

UNIVERSITÀ CATTOLICA DEL SACRO CUORE

*Award of an honorary degree in  
statistics and economics*

## **Population and economic dynamics**

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Ladies and Gentlemen,

I am deeply honoured to receive a degree in statistics, the science defined at the end of the sixteenth century as dealing with the “description of the qualities that characterize and the elements that compose a State”; your decision, moreover, coincides with the fiftieth anniversary of the faculty for teaching statistics at the Università Cattolica del Sacro Cuore.

During the twenty years I spent in the Research Department of the Bank of Italy my interests, of necessity, embraced many aspects of economic analysis and statistical methodology.

In the sixties and seventies we devoted considerable time and energy to constructing a model of the Italian economy that would clarify, both logically and quantitatively, the link between monetary and financial variables and the performance of the real economy; the compilation of the time series was particularly demanding. In accordance with the indications given by Guido Carli, the model was intended to provide operational answers for monetary policy with a view to stabilizing the economic cycle and the financing of investment.

Among the members of the research group that submitted the initial results in May 1964 I should like to recall Guido Rey, Antonio Finocchiaro and Renato De Mattia. The group was later coordinated by Francesco Masera; Franco Modigliani was a consultant and a considerable number of the Bank's economists were involved in the task.

The econometric model is structured along Keynesian lines. It is constantly updated by the Research Department and is used for forecasting and the simulation of monetary and budgetary policy measures.

Monetary base management influences investment and consumption through the credit multiplier, the operation of the financial markets and the level of

interest rates. Aggregate demand responds to the impulses transmitted by the budget. Imports depend essentially on domestic demand, exports on international demand and competitiveness. Special attention is paid to the analysis of labour costs, prices and employment.

The structure of the model will assimilate the new institutional arrangement of the single monetary policy conducted by the European System of Central Banks.

At the end of the sixties the model was used to plan the issue of government securities, forecast the expansion of credit to the economy and target the flows underlying the expansion of monetary base.

In 1974 it provided the analytic and quantitative framework for the stabilization policy agreed with the International Monetary Fund in order to cope with the devastating effects of the first oil crisis. It was used again for the stabilization measures of 1977, agreed with the IMF and the European Community.

On both occasions drastic credit and budget restrictions halted the fall of the exchange rate and staved off hyperinflation and the collapse of the financial system. In 1977 major corrections were made to the mechanisms for indexing incomes and to the public finances.

In both cases inflation and the exchange rate were brought back to acceptable levels. These successes in terms of the balance of payments, the exchange rate and prices were not followed by reforms. Slowly but surely, the Italian economy went adrift; public expenditure and the public debt began to mount again. The failure to take decisive action led to new problems and further crises in the eighties.

Changes in underlying factors, which are often not taken properly into account in the short term owing to their smallness, mean that the analyses

embodied in the model have to be continually deepened to keep it abreast of new developments and provide a clearer insight into the factors that determine the growth and equilibria of the economy in the long term.

One fundamental aspect of the structure of any economy is the evolution and composition of the population, a subject that I researched in my youth and have never completely abandoned. In the dissertation for my degree, which I discussed with Professor Galeotti in Rome in 1960, I endeavoured to analyze the links between Italian population dynamics and economic and social development at the regional level.

The Italian school of demographics boasts a noble tradition; I would like to recall Niceforo, Mortara, Livi and Galeotti. Another person deeply versed in this discipline is Antonino Occhiuto, honorary Director General of the Bank. Today other distinguished scholars are studying the subject. Systematic attention to demographic questions can and should receive fresh stimulus, particularly with a view to identifying the links with economic growth and employment more clearly.

## **1. Population and economic dynamics**

Man, his ability and his intelligence, are the main and, in the long term, the only factor of production. Everything that is produced is the fruit of men's ability to predict, plan and perform. This is the view of the classical economists Smith, Ricardo and Marx, the same that recurs in Sraffa, as well as in Leontief, Harrod and Domar, and Solow.

In neoclassical models production is limited by the amount of physical capital. In today's economies the rent from land and other natural factors is not a decisive factor. Physical capital is itself the fruit of productive activities; scarce factors are eventually replaced, when their prices rise excessively.

In the short term the activity of the productive system depends on effective demand, which in turn is decisively influenced by expectations. This is of enormous practical importance, especially in economies where financial intermediation is highly developed.

Economic and monetary policy, subject to the constraint of stability, together with the proper working of market forces, must push the economy towards the full utilization of available resources.

Man is the final consumer of output. In the long term Say's law holds: supply creates its own demand.

It is the task of government to create conditions that foster investment and saving and enhance the potential capacity of the economy.

Investment is everything, in addition to research, that enhances the level of educational attainment, the skills of workers and the ability to innovate.

The value of education and vocational training is given added emphasis by the longer life expectancy of today's young people, a concept that can be brought into focus by applying the theory of a population's life potential advanced by Hersch.

The supply of saving depends crucially on the population's rate of growth and its composition by age and life expectancy. This is the lesson, in its most recent and developed form, of the life-cycle theory.

A stagnant or declining population and demographic aging are a drag on saving, on the ability to innovate and on investment.

To borrow a simile from Sauvy, the evolution of the population is like the movement of the hour hand on a clock: slow and imperceptible, but in the end it is what counts most.

## **2. Recent demographic trends**

Over the last few decades the world population has aged; the process has been most pronounced in the industrial countries.

In the European Union, the share of the population aged 65 or more rose from 13.6 per cent in the mid-eighties to 15.4 per cent in 1995; in Italy it rose from 12.7 to 16.4 per cent. Italy and Sweden are the European countries with the largest shares of elderly people.

Population aging is set to continue.

United Nations projections for the leading industrial countries indicate that the share of the elderly will rise further in the coming decades (Figures 1-3). In Japan the ratio of the population aged 65 or more to that aged between 15 and 64 is projected to rise from 17.2 per cent in 1990 to 32.3 per cent in 2010; in the United States the ratio will rise only slightly, from 18.9 to 19.2 per cent.

In Italy, according to Istat, the ratio will rise from 21 per cent in 1990 to 31.3 per cent in 2010. Values this high are historically unprecedented.

The growing presence of the elderly in the population is due to the increase in life expectancy and, above all, to the decline in birth rates.

Between 1950-55 and 1990-95, average life expectancy increased worldwide, rising from 45 to 62 years for men and from 48 to 66 years for women (Table 1).

All the industrial countries have seen life expectancy increase to a greater or lesser extent. In Japan, life expectancy at birth in the period 1990-95 is estimated to have been 76.4 years for men and 82.5 years for women. In the United States life expectancy has reached 72.5 years for men and 79.3 years for women.

In Italy, between 1950-55 and 1997, life expectancy at birth rose from 64.3 to 74.9 years for men and from 67.8 to 81.3 years for women.

Fertility rates are declining sharply (Table 2). According to UN estimates, between 1950-55 and 1990-95 the average number of children per woman fell worldwide from 5 to just over 3. The decline was also a feature of the developing countries, where the average number fell from 6.1 to 3.5. In Europe it dropped from 2.56 to 1.58.

In Italy the fertility rate has decreased significantly since the end of the seventies; in 1995 it was equal to 1.18. One factor in the decline is the rise in the average age at which women have their first child. Despite the slight increase in the fertility rate to 1.23 in 1997, Italy still has one of the lowest rates in Europe. The share of young people in the population is much smaller than that required to maintain the population stable. There is an evident shortfall in the cohorts up to the age of 20.

According to a European Community survey, the decision to limit the number of children is influenced by many factors. The most important are the uncertainty of the economic outlook, the lack of adequate housing, women's working outside the home and the risk of divorce. An additional factor is the reduced need for old people to rely on the support of their children where social security systems are most



generous. Even though decisions on fertility have complex motivations that depend only in part on economic factors, the importance of these factors is not negligible.

The findings of the survey suggest that the number of children per woman in the principal countries of Europe is lower than that deemed to be ideal.

In Italy, the gap is nearly one child per woman.

Surveys conducted by Istat have found that the number of children desired, while lower than the ideal, is still higher than the actual fertility rate.

There is scope for a social policy designed to attenuate the difference between the desired and the actual number of children and promote a better balanced age structure of the population.

The natural demographic balance in Italy has been negative since 1993. From that year until 1997 deaths exceeded live births by about 100,000. The population has continued to grow moderately owing to a positive migratory balance.

From 1993 to 1996 the number of new civil register entrants from abroad exceeded that of deletions to move abroad by more than 250,000. At the end of 1996 a total of 885,000 foreign citizens were registered as Italian residents.

The Ministry of the Interior reports that the broader aggregate of persons with a residence permit has also increased appreciably. At the end of 1996 there were more than 985,000 permits, or 52 per cent more than in December 1991.

The foreign community is of an increasingly stable nature: the ratio of males to females dropped from 1.505 in 1991 to 1.116 in 1995 and the proportion of married couples has risen, as has that of persons with dependent children. The

average age of the foreign population is low; two out of three foreigners are between 18 and 39 years old.

### **3. The repercussions on the public finances**

In the leading European countries public expenditure directly referable to individuals first declines with their age and then rises sharply (Figures 4a and 4b). For young people, the spending is connected chiefly with education; for old people, with health care and pensions. Public expenditure on persons younger than 20 is about 30 per cent of per capita GDP; for those older than 65 the ratio is about 80 per cent.

In pay-as-you-go pension systems, benefits have to be covered by the contributions of active workers. The aging of the population increases the burden on the working population.

Projections for the Italian pension system as it was before the reform of 1993 showed that the growth of pension expenditure would be unsustainable. The reforms of recent years represent a considerable advance towards restoring sound public finances, although foreseeable demographic and economic developments mean that the reform of the pension system cannot be considered concluded.

Expenditure for pensions and retirement annuities reached 16 per cent of GDP in 1997. According to the forecasts of the State Accounting Office, which take account of the measures introduced in the 1998 budget, this figure will rise by another 0.5 percentage points by 2010.

These projections assume that pensions are indexed only to prices and that the conversion coefficients linking benefits awarded to contributions paid are adjusted every ten years on the basis of changes in life expectancy at retirement.

The projected levels of expenditure imply, as I have already pointed out on several occasions, a further increase in contribution rates or else increased recourse to general taxation.

The increase in life expectancy does not necessarily require systems that set rigid constraints on workers' choices in the matter of working hours and retirement age. Individual preferences vary. Older people may desire to continue to play an active role in society. Gradual withdrawal from the labour market and flexibility in the choice of retirement age could reconcile the need to consolidate the public finances with personal preferences.

More flexible regimes require a closer link between retirement benefits and residual life expectancy. In this respect, the reform of 1995 is a step in the right direction.

#### **4. The composition of consumption. Investment and saving**

The preferences of consumers change with age.

There will be an increase in the demand for some types of goods and services, such as those connected with health care, recreation and tourism. The demand for domestic and personal care services will also tend to rise. The desired features of housing and urban transport will change.

On the other hand, the share of spending on traditional consumer durables seems likely to diminish owing to the decline in the number of young people, with consequences for industrial production and investment.

The Bank of Italy's regular survey of household budgets has found that durable goods account for 18 per cent of the total consumption of households headed by persons younger than 30; for households headed by persons over 65 the figure drops to 3.4 per cent (Table 3).

The counterweight to the slowdown in the demand for industrial products, the expansion of which was a characteristic feature of the Italian economy from 1950 to 1980, is the development potential inherent in the new needs of the population and the production of goods suitable to the more recently industrializing countries.

It is up to businessmen, to private enterprise, to recognize the changes under way in the composition of aggregate demand, to prepare the financial and organizational means to respond to emerging needs.

Ever since the studies of Milton Friedman and Franco Modigliani, economists have generally agreed that households seek to maintain a pattern of consumption that evolves regularly over time.

According to the life-cycle theory, people save during their working years and run down their savings after retirement. With slower population growth, the average age of the population tends to rise, the number of young people to decline in relation to the elderly and the overall propensity to save to decrease.

The motivations for saving are complex. Inefficiency in the capital market can impede optimizing behaviour by households. Uncertainty concerning the span

of life and future income and the desire to leave descendants a bequest are also factors affecting the pattern of consumption over time.

Calculations based on the data produced by Bank of Italy surveys of household budgets during the eighties suggest that the role played by demographic change has so far been modest. However, the propensity to save declined by about 4 percentage points over the decade.

As I mentioned earlier, the aging of the population is set to intensify. The impact on the saving rate could become more pronounced.

Other things being equal, a decline in fertility reduces household consumption and increases saving. However, it diminishes the incentive to save provided by the need to sustain a larger family in the future; it also weakens the bequest motive.

The lengthening of the average life span tends, instead, to increase the propensity to save. It is also likely to alter individuals' choice of retirement age.

## **5. Human capital**

The human capital that can be used in production depends on the size of the population of working age, the labour force participation rate and the ability to contribute to the production of goods and services. The latter is related to educational attainment and work experience.

Even though economists are not unanimous about how to measure a country's human capital, they are in complete agreement about the crucial importance of this variable for economic growth.

One indicator of individual human capital that has been proposed is the ratio of the compensation of persons with educational qualifications and work experience to that achievable by persons not having either.

This measure has the advantage of being simple, although it is not without its drawbacks. Estimates based on Bank of Italy surveys of household budgets show that the human capital of the Italian labour force, calculated in the manner just described, rose by around 14 per cent between 1981 and 1997 (Figure 5). The growth in the labour force over the same period was much less, amounting to around 4 per cent.

A significant proportion of the increase in productivity in the period can be attributed to the improvement in the quality of labour.

There are various grounds for believing that the per capita human capital of the population of working age in Italy is smaller than in other countries.

Italy's labour force participation rates are lower than those of the other leading industrial countries (Table 4); the young have less opportunity to learn by doing.

In relation to its position in the world Italy suffers from a serious deficit as regards educational attainment.

According to the latest Census, 72 per cent of Italians between the ages of 25 and 64 had at most a lower secondary school diploma. Only 28 per cent had completed an upper secondary school or university education, as against 50 per cent in France, 82 per cent in Germany and 65 per cent in the United Kingdom (Table 5).

The human capital created by schooling is eroded by persistently high rates of joblessness. The risk of unemployment is especially high among the young; according to the 1997 labour force survey, around 21 per cent of youths aged between 25 and 29 with an upper secondary school diploma or a degree were looking for work.

As the population ages, investment in the education of the young, individually the most receptive part of the population, becomes less important in relative terms.

The rise in life expectancy lengthens the period in which education produces a return. Other things, and especially the mortality curve, being equal, the capital embodied in the labour force will decrease considerably in the coming decades, primarily owing to the decline in the number of young people. Estimates made by the Bank's Research Department indicate that Italy's human capital is set to fall by around 30 per cent between 1997 and 2050, despite the foreseeable increase in the average level of educational attainment.

In a context of increasingly open economies, the ability to compete in the years to come will depend to a greater extent than in the past on basic schooling and training, secondary and university education and scientific research.

The industrial countries risk seeing a further large contraction in unskilled jobs, partly owing to automation. The competition of the emerging economies is intensifying and spreading to products with a higher technology content; these countries have the advantage of very low labour costs.

In order to stimulate the specializations that the labour market calls for, it is necessary to strengthen the link between the productive and educational systems, between scientific research and industry.

A high and widespread level of educational attainment is essential to defend and increase employment, to enhance competitiveness. The quality of the educational system must be brought into line with that of the other European countries. The autonomy and organizational flexibility of educational institutions need to be increased, together with competition within the public sector and between the public and the private sectors. Freedom of choice and equal opportunity for the deserving must be ensured. The low level of interest rates suggests the possibility of granting long-term loans to young people to help them meet the cost of their studies.

Parliament and the Government are moving resolutely in the direction of raising Italy's competitiveness in this field.

## **6. Immigration**

Differences in per capita incomes and population trends stimulate emigration from the developing countries. The industrial countries offer an attractive environment in view of their greater prosperity.

The vacuums created by the demographic downturn are an additional factor encouraging immigration.

In a long-term perspective, with policies to regulate the flows and curb the sometimes degenerative short-term effects, immigration should not be judged negatively. Adequate arrangements must be made for the reception and integration of immigrants; security and rigorous respect of the law must be guaranteed.



In countries where the number of young people is declining, the entry of foreign workers can be seen as an asset, in view of the contribution that a new, socially and professionally integrated labour force can make to the growth of the economy.

This has been the experience of the United States, even though its population is younger than those of European countries. The US economy makes good use of the insertion of immigrants in production.

Action in the fields of education and training is indispensable. It will be necessary to tackle the problems of social cohesion and find a link between common values in order to create a widely shared identity. Central and local government and voluntary associations have a hard task in the short run. With a farsighted approach they can make a contribution to the welfare of future generations.

An effort of cultural elaboration is needed to bring these problems to the centre of the attention of society and politics.

Ladies and Gentlemen,

Research is born from the desire of the intellect to adapt to reality.

Through the systematic study of statistical data and information, guided by theoretical models of individual and group behaviour and employing appropriate techniques, we try to discover the intelligible structures, internal laws and hidden harmonies of economic life and society.

Guido Carli used the results of our work on models for operational purposes. Paolo Baffi gave the research strong support. I collaborated with Carlo Ciampi, economist and then head of the Bank's Research Department, and subsequently at length, while he was responsible for monetary policy.

The Bank of Italy's Research Department keeps alive a long tradition of lively and profitable research in an institutional setting that is constantly evolving. The discipline of economic thinking increasingly permeates all the different branches of the Bank's activity: ranging from supervision of the banking system to surveillance of the money, financial and foreign exchange markets and internal management and control.

The approach starts with observation of the facts, followed by collection of the data, which are used to build models that help in understanding behaviour and phenomena.

Care must be taken to establish the limits of theories and models. They stem from the simplifications contained in the underlying hypotheses and lemmas.

The analytical specification of behaviour must be based on thorough knowledge of society. Economic activity is a major and universal manifestation of people's social behaviour; this has many other aspects that are the subject of other disciplines. It should not be forgotten that we are studying a living body. Society is made up of people possessing freedom and intelligence; their behaviour cannot be completely captured in models that are necessarily simplified.

Econometric models often describe the working of the economy in a perspective that, even if restricted to the short term, is of great importance. The long term has its own laws, but it is also a sequence of short terms. Generally speaking, demographic factors receive little attention in short-term economic analysis.

But time is also, and above all, a function of the movement of the hour hand.

In the coming decades Italy and many other European countries will have to cope with major problems caused by the aging and decline of the population, and the need to handle flows of immigrants that, in accordance with economic law, will be intense.

The growth of the decades following the Second World War was marked by a very rapid rise in the demand for manufactures, which led to an increase in employment and productivity in industry. This phase, like that of the earlier expansion of the agricultural sector, has probably reached maturity in terms of demand and employment.

The slowdown in growth in Europe, as I have pointed out on several occasions, reflects the inadequate overall competitiveness of our economies, with a correspondingly high level of unemployment. Slower growth and uncertainty in the most highly developed regions of the Old World can be attributed in large part to the modest expansion of the population and its aging.

The tendency for the population to grow older is common to the whole of Europe.

Italy and Spain, to judge by the trends of the last few decades, are now in the middle of demographic crises. In Japan the sharp contraction in births that began after the Second World War led in the following decades to a rapid rise in the proportion of the population of working age. Now, however, the country is faced with the problem of increasing numbers of old people. The United States is still a relatively young and expanding country; it attracts large numbers of immigrants, especially from Latin America.

Longer working lives create problems that need to be tackled flexibly in a way that respects individuals' preferences while allowing full use to be made of the wealth of skills and experience acquired over the years by those who work and produce.

The prospect of a society in decline is to be avoided. We must invest in the future.

In consideration of the wide gap with respect to the other industrial countries, investment in education must be made more efficient and adapted to the new state of the economy. Entrepreneurial activity will have to be increasingly oriented towards services. We must view immigration in a constructive spirit.

Solving the problems caused by the reduction in the number of young people, the aging of the population, the insertion of immigrants and the lengthening of working lives will be made easier by a vigorous recovery in growth. In turn their solution will foster growth.

◦ ◦ ◦

Italy has a long tradition in the field of demography. The close link between demographics and fundamental economic phenomena needs to be studied in greater depth.

The method of research applied to society to extract its economic laws is no different from that used in other scientific fields. It enables us to advance knowledge in a rigorous manner and to arrive at conclusions that can be communicated and shared.

But the starting point and the path require, if we are to distinguish what is useful and fruitful and to appreciate it, a dose of Wisdom: “from this .... every good thing hath come; in its hands there be untold wealth”.

Let us proceed, then, in our research, to enjoy the pleasure of knowledge, in our action, to construct the common good.

Table 1

**AVERAGE LIFE EXPECTANCY BY SEX**

	Men			Women		
	1950-55	1990-95	2035-40	1950-55	1990-95	2035-40
World	45.1	62.4	73.2	47.8	66.5	78.0
Developing countries	40.2	60.8	72.6	41.8	63.8	77.0
Japan	62.1	76.4	80.0	65.9	82.5	86.2
United States	66.2	72.5	78.1	72.0	79.3	83.8
France	63.7	73.0	78.3	69.5	80.8	84.8
Germany	65.3	72.7	78.0	69.6	79.0	83.8
Italy	64.3	74.2	79.9	67.8	80.6	85.7
United Kingdom	66.7	73.6	78.5	71.8	78.7	83.5
Spain	61.6	74.6	79.0	66.3	80.5	84.5

Source: United Nations, *World Population Prospects*, 1995.

Table 2

**AVERAGE NUMBER OF CHILDREN PER WOMAN**

	1950-55	1990-95	2035-40
World	4.97	3.10	2.14
Developing countries	6.13	3.48	2.15
Japan	2.75	1.50	1.97
United States	3.45	2.08	2.10
France	2.73	1.74	2.10
Germany	2.16	1.30	1.79
Italy	2.32	1.27	1.76
United Kingdom	2.18	1.81	2.10
Spain	2.57	1.23	1.72

Source: United Nations, *World Population Prospects*, 1995.

Table 3

**COMPOSITION OF HOUSEHOLD CONSUMPTION BY AGE**  
*(in thousands of lire and percentages)*

Age bracket (a)	Household expenditure					
	Durable goods	Non-durable goods	Total	Durable goods	Non-durable goods	Total
Up to 30	5,623	25,607	31,230	18.0	82.0	100.0
31-40	3,502	31,964	35,466	9.9	90.1	100.0
41-50	3,242	35,182	38,424	8.4	91.6	100.0
51-65	2,635	33,692	36,327	7.3	92.7	100.0
Over 65	798	22,720	23,518	3.4	96.6	100.0
Total	2,572	30,240	32,812	7.8	92.2	100.0

Source: Banca d'Italia, *Indagine sui bilanci delle famiglie nel 1995*.

(a) With reference to the head of the household.

Table 4

**LABOUR FORCE PARTICIPATION RATES**  
(percentages - 1997)

	Men		Women	
	15-64	55-64	15-64	55-64
Japan	85.4	85.1	59.7	49.5
United States	84.2 (a)	67.6	70.7 (a)	50.9
Canada	81.8	60.6	68.0	36.5
France (b)	74.5	42.3	60.3	31.3
Germany	79.3	54.6	61.4	33.0
Italy	72.2	43.5	43.6	15.0
United Kingdom	84.4 (a)	63.6	68.0 (a)	40.3
Spain	76.0 (a)	56.6	48.0 (a)	20.6

Source: OECD, *Employment Outlook*, 1997.

(a) From 16 to 64. - (b) The figures refer to 1996.

Table 5

**POPULATION BETWEEN 25 AND 64 BY EDUCATIONAL ATTAINMENT**  
(percentages - 1991)

	Early childhood education, primary, lower secondary	Upper secondary education	Tertiary education (non-university and university)	Total
Japan (a)	30	48	22	100
United States	17	47	36	100
Canada	24	36	40	100
France	49	35	15	100
Germany	18	60	22	100
Italy	72	22	6	100
United Kingdom	35	49	16	100
Spain	78	12	10	100

Source: OECD, *Education at a Glance*, 1993.

(a) In 1988.

Figure 1

### AGE STRUCTURE OF THE POPULATION IN ITALY

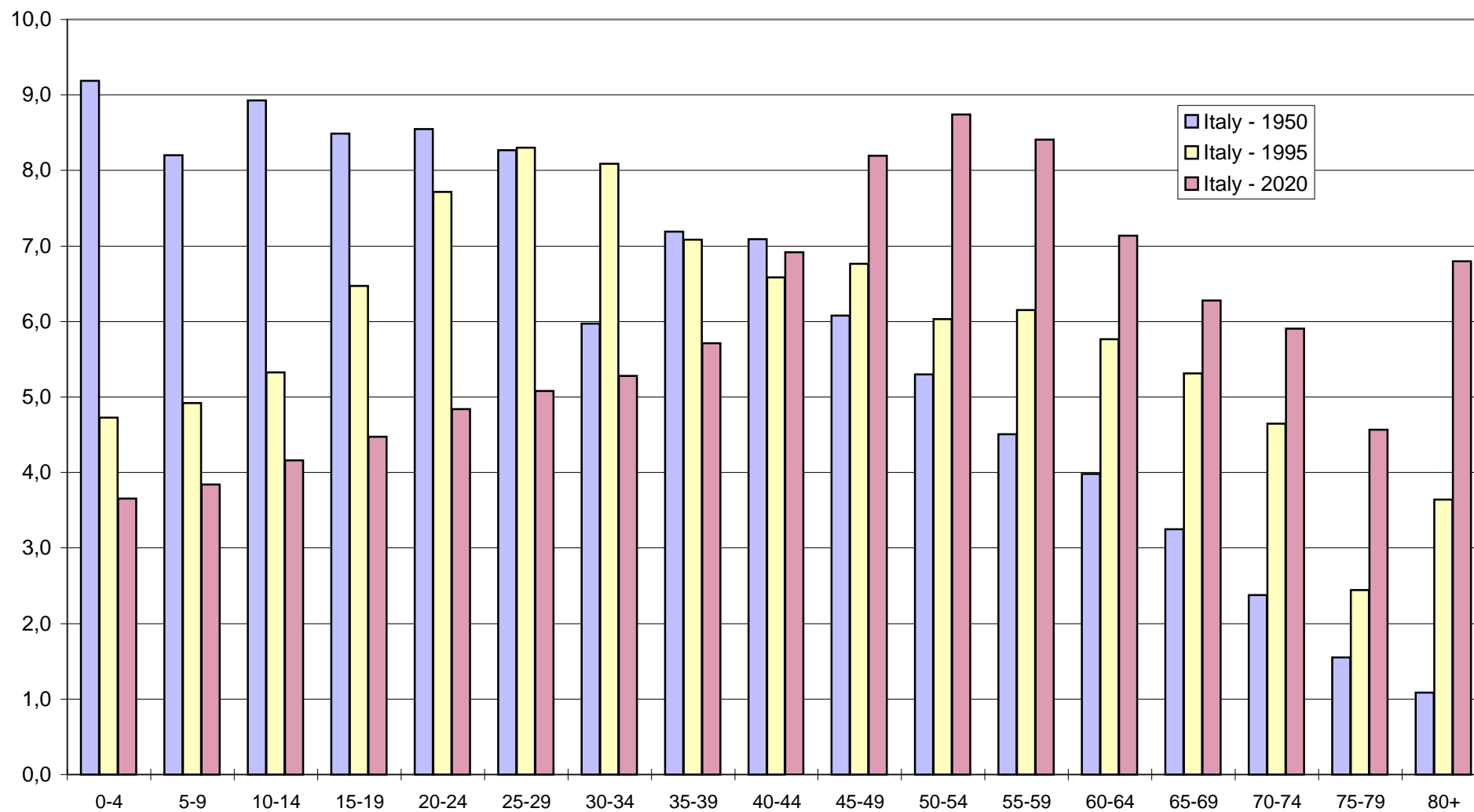




Figure 2

# AGE STRUCTURE OF THE POPULATION IN 1995

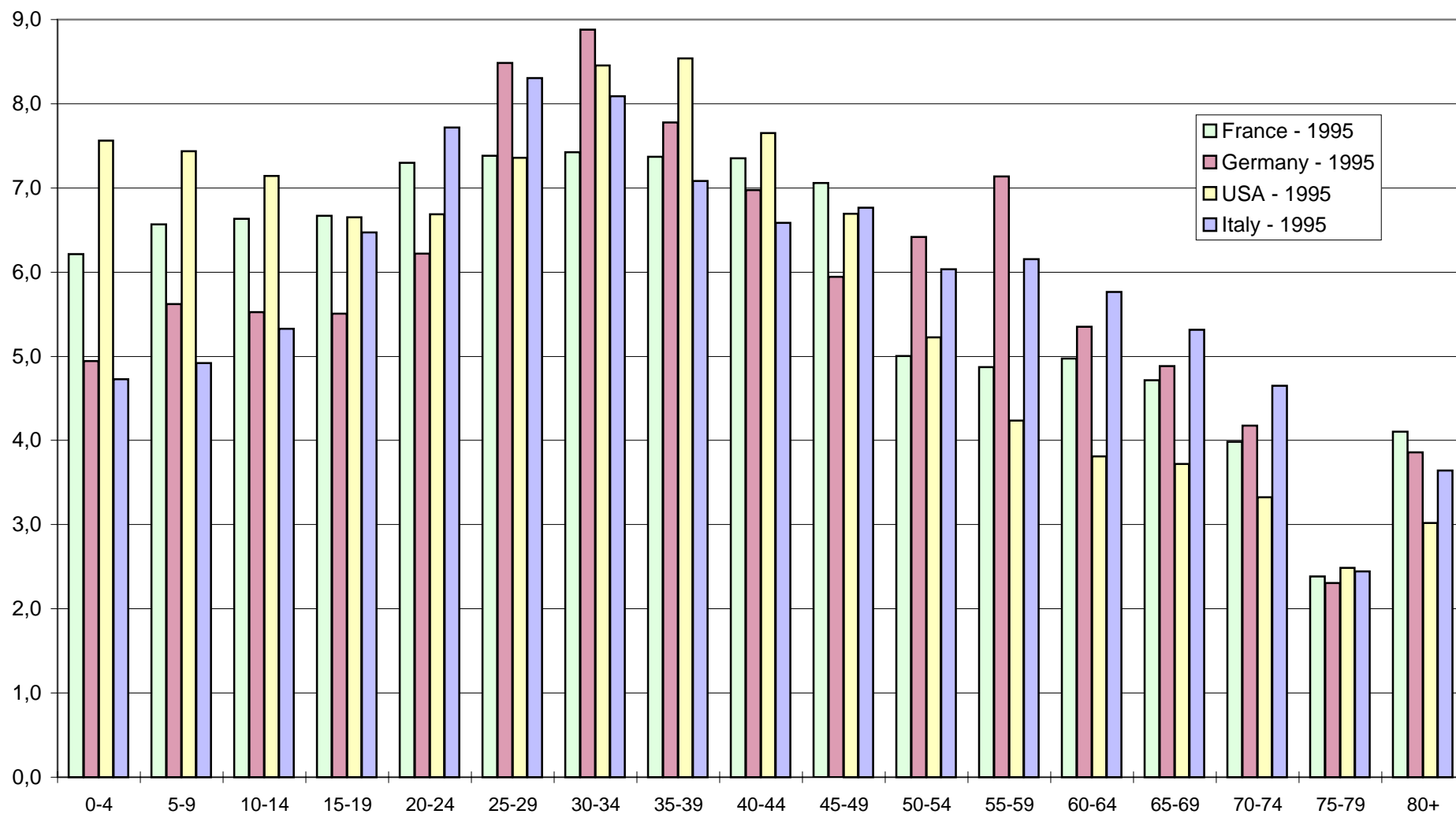


Figure 3

### AGE STRUCTURE OF THE POPULATION IN 2020

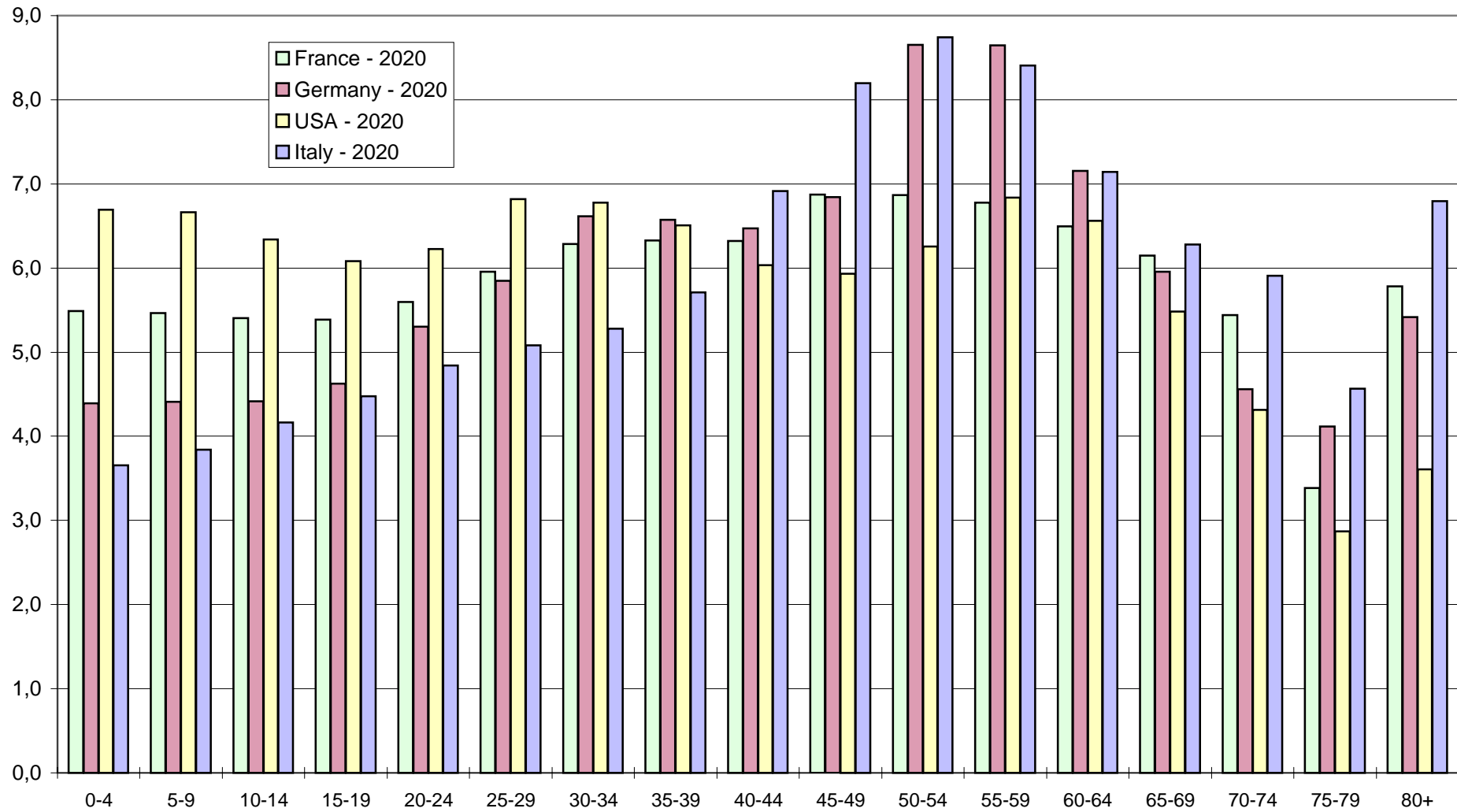


Figure 4a

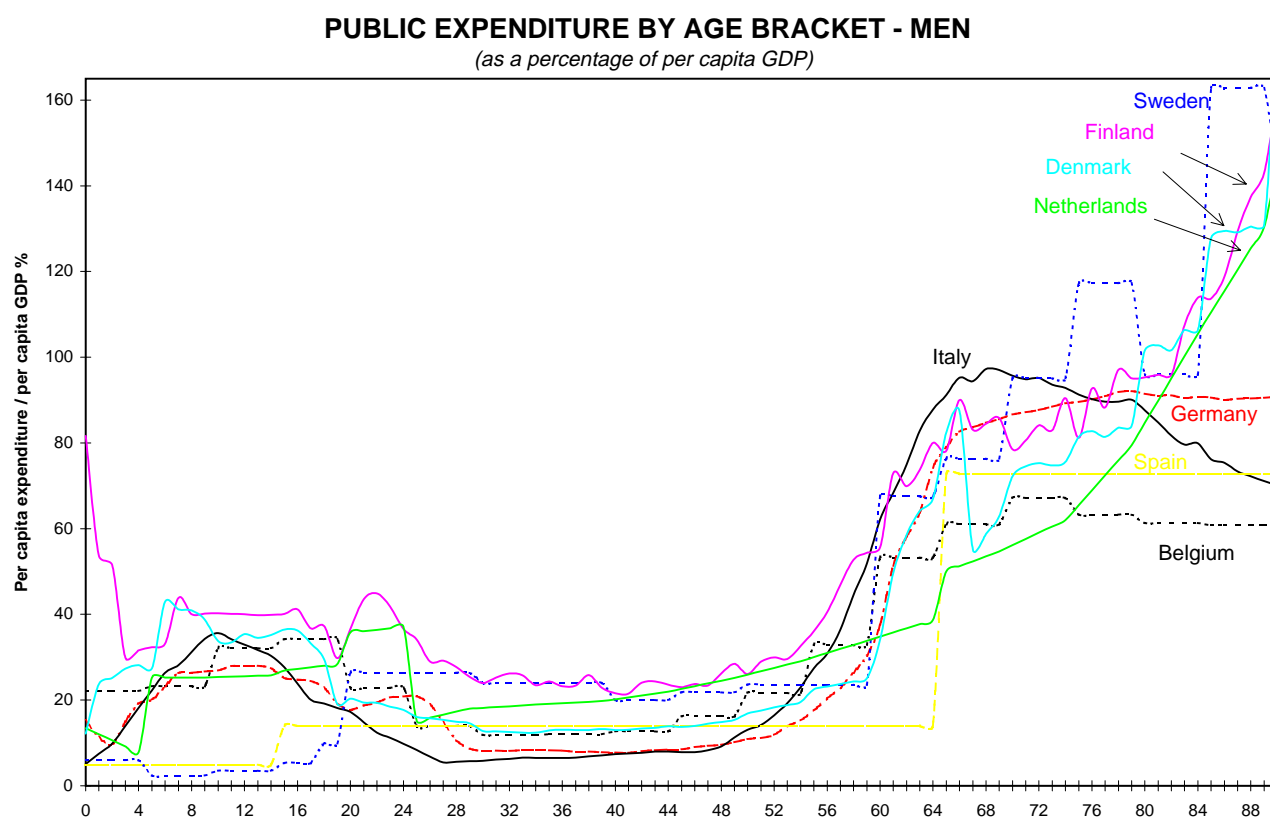


Figure 4b

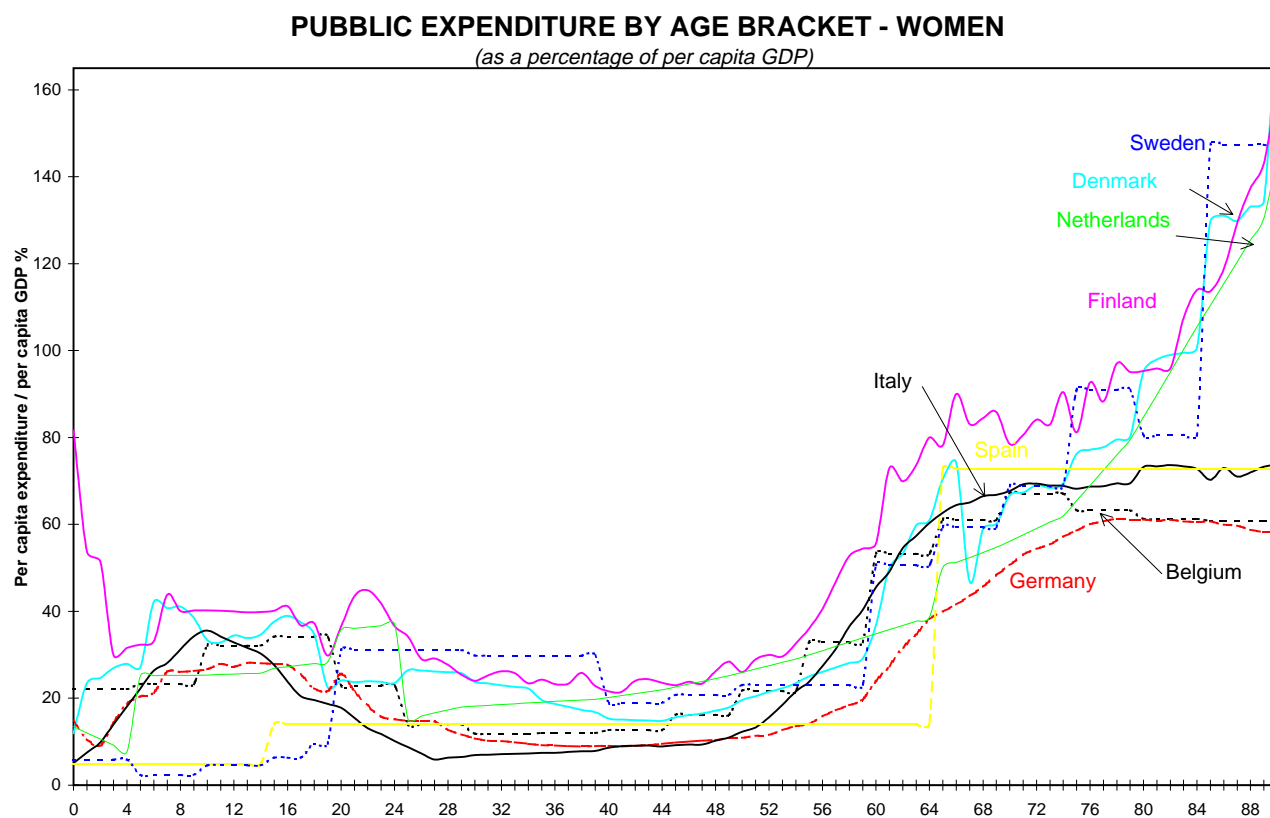


Figure 5

**LABOUR FORCE AND HUMAN CAPITAL**  
*(indices; 1981=100)*

