22*	1.01*	0.16	-0.08
GDP per capita	0.19*	0.27*	0.31*	0.11	-0.04
Fiscal balance/GDP	0.12*	0.14*	0.07	-0.05	-0.02

(b) Including unemployment rate

	Year 0	Year 1	Year 2	Year 5	Year 10
Spending per capita	0.30*	0.50*	0.61*	0.34*	-0.03
Net Taxes per capita	0.86*	1.13*	0.97*	0.20	-0.12
GDP per capita	0.18*	0.25*	0.33*	0.13	-0.06
Unemployment rate	-0.12*	-0.16*	-0.14*	-0.03	0.02
Fiscal balance/GDP	0.11*	0.11*	0.06	-0.04	-0.02*

Robustness: Unemployment

Some European economies are characterized by high unemployment.

Including unemployment rates (given by Eurostat) in the estimation do not change our main findings.

Immigration is found

To reduce unemployment

	Year 0	Year 1	Year 2	Year 5	Year 10
Spending per capita	0.29*	0.50*	0.59*	0.33*	-0.01
Net taxes per capita	0.92*	1.22*	1.01*	0.16	-0.08
GDP per capita	0.19*	0.27*	0.31*	0.11	-0.04
Fiscal balance/GDP	0.12*	0.14*	0.07	-0.05	-0.02

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	Year 0	Year 1	Year 2	Year 5	Year 10
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GDP per capita	0.18*	0.25*	0.33*	0.13	-0.06
Unemployment rate	-0.12*	-0.16*	-0.14*	-0.03	0.02
Fiscal balance/GDP	0.11*	0.11*	0.06	-0.04	-0.02*

Robustness: Without the "migration crisis"

Sample heterogeneity issue

We restrict to the period 1985-2010 to exclude the consequences of the Arab spring and of the wars in Libya and Syria.

The effects are slightly larger.

	Year 0	Year 1	Year 2	Year 5	Year 10
Spending per capita	0.29*	0.50*	0.59*	0.33*	-0.01
Net taxes per capita	0.92*	1.22*	1.01*	0.16	-0.08
GDP per capita	0.19*	0.27*	0.31*	0.11	-0.04
Fiscal balance/GDP	0.12*	0.14*	0.07	-0.05	-0.02

(a) Excluding recent migration crisis

	Year 0	Year 1	Year 2	Year 5	Year 10
Spending per capita	0.30*	0.59*	0.54*	-0.09	0.04
Net taxes per capita	1.14*	1.52*	1.04*	-0.29	0.06
GDP per capita	0.26*	0.37*	0.34*	-0.04	0.02
Fiscal balance/GDP	0.17*	0.18*	0.09*	-0.04	0.00

Robustness: Without the UK

Another potential
sample heterogeneity issue

The UK has received more
skilled immigrants than others.

The results are unchanged.

	Year 0	Year 1	Year 2	Year 5	Year 10
Spending per capita	0.29*	0.50*	0.59*	0.33*	-0.01
Net taxes per capita	0.92*	1.22*	1.01*	0.16	-0.08
GDP per capita	0.19*	0.27*	0.31*	0.11	-0.04
Fiscal balance/GDP	0.12*	0.14*	0.07	-0.05	-0.02

(b) Excluding United Kingdom

	Year 0	Year 1	Year 2	Year 5	Year 10
Spending per capita	0.29*	0.49*	0.58*	0.31*	-0.04
Net taxes per capita	0.92*	1.21*	0.99*	0.11	-0.12
GDP per capita	0.18*	0.26*	0.30*	0.09	-0.07
Fiscal balance/GDP	0.12*	0.14*	0.07	-0.05	-0.02

Robustness: Anticipations

Migrants' expectations cannot be excluded.

	Year 0	Year 1	Year 2	Year 5	Year 10
Spending per capita	0.29*	0.50*	0.59*	0.33*	-0.01
Net taxes per capita	0.92*	1.22*	1.01*	0.16	-0.08
GDP per capita	0.19*	0.27*	0.31*	0.11	-0.04
Fiscal balance/GDP	0.12*	0.14*	0.07	-0.05	-0.02

We think that the anticipation problem is inconsequential in the identification of an immigration shock.

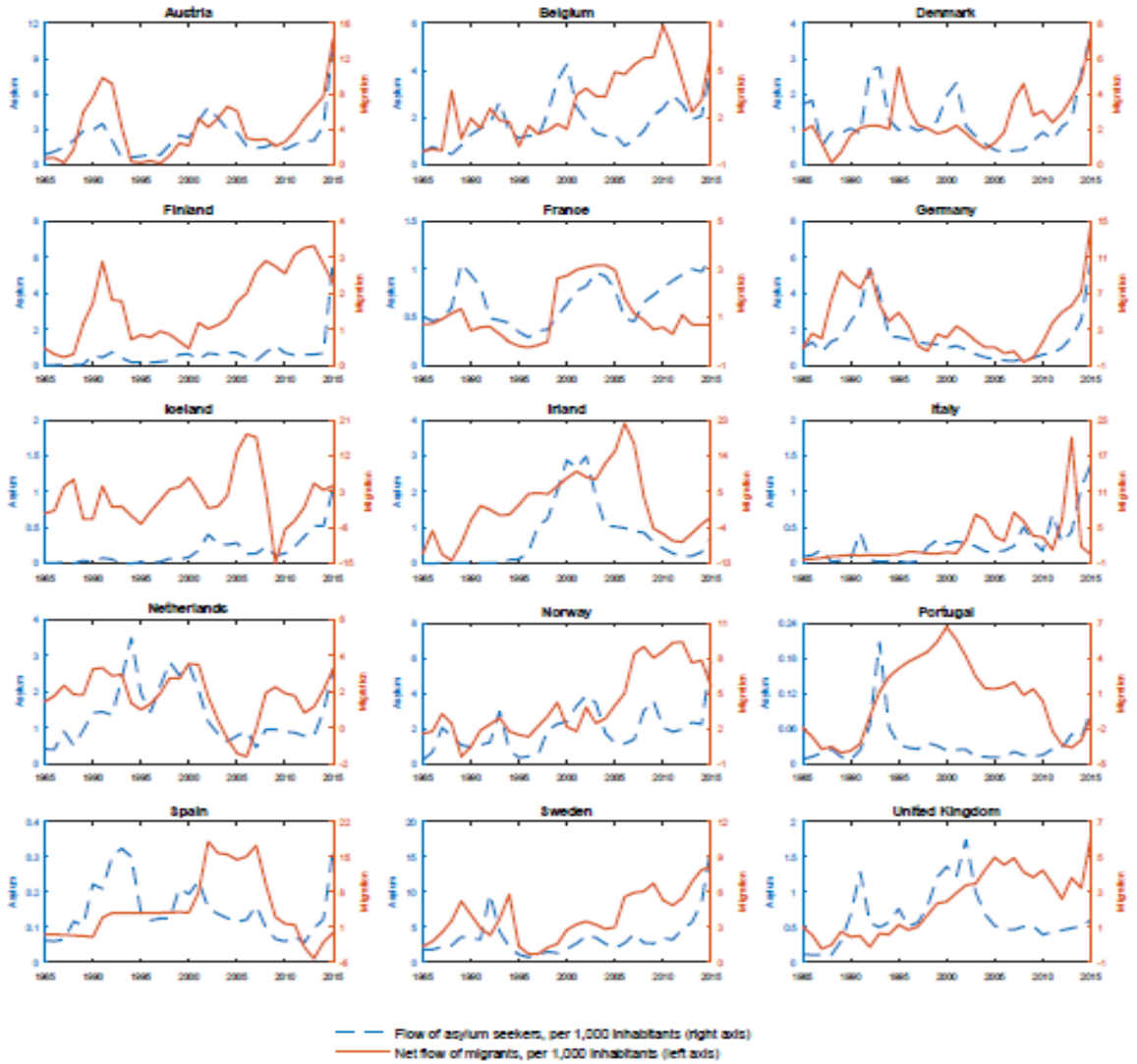
Table 6: Responses to immigration shock, checking for anticipation problem

	Year 0	Year 1	Year 2	Year 5	Year 10
Spending per capita	0.26*	0.40*	0.52*	0.44*	0.05
Net taxes per capita	0.78*	1.10*	1.08*	0.51*	-0.02
GDP per capita	0.19*	0.27*	0.33*	0.19	-0.04
Fiscal balance/GDP	0.10*	0.13*	0.10*	0.00	-0.02

We show it by including two "forward-looking" variables in the VAR (GDP deflator, short run nominal interest) that should contain information about the future effects of shocks. => We find no change in the responses:

- Our results no not suffer from bias linked to anticipations
- Thus suggest that immigration shocks are either unanticipated or difficult to anticipate

Another issue: Asylum Seeker in Western Europe



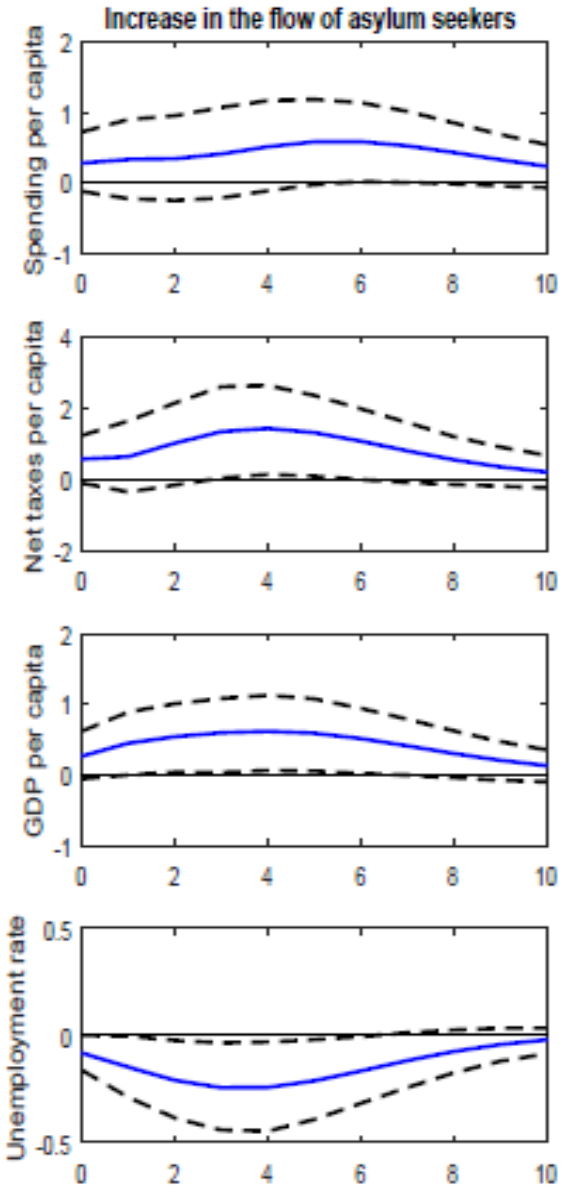
Asylum Seeker in Western Europe (d'Albis, Boubtane and Coulibaly, *2018*)

A VAR Model with

- Flow of Asylum Seekers
- Net flow of migrants
- Gov. Purchases
- Net Taxes
- GDP
- Unemployment

⇒No negative outcome

⇒Positive outcomes after a delay



Immigration vs other demographic variables

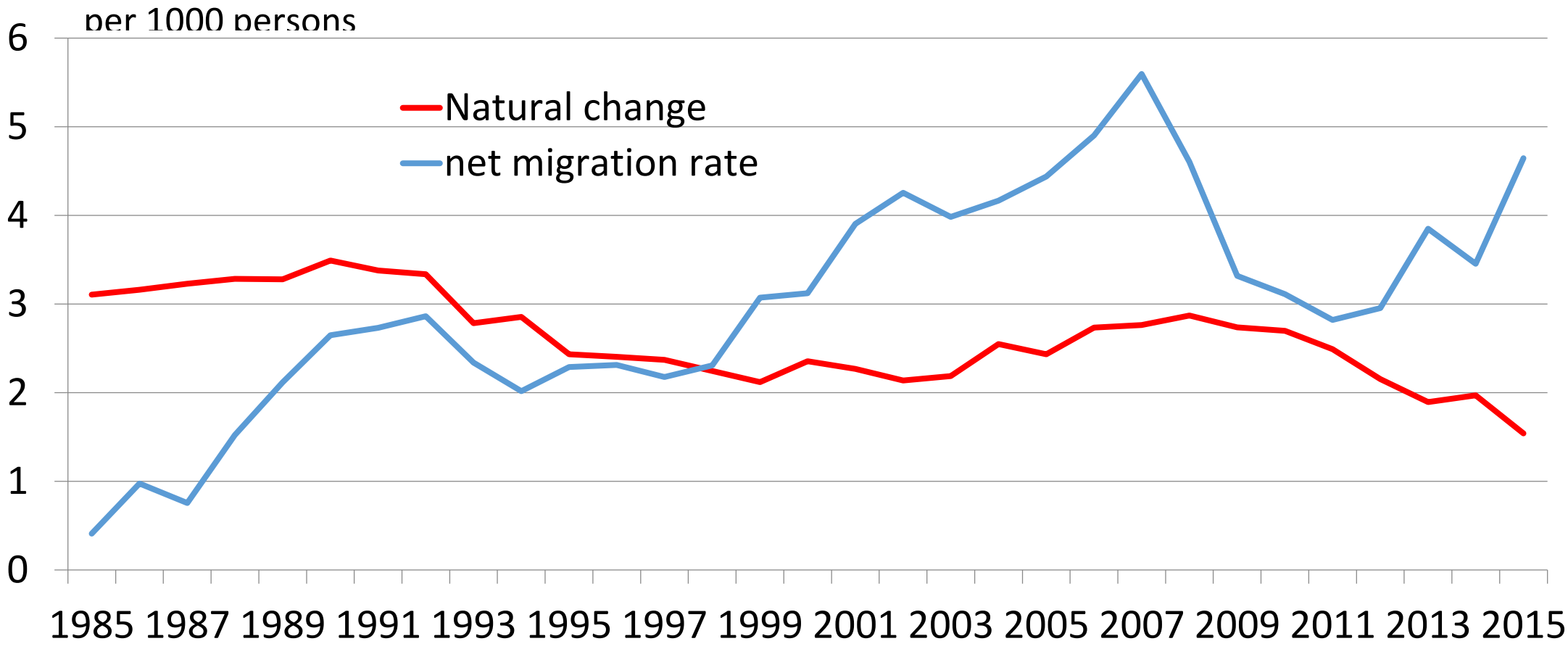
Population increase by components.

Natural rate of increase = live births - deaths

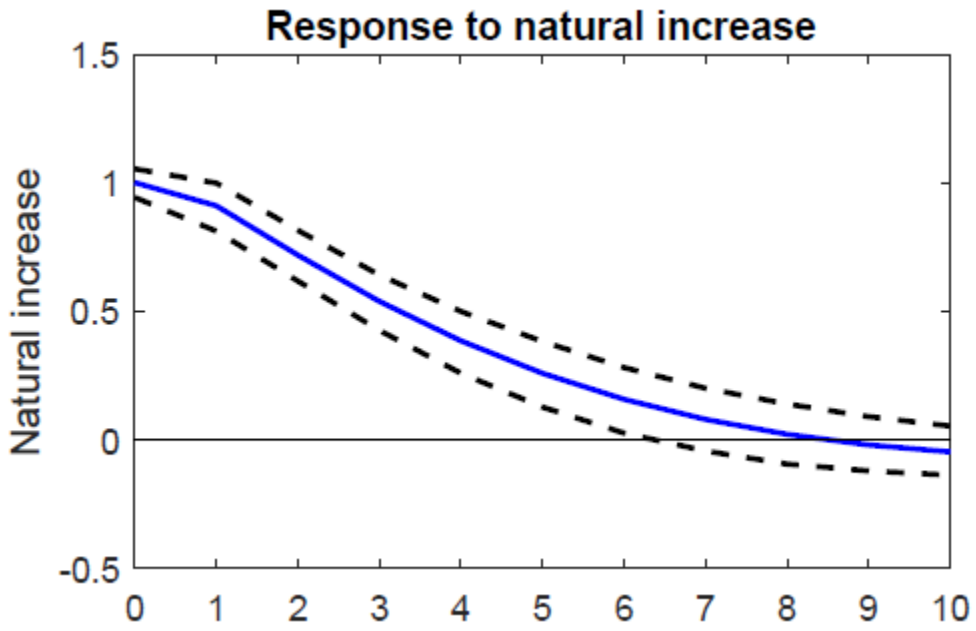
Net migration as a difference between

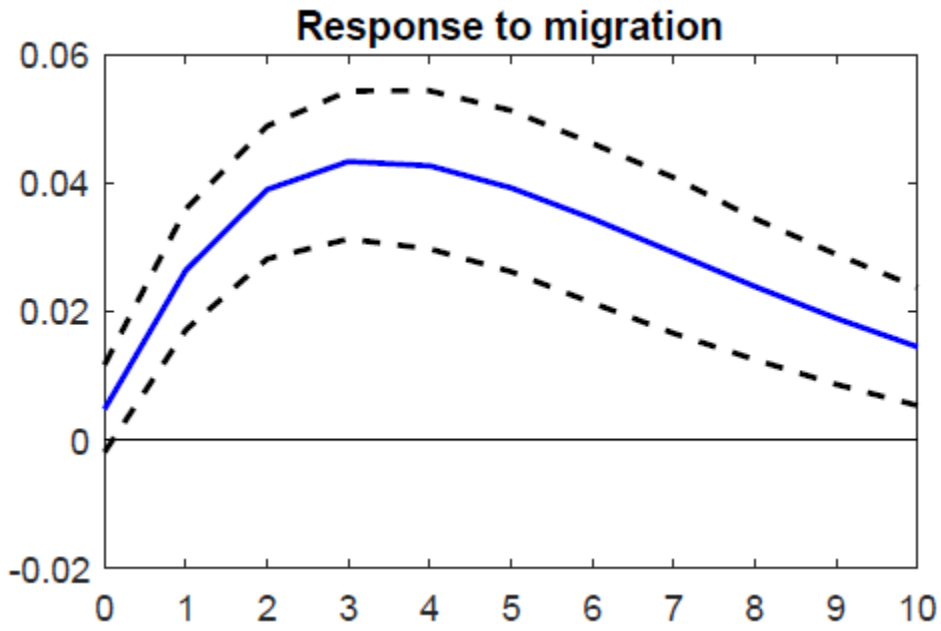
- the population sizes on 1 January of two consecutive years
- natural rate of increase

OECD countries: 1985-2015



Responses of natural rate of increase to demographic shocks





Responses of GDP per capita to demographic shocks

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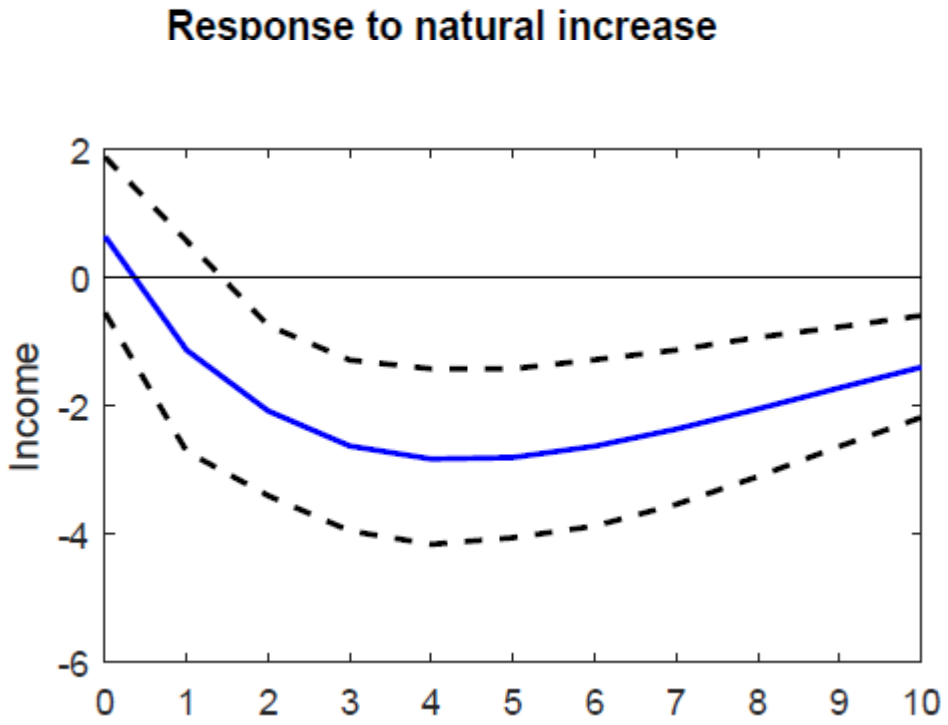

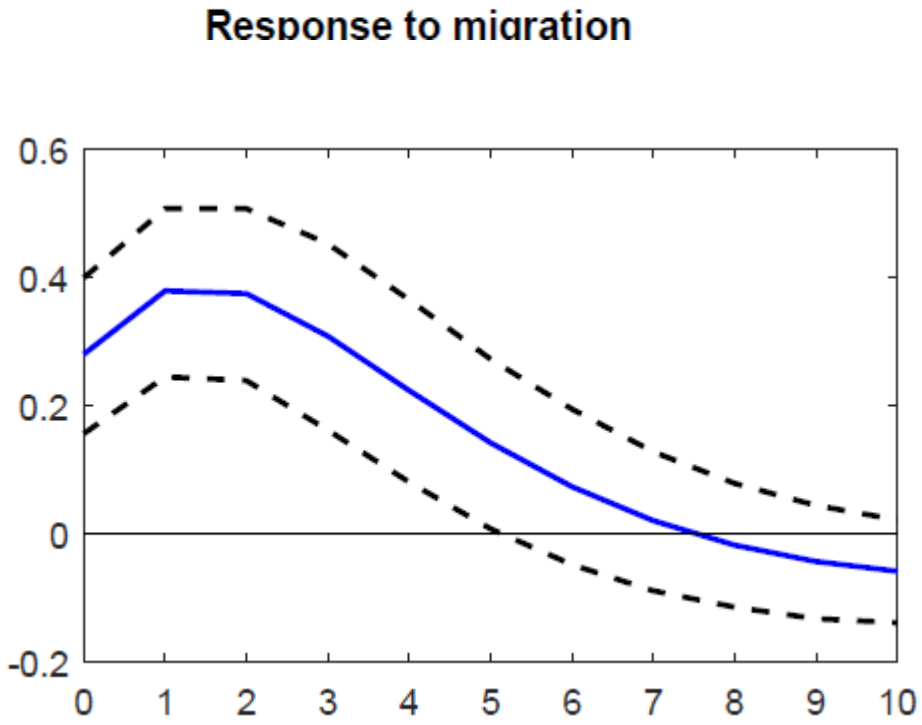

Demographic shocks and unemployment

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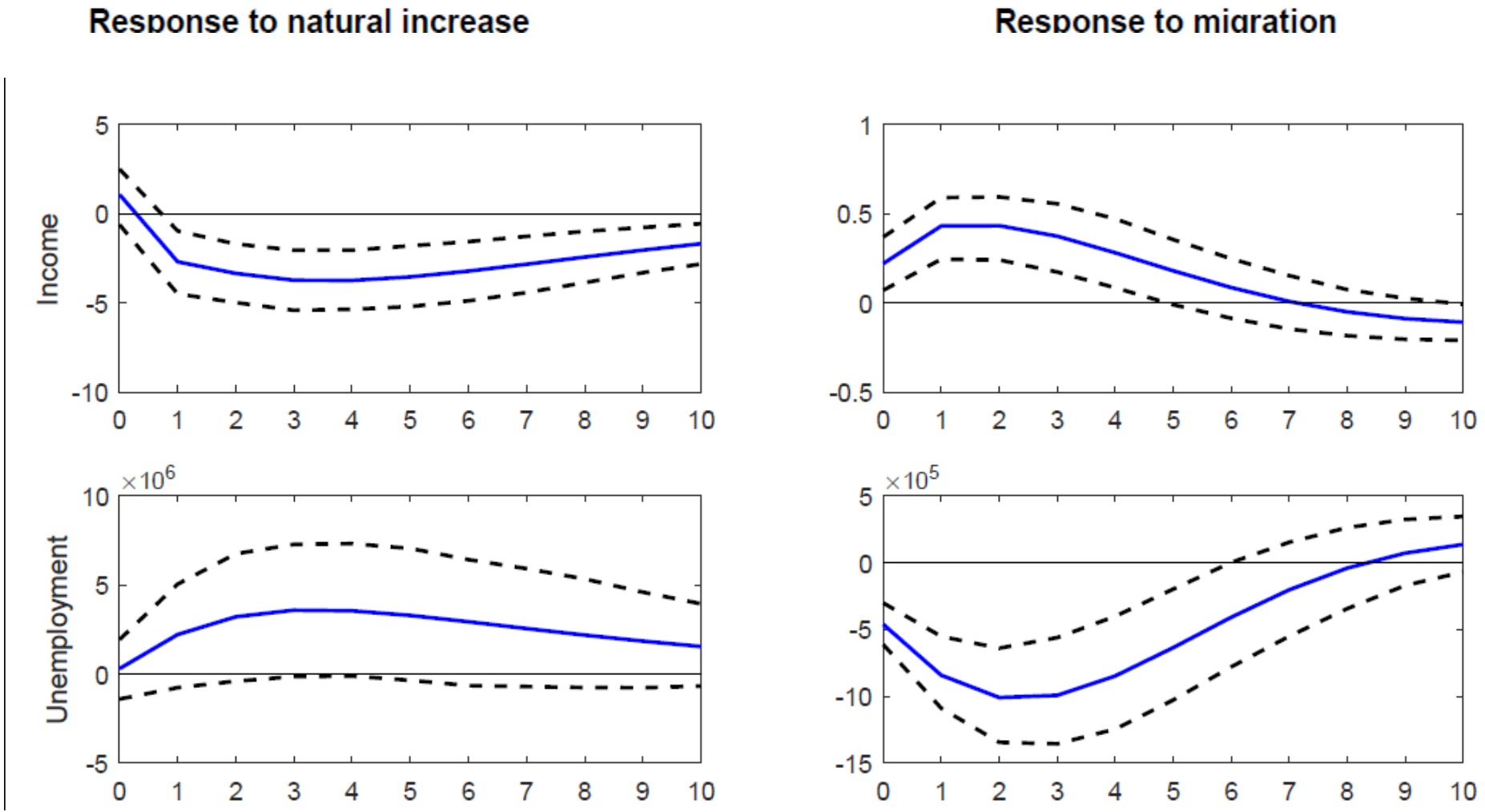


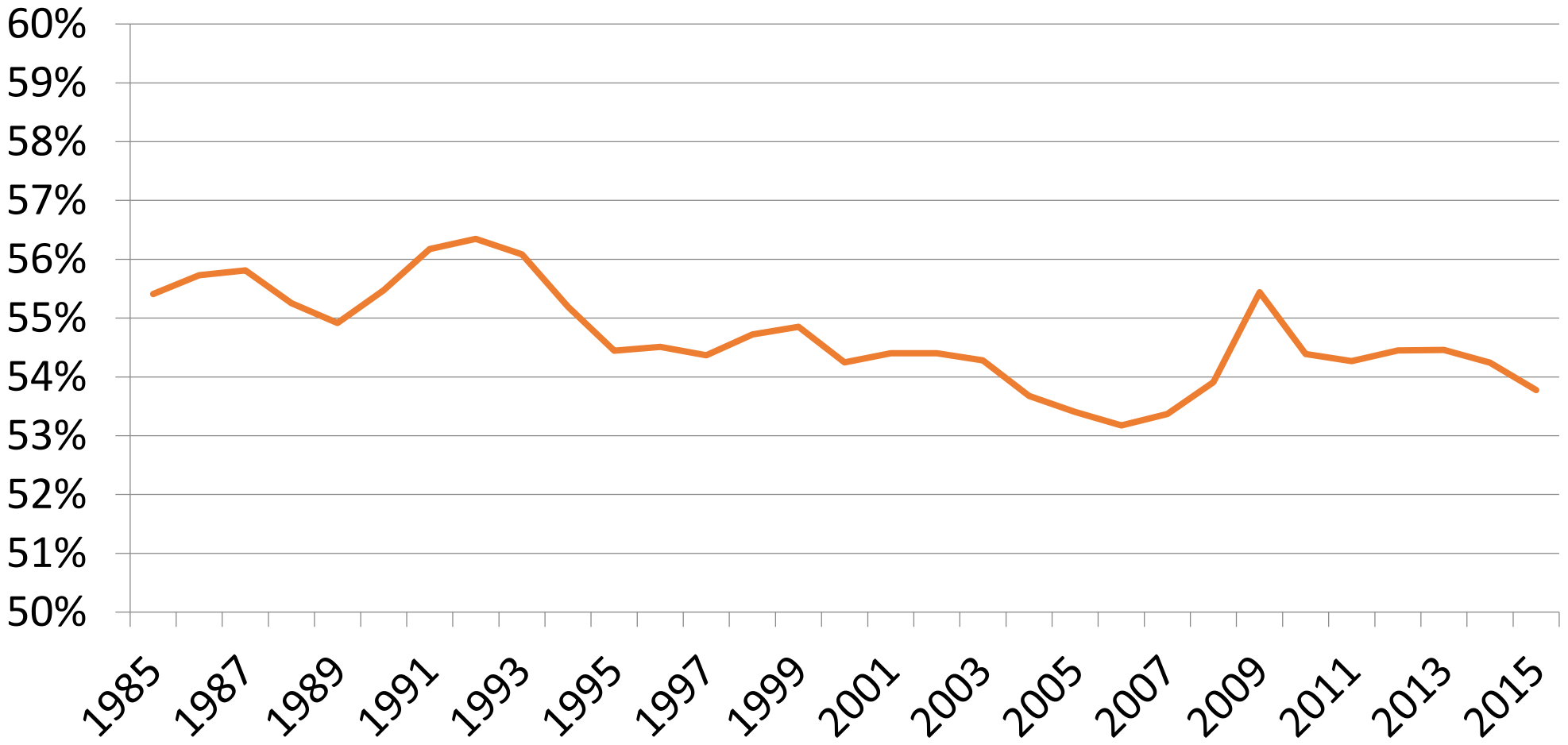
What about inequalities?

Domestic production is the source from which the incomes are generated and is therefore used as :

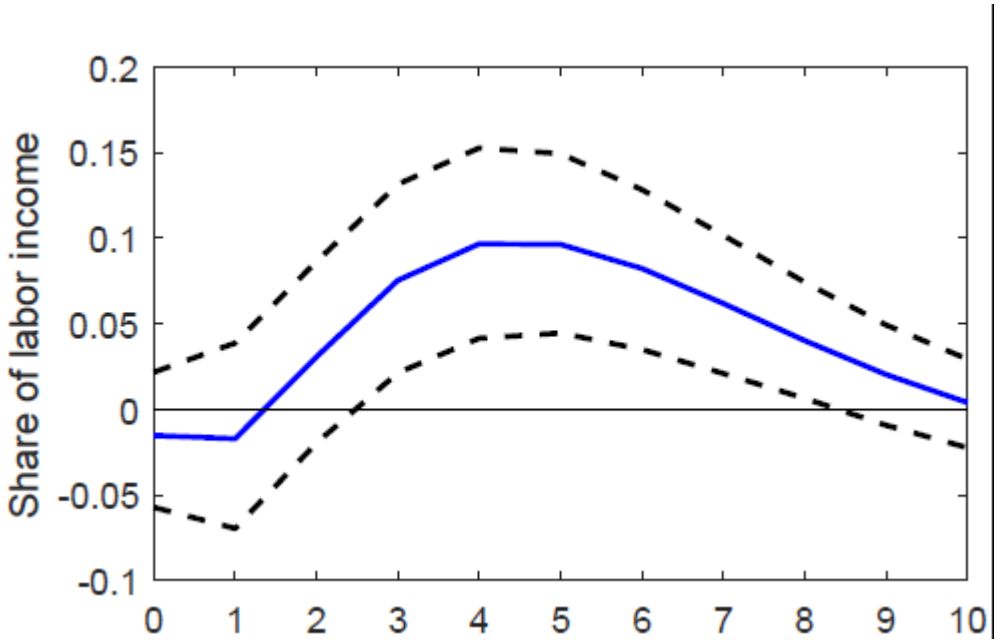
- Compensation of employees
- Gross operating surplus and gross mixed income

Labor share = compensation of employees /domestic output

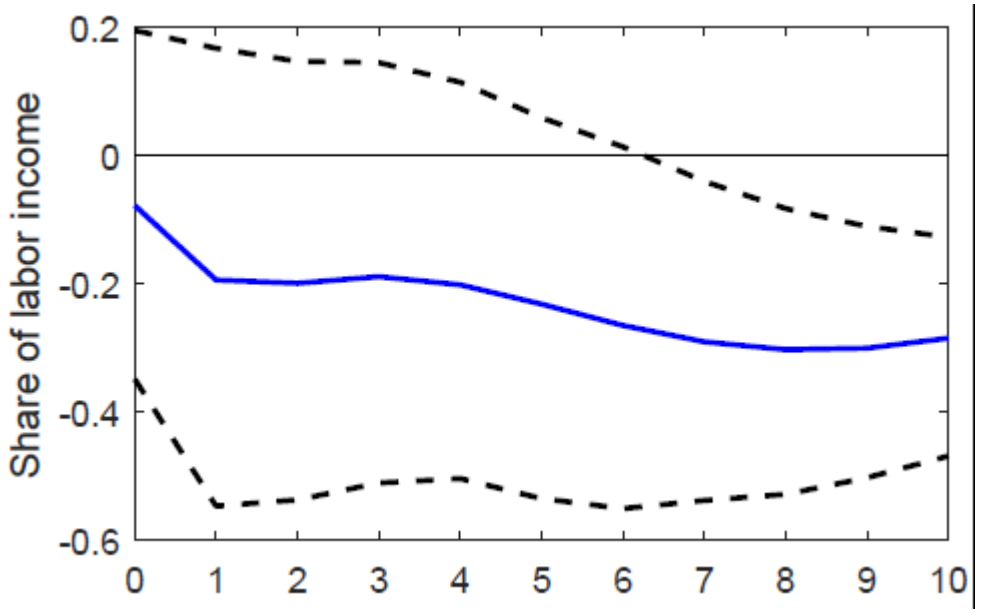
Average Labor share in OECD countries (in %)



Responses of labor share to demographic shocks



to a migration shock



to a shock on the natural rate of increase

What's the use of a model?

Rationalize the observation of opposite effects of natural increase and net migration in the short run.

"Predict" what could be the long run effects of demographic changes.

A model: the objective function

A total utilitarism criteria that write

$$\max_{\{c_t\}} \sum_{t=0}^{+\infty} \gamma^t P_t U(c_t),$$

2 remarks

- Having Pt matters for the results
- Having Pt matters a lot when one studies the “optimal population” problem

A model with a general investment function

Investment does not have to be a additively separable function

$$c_t = \frac{F(K_t, L_t) - G(K_{t+1}, K_t)}{P_t},$$

We will see it's mater

Population dynamics and labor supply

.

$$N_{t+1} = (1+\beta_t)(1+\lambda_t)N_t.$$

$$P_t = \mu N_{t+1} + (1-\mu)N_t = [\mu(1+\beta_t)(1+\lambda_t) + (1-\mu)]N_t,$$

$$L_t = N_t + \eta I_t = (1+\eta\lambda_t)N_t,$$

Basic computing

The income per capita and the labor share of income

$$y_t = \frac{F(K_t, L_t)}{P_t} = \frac{F(k_t, (1+\eta\lambda_t))}{\mu(1+\beta_t)(1+\lambda_t)+(1-\mu)}, \qquad \alpha_t = \frac{L_t F'_2(K_t, L_t)}{F(K_t, L_t)} = \frac{F'_2\left(\frac{k_t}{(1+\eta\lambda_t)}, 1\right)}{F\left(\frac{k_t}{(1+\eta\lambda_t)}, 1\right)}.$$

At date 0 the impact of the natural rate of increase is obvious.

For the immigration rate we have:

$$\frac{dy_0}{d\lambda} \geq 0 \Leftrightarrow \sigma_0 \geq \frac{(\frac{1}{\eta}+\lambda_0)}{(1+\lambda_0)} \frac{\mu(1+\beta)(1+\lambda_0)}{\mu(1+\beta)(1+\lambda_0)+(1-\mu)}.$$

Three conditions to rationalise the findings.

Theoretical results (at steady-state)

Proposition 1. The sign of effect of a permanent change in the rate of natural increase on steady-state capital per initial population is given by:

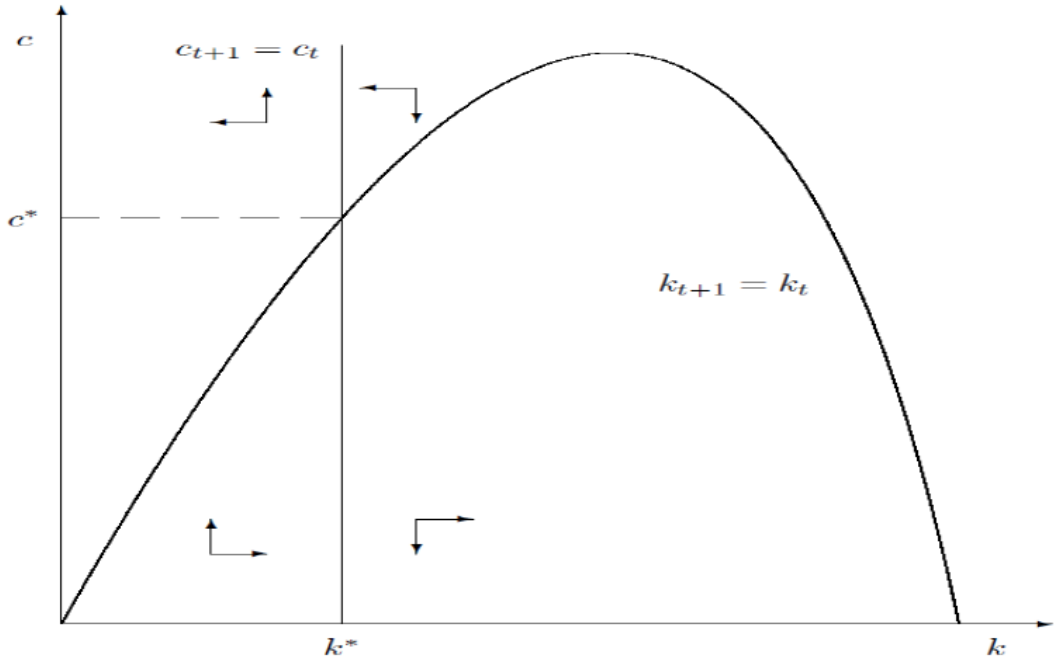
$$\varepsilon_{k^*,\beta} \geq 0 \Leftrightarrow G''_{11}((1+\beta)(1+\lambda),1) + \gamma G''_{12}((1+\beta)(1+\lambda),1) \leq 0.$$

The effect of a permanent change in the net migration rate on steady-state capital per initial population is given by:

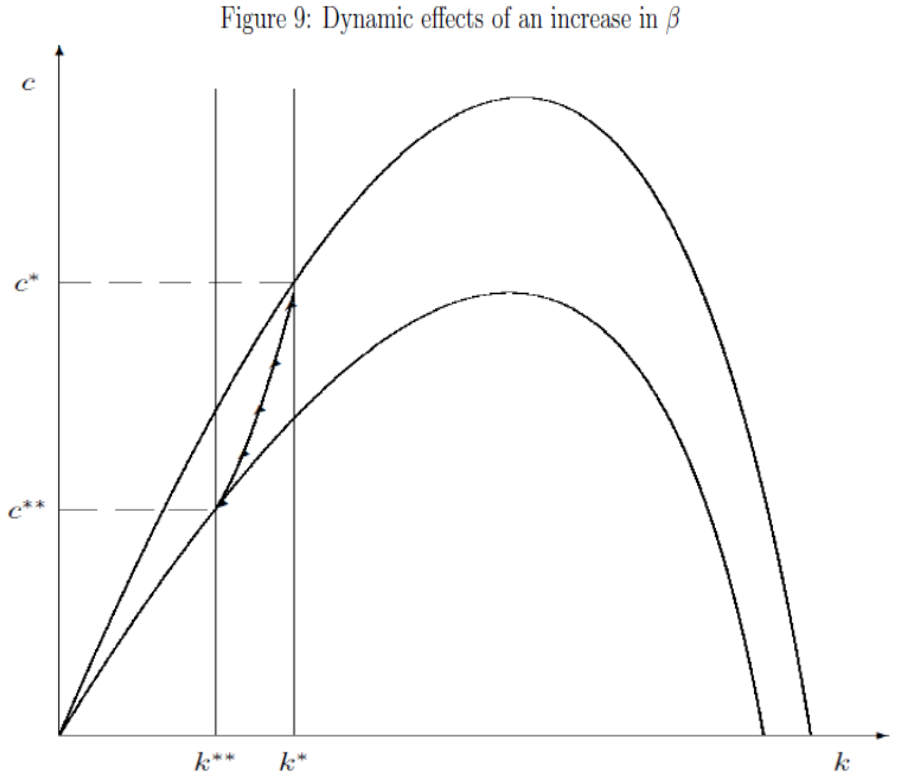
$$\varepsilon_{k^*,\lambda} = \varepsilon_{k^*,\beta} + \frac{\eta(1+\lambda)}{(1+\eta\lambda)}.$$

Phase diagram
with consumption and capital

Figure 8: Phase diagram



Phase diagram
after a permanent change in the natural rate of increase



Phase diagram
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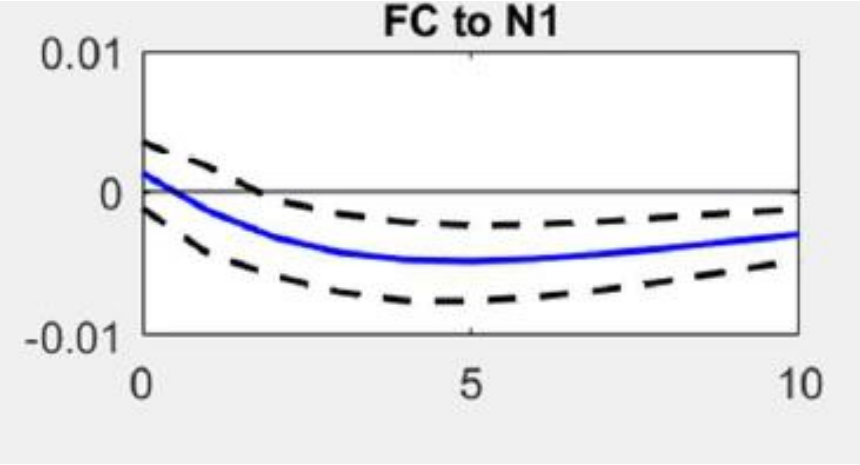
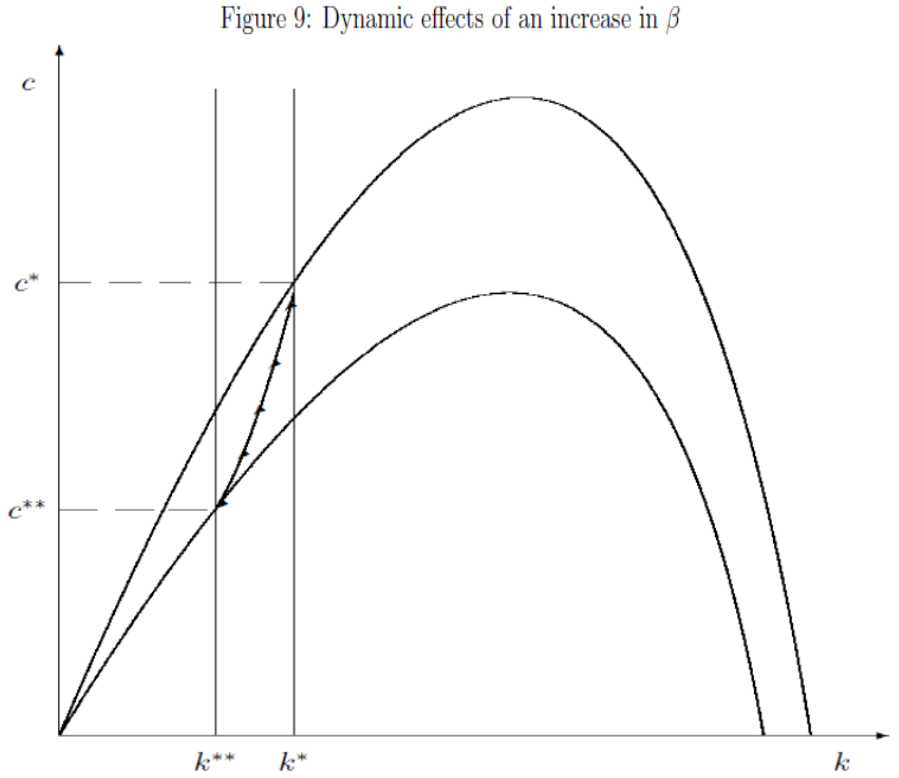
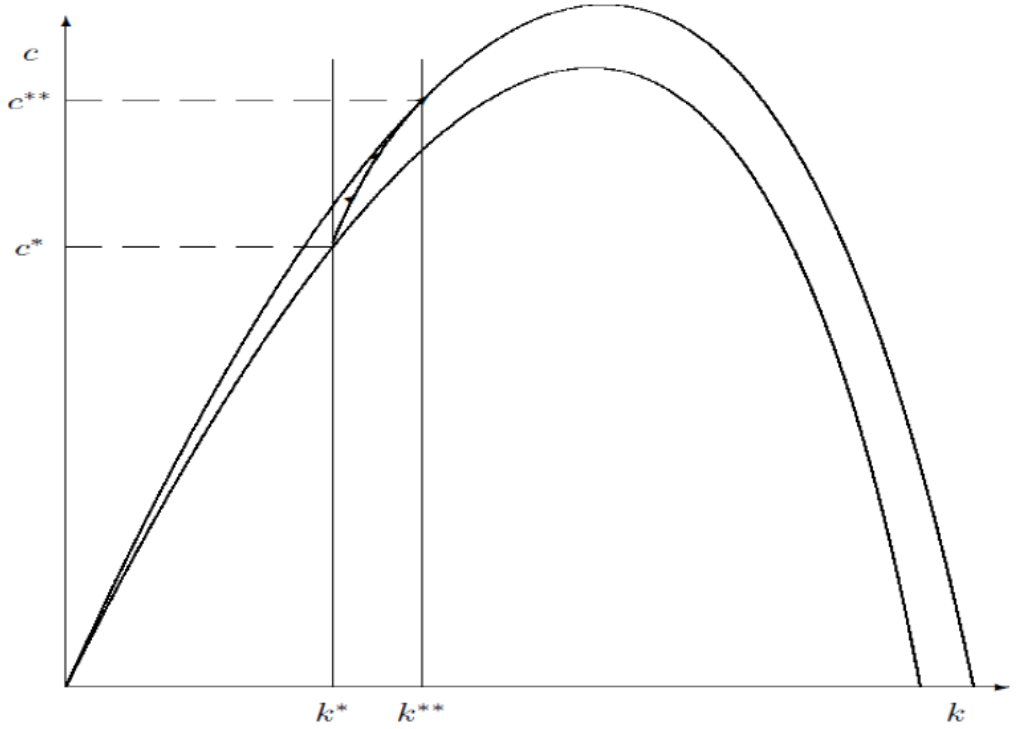




Phase diagram
after a permanent change in the net migration rate

Figure 10: Dynamic effects of an increase in λ



Phase diagram
after a permanent change in the net migration rate

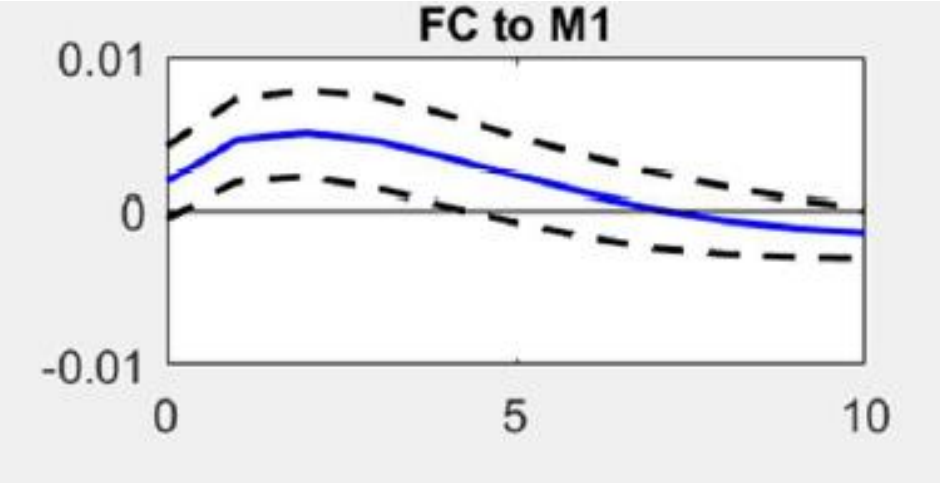


Figure 10: Dynamic effects of an increase in λ