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Methodological report for "Do SMEs create more and better jobs?"

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1 Introduction

On 3 March 2010, the Commission launched the "Europe 2020 Strategy for smart, sustainable and inclusive growth". Europe 2020 is the EU's growth strategy for the coming decade, which entails transforming itself into a smart, sustainable and inclusive economy leading to high levels of employment, productivity and social cohesion. The strategy presents concrete actions to be taken at the EU and the national levels. Smart growth refers to fostering knowledge, innovation, education and digital society. Sustainable growth refers to making EU production more resource efficient while improving competitiveness, and inclusive growth focuses on raising participation in the labour market, the acquisition of skills and fighting poverty.

The Small Business Act (SBA) for Europe was adopted in June 2008. The SBA establishes a comprehensive SME policy framework for the EU and its Member States. The SBA review was presented in February 2011. The review includes the progress of the implementation of the SBA and new actions to be taken by the EC and Member States to respond to challenges resulting from the economic crisis.

Building on work carried out by the Commission and external actors, the Commission has launched a study to investigate the role SMEs play in job creation and the quality of jobs they provide, particularly in the light of the SBA Act and the Europe 2020 strategy. The results of this study are presented in the publication "Do SMEs create more and better jobs?" The results in the study are based primarily on three different data sources: the Orbis-Amadeus database, the Structural Business Statistics (SBS) and the Enterprise Survey 2010. These data sources and the methodologies applied to them are discussed in this document.

The following three chapters discuss the details of each of these data sources and the methodologies applied. In the remainder of the introduction, some general observations are made concerning the comparability of the results of these sources.

Different sector and size class classifications used

The publication "Do SMEs create more and better jobs?" focuses on the business economy, which is defined by NACE Sections[1] D, F-K, N and O (excl. 91). Many of the figures and tables presented in the first chapters of "Do SMEs create more and better jobs?" are, however, based on the publication "European SMEs under Pressure", which uses a different sectoral demarcation: that of the non-financial business economy, defined by NACE Sections C -I and K. Notice that the difference between the non-financial business economy and the business economy is not limited to financial intermediation (NACE J), but also differs regarding private enterprises from other service activities (NACE N health and social work and NACE O other service activities, excl. 91)[2].

[1] This refers to NACE rev. 1.1.

[2] In addition, they also differ regarding mining and quarrying (NACE C) and electricity, gas and water supply (NACE E), but these two divisions involve relatively few private enterprises.

Furthermore, the publication "Do SMEs create more and better jobs?" is concerned with jobs of employees. Although technically speaking, entrepreneurs and the self-employed also have jobs, the common understanding of a job is limited to jobs of employees. Hence, enterprises without employees were excluded from the Enterprise Survey 2010, and all the results based on the Enterprise Survey 2010 refer to employer enterprises only (defined as enterprises employing at least one employee). Unfortunately, many other available databases with enterprise statistics do not distinguish between employer enterprises (enterprises employing at least one employee) and enterprises without employees (self-employed entrepreneurs). Most of the information presented in Part A of "Do SMEs create more and better jobs?" refers to all jobs, i.e. including the employment of self-employed and non-paid family workers. The information presented in Part B usually refers to jobs of employees only.

Data availability for countries outside the EU varies between data sources

The study covers the 27 Member States of the European Union and the following 10 non-EU countries: Albania, Croatia, the Former Yugoslav Republic of Macedonia, Iceland, Israel, Liechtenstein, Montenegro, Norway, Serbia and Turkey. However, not all the available data sources cover all countries. The Structural Business Statistics only cover the EU27 Member States[1]. The Orbis-Amadeus database includes statistics on 24 of the 27 Member States (Cyprus, Malta and Luxembourg are excluded because too few observations are available), 5 of the 10 non-EU countries (Croatia, Iceland, Liechtenstein, Norway and Serbia) and Switzerland. The Enterprise Survey 2010 includes all 37 countries.

[1] The SBS also includes data on Norway, but not on any of the other non-EU countries that participated in this study. The SBS data for Norway is therefore not used for this study.

2 Orbis-Amadeus

2.1 Characteristics of the data

Orbis and Amadeus

The Orbis-Amadeus database is based on two databases, Orbis and Amadeus, which are built and maintained by Bureau Van Dijk (an organisation that specialises in providing company information). The Orbis database contains general information on more than 40 million enterprises in Europe. It includes the following information[1], amongst others:

- general contact information;
- summary of company details, including number of employees, age of company, legal form, industry and activities (including primary and secondary codes in several local and international classifications);
- financial statistics, in specific formats for corporate, banking and insurance companies;
- ownership information.

The Amadeus database contains even more detailed information for 14 million European enterprises.

For this study a subset of all enterprises from the Orbis and Amadeus databases has been used. This subset includes enterprises that:

- are included in either the Amadeus or the Orbis database (or in both);
- are located in the EU, in Switzerland or in one of the non-EU countries that are covered by this study (see Chapter 1);
- are active in the business economy;
- existed at the end of 2008;
- employed fewer than 250 employees at the end of 2008;
- and for which employment statistics were available for 2008.

The large majority of the enterprises included in the Orbis and Amadeus databases do not meet these criteria (in particular the criteria that the enterprise had to exist at the end of 2008, that employment information for 2008 had to be available, and that the enterprises should be located in one of the 37 European countries of this study). Nevertheless, the resulting Orbis-Amadeus database contains observations on somewhat fewer than 3 million enterprises.

Micro enterprises under-represented in Orbis-Amadeus

To a large extent, the Orbis-Amadeus database is based on register data that is obtained from local Chambers of Commerce and/or tax agencies. Micro enterprises in particular are not always obliged to provide detailed company information (including employment levels). As a result, the Orbis-Amadeus database contains information on most of the small and medium-sized enterprises, but on a smaller share of all micro enterprises. This is especially true for enterprises with no employees or only one employee. These enterprises account for a significant part of the actual SME population, but the Orbis-Amadeus database contains

[1] More information on this database can be found on the website of Bureau Van Dijk, www.bvdinfo.com.

relatively few enterprises with fewer than 2 employees (the Orbis-Amadeus database includes more than 600,000 enterprises with fewer than 2 employees, which is in all respects a very large sample. Nevertheless, compared to the larger enterprises in this database, this is a relatively small share of the total enterprise population). In the analyses it is assumed that the developments of enterprises with 2-9 persons employed are representative for all micro enterprises.

Usage of Orbis-Amadeus

The complete Orbis-Amadeus database can be used to present a picture of the employment situation for 2008. The preparations of this complete database are discussed in Section 2.2. For many enterprises, the Orbis-Amadeus database also includes data on the employment history. This offers the possibility of determining patterns of employment changes over time, at the level of individual enterprises. The additional preparations of this restricted database are discussed in Section 2.3. It should be kept in mind that any patterns revealed by this restricted version of the Orbis-Amadeus database refer to a specific subset of enterprises, namely enterprises that still existed at the end of 2008. An analysis of employment changes during 2004-2008 therefore includes enterprises that started during this period (as long as they survived until the end of 2008), but excludes enterprises that did not survive during this period.

2.2 Preparation of the complete database

The enterprises in the Orbis-Amadeus database have been classified into different categories, based on country, sector and age.

2.2.1 Classification by country groups

Classification by EU Membership status

Enterprises are located in individual countries, which in turn can be classified into different country groups. The standard country classification that is used for this study is based on the country's relationship with the European Union. Countries are classified into one of the following three country groups:

1 EU15 (the 15 original Member States of the EU).
2 EU12 (the 12 Member States that joined the EU after 1990).
3 Non-EU countries (these include the following 6 countries: Switzerland, Croatia, Iceland, Liechtenstein, Norway and Serbia. Date was not available for Montenegro, Albania, Israel, the Former Yugoslav Republic of Macedonia and Turkey).

This classification can be reduced to a classification of two groups:

1 EU27 (the 27 Member States of the European Union on 2010);
2 Non-EU countries.

There are many other criteria that can be used to classify countries into different groups. For this study, countries have also been classified based on their relative competitiveness, innovation performance and size-class dominance. The resulting country groupings did not provide much additional insight. The results of these alternative classifications are therefore not included in the main report.

Classification by competitiveness

The grouping of countries by competitiveness is based on the Global Competitiveness Report 2010-2011 from the World Economic Forum. The (unweighted) average score on the Global Competitiveness Index for EU-27 is used as a threshold (4.7). Countries for which the Global Competitiveness Index is above this threshold are classified as highly competitive countries, and the remaining countries are classified as less competitive countries (Table 1).

Table 1 Classification of countries by competitiveness

Highly competitive countries		Less competitive countries	
Country	Competitive	Country	Competitive
Switzerland	5.63	Iceland	4.68
Sweden	5.56	Estonia	4.61
Germany	5.39	Czech Republic	4.57
Finland	5.37	Poland	4.51
Netherlands	5.33	Cyprus	4.5
Denmark	5.32	Spain	4.49
United Kingdom	5.25	Slovenia	4.42
Norway	5.14	Lithuania	4.38
France	5.13	Portugal	4.38
Austria	5.09	Italy	4.37
Belgium	5.07	Montenegro	4.36
Luxembourg	5.05	Malta	4.34
Ireland	4.74	Hungary	4.33
		Slovakia	4.25
		Romania	4.16
		Romania	4.16
		Latvia	4.14
		Bulgaria	4.13
		Croatia	4.04
		the Former Yugoslav Republic of Macedonia	4.02
		Greece	3.99
		Albania	3.94
		Serbia	3.84

Source: Global competitiveness report 2010-2011, World Economic Forum.

Classification by size-class dominance

A country is said to be micro, SME, or LSE dominated if either micro, small and medium-sized (taken together), or large-scale enterprises have the largest share in total employment of the non-financial business economy. The majority of countries are SME dominated; six countries are micro-dominated and five coun-

tries are LSE-dominated (the size-class dominance could not be determined for Turkey).

Table 2 Classification of countries by size class dominance

Size class dominance		
micro	small and medium-sized	LSE
Greece	Austria	Finland
Italy	Belgium	France
Portugal	Denmark	United Kingdom
Malta	Germany	Slovakia
Poland	Ireland	Iceland
Albania	Luxembourg	
	Netherlands	
	Spain	
	Sweden	
	Bulgaria	
	Cyprus	
	Czech Republic	
	Estonia	
	Hungary	
	Latvia	
	Lithuania	
	Romania	
	Slovenia	
	Norway	
	Switzerland	
	Liechtenstein	
	Croatia	
	the Former Yugoslav Republic of Macedonia	
	Montenegro	
	Serbia	

Note: The size-class dominance could not be determined for Turkey.
Source: Own calculations, based on Structural Business Survey.

Classification by innovation performance

Information on the innovation performance of countries is based on the Innovation Union Scoreboard (IUS) 2010, published by DG Enterprise and Industry. The IUS collects information on 25 different indicators of innovation. These indicators are classified into three main types and eight dimensions:

- Type one: enablers
  - Human resources (3 indicators)
  - Open, excellent and attractive research systems (3 indicators)
  - Finance and support (2 indicators)

- Type two: firm activities
  - Firm investments (2 indicators)
  - Linkages and entrepreneurship (3 indicators)
  - Intellectual assets (4 indicators)
- Type three: outputs
  - Innovators (3 indicators)
  - Economic effects (5 indicators)

The data used for the IUS 2010 relate to actual performance in 2007 (4 indicators), 2008 (10 indicators) and 2009 (10 indicators). As a consequence, the IUS 2010 does not fully capture the impact of the financial crisis on innovation performance. The scores on the different indicators are used to construct a summary innovation index (SSI). Based on the scores on this index, countries are classified into four different categories of innovation performance (Table 3).

Table 3 Innovation performance of individual countries

Modest innovators	Moderate innovators	Innovation followers	Innovation leaders
Bulgaria	Croatia	Austria	Denmark
Latvia	Czech Republic	Belgium	Finland
Lithuania	Greece	Cyprus	Germany
Romania	Hungary	Estonia	Sweden
Serbia	Italy	France	
Turkey	Malta	Iceland	
the Former Yugoslav Republic of Macedonia	Poland	Ireland	
	Portugal	Luxembourg	
	Slovakia	Netherlands	
	Spain	Norway	
		Slovenia	
		United kingdom	

Note: The innovative performance is not determined for Albania, Montenegro, Israel and Liechtenstein.

Source: Innovation Union Scoreboard (IUS) 2010, Annex G.

2.2.2 Classification by sector

Seven broad areas of economic activity are distinguished[1]:

1 Manufacturing (NACE D).
2 Construction (NACE F).
3 Wholesale trade (NACE 51).
4 Retail trade (NACE 50, 52).
5 Transport and communication (NACE I).
6 Business services (NACE J and K).
7 Personal services (NACE H, N and O).

[1] The sample size did not allow distinguishing more sectors.

Together, these seven sectors define the business economy (NACE D, F-K, N and O).

The division NACE 91 (Activities of membership organisations, such as professional organisations, trade unions and political organisations) are included as part of the personal services, and hence as part of the business economy. In the Structural Business Statistics (SBS) and the Enterprise Survey 2010, NACE Division 91 is excluded from the definition of personal services (and, hence, of the business economy). Business demography indicators from the SBS indicate that within the EU, NACE Division 91 includes only a relatively small number of enterprises[1], so whether this section is included or not will only have a very small effect on aggregate findings.

2.2.3 Classification by age

The age of an enterprise can be classified into three groups:

1 Newly born enterprises (up to five years old).
2 Young enterprises (5 up to 10 years old).
3 Established enterprises (10 years and older).

The resulting complete Orbis-Amadeus database includes 2.9 million SMEs from 30 European countries. For the 27 Member States of the EU, 2.6 million observations are available. This database is used to prepare the tables regarding the employment situation in 2008. The number of observations varies by industry, but especially by country. For Cyprus, Malta and Luxembourg the number of observations is actually so low that these countries are not included in the database (see Table 4). The Orbis-Amadeus database is therefore mainly used for analysis and tables on a high aggregate level (such as comparing EU12, EU15 and non-EU). Results pertaining to individual countries should be interpreted with care.

[1] The enterprises in NACE Division 91 account for 6% of all enterprises in NACE Section O and 2% of all enterprises in the personal services.

Table 4 Available number of enterprises with employment data in 2008, by country and sector

Country	manufacturing	construction	wholesale trade	retail trade	transport and communication	business services	personal services	total
Austria	8,199	8,448	6,393	12,360	3,637	26,711	8,355	74,103
Belgium	14,038	18,768	15,760	21,485	6,419	26,332	19,789	122,591
Bulgaria	1,198	552	1,540	981	555	712	339	5,877
Czech Republic	4,371	2,166	4,999	3,894	871	6,522	1,594	24,417
Germany	24,000	15,234	20,211	37,220	9,939	51,371	15,046	173,021
Denmark	6,385	7,690	7,431	6,874	2,369	13,106	4,567	48,422
Estonia	3,151	3,412	2,839	3,012	2,238	4,785	2,110	21,547
Spain	45,003	45,101	34,309	39,155	13,321	59,823	28,627	265,339
Finland	5,051	4,730	3,092	3,604	2,552	7,260	3,268	29,557
France	70,108	90,410	46,798	103,532	21,335	102,474	92,189	526,846
United Kingdom	8,941	3,946	5,207	3,150	2,536	19,064	10,074	52,918
Greece	4,539	935	4,928	1,870	819	1,845	1,951	16,887
Hungary	2,221	971	1,839	1,518	1,142	1,136	277	9,104
Ireland	2,363	1,465	1,670	1,830	482	2,098	582	10,490
Italy	80,741	44,559	40,250	36,132	14,984	58,144	33,518	308,328
Lithuania	6,924	4,745	5,942	14,077	5,783	13,034	8,898	59,403
Latvia	5,550	4,797	5,264	11,532	4,157	13,851	6,277	51,428
Netherlands	9,762	9,012	13,644	7,657	4,125	23,637	4,457	72,294
Poland	2,805	822	2,214	875	393	969	260	8,338
Portugal	31,299	27,420	24,280	43,741	15,157	38,186	37,883	217,966
Romania	40,602	35,105	34,651	84,664	25,687	66,557	31,075	318,341
Sweden	21,293	23,131	17,382	23,304	11,544	58,521	20,431	175,606
Slovenia	2,482	735	2,274	904	690	741	157	7,983
Slovakia	857	445	832	572	191	782	353	4,032
Total EU 27	401,883	354,599	303,749	463,943	150,926	597,661	332,077	2,604,838
Switzerland	22,763	22,681	22,410	29,949	6,146	61,813	16,624	182,386
Croatia	5,116	3,555	5,497	4,372	1,692	4,748	2,366	27,346
Iceland	286	536	196	296	140	549	382	2,385
Liechtenstein	157	67	84	125	31	452	73	989
Norway	8,851	11,978	8,632	15,394	4,613	25,506	12,229	87,203
Serbia	3,863	1,158	3,936	1,387	863	1,291	585	13,083
Total non-EU countries	41,036	39,975	40,755	51,523	13,485	94,359	32,259	313,392
Total Orbis-Amadeus database	442,919	394,574	344,504	515,466	164,411	692,020	364,336	2,918,230

Source: Complete Orbis-Amadeus database, based on data from Bureau van Dijk.

Results weighted to correct for under-representation of smaller enterprises

Micro enterprises in particular are under-represented in the Orbis-Amadeus database. Therefore, the actual number of jobs in SME will be higher than the number of SME jobs determined from the Orbis-Amadeus database. All tables that present employment statistics based on the Orbis-Amadeus database therefore present weighted results, where the weights are based on statistics from the Structural Business Statistics regarding the total numbers of SMEs by size class and sector[1]. This ensures that the overall employment dynamics are representative for the SME population.

2.3 Preparation of the restricted database

The Orbis-Amadeus database is mainly used to determine patterns of employment changes over time. This requires a database that contains annual employment information on enterprises for a certain period. The restricted database refers to those enterprises from the complete database, for which the required annual employment information is available.

2.3.1 Period under investigation

In theory, the Orbis and Amadeus databases should contain a track record of the enterprises over 10 years. In practice, the track record of enterprises in the Orbis-Amadeus database only holds for the period of the last 4 to 5 years. A complete track record over the past 10 years is only available for a few percent of the enterprises older than 10 years. This makes it very difficult to perform an unbiased analysis of the employment changes of established SMEs for a period of 10 years. The analysis is therefore limited to an analysis of employment changes over five years, in particular the period 2004-2008.

2.3.2 Dealing with missing data

For some enterprises, information on the number of persons employed is not available for every year of the analysis period. If employment data on the enterprise level is missing for 2005, 2006 and/or 2007, interpolations are used to provide estimates of the missing data. In the case where employment data is missing for 2004, the enterprise is removed from the sample[2]. This is the case for a substantial number of the enterprises from the complete database. Once these are removed, the restricted database includes employment information on 2004 and 2008 for just over one million enterprises. The majority of these enterprises were established during the period under investigation (from 1-1-2004 onwards); about a quarter of the enterprises in the database (994,000) were established before 1-1-2004 (and still existed on 31-12-2008).

[1] The weights are calculated by dividing the actual level of SME jobs according to the Structural Business Statistics (within each sector and size class) by the number of SME jobs in the Orbis-Amadeus database. The weights are computed for 2008 and are used back to 2004.

[2] Employment information on 2008 is always available; otherwise, the enterprise would not be included in the complete database.

2.3.3 Classification by employment growth type

The enterprises in the restricted database are classified into three different growth types: growing, stable and shrinking enterprises. The classification is based on a comparison of the employment levels at the beginning and the end of the period; developments during the period are ignored. To be precise, the following classification rules are applied to all young and established enterprises (all enterprises aged 5 years or more):

1 Growing enterprises: enterprises where the number of employees at the end of 2008 is higher than the number of employees at the end of 2004.
2 Stable enterprises: enterprises where the number of employees at the end of 2008 is exactly equal to the number of employees at the end of 2004.
3 Shrinking enterprises: enterprises where the number of employees at the end of 2008 is lower than the number of employees at the end of 2004.

To remove outliers, maximum growth and shrink rates have been determined for each size class. Enterprises that fall outside the following boundaries are removed from the database:

Size class 1 (1-9 employees in 2004)
- A maximum growth rate of 4906% for the period 2004-2008 (based on an annual growth rate of 166% for each year). This limit allows an employment growth from 1 to 50 or from 9 to 451.
- No maximum employment decline is used. A decline from 9 employees to 1 is allowed.

Size class 2 (10-49 employees in 2004)
- A maximum growth rate of 1500% for the period 2004-2008 (based on an annual growth rate of 100% for each year). This limit allows an employment growth from 10 to 160 or from 49 to 784.
- No maximum employment decline is used. A decline from 49 employees to 1 is allowed.

Size class 3 (50-249 employees in 2004)
- A maximum growth rate of 1500% for the period 2004-2008 (based on an annual growth rate of 100% for each year). This limit allows an employment growth from 50 to 800 and from 249 to 3984.
- A maximum employment decline of -94% for the period 2004-2008 (based on an annual decline of 50% for each year). A decline from 249 to 16 or from 50 to 3 is therefore possible.

The database also contains apparent mistakes, probably due to erroneous reproduction from other databases or for other reasons. These data have also been removed.

The restricted Orbis-Amadeus database includes 1.0 million SMEs from 24 EU countries. No data are available for Cyprus, Malta and Luxembourg. For the non-EU countries, the number of observations in the restricted Orbis-Amadeus database is so small that it is not possible to present average statistics (not even at the level of the non-EU countries as a group). The restricted Orbis-Amadeus database therefore only includes enterprises from the EU. This database is used for the analyses regarding employment changes of individual firms from 2004 to 2008 (Table 5).

Table 5 Available number of enterprises with employment data for 2004 and 2008, by country and sector

Country*	manufacturing	construction	wholesale trade	retail trade	transport and communication	business services	personal services	total
Austria	3,479	3,466	3,068	4,067	1,391	2,573	1,074	19,118
Belgium	10,844	12,520	11,457	14,187	4,667	14,184	9,162	77,021
Bulgaria	940	374	1,077	619	313	446	243	4,012
Czech Republic	2,535	1,117	2,490	2,019	433	2,807	693	12,094
Germany	7,814	4,530	6,579	14,564	3,031	7,904	2,657	47,079
Denmark	3,677	3,499	4,259	3,381	1,218	5,730	2,166	23,930
Estonia	2,302	1,644	1,880	2,238	1,432	2,649	1,398	13,543
Spain	32,973	26,732	23,766	25,745	8,518	31,124	15,362	164,220
Finland	3,509	2,692	2,013	2,263	1,613	3,751	1,827	17,668
France	37,140	39,037	23,425	46,809	10,218	40,562	36,149	233,340
United Kingdom	6,232	2,370	3,646	2,171	1,558	10,056	6,119	32,152
Greece	3,896	703	3,924	1,490	645	1,486	1,670	13,814
Hungary	56	12	30	20	17	7	2	144
Ireland	4	0	0	1	0	3	0	8
Italy	22,190	5,618	8,513	5,730	2,878	8,522	4,083	57,534
Lithuania	339	215	526	209	110	73	14	1,486
Latvia	2,765	1,213	2,155	5,919	1,386	4,870	2,958	21,266
Netherlands	808	468	932	237	253	631	117	3,446
Poland	2,140	593	1,517	615	292	671	161	5,989
Portugal	407	156	289	172	63	178	98	1,363
Romania	25,552	11,893	19,477	51,862	11,843	28,862	16,238	165,727
Sweden	17,147	16,478	13,113	17,080	8,803	37,129	13,397	123,147
Slovenia	1,931	502	1,783	661	434	481	102	5,894
Slovakia	193	74	182	62	20	75	35	641
total	188,873	135,906	136,101	202,121	61,136	204,774	115,725	1,044.636

* No data available for Cyprus, Malta and Luxembourg.

Source: Restricted Orbis-Amadeus database, based on data from Bureau van Dijk.

3 Structural Business Statistics SBS

3.1 Characteristics of the data

The Structural Business Statistics (SBS) database is associated with the Annual Report 2009 of the EC's SME Performance Review[1]. This database provides statistical data on the number of enterprises and employment by country, enterprise size class and sector of industry, amongst other data. Countries include all EU Member States. Size classes distinguished are micro, small, medium-sized and large enterprises, according to a head count of the number of persons employed in the year the data relate to. Sectors of industry include all NACE Rev. 1.1 divisions within the non-financial business economy, i.e. NACE C -I and K.

3.2 Measuring employment growth by enterprise size class

The SBS data is used to determine the extent to which enterprises from different size classes have contributed to net employment changes, amongst other things. This requires that the available longitudinal data on employment levels by size class be corrected for the so-called population effect. This section describes the nature of the population effect and why it is important to correct for it.

The population effect

At the macro level as well as by sector of industry, employment growth is the balance of job creation on the one hand and job destruction on the other. Job creation and destruction may occur because of employment change in incumbent enterprises, or because of entry and exit of enterprises.

An enterprise size-class is defined as a population of enterprises that falls within certain size-class boundaries at a specific point in time. As indicated above, a distinction is made between micro, small, medium-sized and large enterprises, based on a head count of persons employed. Available data measure employment by size class in a certain year as the total employment in all enterprises that belong to that size class in that particular year.

By comparing such employment figures for, say, SMEs, in two years t_0 and t_1, one compares the number of employed persons in enterprises in the SME population in t_0 with the number of employed persons in enterprises in the SME population in t_1. However, enterprises can cross size-class boundaries at any time. The incumbent SMEs at time t_1 may have been large enterprises at time t_0; conversely, enterprises that had fewer than 250 persons employed at time t_0 (and thus were SME at that time) may have become large enterprises at time t_1. Comparing employment figures for SMEs in the two years t_0 and t_1 therefore includes the impact of previously large enterprises that became SME (positively af-

[1] European Commission: European SMEs under Pressure: Annual Report on EU Small and Medium-sized Enterprises 2009 (http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/performance-review/pdf/dgentr_annual_report2010_100511.pdf).

fecting the measured employment change in the SME population), as well as the impact of enterprises that previously were SMEs that have become large (negatively affecting the measured employment change in the SME population). This example shows that changes in the employment level of a certain size class can be attributed to either one of two different causes:

– changes in the level of employment of individual enterprises: job creation and destruction by enterprises (including entry and exit of enterprises);
– changes in the classification of enterprises in size classes: the population effect.

Once the impact of one of these causes is known or estimated, the impact of the other can be calculated by subtracting the known effect from the measured employment change in the size class under review.

Decomposing employment changes by size class: adjusting for the population effect

To what extent have enterprises from different size classes contributed to gross or net employment changes? To what extent are employment changes caused by enterprises from different sizes? Because of the population effect, this question cannot be answered by looking at changes in the employment level of size classes. An adjustment must be made for changes in employment statistics that are due to enterprises crossing size-class boundaries.

One way to adjust for the population effect is to classify each enterprise in a single size class for the period between two measurements. This corrects for the population effect, since the number of enterprises in each size class is now constant during that period. The question that remains is how individual enterprises should be classified into size classes. In the literature[1] one or more of the following three classification methods have been applied:

1 Classification by initial size: the size of the enterprise at the beginning of each measurement period determines the size class in which the enterprise is classified;
2 Classification by end size: the size of the enterprise at the end of each measurement period determines the size class in which the enterprise is classified;
3 Classification by average size: the average of the enterprise's size at the beginning and the end of each measurement period determines the size class in which the enterprise is classified.

The method of Classification by current size takes a different approach: instead of classifying enterprises, this method directly classifies individual employment changes, based on the size of the enterprise prior to each individual change. Basically, it works as follows: if an enterprise employs 230 persons at t_0 and 255 persons at t_1, then its employment increase from 230 to 250 is attributed to SMEs, while the employment increase from 250 to 255 is attributed to large enterprises.

Classification by current size solves a series of problems associated with (some of) the other methods. In the first place, classifications by initial size and by end

[1] See the literature review in De Kok, J., G. de Wit and K. Suddle (2006), SMEs as job engine of the Dutch private economy: A size-class decomposition of employment changes for different sectors of the Dutch economy, EIM, 2006, Research Report H200601.

size share the problem that the results are affected by fluctuations around size class boundaries (see text box). This problem does not occur with classification by current size (nor with classification by average size). In the second place, if enterprises are classified into specific size classes (as is the case with the first three methods), the results depend on how often employment is measured. For example, suppose that enterprise A employs 9 employees in January, 11 employees in June, and 15 employees the following January. If for instance employment was only measured each January, classification by initial size would attribute an employment growth of +6 to the size class of micro enterprises. If employment was measured on a semi-annual basis (e.g., January and July), classification by initial size would attribute an employment growth of +2 to the size class of micro enterprises and an employment growth of +4 to the size class of small and medium-sized enterprises. Classification by current size does not suffer from this measurement bias because it does not involve classifying enterprises into specific size classes. In the third place, classification by current size is the only classification method that can be used to decompose net employment changes by size classes without using micro data.

Impact of enterprises crossing size boundaries on the size-class pattern of employment according to four classification methods: an example

The size of enterprise B fluctuates around the size-class boundary of 10 employees. In the first year employment increases from 9 to 14 employees, while in the second year employment drops back to 9 employees.

- Classification by initial size attributes an employment increase of +5 to the size class of micro enterprises in the first year, while the employment decrease of -5 in the second year is attributed to the size class of small enterprises.
- Classification by end size attributes an employment increase of +5 to the size class of small enterprises in the first year, while the employment decrease of -5 in the second year is attributed to the size class of micro enterprises.
- Classification by average size attributes the employment increase of the first year as well as the employment decrease of the second year to the size class of small enterprises.
- Classification by current size attributes an employment increase of +1 to the size class of micro enterprises and an employment increase of +4 to the size class of small enterprises, and for the second year attributes an employment decrease of -4 to the size class of small enterprises and an employment decrease of -1 to the size class of micro enterprises.

In case of both classification by initial size and by end size, the size class fluctuations of enterprise B do not cancel out over the two years together.

Because of these advantages, classification by current size is used here to adjust for the population effect.

Estimating the population effect using classification by current size

Statistics on changes in the number of enterprises per size class are used to correct for the population effect. The appropriate adjustments are presented in Table 6. A formal proof of these adjustments can be found elsewhere (see previous footnote). Here an intuitive argument is presented. For the largest size class boundary, the net number of times that the boundary between medium-sized and large enterprises is crossed is equal to the change in the number of large

enterprises: $\bullet N_l$[1]. Hence, the adjustment for the size class of medium-sized (large) enterprises is plus (minus) $\bullet N_l$ (the net number of crossings) times 250 (employment size at the boundary). It is plus $250 \cdot \bullet N_l$ for medium-sized enterprises because the (net) change in the number of large enterprises relates to enterprises that previously were assigned to size class of medium-sized, and minus $250 \cdot \bullet N_l$ because previously these enterprises were not yet large enterprises. Similarly, it is clear that the net number of times that the boundary between small and medium-sized enterprises is crossed must be equal to the change in the number of medium-sized and large enterprises together: $\bullet N_{ms+l}$. Hence, the adjustment for the size class of small (medium-sized) enterprises is $\bullet N_{ms+l}$ times 50. The adjustment for the size class of micro (small) enterprises is $\bullet N_{s+ms+l}$ times 10.

Table 6 Required adjustment for the population effect (classification by current size)

Size class	Adjustment	
	for lower boundary	for upper boundary
Micro enterprises (1-9)	0	$+10 \cdot \bullet N_{s+ms+l}$
Small enterprises (10-49)	$-10 \cdot \bullet N_{s+ms+l}$	$+50 \cdot \bullet N_{ms+l}$
Medium-sized enterprises (50-249)	$-50 \cdot \bullet N_{ms+l}$	$+250 \cdot \bullet N_l$
Large enterprises (>= 250)	$-250 \cdot \bullet N_l$	0 (not applicable)

$\bullet N_{X+Y}$: the net change in the total number of enterprises in size classes x+y; "s" represents small enterprises; "ms" represents medium-sized enterprises; "l" represents large enterprises.

Notice that the value of the adjustment does not depend on the initial or end size of enterprises crossing boundaries. This allows for calculating the adjustment for all enterprises together without the help of micro data.

3.3 Discussion of other methodologies applied

The database associated with the Annual Report 2009 in the framework of the European Commission's SME Performance Review covers the period 2002-2008 (and a forecast for 2009-2011). For EU15 countries, data on employment and the number of enterprises are also available from the various Observatory of European SMEs reports published by the European Commission[2]. These data have been linked to the data from the Annual Report database under the assumption that the Observatory of European SMEs data adequately describe trends on the number of enterprises and employment. By doing so, a series on employment and the number of enterprises by sector of industry and enterprises size class was established covering 1988-2008 for EU15 countries.

[1] Entries and exits of large enterprises are treated as enterprises that move through all size classes and pass all size class boundaries in the process. Changes in the number of large enterprises are therefore due to crossings of the boundary between medium-sized and large enterprises only.

[2] See in particular European Commission: SMEs in Europe 2003 (http://ec.europa.eu/enterprise/policies/sme/files/analysis/doc/smes_observatory_2003_report7_en.pdf).

4 Enterprise Survey 2010

4.1 Questionnaire

4.1.1 Unit of observation

The European Commission has defined the size class of micro, small and medium-sized enterprises (SMEs) as all enterprises that employ fewer than 250 persons, have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million[1]. For statistical purposes, however, a different definition of SMEs is generally used, in which SMEs are defined as enterprises employing fewer than 250 people. Large enterprises are defined as those with 250 or more persons employed[2]. This definition is used in various databases (including the SBS data) and publications (including Eurostat publications[3] and the Observatories of European SMEs). This statistical definition is also used for the Enterprise Survey 2010.

The size class of SMEs contains enterprises and not local units or enterprise groups. The observational unit for the Enterprise Survey 2010 is therefore the enterprise. In the case of enterprise groups, this implies that the survey targets the enterprises (subsidiaries) that make up the enterprise group, rather than the enterprise group as a whole.

Autonomous, partnered and linked enterprises

Enterprises may have various relations with other enterprises. A distinction can be made between autonomous, partnered and linked enterprises. Autonomous enterprises are totally independent enterprises and enterprises holding less than 25% of the capital or voting rights (whichever is the higher) in one or more other enterprises[4]. This is by far the largest category. The other two categories are partnered and linked enterprises.

In the case of partnered or linked enterprises, the size of the other enterprises involved (in terms of number of employees, turnover and balance sheet) should be combined with the size of the particular enterprise, before determining its size class[5]. In the case of a telephone survey this is not a feasible solution. Instead, the survey includes a question that distinguishes between autonomous enterprises on the one hand, and partnered or linked enterprises on the other hand. This allows the researcher to check the extent to which the answers to various questions differ between autonomous and non-autonomous enterprises.

[1] Source: Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises (2003/361/EC), Official Journal of the European Union L124/36.

[2] http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Large_enterprises.

[3] For example, see Statistics in Focus on SMEs and entrepreneurs in the EU http://ec.europa.eu/eurostat/ramon/coded_files/KS-NP-06-024-EN.pdf.

[4] The opposite must also apply: outsiders may not have a stake of 25% or more of the capital or voting rights (whichever is the higher) in the enterprise under consideration.

[5] Source: The new SME definition; user guide and model declaration (European Commission 92-894-7909-4).

4.1.2 Content of the questionnaire

The objective of the questionnaire was to obtain information on relevant indicators on the quality and quantity of jobs at enterprise level, and on the impact of (and the reaction to) the economic crisis that started in autumn 2008. Therefore, the questionnaire includes questions on the following topics (the final questionnaire is included in Annex I):

- general characteristics of the enterprise (sector, age, innovative behaviour);
- general characteristics of the workforce (decomposition by age, educational level and gender; employment of people with a physical or mental handicap);
- indicators on quantity of jobs (number of employees, currently and twelve months ago; working with employees from temporary work agencies, currently and twelve months ago; employees laid off during the past twelve months; employees hired during the past twelve months; expected layoffs and hires for the next twelve months);
- indicators on quality of jobs (attention for training and other forms of life-long learning; main reasons for not providing training, if relevant; employees with part-time contracts; employees with fixed-term contracts; share of newly hired employees who were unemployed for at least one year);
- labour market position of the enterprise (factors making it easier or more difficult to attract skilled employees);
- effects of the crisis (various negative and positive effects encountered during the past twelve months; layoffs due to the crisis; usage of publicly supported employment protection schemes).

The questionnaire was designed in close cooperation between EIM and the European Commission. To allow for a comparison of the results with other studies, several questions were based on previous studies. These include the questions on innovative behaviour of enterprises, on the share of employees working full-time, on the workforce decomposition by age categories and on the workforce decomposition by educational level (based on the ISCED classification). These topics are now discussed briefly.

Innovation activities

The questionnaire contains three questions on innovation regarding product innovation, process innovation and innovative activities during the past three years. These questions are aligned with the Community Innovation Survey (in particular; the text of the questions and additional explanations are based on the UK CIS 4 survey).

Employees working full-time

The distinction between fulltime and part-time employment differs between countries and within countries between sectors of industry. This makes it very difficult to establish a precise distinction in a multi-country, multi-sector survey. Following the EU Labour Force Survey, the Enterprise Survey therefore does not include an explicit threshold, but leaves it up to the interpretation of each respondent.

Decomposition by age categories

One of the questions on the survey concerns the distribution of the workforce across three age categories. A common classification is to divide the working population into the following three age brackets[1]:

- 15-24 years of age;
- 25-49 years of age;
- 50-64 years of age.

These age brackets are also used in the Enterprise Survey 2010.

Educational levels according to ISCED classification

Since its introduction in 1997 by UNESCO, the International Standard Classification of Education (ISCED) categorisation has been widely used as a framework for determining the educational level of a population. Amongst others, it is also used for the EU Labour Force Survey[2]. The ISCED classification covers six levels of educational (not counting the zero level, which represents no education whatsoever):

- ISCED 1: primary education or first stage of basic education;
- ISCED 2: lower secondary education or second stage of basic education;
- ISCED 3: (upper) secondary education;
- ISCED 4: post-secondary non-tertiary education;
- ISCED 5: first stage of tertiary education (not leading directly to an advanced research qualification);
- ISCED 6: second stage of tertiary education (leading to an advanced research qualification).

These six levels can be further classified into the following three main categories[3]:

- low: pre-primary, primary and lower secondary education (ISCED 0-2);
- medium: upper secondary and post-secondary non-tertiary education (ISCED 3-4);
- high: tertiary education (ISCED 5-6).

These three categories form the framework for the Enterprise Survey 2010. Most entrepreneurs have no knowledge of this classification system. It is therefore not feasible to directly ask respondents which share of the workforce has an ISCED 0-2 education level (etc). It can be assumed, however, that respondents are familiar with the education system in their country. For each country in the sample, therefore, the national education system is linked to the ISCED classification. For most of the countries in our sample (including all EU Member States), this information is available through Eurybase, which is maintained by the Eury-

[1] See, for example, the publications "Europe's demographic future" (DG Employment, Social Affairs and Equal Opportunities, 2007) and "The flexibility of working time arrangements for women and men" (Eurostat Statistics in Focus, 2007).

[2] See, amongst others, http://circa.europa.eu/irc/dsis/employment/info/data/eu_lfs/LFS_MAIN/Related_documents/ISCED_EN.htm.

[3] See, for example, the background document on the indicator of youth education attainment level at http://circa.europa.eu/irc/dsis/employment/info/data/eu_lfs/LFS_MAIN/Related_documents/QP_Youth_Education_Level_Background%20document.htm.

dice Network[1]. For each of the countries in this database, the national education system is linked to the ISCED classification system. Eurybase does not contain information for the majority of the non-EU countries (Montenegro, Albania, Serbia, Croatia, Israel, and the Former Yugoslav Republic of Macedonia). Basic information on the educational systems of these countries is available at euroeducation.net, and it is this information has been used.

This information is used to determine country-specific lists of school types that represent the three main ISCED-based categories as defined above. For example, for Germany this results in the following examples:

- low educational level: for example, grundschule, gesamtschule, realschule, hauptschule;
- medium educational level: for example, Gymnasiale oberstufe, fachoberschule, berufsfachschule;
- high educational level: for example, universität, fachhochschule, berufsakademie.

Likewise, for each country, country-specific examples of the various educational levels are included in the survey. The questionnaire included in the annex contains examples for the UK educational system.

Finally, it should be noted that the questions pertain to the educational level of employees, not to their educational attainment. To the extent that life-long learning activities may increase the level of human capital of employees, it may also cause the educational level of employees to be higher than their educational attainment (which reflects the highest educational level obtained during initial education).

Testing of the questionnaire

The final draft version was tested in the UK in early September 2010. After this pilot, several final changes were made to the questionnaire.

4.2 Stratification plan

This section describes the stratification plan used for this survey: the classifications used; the objectives of the stratification plan; the sample plan mechanism applied to meet these objectives; the sources of the population data on which this mechanism has been applied; and the final sample plan.

4.2.1 Classifications

Countries

37 countries are distinguished: EU27 countries and 10 non-EU countries (Table 7). The total population amounts to 15 million employer enterprises[2] in the business economy (defined in Section 4.2.2): 13 million (85%) in EU27, and 2 mil-

[1] See http://eacea.ec.europa.eu/education/eurydice/eurybase_en.php.

[2] In the remaining part of this chapter, when no confusion is possible, "employer enterprises" will be shortened to "enterprises".

lion in non-EU countries (over 50% of which in Turkey). Within EU27, 70% of the enterprises are located in the so-called 6 major economies (Poland, United Kingdom, Germany, France, Spain, and Italy).

Individual countries differ enormously with respect to the number of enterprises. On one side of the spectrum one finds Liechtenstein (1,600 enterprises) and Iceland, Montenegro and Luxembourg (12,000-16,000 enterprises), on the other hand Spain (1.6 million) and Italy (2.4 million), implying a ratio between largest and smallest of over 1,400. This skewness of the distribution of the enterprises population is a key element in the sample design.

Table 7 Number of employer enterprises in the business economy, by countries (2008)

Country	Number of employer enterprises
Poland	915,000
United Kingdom	1,212,000
Germany	1,442,000
France	1,516,000
Spain	1,575,000
Italy	2,356,000
6 major EU27 economies	9,014,000
Luxembourg	16,000
Malta	19,000
Estonia	28,000
Cyprus	30,000
Slovakia	43,000
Latvia	42,000
Ireland	59,000
Slovenia	60,000
Lithuania	76,000
Denmark	122,000
Finland	130,000
Bulgaria	160,000
Austria	184,000
Belgium	249,000
Romania	260,000
Sweden	286,000
Hungary	319,000
Netherlands	348,000
Greece	458,000
Portugal	470,000
Czech Republic	524,000
Other EU27 economies	3,882,000
EU27	12,896,000
Liechtenstein	1,600
Iceland	12,000
Montenegro	15,000
Albania	34,000
Serbia	50,000
Croatia	50,000
Norway	150,000
Israel	177,000
the Former Yugoslav Republic of Macedonia	386,000
Turkey	1,326,000
Non-EU	2,202,000
Total	15,099,000

Note: the business economy consists of NACE D, F-K, N and O (excl.91).
Source: EIM.

Sectors of industry

Within the business economy (NACE D, F -K, N, O excl. 91), seven main sectors are distinguished[1]. Within some of these main sectors (manufacturing, business services and personal services) a further distinction of elementary sectors is made:

- Manufacturing, comprised of the following elementary sectors: metal industry; food products, beverages, tobacco; pulp, paper and paper products; publishing and printing; textile and leather; electrical and optical equipment; wood and wood products and furniture; and other manufacturing (NACE Section D).
- Construction (NACE Section F).
- Wholesale trade (NACE Division 51).
- Retail trade, consisting of: sale, maintenance and repair of motor vehicles and motorcycles; and retail sale of automotive fuel (NACE Divisions 50, 52).
- Transport and communication (NACE Section I).
- Business services, comprised of the following elementary sectors: financial intermediation; real estate activities; research and development, computer related activities; other high-skilled business activities (accounting, consulting, market research, architectural and engineering activities, technical testing, advertising and recruitment services); and other low-skilled business activities (includes renting of machinery and equipment without operator and of personal and household goods) (NACE Section J, K).
- Personal services, comprised of the following elementary sectors: hotels and restaurants; health and social work; and other community, social and personal service activities (excluding activities of membership organisations) (NACE Sections H, N and O (excl. 91)).

The distribution of the stock of enterprises over sectors of industry is rather skew, the smallest elementary sector (electrical and optical equipment) having a population of 165,000, and the largest (retail trade) totalling 2.7 million enterprises (Table 8).

[1] NACE Rev. 1.1 is used for the sample plan and reporting.

Table 8 Number of employer enterprises in Europe-37, by sector (2008)

Sector		Number of employer enterprises
NACE rev. 1.1	Label	
D	Manufacturing	2,034,000
DJ	Metal industry	359,000
DA	Food products, beverages, tobacco	289,000
DE	Pulp, paper and paper products; publishing and printing	201,000
DB, DC	Textile and leather	255,000
DL	Electrical and optical equipment	165,000
DD, DN	Wood and wood products, furniture	370,000
DF, DG, DH, DI, DK, DM	Other manufacturing	395,000
F	Construction	2,013,000
51	Wholesale trade	1,526,000
50, 52	Retail trade	2,713,000
I	Transport and communication	1,089,000
J, K	Business services	2,892,000
J	Financial intermediation etc.	199,000
70	Real estate activities	499,000
72, 73	Research and development, computer related activities	307,000
74.1 -74.5	Accounting, Consulting, market research, architectural and engineering activities, technical testing, advertising and recruitment services	1,414,000
74.6 -74.8, 71	Renting of machinery & equipment, other business activities	474,000
H, N, O (excl. 91)	Personal services	2,831,000
H	Hotels and restaurants	1,122,000
N, O (excl. 91)	Other service activities	1,708,000
D, F -K, N, O (excl. 91)	Business economy	15,099,000

Source: EIM.

Size-classes

With respect to enterprise[1] size, the following elementary classes are distinguished: micro-enterprises, small and medium-sized enterprises, and large enterprises (LSEs). Micro enterprises and small and medium-sized enterprises make up the SME-sector of the business economy. The distribution of the enterprise population over size classes is skew, with 86% of the enterprises being micro enterprises and 0.4% being LSEs (Table 9).

[1] "Enterprises" is to be understood as employer enterprises. Statistically, they are defined as enterprises with more than one person employed.

Table 9 Number of employer enterprises in the business economy in Europe-37, by size class (2008)

Size class	Description	Number of employer enterprises
Micro with staff	2-9 occupied persons	12,968,000
Small and medium-sized	10-249 occupied persons	2,076,000
LSEs	>= 250 occupied persons	54,000
Total	>= 2 occupied person	15,099,000

Note: the business economy consists of NACE D, F-K, N and O (excl.91).
Source: EIM.

4.2.2 Objectives of the stratification plan

The survey should enable drawing inferences at a reasonably narrow confidence level for the following strata:

1. Micro enterprises, small and medium-sized enterprises, and LSEs at the level of the business economy in each of the six major EU-countries.
2. SMEs in each elementary sector (and hence, also at the level of the main sectors) in EU15 and EU12.
3. Micro enterprises, small and medium-sized enterprises and LSEs in each of main sectors for EU15 and EU12.
4. SMEs in each individual country at the level of the business economy.
5. SMEs in each main sector for the aggregate of non-EU countries.
6. Micro enterprises, small and medium-sized enterprises and LSEs in each elementary sector in EU27.

There are two main issues to be considered: total sample size and the minimum number of observations required to draw reliable inferences in a stratum. There is a trade-off between these two: higher sample size reduces the variance of the weights to be used, while increasing the minimum number of observation required to draw reliable inferences increases the variance of weights. The maximum total sample size has been set at 7,500. Furthermore, it is assumed that "inferences at a reasonably narrow confidence level" can be drawn if the sample size equals 80[1].

Furthermore, to prevent problems in obtaining sufficient contact details to execute the survey, an overall restriction has been defined limiting sample size as less than 20% of the total enterprise population in each stratum. Additionally, it is known from experience that contact information is extremely difficult to obtain for financial intermediation (NACE J) and real estate activities (NACE 70). Because of this, the maximum number of observations for these sectors of industry in EU27 is limited to 80 in each size-class (this is consistent with basic requirement 6).

[1] The estimated standard error of the point estimate for the estimation of π equals $\sigma = (\pi \cdot (1 - \pi)/n)^{1/2}$, At given n, σ is maximum for $\pi = 0.5$. For $n = 80$ and $\pi = 0.5$, σ equals 0.055. With a probability of 95%, the estimate would lie between $0.5 \pm 1.96 \cdot 0.055$, or between 0.39 and 0.61.

4.2.3 Sample design mechanism

Suppose, for example, that (1) the smallest stratum for which inferences are to be made has a population of 1,500 (number of Liechtenstein SMEs, approximately); (2) the total population amounts to 15 million (number of EU37 SMEs); and (3) reliable inferences can only be made with a minimum sample size of 100; then in case of a proportionate sample, the total sample size should equal 1,000,000 (100 times 15 million, divided by 1,500). This would make the survey prohibitively expensive[1]. Instead, one could limit the number of observations in the largest strata and conversely, have small strata over-represented in the overall design, and apply weighting to arrive at unbiased estimates at the aggregate level. This is known as disproportionate stratified sampling.

However, weighting leads to an increase in the standard error of measurement for results at aggregate level[2]. It is intuitively clear that the more the distribution of observations resembles the population distribution over the strata, the smaller the increase in the standard error of estimate that results from weighting. This is equivalent to having weights w_i as close to one as possible. In turn, this can be interpreted as the variance of the weights being lowest[3]. This can be achieved by an appropriate choice of the sample distribution.

These arguments can be summarised as follows:

- Stratification is necessary to meet all of the requirements for the sample within reasonable costs.
- Given the stratified nature of the sample, weighting is required to obtain unbiased estimates at the aggregated level.
- The sample design (i.e. the sample size by stratum) should be such that the variance of weights is minimised.

Once maximum sample size as well as other restrictions on the sample are given, the optimal sample plan can be calculated by solving a mathematical optimisation model.

4.2.4 Sources of population data

The main body of data is taken from the database developed in the framework of the Annual Report of the SME Performance Review 2009. It covers all 37 countries in the sample. For most countries (including all EU Member States), the reference year is 2008, but in some cases, the year closest to 2008 is chosen from the available data.

The main database covers the non-financial business economy (NACE C -I, K) at the detail of NACE divisions. Additional estimates were prepared to arrive at the sectoral detail described in Section 4.2.1. This specifically refers to:

- the inclusion of the Financial intermediation (NACE J);
- the inclusion of Other service activities (NACE N, O excl. 91);

[1] This is where the skewness issue (mentioned in Section 4.2.1) comes in: if the ratio between smallest and largest stratum had been smaller, total sample size could have been smaller as well.

[2] Under certain - but not unrealistic - conditions, it can be shown that samples with weights will have a higher variance than samples that do not need weights.

[3] Obviously, were all w_i's equal to one, their variance would equal zero.

– the further detail of Other business activities (NACE 74) into 74.1-74.5 and 74.6-74.8.

Also, non-employer enterprises had to be filtered out from the dataset.

Inclusion of financial intermediation and other service activities

For EU-countries, Iceland, Liechtenstein, Norway and Turkey, this was based on data collected in the framework of the Observatory of European SMEs[1]. For other countries, extrapolations from EU-countries were made.

Further detail in the other business activities sector (NACE 74)

It has been assumed that for each size class separately, the distribution of enterprises over other business activities I and II is the same as in The Netherlands (the only country for which data on this subject has been identified).

Selecting employer enterprises

As the survey will be confined to employer enterprises, and the available data include non-employers as well, additional processing of the data is required. The number of employer enterprises has been estimated as follows:

– A Pareto distribution[2] has been fit through the distribution of enterprises over micro, small, medium-sized and large enterprises for each sector of industry in each country.
– Using this distribution, the number of enterprises with 1, 2, …, 9 persons employed has been calculated and subsequently fit against the known total number of micro enterprises.
– Finally, the number of employers has been calculated as the number of enterprises with at least two persons employed.

4.2.5 The final sample plan

The sample plan resulted in a stratified sample containing 1,998 different quotas. Table 10 shows the (aggregated) quota at the level of individual countries and size classes.

[1] EIM Business and Policy Research: Observatory of European SMEs 2003, No. 7 (report submitted to Enterprise Directorate-General of the European Commission). See http://ec.europa.eu/enterprise/policies/sme/files/analysis/doc/smes_observatory_2003_report7_en.pdf.

[2] The Pareto distribution provides a simple model (only two parameters to be estimated) while still giving an acceptable description of the size-class distribution of enterprises in The Netherlands. See G. de Wit and J. de Kok: Enterprise size distributions in The Netherlands - their nature and their underlying employment distribution (in Dutch: Bedrijfsgrootteverdelingen in Nederland - Hoe zien zij er uit en hoe is de onderliggende werkgelegenheidsverdeling?); EIM, Research Report H200906, 2009; http://www.ondernemerschap.nl/index.cfm/12,html?nxt=ctm_publikatie&bestelnummer=H200906).

Table 10 Sample plan: number of enterprises by country and size class, business economy (NACE rev. 1.1 D, F -K, N, O, excl. 91)

Country	Micro (2-9)	Small and medium-sized (10-249)	Large (250+)	Total
Poland	319	87	175	581
United Kingdom	193	84	82	359
Germany	198	130	143	471
France	244	80	182	506
Spain	244	80	97	421
Italy	365	87	159	611
6 major EU27 economies	1,563	548	838	2,949
Luxembourg	19	61	19	99
Malta	23	127	7	157
Estonia	32	153	26	211
Cyprus	29	128	13	170
Slovakia	29	151	49	229
Latvia	25	143	39	207
Ireland	34	54	67	155
Slovenia	50	34	20	104
Lithuania	49	31	43	123
Denmark	49	44	99	192
Finland	57	35	93	185
Bulgaria	53	29	29	111
Austria	60	35	134	229
Belgium	78	30	29	137
Romania	60	25	40	125
Sweden	84	26	30	140
Hungary	74	19	32	125
Netherlands	85	33	25	143
Greece	108	23	23	154
Portugal	104	25	30	159
Czech Republic	134	23	91	248
Other EU27 economies	1,236	1,229	938	3,403
EU27	2,799	1,777	1,776	6,352
Liechtenstein	42	38	1	81
Iceland	24	56	14	94
Montenegro	38	42	14	94
Albania	39	41	7	87
Serbia	44	39	24	107
Croatia	62	18	15	95
Norway	57	23	18	98
Israel	60	21	17	98
the Former Yugoslav Republic of Macedonia	75	23	11	109
Turkey	212	50	23	285
Non-EU	653	351	144	1,148
Total	3,452	2,128	1,920	7,500

Source: EIM.

4.3 Survey

Interviews in the 37 countries concerned were made using questionnaires and native speakers in all relevant languages. The average length of the interviews varied by country and language; the French version was relatively long for instance. On average, though, the interviews took 20 minutes.

After the pilot interviews were conducted and the final changes to the questionnaire had been made, the actual fieldwork started at the end of September 2010. By December 31, 7,566 interviews had been completed. This exceeded the overall quota of 7,500 interviews, but several individual quotas had not been met. During January and February 2011, 11 additional interviews were therefore conducted to ensure that enough observations were available in a few quota regarding "micro" and "small and medium-sized" enterprises. In the final sample most quotas of the sample plan were satisfactorily covered, in particular for micro and small and medium-sized enterprises (Table 11).

Table 11 Survey results: number of completed interviews by country and size class, business economy (NACE rev. 1.1 D, F -K, N, O, excl. 91)

Country	Micro (2-9)	Small and medium-sized (10-249)	Large (250+)	Total
Poland	318	94	170	582
United kingdom	188	72	80	340
Germany	135	113	108	356
France	246	84	181	511
Spain	217	106	109	432
Italy	372	89	160	621
6 major EU27 economies	1,476	558	808	2,842
Luxembourg	14	77	25	116
Malta	44	103	24	171
Estonia	46	153	21	220
Cyprus	52	99	22	173
Slovakia	42	147	41	230
Latvia	59	113	22	194
Ireland	62	77	63	202
Slovenia	50	40	16	106
Lithuania	40	60	27	127
Denmark	75	45	92	212
Finland	74	42	44	160
Bulgaria	56	40	31	127
Austria	59	41	77	177
Belgium	78	31	29	138
Romania	55	45	51	151
Sweden	78	38	31	147
Hungary	76	33	38	147
Netherlands	82	42	34	158
Greece	105	28	23	156
Portugal	91	39	29	159
Czech Republic	93	73	103	269
Other EU27 economies	1,331	1,366	843	3,540
EU27	2,807	1,924	1,651	6,382
Liechtenstein	52	28	0	80
Iceland	42	48	4	94
Montenegro	50	24	5	79
Albania	45	37	4	86
Serbia	58	49	36	143
Croatia	60	32	24	116
Norway	36	44	16	96
Israel	29	51	23	103
the Former Yugoslav Republic of Macedonia	71	29	9	109
Turkey	154	109	26	289
Non-EU	597	451	147	1,195
Total	3,404	2,375	1,798	7,577

Source: EIM.

4.4 Preparation of the dataset

Plausibility check on effects of the crisis

Upon completion of the fieldwork, two plausibility checks were performed on the data obtained: one regarding the answers to the positive and negative effects of the crisis, and one regarding the answers to the various questions regarding the quantity of jobs.

The first check concerns the overall effects of the economic crisis. Two separate questions have been included in the survey concerning various positive and negative effects of the crisis (questions Q104 and Q106). These questions contain several subquestions, including a subquestion on whether or not the crisis had an overall negative or positive on the number of orders or total demand over the past two years. Since these questions refer to the net effect of the economic crisis on demand since the start of the crisis, respondents were expected to tick one of these options at the most, but not both. This was, however, not clear to all respondents: 6% of all respondents responded that the economic crisis had both an overall negative effect on the number of orders or total demand (question Q104_1) and an overall positive effect on the number of orders or total demand (question Q106_1).

These inconsistent answers led to two adjustments to the data. First, for all respondents who answered "yes" to both questions Q104_1 and Q106_1, these answers have been recoded as "do not know".

Second, for some of these respondents, the score on the variables concerning whether any positive or negative effects of the crisis had occurred had to be changed. Whether an enterprise encountered any negative (positive) effects from the crisis can be determined from the answers to all of the negative (positive) effects included in the questions: if none of the effects is reported, it is assumed that the enterprise was confronted directly with any negative (positive) effects of the crisis[1]. The two additional variables are named crisis_neg and crisis_pos. If the overall negative (positive) effect of the crisis on demand was the only negative (positive) effect of the crisis, and if this overall negative (positive) effect was recoded as "do not know", then whether the crisis had any negative (positive) effects on the enterprise is not known either. In these cases, the score on the variable crisis_neg (crisis_pos) is also recoded as "do not know". If, however, the respondent also mentioned at least one other negative (positive) effect of the crisis, the conclusion remains that the crisis had a negative (positive) effects on the enterprise. In these cases, the score on the variable crisis_neg (crisis_pos) does not need to be changed. For 99% of the respondents in the final sample, it is known whether or not the crisis had any negative (positive) effects on the enterprise; the answer category "do not know" occurs for 1% of the respondents.

[1] This interpretation is valid because the last of the negative (positive) effects included in the question is "any other negative (positive) effect". Thus, the list of possible negative (positive) effects of the crisis refers to all negative (positive) effects possible.

Plausibility check on questions regarding quantity of labour

The second plausibility check concerns the internal consistency of the reported employment levels (now and twelve months ago) and on the reported numbers of employees laid off and hired.

The total change in the employment level can be computed as the difference between the current number of people employed and the number of people employed twelve months ago. Changes in the employment level are often the result of laying off employees and/or hiring new employees. Nevertheless, the total change in employment level does not need to be equal to the sum of the number of employees laid off and hired during the past twelve months. An initial explanation for this difference is that the employment level may also change for reasons other than laying off or hiring employees. For example, employees may leave on their own account; they may leave because their temporary contracts are not renewed; or they may retire, become disabled or die. A second explanation is that the information obtained through the Enterprise Survey is an approximation[1]. If the approximation is not exact, this will also result in differences between the sum of layoffs and hires on the one hand and the overall changes in employment levels on the other hand.

Nevertheless, the information on the number of layoffs and hires allows for a few plausibility checks regarding the changes in the employment level during the past twelve months. First of all, typing errors may be detected by comparing the various employment variables. If the number of employees twelve months ago, plus the number of newly hired employees during the past twelve months, minus the number of employees laid off during the past twelve months is exactly 10 times higher (lower) than the current number of employees, it is very likely that the number of current employees written down contains a typing error. A similar argument can be made to detect likely typing errors in the number of employees twelve months ago. This procedure identified 5 likely typing errors (3 regarding current employment, 2 regarding employment twelve months ago). These typing errors have been corrected.

Secondly, although individual enterprises may show large employment increases, in cases where the data indicate extreme employment growth, it is more likely that the data are wrong (because of a mistake by the respondent or by the interviewer) than that the employment growth of these enterprises was indeed so extreme. The difficulty is to determine when employment growth is so extreme. For this study, the following criteria have been applied.

– For enterprises with no more than 100 employees, extreme growth is defined as a Birch-corrected growth rate[2] of 100 or more. A Birch-corrected growth rate of 100 occurs if an enterprise grows from 1 to 11 employees, from 5 to27

[1] The respondents have to provide the answers immediately, without the opportunity to look them up.

[2] In the Birch-corrected growth rate, the standard growth rate is multiplied by a "correction factor". The result is that a standard growth rate of 25% will be valued "higher" for larger enterprises than for smaller enterprises. The correction factor used by Birch is the absolute difference of the number of workers from year 1 to year 2. The Birch-corrected growth rate has been used previously, amongst others in the European Observatories for SMEs. More details can be found in the annex to "European Observatory for SMEs; sixth report", published in 2000 by the European Commission.

employees, from 10 to 42 employees, from 20 to 65 employees or from100 to 200 employees.
- For larger enterprises, the Birch-correction is not required. Therefore, for enterprises with 100 or more employees, extreme growth is defined as a growth rate of 1 or more (i.e. at least a doubling of the number of employees)[1].

Besides employment growth, the data also include enterprises that report employment contraction. The Birch-corrected growth rate cannot be used as a criterion to determine whether the employment reduction can be considered extreme[2]. Therefore, extreme employment reduction is defined in terms of the uncorrected employment growth rate:

- For all enterprises, extreme employment contraction is defined as an employment growth rate of -0.9 or less (a reduction of 90% or more).

According to these criteria, 30 enterprises in the sample showed an extreme employment growth (extreme employment contraction did not occur). For these enterprises, the increase in the employment levels was then compared to the reported numbers of employees laid off and hired during the past twelve months. If a considerable share of the increase in employment levels could be explained by the difference between the number of employees hired and laid off, it may be concluded that the extreme employment growth did indeed take place. If not, it may be concluded that the extreme employment growth is most likely erroneous. In this study, "a considerable share" is operationalised as 2/3. This means that if less than 33.3% of the increase in the employment level can be related to the net result of laying off and hiring employees, the information provided on the employment levels is considered too unreliable to use. In these cases, the observations regarding the number of employees (both currently and twelve months ago) are recoded as missing. As a direct consequence, it is not possible to determine the proper weights for these enterprises[3], which means that they are effectively removed from the dataset. This is the case for 18 of the 30 enterprises with extreme employment growth.

Determining proper weights

Weights must be computed to correct for the disproportionate character of the sample. By using these weights, it becomes possible to present percentage distributions that indeed represent the situation across the 37 European countries covered by the sample. The weights are computed using the actual distribution of the 15 million employer enterprises over the 1,998 quota that are distinguished in the sample plan, based on the following three dimensions:

- the three size classes;
- the 18 sectors of industry;
- the 37 countries.

[1] For example, the Birch-corrected growth rate for an enterprise growing from 5,000 to 5,708 employees is also 100. Although this enterprise shows a considerable growth rate, it is not extreme.

[2] The minimum Birch-corrected growth rate varies with firm size. For example, if an enterprise decreases from 100 to 10 employees, the Birch-corrected growth rate equals -81. When applied to a firm of 80 employees, this would result in a negative head count.

[3] An exception can be made if the reported number of employees currently and twelve months ago are both in the same size class (for example, if employment increased from 2 to 9 employees, or from 260 to 5000). In these cases it is still possible to determine the proper weights, even if the information on the exact number of employees is not reliable. This is the case for 6 enterprises.

The final sample includes observations from 7,577 enterprises. However, because reliable information on the size class is missing for 18 of these enterprises, weights have been computed for 7,559 enterprises. This can be considered as the size of the database used for the analyses in the main report.

Differentiating between prevalence and magnitude

Some questions from the questionnaire ask for both prevalence and magnitude. For example, question Q152 (Does your enterprise currently have any vacancies? If so, how many?) combines two questions: first of all, whether or not the enterprise currently has any vacancies (prevalence), and secondly (if the enterprise does have vacancies) how many (magnitude). The answers to these two questions are recorded in a single variable (Q152), where "0" means "no" and a positive number represents both "yes" to the question of whether the enterprise has any vacancies and the actual number of vacancies.

It is often interesting to differentiate between the prevalence and the magnitude. To this end, an additional variable Q152_dich is computed; this is a dummy variable[1] that registers whether or not an enterprise has any vacancies. Thus, two different basic tables can be determined:

- regarding prevalence: a cross tabulation of Q152_dich by (e.g.) size class, indicating the share of enterprises for each size class that had any vacancies;
- regarding magnitude: average values of Q152 for (e.g.) different size classes, indicating the average number of vacancies for each size class (for those enterprises that reported having vacancies).

This dichotomisation has been done for 14 variables (Table 12).

[1] "dich" stands for dichotomous.

Table 12 Dichotomisation of variables combining prevalence and magnitude

Survey Question	Brief description	Newly defined dummy variable
Q151	Do you currently employ employees from temporary work agencies?	Q151_dich
Q160	Did you employ employees from temporary work agencies twelve months ago?	Q160_dich
Q109_1	Have any employees been permanently laid off due to the economic crisis?	Q109_1_dich
Q109_2	Have any employees been permanently laid off for other reasons?	Q109_2_dich
Q111_1	Do you expect that employees will be permanently laid off due to the economic crisis?	Q111_1_dich
Q111_2	Do you expect that employees will be permanently laid off for other reasons?	Q111_2_dich
Q158_1	How many employees were hired to replace other employees who left the firm?	Q158_1_dich
Q158_2	How many employees were hired because of newly created jobs?	Q158_2_dich
Q159	Had any of these newly hired employees been unemployed for at least a year when they were recruited?	Q159_dich
Q117_1	How many employees will be hired to replace other employees who leave the firm?	Q117_1_dich
Q117_2	How many employees will be hired because of newly created jobs?	Q117_2_dich
Q152	Does your enterprise currently have any vacancies?	Q152_dich
Q153	Are some of these vacancies hard to fill?	Q153_dich
Q161	Has your enterprise used any publicly supported employment protection scheme for any of your employees?	Q161_dich

Source: Enterprise Survey 2010, SMEs and EU Labour Market, EIM/GDCC (N=7559).

Combining absolute and relative answers

The questionnaire contains various questions about characteristics of the workforce of the enterprises. These questions generally ask for either an absolute number of employees or a share (or percentage). For example, question Q78 concerns the number of employees who are female. For enterprises with fewer than 50 employees, the question is formulated in terms of actual number of female employees; for larger enterprises the question is formulated in terms of the share of female employees. These answers have to be made consistent before any analysis can be made. This has been done by calculating the correct percentages for enterprises with fewer than 50 employees (by dividing the actual number of female employees by the total number of employees). The newly created variable has received a new name (female) and has been added to the dataset. This approach has been applied to 11 variables (Table 13).

Table 13 Defining auxiliary variables for variables containing absolute and relative answers

Survey Question	Brief description	Newly defined relative variable
Q161	The share of employees who benefitted from publicly supported employment protection schemes	Empl_protection
Q44	The share of employees with a fixed-term contract	Fixed-term
Q48	The share of employees working on a full-time basis	Fulltime
Q76_1	The share of employees with a low educational level	Edu_low
Q76_2	The share of employees with a medium educational level	Edu_medium
Q76_3	The share of employees with a high educational level	Edu_high
Q77_1	The share of employees younger than 25 years of age	Age_low
Q77_2	The share of employees between 25 and 50 years of age	Age _medium
Q77_3	The share of employees aged 50 years or older	Age _high
Q155	The share of people with a physical or mental handicap	Disabled
Q78	The share of female employees	Female

Source: Enterprise Survey 2010, SMEs and EU Labour Market, EIM/GDCC (N=7559).

Changing the order of the answer categories to question Q121

Question Q121 was formulated as follows: "For each of the following aspects, can you indicate whether they make it easier or more difficult for your firm to attract skilled people compared to other firms, or whether there is no difference?"

The answers have been recorded in a different order, to arrive at an ordinal variable with the following three answer categories:
1 = easier
2 = no difference
3 = more difficult.

A new indicator on innovativeness

The questionnaire includes three different questions on innovation (Q16, Q17 and Q107). The answers to these questions have been combined to generate a single indicator variable, indicating whether or not an enterprise can be considered innovative (in a broad sense). Enterprises are considered innovative if they meet at least one of the following criteria:

- the enterprise has introduced new or significantly improved goods or services in the past three years;
- the enterprise has introduced new or significantly improved processes for producing or supplying goods or services in the past three years;
- at least once a year the enterprise is engaged in activities to develop new goods, services or production processes.

4.5 Analysis

Bivariate analysis

Many of the figures and tables included in Chapters 6 and 8 to 12 of the publication "Do SMEs create more and better jobs?" are based on the results of the Enterprise Survey 2010. For the majority, these figures and tables are based on bivariate analyses of the dataset. To this end, a large number of standard tables have been prepared, where the variables included in the dataset are tabulated against a limited number of control variables:

- by size class;
- by sector (main sectors as well as elementary sectors);
- by country (individual countries as well as country groupings based on the innovation performance of countries[1], competitiveness[2] and income level[3]).

In each case, two different tables have been prepared: a table containing an unweighted number of enterprises (to determine whether enough observations are available to draw inferences at a reasonably narrow confidence level), and a table containing weighted percentage distributions (which provide an estimate of the population distribution).

Depending on the measurement level of the variable of interest, the prepared table is a cross tabulation (in case of nominal or ordinal variables) or a table presenting averages per category (in case of scale variables)[4].

All in all, 100 (variables) x7 (control variables) x 2 (unweighted and weighted) = 1,400 standard tables have been prepared.

Multivariate analysis

In addition to the standard bivariate tables, a set of standard regression analyses has been performed. These regression analyses have been performed for almost all questions included in the survey (the exceptions are the independence of the organisation, gender and position of the respondent, and sector and country). Depending on the measurement level of the dependent variable, the regression technique used is ordinary least squares (in case of a scale variable), a logit regression (in case of a nominal or dummy variable) or a multinomial logit regression (in case of an ordinal variable)[5].

[1] Countries are categorised into four groups based on the scores on the Innovation Union Scoreboard 2010 (source: DG Enterprise and Industry).

[2] Countries are categorised into two groups based on whether their score on the Global Competitiveness Index 2010 (source: World Economic Forum) is above or below the EU27 average.

[3] Countries are categorised into four groups based on the Worldbank 2011 country classification by income. Because of the relatively high income levels in Europe, the lowest two income groups are empty.

[4] The answer category "do not know/no answer" is included as a separate category in these tables.

[5] The answer category "do not know/no answer" is excluded from these analyses.

The regression equations include the following independent variables:

- Enterprise characteristics (firm size, firm age, sector, innovative behaviour).
- Workforce characteristics (decomposition of the workforce by age, educational level and gender; share of employees working fulltime; share of employees on a fixed-term contract).
- Country characteristics; these are incorporated in three different ways (each resulting in a separate regression analysis):
  - By including country dummies, differences between individual countries can be identified that are not explained by country differences in the enterprise and workforce characteristics included in the regression model (available for all 37 countries).
  - By including information on real GDP growth rates (for 2009 and 2010), the 2010 level of GDP per capital level (in purchasing power standards), and the national score on the Innovation Union Scoreboard 2010, it is possible to determine the extent to which country differences are related to the economic and innovation performance of countries. This information is available from Eurostat for 31 countries (these include all Member States plus Croatia, Iceland, Norway and Turkey).
  - In addition to national statistics on GDP and innovation, several indicators from the country fact sheets from the Small Business Act have been included (these include the responsive administration index and the single market index). This information is available for 23 Member States (these indicators are not available for Cyprus, Malta, Bulgaria and Romania).

Results of these multivariate analyses were mentioned in the report whenever this was deemed relevant.

Cluster analysis: an enterprise typology on employment developments

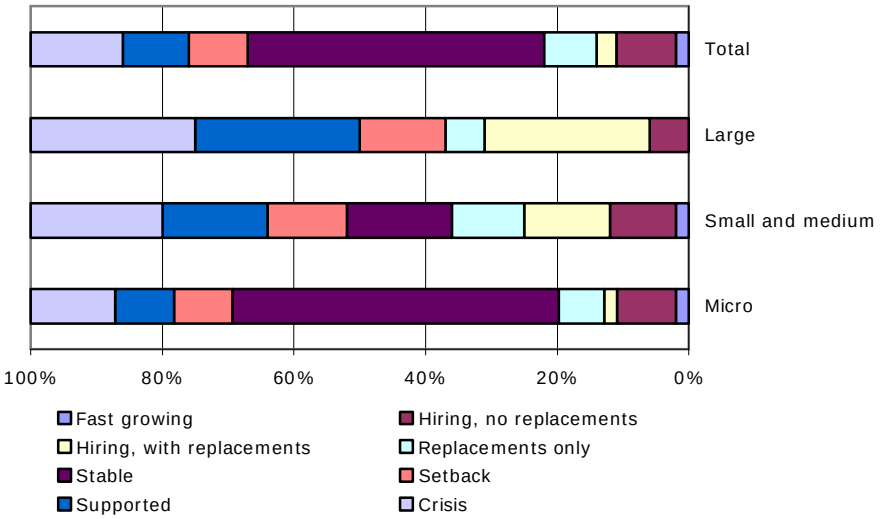
Apart from the regression analyses, a different type of multivariate analysis has also been conducted. A cluster analysis has been performed in order to determine an enterprise typology on employment developments.

The cluster analysis was based on variables representing different aspects of employment developments such as laying off employees, recruiting new employees, the employment growth rate and the usage of publicly supported employment protection schemes. The results of the cluster analysis suggested an enterprise typology of eight different enterprise types, each reflecting different combinations of the actions of enterprises (hiring, firing, usage of support measures) and the outcomes of these actions (gross and net employment changes).

Two of these types consist of enterprises where employment levels have remained the same, either because no employee flows occurred (the "stable" type), or because employees who left the firm were all replaced (the "replacements only" type). These enterprise types account for more than half of all enterprises in the 37 countries included in the survey. Three other types ("fast growing", "hiring, no replacements" and "hiring with replacements") represent enterprises with (on average) positive employment developments. These three types account for 14% of the enterprise population. The remaining three enterprise types ("supported", "setback" and "crisis") represent enterprises with (on average) negative employment developments and account for 33% of the enterprise population.

The distribution of the enterprise types differs considerably across size classes. The main reason is that larger enterprises are less likely to report no labour flows during a year than smaller enterprises. For example, if more employees are employed, it comes increasingly likely that at least one employee leaves the firm on his or her own account or is laid off. As a result, the share of "stable" enterprises decreases from approximately 50% for micro enterprises to 0% for large enterprises (Figure 1).

Figure 1 Enterprise typology of employment development, by size class, for EU37 (2010)



Source: Enterprise Survey 2010, SMEs and EU Labour Market, EIM/GDCC (N=7559); conducted during the final quarter of 2010 (2010Q4).

The main purpose of deriving this typology was to examine the extent to which such a typology would be related to various indicators of job quality. This might help to identify which types of enterprises are more likely to provide jobs of higher quality (besides looking at size, country or sector). Various analyses have been performed to examine (cor)relations between this typology and available indicators for job quality, but these did not provide any additional insights. The enterprise typology is therefore not included in the main report.

ANNEX I Enterprise Survey 2010 Questionnaire

	Question	Applies to:
	INTRODUCTION	
TXT0	[Short Introduction - Mainly to use with GKs when they ask what the call concerns.] Good morning, my name is _____ from GDCC. I'm calling on behalf of the European Commission in Brussels and we'd like to discuss employment trends and how they've been affected by the economic crisis. May I speak to the human resources manager, the general manager or the owner of your enterprise?	All
TXT1	[Full Introduction - To use primarily with suitable respondents] Good afternoon, this is_____ from GDCC on behalf of the European Commission in Brussels. We're currently conducting a study throughout Europe to examine employment trends and how these trends have been affected by the economic crisis. This is to enable the European Commission to better support companies in delivering more and better jobs. Would you have some time to answer a few simple questions? This interview will take approximately 20 minutes. Please note that the information you provide will be treated confidentially. It will not be used at an individual level nor handed over by name to the European Commission or any other third party.	All
	A: General characteristics of the enterprise and the respondent	
Q1	Which of the following descriptions best characterises this enterprise? (INT.: read out) 1. An independent enterprise 2. An enterprise, where less than 25% of equity is owned by other enterprises 3. A subsidiary, or an enterprise where 25% or more of equity is owned by other enterprises 4. Not an enterprise ⇒ END 1 999. (INT.: DO NOT READ) Do not know/no answer ⇒ END 1 INT: (clarification, do not read): Examples of organisations that are not enterprises are (semi-)government organisations, foundations, unions and charities.	All
Q2	What is your position within the enterprise? (INT.: read out) 1. Owner 2. HRM manager or Personnel manager 3. Director or General manager 4. Other member of the management team or group 5. Accountant 6. Family member of the owner(s) 7. Other, specify: … 999. (INT.: DO NOT READ) Do not know/no answer ⇒ END 1	All
Q3a	INT.: note down gender of respondent without asking. 1. Male 2. Female 999. Do not know	All
Q4	How many establishments does your enterprise consist of? (INT: a reasonable estimate will do) 999. (INT.: DO NOT READ) Do not know/no answer	All

Q5	If Q4=1, the question should be formulated as follows: Approximately how many people are currently working for your enterprise? (Including yourself, family workers, other management and owners and regular employees, but excluding temporary external workers). If (Q4>1 and Q4<999), the question should be formulated as follows: Approximately how many people are currently working for your enterprise? (Including yourself, family workers, other management and owners and regular employees, also those in other establishments, but excluding temporary external workers). (INT: a reasonable estimate will do) (INT: All questions refer to NATIONWIDE employees, not outside the country we are calling!) 999999. (INT.: DO NOT READ) Do not know/no answer ⇒ END 1 If Q5=1 ⇒ END 1	All
Q6	And how many people were working for your enterprise twelve months ago? (INT: a reasonable estimate will do) 999999. (INT.: DO NOT READ) Do not know/no answer INT: (clarification, do not read): If the enterprise has been in existence for less than one year, the question refers to the start of the enterprise	All
Q7	What is the main activity of your enterprise? (INT.: ONLY ONE ANSWER ALLOWED, READ OUT IF NECESSARY) 1. Manufacturing ⇒ Q8 2. Construction: preparation, drilling, roads, buildings, installation, plumbing, plastering, etc. ⇒ Q151 3. Retail trade, maintenance and repair of motor vehicles or personal & household goods ⇒ Q151 4. Wholesale trade and commission trade except motor vehicles, motorcycles ⇒ Q151 5. Transport, travel agencies, post & communications ⇒ Q151 6. Business services, incl. financial services and real estate ⇒ Q9 7 Hotels and restaurants ⇒ Q151 8 Other service activities ⇒ Q151 998. Other activities, i.e. agriculture, fishing, mining electricity, public sector activities and defence, activities of membership organisations ⇒ END 1 999. (INT.: DO NOT READ) Do not know/no answer ⇒ END 1 INT: (clarification, do not read): Main in terms of turnover; largest share in enterprise turnover INT: (clarification, do not read): Other service activities include health and social work, recreation, culture and sport activities and other service activities	All
Q8	What type of manufacturing? (INT.: ONLY ONE ANSWER ALLOWED, READ OUT IF NECESSARY) 1.1 Metal industry (basic metals, metal products except machinery and equipment) 1.2 Food products, beverages, tobacco products 1.3 Pulp, paper and paper products, publishing, printing and recorded media 1.4 Textile and leather products 1.5 Electrical and optical equipment 1.6 Wood and wood products, furniture 1.7 Other manufacturing 999. (INT.: DO NOT READ) Do not know/no answer ⇒ END 1 ⇒ Q151	If Q7 =1

Q9	What type of business services? (INT.: ONLY ONE ANSWER ALLOWED, READ OUT IF NECESSARY) 6.1 Financial intermediation, insurance and pension funding, auxiliary activities 6.2 Real estate activities 6.3 Research and development, computer related activities 6.4 Accounting, consulting, market research, architectural and engineering activities, technical testing, advertising and recruitment services 6.5 Renting of machinery & equipment, other business activities 999. (INT.: DO NOT READ) Do not know/no answer ⇒ END 1	If Q7 =6
Q151	Do you currently employ employees from temporary work agencies? 0 no 1 (if yes) how many employees does this concern?____ (INT: fill in number of employees) 999998 (INT.: DO NOT READ) Do not know/no answer 999999 (INT.: DO NOT READ) Do not know the number of employees	All
Q160	And did you employ employees from temporary work agencies twelve months ago? 0 no 1 (if yes) how many employees did this concern?____ (INT: fill in number of employees) 999998 (INT.: DO NOT READ) Do not know/no answer 999999 (INT.: DO NOT READ) Do not know the number of employees INT: (clarification, do not read): If the enterprise has been in existence for less than one year, the question refers to the start of the enterprise	All
Q10	In which year did your enterprise start operating? 4 INT.: (Must be four digits, i.e. 1970 or 2001, reasonable estimate will do) 999. (INT.: DO NOT READ) Do not know/no answer	All
Q104	During the past two years, which of the following negative effects of the current economic crisis applied to your enterprise? (INT.: read out; multiple answers allowed) a an overall negative effect on the number of orders or total demand b under-utilisation of the workforce c increase in customers' payment terms d bankruptcy or closure of major business partners e shortage of working capital f shortage of long term finance g costs of finance (for example, interest rate) h other INT: (clarification, do not read): An overall negative effect on demand means that, over the two-year period as a whole, the net effect of the economic crisis on demand was negative; your enterprise may have gained some new clients or orders, but the net effect should be negative. INT: (clarification, do not read) A major business partner is another enterprise or organisation with which the enterprise often collaborates in projects and/or activities. INT: (clarification, do not read): If the enterprise has been in existence less than two years, the question refers to the period since the start of the enterprise	All

Q106	During the past two years, which of the following positive effects of the current economic crisis applied to your enterprise? (INT.: read out; multiple answers allowed) a an overall positive effect on the number of orders or total demand b it is easier to hire skilled employees c employees are willing to work more flexibly d reduction in purchase prices e lower wage costs f it is easier to collaborate with other organisations g other INT: (clarification, do not read): An overall positive effect on demand means that, over the two-year period as a whole, the net effect of the economic crisis on demand was positive; your enterprise may have lost some new clients or orders, but the net effect should be positive. INT: (clarification, do not read): If the enterprise has been in existence less than two years, the question refers to the period since the start of the enterprise	All
TXT3	INT: read out: The following questions concern the innovation activities of your enterprise	All

Q16	If (Q10<2007 or Q10=999), the question should be formulated as follows: Has your enterprise introduced new or significantly improved goods or services during the past three years?
	
	If (Q10>2006), the question should be formulated as follows: Has your enterprise introduced new or significantly improved goods or services?
	
	0 no
	1 yes
	9 (INT.: DO NOT READ) Do not know/no answer
	
	INT: (clarification, do not read): By significant improvement, we refer to significant improvements with respect to the capabilities of the good or service such as improved user friendliness, components, software, or subsystems. The following improvements are excluded: a simple resale of new goods or services purchased from other enterprises and changes of a solely aesthetic nature. The innovated good or service (new or improved) must be new to your enterprise, but it does not need to be new to your sector or market. It does not matter if the innovation was originally developed by your enterprise or by other enterprises.
		All

Q17	If (Q10<2007 or Q10=999), the question should be formulated as follows: Has your enterprise introduced any new or significantly improved processes for producing or supplying goods or services during the past three years?
	
	If (Q10>2006), the question should be formulated as follows: Has your enterprise introduced any new or significantly improved processes for producing or supplying goods or services?
	
	0 no
	1 yes
	9 (INT.: DO NOT READ) Do not know/no answer
		All

	INT: (clarification, do not read): This includes new or significant improvements to the distribution method or support activities for your goods or services. Purely organisational innovations, however, are excluded. The innovated production process (new or improved) must be new to your enterprise, but it does not need to be new to your sector or market. It does not matter if the innovation was originally developed by your enterprise or by other enterprises.	
Q107	How often is your enterprise engaged in activities to develop new goods, services, or production processes? Is this (INT: read out; only one answer allowed) 1 never 2 less than once a year 3 less than once a month 4 less than once a week 5 every week 9 (INT.: DO NOT READ) Do not know/no answer	All
	C: Quantity of jobs - employment changes	
	During the past twelve months, have any employees been permanently laid off? 0 no 1 yes	All
	(if yes)	
Q109_1	how many employees have been laid off due to the economic crisis ____ (INT: fill in number of employees)	
Q109_2	how many employees have been laid off for other reasons ____ (INT: fill in number of employees)	
	(do not specify the "other reasons") INT: fill in 0 if answer is "no" INT: (clarification, do not read): Only permanent layoffs should be counted, not voluntary retirements or temporary layoffs. Temporary layoffs occur when an enterprise does not have enough work and therefore asks some of the workforce to stay at home. INT: (clarification, do not read): Other reasons for permanent layoffs include misconduct of employees at work (e.g. poor discipline, continually missing work), underperformance of employees, or a reorganisation of the enterprise not due to the economic crisis. INT: (clarification, do not read): If the enterprise has been in existence less than one year, the question refers to the start of the enterprise. INT: (clarification, do not read): This question refers to NATIONWIDE employees, not outside the country we are calling. 999998 (INT.: DO NOT READ) Do not know/no answer 999999 (INT.: DO NOT READ) Do not know the number of employees	
	Do you expect that employees will be permanently laid off in the next twelve months? 0 no 1 yes	
	(if yes)	
Q111_1	how many employees will be laid off due to the economic crisis? ____ (INT: fill in number of employees)	

Q111_2	how many employees will be laid off for other reasons?____ (INT: fill in number of employees) INT: fill in 0 if answer is "no" INT: (clarification, do not read): Only permanent layoffs should be counted, not voluntary retirements or temporary layoffs. Temporary layoffs occur when an enterprise does not have enough work and therefore asks some of the workforce to stay at home. INT: (clarification, do not read): Other reasons for permanent layoffs include misconduct of employees at work (e.g. poor discipline, continually missing work), underperformance of employees, or a reorganisation of the enterprise not due to the economic crisis. 999998 (INT.: DO NOT READ) Do not know/no answer 999999 (INT.: DO NOT READ) Do not know the number of employees	All
	During the past twelve months, have any employees been hired? 0 no => Q117 1 yes (if yes)	All
Q158_1	how many employees were hired to replace other employees who left the firm?____ (INT: fill in number of employees) => Q159	
Q158_2	how many employees were hired because of newly created jobs?____ (INT: fill in number of employees) => Q159 INT: (clarification, do not read): Enterprises may increase their labour force to generate additional turnover. This may result in the creation of new jobs, for which employees must be hired. These hires should be counted as "hired because of newly created jobs". Enterprises may also decide to hire individual employees if they believe that these employees are valuable to their enterprise, even in the absence of an existing vacancy. These hires should also be counted as "hired because of newly created jobs". INT: (clarification, do not read): If the enterprise has been in existence less than one year, the question refers to the period since the start of the enterprise 999998 (INT.: DO NOT READ) Do not know/no answer => Q11 999999 (INT.: DO NOT READ) Do not know the number of employees => Q159	
Q159	Had any of these newly hired employees been unemployed for at least a year when they were recruited? 0 no 1 (if yes) how many employees did this entail?____ (INT: fill in number of employees) 999998 (INT.: DO NOT READ) Do not know/no answer 999999 (INT.: DO NOT READ) Do not know the number of employees	If Q158 =1 or Q158 =999999
	Does your enterprise plan to hire new employees in the next twelve months? 0 no => Q161 1 yes (if yes)	
Q117_1	how many employees will be hired to replace other employees who leave the firm? (INT: fill in number of employees) => Q152	

Q117_2	how many employees will be hired because of newly created jobs?____ (INT: fill in number of employees) => Q152 INT: (clarification, do not read): Enterprises may increase their labour force to generate additional turnover. This may result in the creation of new jobs, for which employees must be hired. These hires should be counted as "hired because of newly created jobs". 999998 (INT.: DO NOT READ) Do not know/no answer => Q161 999999 (INT.: DO NOT READ) Do not know the number of employees => Q152	All
Q152	Does your enterprise currently have any vacancies? 0 no => Q161 1 (if yes), how many vacancies does this entail?____ (INT: fill in number of vacancies) => Q153 999998 (INT.: DO NOT READ) Do not know/no answer => Q161 999999 (INT.: DO NOT READ) Do not know the number of vacancies => Q153	If Q117 =1 or Q117 =999999
Q153	Are some of these vacancies hard to fill? 0 no 1 (if yes) how many vacancies does this entail?____ (INT: fill in number of hard-to-fill vacancies) 999998 (INT.: DO NOT READ) Do not know/no answer 999999 (INT.: DO NOT READ) Do not know the number of hard-to-fill vacancies INT: (clarification, do not read): Hard-to-fill vacancies are all vacancies that you find hard to fill. There is no specific threshold associated with it.	If Q152 =1 or Q152 =999999
Q161	During the past two years, has your enterprise used any publicly supported employment protection scheme for any of your employees? 0 no 1 (if yes) how many employees/what share of employees did this entail?____ (INT: fill in number of employees (if Q5<50) or percentage of employees (if Q5>=50) 99999 (INT.: DO NOT READ) Do not know/no answer INT: (clarification, do not read): Publicly supported employment protection schemes are specific instruments aimed at helping employers retain their employees instead of dismissing them, especially in times of economic distress. They may include, but are not limited to, state allowances provided to employers in the form of temporary payments or reductions of their compulsory social security contributions or measures allowing employers to use more flexible working-time arrangements.	All

	D: Quality of job aspects	
Q121	For each of the following aspects, can you indicate whether they make it easier or more difficult for your firm to attracted skilled people compared to other firms, or whether there is no difference? (answer categories: easier; more difficult; no difference; do not know/no answer) (INT.: read out; multiple answers allowed) 1 remuneration level 2 working-time arrangements 3 work-life balance 4 training opportunities 5 career opportunities 6 location of the enterprise 7 working climate in the enterprise. 8. exciting or challenging job profiles 9 other aspects 99 (INT.: DO NOT READ) Do not know/no answer	All
Q33	I will now mention several training and development activities. For each of these activities, can you indicate whether they have been used by none, some or many of your employees during the past twelve months? 1 firm-provided internal training courses 2 firm-provided external training courses 3 on-the-job training 4 mentoring programmes 5 job rotation 6 learning circles or quality circles 7 self-directed learning 8 attendance at conferences, workshops and lectures 9 study visits to other organisations 10 apprenticeships and traineeships 11 exchanges or secondments 12 other training and development activities INT: (clarification, do not read) Self-directed learning is a training method where it is not the teacher that initiates the learning, but the learner. The learner makes the decisions about what training and development experiences will occur and how. The learner selects and carries out his or her own learning goals, objectives, methods and means to verify that the goals were met. INT: (clarification, do not read) A learning circle or quality circle is a small group of employees who meet regularly to study a relevant subject. INT: (clarification, do not read) With exchanges or secondments, an employee gets the opportunity to work for a certain period within another organisation. INT: (clarification, do not read): If the enterprise has been in existence for less than one year, the question refers to the period since the start of the enterprise. If (answer to categories 1 and 2 is "none"), go to Q154; Otherwise, go to TXT5	All

Q154	What are the main reasons that your enterprise did not provide training courses during the past twelve months? (INT.: read out; multiple answers allowed) 1 Employees have all the required skills 2 Training and development activities would not produce any benefits for the enterprise 3 Financial costs of training 4 Lost working time while workers are being trained 5 Unable to cover work while workers are being trained 6 Lack of information about training opportunities 7 Can't find suitable external training and development 8 Lack of space or skills to provide internal training and development activities 9 Fear of trained workers leaving the enterprise 10 Lack of interest of employees in training and development activities 11 Other reasons 99 (INT.: DO NOT READ) Do not know/no answer INT: (clarification, do not read): If the enterprise has been in existence for less than one year, the question refers to the period since the start of the enterprise	answer to first two categories of Q33 is "none"
	E: Workforce characteristics	
TXT5	INT: read out: If Q4=1, the question should be formulated as follows: To conclude this survey, I will now ask you some questions regarding the workforce of your enterprise. If (Q4>1 and Q4<999) To conclude this survey, I will now ask you some questions regarding the workforce of your enterprise. This includes all of its establishments [INT: All questions refer to NATIONWIDE employees, not outside the country we are calling!]	All
Instruction	If Q5<50, all remaining questions will be in absolute numbers; If Q5>= 50, all remaining questions will be in shares/percentages, except for Q155	
Q44	How many (what percentage) of the people working for your enterprise have a fixed-term contract? INT: Write down absolute number or percentage (0 to 100), depending on firm size 999. (INT.: DO NOT READ) Do not know/no answer INT: (clarification, do not read): This question refers to employees who are hired by the firm. Workers from temporary work agencies should not be included. (This also applies to all of the remaining questions)	All
Q48	How many (what percentage) of the people working for your enterprise work on a full-time basis? INT: write down absolute number or percentage (0 to 100), depending on firm size 999. (INT.: DO NOT READ) Do not know/no answer	All
Q76a	How many (what share) of the people working for your enterprise have a lower educational level, for example, only primary school INT: write down absolute number or percentage (0 to 100), depending on firm size 99999. (INT.: DO NOT READ) Do not know/no answer	All

Q76b	And how many have a medium educational level, for example, secondary school? INT: Write down absolute number or percentage (0 to 100), depending on firm size 99999. (INT.: DO NOT READ) Do not know/no answer	All
Q76c	And how many have a high educational level, for example, university? INT: Write down absolute number or percentage (0 to 100), depending on firm size 99999. (INT.: DO NOT READ) Do not know/no answer	All
Q77a	How many (what share of) the people working for your enterprise are (is) younger than 25 years of age? INT: Write down absolute number or percentage (0 to 100), depending on firm size 99999. (INT.: DO NOT READ) Do not know/no answer	All
Q77b	And how many are (what share is) between 25 and 50 years of age? INT: Write down absolute number or percentage (0 to 100), depending on firm size 99999. (INT.: DO NOT READ) Do not know/no answer	All
Q77c	And how many are (what share is) 50 years of age or older? INT: Write down absolute number or percentage (0 to 100), depending on firm size 99999. (INT.: DO NOT READ) Do not know/no answer	All
Q155	Do you currently employ people with a physical or mental handicap? 0 no 1 (if yes) How many employees does this concern?____ (INT: Fill in number of employees) 999998 (INT.: DO NOT READ) Do not know/no answer 999999 (INT.: DO NOT READ) Do not know the number of employees	All
Q78	How many (what share) of the people working for your enterprise are female? INT: Write down absolute number or percentage (0 to 100), depending on firm size 99999. (INT.: DO NOT READ) Do not know/no answer =>END2	All

END 1
Your company does not match the target group of this study. I would like to end this interview now.
Thank you very much for giving me your time.

END 2
This was our last question.
Thank you very much indeed for giving me so much of your time and providing useful information for policy making in Europe.