CAHIER D'ETUDES
WORKING PAPER

N°1

AN ASSESSMENT OF THE NATIONAL LABOUR MARKET

ON EMPLOYMENT, UNEMPLOYMENT AND THEIR LINK TO THE PRICE LEVEL IN LUXEMBOURG

by Erik Walch
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Abstract

In the framework of its participation in the decision-making process of the single monetary policy, the BCL, among other things, needs to analyse the national economy. Different parts of this paper address different audiences: in order to expose to the general and non-expert public why central banks are interested in labour markets, the first section begins with the basic link between monetary policy and labour markets. The discussion reviews the arguments indicating that in the long run a loose attitude towards inflation does not lead to lower unemployment. In addition, the discussion sketches out to what extent the labour market provides useful information for the conduct of an appropriate monetary policy.

In the second part, the paper focuses on the particularities of the Luxembourg labour market and its impact on the price level. The standard Phillips curve relationship is altered by a number of circumstances: monetary policy is fixed for the euro area as a whole, while the evolution of the labour market is a concern for local policy makers. The very large share of non-residents in domestic employment is the central aspect of Luxembourg's labour market. In addition, the smallness of the economy is associated with a very high degree of openness in terms of exports and imports. These characteristics affect the determination of equilibrium unemployment and the price level. Since residents' low participation rates are often criticised, the size of the potential reserve this represents for the labour market is estimated. This potential reserve is very limited compared with the current speed of job creation, so it remains crucial for the national labour market to remain attractive to cross-border commuters and immigrants. The wage bargaining process and non-wage labour costs also play an important role in the national labour market performance. Finally, aspects of resident unemployment are discussed in the light of job search theory.

Comments are welcome. The views expressed are those of the author and do not necessarily correspond to those of the Banque centrale du Luxembourg.
I am grateful to many of my colleagues in the *Monetary Affairs, Economic Analysis and Statistics Department* of the BCL for useful comments and discussions. I would also like to thank Ferdy Adam and Zulmiro da Costa (STATEC) and Gary Tunsch (Ministry of Labour and Employment) for their comments. All remaining errors are mine.

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Introduction

The present paper proposes to describe and analyse the Luxembourg labour market from a central bank's point of view. In order to set the appropriate basic framework, the paper starts with an analysis of the link between labour markets and monetary policy (chapter 2).

Chapter 3 adapts the standard view of the relationship between the labour market, monetary policy and the price level to the case of Luxembourg. These modifications reflect the country's membership in EMU and the smallness and openness of its economy in terms of imports and exports as well the high number of cross-border commuters.

Chapter 4 deals briefly with the evolution of employment during the last one and a half decades. In the context of the remarkable past performance of the Luxembourg labour market and the dominating role played by non-residents, it then assesses to what extent there remains a potential resident labour force that could help to relax the tightness of the labour market. After describing the evolution of employment in the different sub-sectors of the economy, the two main factors directly influencing the labour market are analysed separately: the wage bargaining process and the role of non-wage labour costs.

Chapter 5 tries to determine the nature of resident unemployment. It further presents an analytical tool - job search theory - that should describe the phenomenon relatively independently from the evolution of total employment. This is considered a useful approach, given that annual net creation of jobs is about twice as high as the average number of unemployed but does not lower the unemployment figures correspondingly.

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Central Banking and Labour markets

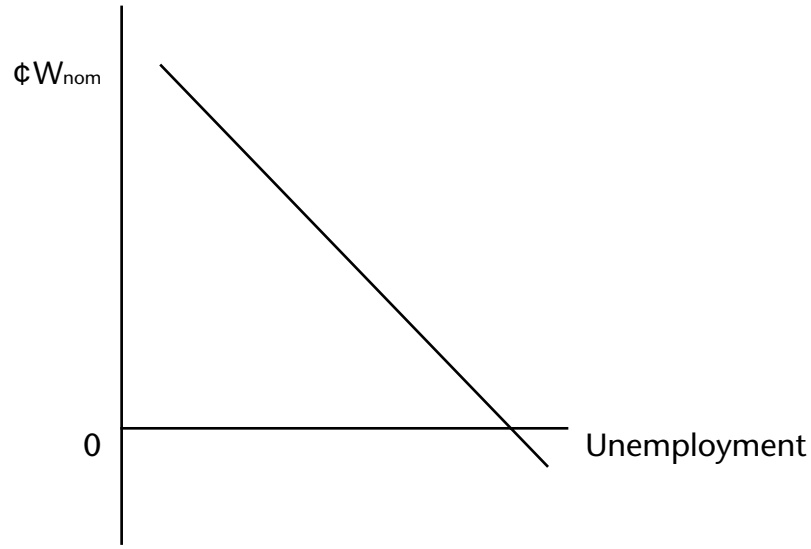
The relation between monetary policy and the labour market is twofold. Firstly, the discussion to what extent monetary policy can influence the performance of the labour market, is both old and of lasting topicality. Secondly, central banking comprises labour market monitoring as part of the assessment of the state and perspectives of the total economy and, more specifically, of inflationary pressures. The elaboration of appropriate monetary policy decisions intended to ensure price stability takes into account the outcome of this assessment.

This chapter comprises brief presentations of these two links.

2.1. The Phillips curve trade-off between inflation and unemployment

The discussion on whether there is a trade-off between price stability and a high level of employment is focussed around the so-called Phillips-curve. The Phillips curve has, since its first appearance, undergone an important number of modifications, as a consequence of changing and diverging views on the link between unemployment and inflation. It began as a mere empirical observation: Phillips (1958) found that the unemployment rate (U) and the rate of change of nominal wages ($\dot{W}_{nom}$) observed in England for the years from 1862 to 1957 were negatively correlated.

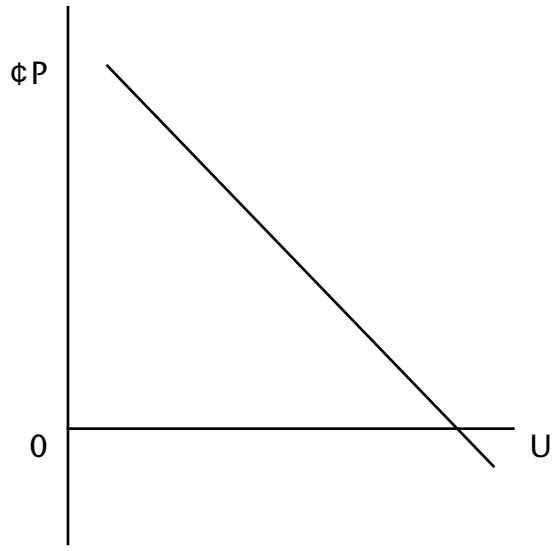
Figure 1: A stylised Phillips curve



The corresponding curve showed a negative slope, had a hyperbolic shape and would touch the x-axis at an unemployment rate of approximately 5.5% [1]. This relationship is not that striking as such. It can be argued that in times of economic upturns, the production factor labour becomes increasingly scarce and enterprises are led to grant higher wage increases. In times of downturns, the contrary would happen. Growing unemployment would prevent workers from claiming high wage increases and lower the will and the capability of firms to pay these higher wages.

The Phillips curve became much more of a topic of interest when Samuelson and Solow (1960) obtained similar results with U.S. data, replacing the nominal wage increase on the y-axis by the inflation rate. As the "modified Phillips curve" showed, higher rates of inflation (¢P) seemed to usually have come along with low rates of unemployment and, vice-versa, years during which inflation had been low had been marked by higher unemployment.

Figure 2: A stylised modified Phillips curve



Again, replacing nominal wage increases with the inflation rate was not a giant step from a methodological point of view. It had been sufficient to assume that inflation reflects the difference between nominal wage increases and the increase in productivity. However, the relationship between unemployment and inflation was still not based on a theoretical macroeconomic framework. It is interesting to note that the Phillips curve could not be integrated into a neo-classical framework, as this postulates the neutrality of money. However, the Keynesian framework did not lend itself easily either to establishing a negative relationship between price stability and employment [2].

1. Phillips (1958) wrote "if … demand were kept at a value which would maintain stable wage rates the associated level of unemployment would be about 5.5 per cent."
2. Keynes's original models were generally marked by a vertical aggregate supply curve - independent of the price level -, in common with the neo-classical macro-model. The exception was the special case in which rigidity of wages is assumed. See Felderer and Homburg (1994, p. 266).

Nevertheless, the Phillips curve gained enormous attention. Despite the existing theoretical difficulties, many people interpreted the Phillips curve as showing the possibility of a trade-off that society could make among various combinations of inflation and unemployment. In this logic, price stability would lead to relatively high unemployment whereas low unemployment could be reached if society accepted higher inflation. Even though both price stability and high employment were considered as desirable, the public as well as politicians often gave priority to the fight against unemployment through price inflation. Consequently, monetary policy makers came under pressure to practise expansionist, accommodating policies.

The Phillips curve, however, also raised growing criticism. Both empirical observations and theoretical considerations led to doubts about the existence of a reliable trade-off between inflation and unemployment. In the 1970's the phenomenon of stagflation was observed, which is a simultaneous rise in unemployment and of the inflation rate, which would have been impossible had the Phillips curve been a stable, long-term relationship. The interpretation of the stagflation phenomenon as an upward shift of the Phillips curve could have saved it as a theoretical concept. But a Phillips curve that shifted over time would definitely lose its relevance as an economic policy instrument, as the stable trade-off between inflation and unemployment would be lost.

Friedman (1968) had argued that the Phillips curve relationship could not provide a trade-off in the long run without the unrealistic assumption of systematic "money illusion": Starting from an initial situation of a stable equilibrium (point A in figure 3), inflationary policy would lead to rising product prices, leading firms to increase output and, consequently, leading them also to increase nominal wages in order to hire the additional workers needed for the production increase. Workers, not being aware of the fact that inflation is accelerating, will increase their labour supply, wrongly assuming that the nominal wage increases were *real* ones (money illusion). Consequently, there is a shift along the Phillips curve from the right to the left (point B). However, as soon as workers notice their error regarding the real value of the wages they are paid, supply on the labour market will again be reduced to the initially observed level (Point C). If, in the next period, policy makers again try to lower unemployment by an inflationary policy, not only does this require a further rise in the price *level*, but also an increase of the inflation rate in order to create money illusion once again on the side of the workers. In addition, the resulting decrease in unemployment (leading to U% of unemployment, Point D) will again be only temporary. Furthermore, even this temporary increase in employment requires that workers again have static expectations, i. e. they think that the inflation rate of the actual period will remain unchanged compared to the previous period. This unrealistic assumption further undermines the case for a trade-off between inflation and unemployment.

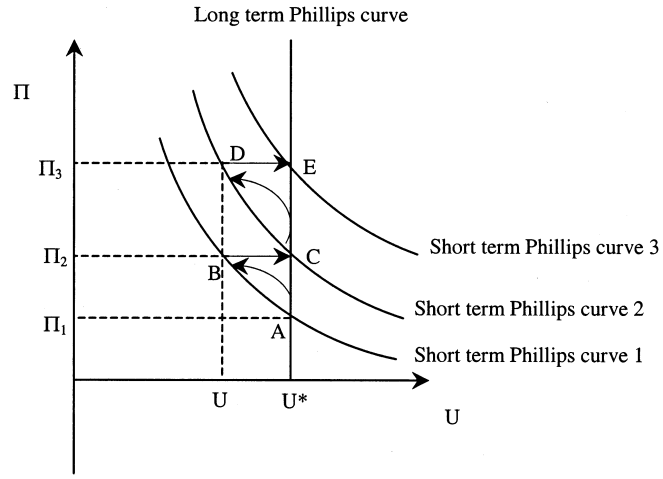
A more realistic assumption is that workers form adaptive expectations, i. e. they observe the trend of inflation over time and adapt their expectations as a

function of the forecast errors they committed in the past. In this case, they will recognise that the monetary authorities are conducting a policy that leads to permanent increases of the inflation rate. In order to maintain money illusion, monetary authorities would have to continuously accelerate the increase of the inflation. Nevertheless, a permanent lowering of the unemployment rate below the one that Friedman (1968) and Phelps (1970) called the natural rate of unemployment (U*), is not possible. As discussed above, the Phillips curve is permanently shifting upwards as monetary policy makers try to use the short-term trade-off possibility between inflation and unemployment. [3]

Under the assumption of rational expectations (i. e. workers learn from their past errors, taking into account all the relevant information so that their expectations are consistent with the "right" model describing the economy) even the short-term Phillips curve is a vertical line in the absence of non-foreseeable shocks [4]. Rational expectations mean that workers are rarely surprised by changes in the rate of inflation. In this case, there is no trade-off between inflation and unemployment even in the short run, and changes in the inflation rate will not lead to any changes in the rate of unemployment which will remain, all other things being equal, at its "natural" level.

3. To be fair, Samuelson and Solow had already warned in 1960 that the choice between price stability and employment might be deceptive.
4. See for instance Lucas/Sargent (1981).

Figure 3: A shifting modified Phillips curve



While it may be disappointing to learn that higher inflation cannot lead to a decrease in unemployment, the good news is that, price stability does not require unemployment above a "natural" level. Due to the known harmfulness of inflation in numerous respects and given the cost of reducing it [5], it is nowadays a widespread view among economists that price stability is the best contribution monetary policy can make for employment - and output - growth [6].

2.2. The NAIRU and monetary policy

Price stability has been defined as the primary objective of monetary policy. The Eurosystem has defined price stability as an annual increase in the Harmonised Index of Consumer Prices (HICP) below 2%. This goal is to be maintained in the medium term. It is clear that price stability is not a final goal in itself. It is rather the best state that the monetary sphere of the economy can be in in order to allow for an optimal functioning of the real sphere of the economy: continuous and stable growth, a high degree of employment, an optimal allocation of scarce production resources, productivity growth etc.

5. It is generally distinguished between the consequences of anticipated and non-anticipated inflation. If inflation is anticipated by the economic agents, it causes menu costs. In addition, if the tax system is not perfectly inflation-indexed, the rising nominal incomes caused by inflation lead to a transfer of resources from the private sector to the public sector. If the economic agents did not anticipate the inflation exactly, it leads, additionally, to distortions in the distribution of income and wealth between workers and employers (as wages usually follow the evolution of prices only with a certain time lag) and between creditors and debtors. It also leads to a distortion in the allocation of scarce production factors and to a reduction of the information efficiency of the price system. As higher inflation usually comes along with higher volatility of inflation, it renders more difficult and increases the risk related to decisions for the future (for instance investment). Reducing inflation can cause costs in terms of, among other things, a temporary increase in unemployment. For a discussion of effects of inflation see Issing (1998), pp. 249-255.
6. Opposite views by distinguished economists exist. For instance, according to Tobin (1972) "higher prices or faster inflation can diminish involuntary, disequilibrium unemployment … The economy is in perpetual … disequilibrium even when it has settled into a stochastic macro-equilibrium … Price inflation … is a neutral method of making arbitrary money wage paths conform to the realities of productivity growth." For an empirical analysis of this thesis see Groshen and Schweitzer (1996).

In order to achieve its goal, the Eurosystem needs to conduct a forward-looking strategy. As the influence that monetary policy decisions have on the inflation rate is lagged in time, the Eurosystem needs a system of indicators that permit an assessment of future price developments. The Eurosystem's monetary policy decisions rely on a two-pillar strategy. The first pillar is based on the evolution of the broad monetary aggregate M3. Inflation being considered a monetary phenomenon, high importance is attached to the evolution of M3 as an indicator of possible future inflationary pressure. However, as the introduction of the single currency was a regime shift, there remain uncertainties about the functioning of monetary transmission in the euro area. These uncertainties include the influence of monetary policy decisions on M3 and the exact link between changes in M3 and in the price level. Monetary policy makers felt that they would benefit from taking into account a number of additional indicators whose observable values provide further information about future price developments. This second pillar of indicators includes financial market indicators and other economic indicators including labour market data.

The information about future inflationary pressure that labour markets can provide is closely linked to the discussion about the Phillips curve relationship. In the debate about the Phillips curve it was suggested that higher nominal aggregate demand cannot permanently lower unemployment below a certain rate. Instead, if initial unemployment corresponds to the location of the vertical long-term Phillips curve, increasing demand only leads to an accelerating inflation rate. As this level of the unemployment rate is the only one compatible with a stable inflation rate, it is often referred to as the *Non Accelerating Inflation Rate of Unemployment* (NAIRU). However, an economy in which the actual unemployment rate matches the NAIRU need not necessarily have price stability. Rather it has *inflation* stability in the sense that the current situation in the labour market does not influence inflation either via an excess demand for labour and a resulting wage inflation or via an excess supply of labour leading to a slowdown in wage growth. In brief, the NAIRU is the unemployment rate compatible with a constant rate of inflation.

In this context, two remarks need to be made.

Firstly: The NAIRU is often equated with the natural rate of unemployment (see above). Friedman (1968) defined the natural rate of unemployment as "the level that would be ground out by the Walrasian system of general equilibrium equations, provided there is embedded in them the actual structural characteristics of the labour and commodity markets, including market imperfections, stochastic variability in demands and supplies, the cost of gathering information about job vacancies and labour availabilities, the cost of mobility, and so on". So the natural rate comprises both frictional unemployment and parts of the structural unemployment. As the use of concepts is not entirely homogenous in the economic literature, the natural rate and the NAIRU are also sometimes said to equal the structural unemployment including also frictional unemployment, the latter component often not being mentioned, though. The

point is that the NAIRU as usually defined excludes the cyclical component of unemployment. However, the NAIRU can, in the short and in the medium run, deviate from the natural rate of unemployment and comprise parts of cyclical unemployment. To put it simply, even when actual unemployment is higher than structural unemployment (for example during a cyclical upturn), the decrease of actual unemployment can be too fast to remain without influence on the inflation rate.

This phenomenon is often referred to as "persistence of unemployment" or "hysteresis" (Blanchard and Summers, 1987) [7]. It can be illustrated by the fact that in many European countries, the fall in unemployment observed during cyclical upturns of the economy was weaker than the rise in unemployment experienced during the last cyclical downturn that had preceded the upturn. The Phillips curve is a useful tool to explain what happens in these cases. The conventional modified Phillips curve shown above graphically illustrated the following relationship between inflation and unemployment [8]:

$$= L( ) - Æ(U - SUR)$$

where

	is the rate of inflation
L(…)	is a lag operator, which means
	that L( ) stands for lagged, past value(s) of .
Æ	is a constant >0
U	is the actual unemployment rate
SUR	is the structural rate of unemployment

The equation simply says that if the actual rate of unemployment is equal to the structural unemployment rate, then the actual situation on the labour market does not in any way lead to changes in the currently prevailing inflation rate:

If U=SUR, then Æ(U-SUR)=0 and =L( ), that is, the inflation rate remains unchanged compared to past values. Analogously, an actual unemployment rate U below the SUR will lead to a rise in inflation. Clearly, in this context, the NAIRU equals the structural rate of unemployment.

7. Some authors equate persistence and hysteresis, others treat them as non-identical concepts. Hysteresis occurs when consequences persist even when their causes have vanished.
8. See IMF (1999, pp. 81-82).

This simple Phillips curve equation can be extended in order to include the phenomenon of persistence of unemployment:

$$= L( ) - Æ(U - SUR) - §(U - L(U))$$

where

	is the rate of inflation
U	is the actual rate of unemployment
SUR	is the structural rate of unemployment
	is a constant > 0
§	is a constant > 0

L(...) is the lag operator, so that L(U) is the lagged (past) value of unemployment and L( ) is the lagged value of inflation

Under this specification of the Phillips curve, the inflation rate is not only influenced by a deviation of actual unemployment from the structural rate. In addition, a fall of actual unemployment below its past values leads to an increase in inflation. Thus, the equality between U and SUR is no longer a sufficient condition for inflation stability. Consequently, if unemployment has in the past diverged from the structural rate, that is if L(U) does not equal the SUR, then the NAIRU diverges from the structural rate of unemployment. This can lead to situations in which actual unemployment is well above the structural rate and in which nonetheless any increase in nominal aggregate demand would result in an increase in inflation. This will be the case when the rise in nominal demand is so strong it tends to increase employment more than the inflation-free reduction in unemployment allowed for by the degree of persistence. The larger is § compared to Æ, the more important is the influence of unemployment persistence or hysteresis.

The concept of unemployment persistence and its relation with NAIRU and the SUR is not treated homogeneously by all authors, which is important to know in order to avoid confusion. As has been done above, persistence can be interpreted as leading to a divergence between SUR (which remains constant) and the NAIRU (which may increase). Alternatively, the equality between SUR and the NAIRU can be kept even in cases where the existence of persistence is admitted. In these cases, the interpretation of persistence is such that it does not only lead to an increase in the NAIRU but that also the SUR changes over time as a consequence of the appearance of persistence in unemployment [9]. The natural rate of unemployment can also be treated in different ways.

9. If one interprets hysteresis in unemployment following a cyclical downturn as a rise in structural unemployment, then any distinction between structural and cyclical unemployment becomes irrelevant. See Issing, (1998, p. 221).

Independently from the choice that is made regarding this question, the important conclusions for monetary policy are the following ones. The situation on the labour market provides important information about possible future inflation developments. The concepts that serve in measuring and in assessing this information are the NAIRU, the structural rate of unemployment and the natural rate of unemployment. The vertical long-term Phillips curve and the possible existence of a negatively sloped short-term Phillips curve provide a useful analytical tool. The central bank, in order to correctly interpret the data, needs very good knowledge of the labour market, of its structure, its agents and their behaviour, its past, present and future evolution, of labour productivity growth etc. Closely linked to this required information is a thorough assessment of the actual and upcoming position of the economy in the business cycle, of the actual and future capacity utilisation, of long-term potential growth, etc.

The fact that the NAIRU can vary over time makes the analysis even more difficult. If it is required, in order to maintain price stability, to avoid an increase of nominal aggregate demand that would lead to a temporary fall of the unemployment rate below the NAIRU, the monetary authorities need to permanently update their assessment of the present and future level of NAIRU. It is important to admit that the phenomenon of hysteresis or persistence can lead to good reasons for monetary authorities to slow down the growth of nominal aggregate demand in order to prevent even a temporary fall of unemployment to a level that had once been compatible with inflation stability.

Secondly: unfortunately, the NAIRU might be high and the public could be unwilling to accept that lowering unemployment via a more accommodating monetary policy in such cases involves an unacceptable cost in terms of inflation. This is especially the case as the public has come to expect that market economies and monetary policy aimed at price stability will allow for both high employment and low inflation. Appropriate conduct of monetary policy under permanent and unanimous public criticism is challenging, even though the independence of central banks is nowadays widely accepted.

It is therefore of crucial importance that monetary policymakers make clear that when unemployment is as low as the NAIRU, it cannot be lowered any further without a risk to inflation. In this case, structural measures are needed in order to lower the NAIRU - or the structural rate of unemployment - and this cannot be achieved by monetary policy. Monetary policymakers can contribute to informing the public by communicating the results of their labour market assessment and indicating the factors behind the current level of the NAIRU as well as any measures that might lower it. It is common knowledge that potential sources of *structural unemployment* are labour market rigidities [10], generous replacement ratios in unemployment or welfare schemes and the high levels of labour taxes. The existence of a skill mismatch between supply and demand on

10. These may be due to various types of labour market regulations covering job protection, inflexible work arrangements and minimum wages.

the labour market is also commonly quoted, and a role is also often played by the structure of the wage bargaining process. The latter may also influence *persistence* in unemployment, which can be interpreted as a rise in structural unemployment (as has been discussed above). Insider-outsider mechanisms can lead to a stabilisation of employment at post-downturn levels (on the insider-outsider theory, see Lindbeck and Snower, 1988). The loss of human capital on the side of unemployed workers that can consist - if unemployment lasts for a long time - in loss of skill and pertinent work habits, can also lead to a rise in structural unemployment through a decrease in productivity of the workers concerned as well as through an increase in the mismatch between supply and demand. The NAIRU might, during cyclical downturns, also be increased by capital constraints resulting from weak investment activity during this downturn. These capital constraints will act as bottlenecks preventing a quick return of the unemployment rate to its previous low levels [11].

These factors, which determine the level of the structural unemployment and of NAIRU, can be influenced by the social partners as well as by those responsible for economic policy. Once the NAIRU is decreasing as a consequence of changed behaviour by social partners or the implementation of structural reforms by economic policy makers, monetary policy can allow nominal aggregate demand to lower actual unemployment to levels that would not previously have been within reach.

Monetary policy makers do not conduct structural reforms themselves. Therefore, their participation in the debate about structural reforms could seem unnecessary at first sight. In fact the opposite is true. Monetary policy makers need to explain why at a given moment they are unwilling to allow a further acceleration of aggregate demand and the debate about structural reforms gives them the opportunity to explain under what conditions they would be able to conduct a more accommodating monetary policy. Participation in this debate contributes both to transparency and to acceptance of monetary policy by the general public.

Finally, while an expansionist monetary policy would not lower unemployment but only lead to higher inflation, undertaking the appropriate structural reforms will lead to lower unemployment without causing higher inflation.

11. See IMF (1999, p. 61).

III

The labour market and the price level in Luxembourg

From the point of view of Luxembourg, the relationship between monetary policy, the price level and labour market performance discussed above is subject to a number of major particularities.

3.1. Consequences of the membership in Economic and Monetary Union (EMU)

First of all, the single monetary policy of the Eurosystem is focussed on price stability in the euro area as a whole, not in individual countries. Participating Member States that experience bottlenecks on their national labour markets or have high inflation rates for some other reason cannot expect the single monetary policy to respond as long as price stability in the euro area as a whole is not at risk. Preventing deviations of the national inflation rate from the euro area's average inflation - if a country sees an interest in doing so - remains the responsibility of national economic policy.

While this is in principle true for all Member States, size matters. Of course, the smaller the economy, the less important is the impact of its national price evolution on the euro area-wide price level. Should an upward deviation of Luxembourg's inflation rate from the euro area-wide Harmonised Index of Consumer Prices (HICP) occur - as observed in 2 000 - and should the level of inflation and its divergence from the EMU average be considered as a matter of concern, carrying out appropriate counter-measures lies in the responsibility of national authorities (including the social partners) [12].

Analogously, countries that might want to benefit from a more accommodating monetary policy than currently conducted by the Eurosystem, cannot expect the Eurosystem to lower interest rates unless this decision is advisable for the euro area economy as a whole.

The NAIRU relevant for the single monetary policy must be estimated following an aggregated, euro area-wide approach. The still diverging structures of the national labour markets in the euro area complicate this aggregation and render more difficult the use of the NAIRU concept for monetary policy purposes [13]. This reinforces the need for monetary policy to be based on a good

12. It would be precipitate to perceive the national responsibility for measures against inflation deviation from EMU average - especially in the case of small economies - as a major disadvantage or weakness of the institutional and economic framework of EMU. The single monetary policy can be seen as setting the appropriate framework and meeting the optimal requirements for price stability also in the individual Member States in the medium and in the long run. National deviations from average should be limited in time. The national discipline and action required to tackle these deviations just are part of the conditions required to benefit to the highest degree from the potential advantages that a monetary union offers to its participants.

13. See Fabiani/Mestre (2000).

understanding of the national labour markets in the euro area. In this regard, national central banks play an important role in the process of analysis, as they generally have an advantage over the ECB in the knowledge about their respective national economies and labour markets.

3.2. Particularities of small open economies (SMOPECs)

The relationship between employment, unemployment and inflation is particular in Luxembourg. First, the supply side of the Luxembourg labour market is characterised by the important involvement of non-residents. However, the unemployment and inflation rates relevant for national policy are limited to the resident unemployed and to prices on the national territory. The second particularity stems from another consequence of the smallness and the openness of the Luxembourg economy, namely the importance of international trade for the economy as a whole and for the price level in particular.

3.2.1. The NAIRU and the non-resident labour supply

As Luxembourg is a small open economy (SMOPEC), inflation is to a very large extent determined abroad and more precisely through import prices. This fact alone is not sufficient to undermine the standard Phillips curve relationship. As discussed above, the Phillips curve relationship links inflation to labour market tightness, but Phillips curve models can recognise that other factors also influence inflation; they simply concentrate on the effect from labour markets. The first difference for Luxembourg stems from the fact that Phillips curve relationships implicitly assume the complementarity of employment and unemployment. For instance, an increase of the former leads to a corresponding decrease of the latter. It is true that this complementarity might also not be exact in other countries of the euro area, but the share of cross-border commuters in employment is unequalled in any other country of the euro area. It is obvious that without the abundant non-resident labour supply, domestic labour demand growth would have led to a degree of scarcity of the production factor "labour". This could have caused important upward pressure on wages and inflation. In addition, an ongoing process of net immigration has contributed to an increase of the resident labour force. As the labour market relevant for the Luxembourg economy covers a territory that is larger than the country itself, an assessment of potential labour market tightness and of the price pressure it generates needs to take into account the labour market situation in the close-to-border regions of the three neighbouring countries. Attempts to estimate a NAIRU for the Luxembourg economy that takes into account unemployment in the neighbouring regions have been made [14]. A NAIRU that includes part of the unemployment in the neighbouring regions within the labour supply, provides a more appropriate tool for the assessment of price pressure stemming from labour market developments.

14. See Guarda (1999) and Molitor (1999).

3.2.2. The NAIRU and the terms of trade

Inside a monetary union, a rise in the price level of a national economy can undermine its international competitiveness. Higher inflation cannot lead to a depreciation of the country's currency, which would have been a possible way of returning to equilibrium under a regime of flexible exchange rates. Because international competition within the monetary union might limit the firms' ability to raise product prices following a national wage-induced rise in production costs, the channel by which the economy would tend to a new equilibrium would be a slowdown of production due to a deterioration of international competitiveness.

This possibility is especially relevant for Luxembourg. Being a very small and very open economy (SMOPEC), import prices have a crucial impact on the economy's price level. The smallness of the national economy limits the influence of the economy's import demand on the level of import prices. The fact that wages are fully indexed to the evolution of consumer prices actually increases the influence of import prices on production costs. Production prices increase not only in response to rising imported intermediate goods' prices. In addition, the automatic indexation of labour corresponds to an upward shift of the labour market's supply curve. On the other hand, rising import prices do not necessarily imply export prices rising to the same extent.

Consequently, inflation in Luxembourg differs from inflation in larger, less open economies in the sense that it does not necessarily affect input prices *and* sales prices to the same extent. If export prices, which are an important part of the national firms' sales prices - *do* increase in the same way, the demand curve on the labour market also shifts upward so that in the end, equilibrium employment and *real* wages remain unchanged. Constant terms of trade leave the NAIRU stable. Rising import and export prices lead to higher inflation, but the labour market itself has no influence, on inflation. Nominal wages just follow the rise in the export and import price level. The NAIRU remains unchanged and if the labour market has been in equilibrium before the rise in import and export prices occurred, it will remain in equilibrium.

However, if export prices *do not* increase to the same extent than import prices do - that is if the terms of trade deteriorate - the wage increase that firms are confronted with as a consequence of the automatic indexation represents a *real* wage increase, not a nominal one. The upward shift of the labour market's supply curve has not been matched by a corresponding rise of the firms' sales prices and it is possible that nominal demand for the firms' products will also in future not increase correspondingly (that is the new, less favourable terms of trade may last for some time). Firms will then experience price pressure stemming from wages even though the level of unemployment was previously compatible with inflation stability. They will try to pass the wage cost increases through to the sales prices of their products. This rise in sales prices does *not* stem from increased nominal aggregate demand - as would be the case in a

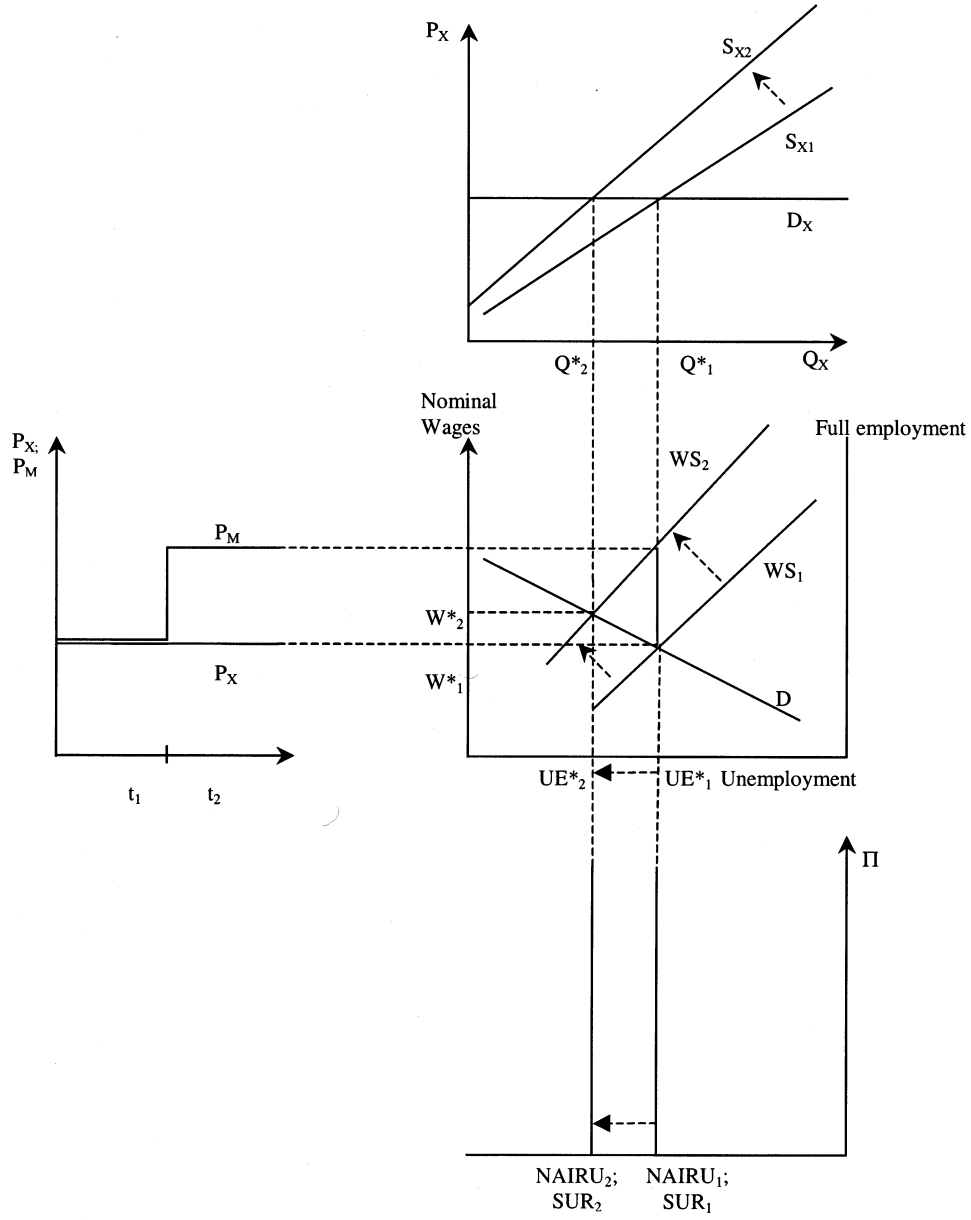
larger and less open economy. Instead, it is the tightness of the labour market - which has been accentuated by the deterioration of the terms of trade - that causes inflation to accelerate. Only a simultaneous increase of the unemployment rate would lead to a reduction of wage pressure so that the net effect of the labour market evolution on inflation can stay neutral. In other words, the NAIRU increases as a consequence of a deterioration of the terms of trade. It is important to see that this dependence of the NAIRU on the evolution of the terms of trade is a particularity of smaller and more open economies in which the evolution of consumer prices can significantly differ from the evolution of the firms' sales prices [15]. In addition, the more the SMOPEC behaves as a price taker on its export markets and the larger is the part the domestic production that is exported, the stronger is the increase in unemployment that results from the deterioration of the terms of trade and the weaker is the effect of the increasing labour cost on the price level.

A more detailed analysis of the relationship between the terms of trade, the price level, employment and the NAIRU is presented in the text box.

As a central bank must closely monitor any evolution in the economy that has a potential impact on inflation, good knowledge of the labour market is a necessity. In order to allow for a better understanding, the following chapters present some key data of the Luxembourg labour market, regarding both the structure and evolution of employment and of unemployment.

15. If wages were not fully indexed to consumer prices, the NAIRU would still increase as a consequence of a deterioration of the terms of trade. This is because workers focus on consumer price inflation and firms on sales price inflation. However, in the absence of automatic indexation, evolution of employment would be less vulnerable to a deterioration of the terms of trade, as trade unions might accept wage increases somewhat below the increase in consumer prices. On the other hand, in a situation of automatic indexation, a corresponding result could (if we assume constant productivity of labour) only be reached if trade unions accepted wage decreases as a result of a wage bargaining round. While economically both cases are in principle equal, the latter one seems more unlikely for psychological reasons.

The terms of trade and the NAIRU in a small open economy



P_x; P_m	Export price level and Import price level, trend-adjusted index
D	Labour Demand function
WS_t	Wage setting curve in period t
W^*_t	Equilibrium wage in period t
UE^*_t	Equilibrium unemployment in period t
$NAIRU_t$	Non-acclererating inflation rate of unemployment in period t
SUR_t	Structural unemployment in period t
f	Inflation rate
D_X	Export demand
S_{Xt}	Export supply function in period t

Assumptions

The model is based on the simplified assumption that the complete production of the small and open economy is sold on the export market. All imported goods are used for final consumption purposes, not as intermediate goods. As the country, due to its smallness, acts as a price taker, the export demand curve is a horizontal line, which means that a reduction of the national export supply will not lead to higher prices of the relevant products on the world market. Workers - or trade unions - link their wage claims to the level (or evolution) of import prices, as import prices, under the assumption that all consumer goods are imported, equal the consumption prices. Analogously, the level of the employers' labour demand curve depends on the level of export prices, as these are the relevant price level indicator for the firms. Trade unions are assumed to trade off the level of the real wage against the level of employment, so that in an equilibrium situation, unemployment is not zero.

Starting point

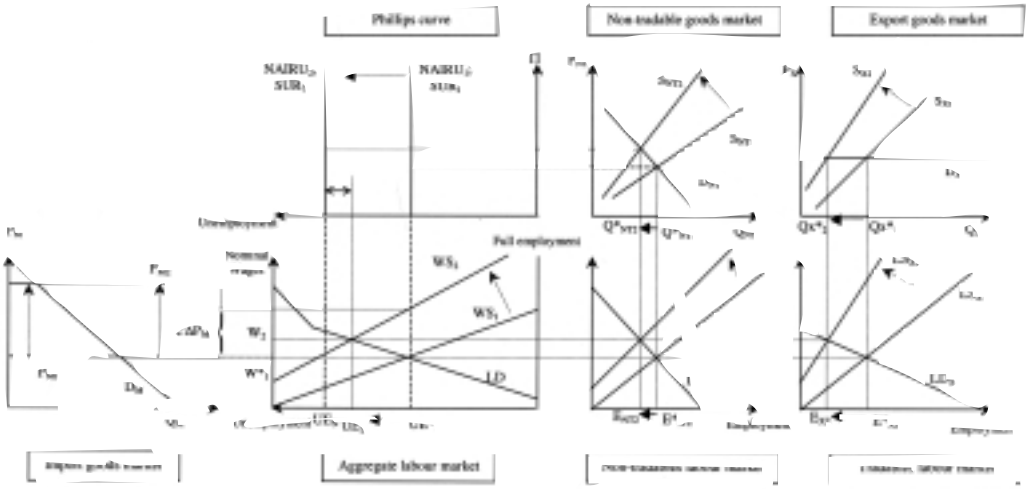
Initially, the labour market is in equilibrium at the equilibrium wage W^*_1 and equilibrium unemployment UE^*_1. The fact that equilibrium unemployment differs from full employment (the vertical line on the right) results from the assumption that wages are negotiated by trade unions that try to find an appropriate - from their view - trade-off between the level of employment and the level of wages. The initial equilibrium unemployment corresponds to the NAIRU in period 1.

The effect of a change in the terms of trade on the NAIRU

Suppose that at the beginning of period t=2, there is a deterioration of the terms of trade. Import prices rise while export prices do not. Consequently, trade unions claim higher wages for an unchanged amount of work - the wage setting curve (WS) shifts up by the same percentage as the observed increase of the import prices. As export prices do not rise, the labour demand curve does not move - employers will not pay more for the same, as they cannot pass through the increased production cost to the consumers on the world market. Consequently, the shift to the upper left of the export supply function due to increased wage and, consequently, production costs solely leads to a reduction of the quantity produced and to an increased level of equilibrium unemployment. The reduction of production and of employment is weaker than the one that would have occurred if trade unions only tried to keep the real wage constant. As trade unions are assumed here also to have the employment level in their utility function, the wage setting curve is not vertical. The new equilibrium wage (W^*_2) therefore corresponds to a certain loss of purchasing power for the workers. Additionally, the equilibrium unemployment and also the NAIRU and structural unemployment increase.

The model shows the fact that changes in the terms of trade have a greater impact on the NAIRU in small open economies that they have in larger, more closed economies. Note that a system of automatic indexation of wages to the consumer price level would lead, at least in the short run, to a full compensation of the workers' initial loss in purchasing power. This corresponds to an even stronger upward shift of the wage setting curve and a more important decrease in employment and more important rise in equilibrium unemployment and the NAIRU. It is also important to see that under the given assumption, unemployment, no matter what level it has, has no effect on the price level, so the term "NAIRU" might appear somewhat misleading. This is due to the restrictive assumption that all consumer goods are imported and, analogously, all produced goods are exported. These assumptions can be relaxed in order to get a more realistic picture.

The terms of trade and the NAIRU in a small open economy with segmented goods markets



t=1,2, N	Period 1, period 2, period N
P_X; P_m	Export price level and Import price level, trend-adjusted index
c	Direct import price elasticity of consumer prices.
c·¢PM	Direct rise in consumer prices due to a rise in import prices
LD	Labour Demand function
LD_{NT}, LD_X	Labour Demand function of the non-tradables and the export goods industry, respectively.
WS	Wage setting curve
LS_{NT}, LS_X	Labour supply function in the non-tradables and the export sector, respectively.
W*	Equilibrium wage
UE*	Equilibrium unemployment
E^*_{NT}, E^*_X	Equilibrium employment in the non-tradables and the export sector, respectively.
NAIRU	Non-accelerating inflation rate of unemployment in period t
SUR	Structural unemployment
	Inflation rate
D_X	Export demand
S_X	Export supply function

Assumptions

In this alternative model, a part of the goods consumed domestically are produced domestically. The goods production consists of tradable goods and non-tradable goods. It is assumed that all the tradable goods are exported, so that all the goods that are produced and consumed domestically are non-tradables. It is further assumed that while there are two distinct domestic labour markets, the workers are able to switch from the export industry to the non-tradables industry. Consequently, the equilibrium wage of the two sub-sectors is equal over time. The aggregate labour market is derived by aggregating the labour supply and labour demand function of both sectoral labour markets. The economy is still assumed to act as a price taker on its export and on its import market.

The starting point

Again, in period 1, we start in a situation of economic equilibrium. The actual rate of unemployment UE^*_1 is equal to the NAIRU or the structural rate of unemployment. There is no pressure for adjustment of any kind, as import, export and domestic goods prices are assumed to follow the same, stable trend. Inflation therefore is stable. The allocation of labour between the non-tradable and the export industry is such that wages in both sectors are equal and there is no incentive for workers to migrate from one sector to the other. The proportion of workers employed in either sector is a function of the position and the slope of the two sector-specific labour demand functions. Also, all three goods markets are in equilibrium.

The effect on the NAIRU of a change in the terms of trade

Suppose, again, that there is a rise in import prices PM at the beginning of period 2 without a corresponding rise in export prices. The Wage setting curve (WS) will shift upwards as workers, confronted with higher consumer prices, will claim higher wages during the wage bargaining process. Unlike what was shown in the first model, the upward shift of the Wage setting curve will, this time, not have the same dimension as the rise in import prices. As one part of the domestically consumed goods is not imported but produced domestically, the upward shift of the WS curve will correspond to the weight of the price of import goods in the whole consumption goods basket of domestic consumers, and this weight, c, is smaller than 1. As labour supply tightens and as the aggregated labour demand function has so far remained unchanged - as export and non-tradable sales prices have not moved (yet) -, the new wage is W_2 and the new, higher level of unemployment is UE_2. These changes are shown in the two lower left quadrants.

The reduction of employment is distributed unequally among the two production sectors of the economy. The reduction of employment in the export sector can be expected to be more pronounced, as the export industry as a price taker is not able to pass through higher wage costs to its customers on the world market. The upward shift of the supply curve on the export goods market (S_X) does not lead to an increase of export goods prices, as the export demand function is a horizontal line. Rather, the shift in the supply curve results solely in a reduction of the volume of goods produced in the export sector. On the tradables labour market, this price taker behavior of export firms results in a higher wage elasticity of labour demand compared to the labour demand function on the non-tradable goods labour market. The consumption demand function on the non-tradables good market, unlike export demand, is downward sloping. As these goods cannot be traded, domestic producers are not subject to international competition on this market and therefore can partly pass through higher wage costs to the consumers, thereby limiting the decrease in output and employment if compared to the export market. These changes are shown in the four quadrants of the right side of the model.

The fact that there is a domestic goods market on which higher production costs can partly be passed through to consumers leads to what is known as the wage-price spiral. The rise in domestic consumer prices occurred as a consequence of the rising wage costs and had not previously included in the upward shift of the WS curve in period 2. As the prices of domestically produced non-tradables are part of the consumer prices relevant for the workers' wage claim, a further upward shift of the WS curve will occur in period three, which will, although to a smaller extend, re-launch the process of increasing unemployment, decreasing output and rising prices.

The disequilibrium - that is, the further need for adjustment - that can be observed in the economy at the end of period 2 (after the prices of the non-tradables have risen) shows on the labour market: The actual unemployment rate UE_2 is lower than the corresponding value of the NAIRU. The equality between the two will only be restored after the wage-price spiral has come to an end and when actual unemployment equals UE_N. As long as this lasts, that is as long the actual unemployment is still lower than NAIRU, both actual unemployment and prices will be driven upwards by the return to equilibrium.

To sum up:

- As in the first model, a deterioration of the terms of trade causes a rise in the NAIRU and in equilibrium unemployment.
- A deterioration of the terms of trade hits the export sector harder than the non-tradable goods sector, both in terms of output and employment.
- Unlike in the first model in which the total domestic output was exported, the evolution of the labour market influences the level of consumer prices.
- After a terms-of-trade-shock, the economy does not return to a stable equilibrium immediately. During the process of returning to equilibrium, the actual rate of unemployment is lower than the NAIRU and the labour market exerts upward pressure on the price level.

Of course, this second model still is quite a simple one. A number of facts would have to be taken into account if the relationship between the terms of trade and employment evolution were to be modelled:

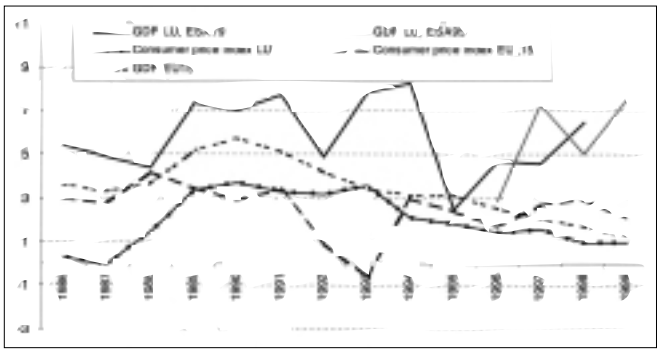
- Rising import prices do not only affect the price of labour. Firms do also import intermediate goods, which would of course also become more expensive.
- Domestic demand for domestically produced, non-tradable goods is likely to be influenced by import price increases.
- The assumption that Luxembourg is a pure price taker on its export markets is a simplifying one. A certain range for the setting of prices does exist. The possibility to somewhat increase product (especially service) prices on the export market will lower the impact on employment in the tradable goods sector.
- The possibility of employees to switch between the two labour markets will in reality be linked to costs.
- Besides the two different "sub-labour markets" of the model, one might perceive that there is a third domain of employment: The sector of the economy through which imported consumer goods are sold to the domestic consumer. In this sector, employers might see their sales prices rise (and demand for their products decrease) before the wage costs increase.

IV

Evolution and structure of employment

Since about the first half of the 1980s, the Luxembourg economy has experienced growth rates that are significantly above the average of the European Union. From 1985 to 1999, the average annual real growth rate of GDP in Luxembourg is 5.9% (ESA version) [16]. Over the same period, consumer price inflation has been lower than in EU15, with the gap closing however and inflation decreasing during the process of economic convergence prior to the introduction of the euro.

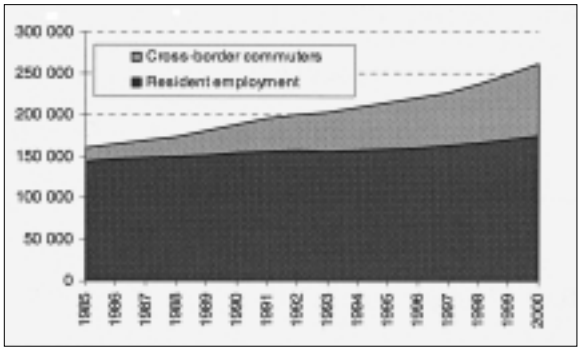
Figure 4: Real GDP and Consumer prices (annual % change) in Luxembourg and in the European Union [17]



Sources: STATEC [18], EUROSTAT

Since the mid-1980's, Luxembourg's total domestic employment grew yearly by 3.3% on average. Non-residents have dominated employment growth. While resident employment grew on average slightly less than 1.3% over the period, the number of cross-border commuters increased by 11.9% on average each year. Non-residents contributed 70% of total employment growth, as resident employment grew by a total of 21.3% and the number of non-residents employed on the national territory by more than 400% between 1985 and 2000.

Figure 5: Evolution of resident and non-resident employment (levels)



Sources: STATEC

16. Average calculated using ESA79 growth rates from 1986 to 1995 and ESA95 growth rates from 1996 to 1999.
17. Growth figures for Luxembourg are ESA95 figures from 1996 onwards and ESA79 figures for the years before.
18. Service Central de la Statistique et des Etudes Economiques.

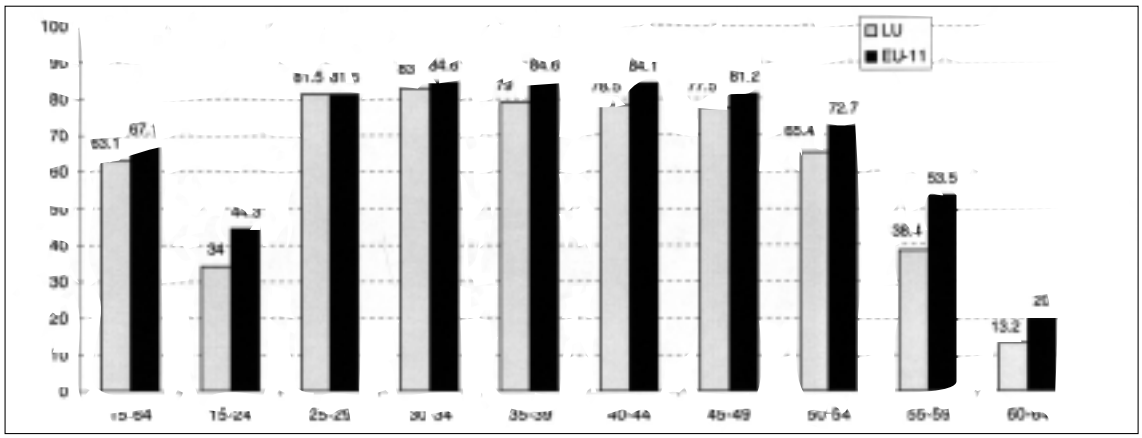
The low level of resident unemployment (see below) suggests that high labour demand is constrained as far as resident labour is concerned. However, in order to appropriately assess the degree of labour market tightness, it is necessary to take into account those people who are potentially both willing and able to accept a job but who are not registered as unemployed. The number of these people is not easy to assess. On the one hand, this additional potential labour force includes those who would like to work but have given up searching, as they believe the probability of finding employment is very low. On the other hand, it also includes individuals who do not want to work under the given circumstances, although they would probably find a job should they search for one. Their decision not to work may be due to an alternative that they feel is more attractive (raising children, other non-paid work or simply leisure).

As a matter of fact, Luxembourg's participation rate is low in international comparison and is regularly criticised [19]. In order to assess the unused potential resident labour supply , participation rates of different segments of the resident population in working age will be briefly compared to corresponding euro-area participation rates [20].

4.1. Residents' participation rates in international comparison

The overall participation rate [21] among Luxembourg residents is 4 percentage points lower than the EU11 average (63.1% vs. 67.1%, 1999 data) [22]. The difference is larger for very young individuals but practically insignificant for those aged 25-29. Beyond this age, the difference reappears and grows continuously with age to reach its maximum (in percentage points) for those aged 55 to 59. The relative maximum difference is highest for the oldest group.

Figure 6: Participation rate of total population as a function of age, 1999 data



Sources: STATEC, EUROSTAT

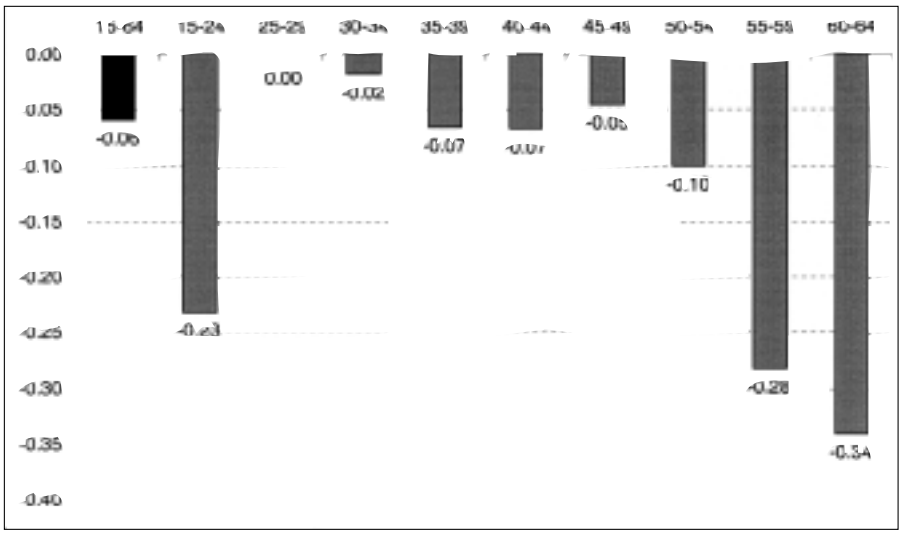
19. See for instance OECD (2001, p 4).

20. Comparisons do not cover all age groups, as the data available are partly incomplete.

21. Active population divided by total population (of the same age class(es)).

22. If the comparison would be made between Luxembourg and the European Union instead of the euro area, the difference would be even larger, as The UK, Sweden and Denmark have participation rates that are higher than the euro area's average.

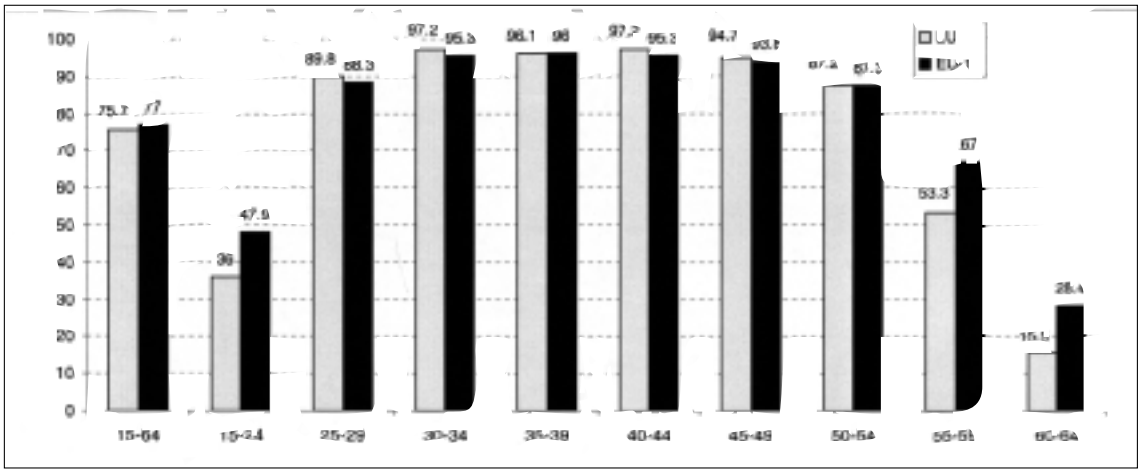
Figure 7: Relative difference between LU and EU11 participation rates as a function of age (1=100%), 1999 data



Sources: STATEC, EUROSTAT

Considering the male population on its own, the average difference is only minor. Participation rates among men are generally much higher than the average of both sexes and this is specially true for Luxembourg. Again, the very young are far less "active" in Luxembourg than on average in the EU11. For all other age classes up the late 40's, the participation rate of resident males is slightly higher than the euro-area average. Again, the two oldest age classes show the most important deviation from the euro area average.

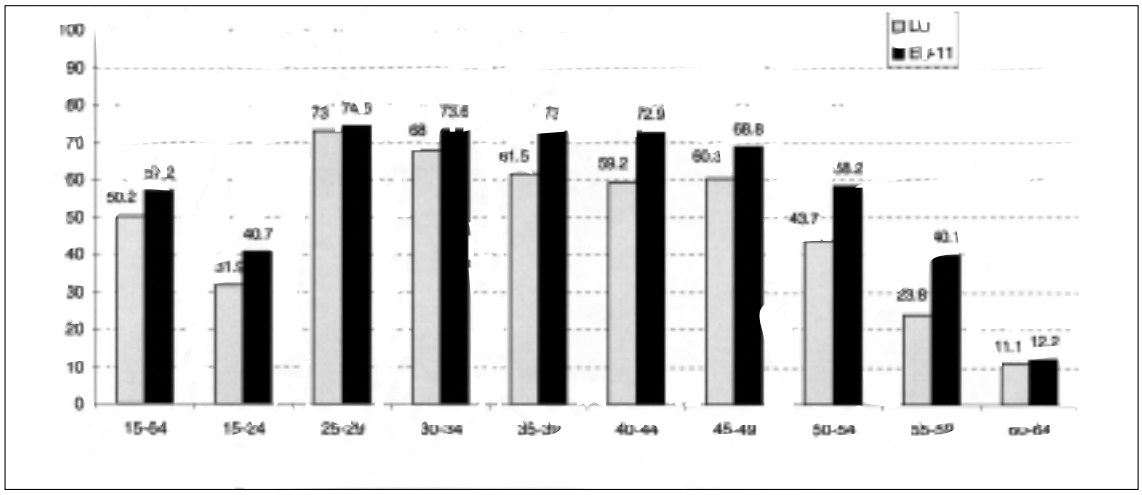
Figure 8: Participation rate of total male population as a function of age, 1999 data



Sources: STATEC, EUROSTAT

The participation rates of women in both Luxembourg and the euro area are significantly lower than the ones of men. The average difference between Luxembourg and the EU11 is important (50.2% versus 57.2%). Unlike their male counterparts, women resident in Luxembourg are clearly less active in any age class when compared to the corresponding euro area average, with the exception of those aged 25 to 29, where the relative difference is very limited. Still the difference in participation rates is generally increasing with age.

Figure 9: Participation rate of total female population as a function of age, 1999 data

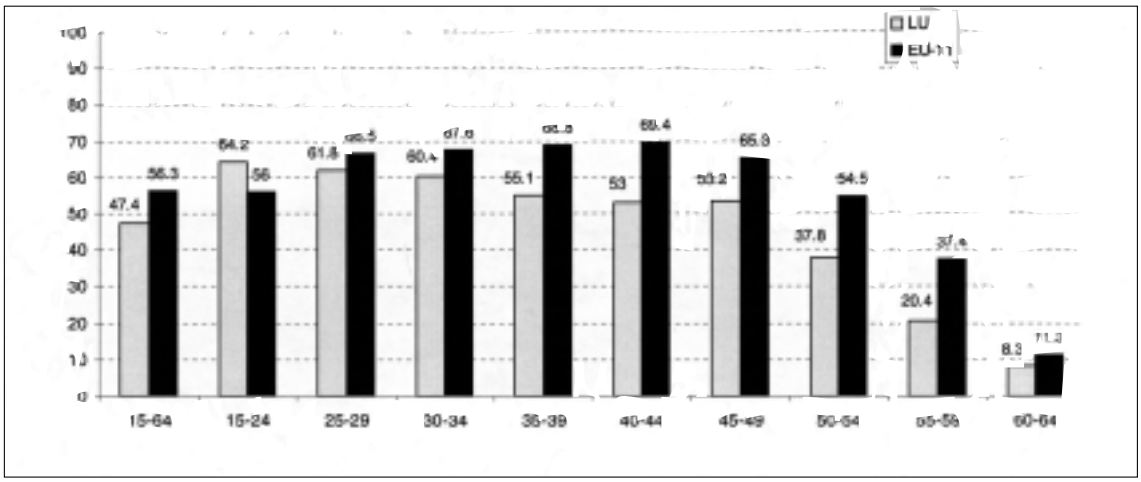


Sources: STATEC, EUROSTAT

The difference in women's participation rate between Luxembourg and the euro area average is largest for those women that are married.

In fact, the participation rate of married women in Luxembourg is drastically lower than the EU11 average. It is striking that among the youngest married women, the participation rate is very high in Luxembourg (more than 64%). One must note, however, that this part of the population is obviously quite small. The participation rate of married women in Luxembourg is generally decreasing continuously with age, while for the EU11 average, the participation rate reaches its peak for married women aged 40 to 44. The difference is most striking for those aged 55 to 59.

Figure 10: Participation rate of married female population as a function of age, 1999 data



Sources: STATEC, EUROSTAT

4.2. The size of the resident potential reserve

Of course, each society has its own specificities, which is why comparisons to the euro area cannot provide *the* one "appropriate" or "desirable" participation rate for Luxembourg. Nevertheless, the resident population's participation rate has often been criticised as unreasonably low. On the other hand, the relatively high participation rate of the euro area as a whole is still significantly below that of the US. An increase in the participation rate has been set as a goal of economic policy both in Europe and in Luxembourg [23].

The fact that a higher participation rate would allow for higher output is not in itself a sufficient reason to increase the participation rate. Individuals' decisions to join the labour market depend on their personal preferences and therefore cannot be considered irrational. The decision not to join the labour market may be rational with reference to social norms, a high standard of living and the existence of other sources of income etc. However, individuals' decisions depend on the existing framework and changes in this framework can reverse decisions without altering preferences of the individuals. Therefore policymakers need to identify the factors that influence decisions by individuals.

The OECD describes a number of factors explaining the low participation rate in Luxembourg especially among women and older persons [24]. Early retirement and disability schemes are seen as major reasons for low participation rates among older individuals. The OECD proposes tighter access to these schemes, with regular assessments of beneficiaries and measures to promote their

23. See, for instance, the presidency conclusions of the Lisbon European Council on 23 and 24 March 2000. See also the Joint Employment Report 2000 (Part II), presented by the Commission.

24. OECD (2001, pp. 34-35.)

integration in the labour market. Regarding the low participation rates among women, the OECD mentions high family incomes, generous child benefits and income tax deductions for children. One proposal is to relax high employment protection and restrictions on fixed-term contracts as well as to improve the legal framework for part-time work and promote flexibility in working hours.

An increase of the number of residents joining the labour market would of course expand labour supply. However, even assuming that the participation rate of Luxembourg residents could be raised to the average level of the euro area, the effect would be rather limited. A rise in the participation rate from the observed 63.1% to a hypothetical 67.1% would raise resident labour supply by approximately 11 000 to 12 000 individuals. Even neglecting problems of mismatch between the level of qualification available and the one demanded by employers, this figure is somewhat below the net creation of jobs observed for the year 2000 (some 13 500). In addition, as the process of (re-)entering the labour market would take time and it would be unrealistic to assume such large increases in participation rates, the effect on the labour supply would be limited. It is therefore unlikely that an eventual wage- and inflation-increasing tightness in the labour market could rapidly be offset by a national policy aimed at increasing participation rates among residents. In the presence of continuously increasing labour demand, output growth without inflationary pressures will require an increasing inflow of cross-border commuters [25]. However, if one simply adds up the supplementary labour supply represented by those parts of the population with *lower* participation rates than the euro area average (while keeping constant the participation rates of those groups where the Luxembourg rate is higher), the potential reserve is of course larger than 11 000 to 12 000 individuals. For instance, if for all age classes, the participation rate of married women was *at least* as high for Luxembourg as for the euro area average, labour supply would be higher by approximately 10 000 individuals. Single women would contribute another 3 000 individuals and men's additional contribution to the workforce would amount to approximately 6 000 individuals.

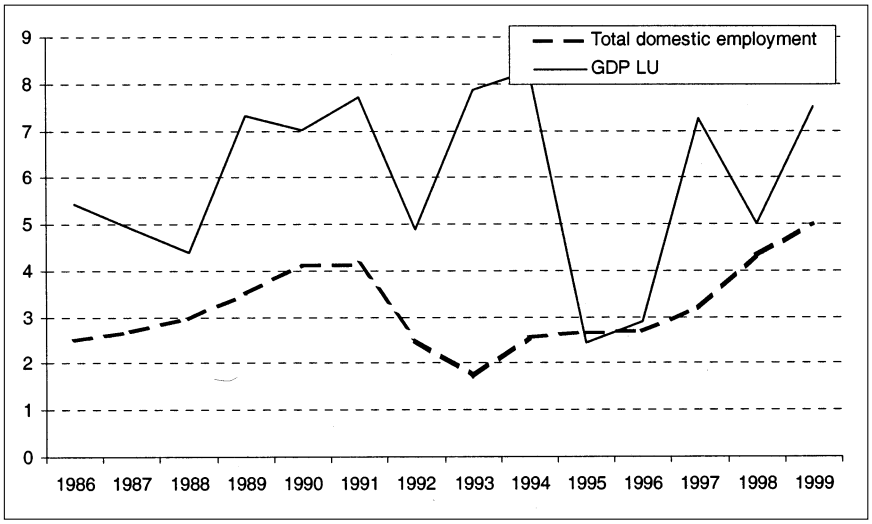
4.3. Sectoral evolution of employment

While the positive link between GDP growth and employment growth may seem obvious, the "real" link between these two variables is actually complicated by several additional factors. These include high volatility of GDP, difficulties measuring output as well as employment, the non-availability of quarterly national accounts data [26] and the existence of a time lag between the evolution of output and employment. In addition, differing evolutions of output and employment in different sectors of the economy seriously reduce the usefulness of aggregate measures of labour productivity.

25. The role of net immigration is has not been mentioned here yet, but it is also important.

26. The first quarterly national accounts data for Luxembourg were still not available when this paper was written.

Figure 11: Real GDP and total domestic employment (annual % change) in Luxembourg [27]



Sources: STATEC

At the level of aggregation shown in the following table [28], the only sector that has seen a net decrease in the number of employees between 1985 and 1998 is the sector including extractive industries and manufacturing (-10.6%). All other sectors have experienced strong growth in the number of employees. Employment in the construction sector has increased by almost 90% (slightly less than 12 000 employees). While employment in commerce, recycling and repairing has grown far less in relative terms (+42%), this represents almost 10 000 new jobs. The growth of employment in credit and insurance institutions amounts to 90% over the observed time horizon. However this underestimates the actual impact of this sector on total employment as other sectors benefit from spill-over effects from the financial (and from the industrial) sector, in particular "other market services" (+109.6%). The non-market services' sector (which to a large extent corresponds to the public sector) has also undergone a notable increase, only slightly below the rate of growth of the total number of employees.

27. GDP growth rates are based on ESA79 data from 1986 to 1995 and on ESA95 data from 1996 to 1999.

28. A detailed description of the evolution of employment and unemployment from 1994 to 1999 is found in STATEC (2000).

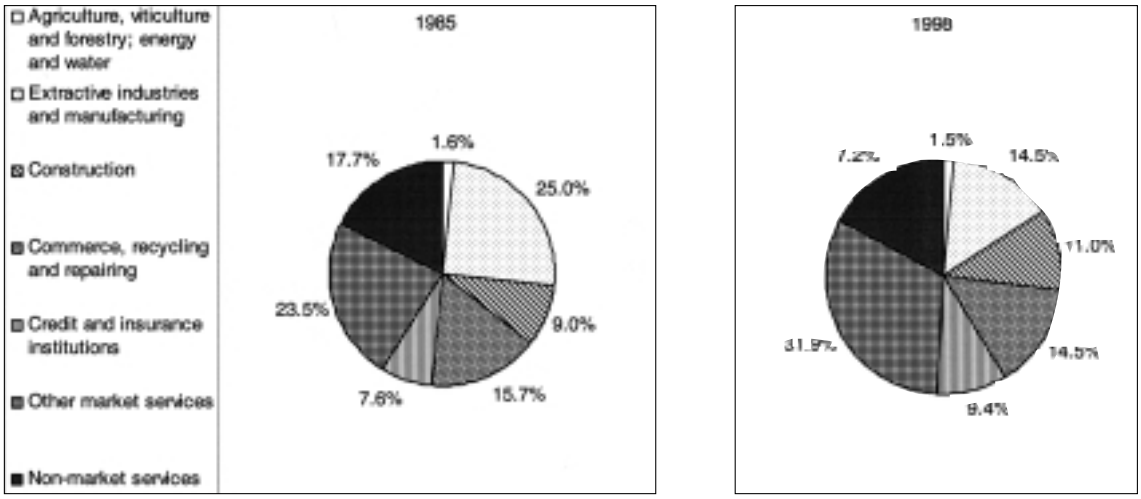
Employees according to sector of activity (rounded)

	1985	1990	1995	1996	1997	1998	% change (1985 to 1998)
Agriculture, viticulture and forestry; energy and water	2 300	2 700	2 600	2 600	3 200	3 200	39.1
Extractive industries and manufacturing	35 700	35 300	32 400	32 100	31 500	31 900	-10.6
Construction	12 800	18 200	22 700	23 100	23 200	24 200	89.1
Commerce, recycling and repairing	22 400	26 000	29 100	30 000	30 600	31 800	42.0
Credit and insurance institutions	10 800	16 600	19 500	19 800	20 000	20 700	91.7
Other market services	33 500	44 200	58 300	61 500	65 200	70 200	109.6
Non-market Services	25 200	28 000	32 900	34 200	36 300	37 800	50.0
Total employees	**142 700**	**171 000**	**197 500**	**203 300**	**210 000**	**219 800**	**54.0**

Sources: IGSS (Inspection Générale de la Sécurité Sociale)

The shares of different sectors in total employment have changed significantly since 1985 reflecting the structural changes that the economy has gone through. The extractive industries and manufacturing, which were the largest of the sub-components in 1985 (virtually a quarter of all employees) have seen a relative decline. This reduction is to a large extent due to the net absolute loss in employment in the ore and metal sub-sector during that time. The number of people employed in this sector fell drastically from 15 000 in 1985 to some 6 900 in 1998. Subtracting the steel industry from "extractive industries and manufacturing" shows that the remainder of the sector has been a net creator of jobs. While the construction sector's share in employment has gained 2 percentage points, commerce, recycling and repairing have somewhat lagged behind average employment growth. Credit and insurance has increased its share by slightly less than 2 percentage points. The main beneficiary of the structural changes in the economy have been "other market services," whose share has increased from less than a quarter to almost a third of the total number of employees. Non-market services have experienced almost the same rate of employment growth as the economy as a whole.

Figure 12: Employees in the different sectors in % of the total number of employees



Sources: IGSS

4.4. Underlying factors

The performance of the labour market is also influenced by factors not directly linked to the labour markets' institutions or the structure of the workforce. Among these factors are the stability of the political system, the adaptability of the economy and of economic policy, the level of taxation [29], and the evolution of international demand.

Other factors that are directly linked to the labour market are the wage bargaining process and the so-called salary wedge.

4.4.1. The wage bargaining process

- Features of the Luxembourg wage bargaining process

Wages in Luxembourg are determined by one of three following possible processes [30].

29. Lower firm taxation leads, all other things being equal, to a higher rate of return of capital. The resulting higher investment favours labour productivity and wage growth. In a context of internationally mobile labour, this leads to improved employment growth.
30. Independently from the way a wage has been agreed on, the law prescribes that all wages and salaries are indexed to consumer price inflation. All wages and salaries are automatically increased by 2.5% whenever the consumer price index rises by the same amount since the indexation adjustment.

1) application of the minimum wage (*Salaire social minimum*). This legally binding minimum is set at different levels for skilled and unskilled workers, and is also a function of the age of the employee. No employer may pay less than the minimum wage.

2) collective agreements (*conventions collectives*) reached by negotiations between representatives of employers and of employees either on the level of the individual firm, or of the (sub)sector or profession.

3) individual bargains between employers and employees.

The minimum wage is applied to about 16.2% of all employees (in 2000) although this proportion has grown steadily since 1996. Increases in the level of the minimum wage - independent of those due to price indexation - are decided by the Government on the basis of bi-annual reports on the evolution of the socio-economic environment prepared by a group of experts.

Collective agreements can be concluded for a period varying from 6 months to 3 years. In practice, only few agreements are valid for less than a year, most are concluded for a 2-year period. Shortly before the expiration of the period, negotiations are renewed. In principle, employer and employee representatives settle wage agreements independently. Government authorities do not usually intervene in the initial wage bargaining process. The social partners have the obligation to consult the "National office of conciliation" only when no agreement can be reached. The social partners can proceed to strikes or lockouts only if there is still no agreement after the prescribed conciliation procedure. Sector-based collective agreements exist for the banking sector, the insurance sector, the transport sector (separate agreements for bus drivers, taxi drivers and professional goods transport), the construction sector (according to different professions), the hospital sector, and others. The industrial sector represents several other collective conventions.

There is no law yet that exactly determines what proportion of employers and employees in a sector need to be represented at the negotiation process for the outcome to be binding for the whole sector. In principle, only firms that agreed to the outcome or were represented are obliged to pay the agreed wage level. However, a collective agreement can become legally binding following a specific procedure. First, the consent of the office of conciliation is required following a request from both of the bargaining partners. Secondly, the Chamber concerned (Chamber of Commerce, Guild Chamber, etc.) must be consulted. The Government Council then decides on the basis of this opinion, and if it agrees, the Grand Duke signs a decree fixing the "*general obligation*" of the agreement. In this case, the agreement becomes legally binding for all employees in the sector or profession concerned. All employees have a right to the agreed wage, whether or not their employer is member of one of the associations that signed the agreement. The government is currently considering new rules setting the conditions necessary to obtain the "*représentativité nationale*" as well as the role

of this status. In fact, a trade union must be considered "nationally representative" to bargain for wage agreements that were to get the "*general obligation*". Of course, individuals are free to bargain individually with employers (conditions offered must then at least be as good as the minimum wage or any collective agreement the employer must apply).

Estimations of the extent of coverage of collective bargaining differ. According to the LCGB [31], one of the major unions, about 100 000 people are directly covered by collective bargaining. This leads to a coverage of approximately 43%. However, these figures do not include employees whose contract is assimilated to contracts that are collectively bargained. It is likely that inclusion of these additional contracts would lead to a significantly higher number. According to OGBL [32], another of the major unions, between 60 and 62% of workers in the private sector have wages set by collective bargaining. Still according to OGBL, collective bargaining determines the wages of 35 to 40% of employees in the private sector. Assuming that all public sector employees have wages determined by collective bargaining, total coverage of collective bargaining is approximately 55%. Again, this figure does not include contracts assimilated to existing conventions collectives. Including these contracts could lead to a coverage of collective bargaining around 80%.

The total number of union members amounts to a figure between 115 000 and 120 000 (LCGB estimate). This puts union density at approximately 50%. The OECD found roughly the same figure for the year 1988 [33]. Coverage of collective bargaining below union density is not necessarily a contradiction as there are union members working in firms where the majority of employees are not members of a union or do not wish to have the union bargain for them.

• Wage bargaining and labour market performance

Labour market performance (measured for instance by the level of employment) is generally considered a function of the degree of centralisation in the wage bargaining process (see Calmfors and Driffill, 1988). However, the relationship between the degree of (de)centralisation and labour market performance is not linear. Instead, a curved relationship between the two variables is often postulated.

The rationale behind this relationship is the following. A very decentralised system of wage bargaining prevents trade unions from accumulating sufficient bargaining power to claim unjustified wage increases that would increase both unemployment and inflation. In this case, the insider-outsider problem is limited.

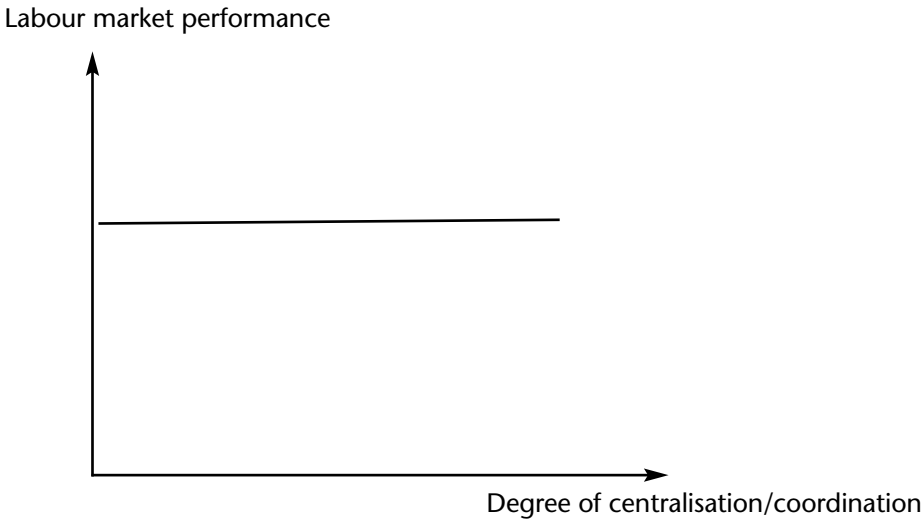
31. Lëtzebuerger Chrëschtleche Gewerkschafts-Bond.

32. Onofhängege Gewerkschaftsbond Lëtzebuerg.

33. OECD (1991, p. 104)

The absence of market power should allow the price mechanism to work properly, leading to an appropriate real wage level and a high level of employment. On the other hand, if the wage bargaining process is very centralised (let's say that only one or two large trade unions negotiate), inappropriately high real wages lead to a reduction of employment which could even have a negative effect on union members. Any inflationary pressure that employers pass on to product prices will be felt by union members as consumers. Consequently, trade unions can be expected to consider the macro-economic consequences of their actions.

Figure 13: Stylised relationship between labour market performance and the degree of centralisation or co-ordination of wage bargaining



The situation between these two extremes is considered less favourable. A relatively limited number of trade unions acting non co-operatively might have sufficient bargaining power to inappropriately raise the real wage for specific sectors or professions. The resulting inflationary pressure - as firms pass higher wage costs through to prices - will be borne by consumers. In this case, unlike the situation in which only one or two trade unions participate in the wage bargaining process, trade unions will be tempted to behave as free-riders, letting their members benefit from high real wages and letting the "rest of the economy" bear the cost in form of higher inflation and lower output and employment. The insider-outsider mechanism is also reinforced, as union members can afford to ignore the interests of the jobless during the bargaining process. In fact, they are virtually forced to ignore the jobless: Any trade union that practises a policy of wage moderation to favour employment in its specific sector reduces the economic pressure on other trade unions to follow suit. Decreasing unemployment figures allow for higher wage claims. So a trade union that behaves moderately in order to contribute to a decrease in unemployment will see its results offset by the utility-maximising behaviour of other trade unions. Its own members will be the only ones to pay the price for the increase in employment in their own sector through weaker growth of their real wages. This

situation is the classic “prisoners' dilemma”: if all other trade unions behave moderately, any trade union has an incentive to behave “immoderately” and if all other trade unions behave “immoderately” any individual trade union has no incentive to behave moderately. This is a classic example of co-ordination failure in which rational behaviour by individual agents leads to collectively sub-optimal results.

The degree of centralisation, or rather co-ordination of collective wage bargaining in Luxembourg is difficult to assess but can probably be regarded as higher than the number of existing unions might suggest. In fact, even those conventions collectives that were not bargained for by either LCGB or OGBL are often co-signed by one of the two. In addition, although negotiations are decentralised at the level of different sectors, professions or even firms, co-ordination may take place within and, to a certain extent, between the two major trade unions. In practice, the signature of one of the two largest unions is generally required if the outcome of the collective bargaining is to get the “general obligation”, making it legally binding for a whole sector (employers in the sector must then offer conditions at least as favourable as in the *convention collective*, even if the firm was not represented in the bargaining process).

While co-ordination can prevent free-riding of subsections of one of the large unions, decentralised negotiations make it possible to consider the situation of individual firms. In addition, the openness of the labour market relative to the neighbouring regions across national borders tends to reduce the bargaining power of unions. Although any existing collective agreement in a specific firm or sector is applicable not only to union members but also to those colleagues that are not member of a union, a higher percentage of union members within a firm or sector increases of course the bargaining power of the union(s). The latter therefore have an interest in recruiting cross-border commuters to prevent what they would call "social dumping" by non-residents [34].

In view of the overall performance of the labour market since the mid-1980s', national wage bargaining arrangements would seem appropriate. As mentioned above, much of the employment growth is due to non-residents. One important feature of the national economy is the high degree of “social peace”, which seems clearly linked to the collective wage bargaining process that only allows for strikes after a prescribed conciliation procedure has failed. In addition, the automatic indexation of wages to consumer prices prevents (possibly diverging) inflation expectations to be a major concern during the wage bargaining process.

34. The term "social dumping" is used often and arbitrarily although no exact definition has ever been agreed. In a market economy, there is no reason why someone who offers a service or a good for less money should be accused of "dumping". On the contrary, this behaviour is the basis of competition and efficient resource allocation in market economies. As long as the wage in question covers the worker's opportunity costs (measured either by alternative sources of income or by the value attached to leisure) the behaviour is legitimate from an economic point of view. In practice, accusations of social dumping may be considered attempts to keep competitors out of the market and to demand a price for labour that is higher than the equilibrium wage - to the detriment of employment and growth.

• The beginning of the end of the *modération salariale*?

Nevertheless, recent developments may give cause for concern. The high rates of inflation (compared to the euro area average), caused in part by a rise in import prices, have led to two automatic 2.5% increases in the wage level, within only 12 months, with a third automatic increase expected for the beginning of the second quarter of 2001. As seen above, in small open economies a deterioration of the terms of trade can hinder labour market performance and/or lead to higher inflation. In theory, automatic wage increases through indexation can be offset by very moderate behaviour of social partners during the bargaining for real wage increases. However, recently trade unions have publicly rejected the principle of the so-called *modération salariale*, raising doubts about whether this principle will still be respected in the future.

In the public sector, the rates at which wages increase in the long run are pegged to the overall evolution of the economy (in terms of growth, productivity etc.). However, the fact that it was the public sector whose wage agreement gave rise to the discussion about the end of the *modération salariale*, might not be a coincidence but be linked to the following factors:

1) The trade union for the "*fonction publique*" is a sectoral union and, not being one of the two major trade unions that are represented throughout the economy, has no immediate need for co-operation with them or for co-operation internally across a large number of sub-sections. High wage increases negotiated for the public sector would benefit employees in this sector only, while any possible negative consequences would be borne by the economy as a whole.

2) Civil servants benefit from job-security. Even if agreed wage increases were high, they cannot lose their jobs as a consequence. This is not the case in the private sector, where firms maximise profits. In the long run, if the public sector reacts to high wage costs by hiring less, the consequences are borne by non-members of the union or, to be more precise, by people not (yet) employed in the public sector (i.e. by outsiders only). There is the possibility of a conflict between insiders and outsiders.

3) The public sector is sheltered in the sense that non-nationals have still only limited access. Compared to the private sector, this carries the risk of a distortion of the resource allocation mechanism, reducing the labour supply significantly and increasing the bargaining power of insiders.

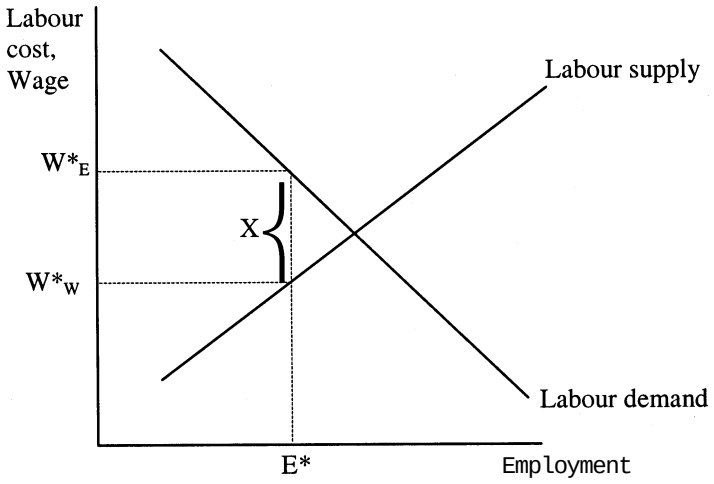
If the public sector wage bargaining process were not embedded into an overall assessment of the economic situation of the country, these three aspects could favour free-riding behaviour of insiders, underlining that a high degree of centralisation - or at least co-operation - in the wage bargaining process can lead to superior results from a national point of view. The reaction of the other trade unions to the last wage increase in the public sector shows that if one of

the participants in the wage bargaining process behaves non-co-operatively - or at least is perceived to be doing so -, others might be tempted to imitate this behaviour. This carries the risk of higher wage costs, increased inflationary pressure and reduced employment growth, especially in conjunction with high automatic wage increases caused by imported inflation.

4.4.2. Non-wage labour costs

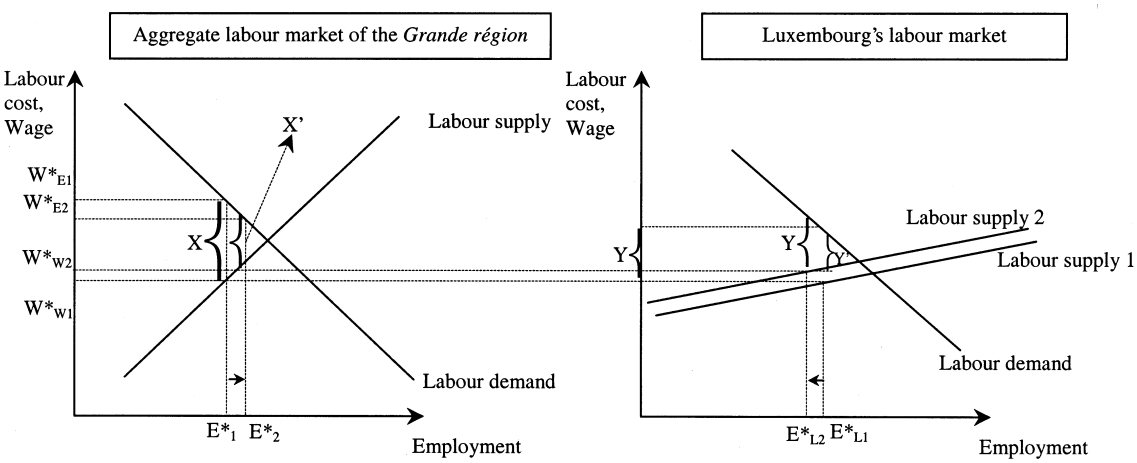
Non-wage labour costs are the difference between the amount that employers pay for labour services and the amount that employees receive as net wages. Non-wage labour costs include social contributions paid by employers and employees and income taxes. These costs influence the decisions of individuals to join the labour force. In addition, these costs influence the level of investment. Higher non-wage labour costs reduce both labour supply and labour demand. This basic relationship is shown in figure 14. For given labour demand and labour supply functions, a given level of non-wage labour costs leads to equilibrium employment at E*. The amount of non-wage labour cost X corresponds to the difference between the worker's net wage W^*_W and the labour cost for the employer W^*_E. A decrease in non-wage labour costs will lead to lower labour cost for the employer, higher net wages for the employed and to higher employment.

Figure 14: Labour market equilibrium with non-wage labour costs



The influence of non-wage labour costs is even greater in Luxembourg than in other countries, because labour is internationally highly mobile. Residents in Luxembourg and the surrounding regions can choose not only whether they want to work but also what country to work in. Abstracting from personal preferences and costs of information and transport, the decisive factor is the net wage. Lower non-wage labour costs in one of the regions favour higher employment in this part of the "*Grande région transfrontalière*". Changes in the non-labour wage costs in one of the regions lead to adjustment processes and to a new equilibrium (see figure 15).

Figure 15: Non-wage labour costs in a 2-country model with international mobility of labour



Suppose that the labour markets are in equilibrium both in the *Grande région* (excluding Luxembourg) and in Luxembourg itself. Equilibrium employment is marked by E*, although this represents different levels in Luxembourg and the *Grande région*. Non-wage labour costs are X in the *Grande région* (X being a weighted average of non-wage labour costs in Belgium, France and Germany) and Y in Luxembourg. Another requirement for an equilibrium situation is, if we exclude transport costs, the equality of net wages on both labour markets [35]. If the non-wage labour costs in the *Grande région* decrease (from X to X'), then employment in the *Grande région* will rise and so will the equilibrium net wage. If non-wage labour costs do not change in Luxembourg, then equilibrium employment decreases in Luxembourg (from E^*_{L1} to E^*_{L2}) as the net wage must increase to match the net wage in the Grande région. Since net income from work in the *Grande région* increases, the opportunity cost of non-residents' decision to work in Luxembourg has also increased [36]. In addition, rising labour costs will exert inflationary pressure.

If Luxembourg wants to preserve its level of employment and output [37], it can respond by reducing non-wage labour costs to Y'. As long as the supply curve on the Luxembourg labour market is not horizontal, a reduction of non-wage labour costs (to Y') will not only return employment to its initial equilibrium level, but also lead to a higher net wage than at E^*_{L2} with a level of non-wage labour cost Y.

35. In reality, net wages differ between Luxembourg and the surrounding regions. The increase in cross-border commuters suggests that the two labour markets are adjusting to a changing equilibrium

36. While this model deals with levels of employment, the effect is on relative changes in employment: In a situation of growth, a tax cut in one of the neighbouring countries may not reduce the number of cross-border commuters, but will reduce its rate of growth.

37. Or, again in relative terms: its growth pace of employment and of output.

The income tax cut recently implemented in Luxembourg will lead to an increase of households' disposable income. Unless the government reduces its own spending, this will increase nominal aggregate demand and may lead to higher inflation. Nevertheless, the model suggests that any additional inflationary pressure might be partially offset by the impact on labour supply of the reduction of non-wage labour costs.

In general, the model suggests that the non-wage labour costs play a role in the allocation of labour in a context of international mobility. The so-called salary wedge - the difference between what an employer pays for an employee and what an employee receives - is systematically lower in Luxembourg than in the three neighbouring countries [38]. This partly explains how the strong growth in labour demand in Luxembourg has been met by non-residents who find it profitable to join the Luxembourg labour market. A narrower gap between the national salary wedge and those in neighbouring countries would probably have led to less employment growth and higher wage costs for resident firms.

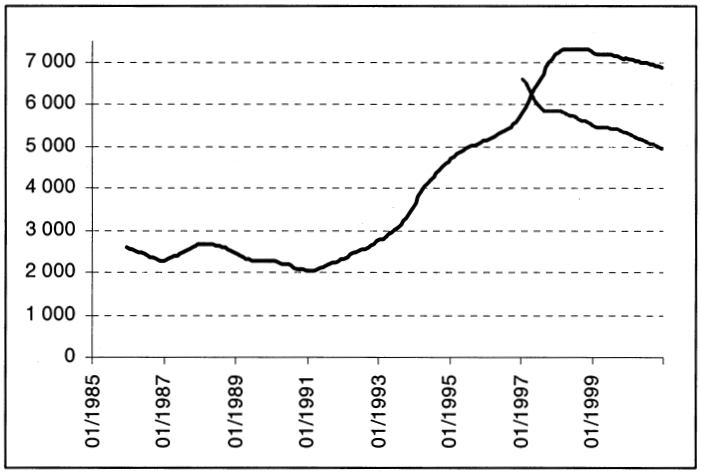
38. See Guarda (1999, pp. 43-45)

V

Evolution and structure of unemployment

Although the level of resident unemployment is lower in Luxembourg than in most other countries, unemployment figures have strongly increased after 1991. The present phenomenon of decreasing unemployment is only observed since 1997.

Figure 16: Number of unemployed people, old (since 1985) and new definition (since 1997) [39], 12-month moving average



Sources: STATEC

As unemployment is a very complex phenomenon, it is difficult to measure. Diverging concepts exist [40]. In general, unemployment is subdivided into several components according to the different causes of unemployment.

5.1. What kind of unemployment in Luxembourg?

Generally, unemployment is divided into the following main categories:

- Seasonal unemployment

Seasonal unemployment results from the fact that the supply or the demand of some sectors of the economy varies systematically across the year. Sectors typically concerned are construction, tourism, and agriculture.

39. Since 1998 official statistics on registered unemployment exclude those who benefit from a special measure for employment. The "old" series is often referred to as unemployment in the "broad" sense.

40. This chapter will stick to the figures provided by the ADEM, which comprise both "narrow" and "broad" unemployment. While the unemployment rate established by EUROSTAT according to ILO methodology provides, in principle, better international comparability, it is not used here, as the figures for Luxembourg seems unreliable. In addition, more detailed information is available for individuals registered as unemployed at the ADEM.

• Cyclical unemployment

Cyclical unemployment is associated with a low degree of capacity utilisation in the economy. This form of unemployment increases in times of economic downturn and decreases during periods of economic growth, disappearing in theory at the peak of a boom.

• Structural unemployment

Structural unemployment has already been dealt with in the part of this paper about labour markets, monetary policy and the Phillips curve. Structural unemployment is the part of unemployment that cannot be lowered simply via an increase of nominal aggregate demand. The level of structural unemployment is determined by a number of factors. Among other things, it depends on the level of mismatch between labour demand and labour supply. This mismatch results from differences in the kind and in the level of qualification, but it can also be of a geographic nature. Mismatch can increase following a change in the production structure of an economy that makes obsolete previously useful skills of workers, for example a shift in demand from relatively low skilled employees to employees with much higher skills. But structural unemployment also depends on rigidities in the labour market. These can be legal provisions (minimum wages, job protection etc.) as well as characteristics of the wage bargaining process and the degree of trade union power. A moderate degree of centralisation in wage bargaining can create a serious insider-outsider problem resulting in higher structural unemployment.

• Frictional unemployment

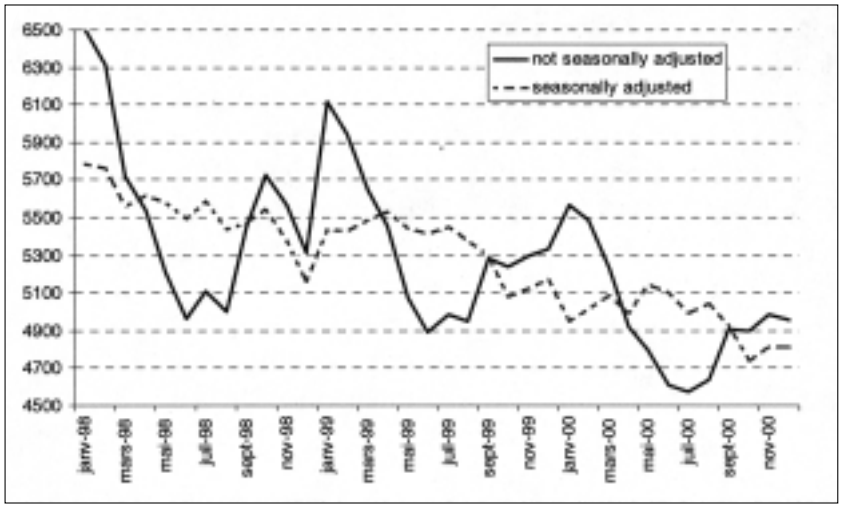
Frictional unemployment is the unavoidable temporary unemployment associated with the re-allocation of labour across sectors of production. It can be measured by the time it takes for workers to quit one job - voluntarily or not - and to join another one. This kind of unemployment is compatible with full employment. In principle, it is not a problem, as it simply reflects the fact that the economy is a dynamic process in which production factors are constantly re-allocated to varying uses. Nevertheless, the level and duration of frictional employment can be affected by the efficiency of public employment agencies who match the unemployed with job vacancies.

In practice, a clear breakdown of the unemployment figures into these four categories is not an easy task. First, structural unemployment can vary over time. For instance, hysteresis effects can transform cyclical unemployment into structural unemployment if the unemployed lose their skills or they become obsolescent. In addition, the concept of frictional unemployment is not clearly separable from cyclical unemployment as the average time it takes to move from one job to another is certainly shorter in times of increasing capacity utilisation than in times of economic slowdown.

Nevertheless, it is important to attempt to categorise unemployment, as the differing kinds of unemployment require different policy measures. From the point of view of monetary policy, these distinctions are important to appropriately assess the information that labour markets provide for the conduct of monetary policy requires good knowledge of these markets.

As in other countries, there is a strong seasonal pattern in the Luxembourg unemployment series. STATEC provides indices for seasonal adjustment that help to isolate the underlying trend. Over the year, the highest unemployment figures (January) are up to 25% above the lowest ones (June).

Figure 17: Observed and seasonally adjusted unemployment figures



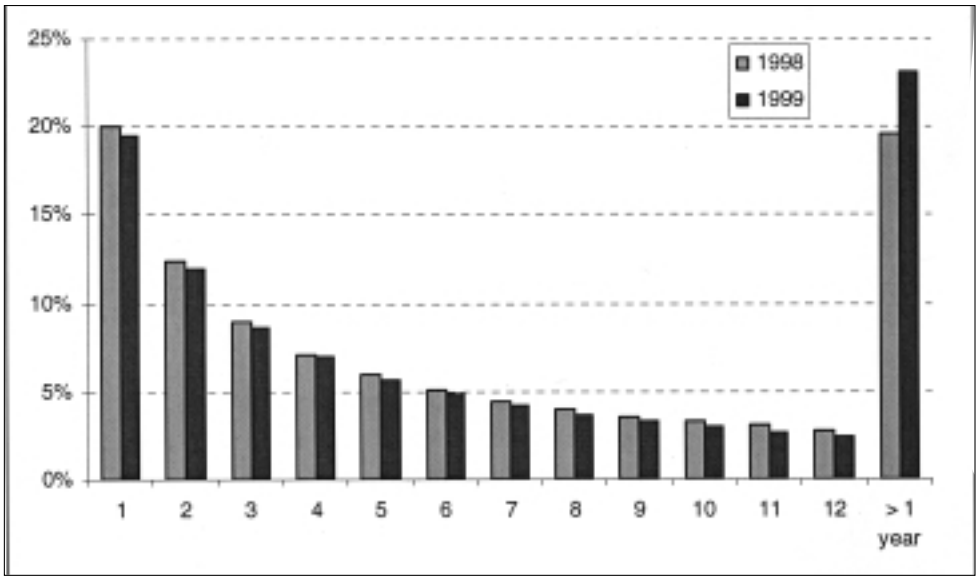
Sources: STATEC

The cyclical part of resident unemployment can be considered virtually nil or at least very low. As the number of jobs created each year in Luxembourg is systematically higher than the total number of unemployed people, it would be unreasonable to consider insufficient capacity utilisation and low economic activity as sources of unemployment. One could only argue that the distinction between frictional and cyclical unemployment is not entirely clear and that if growth was even higher, quitting one job and finding a new one would take even less time, so that cyclical unemployment is not really zero.

In fact, the largest part of the registered unemployment could be regarded as frictional. Both the level and duration of unemployment in Luxembourg are relatively low. In most other countries long-term unemployment represents a much larger part of the unemployed population [41].

41. On EU15 average, 46% of the unemployed are were unemployed for 12 months or even longer in 1999. The values for Belgium, Germany and France were 60.5%, 51.7% and 38.6% respectively.

Figure 18: Unemployed population by duration of unemployment (in months)



Sources: ADEM (Administration de l'emploi)

In 1999, the share of long-term unemployed among total unemployment was lower than 24% on average, although it grew somewhat between 1998 and 1999, suggesting an increase in structural unemployment [42]. Structural unemployment is sometimes identified with long-term unemployment (over 12 months). But some individuals frequently re-enter unemployment, although they are never unemployed for 12 consecutive months.

Frequent re-entry into unemployment is in part due to short-term contracts. However, low levels of qualifications or other personal shortcomings may play an important role in this context, so these individuals could be considered part of structural unemployment. Unfortunately, publically available statistics do not allow an adequate assessment of the number of these cases. Estimates suggest that among the unemployed, 30% are either unemployed for a period longer than a year or only get temporary jobs. The other 70% of the unemployed are only temporarily unemployed and leave this status quite quickly and permanently, so structural unemployment can be estimated at 30% of total unemployment, with the remaining 70% falling under the category of frictional unemployment, seasonal unemployment being zero on average over the entire year.

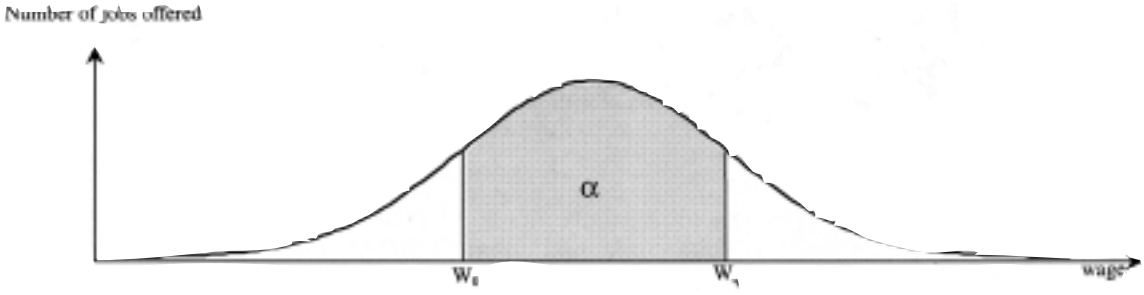
42. Since the beginning of 2000, these figures are no longer published in the same detail, but they still indicate that long-term unemployment has increased further, reaching 25.3% on average in 2000.

5.2. Resident unemployment and job search theory

Job search theory (see Phelps, 1970) starts with the assumption that an individual looking for a job is confronted with one job offer at a time and decides each time whether to accept the offer [43]. The more jobs the person rejects, the longer the search will last. It is also assumed that job offers are distributed normally over the level wages. Every unemployed person has a "reservation wage" (w_0), which is the wage at which this person is indifferent between accepting the offer or continuing the search for a job that provides a higher wage. There is another critical wage level, w_q, which is the maximum wage that the individual can hope for given his or her qualifications.

So any job that the individual might accept is associated with a wage that lies between w_0 and w_q. The optimal job search strategy is to continue searching as long as the expected and discounted additional future income from continuing the search is higher than the cost of continuing the search.

Figure 19: The probability to find a job as a function of the reservation wage, the qualification and the number of vacant jobs



The area Æ corresponds to the probability that job searching yields an acceptable job offer. The probability increases with qualification (higher qualifications shift w_q to the right) and diminishes with higher reservation wages (shifting w_0 to the right). If the total number of jobs offered is normalised to 1, then 1/Æ stands for the expected duration of the job search. This expected duration grows if Æ becomes smaller, that is if the minimum requirement grows or if qualification diminishes.

43. In fact, the theory starts from the assumption that the individual is voluntarily unemployed on the basis of free will in order to be able to better concentrate on the job search. While the assumption that unemployment is generally voluntary is not realistic, this assumption can be easily dismissed without changing anything that is of importance to the further reasoning.

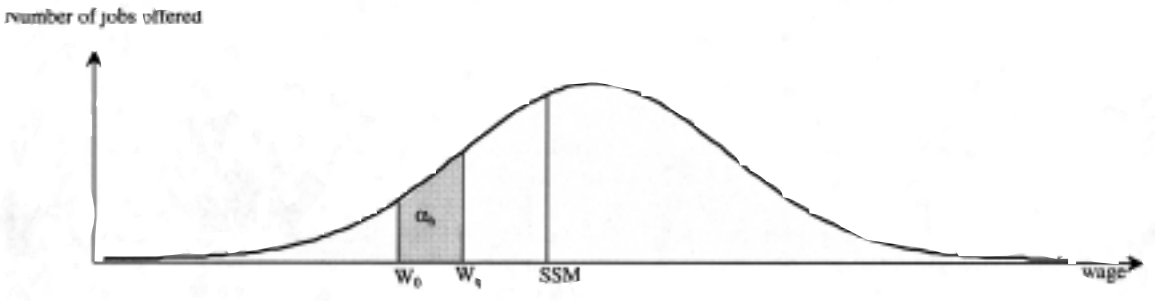
The relevance of this theory for policy results from the fact that the framework policy sets has an influence on the reservation wage and, consequently, on the level and the duration of unemployment. For instance, the level and the duration of the indemnity paid to those unemployed plays an important role in determining the search costs. The higher the indemnity and the longer it is paid, the higher will be the opportunity costs of accepting a job and the higher will consequently be the reservation wage and the duration of unemployment. For the jobless who do not receive unemployment benefits, the revenu minimum garanti (RMG) or any other non-work income might play a similar role.

The search theory also allows illustrating potential consequences of the legally determined minimum wage.

On the occasion of the latest increase of the salaire social minimum, the Government expresses its view [44] that the minimum wage represents a "psychological minimum which takes into account the general evolution of wages as well the evolution of the average of the contracted wages", rather than an instrument in the fight against poverty. It aims at a "sufficiently equilibrated participation of the earners of low wages in the general expansion of the economy".

However, the minimum wage might have some unintended consequences. Firstly, in the case of people with very low qualification, the relevant reservation wage is set, without the unemployed having an influence on it, to a level that might be higher than the wage w_q that corresponds to their qualification and higher than the reservation wage w_0 that the individual would have set. The consequence will be their permanent exclusion from the labour market, which is the classic argument against minimum wages. The Æ that results from personal preferences and from the person's qualification then becomes a purely hypothetical probability. The real probability of the person to find a job is actually zero.

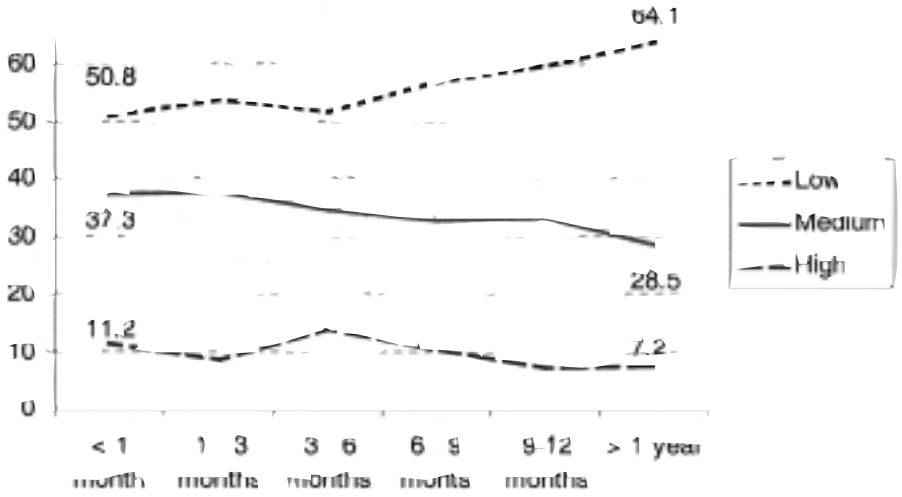
Figure 20: Perpetuation of unemployment as a consequence of a minimum wage



44. See Ministère du Travail et de l'Emploi (2000, p.4).

Low qualification can in fact be regarded as the major reason for long term unemployment in Luxembourg [45]. More than 55% of the unemployed have what the ADEM classifies "low qualification", almost 35% have "medium qualification" and only around 10% the unemployed have a "higher" level of qualification. The relative weight of those people with low qualification clearly increases with the duration of unemployment [46].

Figure 21: The unemployed population (total = 100) as a function of initial qualification and duration of unemployment, 1999 data

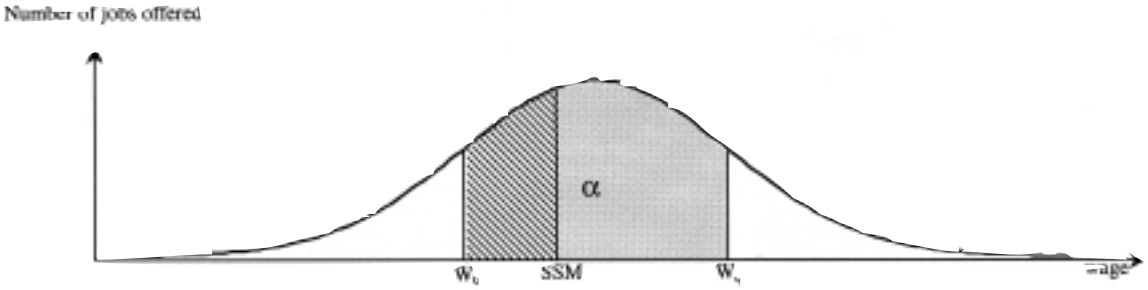


Sources: ADEM

Secondly, even if the minimum wage is lower than w_q, it can have significant influence on the duration of unemployment and, consequently, also on its level: In those cases where the reservation wage is lower than the *salaire social minimum*, the fact that the unemployed person cannot be offered a job the wage of which lies between w_0 and the SSM, reduces the number of jobs offered to this person. So although the person is not permanently excluded from the labour market, the minimum wage, as long as it is higher than the reservation wage, increases the duration of unemployment (marked by the striped area in figure 22. The minimum wage forces the unemployed person to bear search costs he might have chosen to avoid had the minimum wage been lower or non-existent.

45. A detailed analysis of the characteristics of the long-term unemployed is found in ADEM/CEPS Instead 1997.
46. See ADEM (1999).

Figure 22: Increase of unemployment duration caused by a minimum wage



The search theory seems well suited for an analysis of resident unemployment. Unlike other theories of unemployment, it treats the phenomenon as a flow, not as a stock. As in Luxembourg, more than in other countries, unemployment is characterised by relatively short duration, this characteristic of the theory should allow to describe reality in quite an appropriate way. As entries and exits from the status of unemployment are very frequent, an increase in the duration of unemployment (that is, a stronger relative growth of entries compared to exits) will quickly have significant impact on the level of unemployment. This is much less the case in economies where the unemployed population is characterised by a much lower degree of rotation.

The model further allows assessing the evolution of unemployment from a microeconomic point of view. It seems reasonable to try to analyse the phenomenon from the point of view of the unemployed person, not from a macro-economic perspective, the latter one leaving the analyst with the apparent paradox that dynamic employment growth has obviously relatively little impact on the level of resident unemployment. Instead, the level (and duration of payment) of non-wage income such as the guaranteed minimum income RMG or unemployment benefits are often described as having an influence on residents' unemployment figures. The higher this income is, the lower is the cost of the job search and the more time an individual is likely to wait before accepting a job. Analogously, although it concentrates on the wage level, the model allows taking into account the individual's level of qualification, which is captured by w_q.

So the model can capture both structural and frictional unemployment. A cyclical downturn, should it become relevant for the level of registered resident unemployment, can also be captured, namely by a flattening of the normally distributed function (corresponding in a decrease of the total number of jobs offered).

Additionally, while this chapter has so far concentrated on the "narrow" definition of unemployment, the model also allows to deal with the special measures for employment, the number of which is the difference between "narrow" and "broad" employment. Some of these measures consist in putting initially unemployed people to work in the private sector while at the same time subsidising the job through public transfers to the employer [47].

This subsidy clearly increases the probability of the individual to find a job (that is, a increases). Although not intended that way, it can be argued that from the point of view of the unemployed person with low qualification, the minimum wage, in combination with the subsidy, acts as a protectionist instrument that creates a sheltered sector for residents with low qualification and productivity.

In fact, as employers are not willing to hire some people without financial subsidies paid by the public administration, the productivity of these people is obviously lower than the legal minimum wage. While the legal minimum wage, in principle, applies to all potential employees (residents and non-residents), only residents, however, can benefit from one of the special measures for employment. So any non-resident whose productivity is lower than the minimum wage and who is willing to work for a wage lower than the legal minimum finds himself excluded permanently from the Luxembourg labour market, while his resident counterpart still has a chance to "price himself back" into the labour market with the financial and organisational support of the public administration.

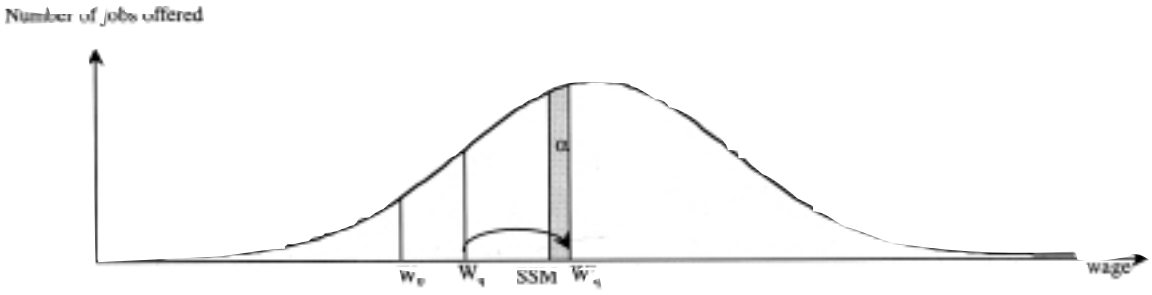
The subsidy corresponds, from the unemployed person's point of view, to a shift to the right of the qualification wage as high as the level of the subsidy. If the sum of the initial qualification wage wq and the subsidy is higher than the revenue that the individual is supposed to earn - let's say the minimum wage -, the probability of finding an occupation (Æ) becomes larger than zero (see figure 23).

The relevance of the question whether the SSM in its present form acts partly as a protectionist instrument is underlined by the observation that the proportion of cross-border commuters is higher among those people earning the minimum wage than it is among the totality of employees. In fact, the proportion of non-residents earning the minimum wage is significantly higher (16.5%) than the corresponding proportion of residents (13.6%). This is a hint that residents are exposed to higher competition by non-residents in the range of rather low wages than they are on average. This competition can be expected to be stronger in the hypothetical case of the non-existence of a legal minimum wage. At the same time, while the structural part of resident unemployment is low, it can be expected that labour supply at the lower limit of the wage scale would be increased as further non-residents could price themselves in to the Luxembourg labour market. Compared to the status of unemployment or to a

47. For a detailed description of the mesures spéciales pour l'emploi, please refer to ADEM (1999).

lower wage earned in a former job, even an income lower than the Luxembourg SSM can be a sufficient incentive for a non-resident to join the Luxembourg labour market.

Figure 23: The effect of wage subsidy in the framework of measures for employment



VI

Summary

The purpose of this paper was to analyse the national labour market and to especially take into account aspects of interest to a central bank. After explaining why it is nowadays widely agreed among central bankers that there is no long-term trade off between price stability and employment, the importance of labour market analysis for the conduct of monetary policy has been discussed. Following this, it has been discussed how membership in a monetary union modifies the traditional Phillips curve relationship for the participating countries, especially if their economy is small and very open. The increased responsibility for price stability and employment that economic policy in general and social partners in particular have to bear, has been derived. It has been shown that the increased responsibility results from the impossibility to adjust exchange rates and the virtual impossibility of very small countries to influence the evolution of the terms of trade.

It has further been tried to give a rough estimate of the potential resident reserve that might somewhat relax the labour market tightness. It has been shown that although Luxembourg is sometimes blamed for the low participation rate of its resident population, even a policy that would lead a significant part of these people to join the labour market is likely to have only a very limited impact on labour market tightness. Consequently, it will remain crucial for the domestic labour market to remain attractive for non-residents and immigrants.

Two factors that have in the past contributed to the favourable labour market performance have been analysed: the wage bargaining process and the level of non-wage labour costs in Luxembourg relative to the neighbouring countries. It has been found that a high degree of co-ordination that characterises the national wage bargaining process offers the potential to serve in the future as well as it did in the past. A high degree of co-ordination could allow for a continuation of the *modération salariale*, a principle that has produced good results in the recent past. In the context of the high imported inflation and frequent automatic wage increases, non-co-operative behaviour of trade unions without a high degree of national responsibility may give rise to concern. It is possible that the appropriateness of the wage bargaining system, which could be observed in the past, will undergo a hard test in the near future, although the wide coverage of the two largest trade unions could help to avoid inappropriately high wage increases. It has further been shown how low non-wage labour costs, in the context of international mobility of labour, can help to reduce labour market tightness and limit inflationary pressure stemming from the evolution of wages.

Unemployment has been described as being mainly frictional. Consequently, a model that treats the phenomenon as a flow, not as a stock, has been used to describe possible reasons for level and duration of unemployment. In this context, the impact of legally determined wage costs (i. e. the minimum wage) on the probability for people with low qualification to find a job, has been described. The combination of wage subsidies in the framework of the special measures for employment and of the minimum wage has further been described as possibly creating a sheltered employment sphere for residents, from which non-residents are excluded.

VII

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