Modelling eWork in Europe

Estimates, models and forecasts from the EMERGENCE project

P Bates, U Huws

EMERGENCE

Report 388

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Falmer
Brighton BN1 9RF
UK

Tel. + 44 (0) 1273 686751
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IES aims to help bring about sustainable improvements in employment policy and human resource management. IES achieves this by increasing the understanding and improving the practice of key decision makers in policy bodies and employing organisations.

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Executive Summary

In 2000, the EMERGENCE Project carried out a major survey of employers in 18 European countries to establish the extent to which employers are currently using eWork. This survey established that there are major differences between countries both in the extent and the type of eWork carried out.

The definition of eWork used was a broad one, including all information-processing work carried out away from the establishment using a computer and a telecommunications link to deliver the work, regardless of whether this work was carried out by direct employees or outsourced. A distinction was made between eWork carried out by individuals working away from the office, for instance in their homes or from multiple locations, and those working on remote office-type premises.

The aim of this study was to combine the results of this survey with existing European official statistics in order to develop models, estimates and forecasts of the numbers of eWorkers in Europe.

It was found that no existing statistics make it possible to estimate the numbers of workers supplying eWork to remote employers from office-type premises. However, there are some data that enable estimates to be derived for 'individual' eWorkers.

Types of 'individual' eWork

Four distinct types of 'individual' eWorkers are identified in the study:

1. Fully home-based eWork by employees (or 'telehomeworking')
2. Multilocational eWork by employees (typically involving an alternation of work between the home and the employer's office, or mobile working from a home base)
3. 'eLancing' — self-employed eWork supplying information-based business services from a home base
4. 'eEnabled self-employment' — self-employed work based in the home, which uses ICTs but does not involve the supply of information-based business services.

Procedure

For the first three of these types of eWork, the evidence from the EMERGENCE establishment survey was linked to evidence from existing labour force statistics. For the fourth category (which was not captured in the EMERGENCE survey) the analysis was based solely on existing labour force statistics.

In order to develop a model of eWork, it was necessary to identify the points of contact between the EMERGENCE data and other statistics available in longitudinal series. These were:

- establishment size
- sector
- geographical location
- prevalence of individualised forms of eWork
- prevalence of home-based work.

Individualised forms of eWork could be modelled because of the existence of a Europe-wide Labour Force survey using common definitions, and because of data on teleworking in the UK since 1997.

Around nine million 'individual' eWorkers in Europe in 2000

The study concluded that there were over nine million eWorkers in Europe in 2000. As can be seen in Table 1, the largest single group were multilocational eWorkers, estimated at 3.7 million.

Table 1: Estimates of telehomeworkers, eEnabled workers and eEnhanced workers in Europe, 2000

	EU 15
1. Home-based employees who use a computer and telecommunications link to conduct their work (person equivalent)	810,000
2. Multilocational employees who use a computer and telecommunications link to conduct their work (person equivalent)	3,700,000
3. eLancers providing business and related industries who use a computer and telecommunications link to conduct their work	1,450,000
Number of person equivalent eWorkers — sum of 1-3 above (EMERGENCE narrow definition)	*5,960,000*
4. Number of eEnabled self-employed workers who require a computer and telecommunications link to conduct their work not working in business related industries	3,080,000
Number of person equivalent eWorkers — sum of 1-4 above (EMERGENCE broad definition)	*9,040,000*
Estimated number of eWorkers based on CLFS and UK LFS (including irregular eWorkers)	*9,830,000*
(ECATT estimate of 'regular' plus 'supplementary' teleworkers in Europe in 1999[1])	9,009,000

[1] ECATT Project, *Telework Data Report*, Bonn, 2000

Source: EMERGENCE analysis, 2001

This group includes employees who work partly at home and partly in the office, as well as those who work nomadically or from clients' premises.

Employees who work exclusively from their homes using ICTs (often presented in the media as the archetypal teleworkers) are in fact rather rare, comprising only an estimated 810,000 in the EU workforce in 2000.

There were, however, an estimated 1.45 million 'elancers' supplying business services to clients using ICTs and a further three million-plus self-employed people whose home-based businesses are dependent on ICTs (the so-called 'eEnabled self-employed'). This makes a combined total of some four and a half million self-employed teleworkers across Europe, forming approximately half of the total number of teleworkers.

In order to test the accuracy of these estimates, the team also carried out an analysis of data on homeworking from the European Labour Force Survey and estimated how many of these homeworkers might be expected to be teleworkers, given the sectors in which they worked and extrapolating from the UK situation. This produced a slightly higher but not dissimilar estimate of 9.8 million. The nine million estimate also accords approximately with those of other surveys.

Teleworking to triple by 2010

Having established base-line estimates for 2000, the study then attempted to develop estimates to 2010. The only source of information which currently provides reliable estimates of growth in the numbers of individualised eWorkers is the UK Labour Force Survey, which has been tracking the expansion of this form of work since 1997 and has found considerable increases.

In order to develop forecasts at the EU level, it was necessary to assume that these growth rates would continue and would apply elsewhere, taking account of the differing size and sectoral structure of the workforce and of the national differences found in the EMERGENCE survey. The effect of a general growth in employment was separated from the effect of increasing ICT diffusion.

The resulting forecast, shown in Table 2, suggests that if current employment trends continue, approximately a million new eWorkers are likely to appear over the ten-year period. However, if technological and organisational change continue at current rates, there is likely to be considerable growth in eWork which, combined with the effects of employment growth, will effectively triple the numbers, to reach 27.1 million by 2010.

Table 2: Projections of the telehomeworkers, multilocational eWorkers and eLancers, 2010

	Employment Growth	ICT diffusion	Employment growth & ICT diffusion
Telehomeworking employees	950,000	2,750,000	3,170,000
Multilocational eWorkers (person equivalent)	4,310,000	12,463,000	14,332,000
eLancers (providing business related services)	1,790,000	2,490,000	3,040,000
eEnabled self-employed	3,080,000	6,580,000	6,580,000
Total estimate of individualised eWorking	10,130,000	24,283,000	27,122,000

Source: EMERGENCE analysis, 2001

By far the largest part of this growth will involve multilocational eWorking by employees, forecast to top 14.3 million. This is followed by eEnabled self-employment, which is predicted to grow to 6.6 million. This form is likely to grow more slowly and reach a plateau sometime after 2010. The reason for this is that, unlike eLancing, self-employment in sectors other than business services shows little evidence of expansion across the EU. Once ITC penetration has reached its maximum in this group, there is therefore no further scope for growth.

Conclusions

The report emphasises the tentative nature of these results, and concludes that there is a need for more reliable statistics for tracking the development of individualised eWork in Europe. These could be like those currently under development at Eurostat and in several national statistical offices in Europe, in collaboration with the EMERGENCE and STILE projects, to introduce relevant questions into labour force surveys. Further work will be required to develop good indicators for forms of eWork that take place on office-type premises.

The report further concludes that there is likely to be a considerable growth in individualised forms of eWork in the EU over the next decade, but that this will be dependent on the continuing uptake of information and communications technologies by employers and individuals.

1. Introduction

The EMERGENCE project was established in 2000, with initial funding from the European Commission's Information Society Technologies (IST) Programme, with a range of objectives relating to the mapping and measuring of eWork at a global level.

In the first eighteen months of its three-year life, EMERGENCE carried out an analysis of the existing evidence, which was available globally at a country level and within the EU at a regional level. We did this to investigate what indicators are already available and what they can tell us about the extent and characteristics of eWork, together with the locations most likely to be involved. In parallel with this study, the project team also carried out a major international establishment-level survey of employers to collect more focused empirical evidence on these issues. The results of both of these studies have now been published by IES: the first under the title: *Where the Butterfly Alights: the Global Location of eWork*[1], the second under the title: *eWork in Europe: Results from the EMERGENCE 18-country Survey*[2]. EMERGENCE has also published a discussion paper on *Statistical Indicators of eWork*[3], as well as carrying out sixty qualitative case studies of remote telemediated work, each involving investigation at two establishments, a 'source' and a 'destination' of relocated information-processing or 'knowledge' work.

This discussion paper draws on the results of this work in order to develop a model of eWork which will make it possible to forecast the growth of this form of work across the EU. In particular, it draws on the first two studies: the results of the EMERGENCE employer survey, and the existing official industrial and labour force statistics. The estimates and forecasts presented in this report are derived from a triangulation of data from these two sources.

It must be emphasised, however, that — as pointed out in our discussion paper, *Statistical Indicators of eWork* – the existing official data are far from adequate for this task. This exercise has therefore involved making some rather large assumptions, which

1 By U Huws and N Jagger, IES Report 378, 2001

2 By U Huws and S O'Regan, IES Report 380, 2001

3 By U Huws, IES Report 385, 2001

should ideally be tested empirically by further research involving more precisely defined indicators.

We do not therefore wish to claim a definitive status for the estimates and forecasts presented in this study. Rather, we present it as an experimental approach to modelling the elusive phenomenon of eWork which is, in our view, as accurate as can be achieved using the existing, inadequate, statistics. We have made recommendations elsewhere[1] for how these statistics might be improved.

[1] Huws, U, *Statistical Indicators of eWork,* IES Report 385, 2001

2. The EMERGENCE Definition of eWork

During the quarter-century or so since it was discovered that the combination of computing and telecommunications technologies could facilitate a relocation of white-collar employment away from its traditional office locations, an enormous range of terminology has been developed to describe some or all of the forms of delocalisation which have been made possible. These include 'telecommuting', 'flexi-place', 'telework', 'remote work', 'networking', 'digital nomadic work', 'electronic homeworking', and many variants of these. The term currently favoured by the European Commission and some other agencies is 'eWork'. Although this term does not specifically refer to distance (as do, for instance, the terms which are prefixed by 'tele' or 'remote'), it has the benefit of avoiding over-specificity and of being capable of being applied across a range of activities and not being restricted to a particular form of remote work, such as homeworking or multilocational working.

We have adopted the term 'eWork' in the EMERGENCE project to refer generically to any type of work which involves the digital processing of information and which uses a telecommunications link for receipt or delivery of the work to a remote employer or business client.

It should be noted that the focus here is on the remote link with the employing body or business client. Such a definition does not include work which involves dealing with the general public by telephone or email (such as call centre work) unless this work also happens to involve the transmission of work over a telecommunications link to a remote employer or business client (*eg* an outsourced call centre, or a call centre located on a remote site but accessing a database at the employer's head office).

Because of the very widespread use of information and communications technologies across industries and occupations, such a definition covers an enormous range of employment, and there are very many different ways in which the broad category 'eWork' can be broken down. Once could, for instance, subdivide it by occupation, by skill or qualification, by the type of remote workplace involved, by industrial sector, by the type of employment contract used, by the number of hours worked, by the demographic characteristics of the workers (*eg* their age, sex,

ethnicity, marital status, disability *etc.*), by the degree of remoteness, flexibility or autonomy involved in the working arrangement, or by any one of a range of other variables.

The EMERGENCE conceptual framework was determined partly by the need to collect empirical data in a precise and unambiguous form which would allow for international comparability and partly by the perceived information needs of policy-makers.

2.1 A typology of forms of work delocalisation

The conceptual framework developed for classifying the various different forms of delocalised work involves drawing two broad distinctions.

The first of these is a legal distinction: between work carried out internally (*ie* by people contracted to work directly for an organisation) and normally covered by a contract of employment, and work that is outsourced, and therefore normally carried out under a contract for the supply of services.

The second is a distinction between work carried out by groups of workers on shared premises (normally a building which could be described as an 'office') and that which is carried out by individuals acting in isolation away from 'office' premises. These people might be working from their homes (wholly or partially), or working nomadically from a variety of different locations, for all or part of the working week.

These variables are summarised in Figure 2.1. When combined, they provide us with a two-by-two cell matrix within which all forms of eWork so far identified by researchers can be grouped.

These categories are necessarily somewhat rough and ready. There are both major differences within each category and overlaps between them.

Figure 2.1: Typology of Work delocalisation

		Contractual	
		Internal/employees	**Outsourced**
Type of workplace	**Individualised (away from 'office' premises)**	Employed tele-homeworkers Mobile employees	Freelance teleworkers or mobile workers
	On shared 'office' premises	Remote back offices/call centres Employees working in telecottages or other third party premises	Specialist business service supply companies Outsourced call centres

Source: IES

It is useful, perhaps, to think of them not so much as discrete and stable categories of employment but as *choices* available to employers in how, and whence, they should obtain the various business services which they require. Should they develop their own internal source of supply using their own employees? If so, should they insist that these employees work at the establishment where the customer department is based? Or should they allow them to work elsewhere? Or would it be a better idea to set up a specialist back office at another location?

In the EMERGENCE employer survey, information was collected on each of these forms of working, *provided*:

- that it was remote: *ie* it took place at a geographical distance from the establishment which was surveyed; and
- that it was telemediated: *ie* that a telecommunications link was used to deliver the work.

Because of the considerable policy interest in the subject of call centres, in the survey an additional distinction was made between remote locations that were described as call centres and those that were not.

Combining these variables gave us in all nine different categories of eWork:

1. Fully home-based working by employees
2. Multilocational or nomadic working by employees
3. Freelance work carried out away from the premises
4. Remote work carried out in remote 'in-house' (internally owned) back offices that are not call centres
5. Work by employees carried out in remote 'in-house' (internally owned) call centres
6. Work carried out by employees in telecottages or other remote third-party premises that are not call centres
7. Work carried out by employees in telecottages or other remote third-party premises that are call centres
8. Work outsourced to business service suppliers that are not call centres
9. Work outsourced to call centres.

Whilst all these forms are separately identified in the EMERGENCE survey results, and form mutually exclusive categories at any given point in time, it is recognised that it is entirely possible that an employer may use more than one of these forms of eWork to carry out any given business function, or may switch from one to another over time. By the same token, an individual worker may also move over the course of a working lifetime between different forms of eWork.

In this report, we focus on the following broad categories of eWork:

1. Fully home-based eWork by employees (or 'telehomeworking')
2. Multilocational eWork by employees (typically involving an alternation of work between the home and the employer's office or mobile working from a home base)
3. 'eLancing' — self-employed eWork from a home base.

For each type of eWork we examine the evidence on its extent from the EMERGENCE establishment survey, and then attempt to forecast its growth across Europe by linking these results to existing longitudinal data sets and using varying scenarios of economic growth and organisational change.

We had originally hoped also to develop some models for two further forms:

1. eWork from remote back offices: information-processing work by employees in remote office-type premises involving a telecommunications link to the main employer
2. eOutsourcing: work carried our remotely involving the delivery of work over a telecommunications link, carried out under a contract for the supply of services (*ie* by people who are not direct employees).

Unfortunately, however, the lack of comparable definitions in the existing statistical sources made it impossible to establish the relationship of the EMERGENCE results to longitudinal data sets with sufficient precision to develop meaningful extrapolations. This challenging task will require further research to become feasible. We hope that the work of other IST projects, such as STILE[1], will clear a path towards such work in the future.

Nevertheless, we present an analysis of the data from the survey relating to these forms of eWork in order to contribute some basic building blocks to this task.

[1] *Statistics and Indicators on the Labour market in the E-Economy*, lead partner: Higher Institute of Labour Studies, Leuven, Belgium; further information from http://www.stile.be

3. The Challenge of Benchmarking the EMERGENCE Definition of eWork Against European Official Statistics

We noted in Chapter 2 that many of the existing classification codes used in official employment statistics represent poor indicators for the new economic activities that are arising in the information economy. This presented us with a major challenge when it came to attempting to integrate the different data sets.

We did, however, identify several points of contact between the EMERGENCE data and other statistics available in longitudinal series, which enabled the main forms of eWork to be modelled.

These included:

- Establishment size. The EMERGENCE survey collected information on the number of employees at each establishment in the sample. In some, but not all European countries, information is available about the size breakdown of establishments in the national economy. In the remaining countries this has to be calculated using a combination of enterprise-level data and labour force information.
- Sector. Despite the inadequacy of current sectoral classification schemes, data are available across Europe broken down by NACE sector codes. Establishments in the EMERGENCE dataset were also classified according to NACE, making it possible to plot the correspondences between EMERGENCE results and other data sources.
- Geographical location. In the EMERGENCE survey, the geographical location of respondent establishments and of their suppliers and customers for eServices, as well as the remote locations of their in-house eService functions, were recorded at the level of standard EU (NUTS1) regions. This makes it possible to calculate correspondences between EMERGENCE geographical data and other EU regional statistics.
- Prevalence of individualised forms of eWork. The UK Labour Force Survey has, since 1997, collected data on the numbers of people in the UK labour force who work at or from their homes in their main employment and who require the use of

computer and a telecommunications link to the employer or client in order to work in this way. Cross-tabulation of these results with other variables makes it possible to calculate the prevalence in the workforce of three different categories of eWork: fully home-based eWork by employees; multilocational eWork; and 'eLancing', broken down by the employer's sector and establishment size. The relationship of this supply-side information to the demand side can be plotted using the results of the EMERGENCE establishment survey, which collected data on employers' use of eWorkers in these three categories (also broken down by sector and establishment size).

- Prevalence of home-based work. The European Labour Force survey includes questions which identifies people who 'usually work from home' or 'sometimes work from home'. The results do not, however, make it possible to distinguish homeworkers using ICTs from other home-based workers engaged in more traditional activities.

Because of the existence of a Europe-wide Labour Force survey using common definitions, and because of the existence of these specific data in the UK, it was possible to model individualised forms of eWork rather more successfully than those which take place on collective, office-type premises. We therefore consider these first in the analysis which follows.

4. Telehomeworking (Home-based eWorking by Employees)

In this chapter we focus on fully home-based eWorking by employees, which we call, for the sake of brevity, 'telehomeworking', in the knowledge that this is a term which has been defined in many different ways by different commentators and researchers.

In the EMERGENCE survey, and in this study, we define it very precisely as work carried out in the home, delivering information-based work using a telecommunications link by employees of the establishment concerned.

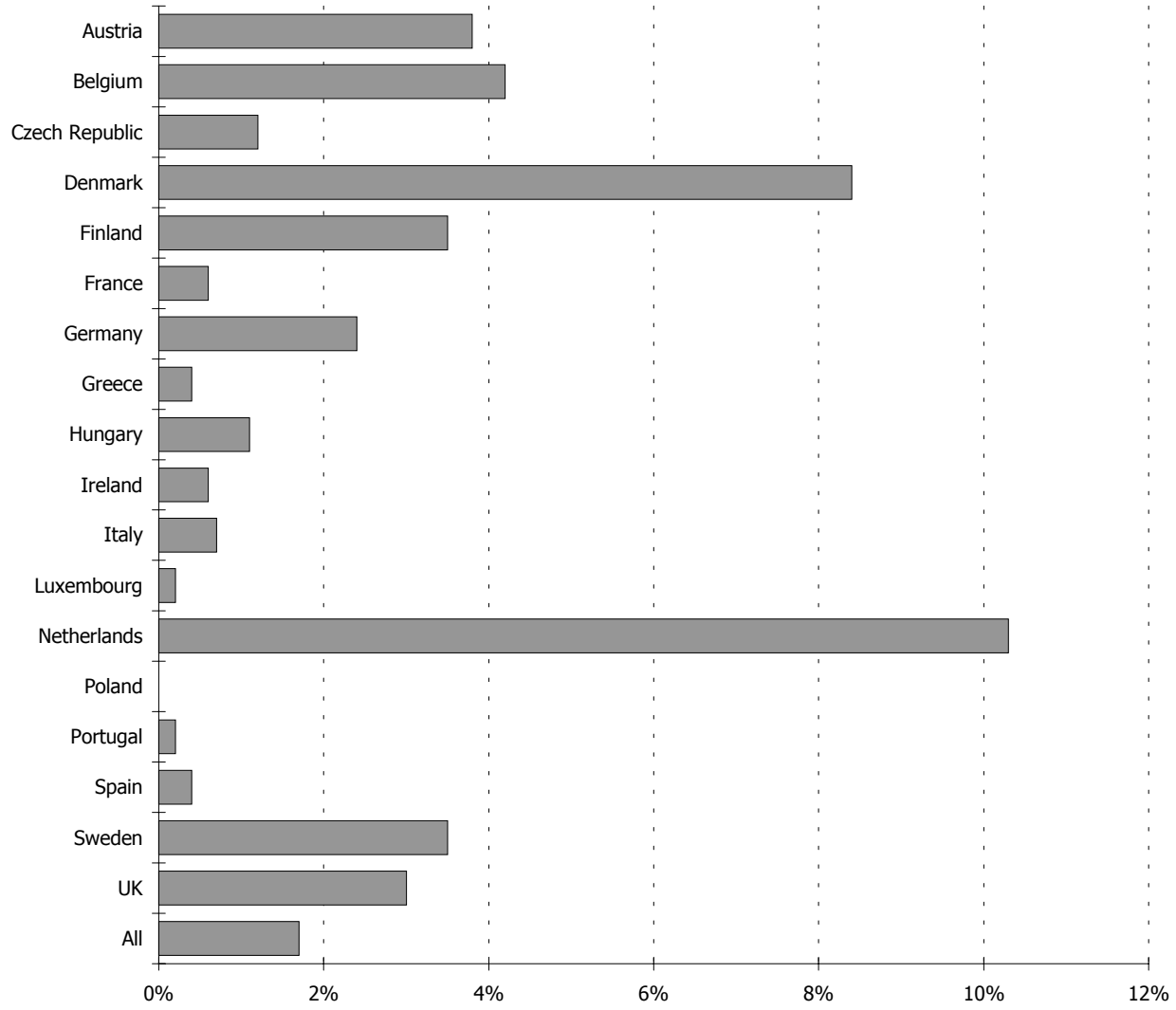
Although much discussed in the literature (often to the extent of representing the paradigmatic form of telework) this form of eWork emerged from our survey as the one with the lowest incidence, apart from the use of telecottages (also a favourite in the teleworking literature) which was used even more rarely by European employers.

4.1 Use of telehomeworking by establishments

We present first a summary of the results of the EMERGENCE survey, showing the use of this form of eWork (telehomeworking by employees) by establishments with fifty or more employees, broken down by country. This is shown in Figure 4.1 and demonstrates relatively high levels of telehomeworking in the Netherlands and Denmark, moderate levels in Sweden, Finland, Austria, Belgium and the UK and, to a lesser extent, Germany, and low levels elsewhere.

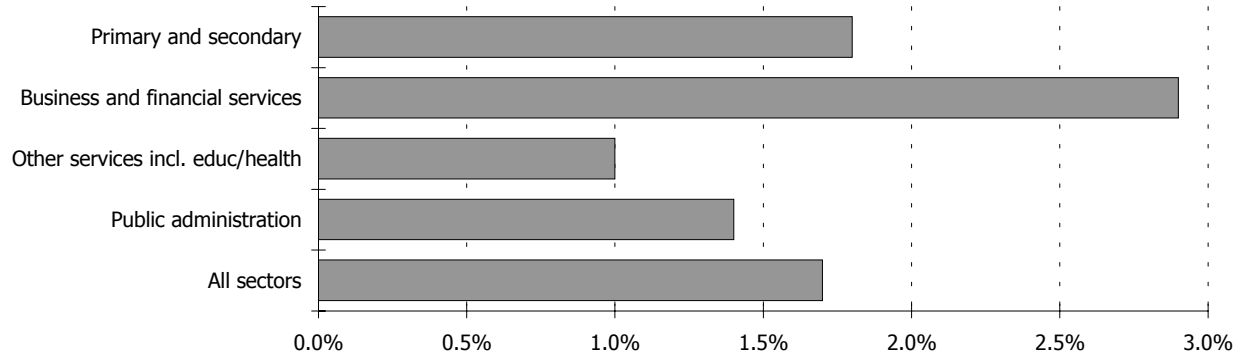
These results were then further analysed at the level of industrial sectors (shown in Figure 4.2) by establishment size (shown in Figure 4.3) and by whether or not an establishment was a branch of a larger organisation with head office located elsewhere (shown in Figure 4.4). The results suggest that telehomeworking can most commonly be found among the largest establishments, establishments in the business and financial services sector and establishments that are branch offices.

Figure 4.1: Use of telehomeworking (by employees), by country



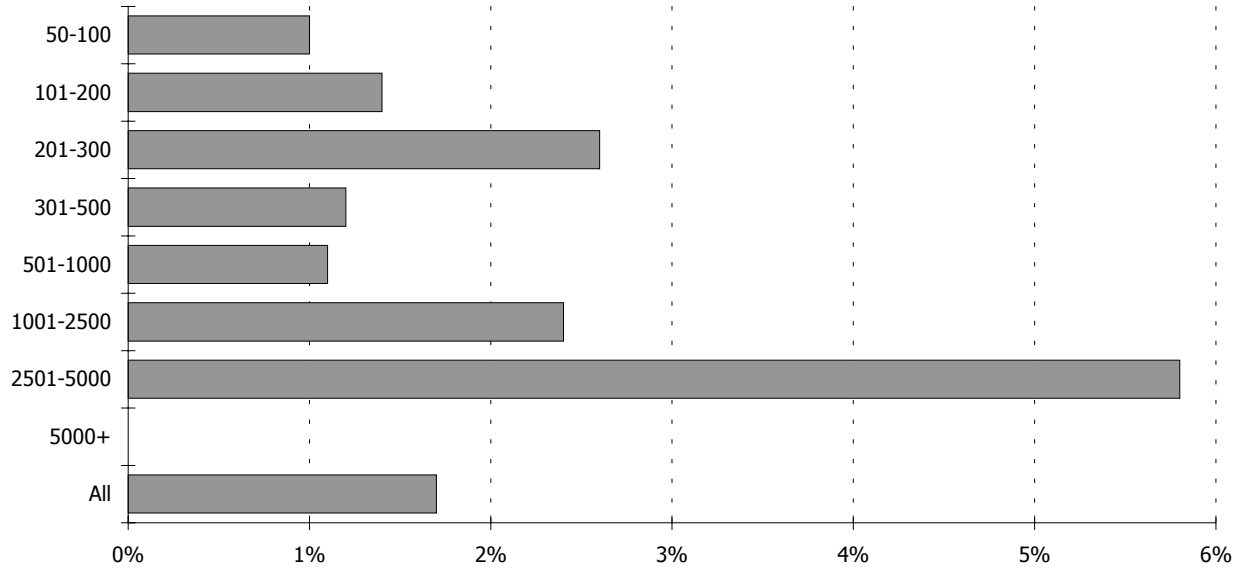
Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Figure 4.2: Proportion of establishments with telehomeworking (by employees), by broad industrial sectors, 2000



Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Figure 4.3: Proportion of telehomeworkers, by establishment size



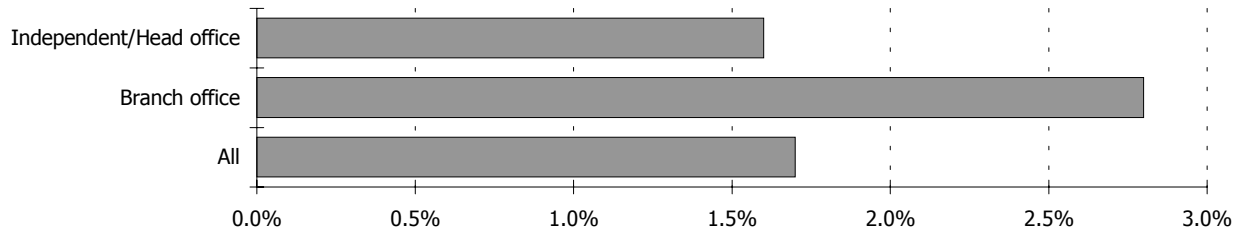
Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

They also show that this form of eWork is most common in the business and financial services sectors. This is to be expected, given the high information content and advanced use of ICTs in these sectors. It is least common in 'other services', which includes a large number of functions, such as health and education, involving the delivery of face-to-face services. Less expected is the comparatively low level of telehomeworking in public administration. This may reflect some managerial conservatism in a sector still dominated by large, hierarchical bureaucracies.

The breakdown by establishment size shows a reasonably even distribution with the exception of the 2,501 to 5,000 employee size category which is over three times as likely as the average to be using telehomeworking.

Finally, telehomeworking is more likely to be found in establishments that are branches than in those that are independent establishments or head offices.

Figure 4.4: Proportion of telehomeworkers, by whether establishment is a branch or independent/head office



Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

4.1.1 Modelling telehomeworking

The above analysis has focused on a number of 'bivariate' relationships between telehomeworking and employer characteristics (showing, for example, that telehomeworking is more likely to occur in branch offices, very large establishments and in the business and finance related sectors, and that the Netherlands, Belgium, Denmark, Austria, Germany, Finland and the UK have rates of establishment level telehomeworking that are above the European average). It is not possible, through this analysis, however, to separate out the inter-related effects of these variables.

The analysis of each separate effect of the propensity of an establishment to conduct telehomeworking, while controlling for the effects of all the other factors, requires the use of logistic regression modelling. An explanation of how the model can be interpreted is presented in Appendix B. In summary, however, we can make the following conclusions:

- Using the UK as a comparison group, France, Italy and Spain have a lower propensity to conduct telehomeworking, while the Netherlands has a higher propensity.
- There is no clear relationship between establishment size and telehomeworking. However, establishments with 201 to 300 employees and those with 2,501 to 5,000 employees were more likely than those with between 50 and 100 employees to employ telehomeworkers.
- Using public administration as a comparison group, there is no clear relationship between industrial sector and the employment of telehomeworkers. Those offering non-business and finance related services were less likely to employ telehomeworkers, but this result was marginally insignificant.
- Interestingly, engagement in other forms of individualised eWorking is negatively associated with telehomeworking, *ie* after controlling for other influences, establishments that offer eLancing or multilocational eWorking are less likely to have telehomeworkers than those which do not.

4.2 Employees

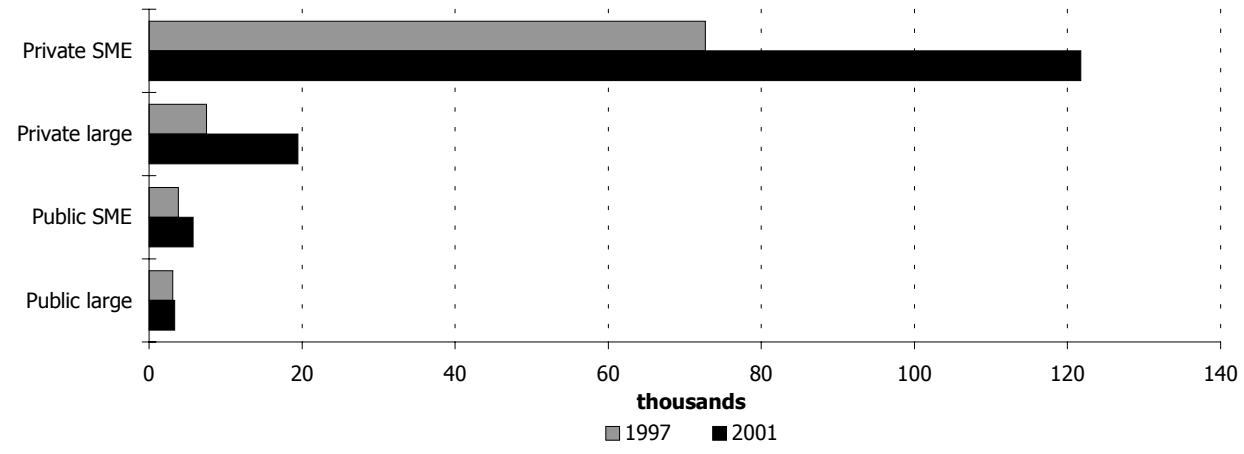
The EMERGENCE survey was an establishment survey designed to capture the regional, motivational and organisational characteristics of large e-based establishments. Its main purpose was not, therefore, to produce a profile of the working habits of the general population, and the survey's use in the analysis of individual employees engaged in various forms of eWorking is therefore going to be restricted. Nevertheless, through the triangulation of the EMERGENCE results with data on teleworking and employment collected from other national surveys, it is still possible to develop a model of individual forms of eWorking.

So far, the UK has been the only country to collect information systematically on the use of ICTs to work from home or multiple locations. Since 1997, questions have been included in the UK Labour Force Survey designed to capture different forms of home-based and multilocational working, and whether those engaged in such work use and require a computer and telecommunications link. Employees in the UK are asked whether they usually conduct paid or unpaid work from their own home and could not do so without the aid of a telephone or a computer. These individuals are classified here as teleworkers (for a review of different approaches to measuring individualised eWork see Chapter 7).

In the first year data were collected, 1997, the UK had 90,000 telehomeworker employees. By 2001, the number of telehome-workers had risen to 150,000. Figure 4.5 shows the levels of ICT-supported homeworking by employees in the UK over the period 1997-2001. The data are broken down by sector (public or private) and by the size of the employing establishment (whether or not it has more than 50 employees). It should be noted that, for brevity's sake, we have described establishments with fewer than 50 employees as 'SMEs' in this figure, although we recognise that this term is often used to describe a somewhat broader size-band.

As can be seen, growth in telehomeworking has been significant, with the vast majority of the increase taking place in small establishments in the private sector. In percentage terms, however, growth has been highest in larger establishments in the private sector. Although this category of eWork excludes the self-employed (who are discussed in Chapter 6) it is quite possible that it includes people who are running microbusinesses from their homes. Where these businesses are limited companies, their directors' status is that of employees of these companies. It is clear, however, that this does not account for all of this employment; certainly not in larger establishments.

Figure 4.5: Growth in UK based Homeworking among employees 1997 to 2001, by size of employing establishment



Source: UK Office of National Statistics, Labour Force Surveys 1997-2001, Analysis by IES, 2001

Having established this growth pattern, the next task is to relate the knowledge we have of telehomeworking in Europe at an establishment level, with what we know about telehomeworking in the UK at an individual level, and what we know about European employment in general at an individual level. To do this, we must make three broad assumptions.

The first is that (all things being equal) there is an association between the proportion of large establishments that allow telehomeworking and the proportion of telehomeworking employees working in large establishments within each country. Thus, if we have two countries (A and B) with similar numbers of employees across similar industries, and proportionally twice as many large establishments in country A allow telehomeworking as in country B, this will translate into twice as many employees being involved in telehomeworking within large establishments in country A relative to country B.

The second assumption is that the number of home-based teleworkers working for large establishments will reflect the number of employees working for large establishments in the country overall. This means that if country A is similar in most respects to country B (*eg* the proportion of large establishments with a propensity to allow telehomeworking) but has twice the number of employees working for large establishments as country B, we would expect twice the number of home-based teleworkers.

The third assumption is that the differences in the ratio of the proportions of employees involved in telehomeworking in large establishments (those with 50 or more employees) against the proportions involved in telehomeworking in small establishments (those with fewer than 50 employees), remain constant across each country. For example, if employees in smaller establishments were twice as likely to be involved in telehomeworking in country A, then the ratio of 2:1 will also hold true in country B.

We recognise that these are big assumptions. As with any model, it is accepted that this represents a simplification of reality and that deviation from the assumptions outlined above will lead to variations in our predication. We know from the UK's experience that as telehomeworking expanded in the late 1990s, the rate of growth among employees working in large establishments was greater than that of those working in smaller ones. In other words, in this phase of development, telehomeworking was relatively more common in smaller establishments than larger ones.

There are several possible explanations for this: that small firms are more likely to be 'early adopters' of innovation; that this period coincided with an explosive growth of small 'dotcom' companies with a high propensity to use teleworking; that a drop in the cost of the technology, an increase in its reliability or interoperability or the successful promotion of teleworking by

large companies like BT created a 'technology push' to encourage teleworking in small firms; or that the development of small home-based businesses is a characteristic of periods of general economic growth. Difference in the relative diffusion of teleworking technology between large and small establishments might therefore reflect different levels of technological expansion and maturity. If this is the case, then countries with a lower proportion of employees of large establishments engaged in telehomeworking than the UK (the only country for which we have individual level data), will have an under-representation of the number of employees within smaller establishments engaged in telehomeworking. Likewise, the reverse will also be true.

Such specific features of the local context during the particular period under investigation will undoubtedly result in other local variations. Nevertheless, certain broad trends can be discerned.

In order to even out some of the effects of local variations and minimise the effects of small sampling in some of the smaller EU countries, for the next stage of our analysis we grouped countries together into larger European 'regions'. These 'regions' were also used by the EMERGENCE project for other purposes, including the selection of case studies. Each European country is unique, and any typology is likely to run the risk of bundling very disparate entities together. The EMERGENCE 'regions' are not entirely arbitrary; they follow an adapted version of Esping-Anderson's typology of European regulatory regimes[1] and are as follows.

1. The UK and Ireland. These two English-speaking countries are categorised by Esping-Andersen as 'liberal' and, apart from some cultural similarities and links with the rest of the Anglo Saxon world, have in common rather open economies and rather loosely regulated labour markets compared with many other parts of the EU. Levels of telehomeworking are above average, but by no means the highest in Europe, according to the EMERGENCE employer survey.
2. The second category brings together several contrasts. Although France, Belgium, the Netherlands and Luxembourg are all defined by Esping-Andersen as 'corporatist' regimes (characterised by a strong social dialogue and highly regulated labour markets), there are also major differences between them. France is unique in many respects and does not fit neatly into any grouping, although it does share a common language with parts of Belgium and Luxembourg. According to the EMERGENCE employer survey, France has low levels of telehomeworking, but the very high levels found in the Netherlands and, to a lesser extent, in Belgium, bring the average for this group up to 0.8%, above those for the UK and Ireland.

[1] Esping-Andersen G, The Three Worlds of Welfare Capitalism, Polity Press, 1990

3. The third 'region' comprises the Nordic countries of Denmark, Sweden and Finland, characterised by Esping-Andersen as 'social democratic' regimes. Relatively egalitarian, with strong welfare states, a high standard of living, a well-educated workforce and a high level of ICT use, these countries all exhibited high levels of telehomeworking in the EMERGENCE employer survey.
4. Our fourth category comprises Germany and Austria, also characterised as 'corporatist' by Esping-Andersen. In the EMERGENCE survey, Austria exhibited relatively high levels of telehomeworking, but the relatively low levels found in Germany, combined with the large size of the German population, brought the average for this region down to 0.6%, the European average.
5. The final category discussed here is made up of four Mediterranean countries: Italy, Spain, Portugal and Greece. This grouping too includes some anomalies. Northern Italy and some regions of Spain (such as those surrounding Madrid and Barcelona) exhibit many of the characteristics of developed northern European regions in Esping-Andersen's 'corporatist' model. However, in general these regions can be characterised as having rather weak welfare states, strong informal economies, and an above-average proportion of the population working in sectors like agriculture and tourism, which are not susceptible to eWork on any significant scale. The average levels of telehomeworking in this region found in the EMERGENCE survey were low, at 0.2% (although, as we shall see, some other forms of eWorking are present on a large scale). An exceptionally high proportion of small firms in these countries does, however, mean that the EMERGENCE survey (based only on establishments with 50 or more employees) was less representative here than elsewhere in Europe.

We should also mention a sixth 'region', represented in the EMERGENCE employer survey and case studies: the Accession States of Hungary, Poland and the Czech Republic. Unfortunately, a lack of comparable data at the right level of disaggregation made it impossible to include these countries in this analysis.

Table 4.1 summaries the estimated number of telehomeworking employees within each of these European regions. Because of major differences in population size between countries, and hence in these regions, a small proportion of employment in a large country may nevertheless translate into a larger absolute number of telehomeworkers than a larger proportion in a smaller country. Thus, although the level of telehomeworking in the Nordic region is twice that found in Germany and Austria, because of their higher combined population, the latter two countries account for 230,000 of the EU's estimated 810,000 telehomeworkers, compared with only 100,000 from Denmark, Sweden and Finland combined.

Table 4.1: Estimated number of telehomeworkers (person equivalent), 2000

	Estimated no. of telehomeworkers	Percentage of employees
UK and Ireland	190,000	0.7
Benelux and France	230,000	0.8
Denmark, Sweden and Finland	100,000	1.2
Germany and Austria	230,000	0.6
Spain, Portugal, Greece, Italy	60,000	0.2
All	*810,000*	*0.6*

Source: IES EMERGENCE Analysis

The development of telehomeworking will ultimately depend on a number of inter-related factors: employment expansion, organisational change, diffusion of ICT technology and the willingness of employees and managers to embrace new working practices. We present here three broad scenarios relating to the growth of telehomeworking, based on the estimates described above and elements of the UK's experience. These three scenarios are:

- employment expansion
- further organisational change/technological diffusion
- further organisational change/technological diffusion with employment expansion.

In the first scenario, there is no further organisational change/ technological diffusion, and the only growth in telehomeworking occurs though employment expansion. This is the type of scenario that could take hold once telehomeworking reaches a 'saturation point' within Europe. We have no evidence to support the view that current levels of telehomeworking represent a saturation in the use of this form of homeworking.

Indeed, evidence from the United States suggests that:

> *'According to CPS (Current Population Survey) data, after an initial spurt of 13 percent growth from 1985 to 1991, the trend in work at home, nine percent, was slightly less than the increase in total persons at work, which was 10 percent. The total number of home-based workers as a percent of total workers seems to be holding steady at about 16 to 17 percent.'*[1]

If we assume a broadly similar pattern in Europe, where levels are currently well below this level, it is reasonable to expect further growth in telehomeworking before a saturation point is reached. For these reasons, the scenario which is presented here has to be

[1] Pratt, J H, *Teleworkers, Trips and Telecommunications: Technology drives telework – but does it reduce trips?,* paper presented to US Transportation Research Board, January 2002

treated as hypothetical. In other words, we do not present this scenario because we think it is a realistic description of what is likely to happen, but rather to use as a baseline, making it possible to identify the separate effect of other forms of change.

A second scenario relates to organisational change and technological diffusion. In this scenario, organisations continue to restructure as they adopt new technologies and, as information about new practices spreads and a new generation of managers takes command, further innovation takes place.

In order to model this outcome, it is necessary to assume a projected trajectory for the proportion of establishments (and employees) embracing this form of working. There are a number of alternatives for this, based on both linear and non-linear trajectories. A standard method is to assume that the take-up of new technology follows an 'S-shaped' curve pattern followed as new technologies are adopted:

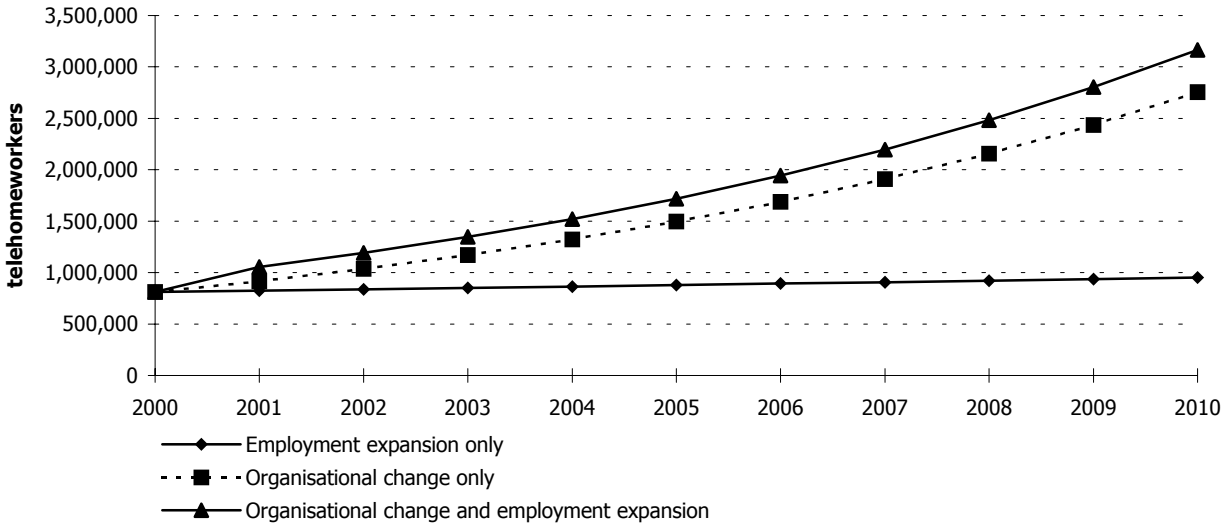
> *Historically, when a new technology is first introduced, the number of users expands rapidly but from a low base. Over time, as a group reaches the middle range of the S-curve, the growth rate tends to slow while the point change continues to increase. Once the penetration nears its saturation point (at the higher end of the S-curve), both the percentage point change and the expansion rate begin to decrease.*
>
> *The adoption rates along these curves depend on a number of factors, including the awareness of the new technology, the affordability of that technology, adaptations to the technology to widen its potential market, and the attraction for people to use the technology as its usage becomes widespread (US Department of Commerce 2000).*[1]

This method requires some knowledge of the starting point and end points (the saturation level for Europe). An alternative, presented here, is to assume that rates of growth are linear and continue on a similar trajectory to previous years. This approach, adopted here, is based on employment estimates from Europe, estimates of telehomeworking for 2001, and the average annual cumulative compound growth rate in telehomeworking for the UK between 1997 and 2001.

The third scenario incorporates both organisational change and technological diffusion, and further assumes overall employment growth. The rates of growth presented here are, once again, based on employment estimates for Europe and the average annual cumulative compound growth rate for the UK between 1997 and 2001.

[1] Joanne H Pratt, email communication to the authors, December, 2001

Figure 4.6: Projected growth of telehomeworking in Europe



Source: EMERGENCE analysis, 2001

As can be seen from Figure 4.6, the scenario based on employment expansion only, taking no account of organisational change, results in very modest growth from around 810,000 to approximately 950,000. Continuing organisational change, however, effectively triples the numbers of telehomeworking employees in the decade from 2000. When combined with the impact of employment growth, this generates an estimated total of 3,200,000 in Europe by 2010.

5. Multilocational eWork (Mobile Teleworking)

We next turn our attention to another form of individualised eWork by employees, which we have termed 'multilocational eWork'. This category acknowledges the fact that the use of ICTs has rendered many kinds of work locationally independent, making it possible to work from any location, provided that the right telecommunications infrastructure is present in combination with a laptop or other computing device. This form of work has been variously labelled 'mobile teleworking', 'flexi-place', 'digital nomadic work', or 'alternating telework', and encompasses a range of different options including working partially from home and partially from a fixed office base, hot-desking, or working whilst on the move or from clients' premises.

In the EMERGENCE survey, respondents were asked to distinguish between employees who worked wholly from their homes (defined as 'telehomeworkers' and discussed in Chapter 4) and those who worked partially at home and partially in the office or from a variety of different locations including clients' premises (who are defined as 'multilocational eWorkers').

This is the form of individualised eWork which seems to combine the greatest advantages of flexibility both to employees (*eg* in the form of reduced stress and improved work-life balance) and to employers (*eg* in the form of greater productivity, improved staff retention and motivation), whilst avoiding the pitfalls sometimes associated with fully home-based working (*eg* social isolation and reduced personal development prospects for employees, and difficulties in effective team management for employers). This is the form which is generally preferred by individual employees and by trade unions as well as by employers, and — according to the results of the EMERGENCE survey — is much more commonly practised.

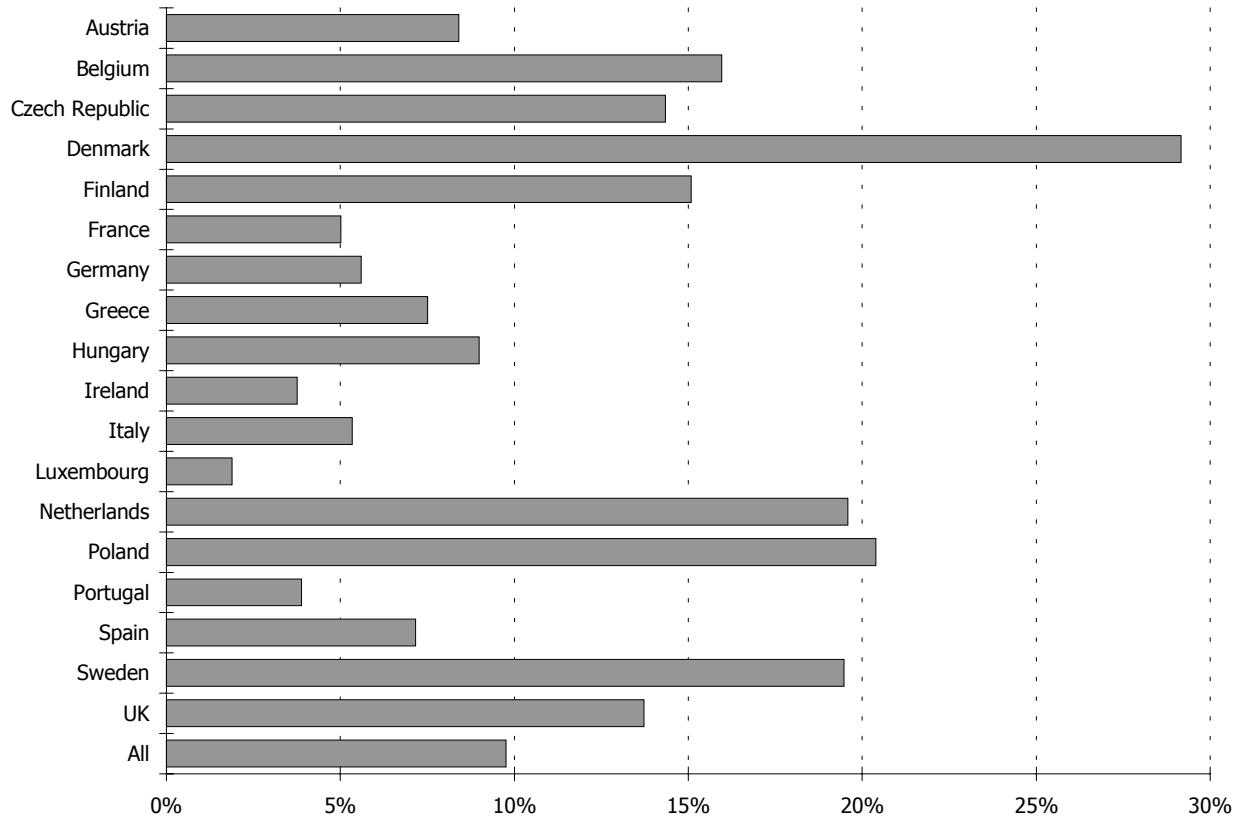
In seeking to model this form of eWork at the European level, we followed essentially the same procedures as for telehomeworking, discussed in Chapter 4.

5.1 Use of multilocational eWork by establishments

Looking first at the bivariate results (shown in Figures 5.1 to 5.4) we find that Denmark is the leading European user of this form of eWork, followed by the Netherlands, Sweden, Belgium, Poland and Finland. We suspect that the very high levels recorded in Poland may stem from rather different social and organisational patterns than the high levels recorded in the high-tech, highly-developed service economies of the Scandinavian and Benelux countries. Indeed, it is possible that the Polish picture may be influenced by the peculiar conditions of an economy in rapid transformation from a centrally planned to a market model.

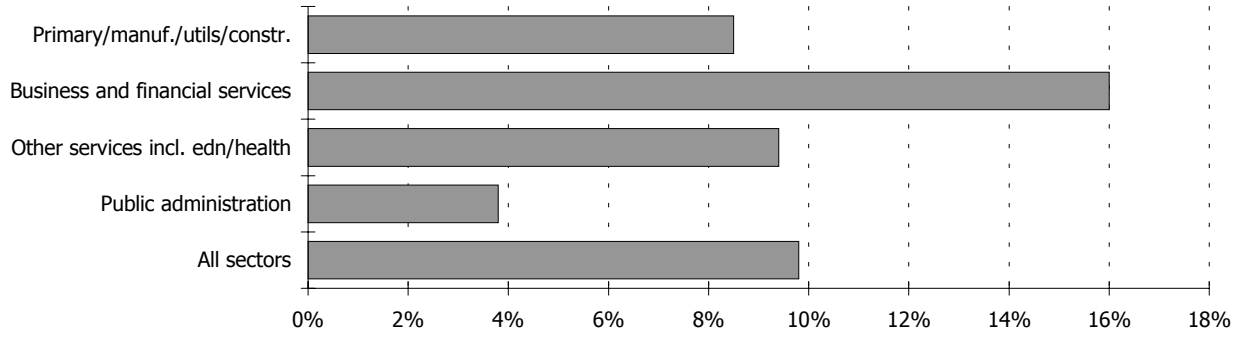
Turning to the sectoral breakdown, we find a picture which is closer to that for telehomeworking. Multilocational eWorkers are far more likely to be found in business and financial services than in other sectors, although here 'other services' score higher than 'public administration'. This reflects the large number of miscellaneous services (especially those with a branch structure, or with a strong client-facing role), which are capable of being delivered by mobile workers, and the scope for 'alternate' or 'partial' teleworking in many health and education professions, which nevertheless require some face-to-face contact with users.

Figure 5.1: Use of multilocational eWorkers, by country



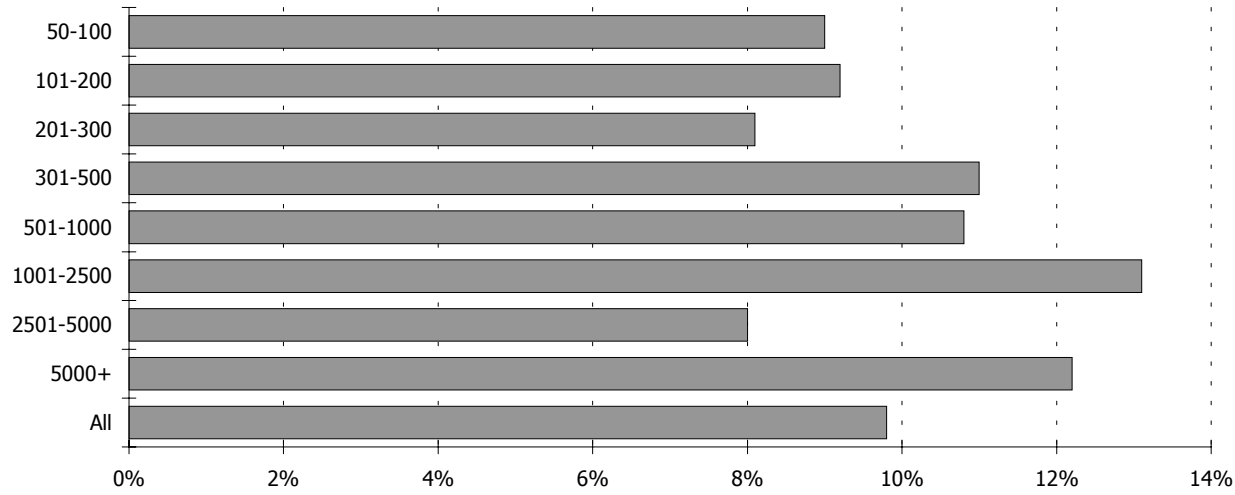
Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Figure 5.2: Use of multilocational eWorkers, by sector



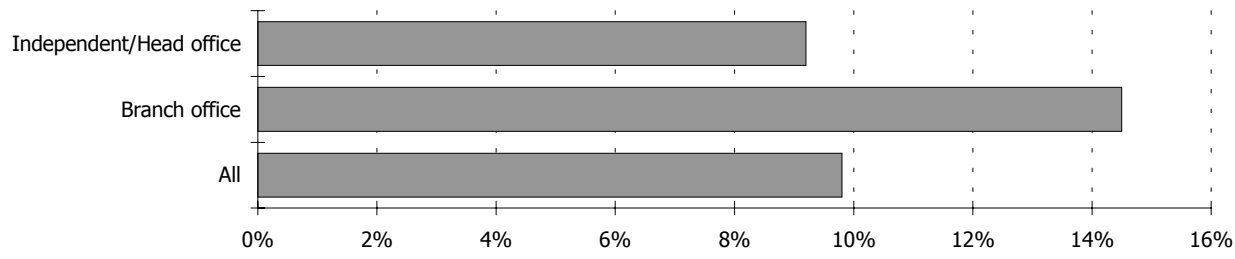
Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Figure 5.3: Use of multilocational eWorkers, by establishment size



Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Figure 5.4: Use of multilocational eWorkers, by whether establishment is independent or a branch



Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Multilocational eWork is more evenly distributed across size categories than telehomeworking. However, it is similar in being more likely to be found in branch offices than in independent or head office establishments.

5.1.1 Modelling multilocational eWork

As with telehomeworking, we analysed the effects of a range of variables (described above) on the propensity of an establishment to conduct multilocational eWorking. The results are presented in Appendix B Table B3 and are summarised below:

- Using the UK as a comparison group, Greece, Italy, Germany, France, Portugal and Spain all have a significantly lower propensity to conduct multilocational eWorking. Interestingly, countries displaying high rates of multilocational eWorking in the bivariate analysis, *eg* Denmark, the Netherlands, Poland and Sweden (Figure 5.1, above), were not statistically more likely to have multilocational eWorkers when other factors (*eg* industry, establishment size and establishment type) were taken into account.
- There was no statistically significant relationship between establishment size and multilocational eWorking.
- Using public administration as a comparison group, establishments in all the other industrial sectors had a significantly higher propensity to conduct multilocational eWorking.
- Multilocational eWorking was statistically less like to take place in independent or head office establishments than in branches.
- As in the case of telehomeworking, engagements in other forms of individualised eWorking were negatively associated with multilocational eWorking. This suggests that the different forms of eWork act as alternative options for the employer, rather than supplementing each other.

5.2 Multilocational eWork by employees

There are two forms of multilocational eWork identified in the UK Labour Force Survey.

- Respondents are asked whether they usually conduct paid or unpaid work from different places, but using home as a base, and could not do so without the aid of a telephone or a computer. Those answering yes to both questions are often known as mobile teleworkers.
- In addition, respondents are also asked whether they have worked from home or from a different place, but using home as a base, in the last week, and whether they could not do so

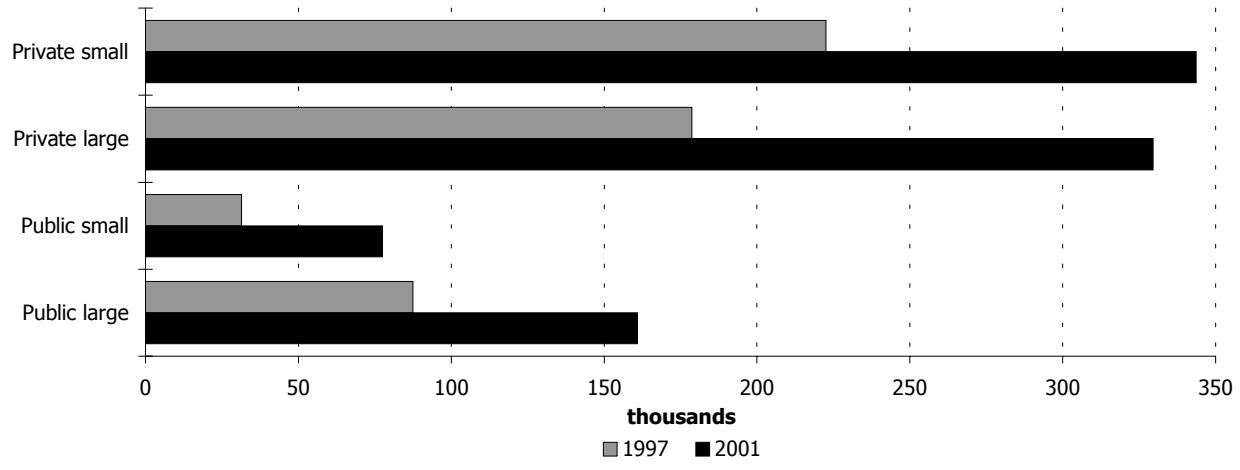
without the aid of a telephone or computer. Individuals who fit this category but are not usually telehomeworkers or mobile teleworkers can be classified as 'occasional multilocational eWorkers'.

The definition of multilocational workers that we use here is based on the amalgamation of these two categories: mobile eWorkers and occasional multilocational eWorkers. It is important to note, however, that the estimate of occasional teleworkers is a 'flow' measure that only captures those who have been working from home (or have used home as a base) in the previous week. It is therefore likely to be lower than the total number of individuals engaged in teleworking identified in other studies. However, given that the probability of being included in the sample depends on the frequency of each individual's engagement in multilocational eWorking, the overall estimate will reflect their 'person equivalence'. For example, two people working from multilocations once every fortnight have the same person equivalence as one person working from multilocations every week. In other words, this indicator becomes, in part, a measure of the degree of multilocational working as well as the numbers of multilocational workers.

For many policy purposes (*eg* for calculating the impact on traffic congestion or on environmental impacts) 'flow' measures are the most important. For others (such as gauging the impact on organisational culture or on work-life balance), then the absolute numbers of people in a population who sometimes experience this form of work may be more important.

Figure 5.5 illustrates this aggregated category of multilocational eWorkers in the UK between 1997, when such records began, and 2001. The data are broken down by establishment size and private and public sector (public administration and education).

Figure 5.5: Growth in UK based multilocational eWorking among employees 1997 to 2001



Source: EMERGENCE analysis, 2001

Table 5.1: Estimated number of multilocational eWorkers (person equivalent), 2000

	Estimated no. of multilocational eWorkers	Percentage of employees
UK and Ireland	1,000,000	3.9
Benelux and France	870,000	2.8
Denmark, Sweden and Finland	510,000	5.9
Germany and Austria	640,000	1.7
Spain, Portugal, Greece, Italy	650,000	1.8
All	*3,670,000*	*2.6*

Source: EMERGENCE analysis, 2001

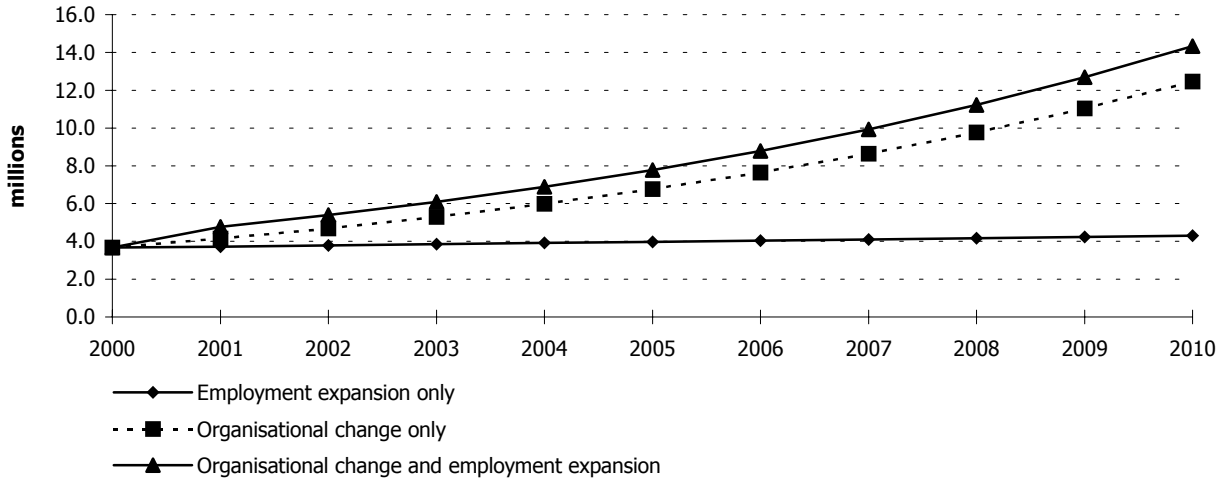
The numbers of multilocational eWorkers increased dramatically during this four-year period, from 520,000 to 910,000. Between 1997 and 1999 the growth rate was marginally higher among public sector establishments and smaller private establishments.

Using the same assumptions as for telehomeworking growth (outlined in Chapter 4) this growth pattern was extrapolated to the rest of the EU to arrive at the figures presented in Table 5.1.

Once again, we find that population differences make a major impact on the overall distribution of multilocational eWork across the EU. Because of its population small size, the Nordic group contributes only 510,000 of the 3,670,00 total, despite having a much higher prevalence of this type of work (at 5.9 per cent) whereas the UK and Ireland, with levels of only 3.9 per cent, nevertheless contribute a million between them.

Figure 5.6 shows the projected growth of multilocational eWork across the EU using the same three scenarios as were outlined in Chapter 4 for the growth of telehomeworking.

Figure 5.6: Projected growth of multilocational eWorkers in Europe to 2010



Source: EMERGENCE analysis, 2001

As can be seen, if we assume that present trends will continue in both employment growth and in organisational change with ongoing technological innovation, then there is likely to be a substantial increase from the present 3.7 million to around 14 million. If employment growth flattens, then there is still the potential to exceed 12 million over the next decade. This level would represent some ten per cent of all employees, and it seems likely that at (or shortly after) this level is reached, saturation will be reached in some sectors and occupations and some levelling off may occur.

A failure on the part of European enterprises to continue to reorganise and adopt new technologies and working practices would, however, result in a substantially lower rate of growth, reaching only half this level by 2010.

We can therefore conclude that continuing organisational change and ICT uptake will make a substantial contribution to the further growth of eWork in the EU.

6. eLancing and eEnabled Self-employment

The next category of eWork we examine concerns people who work from their homes or from multiple locations using an ICT link (like the telehomeworkers and multilocational eWorkers discussed in Chapters 4 and 5), but who are self-employed rather than employees, and who could perhaps be termed 'freelance eWorkers'. For the sake of brevity, we have adopted the term 'eLancer' for this category of eWorker.

6.1 Use of eLancers by establishments

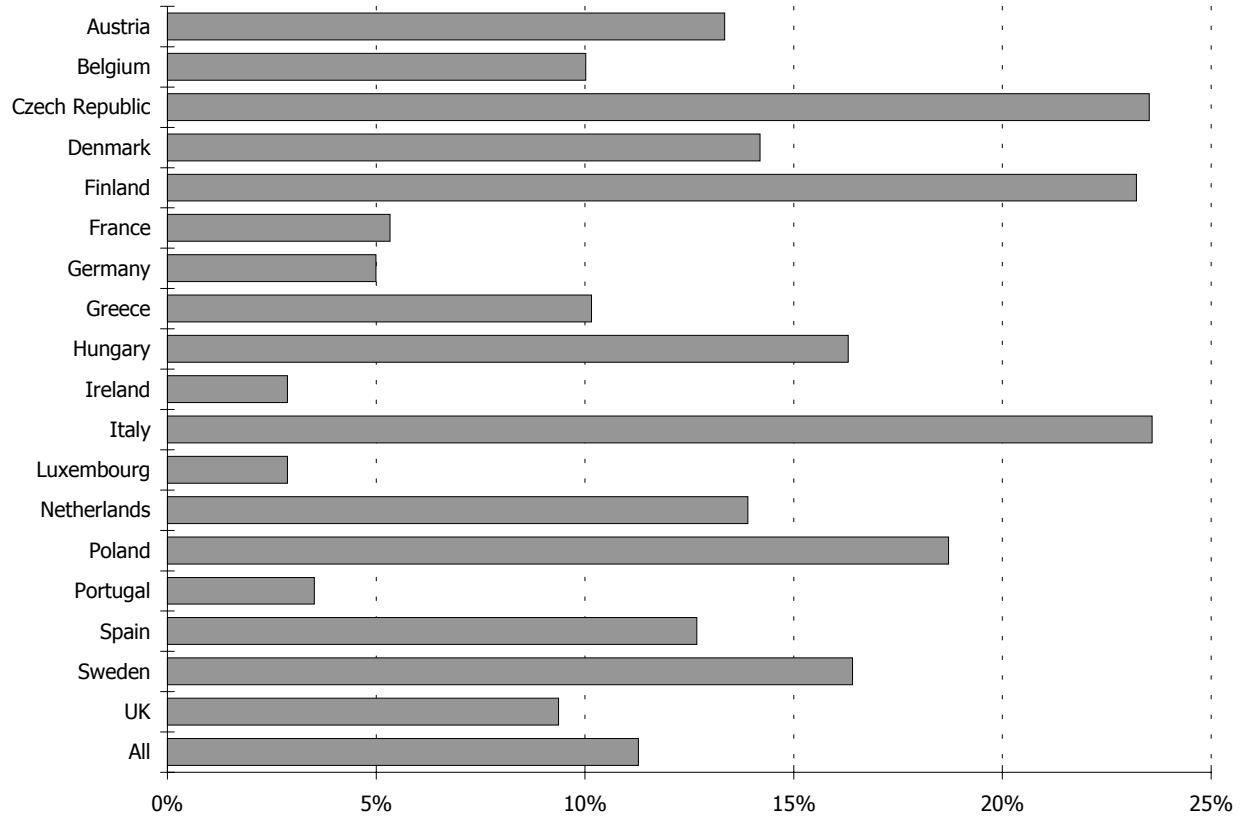
In the EMERGENCE survey, the use of this form of eWork was captured at the establishment level by means of questions which asked whether specific business services were outsourced and, if so, whether this was to individuals or to companies. A further question was then asked about whether or not a telecommunications link was used for the delivery of these outsourced services. Cases where business services were outsourced to individuals using a telecommunications link were then categorised as instances of the use of eLancing.

Figures 6.1 to 6.4 provide the summary characteristics of the uses of eLancers identified in the EMERGENCE 2000 European employer survey.

As can be seen from Figure 6.1, there are wide variations in the use of eLancers between countries. A high use of eLancers can probably be interpreted differently in different countries. In Poland, Hungary and the Czech Republic it seems to relate to the very rapid growth in 'involuntary self-employment' experienced in the Central and Eastern European EU Applicant countries in recent years.[1] It may also relate to a greater need to buy in external expertise in a time of rapid restructuring in enterprises which lack in-house know-how developed over a period of years.

[1] Lado M, Ministry of Economic Affairs, National Labour Centre, Hungary, 'Social Dialogue in the Applicant Countries', *EMU and Euro: the Future of Industrial Relation*, Conference, NUTEK with the European Foundation for the Improvement of Living and Working Conditions, Stockholm, 25-26 October, 2001.

Figure 6.1: Percentage of establishments using eLancers, by country



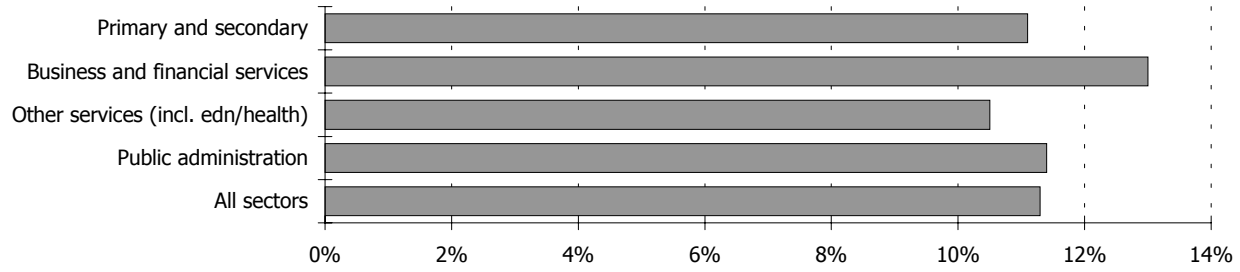
Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

In Southern European countries like Italy and Spain, by contrast, high levels of eLancing are more likely to be the result of a well-developed informal sector, with strong traditions of networking between microbusinesses.

Finland, Sweden, Denmark and the Netherlands, also with high levels of eLancing, exhibit a third pattern, associated with a high penetration of ICTs, high-skill, service-oriented economies and relatively good forms of social protection for the self-employed.

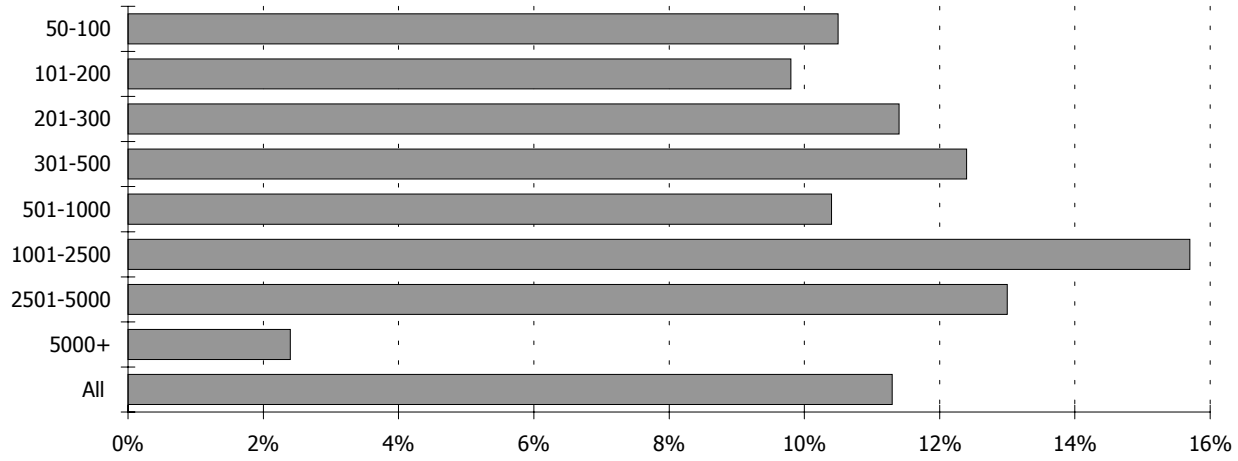
Turning to the distribution of use of eLancers by sector and size of establishment, we find a picture which is remarkably similar to

Figure 6.2: Use of eLancers, by sector



Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Figure 6.3: Use of eLancers, by size of establishment



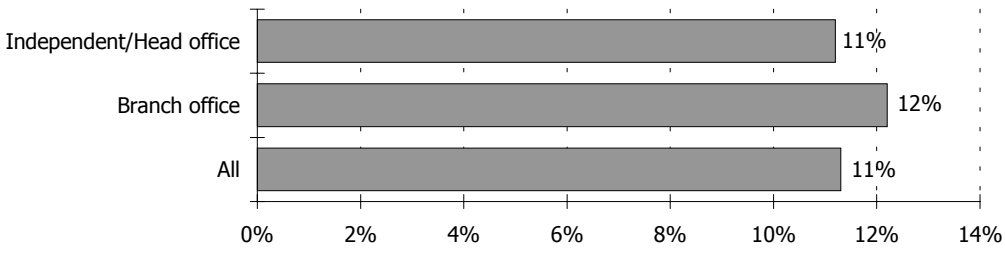
Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

that for multilocational eWork employees (presented in Figures 6.2 and 6.3).

This is hardly surprising, if we assume that the functions involved are essentially the same in both cases. The different employment status of workers, whilst no doubt making a significant impact on their social conditions, has little or no impact on the way in which tasks are carried out (except, perhaps, when labour markets are unusually tight). Again we find a suggestion that the differing forms of eWork are alternatives to each other. We can conclude that the decision whether to use an employee or a freelancer to do the same work is largely determined by national and corporate culture and the prevailing regulatory environment, rather than by factors intrinsic to the work processes involved.

As with the other forms of individualised eWork, discussed in Chapters 4 and 5 (Figures 4.4 and 5.4), we also find here a repetition of the pattern whereby eWork is more likely to be carried out in establishments which are branches of organisations headquartered elsewhere, than in independent establishments or head offices.

Figure 6.4: Use of eLancers, by whether establishment is independent or a branch



Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

6.1.1 Modelling eLancing

As with the other forms of individualised eWork discussed in Chapters 4 and 5, we moved beyond this bivariate analysis in order to model the propensity of establishments to conduct eLancing. The results of this process are presented in Appendix B Table B4 and can be summarised as follows:

- Establishments in Greece, Germany and Portugal had a significantly lower propensity to employ eLancers than the UK, while Italy had a higher propensity.
- There was no clear relationship between establishment size and employment of eLancers. Establishments with between 1,001 and 2,500 employees were more likely to employ eLancers, while those with 5,000 or more employees were less likely to do so.
- Using public administration as a comparison group, establishments in 'other services including education and health' had a lower propensity to employ eLancers.
- There was no statistically significant relationship between type of office (independent/branch) and the employment of eLancers.
- Finally, establishments outsourcing to companies with the aid of a telecommunications link (eOutsourcing), or other forms of individualised eWorking, were also statistically less likely to employ eLancers. This suggests that individual eLancers and companies are substitutes for each other.

6.2 Individuals

As in the case of employees, the UK LFS is the only national survey that captures teleworking (ICT-supported home-based working) conducted by the self-employed. Unlike employees, however, we have chosen to make a distinction between two categories of self-employed workers who work from a home base and whose work is supported by ICTs.

The first category (whom we have defined as eLancers) are those who provide business and finance related services. It is this category, whose use was captured at the establishment level by the EMERGENCE employer survey, which asked about the location and employment status of workers in relation to the supply of six generic business services.

The second category encompasses self-employed workers who provide other services, and who use ICTs in the course of their work. We have categorised these as the 'eEnabled self-employed'. In such cases, the ICTs can be regarded as means of managing and organising the business and communicating with clients, but do

not constitute the means of delivery of the core content of the business as in the case of the eLancers.

6.2.1 eLancers

Because of the imperfect match between sectoral categories, occupational categories and definitions of the generic business services used in the survey, the distinction between the two groups is not always absolutely clear. It is possible, for instance, that some of the eLancers captured in the EMERGENCE survey, for instance those involved in the supply of 'creative' functions such as design, might have been classified as artistic workers rather than suppliers of business services.

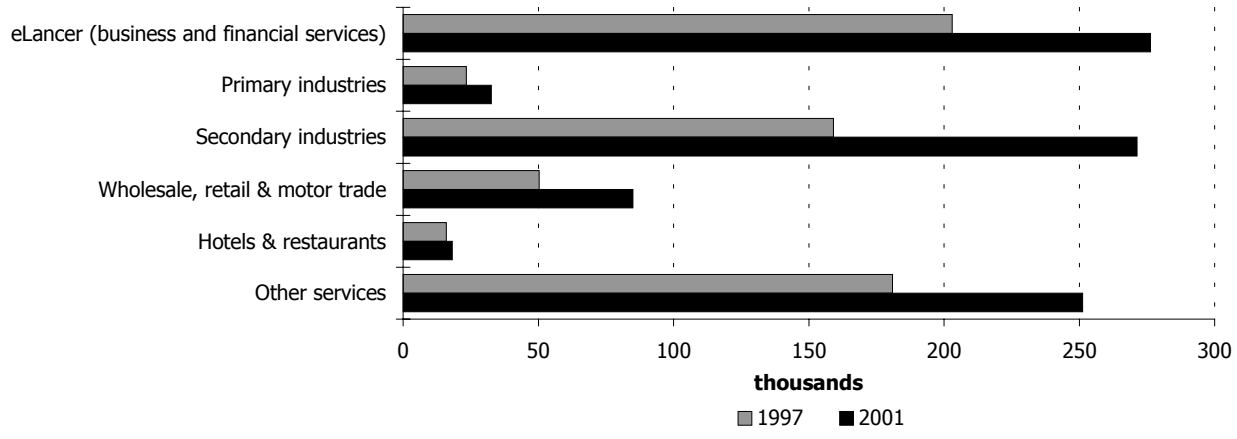
Nevertheless, it is undoubtedly the case that there are large and growing numbers of self-employed people who use ICTs but who are not supplying services to business users. We therefore felt it useful to retain a distinction between these categories in our analysis.

Because of the nature of the EMERGENCE survey, we concentrate in this chapter on eLancers as the group most likely to provide to businesses services that might traditionally — in the days before ICTs were introduced — have been conducted in-house by suitably qualified employees.

Figure 6.5 illustrates the growth in eLancers within the UK between 1997 and 2001.

Although the European Labour Force Survey does not provide us with information about the use of ICTs by the self-employed, it does provide us with basic information about self-employment and about sector. If we use a similar methodology to that proposed for the estimation of telehomeworkers, we arrive at a broad estimate for the number of eLancers in Europe of around 1.4 million (Table 6.1).

Figure 6.5: eLancers and other eEnabled self-employed in the UK, 1997 to 2001



Source: EMERGENCE analysis, 2001

Table 6.1: Estimated number of eLancers, 2000

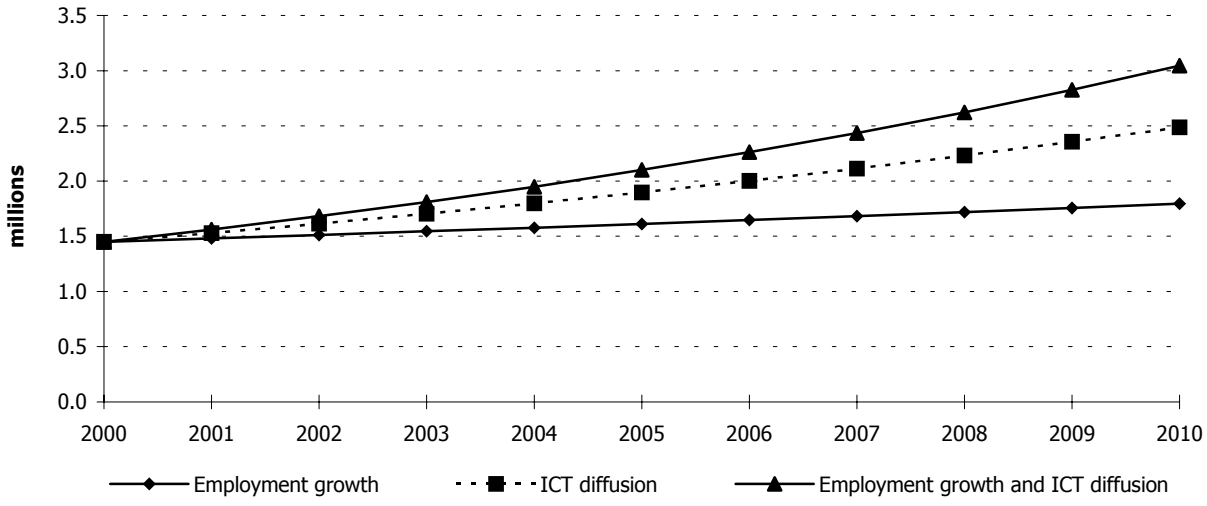
	eLancers
UK and Ireland	290,000
Benelux and France	240,000
Denmark, Sweden and Finland	70,000
Germany and Austria	350,000
Spain, Portugal, Greece, Italy	500,000
All	*1,400,000*

Source: EMERGENCE analysis, 2001

The composition of this total, however reveals some striking contrasts with the picture of telehomeworking and multilocational eWork revealed in Chapters 4 and 5. Over one-third of this total is contributed by the Mediterranean region with its estimated half a million eLancers, characteristic of the informal networks which characterise these countries. This exceeds all other regions, and approaches the combined totals of the UK and Ireland, France, Belgium, the Netherlands and Luxembourg, at 550,000, and contrasts strongly with the very low levels of individualised eWork by employees in Southern Europe.

Figure 6.6 presents estimates of the growth in this form of eWork to 2010, using the same three scenarios as in Chapters 4 and 5. As can be seen, if current employment trends continue, even without an increase in the use of ICTs, there seems likely to be a growth in eLancing from its present estimated level of around 1.5 million to around 1.8 million. A continuing growth in ICT use, combined with static employment growth, would lead to an increase of approximately 2.5 million. Taking a combined scenario, we find a leap to 3.0 million, *ie* a doubling of the number of eLancers in the EU labour market over the next decade.

Figure 6.6: Projected growth in eLancing in the EU, 2000-2010



Source: EMERGENCE analysis, 2001

Table 6.2: Estimated number of eEnabled self-employed in EU15, 2000

Agriculture	470,000
Industry	1,060,000
Wholesale, retail	640,000
Hotel and catering	150,000
Other services not business and finance related	760,000
All	*3,080,000*

Source:: EMERGENCE analysis, 2001

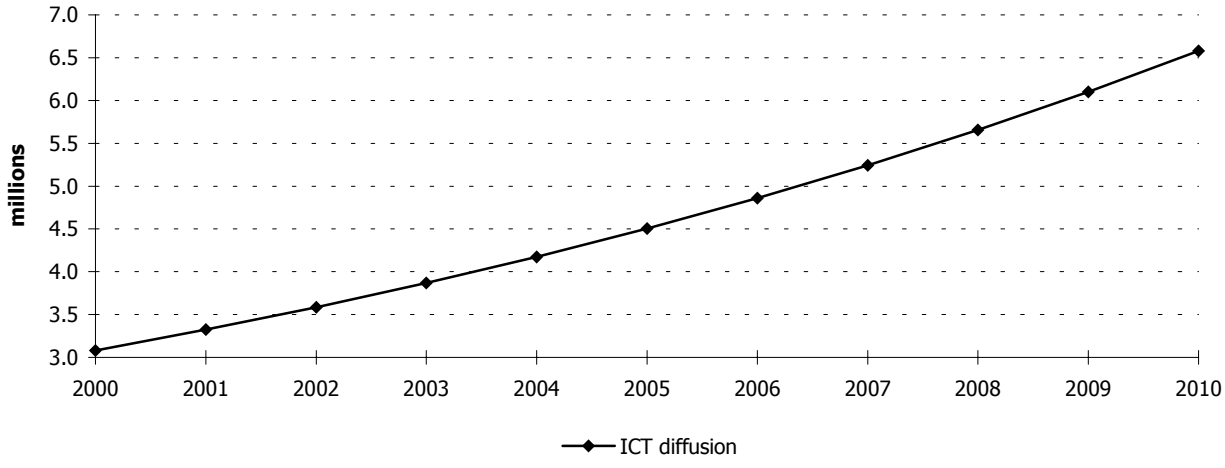
6.2.2 eEnabled self-employment

In a similar process, we used a combination of data from the UK labour force survey and the Community labour force survey to derive estimates of the growth in eEnabled self-employment; that is, self-employment which is not categorised as involved in supplying business services, but which nevertheless involves the use of ICTs for its successful performance.

As a proportion of self-employed workers involved in non-business and finance related activities, this category has experienced a growth of at least eight per cent between 1997 and 2001 in the UK, mainly due to the diffusion of ICTs during this period. Breaking the growth rates down by industrial sectors and, albeit simplistically, relating this back to the data from the Community LFS, would produce overall European estimates of around three million eEnabled workers (Table 6.2).

A continuation of this trend (shown in Figure 6.7 below) would result in a doubling of all eEnabled self-employed people involved in the supply of non-business-related services in the next

Figure 6.7: eEnabled self-employment: projected growth to 2005, based on continuation of existing trends



Source: EMERGENCE analysis, 2001

decade. It seems likely that in reality this growth in enablement will slow down over the latter part of the next decade once some saturation point is achieved. However, existing data give us no means of estimating what that saturation point might be. It is of course conceivable that over the next few years ICTs will become essential tools for all self-employed people, and will indeed reach this high penetration level. If this is the case, then (using a broad definition of eWork) some three million extra eWorkers will be added to the European workforce by 2010, in addition to those discussed earlier.

7. Combined Estimates of Individualised Forms of eWork

There are variety of ways in which different authors have attempted to classify and measure individualised eWorking or teleworking. Among these classifications, estimates as to the numbers of such workers may include the measurement of those who are:

- home-based employees who require computers and a telecommunication link to perform their work (telehomeworkers)
- multilocational employees who require computers and a telecommunication link to perform their work (multilocational eWorkers)
- home or multilocational self-employed workers who provide business or financial services and require computers and a telecommunication link (eLancers)
- home or multilocational self-employed workers who do *not* provide business or financial services, but do require computers and a telecommunication link to perform their work (eEnabled self-employed).

It is clear from the above typologies that differences in definition will produce a wide variation of estimates for the number of 'eWorkers' in Europe. The 2000 EMERGENCE employer survey focused on the use of ICT for the delivery of information-based services to business customers. In order to maintain compatibility with the survey, a large number of those employed who were not specifically providing business related services were excluded from our definition of 'eLancers' or self-employed eWorkers discussed in Chapter 6.

We first produce an estimate based upon the groups who use a computer and a telecommunication link to perform their work and excluding those occasional workers who have not teleworked in the previous week. In other words, telehomeworkers, multilocational eWorkers and eLancers. Based on this narrow definition of individualised eWorking, we estimate that there were approximately six million person equivalent eWorkers in Europe in 2000 (Table 7.1).

Table 7.1: Estimates of telehomeworkers, eEnabled workers and eEnhanced workers in Europe, 2000

	EU 15
1. Home-based employees who use a computer and telecommunications link to conduct their work (person equivalent)	810,000
2. Multilocational employees who use a computer and telecommunications link to conduct their work (person equivalent)	3,700,000
3. eLancers providing business and related industries who use a computer and telecommunications link to conduct their work	1,450,000
Number of person equivalent eWorkers — sum of 1-3 above (EMERGENCE narrow definition)	*5,960,000*
4. Number of eEnabled self-employed workers who require a computer and telecommunications link to conduct their work not working in business related industries	3,080,000
Number of person equivalent eWorkers — sum of 1-4 above (EMERGENCE broad definition)	*9,040,000*
Estimated number of eWorkers based on CLFS and UK LFS (including irregular eWorkers)	*9,830,000*
(ECATT estimate of 'regular' plus 'supplementary' teleworkers in Europe in 1999[1])	9,009,000

Source: EMERGENCE analysis, 2001

If we widen the analysis to include those self-employed who are not providing business or financial services, those that we have defined as the 'eEnabled self-employed', the overall estimate is likely to become a great deal higher. In 1999 there were over 22 million self-employed workers in Europe, 19 million of whom were not involved in the provision of business or financial services. Estimates from the Labour Force Survey (which records their ICT usage) suggest that in the UK alone there were 700,000 eEnabled self-employed individuals who were not providing business or financial services in 2001. In the absence of any other comparable data on the proportions of similar individuals in the rest of Europe, estimates for the EU 15 have to be treated with extreme caution.

Accepting this caveat, if we make the crude assumption that a similar proportion of self-employed individuals who are not providing business related services are eEnabled in the rest of Europe as in the UK then, after controlling for differences in the industrial distribution of self-employed workers, we would expect an estimate of around three million eEnabled self-employed workers.

The total number of eEnabled self-employed workers in Europe would therefore represent about one in six of the self-employed population. Adding this group to the previous estimate of eWorkers would suggest that there is the equivalent of nine million people employed in Europe who use a computer and telecommunication link to work remotely.

It is interesting to consider whether it is possible to develop an estimate of the number of eWorkers and eEnabled workers in

[1] ECATT Project, *Telework Data Report*, Bonn, 2000

Europe that also includes estimates for those occasional eWorkers who did not conduct eWork in the reference period. Unfortunately, as this is very much beyond the purpose for which the original EMERGENCE survey was conducted, and in the absence of any other data sources, we are restricted to estimates based on approximations using the UK LFS and the Community LFS.

The Community LFS reports the number of individuals who 'usually work from home' or 'sometimes work from home'. This definition is slightly broader than the one used in much of our analysis, as it includes individuals who work from home infrequently and were not captured in the UK LFS. Nevertheless, If we make the assumption that the expansion of homeworking has been facilitated by enabling ICT technology, then using UK estimates for the proportion of regular homeworkers who are also telehomeworkers (*ie* who use ICTs to perform their work) and the proportion of individuals who are frequently working from multiple locations and are eWorkers, would produce an estimate for Europe of around 8.8 million eWorkers in 1999. An annual growth rate in the number of eWorkers in Europe of 13 percent (based on an annualised average of the rates of growth in the UK between 1997 and 2001) would mean a European estimate of 9.8 million eWorkers in 2000.

It should be stressed that both these estimates are hypothetical and that, in the absence of any other data, a micro-level analysis of the data from the Community LFS, controlling for industrial distribution, occupation distributions, employment contracts and other related factors, would be required to produce more robust results.

Nevertheless, it is interesting that this estimate, drawing on different data and using a different methodology, is nevertheless remarkably close to that produced using data from the EMERGENCE survey.

The only other attempt of which we are aware to estimate the numbers of eWorkers in Europe was carried out by the ECATT project, drawing on the results of a population survey. Despite some differences in definition, here too we find very similar conclusions. ECATT estimated that in 1999 there were 6,049,000 'regular' teleworkers (both employees and eLancers using ICT to deliver their work from a distance) and about half as many again 'supplementary teleworkers', producing a total of 9,009,000 teleworkers in all in 1999.[1] Given the weakness of existing indicators and definitions, and differing methodological approaches, this convergence is striking and lends credibility to the conclusions.

[1] ECATT Project, *Telework Data Report*, Bonn, 2000

Table 7.2: Projections of the telehomeworkers, multilocational eWorkers and eLancers, 2010

	Employment growth	ICT diffusion	Employment growth & ICT diffusion
Telehomeworking employees	950,000	2,750,000	3,170,000
Multilocational eWorkers (person equivalent)	4,310,000	12,463,000	14,332,000
eLancers (providing business related services)	1,790,000	2,490,000	3,040,000
eEnabled self-employed	3,080,000	6,580,000	6,580,000
Total estimate of individualised eWorking	10,130,000	24,283,000	27,122,000

Source: EMERGENCE analysis, 2001

Finally, Table 7.2, aggregates the forecasts from the preceding chapters of this report and highlights the projected forecasts for individualised eWork resulting from the three growth scenarios.

As can be seen, employment growth alone will affect these figures only slightly, producing only an estimated additional million teleworkers by 2010. The main source of growth is likely to come from organisational restructuring and increased ICT. Under the scenario of continuing employment growth and ICT diffusion, we may expect a threefold increase in the number of individualised eWorkers over the decade.

8. Forms of eWork on Remote Office Premises

As noted in our introduction, we found no statistical sources which presented us with data in longitudinal sets that would enable us to develop forecasts for the growth of forms of eWork which take place, not in individual workers' homes, on the road, or in other scattered remote locations, but in remote offices which are linked by telecommunications to the establishments to which they supply their services.

We nevertheless present in this chapter an analysis of the results of the survey which might contribute to the construction of a model, were such data to become available.

According to the EMERGENCE typology, such remote, ICT-linked office premises fall into two broad categories, the distinction between which is basically a contractual one.

Where work is carried out in a remote office by employees of the surveyed establishment — in other words when it represents an ICT-enabled geographical division of labour within the same organisation — we refer to it as a 'remote back office'. Because 'remoteness' can be a rather vague concept, in the EMERGENCE survey this was made more precise by defining as 'remote' only those activities which took place outside the NUTS1-level region in which the surveyed establishment was based.

The NUTS regions used as standard categories within the EU have the merit of being stable easily-identified geographical entities, at a level of disaggregation for which a number of other economic indicators are available. However, they vary considerably in size (both geographical and in terms of population) from one country to another. Some smaller EU countries — Portugal, Ireland, Denmark, Sweden and Luxembourg — consist only of a single NUTS1 region. This means that the definition of 'remote' used in the survey could be regarded as quite extreme in some countries, and the data from the survey probably underestimate the extent to which work is being carried out in remote ICT-linked back offices in the EU. We preferred to err in this direction than to adopt the alternative approach — to classify as 'remote' any building at a different address from the surveyed establishment — which would have involved greatly overestimating this form of eWork. Although we were left with a relatively small number of cases, we

can be confident that these involved genuine instances of remote work, carried out at distances too far to be covered by daily travel and therefore involving a significant substitution of 'virtual' communication for face-to-face contact.

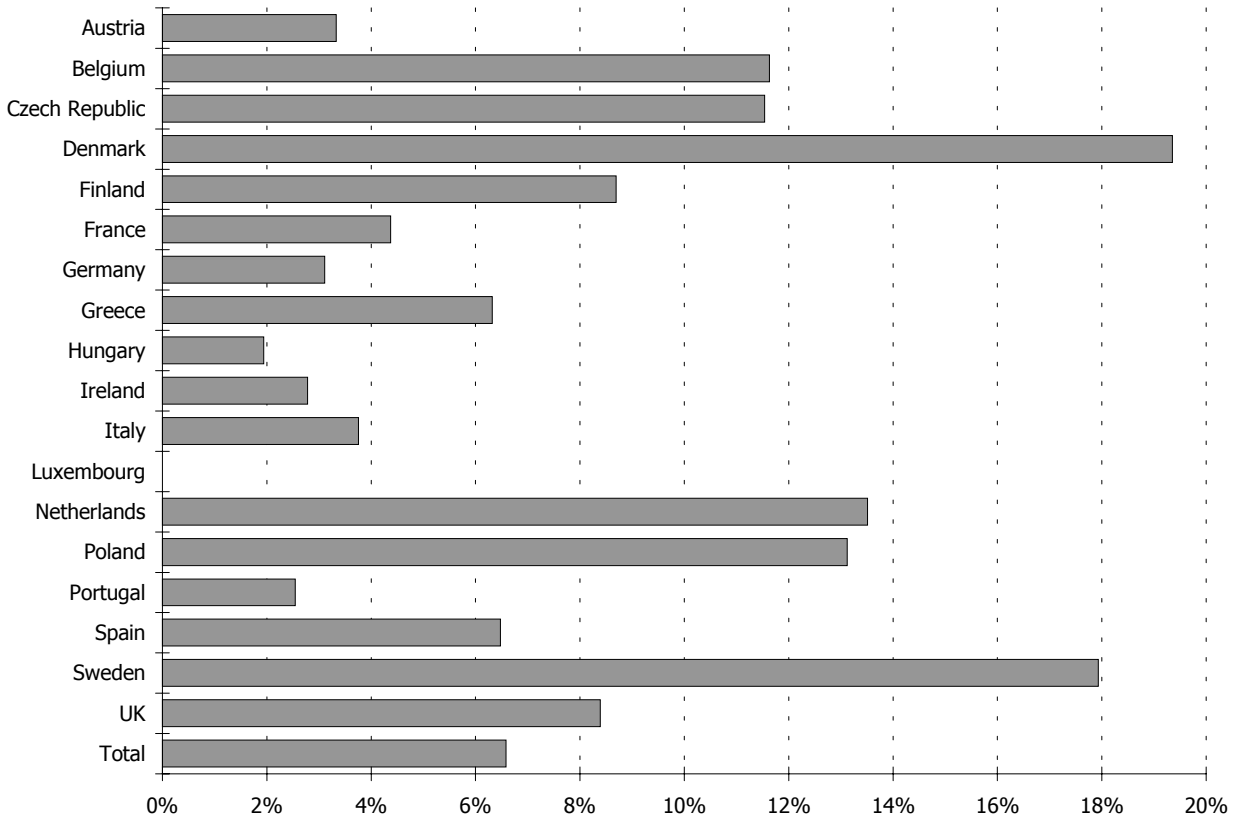
Our second category involves the supply of business services by externally owned organisations, termed 'eOutsourcing' in the EMERGENCE survey.

8.1 Remote back offices

We first turn our attention to remote back offices.

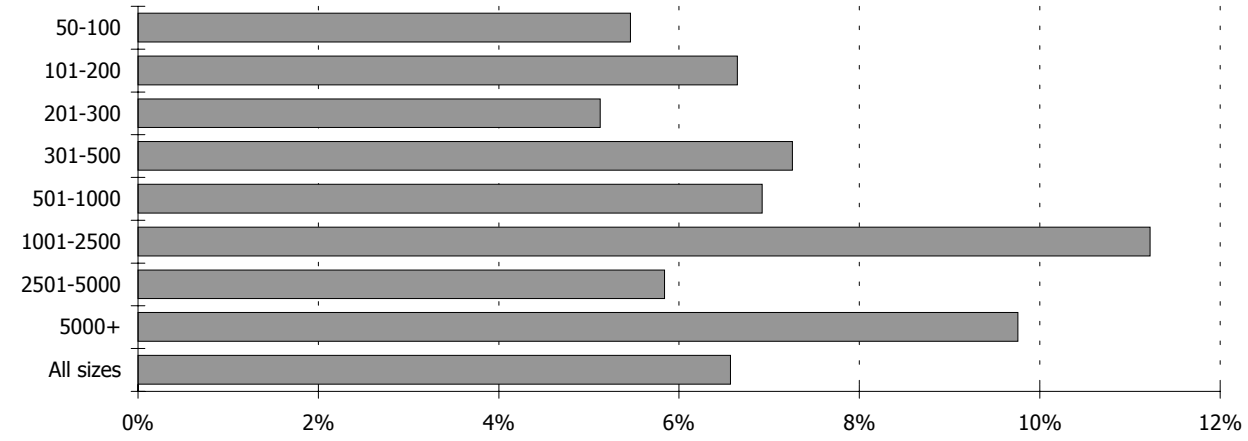
As can be seen from Figure 8.1, the use of remote back offices varies considerably from country to country. High users of this form of eWork appear to fall into two main categories. On the one hand we find sophisticated high-tech, high-skill economies such as Denmark, Sweden, the Netherlands and Belgium. Here, they can be interpreted as evidence of a highly networked economy, with good quality telecommunications infrastructure, a high use of ICTs and a well developed business services sector. It may well be that progressive, trust-based management systems also play a part, by facilitating the management of remote groups of workers.

Figure 8.1: Proportion of establishments with back offices, by country



Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Figure 8.2: Proportion of establishments with back offices, by establishment size



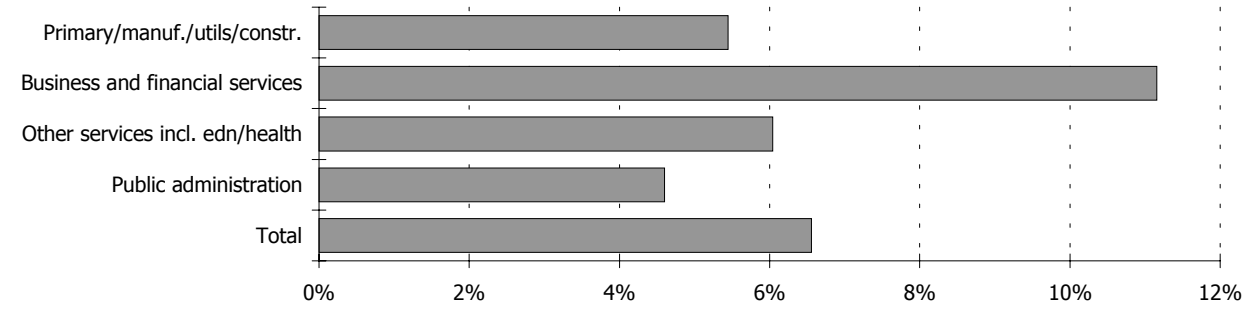
Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Contrasting with these we find the Accession States of Poland and the Czech Republic, where the extensive use of remote back offices may be an indicator of a rather different state of affairs: a rapidly changing transitional economy, with a high proportion of relatively new enterprises and a strong presence of recently arrived foreign-owned transnational corporations.

In some cases, it is possible that public policies may have played some role in bringing about this pattern. In highly-developed Sweden, for instance, government subsidies have been made available to encourage the establishment of call centres and other back offices in remote rural regions in the north of the country. It is possible that the desire to create jobs in regions of high unemployment may also have played a part in other countries.

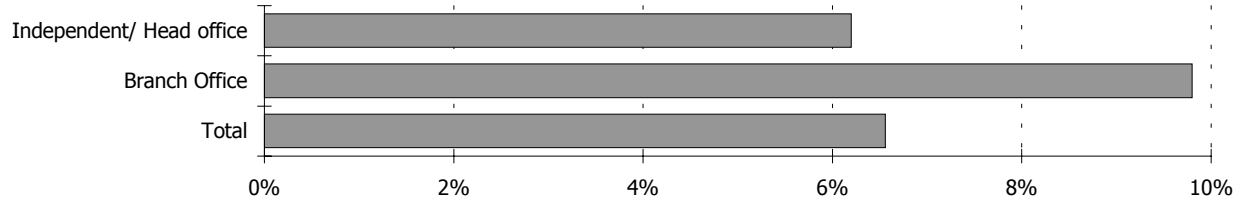
Figure 8.2 shows the breakdown of usage of remote back offices by establishment size. Although there is a dip in the 2,501-5,000 employee size band, in general it is in the largest organisations that this form of eWork is most likely to be found, with the greatest prevalence in the 1,001-2,500 size band, followed by the 5,000+ size band.

Figure 8.3: Proportion of establishments with back offices, by industrial sector



Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Figure 8.4: Proportion of establishments with back offices, by whether they are independent or branch offices



Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

This supports the not unsurprising proposition that the most complex geographical division of labour will be found in the largest organisations. However, this does run contrary to some models of the 'networked organisation' or 'virtual enterprise'. This result does not support a simplistic model of a 'networked firm' broken down into a large number of small component parts scattered around the globe. On the contrary, it suggests that the unit size may remain relatively large, even in highly networked organisations.

8.1.1 Modelling back office employment

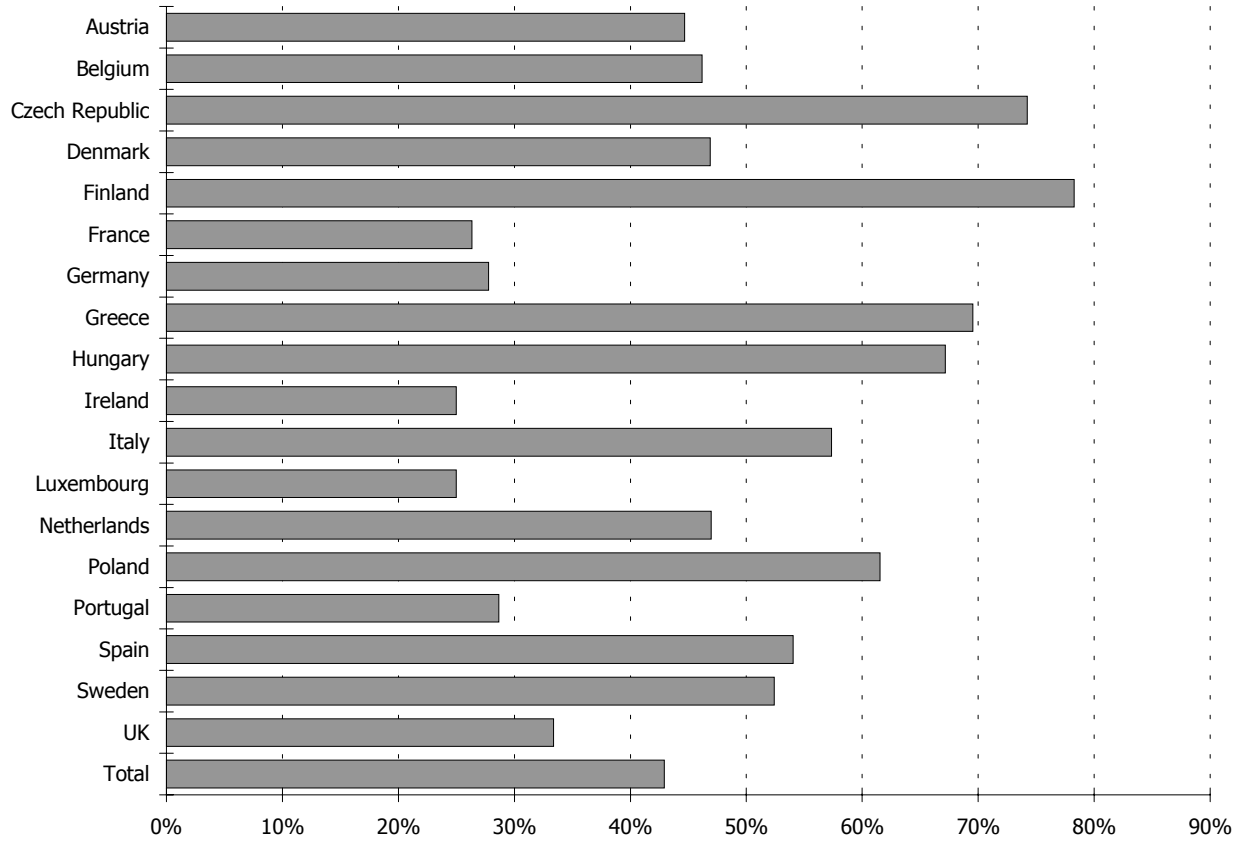
A logistic model of the propensity of establishments to demand Back office operations is presented in Appendix B Table B5 and summarised below:

- There was no clear relationship between types of location and the propensity to demand back office business support operations. Establishments in Spain, Sweden and the Czech Republic were more likely to use back offices, while those in Hungary was less likely to do so.
- There was no clear relationship between establishment size and use of back offices.
- The production industries and 'other services including healthcare' were less likely than public administration to demand back office operations.
- There was no statistically significant relationship between type of office (independent/branch establishment) and the demand for back office operations.
- Neither was there any clear relationship between other forms of eWork and demand for back office operations.

8.2 eOutsourcing

Establishments which used eOutsourcing followed a different national distribution. As can be seen from Figure 8.5, the pattern was broadly similar to that for eLancing, described in Chapter 6 above, in that high users of this form of eWork fell into three

Figure 8.5: Proportion of establishments that conduct eOutsourcing, by country



Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

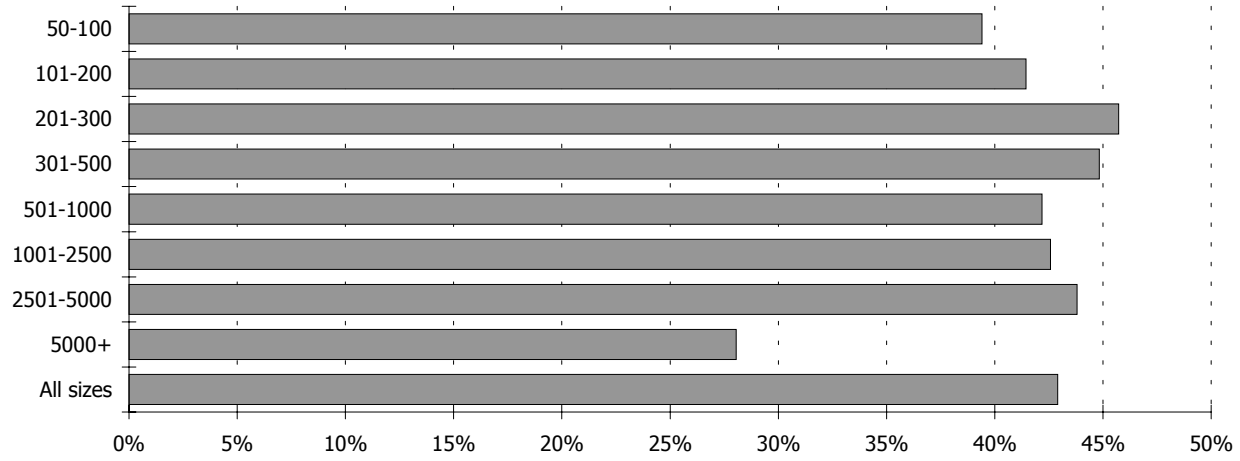
broad national groups: Poland, Hungary and the Czech Republic, where it seemed to be associated with the transition to a market economy; Southern Europe, where it is associated with a strongly networked small firm sector; and Finland, Sweden, Denmark and the Netherlands, where it is associated with advanced use of ICTs and modern management methods.

Figure 8.6 shows that the use of eOutsourcing is fairly evenly spread across the different size bands and varies little by company size.

There are, however, major differences by sector, as can be seen from Figure 8.7. As with other forms of eWork, we find that the business and financial services sector is the highest user of eOutsourcing. However, this is followed by the public administration sector, which is a relatively low user of other forms of eWork, including remote back offices.

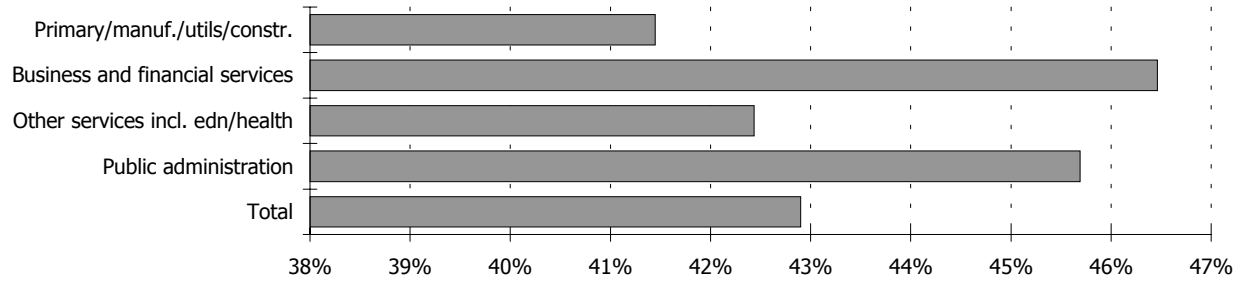
Perhaps in many cases as a result of relatively recent restructuring, privatisation or the introduction of initiatives like compulsory competitive tendering, 'best value' or in some cases aspects of 'eGovernment' initiatives, the public sector is clearly now a major market for outsourced eServices.

Figure 8.6: Proportion of establishments that conduct eOutsourcing, by establishment size



Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Figure 8.7: Proportion of establishments that conduct eOutsourcing, by industrial sector



Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Finally, we looked at the propensity to use eOutsourcing by whether an establishment is independent or a branch office. Here we found no significant difference: with eOutsourcing practised by 42.7 per cent of branches compared with 43 per cent of independent establishments. This contrasts with the situation which applies in the case of all other forms of eWork: branch offices are both more likely to employ telehomeworkers, multilocational eWorkers and eLancers, and more likely to be linked into large multi-site organisations and hence to use remote back offices.

8.2.1 Modelling eOutsourcing

As with other forms of eWork, we went beyond the simple bivariate analysis presented above to develop a logistic regression model. The results are presented in Appendix B Table B6 and are summarised below:

- Relative to the UK, establishments in Austria, Belgium, the Czech Republic, Finland, Greece, Hungary, Poland and the Netherlands were all more likely to employ eOutsourcing.

- Relative to establishments with 50 to 100 employees, medium sized establishments with between 201 and 500 employees were more likely to employ eOutsourcing.
- There was no relationship between industrial sector and the demand for eOutsourcing.
- eOutsourcing was not statistically related to whether the establishment was a head office or branch office.

Appendix A: Tables

Table A1: Proportion of telehomeworkers, by broad industrial sectors

	No telehomeworkers employed	Telehomeworkers employed
Primary and secondary	98.2	1.8
Business and financial services	97.1	2.9
Other services incl. educn/health	99.0	1.0
Public administration	98.6	1.4
All sectors	*98.3*	*1.7*

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table A2: Proportion of telehomeworkers, by establishment size

	No telehomeworkers employed	Telehomeworkers employed
50-100	99.0	1.0
101-200	98.6	1.4
201-300	97.4	2.6
301-500	98.8	1.2
501-1000	98.9	1.1
1001-2500	97.6	2.4
2501-5000	94.2	5.8
5000+	100.0	**
All	*98.3*	*1.7*

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table A3: Proportion of telehomeworkers, by whether establishment is branch or independent/ head office

	No telehomeworkers employed	Telehomeworkers employed
Head office	98.4	1.6
Branch office	97.2	2.8
Total	*98.3*	*1.7*

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table A4: Use of multilocational teleworking employees, by sector

	No multilocational teleworkers	Multilocational teleworkers
Primary/manufact/util/constrn	91.5	8.5
Business and financial services	84.0	16.0
Other services incl. educn/health	90.6	9.4
Public administration	96.2	3.8
All sectors	*90.2*	*9.8*

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table A5: Use of multilocational teleworking employees, by establishment size

	No multilocational teleworkers	Multilocational teleworkers
50-100	91.0	9.0
101-200	90.8	9.2
201-300	91.9	8.1
301-500	89.0	11.0
501-1000	89.2	10.8
1001-2500	86.9	13.1
2501-5000	92.0	8.0
5000+	87.8	12.2
All sizes	*90.2*	*9.8*

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table A6: Use of multilocational teleworking employees, by independent/ head office

	No multilocational teleworkers	Multilocational teleworkers
Head office	90.8	9.2
Branch office	85.5	14.5
Total	*90.2*	*9.8*

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table A7: Use of eLancers, by sector

	No eLancers	eLancers
Primary and secondary	88.9	11.1
Business and financial services	87.0	13.0
Other services (incl. edn/health)	89.5	10.5
Public administration	88.6	11.4
All sectors	*88.7*	*11.3*

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table A8: Use of eLancers, by establishment size

	No eLancers	eLancers
50-100	89.5	10.5
101-200	90.2	9.8
201-300	88.6	11.4
301-500	87.6	12.4
501-1000	89.6	10.4
1001-2500	84.3	15.7
2501-5000	87.0	13.0
5000+	97.6	2.4
All sizes	*88.7*	*11.3*

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table A9: Use of eLancers, by head/independent office or branch office

	No eLancers	eLancers
Head office	88.8	11.2
Branch office	87.8	12.2
Total	*88.7*	*11.3*

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table A10: Proportion of establishments with back offices, by country

	No back offices	Back office
Austria	96.7	3.3
Belgium	88.4	11.6
Czech Republic	88.5	11.5
Denmark	80.6	19.4
Finland	91.3	8.7
France	95.6	4.4
Germany	96.9	3.1
Greece	93.7	6.3
Hungary	98.1	1.9
Ireland	97.2	2.8
Italy	96.2	3.8
Luxembourg	100.0	
Netherlands	86.5	13.5
Poland	86.9	13.1
Portugal	97.5	2.5
Spain	93.5	6.5
Sweden	82.1	17.9
UK	91.6	8.4
Total	*93.4*	*6.6*

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table A11: Proportion of establishments with back offices, by establishment size

	No back offices	Back office
50-100	94.5	5.5
101-200	93.4	6.6
201-300	94.9	5.1
301-500	92.7	7.3
501-1000	93.1	6.9
1001-2500	88.8	11.2
2501-5000	94.2	5.8
5000+	90.2	9.8
All sizes	*93.4*	*6.6*

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table A12: Proportion of establishments with back offices, by sector

	No back offices	Back office
Primary/manuf./utils/constr.	94.6	5.4
Business and financial services	88.8	11.2
Other services incl. edn/health	94.0	6.0
Public administration	95.4	4.6
Total	*93.4*	*6.6*

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table A13: Proportion of establishments with back offices, by independent/head office or branch

	No Back office	Back office
Head office	93.8	6.2
Branch	90.2	9.8
Don't know	100.0	
All	*93.4*	*6.6*

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table A14: Proportion of establishments conducting eOutsourcing, by country

	No eOutsourcing	eOutsourcing
Austria	55.3	44.7
Belgium	53.8	46.2
Czech Republic	25.8	74.2
Denmark	53.1	46.9
Finland	21.7	78.3
France	73.6	26.4
Germany	72.2	27.8
Greece	30.5	69.5
Hungary	32.9	67.1
Ireland	75.0	25.0
Italy	42.7	57.3
Luxembourg	75.0	25.0
Netherlands	53.0	47.0
Poland	38.5	61.5
Portugal	71.3	28.7
Spain	46.0	54.0
Sweden	47.6	52.4
UK	66.6	33.4
Total	*57.1*	*42.9*

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table A15: Proportion of establishments conducting eOutsourcing, by establishment size

	No eOutsourcing	eOutsourcing
50-100	60.6	39.4
101-200	58.6	41.4
201-300	54.3	45.7
301-500	55.2	44.8
501-1000	57.8	42.2
1001-2500	57.4	42.6
2501-5000	56.2	43.8
5000+	72.0	28.0
Total	*57.1*	*42.9*

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table A16: Proportion of establishments conducting eOutsourcing, by industrial sector

	No eOutsourcing	eOutsourcing
Primary/manuf./utils/constr.	58.6	41.4
Business and financial services	53.5	46.5
Other services incl. edn/health	57.6	42.4
Public administration	54.3	45.7
Total	*57.1*	*42.9*

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table A17: Proportion of establishments conducting eOutsourcing, by independent/ head office or branch office

	No eOutsourcing	eOutsourcing
Head office	57.0	43.0
Branch office	57.3	42.7
Total	*57.1*	*42.9*

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Appendix B: Logistic models of eWorking

This section presents the results of analysis of the determinants of various forms of eWork, conducted through the use of logistic regression modelling. To use this technique, we define the variable of interest (in the case of Table B2, whether the establishment employs telehomeworkers) as being equal to 1 if true and 0 if false. The model then assesses the effects of a change in the 'explanatory' variables (*eg* country, establishment size, industrial sector) on the odds of an establishment employing home-based teleworkers. All the explanatory variables that have been used in this instance are categorical and in each case, one category has been chosen as a reference category (the reference category for each variable is summarised in Table B1). For example, in the case of establishment size, the category 50 to 99 employees has been taken as the reference category, in the case of country the reference category is the UK.

The last two columns in these tables are of particular interest. The last column 'Exp(B)' refers to the effects that a particular coefficient has, relative to the reference category, on the 'odds-ratio' of a particular form of eWorking being employed. A value that is greater than one suggests that the category has a positive effect on the odds ratio, while a value of less than one suggests a negative effect on the odds ratio. The statistical significance of the variable is indicated in the penultimate column 'Sig'. Commonly accepted levels of significance are the five per cent level (0.05) and the one per cent level (0.01), *ie* levels at which there is a one in twenty or one in one hundred chance that any association found was the result of chance.

So, taking telehomeworking as an example in Table B2, we can see that being in the Netherlands has a positive effect, relative to the UK, on the odds of an establishment having telehomeworking employees. This effect is also statically significant at the one per cent significance level. Industrial distribution did not have a significant effect, while establishments with 201 to 300 employees and those with 2,500 to 5,000 employees were more likely to have home-based teleworkers than those with fewer than 101 employees. These results are statistically significant at the one per cent level.

Table B1: Variables and reference categories used in the logistic regressions

Variable	Reference category
Country	UK
Industrial sector	Public administration
Establishment size	50 to 100 employees
Head office	Head office
Telehomeworking	No telehomeworkers
Multilocational eWorkers	No multilocational eWorkers
eLancers	No eLancers
Back offices	No Back offices
eOutsourcing	No eOutsourcing

Table B2: Propensity to conduct Telehomeworking

	B	S.E.	Wald	Sig.	Exp(B)
Country					
Austria	0.38	0.50	0.59	0.44	1.47
Belgium	0.10	0.47	0.05	0.83	1.11
Czech Republic	–1.12	0.62	3.20	0.07	0.33
Denmark	0.63	0.73	0.74	0.39	1.88
Finland	–0.10	0.64	0.03	0.87	0.90
France	–1.43	0.47	9.19	0.00	0.24
Germany	0.01	0.28	0.00	0.96	1.01
Greece	–1.97	1.30	2.31	0.13	0.14
Hungary	–1.03	0.72	2.04	0.15	0.36
Ireland	–1.08	2.23	0.24	0.63	0.34
Italy	–1.28	0.58	4.91	0.03	0.28
Luxembourg	–2.11	7.21	0.09	0.77	0.12
Netherlands	1.05	0.38	7.76	0.01	2.86
Poland	–8.06	8.45	0.91	0.34	0.00
Portugal	–2.50	2.00	1.56	0.21	0.08
Spain	–1.91	0.66	8.30	0.00	0.15
Sweden	–0.03	0.53	0.00	0.96	0.97
Industry					
Primary/manuf./utils/constrn	–0.26	0.44	0.35	0.55	0.77
Business and financial services	0.17	0.45	0.14	0.71	1.18
Other services incl. edn/health	–0.84	0.47	3.23	0.07	0.43

cont.:

Table B2: Propensity to conduct Telehomeworking (cont.)

	B	S.E.	Wald	Sig.	Exp(B)
Establishment size					
101-200	0.32	0.40	0.64	0.42	1.38
201-300	0.98	0.33	8.88	0.00	2.65
301-500	0.01	0.38	0.00	0.98	1.01
501-1000	0.03	0.42	0.00	0.94	1.03
1001-2500	0.63	0.43	2.17	0.14	1.87
2501-5000	1.73	0.50	11.96	0.00	5.61
5000+	–6.62	28.03	0.06	0.81	0.00
Head office					
Branch	0.04	0.27	0.02	0.89	1.04
Don't know	–5.87	74.80	0.01	0.94	0.00
Other forms of eWorking					
eOutsourcing	–0.05	0.23	0.06	0.81	0.95
Back office	–0.19	0.31	0.37	0.54	0.83
multilocational	–1.85	0.27	48.69	0.00	0.16
eLancer	–0.62	0.29	4.73	0.03	0.54
Constant	–1.56	0.61	6.48	0.01	0.21

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table B3: Propensity to conduct multilocational eWork

	B	S.E.	Wald	Sig.	Exp(B)
Country					
Austria	–0.33	0.38	0.77	0.38	0.72
Belgium	–0.16	0.34	0.22	0.64	0.85
Czech Republic	–0.48	0.31	2.44	0.12	0.62
Denmark	0.54	0.59	0.83	0.36	1.71
Finland	0.00	0.42	0.00	1.00	1.00
France	–1.23	0.24	25.80	0.00	0.29
Germany	–0.74	0.20	14.10	0.00	0.48
Greece	–0.92	0.43	4.72	0.03	0.40
Hungary	0.00	0.31	0.00	1.00	1.00
Ireland	–1.13	1.08	1.08	0.30	0.32
Italy	–1.02	0.29	12.69	0.00	0.36
Luxembourg	–2.57	3.16	0.66	0.42	0.08
Netherlands	–0.16	0.35	0.21	0.65	0.85
Poland	0.32	0.19	2.82	0.09	1.38
Portugal	–1.10	0.54	4.26	0.04	0.33
Spain	–0.85	0.26	10.52	0.00	0.43
Sweden	–0.43	0.38	1.25	0.26	0.65
Industry					
Primary/manuf./utils/constr.	1.25	0.33	14.31	0.00	3.50
Business and financial services	1.69	0.34	24.81	0.00	5.40
Other services incl. edn/health	1.33	0.34	15.69	0.00	3.78
Establishment size					
101-200	–0.20	0.20	1.00	0.32	0.82
201-300	–0.33	0.18	3.38	0.07	0.72
301-500	–0.01	0.18	0.00	0.97	0.99
501-1000	0.02	0.19	0.01	0.91	1.02
1001-2500	–0.31	0.25	1.55	0.21	0.74
2501-5000	–0.79	0.47	2.80	0.09	0.45
5000+	0.10	0.57	0.03	0.86	1.11
Head office					
Branch	0.33	0.17	4.10	0.04	1.40
Don't know	–2.12	6.48	0.11	0.74	0.12
Other forms of eWorking					
eOutsourcing	–0.31	0.13	6.11	0.01	0.73
Back office	–4.85	0.16	969.19	0.00	0.01
telehomework	–1.86	0.27	48.74	0.00	0.16
eLancer	–0.47	0.16	8.67	0.00	0.62
Constant	3.38	0.48	49.16	0.00	29.43

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table B4: Propensity to conduct eLancing

	B	S.E.	Wald	Sig.	Exp(B)
Country					
Austria	0.13	0.31	0.18	0.67	1.14
Belgium	–0.42	0.31	1.82	0.18	0.66
Czech Republic	0.22	0.21	1.11	0.29	1.25
Denmark	–0.09	0.60	0.02	0.89	0.92
Finland	0.08	0.30	0.06	0.80	1.08
France	–0.35	0.21	2.85	0.09	0.71
Germany	–0.54	0.19	8.60	0.00	0.58
Greece	–0.73	0.29	6.12	0.01	0.48
Hungary	–0.16	0.25	0.41	0.52	0.85
Ireland	–0.99	1.06	0.86	0.35	0.37
Italy	0.69	0.18	13.98	0.00	1.99
Luxembourg	–1.09	2.24	0.24	0.63	0.34
Netherlands	–0.08	0.31	0.07	0.79	0.92
Poland	0.10	0.17	0.36	0.55	1.11
Portugal	–0.95	0.48	3.91	0.05	0.39
Spain	–0.18	0.19	0.83	0.36	0.84
Sweden	0.16	0.29	0.31	0.58	1.18
Industry					
Primary/manuf./utils/constr.	0.09	0.17	0.26	0.61	1.09
Business and financial services	0.13	0.19	0.50	0.48	1.14
Other services incl. edn/health	–0.03	0.18	0.04	0.85	0.97
Establishment size					
101-200	–0.16	0.16	1.01	0.32	0.85
201-300	–0.05	0.13	0.11	0.73	0.96
301-500	0.03	0.14	0.04	0.85	1.03
501-1000	–0.11	0.15	0.46	0.50	0.90
1001-2500	0.51	0.18	7.80	0.01	1.66
2501-5000	0.12	0.31	0.14	0.71	1.12
5000+	–1.71	0.85	4.02	0.05	0.18
Head office					
Branch	0.11	0.14	0.60	0.44	1.11
Don't know	–7.23	63.69	0.01	0.91	0.00
Other forms of eWorking					
eOutsourcing	–10.01	4.13	5.87	0.02	0.00
Back office	0.05	0.20	0.05	0.81	1.05
telehomeworking	–0.59	0.29	4.22	0.04	0.56
multilocational eWork	–0.49	0.16	9.34	0.00	0.61
Constant	–0.07	0.38	0.04	0.85	0.93

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table B5: Propensity to conduct Back office operations

	B	S.E.	Wald	Sig.	Exp(B)
Country					
Austria	–0.78	0.59	1.76	0.18	0.46
Belgium	0.47	0.40	1.40	0.24	1.60
Czech Republic	0.82	0.36	5.33	0.02	2.27
Denmark	0.39	0.68	0.33	0.57	1.47
Finland	0.11	0.54	0.04	0.84	1.12
France	0.42	0.28	2.29	0.13	1.53
Germany	–0.34	0.26	1.78	0.18	0.71
Greece	0.59	0.48	1.48	0.22	1.80
Hungary	–1.53	0.60	6.53	0.01	0.22
Ireland	–0.20	1.35	0.02	0.88	0.82
Italy	0.00	0.35	0.00	1.00	1.00
Luxembourg	0.70	2.52	0.08	0.78	2.01
Netherlands	0.51	0.40	1.58	0.21	1.66
Poland	0.37	0.25	2.31	0.13	1.45
Portugal	–0.10	0.65	0.02	0.88	0.90
Spain	0.60	0.30	3.92	0.05	1.83
Sweden	1.34	0.40	11.11	0.00	3.81
Industry					
Primary/manuf./utils/constr.	–0.66	0.31	4.48	0.03	0.52
Business and financial services	–0.37	0.32	1.32	0.25	0.69
Other services incl. edn/health	–0.62	0.31	3.83	0.05	0.54
Establishment size					
101-200	0.28	0.24	1.28	0.26	1.32
201-300	–0.03	0.22	0.02	0.90	0.97
301-500	0.15	0.22	0.45	0.50	1.16
501-1000	0.04	0.24	0.03	0.86	1.04
1001-2500	0.92	0.27	11.40	0.00	2.52
2501-5000	0.64	0.54	1.44	0.23	1.90
5000+	0.48	0.61	0.62	0.43	1.61
Head office					
Branch	0.18	0.19	0.89	0.34	1.20
Don't know	–3.22	10.65	0.09	0.76	0.04
Other forms of eWorking					
eOutsourcing	0.18	0.16	1.36	0.24	1.20
eLancer	0.07	0.20	0.12	0.73	1.07
telehomeworking	–0.14	0.32	0.20	0.65	0.87
multilocational eWork	–4.85	0.16	975.24	0.00	0.01
	0.43	0.50	0.74	0.39	1.54

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases

Table B6: Propensity to conduct eOutsourcing

	B	S.E.	Wald	Sig.	Exp(B)
Country					
Austria	0.46	0.20	5.10	0.02	1.58
Belgium	0.64	0.19	11.97	0.00	1.91
Czech Republic	1.71	0.17	96.15	0.00	5.52
Denmark	0.57	0.41	1.94	0.16	1.77
Finland	2.01	0.28	51.51	0.00	7.45
France	–0.18	0.12	2.54	0.11	0.83
Germany	–0.08	0.10	0.61	0.43	0.92
Greece	1.75	0.19	83.62	0.00	5.74
Hungary	1.50	0.18	69.49	0.00	4.46
Ireland	–0.12	0.42	0.08	0.77	0.88
Italy	0.89	0.13	44.84	0.00	2.42
Luxembourg	–0.03	0.84	0.00	0.97	0.97
Netherlands	0.59	0.20	8.22	0.00	1.80
Poland	1.16	0.12	100.16	0.00	3.18
Portugal	0.08	0.21	0.17	0.68	1.09
Spain	0.95	0.12	59.63	0.00	2.59
Sweden	0.79	0.20	14.86	0.00	2.20
Industry					
Primary/manufact/util/constrn	–0.18	0.11	2.55	0.11	0.84
Business and financial services	0.03	0.12	0.05	0.82	1.03
Other services incl. educn/health	–0.07	0.12	0.41	0.52	0.93
Establishment size					
101-200	0.16	0.10	2.77	0.10	1.18
201-300	0.33	0.09	14.22	0.00	1.39
301-500	0.24	0.09	6.84	0.01	1.27
501-1000	0.19	0.10	3.67	0.06	1.21
1001-2500	0.05	0.13	0.17	0.68	1.06
2501-5000	0.19	0.21	0.78	0.38	1.21
5000+	–0.04	0.27	0.02	0.88	0.96
Head office					
Branch	–0.01	0.09	0.00	0.95	0.99
Don't know	–1.38	1.11	1.56	0.21	0.25
Other forms of eWorking					
Back office	0.16	0.15	1.17	0.28	1.18
eLancer	–9.59	3.35	8.18	0.00	0.00
telehomeworking	–0.06	0.22	0.08	0.78	0.94
multilocational eWork	–0.29	0.13	5.19	0.02	0.75
	8.61	3.36	6.56	0.01	5,502.57

Source: EMERGENCE European Employer Survey, 2000 (IES/NOP) Weighted figures; % of establishments with >50 employees in EU (15) plus Hungary, Poland and Czech Republic. Weighted base: 7,305 cases