INTEGRATING LABOR MARKET IN POPULATION PROJECTIONS

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§ Basic assumptions and parameters
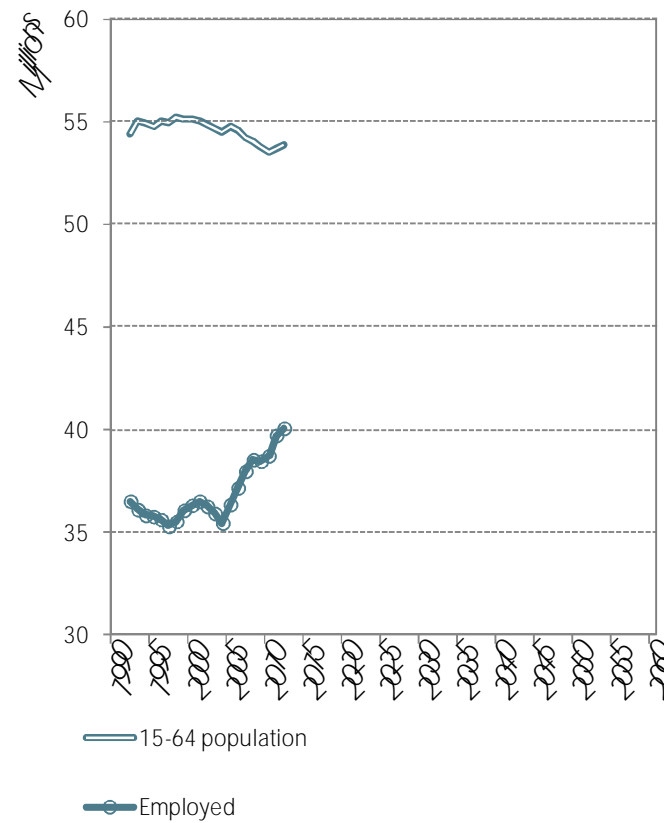
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Why

What does it mean that working-age population will shrink in the future?

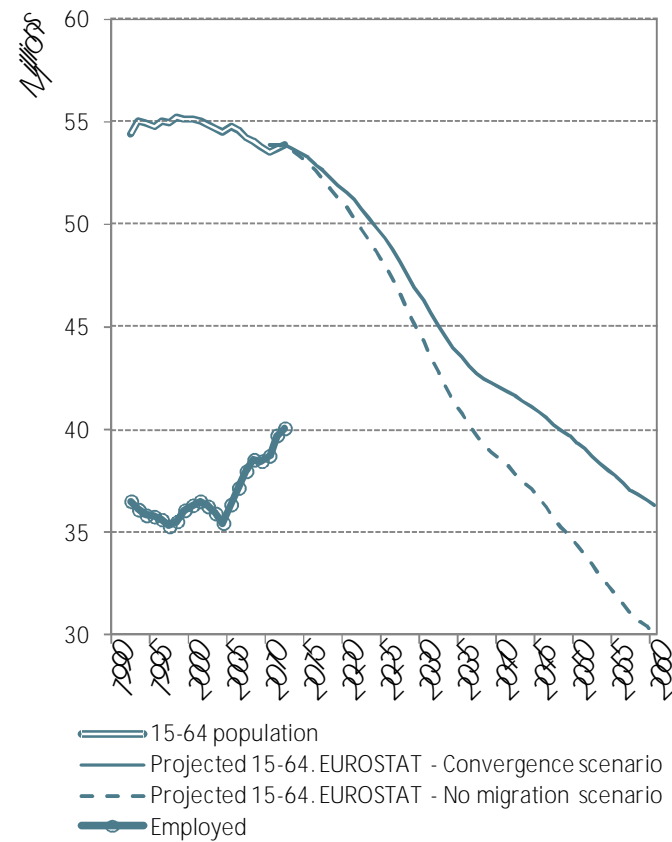Employment and working-age population in Germany

Source: EUROSTAT. Labor Force Survey.

Why

What does it mean that working-age population will shrink in the future?

## Employment and working-age population in Germany

Legend:
- 15-64 population
- Projected 15-64. EUROSTAT - Convergence scenario
- Projected 15-64. EUROSTAT - No migration scenario
- Employed

Source: EUROSTAT. Labor Force Survey. EUROPOP 2010.

Why

… And what does it mean that working-age population will shrink relative to the elderly?

Two dependency ratios in Spain
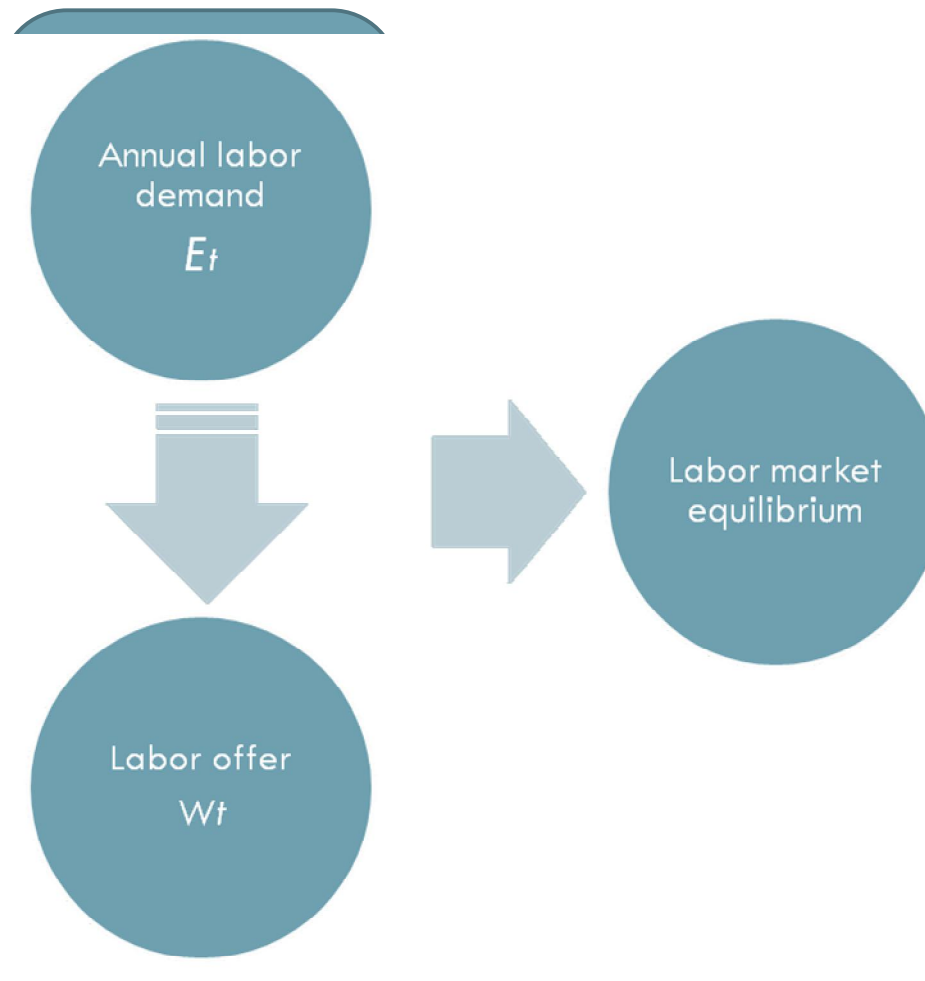

Demographic dependency ratio: Population 65+ / Population 15-64
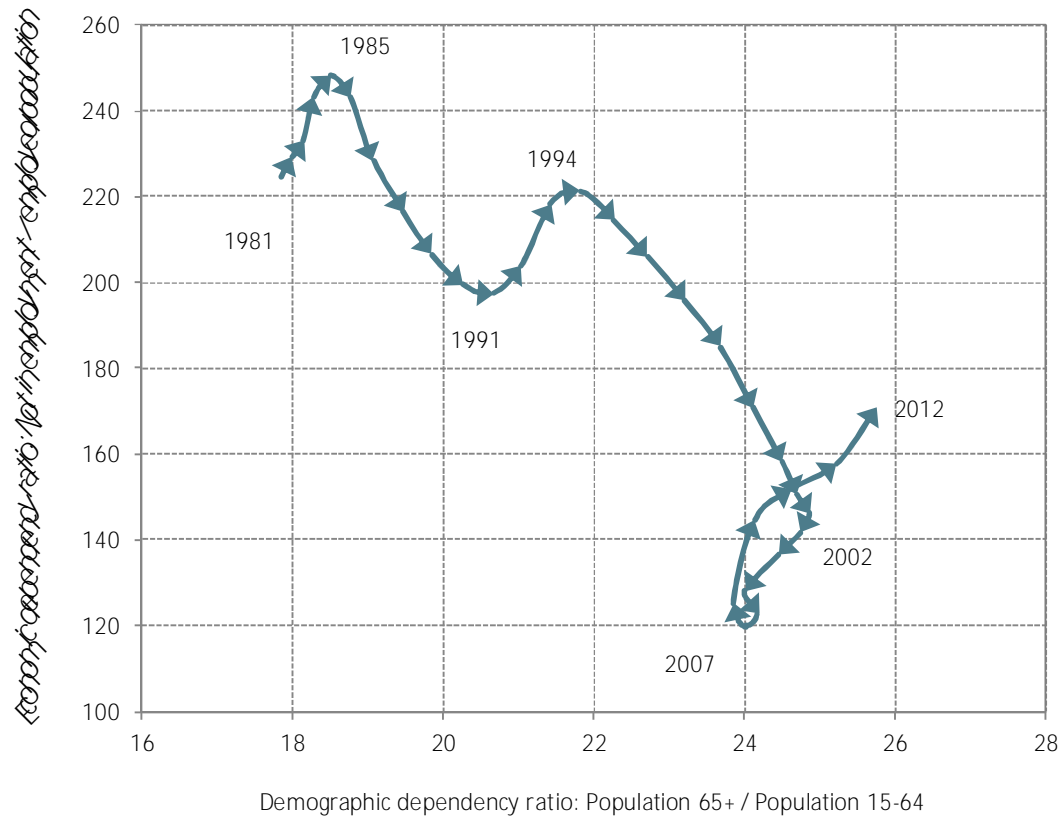
Source: INE. Labor Force Survey

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Basic assumptions and parameters

The basics.

Annual labor demand E_t

Labor offer W_t

Labor market equilibrium

Basic assumptions and parameters

The annual variation of labor demand is determined by the growth rate of GDP & productivity

Annual labor demand
E_t

$$= \frac{\quad}{\quad}$$
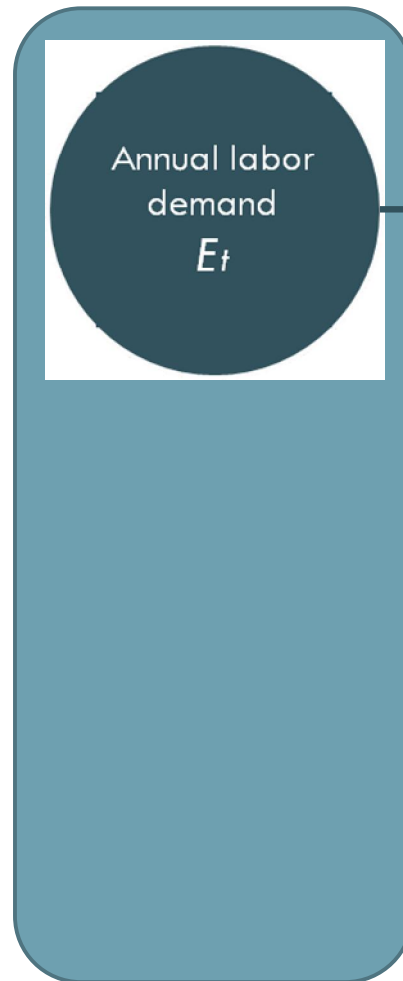
$$= \frac{\quad}{\quad_1} \qquad 1 = \frac{\hat{O}}{{}_1\hat{O}\quad_1} \qquad 1 = \frac{\quad}{1+}$$

$$= \frac{\quad}{1+}$$

Basic assumptions and parameters

The annual variation of labor demand is determined by the growth rate of GDP & productivity
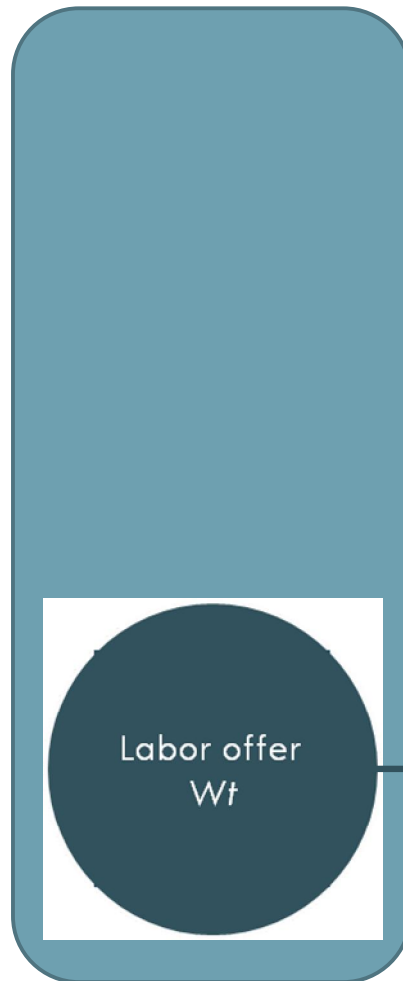
…We have used benchmark growth rates, by OECD for our two main scenarios

Annual labor demand E_t

OECD Economic Policy Papers No. 03

Economic Policy Reforms 2012

NOVEMBER 2012

Looking to 2060: Long-term global growth prospects

Basic assumptions and parameters

Finally, labor offer reacts to balance the labor market, in two possible ways.

Labor offer Wt

(a) Increasing employment rates

§ It has no effect in population figures
§ It changes economic dependency ratios (those with denominator = employed population)

Basic assumptions and parameters

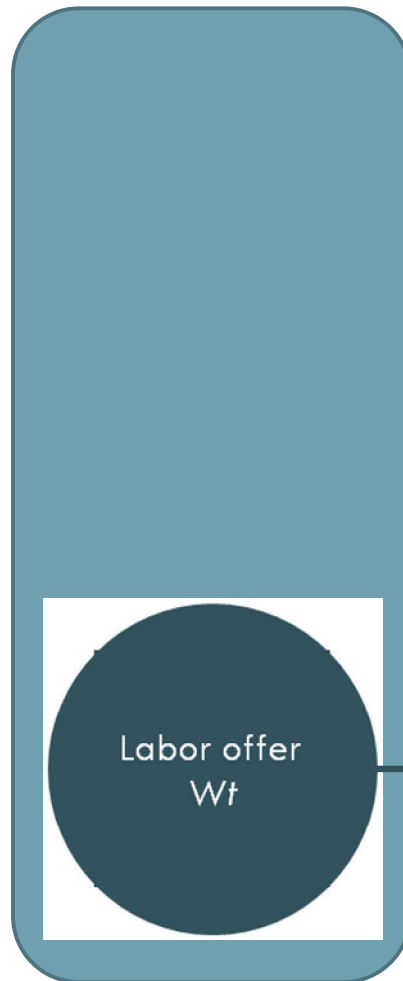Finally, labor offer reacts to balance the labor market, in two possible ways.

Labor offer
Wf

(a) Increasing employment rates

§ It has no effect in population figures
§ It changes economic dependency ratios (those with denominator = employed population)
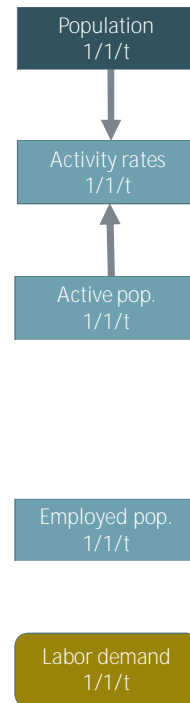
(b) Additional immigration

§ It changes population figures
§ It changes demographic & economic dependency ratios

Basic assumptions and parameters
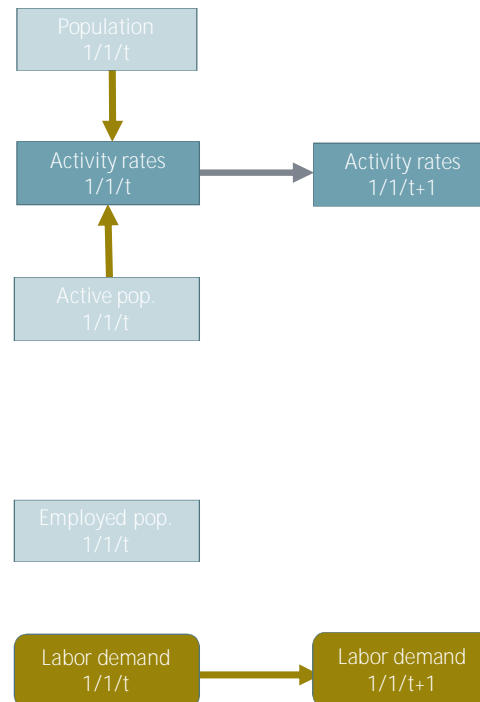
The flow chart.

We start with aggregates in time t.

Overall employed population is equal to labor demand.

```
Population
1/1/t
   |
   v
Activity rates
1/1/t
   ^
   |
Active pop.
1/1/t


Employed pop.
1/1/t


Labor demand
1/1/t
```

Basic assumptions and parameters

The flow chart.

We make explicit assumptions on future economic performance & activity rates

```
┌──────────────┐
│  Population  │
│    1/1/t     │
└──────┬───────┘
       │
       ▼
┌──────────────┐         ┌──────────────┐
│Activity rates│ ──────▶ │Activity rates│
│    1/1/t     │         │   1/1/t+1    │
└──────▲───────┘         └──────────────┘
       │
┌──────┴───────┐
│ Active pop.  │
│    1/1/t     │
└──────────────┘

┌──────────────┐
│ Employed pop.│
│    1/1/t     │
└──────────────┘

┌──────────────┐         ┌──────────────┐
│ Labor demand │ ──────▶ │ Labor demand │
│    1/1/t     │         │   1/1/t+1    │
└──────────────┘         └──────────────┘
```

Basic assumptions and parameters

The flow chart.

We estimate the surviving population, with death and emigration probabilities.


```
┌──────────────┐          ┌──────────────┐
│  Population  │ ───────▶ │ Surviving pop.│
│    1/1/t     │          │   1/1/t+1     │
└──────────────┘          └──────────────┘
       │
       ▼
┌──────────────┐          ┌──────────────┐
│ Activity rates│ ──────▶ │ Activity rates│
│    1/1/t     │          │   1/1/t+1     │
└──────────────┘          └──────────────┘
       ▲
       │
┌──────────────┐
│  Active pop. │
│    1/1/t     │
└──────────────┘


┌──────────────┐
│ Employed pop.│
│    1/1/t     │
└──────────────┘


┌──────────────┐          ┌──────────────┐
│ Labor demand │ ───────▶ │ Labor demand │
│    1/1/t     │          │   1/1/t+1    │
└──────────────┘          └──────────────┘
```
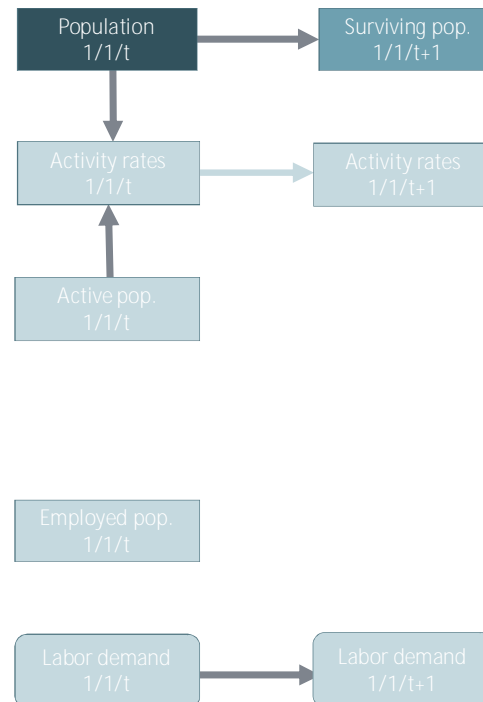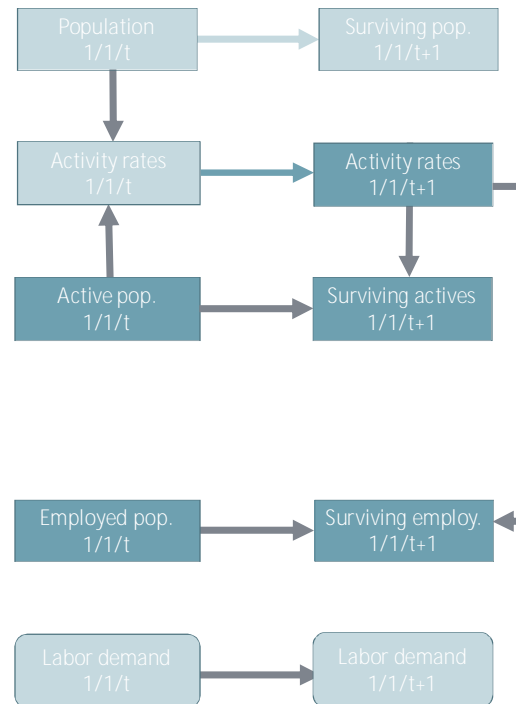
Basic assumptions and parameters

The flow chart.

We estimate surviving active and employed population with the following probabilities:

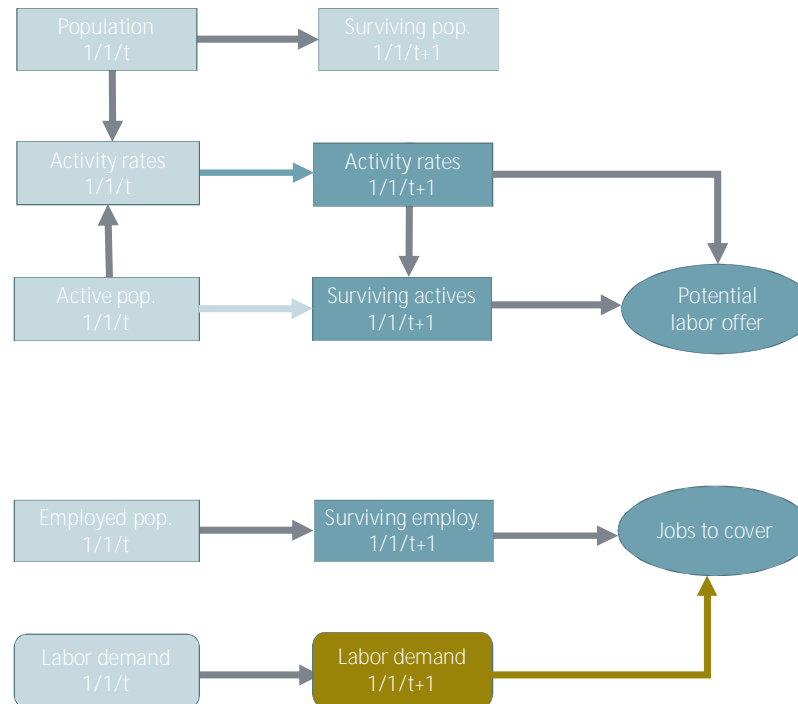§ Death

§ Emigration

§ Exit from labor market

Basic assumptions and parameters

The flow chart.

Jobs to cover are not only the newly created jobs by the economy, but the jobs left by not surviving in employment.
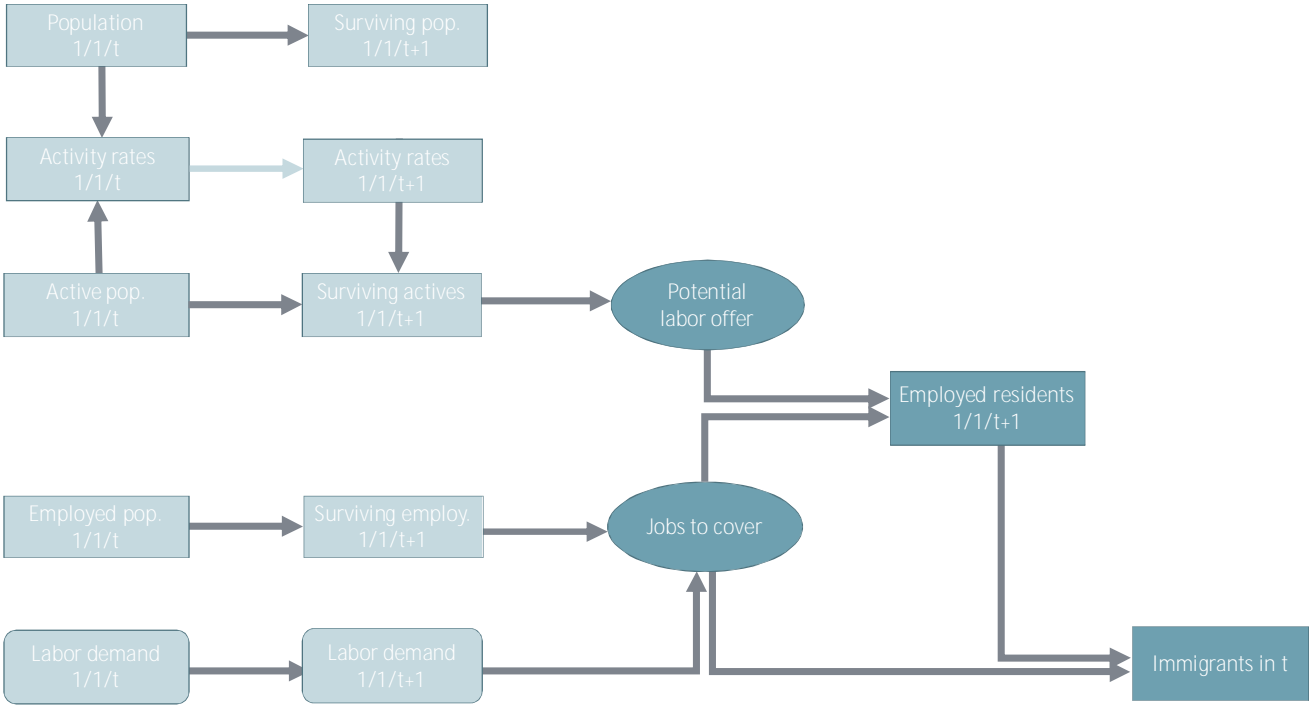
Potential labor offer equals active population minus frictional unemployment.

Basic assumptions and parameters

The flow chart.

The labor market balances the jobs to cover in two ways: employing more residents and by low unemployment; attracting new immigrants
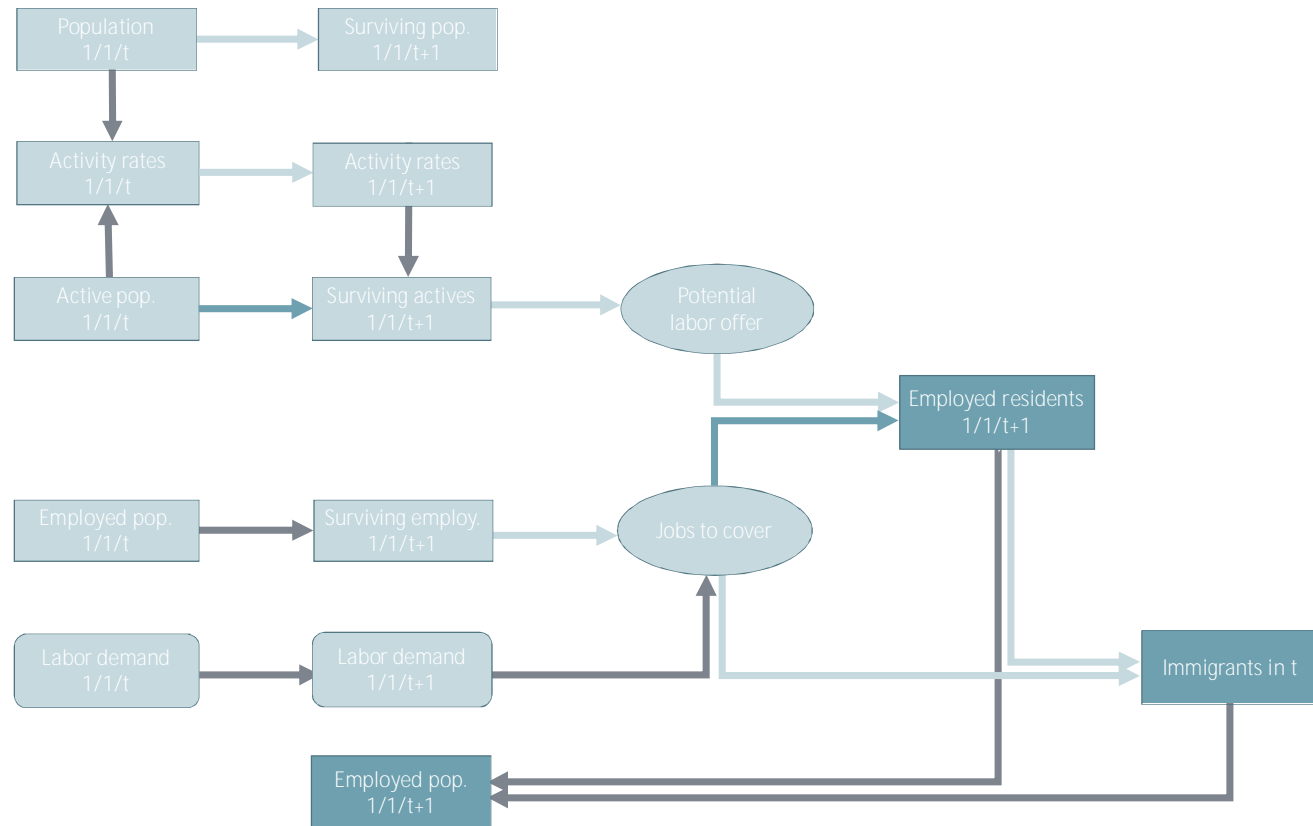
Basic assumptions and parameters

The flow chart.
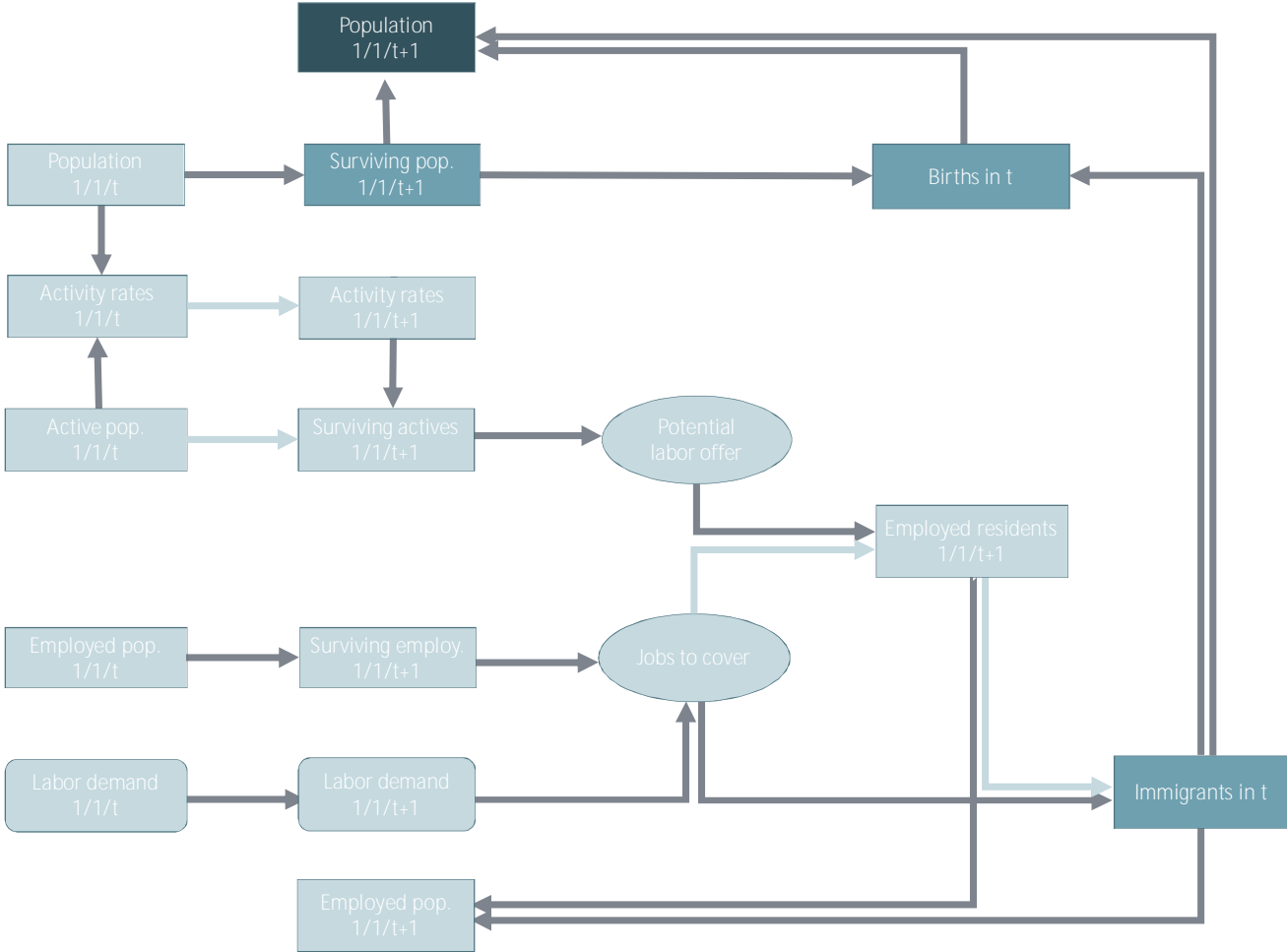
Finally, we obtain the employed population at t+1

… which equals labor demand (equilibrium condition).
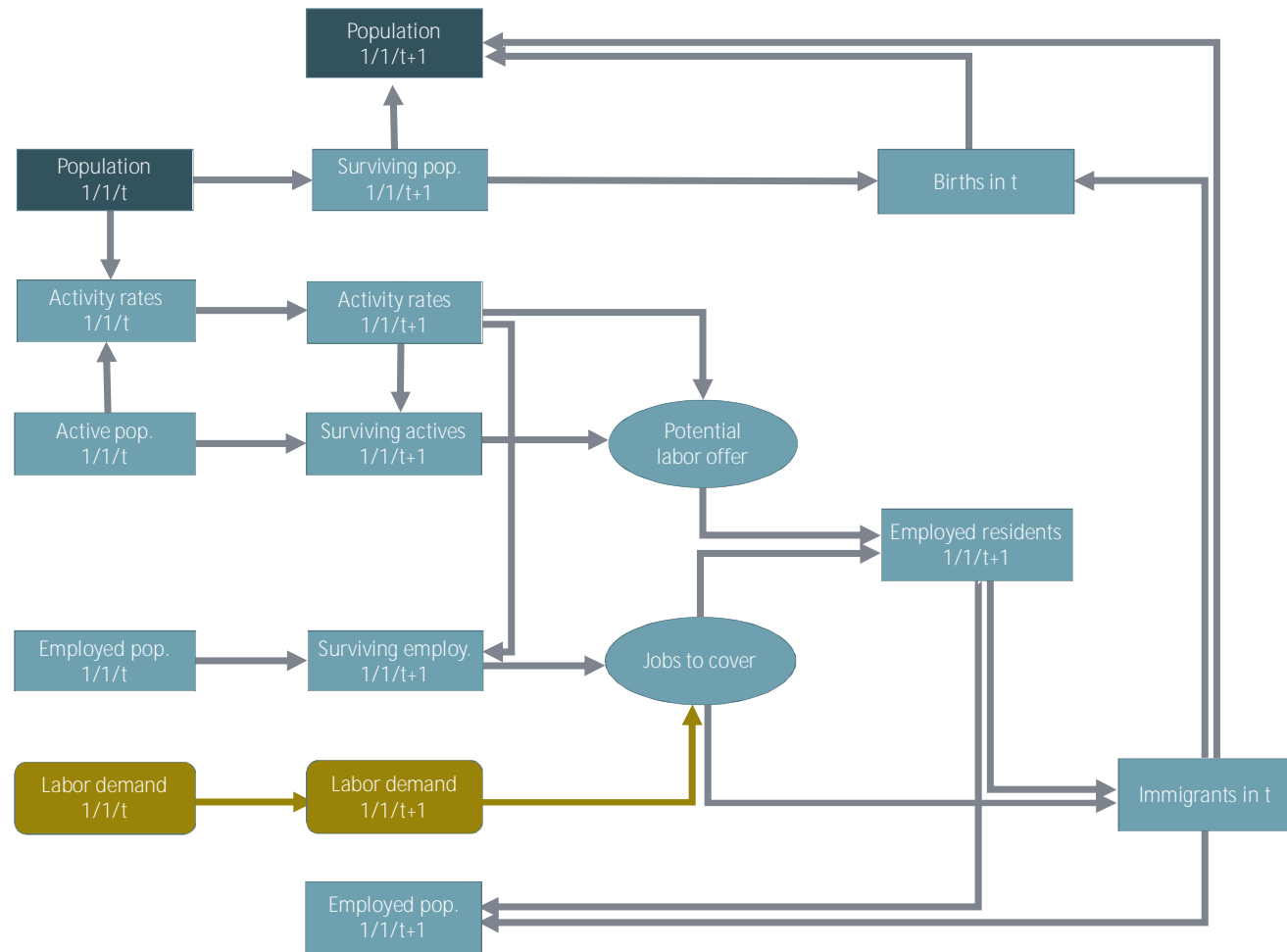
Basic assumptions and parameters

The flow chart.

…and we also get population at t+1, with the traditional cohort-component approach.

Basic assumptions and parameters

The flow chart.

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Scenarios

We selected five European countries.

… and we set certain parameters.

Selected countries: Germany, France, Italy, Spain, Sweden

Labor demand scenarios (GDP and productivity assumptions) were taken from the OECD report: "Looking to 2060: long term global growth prospects"

Average annual growth rate of GDP & productivity (2011-2060). OECD

Country	GDP	Prod.
Spain	1,7%	1,1%
France	1,6%	1,1%
Germany	1,1%	1,4%
Italy	1,4%	1,1%
Sweden	1,9%	1,3%

Several demographic parameters were taken from EUROPOP 2010:
§Starting population (1/1/2012)
§Fertility, mortality & emigration
§Even initial number of immigrants (so our projections are equal to EUROPOP-2010 until new additional immigrants are required).

Two possibilities for activity rates: remain constant or converge to EU-leader

Minimum-frictional unemployment was set al 2%. Below that threshold, the market equilibrium is reached with additional immigration only.

Scenarios

Finally four scenarios were developed for each country, combining three labor market parameters.

Scenario	Growth of GDP	Growth of Productivity	Activity rates
A	OECD	OECD	constant
B	OECD	OECD	convergent
C	2.1%	1.2%	constant
D	1.2%	1.2%	convergent

Annual growth rate for GDP & Productivity (2011-2060). OECD

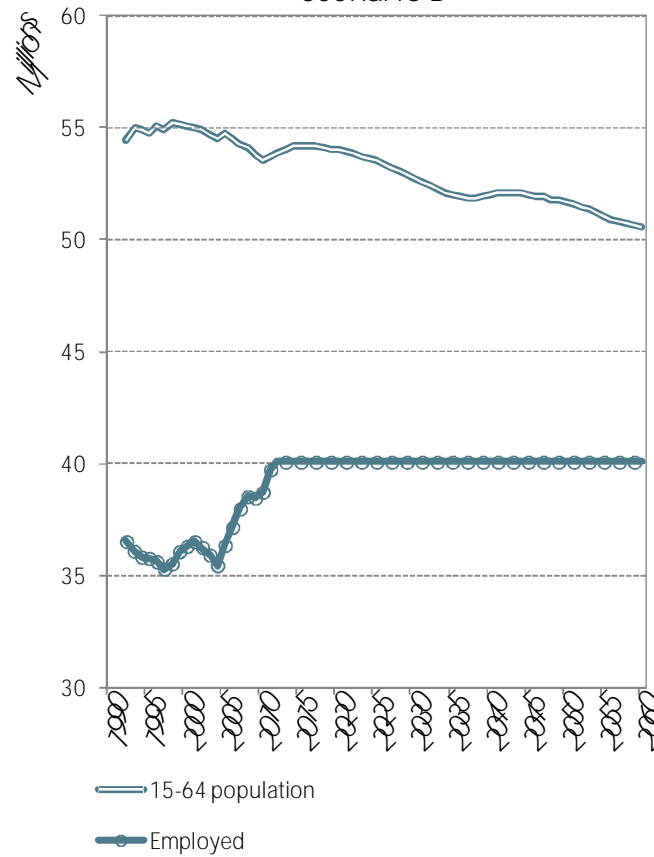| Country	GDP	Prod.
Spain	1,7%	1,1%
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Germany	1,1%	1,4%
Italy	1,4%	1,1%
Sweden	1,9%	1,3%
USA	2,1%	1,2%

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Results

Let´s go back to the
original questions

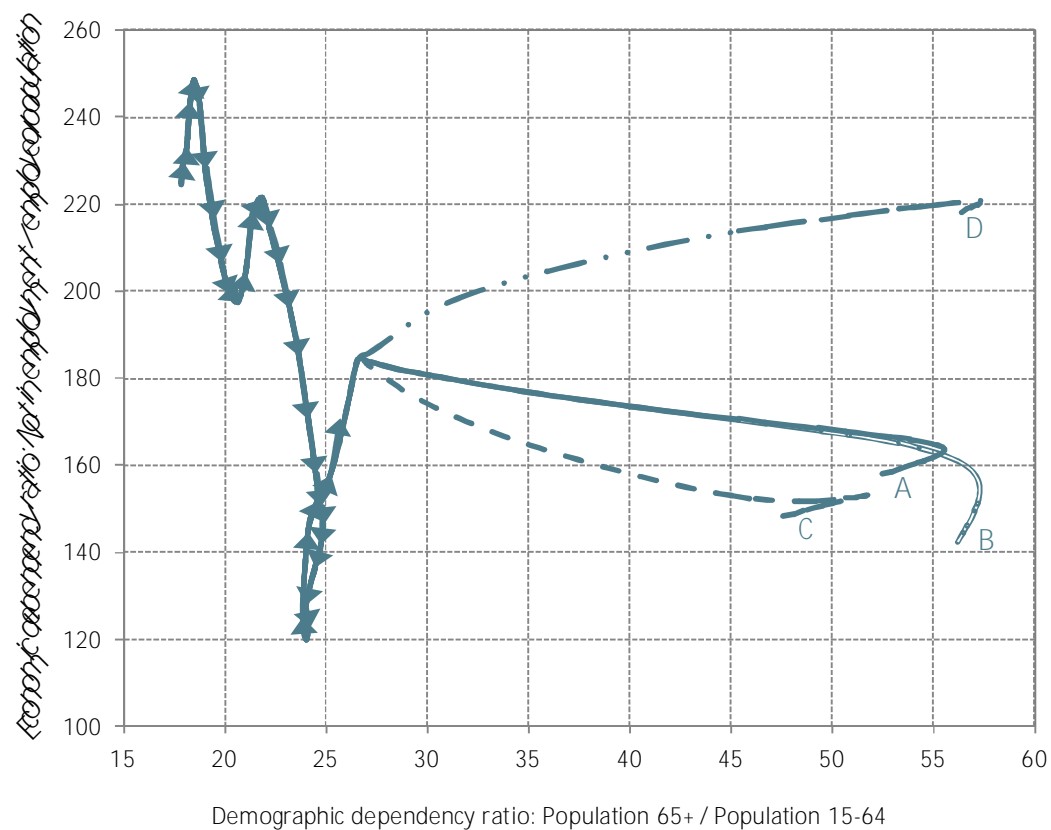Employment and working-age population in Germany.
Scenario D

Source: EUROSTAT and own-elaboration.

Results

Let´s go back to the
   original questions

Two dependency ratios in Spain

Demographic dependency ratio: Population 65+ / Population 15-64

Source: INE, EUROSTAT and own-elaboration

Results

More comments on dependency:

(1) Demographic dependency

Future increase, but slightly less than pure demographic projections.

(2) The economic side

It may grow or fall relative to 2012.

… but nothing similar to expected growth in demog. dependency

Demographic Dependency Ratio. Population 65+ / Population 15-64

Country	1986*	2012	2060					
			EUROPOP		Population projections based on labour demand			
			Convergence	No migration	Scenario A	Scenario B	Scenario C	Scenario D
Spain	20	25	56	75	52	56	47	56
France	20	25	47	48	42	46	38	47
Germany	22	31	60	71	53	55	40	51
Italy	20	31	57	72	49	56	43	57
Sweden	28	29	46	52	41	41	38	46

Economic Dependency Ratio. Not-working population / employed population

Country	1986*	2012	2060					
			EUROPOP		Population projections based on labour demand			
			Convergence	No migration	Scenario A	Scenario B	Scenario C	Scenario D
Spain	247	154			157	141	148	218
France	147	140			153	130	145	187
Germany	126	103			140	126	118	118
Italy	173	163			185	145	171	187
Sweden	122	104			116	116	112	148

(*) First data for Sweden corresponds to 1996

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Conclusions

§   Demography and social features are parts of a general system, which is more adaptive and balanced than each of its parts alone.

§   In this paper we have focused on one of the links among the two worlds: population projections & labor markets. We have developed a population projection model which is based on labor demand.

§   We have exemplified the model to five European Countries, finding:

1. Demographic dynamics with a diminishing working-age population might lead to full employment.

2. Population figures and dependency ratios change when we consider the economic implications of population projections, leading to a more adaptive and balanced system (in terms of lower dependency ratios).

Conclusions

Limitations and further work

§   Fertility, mortality and mobility patterns might be different depending on the state (employed-unemployed-inactive).

§   And also depending on immigrant background.

§   What is the reproductive role of inactive population?

§   What about emigration?

§   Re-migrations.

§   Immigrants availability?

§   Shall we consider the number of hours worked instead of being employed/unemployed?

THANK YOU