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ABSTRACT

Minimum Wage and the Average Wage in France: A Circular Relationship?*

This paper investigates whether increases in the minimum wage in France have the same impact on the average wage when intended to preserve the purchasing power of the minimum wage as when intended to raise it. We find that the impact of the minimum wage on the average wage is strong, but differs depending on the indexation factor. We also find some empirical evidence of circularity between the average wage and the minimum wage.

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1. Introduction

Most industrialized countries have a statutory minimum wage. However, as emphasized by many studies (see e.g. Cahuc *et al.* 2008), the French minimum wage has very particular characteristics. First, the French minimum wage is very homogeneous: there is very little differentiation by age and no difference across regions. Second, the level of the minimum wage is high, both in absolute terms and relative to the wage distribution (Verdugo *et al*. 2012). A third important aspect is that changes to the minimum wage are strictly defined by the Labor code. The law states that the minimum wage must be annually adjusted in accordance with three factors: the first is indexation to the past annual change in the consumer price index which guarantees that the real value of the minimum wage does not decrease over time. The second factor is indexation to half of the real annual increase in the basic hourly wage rate of blue collar workers (the SHBO in French). This second indexation is aimed at diminishing wage inequality. Lastly, the government may also decide to implement discretionary increases (*coups de pouce*). In practice, these discretionary increases have been common after election years. These three components endow the French minimum wage with a sizeable impact on France's labor market equilibrium compared to the impact of equivalent measures in other industrialized countries (Aghion *et al*. 2007).

This paper revisits the empirical effects of increases in the minimum wage on the average wage. Existing studies on the minimum wage in France find a generally positive impact on wages. Using aggregate data, Bazen and Martin (1991) find a long-run elasticity of about 0.2 for the average wage of adults and 0.35 for young workers. Using a similar method, Desplatz *et al*. (2003) find a smaller effect of 0.1 on the average wage measured by SHBO, SMPT or monthly base salary (SMB). Using individual level data, Koubi and Lhommeau (2007) and Goaran and Muller (2011) examined the impact of minimum wage increases on workers located at different levels in the wage distribution. Using a 1-year horizon, they find that a 1% increase in the minimum wage lifts wages of between 1x and 1.1x the minimum wage by 1% and wages of between 1.4x and 1.5x the minimum wage by 0.5%

We investigate the impact of minimum wage increases on two quarterly indicators of average wages: the basic hourly wage of blue-collar workers (SHBO), which is used to index the minimum wage, and the average wage per capita (SMPT) from the national accounts. While the SHBO only includes the base wage and focuses on blue-collar workers, the SMPT includes all wage income and refers to the entire population. We use macroeconomic data at national level across four decades from 1970, when the minimum wage was created, to 2009 when the date of the annual adjustment of the minimum wage was moved from the 1st of July to the 1st of January.

We contribute to the literature in three important ways. First, we investigate empirically whether minimum wage increases based on different combinations of the three factors described above produce different effects. Previous studies have constrained the effect of minimum wage increases to be similar for each of the three factors. Second, from this approach, we show evidence of a risk of circularity between the minimum wage and the SHBO. This is an important issue for assessing whether alternative indexation mechanisms would be more desirable (see Cette and Wasmer 2012, for an extensive discussion). Third, we estimate models which allow for a flexible dynamic response of the average wage to the minimum wage while most of the previous literature constrained the model to an instantaneous impact from the minimum wage increase. Over the period 1970-2009, the legal increases of the minimum wage took place on the first of July each year. However, several

recent studies have shown that for about 60% of employees, wage adjustments occurred in the first quarter of the year (see Le Bihan *et al*. 2012). It therefore seems reasonable to assume that increases in the minimum wage might be transmitted progressively rather than instantly.

Table I: Average Wages and the Minimum Wage in France 1970-2010

	Period			
	1970-1979	1980-1989	1990-1999	2000-2010
Panel A. **Average Annual *Real* Growth Rates (in %)**				
Δ Minimum Wage	5.2	1.7	1.3	1.8
Δ SMPT	3.8	0.6	0.8	1.1
Δ SHBO	4.4	0.9	1.2	1.5
Panel B. **Decomposition of Nominal Minimum Wage increases (in %)**				
Total nominal increase	13.9	8.6	3.1	3.3
Increase related to the indexation on: -Price	8.6	6.9	1.8	1.6
-SHBO	2.2	0.5	0.5	0.8
-Discretionary increases (*Coup de Pouce*)	3.2	1.1	0.7	1.0
Panel C. **Other Variables: Annual Average (in %)**				
Δ Price Index	8.8	6.8	1.8	1.9
Δ Hourly Labor Productivity	1.2	0.8	0.6	0.4
Δ Average Number of Hours Worked	-0.3	-0.2	-0.2	-0.1
Unemployment rate	3.4	8.0	9.8	8.4

Source: OECD, INSEE. Authors' calculations.

2. The Evolution of Wage Indexes and the Minimum Wage from 1970 to 2010

In Table I, we show the evolution of average wage indexes and of the minimum wage over the past four decades. Panel A shows their evolution in real terms. Increases in the minimum wage in real terms were quite large during the 1970s but declined dramatically in subsequent decades, from an annual average of 5% to between 1.7% and 1.3% during the 1980s, 1990s and the 2000s. Over the period, minimum wage increases were consistently larger than the increases in the SMPT and SHBO indexes. This discrepancy has led to a significant compression of the lower end of the wage distribution in France (Verdugo et al. 2012). The difference in growth rates is less marked in the case of the SHBO index, which rises much more rapidly than the SMPT. The fact that the SMPT increases less rapidly than the SHBO reflects in part the non-inclusion of the flexible part of wages in the SHBO. As a result, the SHBO is much less volatile over the period.

In Panel B, we break down the nominal increases in the minimum wage according to the three indexation factors. Quantitatively, the most important indexation factor in each decade is always the indexation to prices. However, the contribution of the two other factors is not negligible: the indexation to the SHBO and the discretionary increases together account for between 20 and 50% of the change in the minimum wage, depending on the decade. In practice, discretionary increases have tended to be substantially larger than the indexation to the SHBO, particularly during the 1980s.

Panel C shows the other control variables that we introduce in the empirical model described below. The figures indicate that inflation decreased dramatically during the 1980s, when the French government attempted to freeze prices and wages in 1982 (see, amongst others, Blanchard and Sevestre 1989, or Desplatz *et al.* 2003), and remained relatively stable during both the 1990s and the 2000s. Changes in hourly labor productivity also declined substantially over the period. During the 2000s, the average growth rate was three times lower than in the 1970s. The number of hours worked also declined consistently over the period due to a number of changes in the legal working time, notably in 1982 and in 2000. Finally, the unemployment rate increased rapidly during the 1980s and remained at a relatively high level during the 1990s and the 2000s.

3. Econometric Model

Below, we use capitals or lowercase letters to indicate whether a variable is in level or logarithm, while Δ before a variable indicates that the first differences are taken. The growth rate of a variable is approximated by taking the first differences of the logarithm. The baseline model is the following:

$$\Delta w_t = \alpha + \sum_{j=1}^{3}\beta_j \Delta w_{t-j} + \sum_{j=0}^{3}\gamma_j \text{b82}\_\Delta cpi_{t-j} + \sum_{j=0}^{3}\varphi_j \text{f82}\_\Delta cpi_{t-j} + \theta_1 UNEMPL_t$$

$$+\theta_2 \Delta\text{UNEMPL}_t + \theta_3 \Delta prodh_t + \theta_4 \Delta\text{hour}_t + \sum_{j=0}^{3}\delta_j^1 \Delta c\_cpi_{t-j}$$

$$+\sum_{j=0}^{3}\delta_j^2 \Delta c\_shbo_{t-j} + \sum_{j=0}^{3}\delta_j^3 \Delta c\_cp_{t-j} + TRIM + \varepsilon_t$$

Our model follows a standard macroeconomic wage equation relating quarterly changes in log wages Δw_t to changes in the consumer price index (Δcpi_t), unemployment level and rates ($UNEMPL_t$ and $\Delta UNEMPL_t$), productivity $\Delta prod_t$ (hourly labor productivity $\Delta prodh$ or per capita $\Delta prodt$ depending on whether the measured wage is SHBO or SMTP), and the average number of hours worked ($hour_t$). The dependent variable w_t is either the SHBO or the SMTP. The model also includes quarterly fixed effects (TRIM) which absorb any systematic seasonal trends in wage growth. All variables are included by using up to three lags to capture their dynamic relationship.

As in most of the literature on macro-wage dynamics in France, we introduce a structural break in wage indexation in 1982 when a sharp slowdown in the evolution of inflation occurred (see e.g. Blanchard and Sevestre 1989, or Desplatz *et al.* 2003). Thus, b82_Δcpi or f82_Δcpi refer respectively to price changes before or after the first quarter of 1982.[1]

Unlike previous studies, the minimum wage is introduced by distinguishing each component of its annual indexation: the indexation to prices Δc_cpi, half the real change in the SHBO Δc_shbo, and the discretionary increases Δc_cp. By definition, we have $\Delta smic_t = \Delta c\_cpi_t + \Delta c\_shbo_t + \Delta c\_cp_t$.

[1] We have performed a test for various dates of structural breaks which suggests to use the first quarter 1982.

4. Impact of changes in the minimum wage on average wages

The results of estimates produced by the previous model for the two measures of the average wage (SHBO and SMTP) are reported in Table II and summarized in Table III. The first column in Table II examines a model in which the minimum wage is introduced directly without decomposition. We find that introducing a more realistic dynamic makes a difference: the lagged parameters of the minimum wage are large and significant. With respect to a simple model with an instantaneous indexation (not reported), we find the long run elasticity increases from 0.10 to 0.33.

In Columns 2 and 3, we examine the impact of introducing each indexation factor separately. Column 3 shows our preferred specification which allows for a structural break in the indexation to the price index before and after 1982. There is significant evidence that both the effect and the dynamics of each indexation factor differ. Over the long-run, we find an elasticity of the average wage at 35% for increases related to inflation, at 65% for increases related to the real increase of the SHBO, and at 23% for the discretionary increases. Interestingly, increases related to SHBO indexation and the discretionary factor are transmitted much more slowly to average wages, while increases related to prices have a greater instantaneous effect.

In Columns 4, 5 and 6, we examine similar regressions, but with the dependant variable being the SMPT from the national accounts. We obtain broadly similar results for the long-run effects of price-indexed increases and discretionary increases, with elasticities of respectively 30% and 28%. However the effect of increases related to SHBO indexation is smaller, to only 14%.

Table II: Results of estimates

Dependant variable :	**SHBO**			**SMPT**		
	(1)	(2)	(3)	(4)	(5)	(6)
Δw_{t-1}	-0.097	-0.062	-0.077	0.207***	0.229***	0.178**
	(0.077)	(0.078)	(0.078)	(0.076)	(0.076)	(0.073)
Δw_{t-2}	-0.037	0.042	0.093	0.06	0.086	0.101
	(0.077)	(0.083)	(0.081)	(0.078)	(0.078)	(0.074)
Δw_{t-3}	-0.097	-0.086	-0.073	-0.157**	-0.152**	-0.143**
	(0.076)	(0.083)	(0.082)	(0.069)	(0.071)	(0.067)
Δcpi_t	0.353***	0.306***		0.162**	0.137**	
	(0.095)	(0.092)		(0.069)	(0.069)	
Δcpi_{t-1}	0.096	0.054		0.199***	0.190**	
	(0.105)	(0.108)		(0.076)	(0.080)	
Δcpi_{t-2}	0.067	0.008		-0.024	-0.051	
	(0.105)	(0.122)		(0.077)	(0.088)	
Δcpi_{t-3}	0.07	0.122		0.058	0.041	
	(0.096)	(0.106)		(0.074)	(0.081)	
b82 Δ**cpi**			0.507***			0.165*
			(0.125)			(0.093)
b82 Δcpi_{t-1}			0.205			0.177
			(0.155)			(0.111)
b82 Δcpi_{t-2}			-0.135			0.073
			(0.167)			(0.120)
b82 Δcpi_{t-3}			-0.008			0.042
			(0.147)			(0.110)
f82 Δcpi_t			0.101			0.040
			(0.114)			(0.084)
f82_Δcpi_{t-1}			-0.034			0.198**
			(0.125)			(0.092)
f82 Δcpi_{t-2}			0.104			-0.064
			(0.133)			(0.095)
f82 Δcpi_{t-3}			0.211*			0.083
			(0.113)			(0.086)
$UNEMPL_t$	-0.161***	-0.119***	-0.088***	-0.120***	-0.114***	-0.091***
	(0.029)	(0.032)	(0.031)	(0.022)	(0.025)	(0.025)
$\Delta UNEMPL_t$	-0.277	-0.232	-0.358**	-0.183	-0.230*	-0.300**
	(0.187)	(0.184)	(0.176)	(0.128)	(0.130)	(0.124)
$\Delta prodh_t$	0.120*	0.118*	0.092	0.148***	0.142***	0.160***
	(0.067)	(0.064)	(0.062)	(0.054)	(0.053)	(0.051)
$\Delta hour_t$	-0.029	-0.006	0.04	-0.073	-0.065	-0.019
	(0.126)	(0.121)	(0.116)	(0.070)	(0.068)	(0.066)
$\Delta MinWage_t$	0.135***			0.063***		
	(0.028)			(0.021)		
$\Delta MinWage_{t-1}$	0.047			0.052**		
	(0.030)			(0.022)		
$\Delta MinWage_{t-2}$	0.108***			0.059***		
	(0.029)			(0.021)		
$\Delta MinWage_{t-3}$	0.128***			0.091***		
	(0.028)			(0.020)		
$\Delta c\ cpi_t$		0.210***	0.185***		0.078**	0.073**
		(0.049)	(0.048)		(0.036)	(0.035)
$\Delta c\ cpi_{t-1}$		0.063	0.054		0.089**	0.080**
		(0.056)	(0.054)		(0.041)	(0.040)
Δc_cpi_{t-2}		0.046	0.027		0.014	-0.005
		(0.055)	(0.053)		(0.041)	(0.039)
$\Delta c\ cpi_{t-3}$		0.101**	0.102**		0.118***	0.109***
		(0.048)	(0.046)		(0.036)	(0.034)
$\Delta c\ shbo_t$		0.032	-0.006		0.019	0.009
		(0.108)	(0.103)		(0.076)	(0.073)
$\Delta c\ shbo_{t-1}$		0.109	0.104		-0.039	-0.073
		(0.110)	(0.107)		(0.077)	(0.073)
$\Delta c\ shbo_{t-2}$		0.253**	0.281***		0.11	0.088
		(0.102)	(0.099)		(0.075)	(0.073)
$\Delta c\ shbo_{t-3}$		0.329***	0.309***		0.122*	0.098
		(0.098)	(0.096)		(0.074)	(0.071)
Δc_cp_t		0.132***	0.111***		0.079***	0.080***
		(0.036)	(0.035)		(0.028)	(0.027)
$\Delta c\ cp_{t-1}$		-0.01	-0.032		0.033	0.028
		(0.038)	(0.037)		(0.028)	(0.027)
$\Delta c\ cp_{t-2}$		0.092**	0.059		0.066**	0.050*
		(0.038)	(0.037)		(0.028)	(0.027)
Δc_cp_{t-3}		0.122***	0.105***		0.081***	0.083***
		(0.037)	(0.035)		(0.027)	(0.026)
Nb. obs.	156	156	156	156	156	156
$\mathbf{R^2}$	0.90	0.91	0.92	0.94	0.94	0.95

Standard errors in parenthesis. An ***, ** or * indicates standard significance level of 1 %, 5 % or 10 %.

Table III: Short and long-run elasticities of the average wage SHBO and SMPT to CPI and to the three components of Minimum Wage Increases

	SHBO		SMPT	
	Short-run	**Long-run**	**Short-run**	**Long-run**
Consumer Price Index				
- Before 1982	0.51	0.54	0.17	0.53
- After 1982	0.10	0.36	0.04	0.30
Components of the Minimum Wage Increases				
- Inflation-indexed	0.19	0.35	0.07	0.30
- Purchasing Power of SHBO-indexed	0.00	0.65	0.01	0.14
- Discretionary	0.11	0.23	0.08	0.28

The elasticities are obtained from estimates reported in columns 3 and 6 of Table II. The short-run elasticity is the instantaneous effect in the same quarter. The long-run elasticity is the final effect, taking into account the impact of inertia.

5. Robustness

An initial concern is that these series might be potentially non-stationary which could lead to false inferences (Hayashi 2000, p.643). Unit root tests indicate that the series used here are in general integrated of order 2. This would suggest differencing the series twice. But such a choice has a high cost by increasing the noise in the data variance which potentially biases the estimation of the parameters toward zero (Griliches and Hausman 1986). In addition, unit root tests are not very powerful (Hayashi 2000, p. 602). For these reasons, we have followed most of the literature by using first differenced models (Desplatz *et al*. 2003). Nevertheless, results from a double-differenced model were broadly similar but less precise.

Another possible problem is that a model including only three lags could be mis-specified. However, the estimates of the three first lags are not affected by the inclusion of a fourth lag and the coefficient estimate of a fourth lag is not significantly different from zero across specifications.

These additional results are available upon request from the authors.

6. Conclusion

In this article we show that the impact on the average wage of minimum wage increases is strong and depends on whether minimum wage increases are related to preserving or raising the real minimum wage. We also obtain much larger effects by allowing a more realistic dynamic response of the impact of the minimum wage. Finally, we find evidence of a circular relationship: minimum wage increases related to the indexation on the average wage SHBO have a large effect on the SHBO itself. This circularity can weaken the competitiveness of French workers if the inflation rate fluctuates significantly since such fluctuations could ‘spontaneously’ increase real wages compared with other countries (see Cette and Wasmer

2010). As a consequence of this legal mechanism for revaluation of the minimum wage and of the impact of the increases on the average wage, France is probably one of the industrialized countries where competitiveness is the most threatened by inflation volatility.

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