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THE IMPACT OF THE MINIMUM WAGE ON EARNINGS AND EMPLOYMENT IN FRANCE

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INTRODUCTION

Minimum wages, whether established by government legislation, collective agreements or convention, are an important feature of labour markets in many OECD countries. They are usually justified as a means to achieve certain income distribution goals, in particular improving the position of low-paid workers. To assess whether they actually achieve these goals or whether other policy measures might be more effective, it is vital to quantify the impact of minimum wages on earnings and employment. A minimum wage, if it is to be effective in reducing poverty, must be fixed above the market-clearing wage. But the corollary of this is that it is likely to cause employment losses. This latter effect may be particularly important in youth labour markets since young people tend to be over-represented among the lower paid.

In the United States a large amount of research has been devoted to identifying a negative, though small, effect on youth employment of increases in the Federal minimum wage. A survey of this literature by Brown, Gilroy and Kohen **(1982,** p.524) concluded that a consensus view is that "a 10 per cent increase in the minimum wage reduces teenage employment by one to three percent" – aconclusion which is confirmed in a recent review by Brown **(1988).** The much sparser literature on the Canadian experience also arrives at similar minimum wage elasticities for teenage employment.

Statutory national minimum wages also exist in several European countries such as France, Luxembourg, the Netherlands, Portugal and Spain. But little research has been carried out on the labour market impacts of these minimum wages except for a few French studies. Compared with the Federal minimum wage in the United States, the value of the minimum wage in France – the "salaire minimum interprofessionnel de croissance" (SMIC) – is higher as a proportion of average earnings and – unlike U.S. experience – its relative value has tended to rise over the past two decades. Consequently, a more pronounced effect on youth employment might be expected than that observed in the United States. However, Martin **(1983,** p. 62), using the kind of model applied in most of the U.S. studies, concluded that "the SMIC had virtually no discernible impact on the French youth labour market", although other studies have come to the opposite conclusion – for details, see Section II.

The purpose of this paper is to re-examine the empirical evidence on the impact of the **SMIC** on the French youth labour market. After presenting some background information on the **SMIC,** it is argued that the conventional model used in the literature to estimate the employment effects of minimum wages is not the right one to use. An alternative model of the relationship between the minimum wage and employment which is both more flexible and more securely based in the theory of labour demand, is then proposed and estimated. Essentially we argue that the effect of the minimum wage on employment should be calculated in three steps. First, disequilibrium wage adjustment equations should be estimated with the minimum wage as one argument. Second, labour demand equations should be estimated with a vector of appropriate wages (including the minimum wage) as arguments. Finally, the impact of a change in the minimum wage on the employment vector is calculated using the results obtained in the first two steps.

I. MAIN FEATURES OF THE **SMIC**

Although state intervention in the process of wage determination in France has a long history, legally binding minimum wages were first legislated in **1950.** Under the **1950** legislation, the minimum guaranteed wage – the "salaire minimum interprofessionnel garanti" **(SMIG)** – was determined by the State and applied to all occupations. While the real value of the **SMIG** increased during the **1950s** and **1960s,** it did not keep pace with the growth of average real earnings. For this and other reasons, the **SMIG** was replaced in **1970** by the **SMIC** which was designed to ensure that minimum-wage workers benefited adequately from economic growth. The **SMIC** is defined as the minimum gross wage that an employer must pay to any worker aged **18** or over; there are exceptions for apprentices, certain types of trainees and handicapped workers. Hence, coverage of the **SMIC** is almost universal. Workers aged **16** or under receive **80** per cent of the **SMIC,** while **17** year olds receive **90** per cent. The **SMIC** is fixed in hourly terms – in July **1990** it was **31.28** francs per hour – but is applied to a standard working month (currently **169** hours).

Data on the proportion of French workers paid at or below the **SMIC** since **1972** are presented in Table **1.** This proportion varies from year to year but in **1989 8** per cent of the work force in establishments employing ten or more workers in industry, commerce and services were paid at the **SMIC** rate compared with an average of **4.3** per cent over the period **1972-80.** The coverage rate has, however, fallen by 1½ percentage points between **1985** and **1989.** These data do not include minimum-wage workers in small establishments employing less than ten workers or in sectors which are excluded from the coverage of the establishment survey –

agriculture, coal mining, electricity, gas and water, public transport and domestic services. In the last few years data have been collected on the proportion of minimum-wage workers in small establishments employing less than ten workers in industry, commerce and services: in 1989 17 per cent of the work force in such establishments were paid the SMIC. Overall, 10.5 per cent of the work force in all establishments covered by the survey were paid at or below the SMIC in 1989[1].

Table 1. Proportion of wage and salary earners in establishments employing more than ten workers in industry, commerce and services, covered by the SMIC, 1972-89'

	Males	Females	Total
1972	1.8	4.6	2.7
1976	3.6	8.4	5.1
1979	3.0	6.2	4.0
1981	5.1	13.9	8.0
1983[2]	4.6	10.4	6.6
1985	6.2	16.2	9.7
1987	5.1	12.6	1.8
1989	5.2	13.9	8.2

1. The data refer to July of each year. They cover all workers whose hourly wage is less than the new hourly SMIC rate which applies from 1 July of each year.
2. New series from 1983 on.

Source: Service des études et de la statistique, Ministère du travail, de l'emploi et de la formation professionnelle.

When rough estimates for those minimum-wage workers in sectors not covered by the survey of establishments are added to the total from the survey, it appears that around 2 million persons – 12 per cent of all wage and salary earners – were paid at or below the SMIC in 1987[2]. In contrast, only about 5 per cent of all US. wage and salary earners received the Federal minimum wage ($3.35 per hour) or less in 1988 compared with around 9 per cent in 1981[3].

Most of those paid the minimum wage in both France and the United States are young workers. Although it is not possible to get coverage data disaggregated by broad age groups such as 15-19 years and 20-24 years, the annual establishment survey carried out by the French Labour Ministry has for the past two years produced data on the proportion of minimum-wage workers by three broad age groups – less than 26 years, 26-49 years and 50 years and over. These data show

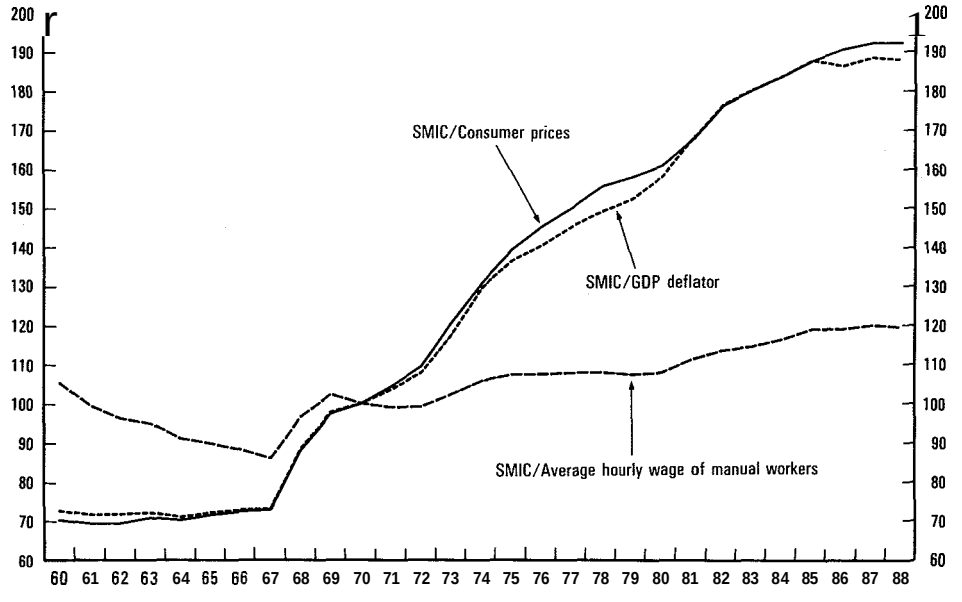
that in 1989 40 per cent of all minimum-wage workers were aged less than 26 (Ministere du travail, de l'emploi et de la formation professionnelle, 1990). The proportion is significantly higher in the United States: in 1988, 36 per cent of all hourly-paid workers earning the minimum wage or less were teenagers and a further 22 per cent were aged 20 to 24 (Haugen and Mellor, 1990).

Apart from its wider legal and effective coverage of the work force, the main distinguishing feature of the French minimum wage legislation, as compared with the U.S. legislation, is the method of up-rating and indexing. There are essentially three mechanisms by which the SMIC is increased. First, it is increased each year, usually in July, when the government, taking into account general economic conditions and the opinion of the joint employer-employee advisory committee (la Commission superieure des conventions collectives), decides on the new hourly rate. Second, a rise in the SMIC is "triggered" automatically by a two percentage point increase in the consumer price index over and above what it was when the SMIC was last increased. This adjustment must fully match the price rise. Finally, apart from these statutory requirements, the government can raise the SMIC at its discretion: the 10 per cent increase following the election of President Mitterrand

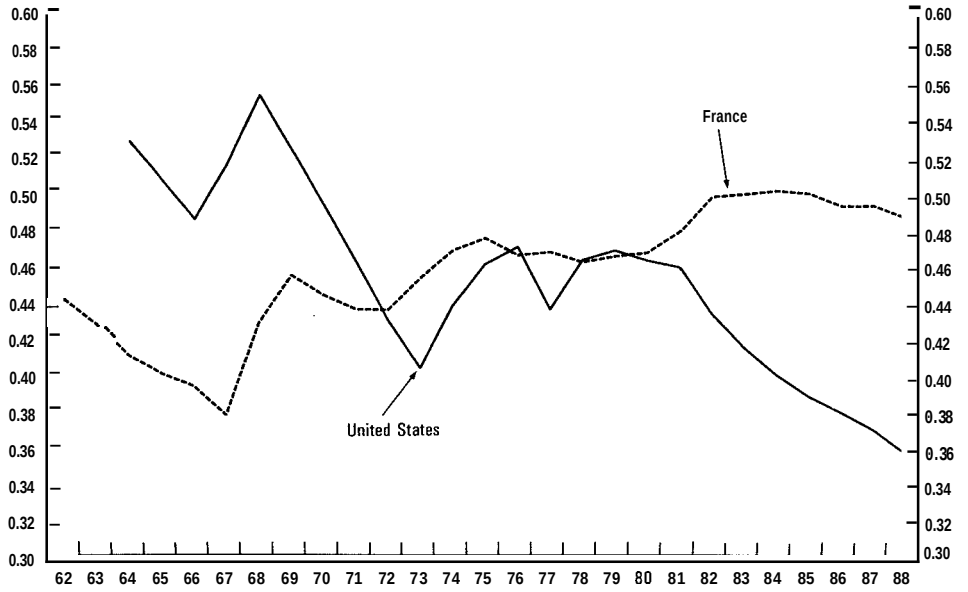
CHART 1

REAL AND RELATIVE VALUES OF THE SMIC, 1960-88

1970 = 100



Sources: OECD, *Main Economic Indicators; Narional Accounts.*



in May 1981 had a major impact on the proportion of the work force receiving the SMIC. These three mechanisms ensure that the real value of the SMIC never falls by more than 2 per cent at any time during the year, and that the SMIC is regularly up-rated, so that its real value increases when real average earnings rise. As Chart 1 shows, the real and relative value of the SMIC increased during the 1970s and into the 1980s. Between 1970 and 1988, the real value of the SMIC almost doubled, whether deflated by an index of consumer prices or by the GDP deflator.

The SMIC has also risen relative to average earnings. Chart 2 shows an increase from just under 40 per cent of net average annual earnings in the late 1960s to 51 per cent by 1985. Since then it has stabilised at around 50 per cent of the average. The contrast with the U.S. situation is striking. Relative to average hourly earnings, the value of the Federal minimum wage has fallen from over 50 per cent in the late 1960s to 36 per cent in 1988. This decline has not been continuous as

Congress raised the nominal value of the minimum wage periodically. The only increase in the **1980s** was in **1981;** since then its real value has been steadily eroded by inflation. However, it has now been decided to raise the Federal minimum to **$4.25** an hour by **1991,** combined with a sub-minimum wage for teenage workers. Even when this is fully implemented, it will not bring the ratio of the minimum to average hourly earnings back to where it was in **1981.**

II. EVIDENCE ON THE EFFECTS OF THE SMIC

Given the higher relative value of the SMIC in the **1980s,** its automatic up-rating and the larger proportion of young persons affected compared with the United States, its impact on the French youth labour market could be expected to be more noticeable. However, this does not appear to be the case. There have been five studies of the French experience and, what evidence there is, does not make a strong case for the proposition that the SMIC has had significant effects on youth employment and unemployment.

Fourçans **(1980)** was the first to examine the impact of the SMIC on French age- and sex-specific unemployment rates. Using quarterly data he claimed to find a significant and large positive relationship between the real value of the SMIC and the youth and adult unemployment rates. However, his results are implausible: taken at face value, they imply that increases in the real value of the SMIC accounted for over **80** per cent of the increase in the unemployment rate of young males and two-thirds of the increase in adult male unemployment over the period **1973-77!** Also the use of the unemployment rate as the dependent variable does not allow one to distinguish between the different impacts which the SMIC may have on employment and participation rates.

In the U.S. literature, the effect of the minimum wage on youth employment and unemployment has usually been examined using an equation which was first popularised by Mincer **(1976)**[4]. This equation takes the form:

$$N_Y/P_Y = \alpha_0 + \alpha_1\, mw + \alpha_2\, u_A + \alpha_3\, X + v \qquad [1]$$

where N_Y is youth employment, P_Y the youth population, mw the value of the minimum wage relative to the average adult wage, u_A the unemployment rate of prime-age males, and X a set of other "control" variables including time trends[5]. Sometimes the dependent variable is the employment of youths relative to the employment of adults (see Brown, Gilroy and Kohen, **1982,** for further details).

Four studies have adopted this Mincer-type approach when examining the case of France. Rosa **(1981),** using annual data for the period **1963-79,** estimated six such employment equations for young persons (aged **15-24).** In three of these

equations, the ratio of the SMIC to average adult wages appeared to have a significant negative impact. However, the errors were serially correlated in each of these equations and hence the standard errors of the estimated coefficients were biased downwards. Thus, his conclusion that "the SMIC significantly reduces the employment... of the young" (p. 374) may not be justified. In his other three equations, the impact of the SMIC was not statistically significant. Rosa has since re-estimated his equations on annual data up to 1984, using a second-order Cochrane-Orcutt transformation, and claims to have obtained unbiased coefficient estimates (Rosa, 1985). Based on these results, he argues that a 10 per cent rise in the SMIC relative to the average hourly wage will lower the youth employment rate by between 2 and 4.6 per cent.

Martin (1983), using annual data for the period 1962-81, found that the real value – deflating by the GDP deflator – of the SMIC had a statistically significant negative effect on the youth employment/population ratio in some equations. Serial correlation among the equation residuals once again proved to be a serious problem. The inclusion of linear and quadratic time trends reduced this problem but at the same time caused the minimum-wage coefficient to be statistically insignificant (and even to change sign in some equations)[6]. In an attempt to examine the effect of the relative value of the SMIC on the ratio of youth to adult employment, Martin was unable to find even one statistically significant coefficient on the minimum-wage variable.

In the most recent study, Benhayoun (1990) has applied a Mincer-type approach to annual time-series data for the period 1968-88. One innovation in this study is that it tests a wide variety of different measures of the minimum wage. In regressions where the dependent variable is the employment/population ratio, the SMIC variable was always significant with a coefficient in the range of –0.2 to –0.6 for young males, but it was rarely significant for young females. Like some of the other studies, Benhayoun's estimates are plagued by positive serial correlation of the residuals. He finds that the introduction of a zero-one dummy variable to adjust for years in which there was an "abnormal" increase in the SMIC largely removes the serial correlation. The interpretation of this dummy variable is difficult: either, as he argues, it represents the political nature of large increases in the minimum or it suggests some kind of non-linear effect of large increases in the SMIC. It remains unclear why serial correlation should disappear as the result of the inclusion of this dummy variable.

On the basis of these five studies, it is difficult to conclude that increases in the SMIC have significantly reduced French youth employment. They may have done so but the econometric methods used so far have been unable to detect statistically significant and robust effects. In the next two sections an alternative method is proposed and estimated on annual time-series data. The results suggest that increases in the real value of the SMIC have indeed raised average earnings of young workers, but that it is extremely difficult to derive robust negative effects on youth employment.

III. AN ALTERNATIVE APPROACH

A. The conceptual framework

Mincer-type equations can be criticised on several counts. In particular, equation [1] is not well based on the theory of factor demand except under some very restrictive assumptions[7]. Even then the use of the employment/population ratio as the dependent variable confounds supply and demand factors since it is the product of the labour force participation rate and the proportion of the labour force actually in employment.

A further difficulty arises if the minimum wage enters the equation as a proportion of average earnings unless it is an adequate proxy for youth wages and average earnings are independent of the minimum wage. While Marsden (1985) argues that increases in the SMIC are an important determinant of changes in the wages of youths, Begue (1978) suggests that increases in the SMIC also have an upward "ripple effect" on the wages of workers earning more than the SMIC. This means that changes in the minimum wage may alter both the numerator and the denominator of the relative wage variable used to capture its influence, thereby masking possible additional channels of influence on employment (e.g. capital-labour substitution as both adult and youth labour become more expensive).

If we assume for expositional purposes that there are only two types of labour used in production – youths and adults – and that the demand for youth labour depends on the real wages of youths and adults, the elasticity of youth employment with respect to the minimum wage will in general be given by:

$$\varepsilon_{Ym} = \theta_{Ym} \cdot \varepsilon_{YY} + \theta_{Am} \cdot \varepsilon_{YA} \qquad [2]$$

where ε_{Yj} represents the elasticity of youth employment with respect to the appropriate wage j, θ_{im} represents the elasticity of wages of group i with respect to the minimum wage (m) and subscripts A and Y stand for adults and youths, respectively. (A similar expression can be written for adult employment).

From an empirical standpoint, this suggests that an equation like [1] is misspecified in that it fails to take account of the effects of increases in the minimum wage on the earnings of other groups that compete with youths. The analysis can be improved upon by first examining the impact of an increase in the minimum wage on youth and adult wages to obtain estimates of the θ elasticities; and secondly, estimating labour demand equations that correspond more closely to the underlying production theory to obtain estimates of the ε elasticities. A similar approach has been followed by Kaufman (1989) in his analysis of the effects of statutory minimum wages on employment in Great Britain.

B. Real wage equations for youths and adults

In line with other work on wage equations, the framework we have adopted for wage-setting behaviour is a bargaining model in which workers are assumed to have a "target" real wage which itself is a function of productivity, the probability of securing another job and the real value of the minimum wage.

Productivity is the main determinant of real wages in the long run. It is also conventional to include the unemployment rate as a determinant of the real wage in union bargaining models – see, for example, Nickell and Andrews (1983) or Layard and Bean (1989). In such models, unions are assumed to bargain over wages, knowing that firms will fix the level of employment on the basis of the bargained real wage. At the same time, unions and their members know that raising the real wage above the market-clearing level will lead to a decline in employment. Since the probability of the median union member losing his job is not zero and his chances of finding another job vary directly with the state of the labour market, the real wage is assumed to decrease with the level of the unemployment rate.

Finally, the minimum wage is assumed to have a positive impact on the average wage for two reasons. First, an increase in the minimum will increase the average wage as those initially earning less than the new minimum have their pay increased or cease to be employed. Second, workers earning more than the minimum will bargain to have their wages increased in an attempt to maintain a differential between their wages and those of other groups earning the minimum wage. In this way, minimum wages compress the lower end of the distribution of earnings and cause "ripples" through the rest of the wage structure.

For both youths and adults, the estimated dynamic relationships are of the error-correction form:

$$\Delta w_t = \beta_0 + \beta_1 w_{t-1} + \beta_2 m_{t-1} + \beta_3 g_{t-1} + \beta_4 u_{t-1} + \beta_5 \Delta m_t + \beta_6 \Delta g_t + \beta_7 \Delta u_t + v_t \quad [3]$$

where w = average real earnings;
u = the unemployment rate of youths or adults;
g = labour productivity;
m = real minimum wage;
(all variables are in logarithms)
and v_t is a white-noise error term.

The steady-state relationship implied by equation [3] defines the time path of the real wage that prevails when all variables are growing at a constant rate. Assuming that g is the steady-state growth rate of productivity and m the steady-state growth rate of the minimum wage, the steady-state solution to the wage equation is[8]:

$$w = k + \alpha_1 u + \alpha_2 g + \alpha_3 m \qquad [4]$$

where with $w = m = \hat{g}$, $k = -[\beta_0 - \hat{g}(1 - \beta_5 - \beta_6)]/\beta_1$;

$$\alpha_1 = -\beta_4/\beta_1; \quad \alpha_2 = -\beta_3/\beta_1; \quad \alpha_3 = -\beta_2/\beta_1 = \theta;$$

and "^" is the steady-state growth rate of the variable in question. Homogeneity requires that the coefficients of the minimum wage and productivity variables in equation [4] sum to unity, i.e. $\alpha_2 + \alpha_3 = 1$.

Annual time-series data for the period 1963-86 are used to estimate equation [3] for youths and adults. The sample period is rather short, but the main factor constraining analysis for a longer period is the availability of earnings data by age group. Data on average hourly or weekly earnings for youths and adults would be most suitable for our purposes. But time-series data on such variables disaggregated by age are not readily available for France. Instead, we have had to make do with data on annual earnings (net of employees' social security contributions) by age, from which data on monthly gross earnings (including social security contributions) have been derived for use in the regressions. Youths are regarded as the age group 15-24, and adults as those aged 25 or over[9]. The earnings variables are deflated by the CPI; further details on the definitions and sources of the series used for the estimation are described in the appendix. Since the data sample is small and the earnings data are less than ideal, all results should be treated with appropriate caution.

Before discussing the regression results, certain points concerning the estimation strategy are worth noting. In order for the ordinary least squares (OLS) estimators to be unbiased, the regressors should all be weakly exogenous. If any of the right-hand side variables is endogenous, the resulting coefficient estimates will be biased. In the model above, two regressors are possibly endogenous: Au and Am. Since labour demand depends on the real wage, and unemployment is by definition related to labour demand, including the change in unemployment as a determinant of the change in real wages may cause simultaneity bias. Furthermore, in Section II above it was noted that the growth of the minimum wage was determined, at least after 1970, by the growth of the economy and the requirement that the rate of increase of the SMIC in real terms should be at least half of the annual growth of real average earnings. This could be a source of bias, particularly in the adult wage equation. Instrumental variables estimation (IVE) – instrumenting for Au and Am (using lagged values of these two variables and of average real wages for adults) – revealed little difference from the OLS estimates. The parameter on Au was insignificant in both equations (whether estimated by OLS or by IVE). Consequently, it was dropped from the reported final equations in Table 2.

A further specification issue concerns the functional form adopted. By relating the log of earnings to the log of the minimum wage, the proportionate effect of changes in the minimum wage on average real earnings is constrained to be constant. It is possible, however, that the effect of the minimum on the average wage

is non-linear. In order to test for this, first the square of the log of the minimum wage was introduced as a separate regressor. A second approach involved using a dummy variable taking the value one for the period after 1970 (when the minimum wage setting mechanism was altered) which was interacted with the minimum wage variable. Both variables were always insignificant in estimation.

Finally, in order to check for the possibility that there was contemporaneous correlation of the equation errors, Zellner's Seemingly Unrelated Regressions estimator was used to estimate the equations jointly. There was little difference from the OLS estimates.

The estimated youth wage equation is presented in the first row of Table 2. The results suggest that in the short run, changes in the real wages of youths are mainly determined by changes in the minimum wage and productivity. The short-run elasticity of youth real wages with respect to the real minimum wage is 0.44.

Table 2. Wage equations for youths and adults

Youths (the age group 15-24) W_y = log [gross monthly wage (incl. social security contributions)/p_c]

$$\Delta W_{yt} = \underset{(3.05)}{3.32} + \underset{(4.35)}{0.436}\,\Delta (SMIC/p_c)_t + \underset{(3.61)}{0.964}\,\Delta PROD_t - \underset{(3.02)}{0.740}\,W_{yt-1} + \underset{(2.48)}{0.273}\,(SMIC/p_c)_{t-1} + \underset{(2.61)}{0.504}\,PROD_{t-1} - \underset{(2.73)}{0.0053}\,U_{yt-1}$$

$R^2 = 0.834$ LM(2,12) = 1.59 Chow(6,10) = 0.43 $\hat{\theta}_{YM} = 0.273/0.740 = 0.37$

Adults

$$\Delta W_{At} = \underset{(1.76)}{1.89} + \underset{(2.05)}{0.133}\,\Delta (SMIC/p_c)_t + \underset{(2.94)}{0.492}\,\Delta PROD_t - \underset{(1.85)}{0.313}\,W_{At-1} + \underset{(1.03)}{0.063}\,(SMIC/p_c)_{t-1} + \underset{(2.06)}{0.243}\,PROD_{t-1} - \underset{(1.54)}{0.0012}\,U_{At-1}$$

$R^2 = 0.73$ LM(2,12) = 1.29 Chow(6,10) = 1.49 $\hat{\theta}_{AM} = 0.063/0.313 = 0.20$

Notes:

1. Absolute t-values in parentheses. These results were obtained using PCGIVE (Hendry, 1987).
2. LM(2,k) is the F form of the Lagrange Multiplier test for up to second-order residual autocorrelation. The critical value for the test statistics above is F(2,12) = 3.8.
3. Chow(6,k) is a form of the Chow test for parameter stability. Instead of splitting the sample, the equation was reestimated for the period up to 1980 and forecasts made for the period 1981-86. The Chow test statistic is distributed as F, for which the critical value is F(6,10) = 3.22.

The three determinants of the long-run real youth wage – the real value of the SMIC, labour productivity and the youth unemployment rate – are all significant with the expected signs. The long-run real minimum wage elasticity is 0.37, implying that a 1 per cent rise in the real value of the SMIC leads to an increase of almost **0.4** per cent in real youth earnings. The homogeneity restriction on the sum of the coefficients of the minimum wage and productivity variables is easily accepted by the data.

A similar relationship was estimated for adults. The results suggest that the SMIC has less effect on their wages than it has on youth wages. While the SMIC has a significant impact on the short-run dynamics of adult wages, its long-run effect is both small ($\hat{\theta}_{Am} = 0.2$) and insignificant. The adult unemployment rate has a negative influence on real earnings. But the main influence on adult real wages, in both the short and the long run, is productivity. Once again, the homogeneity restriction on the coefficients of the minimum wage and productivity is accepted.

Taken together, these equations show that the SMIC affects the earnings of young people more than adults, a result which is in line with our prior expectations given the large proportion of young French workers earning the minimum wage. Since the magnitude of the impact of the SMIC is higher for young persons, it follows that increases in the ***real*** minimum wage ***compress*** the earnings distribution overall, with the relative position of young persons improving. The impact on youth/adult relativities may be larger given the low significance of the minimum wage in the adult equation. At the same time, if productivity rises, adult earnings increase ***relative*** to the earnings of young persons if the minimum wage remains constant in real terms.

In sum, the estimated wage equations show clearly that the minimum wage increases youth earnings. There may also be some effect on adult earnings but it is much smaller. Whether this leads to a fall in employment depends on the responsiveness of employment to increased real labour costs, a topic investigated in the next section.

C. Labour demand equations for youths and adults

Before proceeding to the derivation of the youth and adult employment equations and the estimation results, it is useful to examine the trends in the two series over the past two decades. Data on employment by age are available from 1962 on from the annual labour force survey – the Enquête sur l'emploi – which is undertaken by INSEE, the French national statistical agency. But data for the period 1962-67 are not fully comparable with later years. Chart 3 shows that youth and adult employment have behaved very differently since 1968. Youth employment has declined steadily since 1970 whereas adult employment, on the other hand, has risen steadily over the same period.

CHART 3

YOUTH AND ADULT EMPLOYMENT IN FRANCE, 1968-89

1970 = 100

Source: INSEE, *Enquête sur l'emploi.* The data refer to the month of March of each year except for 1982 when the data refer to April-May.

In order to derive labour demand equations for youths and adults, we begin by assuming an aggregate CES production function:

$$Q_t = (\Sigma \gamma_i X_{it}^{\rho})^{1/\rho} A e^{\lambda t} \qquad [5]$$

where Q_t = real output at time t;

X_{it} = the amount of factor input i – youth labour, adult labour and capital – in production;

t = a time trend to represent disembodied technical progress;

A, y and λ = production function parameters, with $\Sigma \gamma_i = 1$;

and $\sigma = 1/1-\rho$, the elasticity of substitution between any two of the factors.

Profit-maximising firms will hire inputs up to the point where their marginal value products are equated to their marginal costs. Differentiating equation [5] with respect to youth and adult labour, e^y and e^A, respectively, equating the first derivatives to the real product wage for youths and adults, and taking logarithms gives:

$$\ln e_t^y = \sigma (\ln \gamma^y + \rho \ln A) + \ln Q_t - \sigma \ln w_t^y + \rho\sigma ht \qquad [6]$$

$$\ln e_t^A = \sigma (\ln \gamma^A + \rho \ln A) + \ln Q_t - \sigma \ln w_t^A + \rho\sigma \lambda t \qquad [7]$$

where w^Y, w^A = real labour costs for youths (adults), defined as youth (adult) earnings including social security contributions deflated by the GDP deflator.
The own-wage constant-output elasticity of demand for labour of type i is given by:

$$\varepsilon_{ii}|Q = -(1-s_i)\sigma$$

where s_i is the share of labour of type in total costs. The cross-elasticity is given by:

$$\varepsilon_{ij}|Q = s_j\sigma$$

In order to estimate the labour demand equations, we experimented with various lags. The best results we were able to find are reported in Table 3. In the estimation, returns to scale were tested and it was found that the data did not reject the hypothesis that they are constant.

The results in Table 3 are not entirely satisfactory in terms of the underlying theoretical framework[10]. For one thing, the time trend has different signs in the youth and adult equations. The results also suggest that technical progress, all other things being equal, "destroyed" 4 per cent of French youth jobs on a yearly basis over the period 1968-86, but had no effect on adult employment. For another, the real labour cost variable is significant with a negative sign in the youth equation but is not significant in the adult equation. Nevertheless, if we take the results at face value, the estimated long-run elasticity of substitution is 0.44 when estimated via the youth equation and 0.68 when the adult equation is estimated. This compares with similar estimates for male and female minimum-wage workers in Great Britain of between 0.41 and 0.89 (Kaufman, 1989).

In order to calculate the minimum-wage employment elasticity, we need to combine the results in Tables 2 and 3. In order to do this, we need data on the shares of youth and adult labour in total costs. Combining the data on average youth and adult labour costs with employment shares gives the share of adults in

Table 3. Labour demand equations for youths and adults, 1968-86

Youths

$$ey_t = \underset{(0.51)}{-0.771} + \underset{(1.44)}{0.309}\,ey_{t-1} - \underset{(2.92)}{0.306}\,wy_{t-1} - \underset{(2.39)}{0.029}\,time + \underset{(0.33)}{0.691}\,Q$$

$R^2 = 0.997$ S.E.E = 0.020 Durbin's h = -0.282

Adults

$$ea_t = \underset{(0.30)}{0.513} + \underset{(6.26)}{0.787}\,ea_{t-1} - \underset{(0.73)}{0.144}\,wa_{t-1} + \underset{(0.33)}{0.0017}\,time + \underset{(0.33)}{0.213}\,Q$$

$R^2 = 0.993$ S.E.E = 0.012 Durbin's h = -0.89

the total wage bill as varying between 0.86 and 0.93 over the period, with a mean share of 0.89. The share of youths in the wage bill is one minus the adult share, 0.11. The mean share of labour costs (adjusted for self-employment) in French factor income over the period in question is 0.69[11].

This implies that the shares of youths and adults in total factor income are 0.076 and 0.614, respectively. Combining these with the estimated elasticities of substitution gives the following values for the own- and cross-wage employment elasticities:

	Low (a = *0.443*)	*High* (a = *0.676*)
Own-wage elasticity		
Adults	–0.171	–0.261
Youths	–0.409	–0.625
Cross-wage elasticity		
Adults	0.03	0.051
Youths	0.27	0.42

The minimum-wage elasticities of employment can then be computed on the basis of equation [2] using these estimates. For example, the estimated minimum-wage elasticity for youths (assuming $\sigma = 0.44$) is

$$-0.409\ (0.37) + 0.27\ (0.2) = -0.097$$

or, alternatively, –0.15 if $\theta_{Am} = 0$. If the elasticity of substitution is 0.68, the estimated range for the minimum-wage elasticity of youth employment is –0.15 to –0.23. The equivalent elasticities for adults are all clustered around zero.

While the estimated labour demand equations are not very satisfactory, it is some consolation that the range of values for the minimum-wage elasticity of youth employment is a narrow one, –0.1 to –0.23. This range also spans the values reported for this elasticity from studies of the effects of minimum wages in other countries such as the United States, Canada and Great Britain.

IV. CONCLUSIONS

The few studies of the effects of the minimum wage – the SMIC – on youth employment in France have so far not been conclusive. At first sight, this is surprising since the proportion of the French work force covered by the SMIC in recent years is much larger than the equivalent proportion in the United States, and the value of the SMIC has continued to rise relative to average earnings at least until 1985, whereas the opposite has happened in the United States. There is a very

large literature on the U.S. case; the clear consensus is that increases in the Federal minimum wage have had small negative effects on teenage employment.

It is argued that at least part of the explanation for the inconclusive results in the case of France lies in the unsatisfactory specification of the basic equation which has been used to estimate the youth employment effects. A similar criticism can be made of much of the U.S. time-series literature on the minimum wage. The approach adopted in this study permits the minimum wage to affect the labour market in a theoretically more satisfactory manner than previous studies of the French or U.S. cases.

The results suggest that increases in the real value of the **SMIC** have exerted significant upward pressure on real youth earnings. We have not been able to establish satisfactorily, however, that increases in real youth labour costs have had a negative impact on youth employment – even though we believe this to be the case. Some estimates were found which would support this hypothesis but they are not very robust. Nevertheless, the estimated youth minimum-wage elasticities lie in a range from **–0.1** to –0.2 which spans the consensus values found in the North American and British literature. The adult employment elasticity with respect to the minimum wage appears to be zero.

If one accepts these estimates at face value and the reality that the French government is committed to maintaining the **SMIC** as an instrument of income redistribution policy, what can be done to offset youth employment losses as the real value of the **SMIC** increases? The results presented in this study suggest that simply moderating the rate of increase of the **SMIC** relative to the average wage would be sufficient to alter the composition of employment in favour of youths. From a policy point of view this amounts to maintaining the indexation mechanism mentioned in Section **I,** and foregoing the July up-rating. In this regard, it is worth noting that the **SMIC** has stabilised relative to average earnings since **1985.** The Dutch authorities have followed such a strategy in the **1980s;** as a result the gross minimum wage as a percentage of the average wage has fallen from **77** per cent in **1978** to **68** per cent in **1987.** OECD **(1989)** cites evidence that this relative decline in the Dutch minimum wage has raised employment of low-productivity workers. The U.S. authorities also followed a similar strategy in the **1980s.**

Another, not necessarily conflicting, option would be to introduce a youth differential, i.e. special sub-minimum wage rates for young workers. Such youth differentials exist in the Netherlands and they are to be introduced in the United States for the first time under the new minimum-wage legislation. Such differentials would tend to raise the demand for youth labour. But there would also be a substitution effect as employers have an incentive to substitute young workers paid at the sub-minimum wage rate for other workers.

There are no youth differentials in the **SMIC** except for a very few small groups such as apprentices and handicapped workers. Since **1985,** however, there has been a major expansion of special employment measures: these include commu-

nity work schemes, training courses aimed at integrating young people into working life as well as schemes which permit employers to claim exemption from social insurance contributions in respect of new hires[12]. These schemes have been targeted on young people and it is noteworthy that the allowances/wages paid to young people on the community work and training schemes are significantly less than the SMIC. Thus, even if there is no statutory youth differential in France, recent policies have tended to create a de *facto* one[13]. This is probably one factor contributing to the recent reduction in French youth unemployment: the teenage unemployment rate has declined sharply from **34** per cent in **1985** to **18.4** per cent in **1989** while the adult unemployment rate has only declined slightly from **9.5** to **9.3** per cent over the same period.

NOTES

1. There is another source of data on SMIC coverage rates. This is the very detailed survey on the structure of earnings which is carried out on an irregular basis – the most recent one referred to October 1986. This survey covers all establishments employing ten or more workers in the private and semi-public sectors. These data show that 10.6 per cent of all workers in these establishments received a monthly salary (excluding bonuses and overtime payments) less than the SMIC of FF 4 549 (= hourly SMIC in October 1986 of FF 26.92 multiplied by 169 hours). If part-time workers are excluded, this proportion falls to 7.6 per cent. For more details, see Rotbart (1989).
2. This estimate was supplied by the Service des études et de la statistique of the Ministere du travail, de l'emploi et de la formation professionnelle.
3. See Haugen and Mellor (1990), Table 2.
4. A survey of the U.S. literature by Brown, Gilroy and Kohen (1982) cites more than two dozen studies which have used Mincer-type equations.
5. The minimum wage variable in the original Mincer study was weighted by the proportion of workers covered by the legislation. A variable measuring the proportion of youths in the armed forces was also included.
6. Rosa (1985) finds the same result when he adds a time trend to his equations. However, he criticises Martin for including time trends in the estimating equation on the grounds that theory provides no justification for it. The time trends were originally justified by Mincer as "an admittedly crude substitute for more complete specifications of employment and labor force functions" (Mincer, 1976, S.100). Fifteen of the U.S. studies reviewed by Brown, Gilroy and Kohen (1982, Table 1) also include time trends in their estimating equations.
7. See Hamermesh (1982) on this point.
8. It might be argued that the variables in equation [4], particularly the real minimum wage, are not exogenous. For example, the real minimum wage may depend on labour productivity since employers will only hire workers whose marginal value products are equal to or greater than the minimum. However, we would argue that the real minimum wage can be regarded as exogenous in France because of the significant role of political influences in its determination. Chart 2 shows that the minimum rose significantly relative to average annual earnings in certain years – 1968, 1974 and 1981 – and these increases were determined by political decisions.
9. In some earlier work on the same topic, we used data on annual net earnings for those aged less than 20 – see Bazen and Martin (1988). Unfortunately, we discovered subsequently that there are sampling problems with these data which necessitated working instead with the entire under-25 age group. The basic source of annual earnings data by age is a 1/25 sample of all employer payroll tax returns (Déclarations annuelles de donnees sociales). Because of

the way the sample is drawn, it is not representative for the **16-18** age group in even years nor the **17-19** age group in odd years. This produces artificial fluctuations in the year-to-year changes for the under-20 age group. These fluctuations are greatly reduced – but not eliminated entirely – when the analysis is confined to the whole age group **15** to 24.

10. Because the equations are derived from a strict theoretical framework, the estimated coefficients in both equations should satisfy certain restrictions. In fact, the equations should be identical in steady-state. In order to test these restrictions, the two equations were estimated jointly, imposing constant returns. Once again, these results were not very satisfactory. While the estimated elasticity of substitution between youth and adult labour of **0.59** seems reasonable and the coefficient was significant at the **10** per cent level, the time trend had to be excluded from the adult equation to get reasonable parameter estimates and the size of the negative trend in the youth equation was implausibly large.

11. This calculation assumes that the average wage imputed to the self-employed is equal to the average wage and social security contributions of employees.

12. See Ermakoff and Tresmontant **(1989)** for a discussion of these special employment measures and estimates of their effects over the period **1985-88.**

13. This point is made by Perret **(1989).**

Appendix

DATA SOURCES

The following variables were used:

e log of employment for youths (the age group **15-24)** and adults (aged **25** and over). The data are from **INSEE,** ***Enquête sur l'emploi,*** and refer to March of each year except in **1982** when the data refer to April-May.

w log of real monthly earnings, calculated as:

$\exp(w)$ = [annual net earnings x $(1+t_1)$ x $(1+t_2)$]/(p_c x **12)**

where annual net earnings are taken from the **Déclarations** annuelles de **données** sociales (DADS), t_1 is the employers' payroll tax and social security contribution rate taken from Malinvaud **(1986),** t_2 the employees' social security contribution rate ***(ibid.),*** and p_c the CPI (in the labour demand equations, the earnings measures are deflated by the GDP deflator). As earnings data by age group are not available from the DADS file for **1981** and **1983,** the data were interpolated for these years.

m log of the real minimum wage. This is defined as the gross monthly SMIC for a full-time worker; it includes social security contributions. The data are taken from the DADS file and are deflated by the consumer price index.

u log of the unemployment rate for youths and adults (separately). ***Source:*** **INSEE,** ***Enquête sur l'emploi.***

g log of output per person employed. GDP divided by employment – see above.

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