

Joint UN/ECE-Eurostat Work Session on Demographic Projections
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**MIGRATION ASSUMPTIONS IN A SMALL OPEN ECONOMY : THE CASE OF
LUXEMBOURG¹**

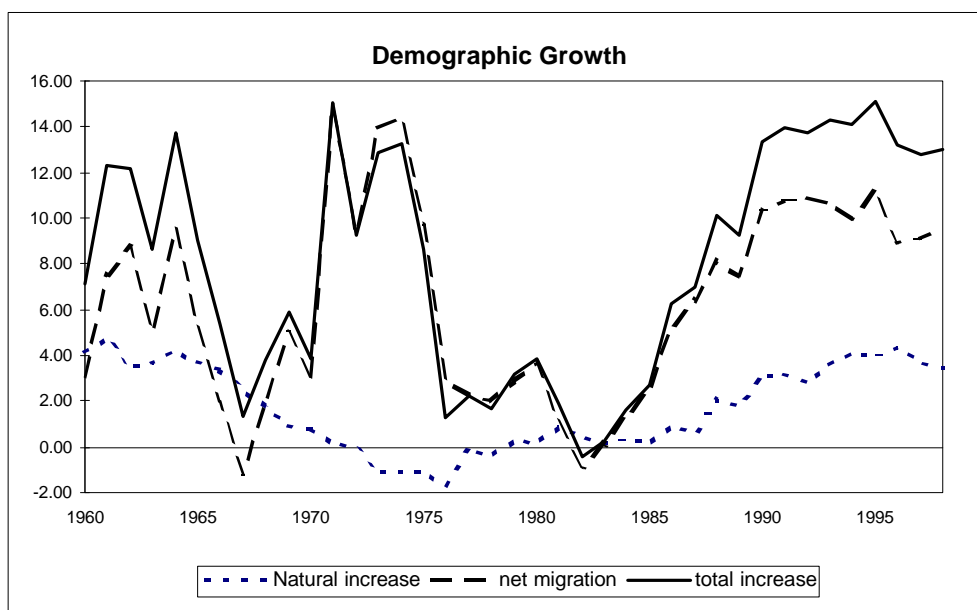
Introduction

1. In Luxembourg where demographic growth depends strongly on immigration, assumption on migration flows play a crucial part in population projections. It can be shown that net migration and economic growth are highly correlated. Therefore, population forecasts and projections should consider the future development of the economy. As the latter is largely unknown, we must ask ourselves, if population projections, at least for a long period, make any sense in a country like Luxembourg.

I. Net migration and demographic growth.

2. The outstanding importance of net migration in demographic growth appears in the two following graphs.

3. In the first one you can find the growth rates of total population, natural increase and net migration, for almost the last 40 years. Except for some short periods, natural increase always remained lower than net migration (At present, each year about 10 000 arrivals, 6 000 departures, 5 000 births and 4 000 deaths are registered). Comparing these different growth rates, an extremely high correlation between net migration and total population change appears.

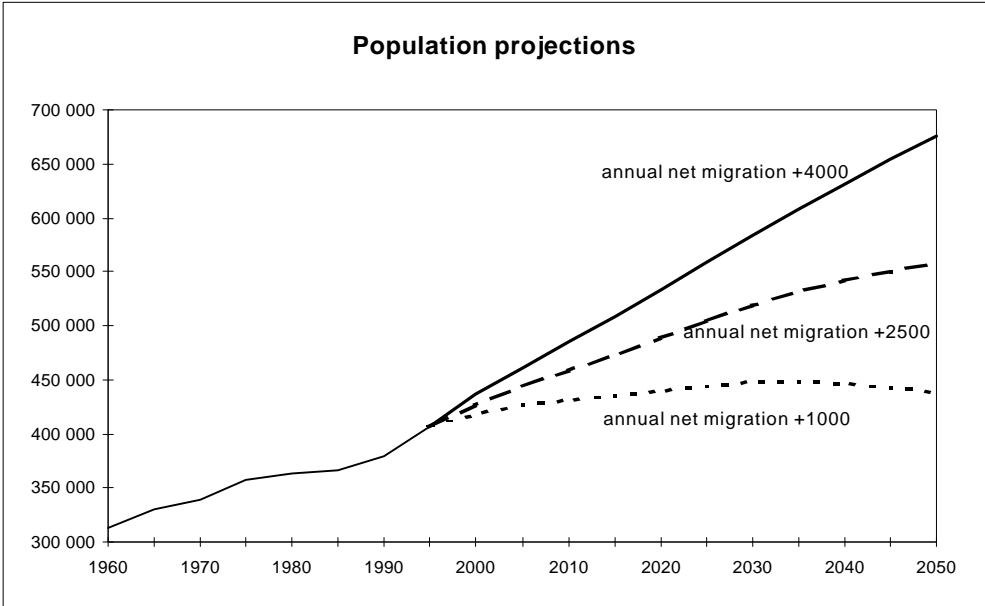


4. You cannot lose sight of another aspect : The foreigners arriving in Luxembourg do not just support demographic growth by net migration. Due to their young age structure, the excess of births

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over deaths is relatively important. (Mortality as well as fertility are not significantly higher than those of the nationals).

5. The impact of assumptions on migration flows in population projections emerges from graph 2. Mortality and fertility are supposed to develop in the same way in the three scenarios. For net migration the assumptions were the following : + 1 000, + 2 500, + 4 000, corresponding to rates (for the current population) equal to respectively 2.3 0/000, 5.8 0/000, and 9.3 0/000. (During the last years, the rates were close to the high scenario assumption). By the year 2050, the difference between the low and the high scenario is more than 50%. The number of residents would virtually double in the high scenario.

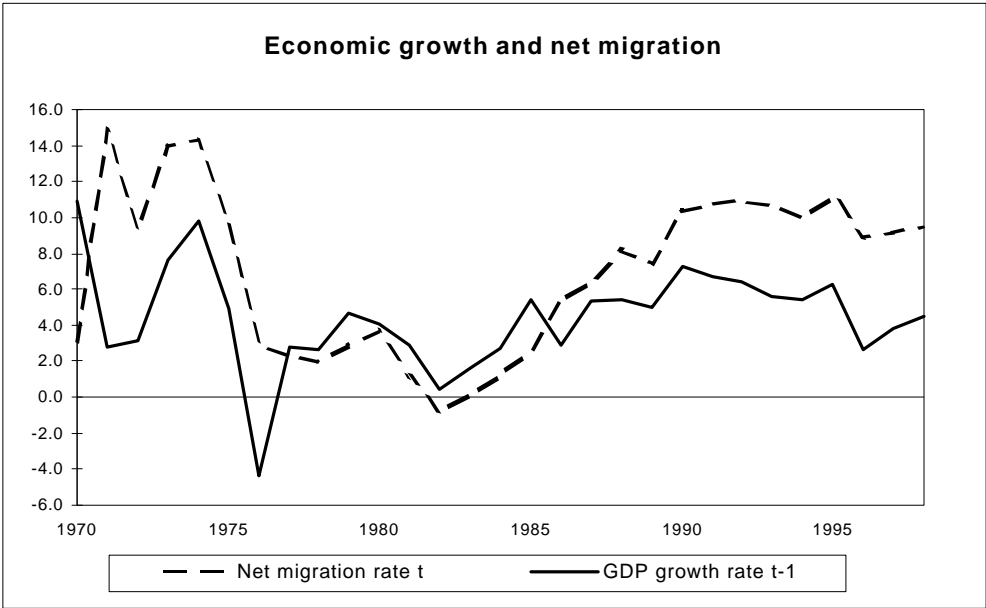


II. Reasons of this considerable immigration

6. In order to be able to make assumptions on future migration flows, you have to know the factors explaining them.

1st point of note :

There exists a strong relationship between net migration and economic growth. Net migration reacting with some delay ,the GDP growth rate has been lagged by one year. The correlation coefficient of 0.491 is close to the one observed in Switzerland.

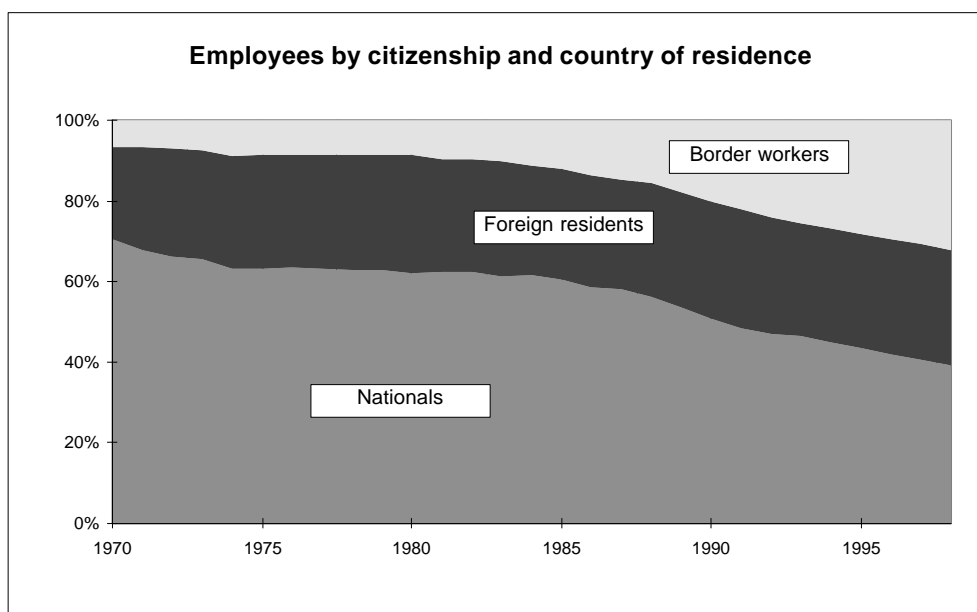


2nd point of note :

The labour supply of the nationals is insufficient to face the needs of the economy. The increasing dependency of the luxembourgish economy on foreign workers becomes obvious when looking at graph 2 . Besides the nationals you have foreign residents and border workers from the three border countries (France, Belgium and Germany). Clerks and employees of the international institutions, like EUROSTAT, considered, according to National Accounts, as working abroad are not taken into account in this graph.

7. When at the beginning of the seventies, more than 70% of the employees are still natives, their share falls at about 40% in 1998. The total number increases, however, slightly by 9%.

8. Foreigners living in Luxembourg rise about 150%. The largest increase is observed among the border workers who are now in a greater number than the foreign residents. It should be noted that the high inflow of foreign workers didn't generate a crowding out of the nationals on the labour market whose unemployment rate still remains very low (2- 3%).

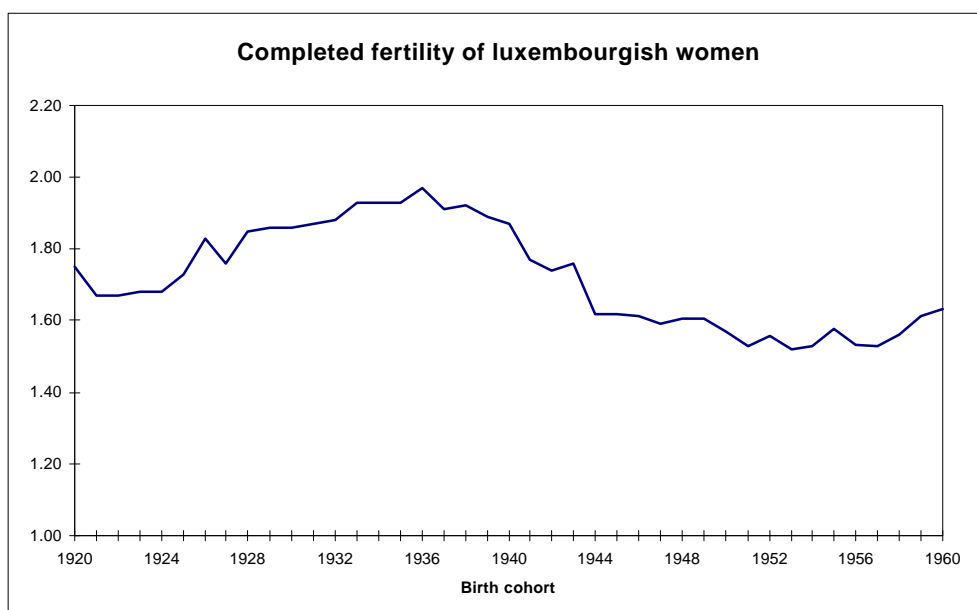


A question, of course arise: what are the reasons for this insufficient labour supply of the nationals ?

9. In the past the limited socio-demographic potentialities had been put forward.

- The low fertility of the nationals

As you can see in the following graph, completed fertility never reached the 2.1 threshold.



- the low activity rates
- - female activity rates in general;
- - male activity rates after 55 years.

T1. POPULATION AND LABOUR FORCE 15 - 64

CENSUS, LFS

YEAR	TOTAL POPULATION			NATIONALS			FOREIGNERS		
	TOTAL POPULATION	LABOUR FORCE	ACTIVITY RATE	TOTAL POPULATION	LABOUR FORCE	ACTIVITY RATE	TOTAL POPULATION	LABOUR FORCE	ACTIVITY RATE
Males and Females									
1970	221 835	126 461	57.0	179 917	99 686	55.4	41 918	26 775	63.9
1981	247 558	151 729	61.3	180 865	105 727	58.5	66 693	46 002	69.0
1991	266 460	167 240	62.8	180 187	106 466	59.1	85 887	60 774	70.8
1998	287 100	172 300	62.0	176 500	106 200	60.0	110 600	73 000	66.0
Males									
1970	110 298	93 638	84.9	89 088	74 165	83.2	21 210	19 473	91.8
1981	123 864	101 347	81.8	90 225	71 284	79.0	33 639	30 063	89.4
1991	135 200	105 864	78.3	91 251	68 719	75.3	43 734	37 145	84.9
1998	145 600	110 600	76.0	89 800	67 400	75.0	55 700	44 000	77.0
Females									
1970	111 537	32 823	29.4	90 829	25 521	28.1	20 708	7 302	35.3
1981	123 694	50 382	40.7	90 640	34 443	38.0	33 054	15 939	48.2
1991	131 260	60 742	46.3	88 936	37 747	42.4	42 153	22 788	54.1
1998	141 500	66 500	47.0	86 700	38 200	44.0	54 900	29 660	54.0

10. The virtual stagnation of national labour force comes from a small decrease in the working-age population and a decline of the male activity rate, not compensated by the increase of female activity .

11. Concerning foreign residents, the important rise of available labour force is due to net migration, the changes in the activity rate being quite similar to those observed for the nationals.

12. Considering the high proportion of foreigners (not far from 60%) in employment, the insufficient socio-demographic potentialities can just be a minor cause. Simulations corroborate this point : neither higher birth rates nor higher activity rates of the nationals would have ensured the necessary labour supply .

13. The major reason is that the economy has developed in such a way that the recourse to migrant workers and, later on, to border workers had become necessary.

Several factors explain this development :

- Central situation of Luxembourg in a part of Europe which constitutes a big market;
- Low social security contributions compared to other European countries.
- High productivity of the labour force (low absenteeism, high professional integrity)
- Favourable legislative and administrative environment .
- High standard of living generating a strong demand of the households not only for imported goods and services but also for such goods and services produced inside the country in sectors such as construction, trade, personal services employing an important proportion of foreign workers.

14. By increasing the number of residents, immigration induces an increase of domestic demand in the sectors mentioned above which on his turn makes necessary new arrivals of migrant workers.

III. Heterogeneity of foreign labour force.

15. In a first approach, you could consider that migrant workers constitute an approximately homogenous group with socio-economic characteristics quite different from those of the natives. Having badly paid jobs in economic sectors on which natives are turning their backs, they would be complementary to later rather than substitutes.

T2. OCCUPATION BY CITIZENSHIP OR COUNTRY OF RESIDENCE

LFS98 - Social Security

OCCUPATION (ISCO)	RESIDENTS BY CITIZENSHIP						Border Workers
	Luxbg	France	Belgium	Germany	Italy	Portugal	
Managers	2.5	6.5	4.7	6.9	2.0	0.6	1.3
Professionals	15.2	23.8	35.9	25.6	15.6	0.9	12.3
Technicians	22.6	19.7	26.8	34.3	13.8	1.8	14.8
Clerks	22.8	11.9	14.5	14.1	16.3	6.6	15.0
Service workers	8.6	20.7	4.9	7.1	13.6	11.8	6.2
Agricultural workers	1.2	0.0	0.0	1.9	0.0	1.7	0.0
Craft and related trades workers	10.5	7.6	3.4	4.3	14.2	31.2	24.7
Plant and Machine operators	9.3	5.4	7.2	3.3	13.3	12.4	18.0
Elementary occupations	6.8	3.9	2.5	2.5	10.6	33.0	7.6
Armed Forces or No Indicates	0.5	0.5	0.1	0.0	0.6	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Managers and Professionals	17.7	30.3	40.6	32.5	17.6	1.5	13.6
Technicians and clerks	45.4	31.6	41.3	48.4	30.1	8.4	29.8
Manual workers	36.4	37.6	18.0	19.1	51.7	90.1	56.5
Armed Forces or No Indicates	0.5	0.5	0.1	0.0	0.6	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

T3. ECONOMIC ACTIVITY BY CITIZENSHIP OR COUNTRY OF RESIDENCE

LFS98 - Social Security

ECONOMIC ACTIVITY (NACE)	Residents by citizenship							Border Workers	Total
	Luxbg	France	Belgium	Germany	Italy	Portugal	Others		
Agriculture	0.4	0.7	0.4	1.6	0.0	1.6	0.2	0.4	0.5
Manufacturing	16.4	11.8	11.5	9.7	20.3	10.8	8.8	21.1	16.5
Construction	3.7	5.9	3.8	3.2	14.1	30.6	11.6	13.2	10.9
Trade, HORECA	14.2	35.3	13.5	17.7	26.6	20.5	22.0	20.1	18.3
Transport, communication	9.9	4.4	4.8	6.5	4.7	4.7	8.0	7.0	7.7
Financial intermediation, business activities	15.4	28.7	30.8	51.6	23.4	9.7	38.8	29.1	21.7
Public administration	29.1	4.4	4.8	3.2	3.9	2.3	4.1	0.7	13.0
Other services	11.0	8.8	30.4	6.5	7.0	19.8	6.5	8.3	11.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture	26.7	4.2	1.7	4.2	0.0	37.9	1.9	23.3	100.0
Manufacturing	40.2	2.2	1.7	0.8	3.6	8.4	2.7	40.4	100.0
Construction	13.8	1.7	0.8	0.4	3.8	35.8	5.3	38.3	100.0
Trade, HORECA	31.4	6.0	1.8	1.4	4.3	14.4	6.0	34.7	100.0
Transport, communication	52.0	1.8	1.5	1.2	1.8	7.8	5.2	28.7	100.0
Financial intermediation, business activities	28.7	4.1	3.4	3.4	3.2	5.7	9.0	42.4	100.0
Public administration	91.1	1.1	0.9	0.4	0.9	2.3	1.6	1.8	100.0
Other services	39.7	2.5	6.5	0.8	1.8	22.5	2.9	23.4	100.0
Total	40.6	3.1	2.4	1.4	3.0	12.8	5.0	31.7	100.0

16. Tables 2 and 3 make clear that such a view would be too simplistic and that the foreign labour force is quite heterogeneous. Only the Portuguese, and to a lesser extent the Italians seem to correspond to the traditional picture of migrant workers. It's also noteworthy that the qualification of the border workers, as a whole, is quite different from the one of their compatriots living in Luxembourg.

17. Unfortunately, for the time being, we have no data allowing us to test hypotheses on substitutability or complementary by estimating production functions with separated labour factors for the different components of employment.

IV. Future labour demand and immigration.

18. Assumptions on immigration in population forecasts or population projections should take into account a possible change not only in total employment, but also in the allocation between residents and border workers and inside the residents between natives and migrants.

19. Looking at the origin of people entering employment in a particular year, four broad categories can be distinguished :

- Nationals
- Border workers
- Foreigners already living in Luxembourg
- Foreigners arriving in the country during the year

20. About 80% of this net increase are due to border workers, while natives remain stable or even decrease. This would mean that both categories of foreigners represent approximately 20% of the total.

21. If we are now turning to entries into the social security system, the proportions become the following :

Border workers :	55%
Nationals :	5%
Foreigners:	40%

22. From these two sets of figures we could conclude regarding the foreigners that besides the entries, we have also an important number of exits. To know how many of the foreigners were residents and how many new migrants we use figures from the Employment survey (even if they are not completely reliable), which show that about 60% of them were residents.

23. For the forecasts, you could imagine to make separate projections for the different categories of employees. It would also be advisable to consider possible changes in the economy.

24. During the last years, financial intermediation and services related to business activities have been, by far, the most dynamic sectors. Will this also be the case in the future, when changes in the legislative and administrative environment may have occurred? Such forecasts based on a breaking up by categories of employees and economic activity are perhaps too ambitious, at least for the time being.

25. Another way is to turn to a more global approach using a regression model determining the relationship between net migration (or in-migration) and the growth of GDP.

V. Immigration and GDP: a regression model.

26. You can, for instance, estimate, the following equation:

$$\text{IMMIG} = 3.66 + 0.684\text{GRGDP} + 0.436\text{GRGDP}_1 + 0.465\text{GRGDP}_2 + 0.332\text{IMMIG}_1 + 0.215\text{IMMIG}_2$$

R^2 adj : 0.787 IMMIG = Immigration Rate

DW statistic : 1.89 GRGDP = Growth Rate of the GDP

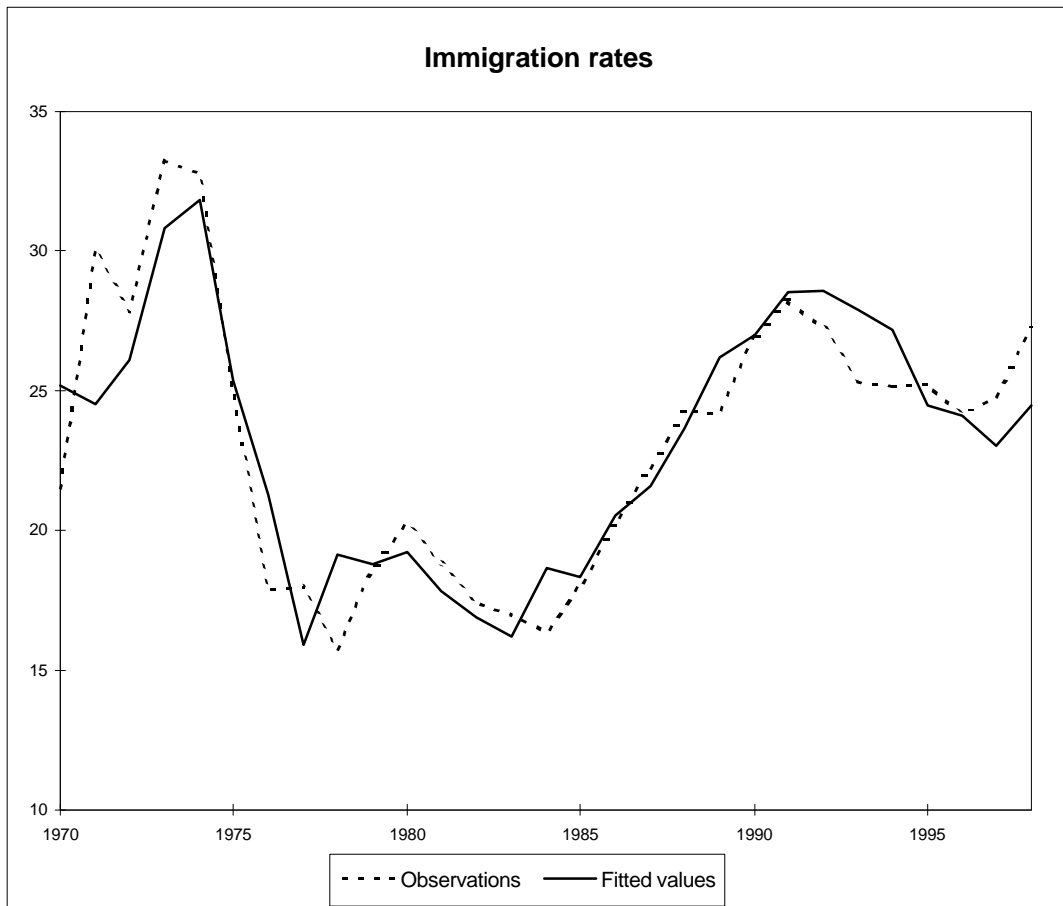
UNIT ROOT TEST : AUGMENTED DICKEY-FULLER

ADF Test Statistic 1% Critical Value : - 3.6959

IMMIG : - 2.163010 5% Critical Value : - 2.9750

GRGDP: - 3.621833 10% Critical Value : - 2.6265

The test statistic should be smaller than the critical value



27. With this type of equation is that you come up with the problem of spurious regression. If two time-series are growing over time, they can be correlated even if the increments in each series are uncorrelated. (A high R^2 combined with a low Durbin-Watson statistic reveals in most cases spurious regression).

28. An alternative would be to use a so-called Error Correction Model (ECM) where the variables are the differences from one year to another. These models provide also short and long-term elasticities. Further work will be done in this direction.

VI. Conclusion

29. In Luxembourg, population forecasts depend on economic forecasts and should therefore limit themselves to a five or, perhaps, ten year period.

30. In the long term, it's probably better to present just an extensive set of assumptions on net migration showing the possible consequences as well on the level of population as on its structure. Attention should be paid to the possible impact of demographic change on social cohesion, regional planning the natural environment. Some migration scenarios may appear to be less desirable.