Forecast in the French Ministry of Education

Methodology using International classifications and some results for France

- Forecasting recruitment needs
  by sector and skill type concerning school leavers

- Methodology and models used by BIPE (the company in charge of the studies: Bureau d'Informations et de Prévisions Economiques)

Claude SAUVAGEOT

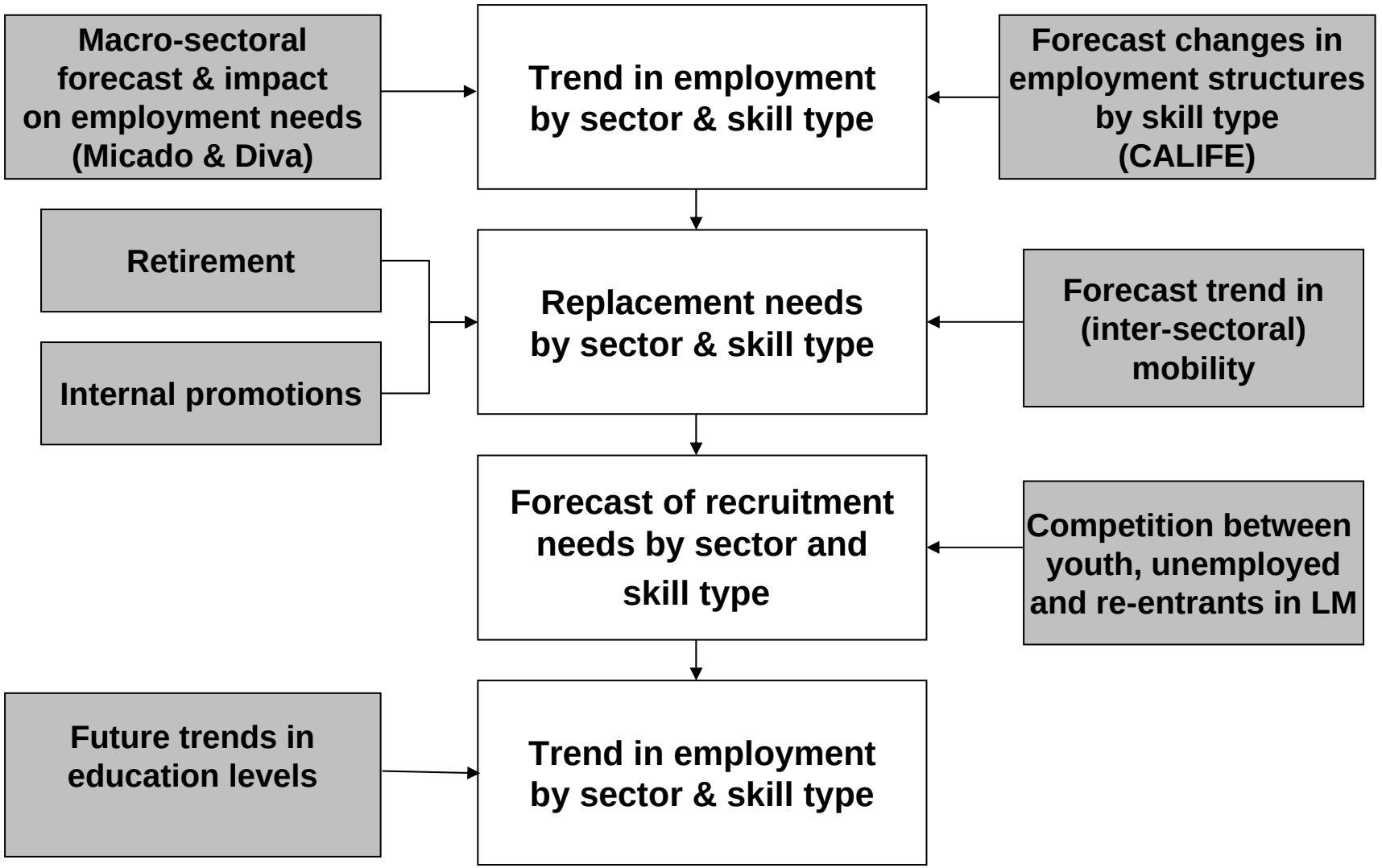
Directorate for evaluation, forecast and performance

Warwick 2-3 November 2006

REMINDER

About the BIPE Methodology and its Models

Approach (1)



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Approach (2)

- Step 1: Long term macro and sectoral forecast of the economy of France
  - Production, value added, employment
- Step 2: Forecast changes in the necessary skill mix by sector, taking into account technological change and the modernisation of the capital stock
- Step 3: Forecast exits from the work force (due to retirement, mobility, other); estimate replacement needs per sector
- Step 4: Confront the skill mix of those at work with the needed skill mix; define the recruitment needs by sector / skill type
- Step 5: Estimate future recruitment patterns taking into account:
  - The number of people who exited the education system, and their qualification level
  - Competition for work between those entering the labour market, registered unemployed and formerly discouraged workers who decide to re-enter the labour market

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The MICADO Model

- MICADO = Modèle d'Interprétation de la Croissance et d'Anticipation de la Demande et de l'Offre
- Macro model used to forecast long term trends in the French economy
- Forecasts both long term demand and long term supply trends
  - Assumes a constant returns Cobb-Douglas production function
- Takes into account capital accumulation and L/K substitution
- Takes into account financing capacity of the economy

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DIVA

- Diva = Dynamiques Inter-sectorielles à Vingt Ans
- A long term, I-O based, sectoral forecast model of the French economy
- 36 sectors
- Four blocks:
  - Trade with the rest of the world
  - Domestic demand
  - Production and imports, incl. Inter-linkages between sectors
  - Productivity and employment by sector

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CALIFE

- CALIFE = Qualification emploi
- Forecasts employment by sector and skill type
  - Forecasts changes in skill mix over time, taking into account the different generations of equipment & the impact of technological developments on skill levels needed
  - Takes into account the differences between modernisation investments, and investments in new capacity, on the skills needed
  - Expert information is taken into account to identify potential breaks from past trends and validate the needed changes in the skill mix
- 36 sectors, 16 socio-professional categories

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In fact, what do we need?

- A macroeconomic model taking into account various assumptions (GDP growth, productivity….) allowing scenarios
  - For BIPE, it uses MICADO and DIVA
- A number of employees by ISCO group in 20.. for each scenario
  - For BIPE, it uses CALIFE
- But, of course, any suite of models producing at the end a number of employees by ISCO group in 20.. can be used

- And of course a labour force survey since 198.

Macroeconomic assumptions

Growth, employment, duration of work and productivity

	1980-1990	1990-2002	2002-2015
GDP	2,5	1,9	2
Productivity by hour	2,6	1,6	1,5
Number of worked hours	-0,1	0,3	0,5
Duration of work by employee	-0,7	-0,8	0
Salaried employment	0,6	1,1	0,5
Productivity by salaried employee	1,9	0,8	1,5

Sources : 1980-2002 Insee comptes nationaux, projections 2015 BIPE

Assumptions - results

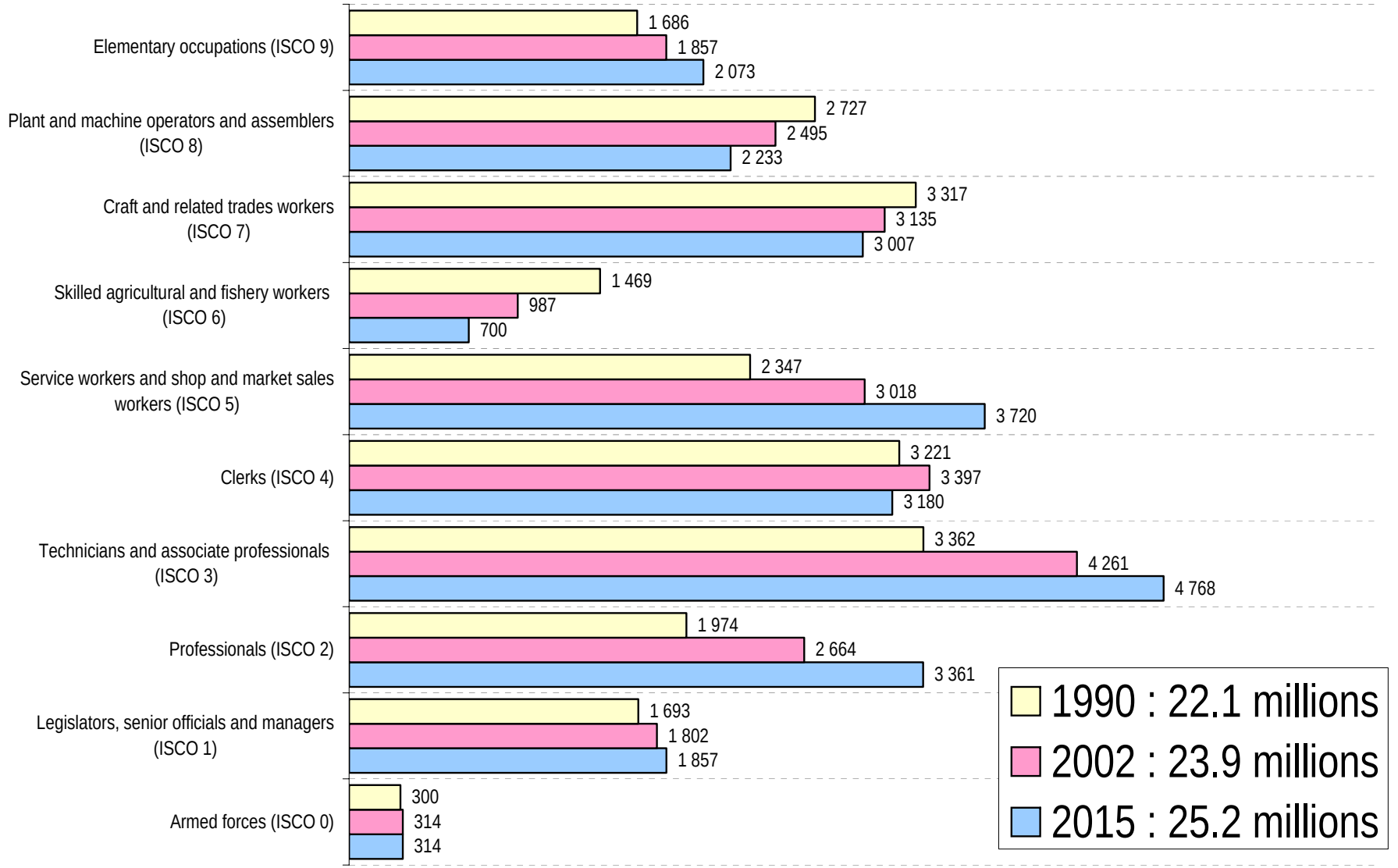
In millions	**1990**	**2002**	**2015**
Population 15-64 years	36,9	38,3	40,1
Active Population	24,6	26,3	27,2
Occupied active Population	22,3	23,9	25,2
Unemployment	2,3	2,3	2
In %			
Activity rate	66,5	68,6	68
Employment rate	60,4	62,5	63
Unemployment rate	9,2	8,9	7,4

Results on employment

by ISCO group

Trend for employees by ISCO group

in thousands



Source : Based on labour survey, INSEE and BIPE forecasts

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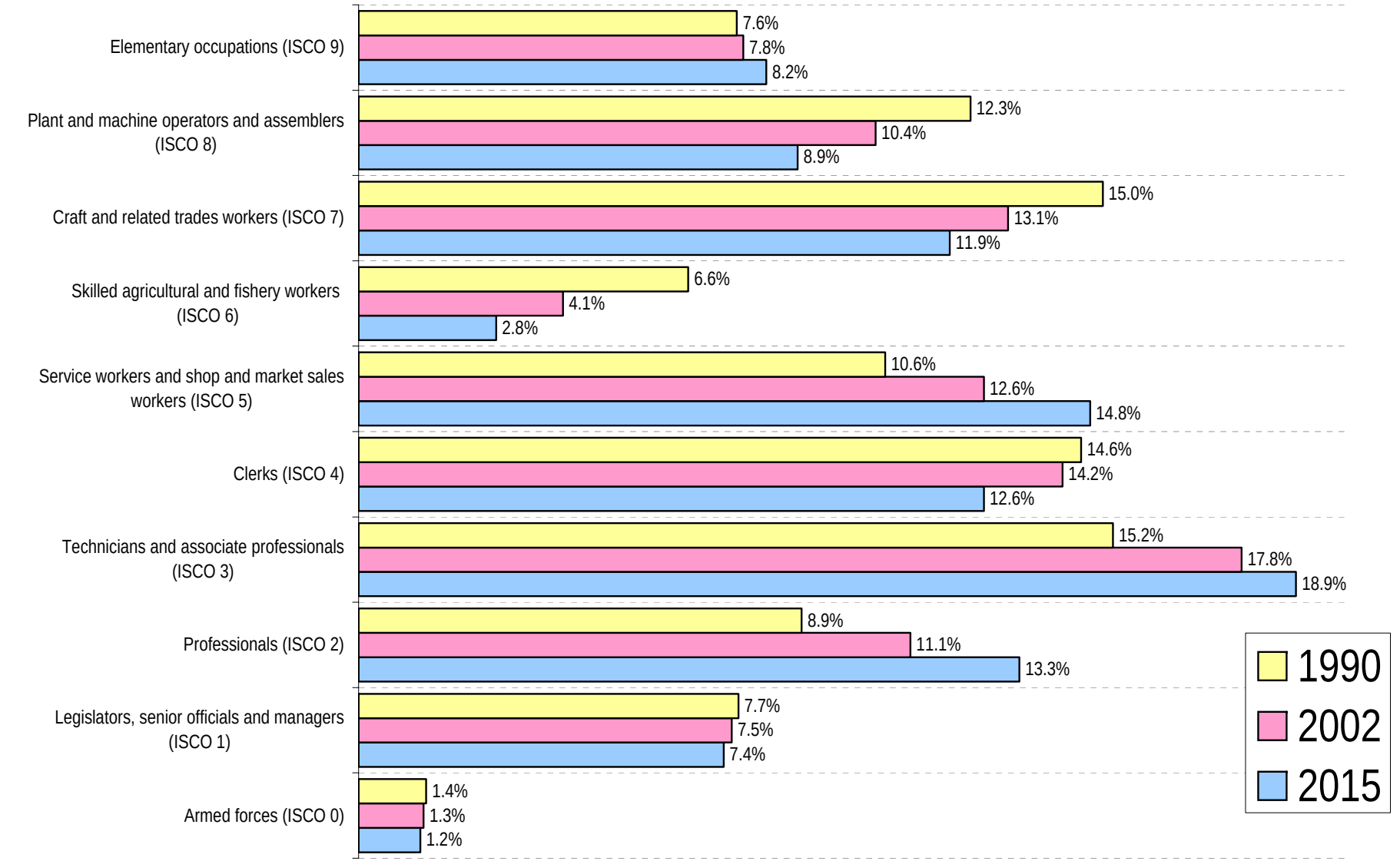
Trend for the employees structure by ISCO

in %



Source : Based on labour survey, INSEE and BIPE forecasts

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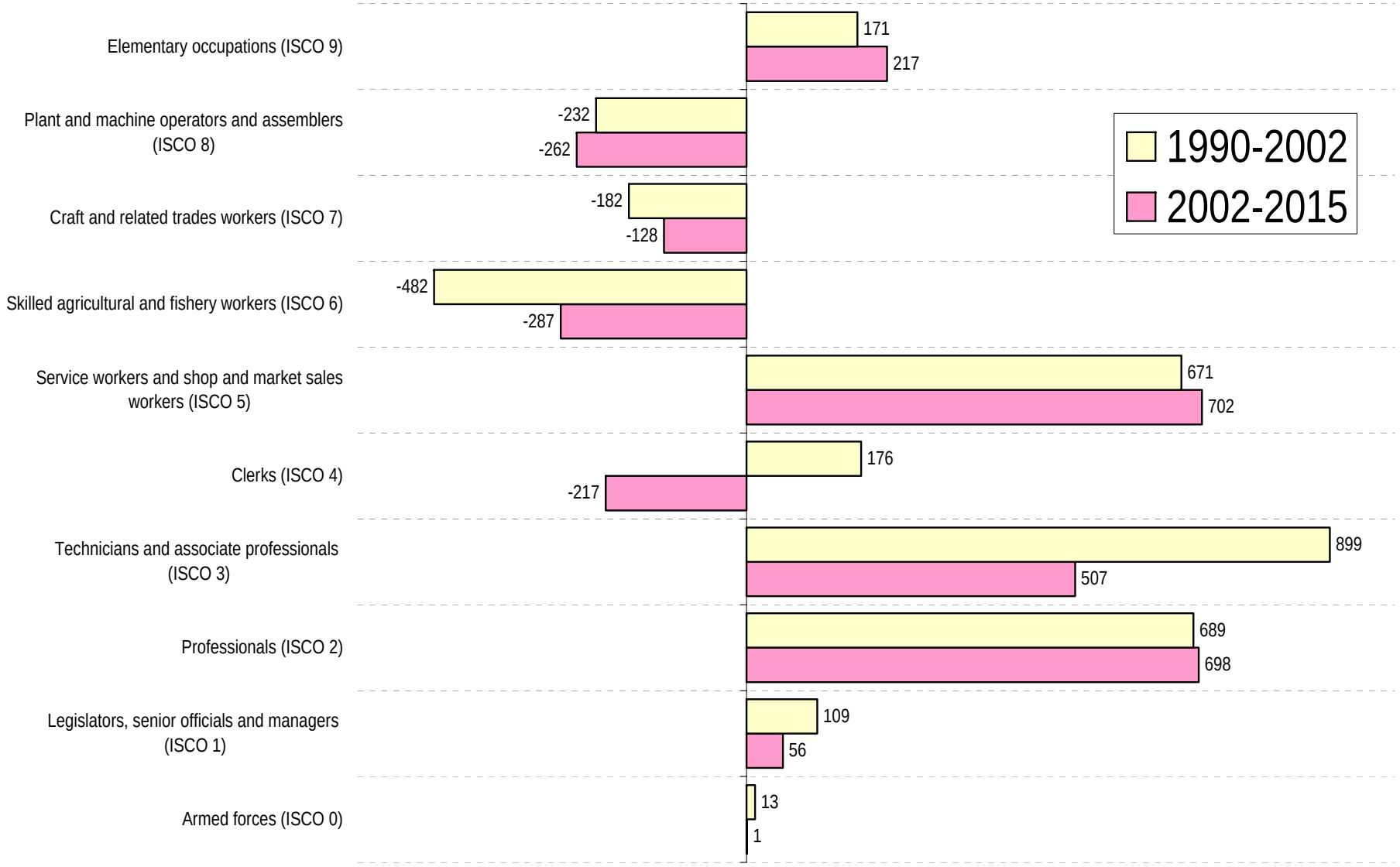
Variation 1990- 2002 and projection by ISCO group

in thousands



Source : Based on labour survey, INSEE and BIPE forecasts

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Trend for employees by ISCO group

	Thousands			Average annual growth			
				Thousands		%	
	1990	2002	2015	1990-2002	2002-2015	1990-2002	2002-2015
Armed forces (ISCO 0)	300	314	314	1	0	0.4%	0.0%
Legislators, senior officials and managers (ISCO 1)	1 693	1 802	1 857	9	4	0.5%	0.3%
Professionals (ISCO 2)	1 974	2 664	3 361	57	54	2.5%	2.0%
Technicians and associate professionals (ISCO 3)	3 362	4 261	4 768	75	39	2.0%	0.9%
Clerks (ISCO 4)	3 221	3 397	3 180	15	-17	0.4%	-0.5%
Service workers and shop and market sales workers (ISCO 5)	2 347	3 018	3 720	56	54	2.1%	1.8%
Skilled agricultural and fishery workers (ISCO 6)	1 469	987	700	-40	-22	-3.3%	-2.8%
Craft and related trades workers (ISCO 7)	3 317	3 135	3 007	-15	-10	-0.5%	-0.3%
Plant and machine operators and assemblers (ISCO 8)	2 727	2 495	2 233	-19	-20	-0.7%	-0.9%
Elementary occupations (ISCO 9)	1 686	1 857	2 073	14	17	0.8%	0.9%
Total	22 096	23 929	25 215	153	99	0.7%	0.4%

Source : Based on labour survey, INSEE and BIPE forecasts

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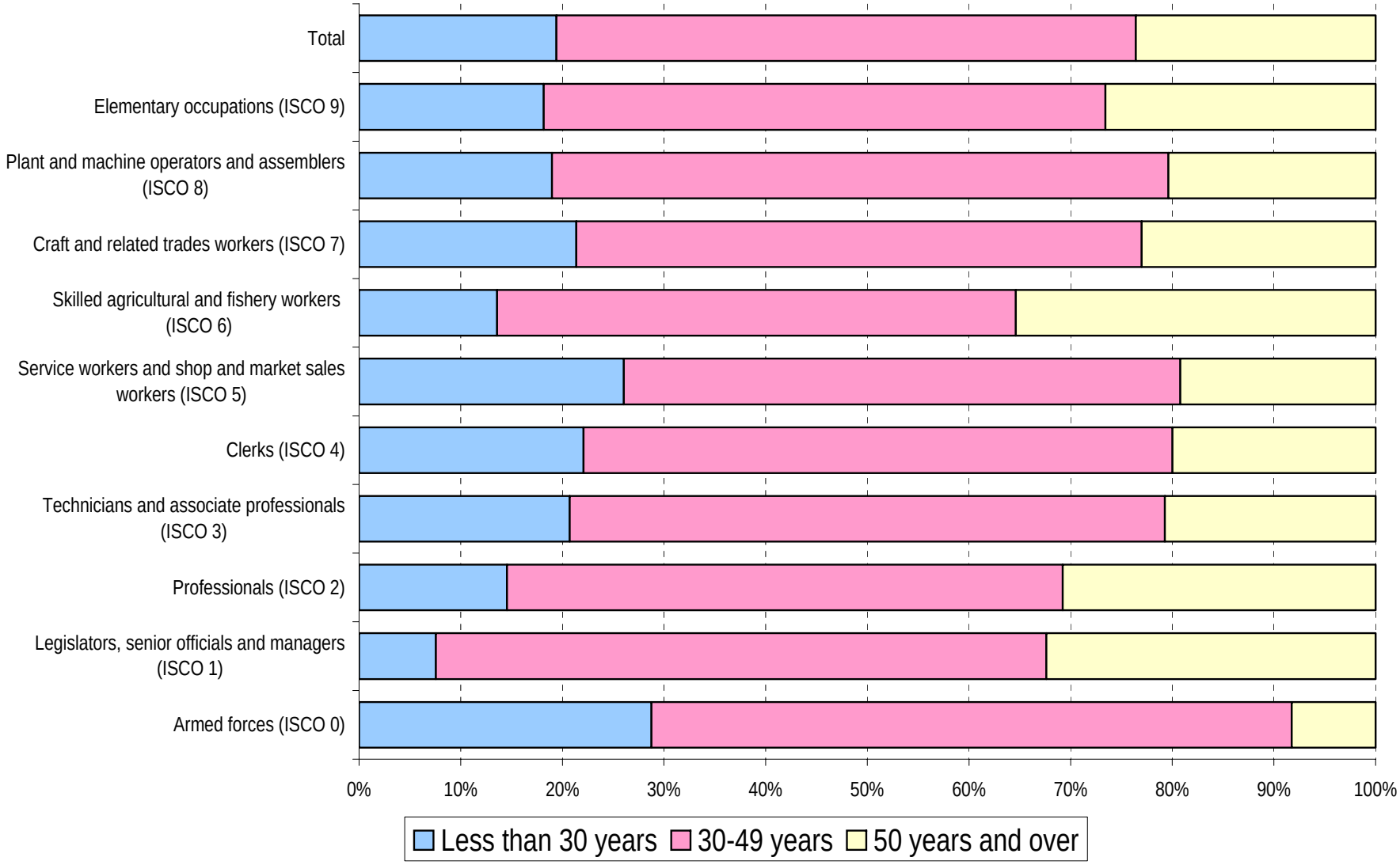
Structure of employees by age and ISCO group in 2002

in %



Source : BIPE - Based on labour survey, INSEE

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Trend of the employees structure by age group and ISCO group

in %

		Less than 30 years	30-49 years	50 years and over	Total
Armed forces (ISCO 0)	1990	29%	62%	8%	100%
	2002	29%	63%	8%	100%
Legislators, senior officials and managers (ISCO 1)	1990	9%	61%	29%	100%
	2002	8%	60%	32%	100%
Professionals (ISCO 2)	1990	15%	64%	21%	100%
	2002	15%	55%	31%	100%
Technicians and associate professionals (ISCO 3)	1990	24%	62%	14%	100%
	2002	21%	59%	21%	100%
Clerks (ISCO 4)	1990	31%	57%	12%	100%
	2002	22%	58%	20%	100%
Service workers and shop and market sales workers (ISCO 5)	1990	35%	49%	16%	100%
	2002	26%	55%	19%	100%
Skilled agricultural and fishery workers (ISCO 6)	1990	16%	41%	43%	100%
	2002	14%	51%	35%	100%
Craft and related trades workers (ISCO 7)	1990	27%	55%	18%	100%
	2002	21%	56%	23%	100%
Plant and machine operators and assemblers (ISCO 8)	1990	26%	57%	16%	100%
	2002	19%	61%	20%	100%
Elementary occupations (ISCO 9)	1990	26%	48%	26%	100%
	2002	18%	55%	27%	100%
Total	1990	25%	56%	19%	100%
	2002	19%	57%	24%	100%

Source : BIPE - Based on labour survey, INSEE

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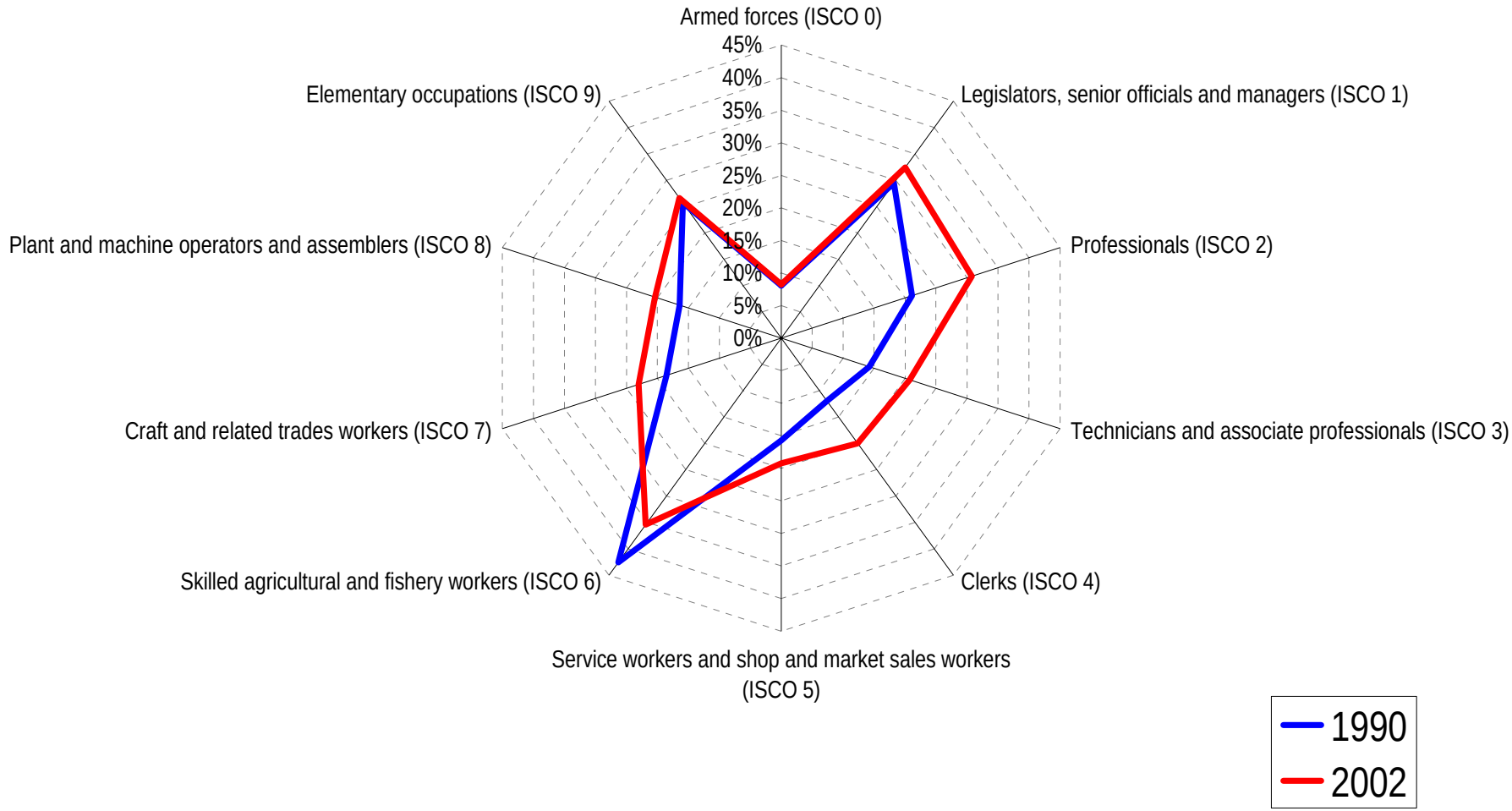
Trend in the share of 50 years old and + in employees by ISCO group

in %



Source : BIPE - Based on labour survey, INSEE

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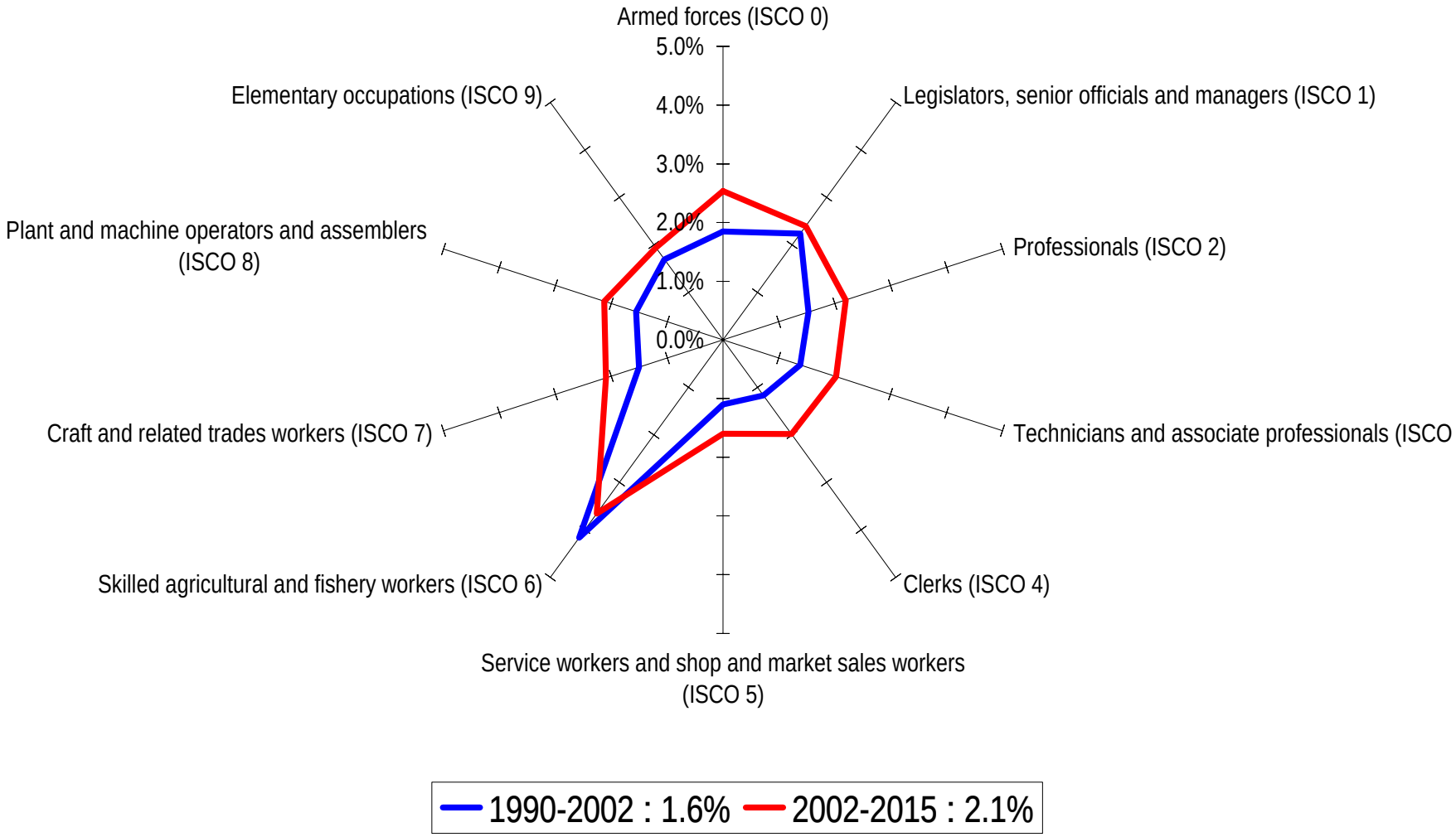
Share in average annual leaves for employees retirement by ISCO group

in %



Source : Based on labour survey, INSEE and BIPE forecasts

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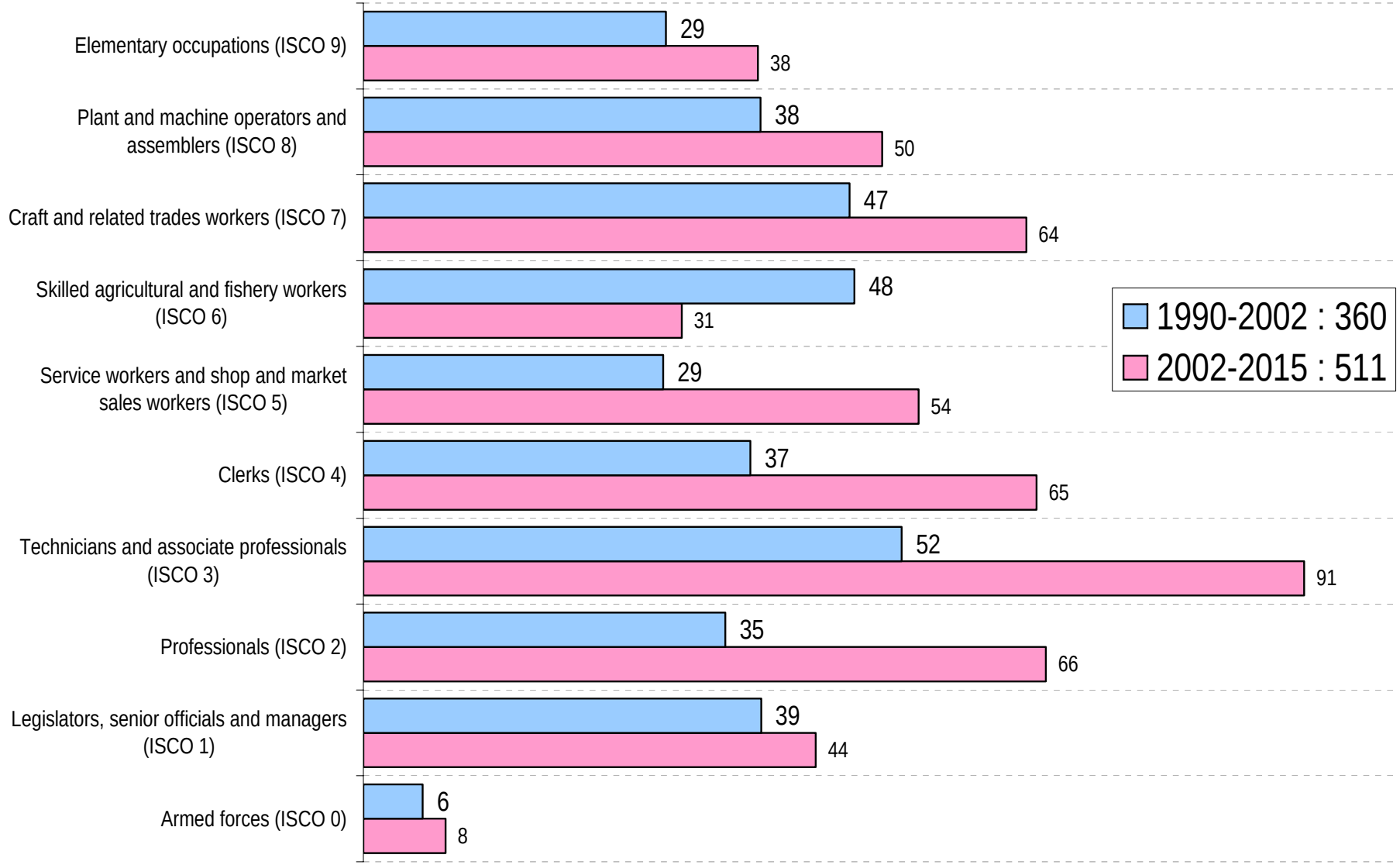
Average annual leaves for retirement by ISCO group

in thousands



Source : Based on labour survey, INSEE and BIPE forecasts

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LINKS WITH EDUCATION AND TRAINING

- Employment by ISCO group by ISCED level
- Projection of recruitment needs for school leavers by ISCED level for each ISCO group

Recruitment by ISCO group during the period 1990-2002

Thousands per year

	Factors influencing recruitment needs			Net recruitment needs	Contribution to recruitment of :			
	Change in employment	Retirement	Other mobility		Change in unemployment	Coming from inactivity	Military service	School leavers
Armed forces (ISCO 0)	1	6	0	7	0	0	4	3
Legislators, senior officials and managers (ISCO 1)	9	39	-47	1	-12	0	3	10
Professionals (ISCO 2)	57	35	-14	78	-5	0	9	74
Technicians and associate professionals (ISCO 3)	75	52	-21	106	-12	0	16	102
Clerks (ISCO 4)	15	37	43	95	2	4	5	84
Service workers and shop and market sales workers (ISCO 5)	56	29	23	108	-5	19	4	90
Skilled agricultural and fishery workers (ISCO 6)	-40	48	12	20	1	2	2	15
Craft and related trades workers (ISCO 7)	-15	47	19	51	-22	0	7	66
Plant and machine operators and assemblers (ISCO 8)	-19	38	16	35	-12	2	12	33
Elementary occupations (ISCO 9)	14	29	29	72	24	15	6	27
Total	153	360	60	573	-41	42	68	504

Source : BIPE - Based on labour survey, INSEE

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Recruitment by ISCO group during the period 2002-2015

	Factors influencing recruitment needs			Net recruitment needs	Contribution to recruitment of :			
	Change in employment	Retirement	Other mobility		Change in unemployment	Coming from inactivity	Military service	School leavers
Armed forces (ISCO 0)	0	8	1	9	0	0	0	9
Legislators, senior officials and managers (ISCO 1)	4	44	-47	1	-4	0	0	5
Professionals (ISCO 2)	54	66	-12	108	-1	0	0	109
Technicians and associate professionals (ISCO 3)	39	91	-19	111	-4	0	0	115
Clerks (ISCO 4)	-17	65	42	90	3	5	0	82
Service workers and shop and market sales workers (ISCO 5)	54	54	19	127	-1	22	0	106
Skilled agricultural and fishery workers (ISCO 6)	-22	31	11	20	2	2	0	16
Craft and related trades workers (ISCO 7)	-10	64	20	74	-6	0	0	80
Plant and machine operators and assemblers (ISCO 8)	-20	50	17	47	-4	3	0	48
Elementary occupations (ISCO 9)	17	38	27	82	40	18	0	24
Total	99	511	59	669	25	50	0	594

Source : BIPE

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Some remarks

- If we compare the last two tables, we can see in which ISCO groups the demand for school leavers will increase.

- In this case:
  - Professionals (ISCO 2): 109 vs 83 recruitments of school leavers in average by year (in thousands)
  - Service workers…(ISCO 5): 106 vs 94
  - Craft and related trade workers (ISCO 7): 80 vs 73

Question: for all these groups, what do we have to do in education and training?

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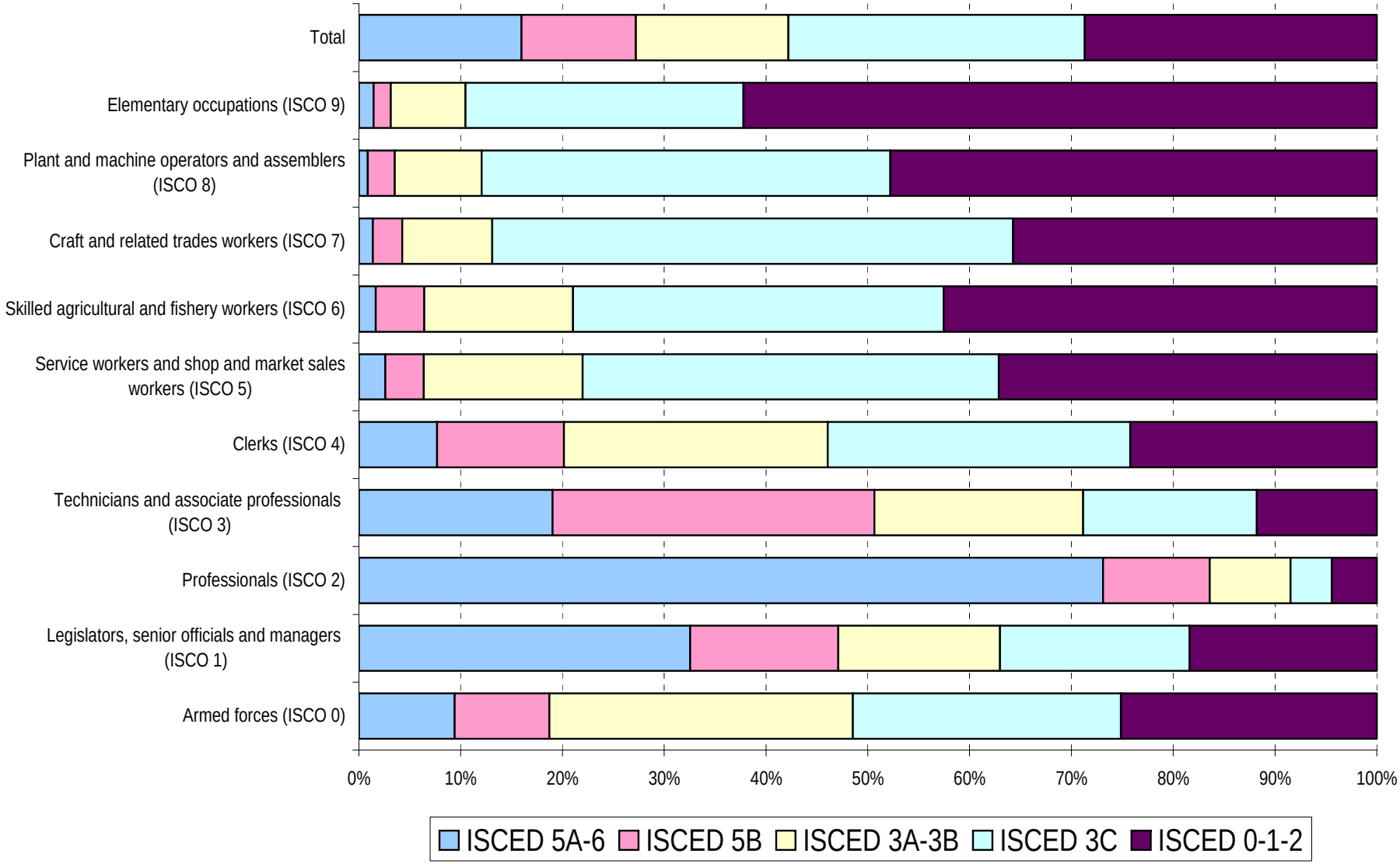
Employees structure by ISCED levels and ISCO groups en 2002

in %



Source : BIPE - Based on labour survey, INSEE

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Change in the employees structure by ISCED levels and ISCO groups

in %

		ISCED 5A-6	ISCED 5B	ISCED 3A-3B	ISCED 3C	ISCED 0-1-2	Total
Armed forces (ISCO 0)	1990	7%	3%	18%	35%	38%	100%
	2002	9%	9%	30%	26%	25%	100%
Legislators, senior officials and managers (ISCO 1)	1990	20%	7%	17%	20%	36%	100%
	2002	33%	15%	16%	19%	18%	100%
Professionals (ISCO 2)	1990	68%	9%	13%	5%	6%	100%
	2002	73%	10%	8%	4%	4%	100%
Technicians and associate professionals (ISCO 3)	1990	15%	23%	23%	20%	19%	100%
	2002	19%	32%	21%	17%	12%	100%
Clerks (ISCO 4)	1990	3%	5%	20%	35%	36%	100%
	2002	8%	12%	26%	30%	24%	100%
Service workers and shop and market sales workers (ISCO 5)	1990	1%	1%	7%	39%	52%	100%
	2002	3%	4%	16%	41%	37%	100%
Skilled agricultural and fishery workers (ISCO 6)	1990	1%	1%	6%	25%	67%	100%
	2002	2%	5%	15%	36%	43%	100%
Craft and related trades workers (ISCO 7)	1990	0%	1%	4%	47%	47%	100%
	2002	1%	3%	9%	51%	36%	100%
Plant and machine operators and assemblers (ISCO 8)	1990	0%	1%	4%	33%	62%	100%
	2002	1%	3%	9%	40%	48%	100%
Elementary occupations (ISCO 9)	1990	1%	0%	3%	21%	75%	100%
	2002	1%	2%	7%	27%	62%	100%
Total	1990	11%	6%	12%	29%	42%	100%
	2002	16%	11%	15%	29%	29%	100%

Source : BIPE - Based on labour survey, INSEE

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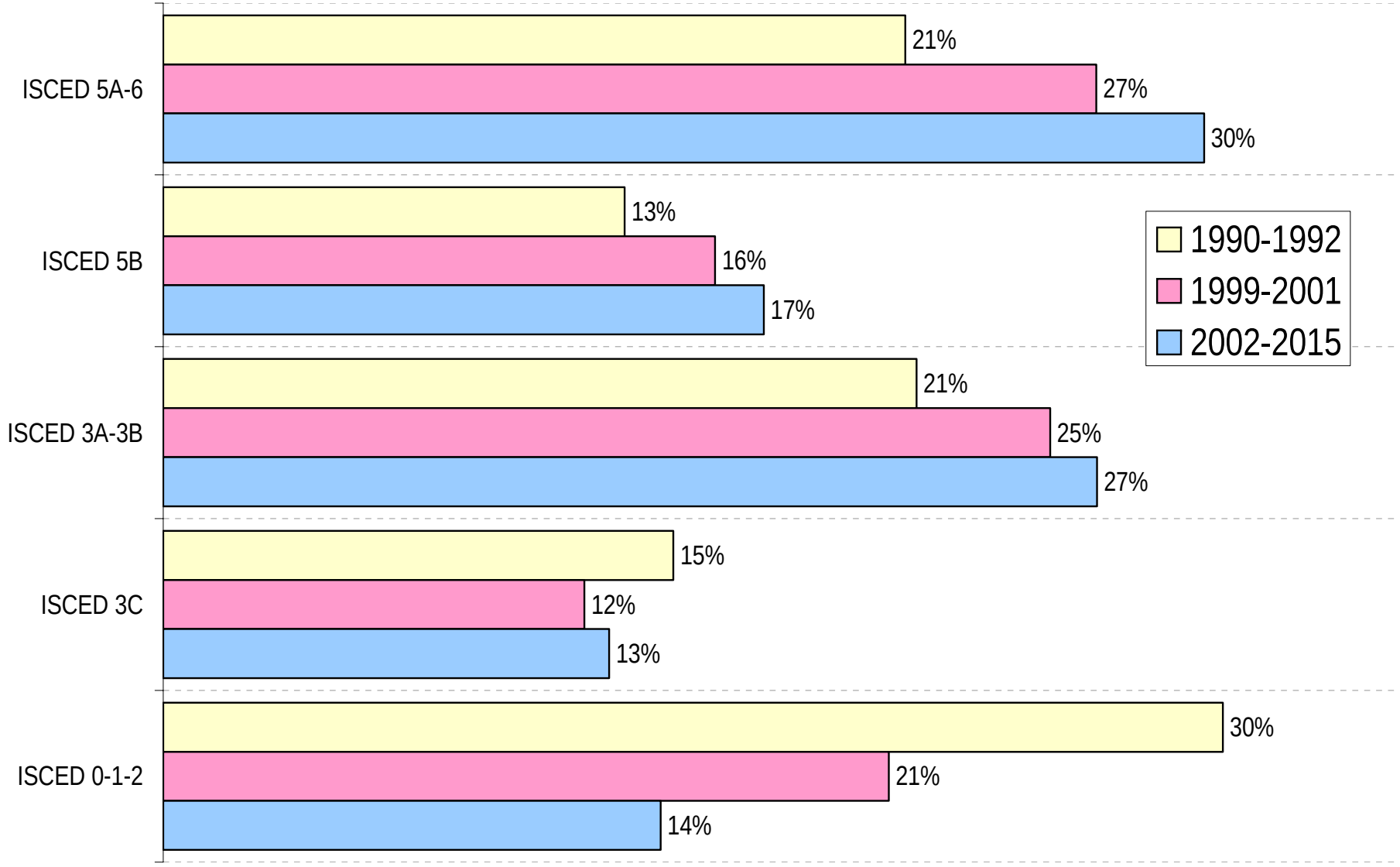
Recruitment needs structure for school leavers by ISCED levels

1990-1992 ; 1999-2001 ; projection for 2002-2015



Source : Based on labour survey, INSEE and BIPE forecasts

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Question about ISCED levels?

- We can compare, for school leavers, their structure by ISCED level and their number by ISCED level with the school leavers needs of recruitments by ISCED level.

- Shortages?

Yes, or at least tensions for 5A, 3A-B. We need to improve our education system....

ISCED levels	recruitments in average 2002-2015	estimated school leavers in average 2002-2015	Entries in activity	Unemployment rates 2015	Unemployment rates 2004
	in thousands			Rate after 9 monts	
ISCED 5A-6	154	186	180	15%	21%
ISCED 5B	119	126	122	3%	14%
ISCED 3A-B	160	175	161	1%	27%
ISCED 3C	77	129	121	37%	26%
ISCED 1-2	83	124	107	22%	40%
total	594	740	692	14%	25%

Source : DEPP, BIPE, CEREQ

Recruitment needs structure for school leavers by ISCED level and by ISCO group

1990-1992 ; 1999-2001 ; projection 2002-2015

Armed forces (ISCO 0)

	ISCED 5A-6	ISCED 5B	ISCED 3A-3B	ISCED 3C	ISCED 0-1-2	Total
1990-1992	7%	3%	52%	9%	29%	100%
1999-2001	12%	11%	43%	18%	16%	100%
2002-2015	16%	10%	46%	19%	9%	100%

Source : Based on labour survey, INSEE and BIPE forecasts

Legislators, senior officials and managers (ISCO 1)

	ISCED 5A-6	ISCED 5B	ISCED 3A-3B	ISCED 3C	ISCED 0-1-2	Total
1990-1992	68%	12%	8%	5%	8%	100%
1999-2001	78%	7%	10%	2%	3%	100%
2002-2015	84%	5%	9%	1%	1%	100%

Source : Based on labour survey, INSEE and BIPE forecasts

Professionals (ISCO 2)

	ISCED 5A-6	ISCED 5B	ISCED 3A-3B	ISCED 3C	ISCED 0-1-2	Total
1990-1992	74%	4%	18%	1%	4%	100%
1999-2001	84%	6%	9%	0%	1%	100%
2002-2015	86%	12%	2%	0%	0%	100%

Source : Based on labour survey, INSEE and BIPE forecasts

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Recruitment needs structure for school leavers by ISCED level and by ISCO group

1990-1992 ; 1999-2001 ; projection 2002-2015

Technicians and associate professionals (ISCO 3)

	ISCED 5A-6	ISCED 5B	ISCED 3A-3B	ISCED 3C	ISCED 0-1-2	Total
1990-1992	24%	38%	21%	6%	11%	100%
1999-2001	31%	37%	25%	4%	3%	100%
2002-2015	34%	36%	25%	3%	2%	100%

Source : Based on labour survey, INSEE and BIPE forecasts

Clerks (ISCO 4)

	ISCED 5A-6	ISCED 5B	ISCED 3A-3B	ISCED 3C	ISCED 0-1-2	Total
1990-1992	13%	17%	37%	16%	18%	100%
1999-2001	22%	22%	40%	7%	9%	100%
2002-2015	27%	28%	36%	6%	3%	100%

Source : Based on labour survey, INSEE and BIPE forecasts

Service workers and shop and market sales workers (ISCO 5)

	ISCED 5A-6	ISCED 5B	ISCED 3A-3B	ISCED 3C	ISCED 0-1-2	Total
1990-1992	3%	2%	20%	24%	51%	100%
1999-2001	7%	6%	28%	22%	37%	100%
2002-2015	8%	12%	37%	22%	21%	100%

Source : Based on labour survey, INSEE and BIPE forecasts

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Recruitment needs structure for school leavers by ISCED level and by ISCO group

1990-1992 ; 1999-2001 ; projection 2002-2015

Skilled agricultural and fishery workers (ISCO 6)

	ISCED 5A-6	ISCED 5B	ISCED 3A-3B	ISCED 3C	ISCED 0-1-2	Total
1990-1992	0%	2%	22%	29%	46%	100%
1999-2001	0%	4%	30%	25%	40%	100%
2002-2015	3%	5%	35%	30%	27%	100%

Source : Based on labour survey, INSEE and BIPE forecasts

Craft and related trades workers (ISCO 7)

	ISCED 5A-6	ISCED 5B	ISCED 3A-3B	ISCED 3C	ISCED 0-1-2	Total
1990-1992	1%	2%	8%	19%	70%	100%
1999-2001	2%	6%	15%	19%	57%	100%
2002-2015	2%	5%	27%	25%	41%	100%

Source : Based on labour survey, INSEE and BIPE forecasts

Plant and machine operators and assemblers (ISCO 8)

	ISCED 5A-6	ISCED 5B	ISCED 3A-3B	ISCED 3C	ISCED 0-1-2	Total
1990-1992	1%	5%	15%	32%	47%	100%
1999-2001	3%	8%	28%	29%	32%	100%
2002-2015	4%	8%	37%	24%	27%	100%

Source : Based on labour survey, INSEE and BIPE forecasts

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Recruitment needs structure for school leavers by ISCED level and by ISCO group

1990-1992 ; 1999-2001 ; projection 2002-2015

Elementary occupations (ISCO 9)

	ISCED 5A-6	ISCED 5B	ISCED 3A-3B	ISCED 3C	ISCED 0-1-2	Total
1990-1992	8%	2%	26%	22%	42%	100%
1999-2001	10%	7%	33%	22%	28%	100%
2002-2015	11%	6%	35%	23%	25%	100%

Source : Based on labour survey, INSEE and BIPE forecasts

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And now....

- Why don’t you try to apply such an approach …
- It would be nice and interesting to compare our results…