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Flexible Labour, Firm Performance and the Dutch Job Creation Miracle

ALFRED KLEINKNECHT, REMCO M. OOSTENDORP, MENNO P. PRADHAN & C.W.M. NAASTEPAD

ABSTRACT *Unlike internal ('functional') forms of flexibility of labour, external ('numerical') forms of flexibility (i.e. high shares of people on temporary contract or a high turnover of personnel) yield substantial savings on a firm's wage bill. Savings on wage bills lead to higher job growth, but do not translate into higher sales growth. Externally flexible labour appears to be related to lower labour productivity growth, the effects being different for innovating vs non-innovating firms. We discuss these findings from firm-level and worker-level data against the background of the Dutch job creation miracle during the 1980s and 1990s. Modest wage increases and flexibilization of labour markets may indeed create lots of jobs. However, this is likely to happen at the expense of labour productivity growth, raising serious doubts about the long-run sustainability of a low-productivity–high-employment growth path.*

KEY WORDS: Flexible labour, determinants of labour productivity growth, wage costs, firm growth and employment.

JEL CLASSIFICATION: J23, J31, J53, M51, O31

Background: A Trade-off Between Flexibility and Productivity?

Mainstream economists tend to explain high European unemployment by rigid labour markets. In their view, strong unemployment protection legislation, high social benefits for those out of work, and strong trade unions ('cartelizing' the labour market) prevent the labour market flexibly adapting to changes in demand and supply. Notably downwardly rigid wages keep the unemployed out of work (see Siebert, 1997 as a recent example). Advocates of the flexibilization of labour markets usually make a plea for easier hiring and firing of personnel, a reduction of trade union power, less generous social benefits, and more wage flexibility (in particular *downward* flexibility).

Heterodox critics refer to this as 'low road' practices and argue that 'high road' (or 'high trust' or 'high involvement') HRM practices may be more promising for firm performance (see Delaney & Huselid, 1996; Fernie & Metcalf, 1995; Appelbaum *et al*., 2000; Laursen & Foss, 2003). More generally, this literature suggests

Correspondence Address: Alfred Kleinknecht, TU Delft, Jaffalaan 5, NL-2628 BX Delft, The Netherlands. Email: a.h.kleinknecht@tudelft.nl

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that cooperative labour relations may lead to higher productivity growth. For example, protection against dismissal may enhance productivity performance, as secure workers will be more willing to cooperate with management in the development of the production process and in disclosing their (tacit) knowledge for the firm (see Gächter & Falk, 2002; Lorenz, 1992, 1999). Moreover, high employment protection also makes it worthwhile for workers to invest in education and training, because it reduces the uncertainty associated with the future pay-offs of such human capital investments (Agell, 1999).

It is surprising that, in spite of this divergence between standard neoclassical and heterodox views, there is little empirical research on the alleged trade-off between flexibility and productivity. Notably research with firm data is still sparse.[2] This paper contributes to fill this gap. We take the Netherlands as a case for our empirical investigation, because this country has become famous for its high rates of job creation during the 1980s and 1990s (see column 3 of Table 1), which is in itself an interesting experiment.

There is a broad consensus in the Netherlands that the high job growth is to be ascribed to the trade unions' voluntary acceptance of modest wage increases. Since 1982, wage claims by Dutch trade unions were almost constantly below the EU average.[3] Inspired by neoclassical theory, trade unions followed the principle: 'Jobs are more important than wages'. At the same time, trade unions tolerated an increasing flexibilization of labour relations. In the next section we present estimates of wage equations that show that various forms of externally flexible labour allowed for substantial wage bill savings, thus enhancing the policy of voluntary wage restraint.

It is remarkable to see from Table 1 that the marvellous job growth in the Netherlands during the 1980s and 1990s was *not* due to extra GDP growth. Aggregate GDP growth hardly deviated from the EU average (column 1). However, from the 1980s onwards, GDP *per working hour* grew only at about half the European rate. The logical consequence is given in column 3: Dutch GDP growth has been highly labour-intensive.

This paper is structured as follows. The next section gives a theoretical discussion of the possible impact of savings on wage bills and of flexible labour on

Table 1. GDP growth (1), labour productivity growth (2) and the labour intensity of GDP growth (3). The Netherlands (NL) compared to the European Union

	Average annual GDP growth (1)		Average annual GDP growth per hour worked (2)		Growth of labour hours per 1% GDP growth (3)	
	EU-14*	NL	EU-14*	NL	EU-14*	NL
1950–1960	4.5	4.6	4.2	4.2	0.07	0.10
1960–1973	5.2	4.9	5.7	4.5	–0.09	0.07
1973–1980	2.6	2.4	3.0	2.5	–0.15	–0.05
1981–1990	2.4	2.2	*2.1*	*1.0*	*0.12*	*0.57*
1990–2000	2.5	2.8	*2.2*	*1.1*	*0.13*	*0.61*

*Annual average growth rates of EU-14 (excluding Luxemburg)
Source: Calculations based on figures from the website of the Groningen Growth and Development Centre (www.eco.rug.nl/ggdc).

innovation and productivity growth. In the third section we document wage equations that illustrate that flexible labour relations indeed yielded substantial savings on wages. Following this, we analyse whether such wage cost savings translate into extra sales and employment growth. Our estimates allow for indirect inferences about labour productivity growth. These estimates reveal that the main carriers of the low-productive and labour-intensive growth path in the Netherlands were smaller firms. Smaller firms were the most important job machines as they had very low rates of labour productivity growth. The final section presents conclusions about the broader meaning of the findings.

Hypotheses

How to explain the low productivity but high employment growth path in the Netherlands as visible in Table 1? Various parts of economic theory suggest that there exists a positive causal relationship between wage growth and labour productivity growth, notably:

(i) In standard *neo-classical theory*, an increase in the relative price of labour leads to substitution of capital for labour, shifting along a given production function, until the marginal productivity of labour equals the given real wage. Causality in this argument runs from relative factor prices to choice of technique and hence productivity.
(ii) In *vintage models*, wage increases lead to scrapping of old, labour-intensive vintages of capital in favour of new and more productive vintages of capital.
(iii) In the theory of *induced technological change*, higher relative wages increase the labour-saving bias of newly developed technology (Hicks, 1932; Kennedy, 1964; Ruttan, 1997);
(iv) The *Schumpeterian theory of creative destruction* suggests that, due to their monopoly rents from innovation, innovating firms can better live with an aggressive wage policy by trade unions. Higher real wage growth enhances the Schumpeterian process of '*creative destruction*' in which innovators compete away technological laggards. Conversely, slow wage growth and flexible labour relations increase the likelihood of survival of low-quality entrepreneurs. While this is favourable for employment in the short-run, it leads to a loss of innovative dynamism in the long run (Kleinknecht, 1998).
(v) According to Schmooklerian demand–pull theory[4] and the Verdoorn–Kaldor law, higher effective demand raises innovative activity and labour productivity. This implies that wage restraint or downward wage flexibility may impede innovation as far as it leads to a lack of effective demand.
(vi) Within an *endogenous growth framework* (e.g. Foley & Michl, 1999, pp. 288–298), a profit-maximising firm's decision to invest in (labour productivity increasing) R&D, can be shown to depend on the share of wages in total costs. The higher the wage share, the more profitable it becomes to devote resources to increasing the productivity of labour.

Some of these theories point to a direct link between wages and labour productivity growth. Others, such as the '*creative destruction*' argument, suggest that overall innovation activity may slow down in response to lower wage cost pressure. In any case, all those pieces of theory may contribute to explain the sharp post-1980 decline of Dutch labour productivity growth (relative to the average EU-14 productivity growth) observed in column 2 of Table 1.

Such effects can be enhanced by flexible labour. Of course, one could argue that 'more flexibility' (resulting, among others, in a higher labour turn-over) might be favourable to a firm's innovation potential. A larger inflow of new people may enrich the pool of a firm's innovative ideas and open up new networks. Moreover, it will be easier for a firm to replace less productive people by more productive ones. Together, such advantages should result in higher sales, employment and productivity growth among those firms that have taken a lead in making their labour relations more flexible.

However, high flexibility of labour also has disadvantages. A permanently high rate of people joining and leaving a firm may diminish social cohesion and trust and increase the probability of opportunistic behaviour. In other words, such flexibility will diminish social capital, forcing firms to invest more money in monitoring and control (see Naastepad & Storm, 2005).[5] Moreover, the so-called '*hold up*' problem may become more relevant: As labour relations are expected to be of shorter duration, employers and employees may be reluctant to really 'invest' into the labour relation. For example, the employer may hesitate to invest into the human capital of his flexible workers, but the employees themselves may also invest less in firm-specific knowledge, networks, trust, etc. High external mobility of people increases the probability that one cannot fully appropriate the benefits of such investment.

Flexible and short-run labour relations may also favour the leaking of trade secrets and of technological knowledge, which may discourage investments in R&D and innovation. In other words, the loss of social capital will aggravate the problem of market failure due to positive externalities. This may be particularly harmful for innovative and knowledge intensive firms. Moreover, firms with a more flexible workforce may also suffer in terms of the quality of their services since frequent changes of personnel may cause problems of information transfer between people leaving the firm and people coming in. Besides impeding the accumulation of 'tacit' knowledge, a high personnel turnover may weaken a firm's historical memory.

It is hard to predict theoretically whether such drawbacks of flexible labour will or will not compensate for its advantages. We therefore engage in an empirical exploration. We analyse first the wage bill saving effects of flexibility and then proceed to investigate whether the use of flexible labour has an impact on a firm's sales and employment growth.

Effects of Flexible Labour on Wages

We first investigate whether the use of flexible personnel results in savings on a firm's wage expenditures. We assume savings on a firm's wage bill to be achieved by two reasons. First, flexible work is hired and paid only if there is work, typically during temporary production peaks. In other words, the risk of temporary lack of new orders is shifted from firms to employees. Second, we assume that flexible workers tend to be recruited among less-favoured people. As these people come from segments of the labour market with relatively high unemployment, they can be assumed to earn less than comparable tenured workers.

We use firm-level as well as person-level wage data collected by the Organisation for Strategic Labour Market Research (OSA) of the Netherlands. The OSA enterprise data cover firms from all sectors of manufacturing and services, from agriculture, and even from non-commercial services. In addition to information

about characteristics of firms that will serve as control variables, the following data on flexibility of labour at the firm level are available in the OSA database:

(i) An indicator of *internal* flexibility of labour: The percentage of personnel who were given a new function or who moved to a different department within the same firm during 1994.
(ii) Indicators of *external* flexibility of labour:

- The percentage of personnel who were newly hired or who left the firm in 1994; as an explanatory variable, we take the lowest of both values.[6]
- The percentage of personnel being on temporary contracts at the end of 1994 (without a perspective of tenure);
- The percentage of a firm's total 1994 working hours worked by people hired from private manpower agencies.

Our above division between *internal* and *external* flexibility is comparable to the distinction often made in the literature between *functional* and *numerical* flexibility. Numerical flexibility aims at (quantitative) adaptation of labour to the needs of the enterprise by easy hiring or dismissal. In a normative sense, it is often referred to as 'low road' practices, leading to a higher turnover of personnel and possibly to low-trust labour relations. Internal flexibility tends to be associated to notions of *functional* flexibility, emphasizing the *qualitative* adaptation of labour to the changing needs of the enterprise; it tends to be associated with re-training of personnel, long-run commitments, and, in a normative sense, it may be characterized as 'high road' practices.

When explaining the hourly wage earned by a person (or the average hourly wage paid by a firm), the most outstanding control variables are age, education and sex. Typically, older people, people with higher education and males earn more than younger people, lower educated people and females. Besides, we expect wage differences by sector, region, firm size and firm age. In our firm-level estimates (Table 2) we estimate two model versions. Model 1 includes simply the indicators of flexibility; model 2 includes cross-terms: Flexibility times a dummy for firms that do or do not perform R&D. This specification attempts to capture the possibly differential impact of flexibility on wages in innovating firms compared to traditional firms.

Table 2 presents an estimate at the firm level (derived from the OSA enterprise panel). This estimate explains the average annual wage per hour paid by enterprises. Table 3 documents an estimate at the individual person level, derived from the OSA labour supply panel, which is a representative survey of the Dutch labour force. As expected, both estimates show that, besides education, the age structure of a firm's personnel (or, in Table 3: the age of the individual employee) is very important for explaining wage differences. Besides differences between sectors, we also find regional differences: Firms in the country's core regions pay higher wages than those in the (semi-) periphery. While collective wage contracts are national, the actual payment practices seem to be flexibly enough to take into account regional differences in costs of living. As expected, female employees earn less than males. Moreover, larger firms pay higher wages, which is well documented but badly understood in the literature (see Brown & Medoff, 1989).

It is interesting to note that high rates of internal flexibility (i.e. high shares of employees changing function or department) do not yield wage cost savings. On the contrary, they even lead to a significant increase. So 'high road' practices or

functional flexibility are not cheap. A high (external) labour turnover yields wage bill savings among non-R&D performing firms, but not among the R&D performers. An obvious explanation of this finding is that non-R&D performers can use a high turnover for hiring younger and cheaper workers, while innovative firms are more strongly dependent on the knowledge from experience by older (and more expensive) people. Irrespective of whether firms perform R&D, high shares of temporary contracts (without a perspective of tenure) lead to significant wage cost savings. Table 3 shows that, at the individual person level, people on truly temporary contracts earn 20% less per hour than do tenured workers. Self-employed people ('free lance') earn 9% less, in spite of taking on an entrepreneurial risk. It is interesting to note that wages of part-time workers do not differ from those of their full-time colleagues. Other than in most other European countries, part-timers in the Netherlands are *not* considered as being flexible workers (being discriminated against in pay or by the labour law).

Finally, it is interesting to note that we find no evidence of compensating wage differentials. There are several groups of workers for which one might expect such differentials. Take, for example, people who do heavy physical work or people who have non-regular working times, and, of course, people who, because of their flexible contracts, have higher risks of being fired, or 'free lance' people who carry an entrepreneurial risk. In all these cases, one would expect that, under 'normal' circumstances, they should earn some premium above the 'normal' market wage. However, we find even *negative* premiums. A possible explanation for this is the oversupply of low qualified labour in a segmented labour market.

In conclusion, the above Tables 2 and 3 give evidence that flexible contracts lead to significant savings on a firm's wage bill. This holds for people on truly temporary contracts and for self-employed ('free lance') people. It does not, however, hold for people hired from manpower agencies. High shares of working hours worked by people from manpower agencies do not significantly influence average wages paid by a firm. One should be aware that a firm's wage expenditures for people hired from a manpower agency also cover the value added of the manpower agency. This suggests that the individual workers hired from the agency earn less than the market wage.

The Impact of Flexible Work on Sales and Job Growth

Above we found that several categories of flexible workers earn lower wages per working hour and firms that engage more flexible workers pay, on average, lower wages compared to firms that employ more tenured workers. Do such wage bill savings translate into higher sales and job growth? In principle, one would expect it should. Lower wage bills are a competitive advantage. Moreover, one can argue that the decision to hire new workers is taken more easily if workers can be fired more flexibly under adverse circumstances. As part of the entrepreneurial risk is shifted to employees, job creation is made easier. A high rate of internal flexibility of labour is likely to yield productivity gains, while not having the negative effects on the firm's social capital and on investment in human capital, caused by external flexibility. We therefore expect firms that have a greater degree of *internal* flexibility among their labour force to show faster sales growth and, to a lesser extent (because of possible productivity gains), faster employment growth. As outlined above, we leave open the impact on sales and employment of greater *external* flexibility because gains in allocative

Table 2. Factors that influence the (log of) average annual wages paid in enterprises (estimates based on OSA labour demand panel)

	Model *without* slope dummies		Model *with* slope dummies for (not) having R&D	
Variables on flexibility	coeff.	*t*-values	coeff.	*t*-values
Minimum of inflow and outflow percentages	–0.002	–1.5	–	–
Percentage of personnel that changes function or department (IV)*	0.034	2.2	–	–
Percentage of personnel on temporary contract	–0.007	–3.3	–	–
Percentage of labour hours hired from manpower agencies	0.001	0.4	–	–
Slope dummies (R&D activities: yes or no?)				
Minimum of inflow and outflow/no R&D	–	–	–0.003	–1.9
Minimum of inflow and outflow/some R&D	–	–	0.001	0.3
Percentage of personnel that changed internally/no R&D (IV)*	–	–	0.051	2.6
Percentage of personnel that changed internally/some R&D (IV)*	–	–	0.008	0.3
Percentage of personnel on temporary contracts/no R&D	–	–	–0.007	–2.1
Percentage of personnel on temporary contract/some R&D	–	–	–0.010	–2.8
Percentage of labour hours hired from manpower agencies/no R&D	–	–	0.003	0.9
Percentage of labour hours hired from manpower agencies/some R&D	–	–	–0.000	–0.3
Control variables:				
Constant term	10.77	67.0	10.76	66.7
Dummy: Agriculture	–0.00	–0.0	–0.00	–0.0
Dummy: High technological opportunity industries	–0.10	–1.7	–0.09	–1.7
Dummy: Construction and installation	–0.04	–0.7	–0.04	–0.6
Dummy: Trade, transport, communication	–0.07	–1.3	–0.08	–1.3
Dummy: commercial services	0.01	0.2	0.00	0.1
Dummy: Location in semi-periphery (Overijssel, Gelderld., Flevold.)	–0.09	–2.5	–0.09	–2.5
Dummy: Location in periphery (Friesld., Groningen, Zeeld., Limburg)	–0.08	–1.9	–0.08	–1.9
Proportion of employees <20 years old	–0.88	–3.5	–0.90	–3.6
Proportion of employees 20–29 years old	–0.38	–2.4	–0.36	–2.3
Proportion of employees 30–39 years old	0.06	0.4	0.08	0.5
Proportion of employees 40–49 years old	0.16	0.8	0.18	1.0
Proportion of female employees	–0.33	–3.9	–0.33	–3.9
Proportion of employees with higher education	0.37	3.4	0.37	3.4
Proportion of employees with medium education	0.15	2.3	0.14	2.3
Proportion of part-time employees	0.10	1.1	0.12	1.2
Percentage of employees with flexible working schemes**	–0.02	–1.6	–0.02	–1.8
Firm size (log of employees)	0.06	5.0	0.06	5.0
Dummy: young firm (<5 years old)	–0.07	–2.0	–0.07	–2.0
Sales per employee (in 1,000,000)	0.14	4.3	0.13	4.2
R&D (as a percentage of sales)	0.007	1.6	0.009	1.8
Percentage of employees doing heavy physical work**	–0.02	–2.2	–0.02	–2.1
Adjusted R^2	0.45		0.46	
Numbers of observations	472		472	
χ^2 (Chow test)			0.0623	

Notes: Standard errors are heteroscedastically consistent according to the method of White. The Chow test indicates that the coefficients of the flexibility variables differ at a 6% level of significance between firms that have some or no R&D.

*Abbreviation: IV = variable is instrumented because the Hausman specification test rejects the assumption of exogeneity (p value: 0.013). Instruments used are the percentage of personnel that changed function or department in 1992 and the sector dummies.

**Classes: 1 = nobody; 2 = 0–20% of employees; 3 = 21–40%; 4 = 41–60%, 5 = 61–80%; 6 = 81–100%.

Table 3. Factors that explain the log of gross hourly wages earned in 1994 by individual workers (estimates based on OSA labour supply panel)

Flexibility variables	Coefficients	*t*-values
Dummy: part-time worker	0.02	1.1
Dummy: temporary contract (without a perspective of tenure)	–0.20	–6.3
Dummy: self-employed ('freelance')	–0.09	–2.0
(Reference group: tenured position)	–	–
Control variables:		
Constant term	3.09	22.7
Dummy: <19 years old	–0.80	–9.8
Dummy: 20–29 years old	–0.20	–2.9
Dummy: 30–39 years old	0.04	0.6
Dummy: 40–49 years old	0.10	1.7
Dummy: 50 years and older (reference group)	–	–
Dummy: Physically tough worker	–0.11	–7.1
Dummy: Lives in a core region (Randstad or North-Brabant)	0.06	3.5
Dummy: Lives in semi-periphery (Overijssel, Flevoland)	0.04	1.3
Firm size (employees/1,000,000)	31.65	4.6
Dummy: firm size unknown	–0.05	–1.0
Dummies for employees that work in:		
– Agriculture	–0.07	–1.2
– Trade, transport or communication	–0.07	–2.1
– High technological opportunity sectors in manufacturing	–0.07	–1.9
– Construction and installation	–0.07	–1.7
– Commercial services	0.04	1.1
– Education	0.10	2.6
– Health care	–0.02	–0.6
– Other services	–0.04	–1.3
– Low technological opportunity sectors in manufacturing (reference group)	–	–
Personal properties (sex and level of education)		
– Female, highly educated	–0.00	–0.1
– Male, highly educated	0.38	10.2
– Female, medium education	–0.22	–4.7
– Male, medium education	0.12	4.4
– Female, low education	–0.38	–7.0
– Male, low education (reference group)	–	–
Heckman correction term	0.34	2.8

efficiency may be offset by losses in terms of social and human capital (as discussed in earlier).

The relevance of a possibly negative impact of flexibility on human and social capital may differ between more or less innovative and knowledge-intensive firms. We therefore use slope dummies: flexibility times a dummy for innovativeness, using a dummy that is zero for firms that have no R&D activities and one for firms having some R&D. In general, we expect external flexibility to have a more positive (or less negative) impact on growth in firms without R&D. In other words, innovating firms that are more strongly dependent on factors such as human capital investment and appropriation of innovation benefits (prevention

of knowledge leaking) may have less advantage from a higher external flexibility of their workforce.

As control variables we use sector dummies defined along the lines of Pavitt's (1984) classic paper. Furthermore, we include firm size, taking account of a large literature on Gibrat's law. In interpreting Gibrat's law, Klomp (1996) argued that there might be no difference in firm growth by size, except for starting firms. In the beginning, newly founded firms tend to work below a minimum efficient scale, which forces them to grow rapidly in order to survive. We take account of Klomp's argument by including a dummy for firms that are less than five years old, as well as a continuous variable for firm size (i.e. the log of numbers of employees).

Another control variable relates to firms that underwent a major structural change during the last two years. Since such structural change is frequently associated with lay-offs of personnel, we expect this dummy to have a negative sign in the employment and sales equations. Finally, we include variables about innovative behaviour, two of which relate to process innovation: (1) a dummy for firms that claim having *'an advanced position in the mechanisation and automatisation of the production process*', and (2) a dummy for firms that indicate that they have *'introduced a major new technology during the past two years*'.

Moreover, we include a measure of R&D intensity (R&D expenditures as a percentage of sales), as well as a measure of the 'output'-side of the innovation process: the share in 1994 sales of (new or improved) products introduced during 1992–1994. In general, we expect these innovation variables to have a positive (or at least a non-negative) impact on sales and employment growth. In our various estimates, several of the explanatory variables needed to be instrumented in order to avoid problems with endogeneity. Instrumented variables are indicated as 'IV' in the tables.[7]

Our estimates on sales performance and employment growth are summarised in Tables 4 and 5. In both cases we estimate two models: one in which we simply include indicators of flexibility and one with slope dummies: indicators of flexibility times a dummy for firms with or without some R&D. The latter version (model 2) informs us about whether the impact of flexibility is different for innovators and non-innovators (proxied by the dummy 'R&D: yes/no'). In order to allow for direct comparability, the models in Tables 4 and 5 are estimated on identical firms (590 observations), and identical exogenous variables are used. This has an important implication: differences in coefficients between the sales equation and the employment equation can be ascribed to differences in labour productivity growth (assuming that the growth of sales per employee is a fair approximation of labour productivity growth). In other words, in addition to informing us about sales and employment growth, comparison of the coefficients of the two models allows indirect conclusions to be drawn about labour productivity growth.[8]

One may be concerned about the direction of causality. Notably, some of the technology variables and some flexibility indicators may be endogenous. We therefore used as instruments lagged values for the technology and flexibility indicators and estimated our model with and without instruments. Application of the Hausman test suggested that it was *not* necessary to use instruments (see for details Kleinknecht *et al*., 1997, pp 81–82).

The results in Tables 4 and 5 seem to confirm our expectations with respect to flexibility. Firms with higher *internal* flexibility indeed experience above-average sales and employment growth. The indicators of *external* flexibility generally have

Table 4. Factors that influence a firm's percentage growth of sales (1992–1994)

	Model 1		Model 2	
Indicators of labour market flexibility (model 1)	coeff.	*t*-value	coeff.	*t*-value
Percentage of personnel joining or leaving the firm (the lowest of both)	0.06	0.6	–	–
Percentage of personnel changing internally by function or department	0.34	2.7	–	–
Percentage of personnel on temporary contracts	0.03	0.2	–	–
Percentage of hours hired from private manpower agencies	0.10	1.2	–	–
Slope dummies for flexibility times a dummy for R&D (model 2)				
Percentage of personnel joining or leaving times a dummy for firms with:				
• No R&D activities	–	–	0.07	0.6
• Some R&D activities	–	–	0.13	0.7
Percentage of personnel changing internally by function or department times a dummy for firms with:				
• No R&D activities	–	–	0.23	1.6
• Some R&D activities	–	–	0.67	2.8
Percentage of personnel on temporary contracts times a dummy for firms with:				
• No R&D activities	–	–	0.17	1.0
• Some R&D activities	–	–	–0.17	–0.8
Percentage of hours hired from private manpower agencies times a dummy for firms with:				
• No R&D activities	–	–	–0.19	–1.6
• Some R&D activities	–	–	0.27	2.7
Control variables:				
Intercept	4.17	1.3	4.61	1.5
Sector dummies (reference sector: low technological opportunity manufacturing sectors):				
• Agriculture	4.79	1.3	5.71	1.6
• High technological opportunity manufacturing sectors	0.87	0.3	0.96	0.4
• Construction and installation	8.20	2.9	8.13	2.9
• Trade, transport and communication	1.34	0.5	1.67	0.7
• Banking, insurance and brokers	10.1	3.0	10.2	3.0
• Other commercial services	3.75	1.3	4.00	1.4
Dummy: young firm (<5 years old)	3.50	1.9	3.31	1.8
Firm size (log of employees)	–0.45	–0.8	–0.60	–1.0
Dummy: major structural change during the last two years	–6.28	–3.5	–6.28	–3.5
Dummy: advanced position in mechanization and automatization	1.61	1.0	1.54	0.9
Dummy: firm recently introduced a new technology	2.77	1.7	2.67	1.6
Share in total sales of product-related R&D	0.02	0.0	–0.11	–0.3
Slope dummy: share in sales of innovative products times:				
• Dummy for firms with no R&D activities	0.11	1.6	0.12	1.8
• Dummy for firms with some R&D activities	0.10	1.6	0.06	0.9
Adjusted R^2		0.06		0.08
Number of observations		590		590
χ^2 (White test, significance level)		0.5681		0.8477
χ^2 (Chow test, significance level)				0.0084

Note: The Chow-test indicates whether the coefficients of the variables for labour market flexibility differ between firms with some or no R&D activities. The White test indicates whether the error terms are heteroskedastic.

Table 5. Factors that influence a firm's percentage growth of employment (1992–1994)

	Model 1		Model 2	
Indicators of labour market flexibility (model 1)	coeff.	*t*-value	coeff.	*t*-value
Personnel joining or leaving the firm (the lowest of both) (%)	0.13	1.4	–	–
Personnel changing internally by function or by department (%)	0.29	2.4	–	–
Personnel on temporary contracts (%)	0.03	0.3	–	–
Hours hired from private manpower agencies (%)	0.11	1.4	–	–
Slope dummies for flexibility times a dummy for R&D (model 2)				
Percentage of personnel joining or leaving times a dummy for firms with:				
• No R&D activities	–	–	0.10	1.0
• Some R&D activities	–	–	0.31	1.8
Percentage of personnel changing internally by function or department times a dummy for firms with:				
• No R&D activities	–	–	0.27	2.0
• Some R&D activities	–	–	0.43	1.9
Percentage of personnel on temporary contracts times a dummy for firms with:				
• No R&D activities	–	–	0.29	1.8
• Some R&D activities	–	–	–0.31	–1.7
Percentage of hours hired from private manpower agencies times a dummy for firms with:				
• No R&D activities	–	–	–0.13	–1.1
• Some R&D activities	–	–	0.25	2.6
Control variables:				
Intercept	4.59	1.6	4.54	1.5
Sector dummies (reference sector: low technological opportunity manufacturing sectors):				
• Agriculture	1.28	0.4	2.56	0.7
• High technological opportunity manufacturing sectors	0.55	0.2	0.85	0.3
• Construction and installation	4.76	1.8	4.66	1.8
• Trade, transport and communication	2.85	1.2	3.10	1.3
• Banking, insurance and brokers	6.42	2.0	6.24	2.0
• Other commercial services	1.31	0.5	1.45	0.5
Dummy: young firm (<5 years old)	6.56	3.7	6.33	3.1
Firm size (log of employees)	–1.70	–3.0	–1.73	–3.1
Dummy: major structural change during the last two years	–7.01	–4.1	–7.00	–4.2
Dummy: advanced position in mechanization and automatization	0.26	0.2	0.20	0.1
Dummy: firm recently introduced a new technology	1.61	1.0	1.53	1.0
Share in total sales of product-related R&D	0.41	1.4	0.36	1.2
Slope dummy: share in sales of innovative products times:				
• Dummy for firms no R&D activities	0.12	2.0	0.13	2.2
• Dummy for firms with some R&D activities	0.04	0.6	0.02	0.3
Adjusted R^2	0.08		0.09	
Number of observations	590		590	
χ^2 (White test, significance level)	0.6152		0.1801	
χ^2 (Chow test, significance level)			0.0175	

Note: The Chow test indicates whether the coefficients of the variables for labour market flexibility differ between firms with some or no R&D activities. The White test indicates whether the error terms are heteroskedastic.

positive but insignificant signs. Model 2 shows interesting differences between innovative and non-innovative firms:

- A high rate of *internal* mobility indeed has positive effects on both sales and employment. Coefficients among innovators are higher, however, indicating that they show higher growth in sales and employment under a higher rate of internal mobility. Moreover, innovators experience a higher growth in sales than in employment, indicating that they realise higher rates of labour productivity growth. This suggests that innovative firms derive more benefit from greater internal mobility (i.e. by keeping peoples' knowledge within the firm).
- A high rate of people joining or leaving the firm has no significant impact on sales growth. Among innovators, however, it may result in a higher growth of employment (significant at 10% level). Comparing this to the insignificant coefficient for labour turnover in the sales equation, we conclude that, among innovators, a high labour turnover may have a negative effect on labour productivity growth (thus resulting in higher job growth at the same rate of sales growth).
- A high rate of people on temporary contracts has no significant effect on sales, the sign of the coefficients being positive among non-innovators and negative among innovators. However, high rates of temporary contracts increase employment in non-innovating firms (significant at 90% level), suggesting that their growth of labour productivity is lower.
- Finally, the outcomes with respect to workers hired from private manpower agencies are remarkable: Among innovators there is a highly significant positive effect on both sales and employment growth, while among non-innovators there is a negative but weakly significant effect on sales and an insignificant effect on employment (suggesting that labour productivity may be negatively affected by hired labour). The divergent impact of hired labour could possibly be explained by different usage: non-innovators seem to use hired labour mainly as a substitute for permanent labour, while innovators use them mainly for covering temporary labour shortages. This can be related to the varying impact of the 1992/93 recession on innovators and non-innovators (our observations relate to 1992–1994). Geroski *et al*. (1993) found that innovators can better resist the pressure from recessions. This suggests that, during our observation period (1992–1994), many non-innovators were likely to be reducing their stock of personnel (and often substituting hired labour for permanent staff),[9] while innovators were doing better and tried to cover temporary labour shortages by hiring extra labour.

In addition to indicators of flexible labour, the innovation variables merit attention. Firms that experienced major structural changes over the last two years have the expected negative coefficients, but none of the various innovation indicators has a negative impact on employment. Firms that claim having 'an advanced position in mechanisation and automatisation' do not differ from others. However, firms reporting a recent 'introduction of a new technology' have higher sales growth but do not differ in terms of employment growth. Obviously this is due to labour productivity gains as a result of the new technology.

The behaviour of the variables on sales of innovative products is interesting. We used the slope dummy '*sales of innovative products*' times a dummy for firms that have some (or no) R&D activities. This was intended to distinguish between

'heavier' and 'easier' innovations, because many firms introduce new products (including imitations) without (substantial) R&D effort. It turns out that 'easier' innovations tend to have a positive impact on both sales and employment, while a positive impact of 'heavier' innovations is doubtful. This may be ascribed to the time lags in our model. 'Heavier' innovations probably have incubation times that are longer than those taken into account in our model.

Finally, we find that sales of young firms grow much faster than average, while firm size in general (as a continuous variable) does not matter for sales. This confirms Klomp's (1996) conclusion about Gibrat's law: Growth is independent of firm size, except for young, starting firms. The picture is different, however, for employment growth. While sales growth does *not* significantly differ by firm size, employment growth does. Smaller firms realise significantly higher employment growth. This implies that their growth rates of labour productivity (proxied by sales per employee) are lower. A similar pattern emerges among young firms: the coefficients of employment growth are higher than the coefficients of sales growth. This confirms the popular notion that small and young firms are the engines of employment growth. However, the difference of the coefficients for firm size between the sales equation and the employment equation also reveals a major weakness behind this engine: Employment gains are, to an important degree, caused by a weak growth of labour productivity in young as well as in smaller firms. This implies that the low-productive and labour-intensive growth shown in Table 1 above is, to an important degree, due to a productivity crisis in the smaller firms.

Broader Meaning of the Findings

The above estimates confirm our expectation that (externally) flexible labour (except for labour hired from manpower agencies) did indeed allow for savings on wage bills. Besides a deliberate policy of sacrificing wage increases by the trade unions, savings on wage bills due to flexible labour relations contributed to diminished wage cost pressure, which was at the base of the Dutch job miracle during the 1980s and 1990s. As shown in Table 1, the job creation miracle coincided with a decline in labour productivity growth. Our above estimates show that the productivity decline was particularly strong among smaller and younger firms.

Our indicator of *internal* flexibility of personnel can be taken as a proxy for *functional* (other than *numerical* or *external*) flexibility. Such functional flexibility may be more typical for 'Rhineland' than for 'Anglo-Saxon' labour relations. It is remarkable to note that firms that make greater use of such internal flexibility realize significantly higher sales and employment growth, in spite of paying higher wages. The effect of internal flexibility on sales growth is highly significant among firms that perform some R&D, and it is weakly significant among non-R&D performers. This confirms our hypothesis that functional flexibility is more beneficial to innovators. By handling internal (other than external or numerical) flexibility, innovators invest in trust and loyalty of their personnel, which is favourable for the accumulation of (tacit) knowledge and reduces the leaking of knowledge to competitors.

In general, firms that have a high turnover of personnel do not realize significantly higher sales growth, and the same holds for firms that employ high shares of personnel on truly temporary contracts (without a perspective of tenure).

Seemingly, advantages from lower wage costs (found in Tables 2 and 3) are more or less compensated by losses on various forms of social capital: an increased turnover of workers with short-run commitments leads to diminished trust, loyalty and identification with the firm, creates '*hold-up*' problems and leads to increased market failure owing to easier leaking of knowledge (i.e. positive externalities).

These latter arguments may also explain why, comparing the coefficients of the sales and employment equations, we find several indications that external flexibility is damaging to labour productivity growth. The latter finding comes close to conclusions by Buchele & Christiansen (1999). Using slightly different indicators and highly aggregate macro data, they illustrate that the Anglo-Saxon model may be strong in creating employment, but weak in labour productivity growth, while the opposite holds for the Rhineland model: 'We have argued above … that while more highly regulated European style labour market institutions may inhibit employment growth, they also promote productivity growth. While less regulated US style labour markets my promote employment growth, they also inhibit productivity growth' (1999, p. 323).

Of course, while Buchele and Christiansen compare across countries, we have microdata within a country. On the other hand, categories such as 'Rhineland' vs 'Anglo-Saxon' models of labour relations are broad generalizations. Different firms within each country may have a different mix of both. It is interesting to conclude that firms in the Netherlands that rely more strongly on Anglo-Saxon labour relations (using many temporary contracts, and having a high labour turnover) have not realized extra sales growth, in spite of substantial savings on wage costs. At the same time, we find indications that such firms will experience lower labour productivity growth, leading to higher employment growth. This is consistent with the macro pattern in Table 1 above and comes close to the conclusions by Buchele & Christiansen (1999).

In this context, our finding that the pattern of high employment vs low productivity growth is more pronounced among smaller firms is also of interest. It is obvious that smaller firms have lower trade union coverage, and therefore the protection of personnel may be weaker. It is therefore likely that our firm size variable has actually captured some elements of flexibility of labour not covered by our direct flexibility indicators.

Finally, we may ask: why should we be concerned about a low-productivity–high-employment growth path? There are at least four reasons to be concerned about the long-run sustainability of this growth regime in the Netherlands.

First, during the late 1990s, the labour-intensive growth model lead to labour-scarcity that drove up wages—in spite of modest wage demands by the trade unions. Labour scarcity forced firms to pay an increasing number of individual workers above the level of collective wage agreements negotiated by trade unions. With a still lasting productivity crisis, these wage increases were not matched by higher productivity gains, thus weakening the competitive position of Dutch firms on international markets. This points to a general problem with an economic model that mainly competes on low factor costs (rather than on innovation). If successful, such a model will unavoidably run into problems, as success will make certain production factors scarce and drive up factor prices.

Second, if collective wage agreements by trade unions keep wage increases low in times of labour scarcity, scarcity will nonetheless drive up wages: those employees that are scarce in supply will negotiate individual wage increases.

From a neoclassical viewpoint, this is 'good', as it is a signal about scarcity that gives incentives to an increase in the supply of scarce people. From an evolutionary view, however, it is rather harmful. It is well known that the scarcity in the Dutch labour market was mainly related to highly educated labour. From other analyses of the OSA database,[10] we know that the innovative segment of the economy has the most urgent need for highly educated personnel. This implies that the individually negotiated wage increases at the end of the 1990s were mainly paid by innovative enterprises. Low technology firms and technological laggards tended to pay the lower wage levels agreed upon in collective agreements. This is likely to have hampered the Schumpeterian process of 'creative destruction' in which innovators compete away the laggards. Moreover, it is comparable to a situation in which the government imposed an extra tax on innovators, using the tax revenues for subsidizing the laggards. It is therefore not surprising that the wage drift at the end of the 1990s did not trigger a revival of labour productivity growth.

Third, lack of productivity growth has, to an important degree, to do with a lack of modernization of capital stock. Job growth that is achieved by lack of modernisation of capital stock is likely to be fragile. Recall from Table 1 (column 1) that the Netherlands had *no* higher GDP growth than the rest of Europe. Therefore, many of the new jobs in the Netherlands are in a sense artificial. They would not have been created if labour productivity had grown at the same rate as in the rest of Europe. During the recession since 2001, Dutch unemployment was rising strongly and GDP growth declined more strongly than in the rest of Europe. It looks as if lack of modernisation in the 1980s and 1990s has made the Dutch economy extra vulnerable in a business cycle downswing.

Finally, numerous mainstream economic think tanks again and again propagate that achieving more flexible labour markets should solve the European unemployment problem. This often includes a plea for reduction of wage costs by easier hiring and firing, by bashing trade unions, and by greater (downward) wage flexibility. This paper warns that, here again, there is no free lunch. The example of the Netherlands shows that sacrificing wage increases can indeed lead to higher job growth. As can be seen from Table 1, however, this job growth is not due to extra GDP growth. It comes from lower GDP growth per hour worked. This required many more hours of work in order to achieve the same GDP growth as in the neighbouring countries, leading to a welfare loss in terms of a loss of leisure time.

The standard recipe of more flexible labour markets may therefore come at the cost of reducing incentives for labour productivity growth and innovation. In a textbook economics world where there are no other distortions except for inflexible labour markets, the first-best policy is indeed to remove the labour market distortion. In the real world, however, there are many distortions or market failures, and the removal of one distortion is not necessarily welfare-improving. In this paper we have provided evidence that this may indeed be the case—more flexible labour markets may reduce unemployment and create jobs but at the cost of reduced innovation and labour productivity growth due to the presence of other distortions (such as moral hazard problems, hold up problems, appropriation problems due to high personnel turnover, etc.). A singular emphasis on more flexible labour markets may therefore be counterproductive. Moreover, reduction of unemployment could also have been achieved if trade unions had demanded shorter standard working times in exchange for wage increases, i.e. by trading higher consumption against more leisure time.

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Notes

1. Dr Alfred Kleinknecht is Professor of Economics and Dr C.W.M. Naastepad is lecturer in economics, both at *TU Delft.* Dr Remco M. Oostendorp is Associate Professor of Economics at the *Vrije Universiteit*, Amsterdam. Dr Menno P. Pradhan is economics researcher for the World Bank at Jakarta, Indonesia. The findings, interpretations and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the view of the World Bank, its Executive Directors, or the countries they represent.
2. Some of the few examples include Michie & Sheehan (1999); Huselid (1995); Fernie & Metcalf (1995), or Laursen & Foss (2003).
3. See, for example, the compilation of data published by the Dutch Central Planning Office (CPB, 2000, see www.cpb.nl).
4. The classical reference is Schmookler (1966); for a survey of literature and empirical support see Brouwer & Kleinknecht (1999).
5. Estimates by Naastepad & Storm (2005) for the period 1984–1997 show considerable variation in the average intensity of management supervision (defined as the percentage of the non-agricultural labour force working in administrative and supervisory occupations). These reach from a low of 2–4% in the 'inflexible' economies of Germany, Norway, and Sweden, to a high of 13% in the quite flexible economies of the USA and Canada. For a sample of 19 OECD countries (1984–1997), Naastepad and Storm find a statistically significant negative association between the strength of employment protection legislation (as measured by the OECD EPL-index) and their index of supervision intensity.
6. The reason behind this is the following. To a certain degree, the inflow and outflow of personnel just reflects the normal growth (or decline) of a firm's activities; suppose a firm has a net inflow of personnel (inflow > outflow). In this case, the percentage of *out*flow is a measure of *extra* flexibility (exceeding the 'normal' flexibility needed to adjust its personnel to changes in production growth). The opposite holds if the outflow of personnel is larger than the inflow. In other words, by taking the minimum of inflow and outflow, we measure *extra* flexibility that exceeds a firm's 'normal' need for change in personnel.
7. Details about the instrumentation can be found in Kleinknecht *et al*. (1997, pp. 81–82).
8. One should note that inferences about labour productivity growth in this paper are confined to productivity growth in *existing* firms; productivity effects due to exiting or entering firms are neglected. A recent study by the OECD (2003) suggests that about 2/3 of aggregate productivity growth is taking place in existing firms. The remainder is due to entry or exit.
9. When analysing determinants of the use of flexible labour, we found that firms that underwent major processes of reorganisation not only reduced their personnel, but also substituted flexible personnel for tenured personnel (Kleinknecht *et al*., 1997, p. 35)
10. See Kleinknecht *et al*. (1997), Kleinknecht & Oostendorp (2002) and Dekker & Kleinknecht (2003).

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