



Quality Assessment of the 2nd European Company Survey

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This report is available in electronic format only and has not been submitted to the standard Eurofound editorial procedures.

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1 Introduction

The 2nd European Company Survey (ECS) was carried out in early 2009 by TNS Infratest for the European Foundation for the Improvement of Living and Working Conditions. It was implemented in 30 countries, i.e. the 27 EU Member States and the three Candidate countries (Croatia, FYROM and Turkey).

The aim of this survey was to collect statistical information on company structures and practices on flexibility, as well as the development of social dialogue in companies.

The survey was conducted by telephone interviews (CATI) covering 27160 establishments across Europe. The target population was all establishments with 10 or more employees. All sectors of economic activity were covered except for ‘Agriculture, Forestry and Fishing’, ‘Private Households’ and ‘Extraterritorial organisations’ (NACE rev 1.1 A, B, P and Q and NACE rev. 2 A, T and U)

The present document is the quality report on the 2nd ECS. It assesses the quality of the survey in all its stages, starting from the sampling design to the final dissemination of data. It aims at providing a useful insight into the data quality of the current survey and making recommendations for the forthcoming rounds.

The report is organised as follows: Chapter 2 presents general issues about quality assurance and also introduces the distinction between quality assessment of the statistical output and quality assessment of the survey process. Chapter 3 assesses the quality of the main stages in the survey process based on specific key process variables. Chapter 4 presents the quality assessment of the statistical output of the 2nd ECS. This assessment is made on the basis of the five quality dimensions set out by the European Statistical System. Chapter 5 summarises the conclusions extracted from the quality assessment of the 2nd ECS. Finally, Chapter 6 provides information on the challenges of the current survey and the recommendations suggested for further improvements.

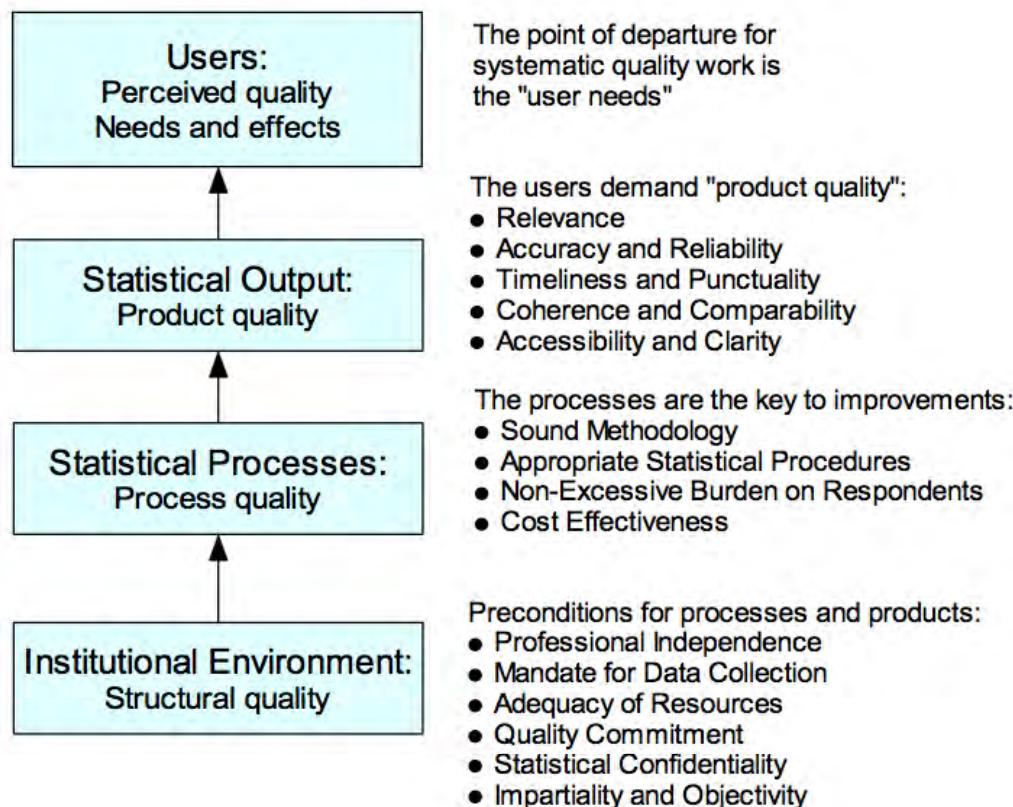
2 Quality Assessment

Quality assessment of a statistical product is based on the availability of documentation on user needs, processes and the product itself.

Figure 1 shows how the three components and one more (the institutional environment of the organisation that produces the statistics) are related.

In this report the available information is analysed. This information mainly concerns the process and product level, as Eurofound has not yet conducted a user satisfaction survey into the user needs regarding the ECS the following chapters describe the methods and techniques commonly used for measuring product quality and processes. We anticipate that the assessment of product and process quality will point out where the survey can be further improved. The ultimate goal is to suggest improvements of the survey process that will have an impact on the quality of the statistical output.

Figure 1. Model for Total Quality and Code of Practice (Sæbø (2006))¹



3 Quality Assessment of the Survey Process

In this chapter an evaluation of the quality of the statistical survey process is discussed, covering all stages from survey design to data reporting and dissemination.

In order to analyse the quality of the ECS survey process, we have decomposed it into six stages: (a) Initial Design, (b) Conceptual Design, (c) Survey Implementation, (d) Data Processing, (e) Data Dissemination – Reporting, and (f) Post-Survey Actions. Each of these stages may be decomposed further into sub-stages.

The monitoring of key process variables allows for the ongoing quantitative evaluation of components of a statistical operation aimed at improving the survey². Key process variables are defined to be “*those factors that can vary with each repetition of the process and have the largest effect on critical product characteristics, i.e. those characteristics that best indicate the quality of the product*”³.

Process variables are in general different from quality indicators, which are more closely related to output quality. Linkage of process variables with the ESS quality dimensions, to be analysed in Chapter 4, will be made where possible.

¹ Sæbø, H.V. (2006) “[Systematic quality work in Official Statistics – Theory and Practice](#)”, Statistics Norway

² Morganstein D and Marker D A (1997). Continuous Quality Improvement in Statistical Agencies, in Lyberg L, Biemer P, Collins M, De Leeuw E, Dippo C, Schwarz N, and Trewin D (eds.), Survey Measurement and Process Quality, New York: Wiley, pp. 475-500

³ Eurostat (2003), “[Handbook on improving quality by analysis of process variables](#)”.

For example, the sub-processes taking place during the ‘Initial Design’ phase of the survey affect both relevance and accuracy. In the following table we have produced cross-tabulation of survey processes and quality indicators. The sub-processes listed under each one of the six main survey processes match the quality indicator(s) that will be affected upon improvement of the respective sub-process.

Table 1. Cross-tabulation of the survey processes with the five ESS quality dimensions

Survey Process \ Quality	Initial Design	Conceptual Design	Survey Implementation	Data Processing	Data Dissemination Reporting	Post-Survey Actions
Relevance	Consultations with stakeholders and users/experts	Finalisation of Questionnaire				Further Analysis with focus on special issues
Accuracy	Update of Questionnaire & Update of Methodological Specifications	Finalisation of Questionnaire, Determination of Survey Design, Sampling, Data Collection Design, Data Processing Design	Sample Implementation & Data Collection	Data Input, Data Coding, Data Editing, Weighting & Estimation		Assessment of Measurement Errors, Input for Next Implementation
Timeliness & Punctuality		Data Collection & Data Processing Design	Conformity with Schedule	Time spent in Examination of Questionnaire and Data Editing	Timely Release of Data	Input for Next Implementation
Accessibility & Clarity					Detailed Methodological Description & Other Metadata, Final Survey Dataset	Further Analysis with focus on special issues
Comparability & Coherence			Conformity with Sample Design	Data Coding & Data Editing	Metadata & Final Survey Dataset	Further Analysis with focus on special issues

In the assessment of the survey process we will assess each process along with its sub-processes separately by presenting key process variables in each stage. Most of the described process variables are qualitative. Some of these variables will be thoroughly discussed in Chapter 4 where relevant (we have used cross-references where possible). We will therefore not go into great detail in this Chapter but report key issues that will help us identify problematic areas and propose actions for improvements in future implementation of the survey.

Overall, we suggest that systematic monitoring of process indicators is considered for future implementation of the survey. It is moreover recommended that real-time, rather than post-survey, measurement of process variables is considered in the future⁴. Real-time evaluation enables the prompt identification of problems and accordingly the prompt reaction to resolve them before it is too late.

3.1 Initial Design

The Initial Design process starts from the point where a decision to undertake a new ECS is taken and ends with the selection of survey contractor. This phase mainly involves the consultations with stakeholders and users / experts groups and the update of the survey questionnaire.

The main instrument through which Eurofound collects information on users’ needs is through consultations (e.g. e-mail consultations) and expert group meetings organized in view of the preparation of the next round. Experts from various organisations, the research team of Eurofound, the

⁴ Marker D A. *Using Real-Time Process Measures to Improve Data Collection*. Available at http://epp.eurostat.ec.europa.eu/portal/page/portal/ver-1/quality/documents/USING_REAL-TIME_PROCESS_MEASURES_TO_IMPROVE_DATA_COLLECT.pdf

Advisory Committee of Eurofound for this project and the TNS Infratest Sozialforschung participate in the consultations and provide comments and suggestions on the content and the design of the survey. In particular the Advisory Committee consists of representatives from trade union federations, employer federations, governments, EU representatives and scientists.

The involvement of different actors in the preparation of the survey is considered to be a strong asset of ECS. It demonstrates a very responsive attitude towards users and their needs and to a large extent assures the continuing relevance of ECS data. Moreover, both the Management- (MM) and the Employee representative (ER) questionnaires were pre-tested in 8 countries prior to finalisation. In deciding on the final master questionnaires, the involved parties have therefore taken into consideration proposals for revision and mainly concerning shortening of the questionnaires based on the experience of the pre-test.

Identification and measurement of key process variables – Initial Design

In the following three tables we have summarized the main findings on the process indicators for each one of the sub-processes of the Initial Design process:

1. Consultations with stakeholders and users / experts
2. Questionnaire / survey re-design
3. Tendering

During the initial phase, Eurofound has taken into consideration recommendations made by TNS Infratest at the end of the first round of the company survey (i.e. ESWT 2004/05) as well as policy needs outlined in the Eurofound' Four-year programme 2005-2008 'Changing Europe: Better work, better life'. Recommendations from the first round have been summarized in the 'Technical Report for the ESWT 2004/05'. No other post-survey activities (e.g. assessment of the quality of statistical output) have taken place after the first round. Therefore decisions for the organisation of the second round are almost exclusively based on consultations organised in the framework of ECS 2009.

Table 2. Initial design – Consultations with stakeholders and users / experts

Variable	Description	Comments
Level of participation	Number of experts and organisations participating in consultations	The decision of having the new ECS survey was embedded in the 4-year work programme (2005-2008) ⁵ . The Advisory Committee set up for the preparation of ECS 2009, consisted of representatives from trade union federations, employer federations, governments, EU representatives and scientists. The ECS 2009 questionnaires were developed in close co-operation between TNS Infratest Sozialforschung, the Eurofound research team responsible for the ECS 2009, the ECS Advisory Committee and an international group of scientific experts on the subject matter and on international survey research.
Requests for changes	Number of requests for changes recorded during the consultations	In the course of the questionnaire discussions and in response to the input of the newly formed Advisory Committee, it turned out that there were many ideas for new topics so that large parts of both the MM and the ER questionnaire had to be developed newly.
Concerns raised	Number of problems identified during the consultations	The design of the 2nd wave was discussed in numerous expert group meetings, covering the scope of the survey as well as the topics to be covered. Issues of particular concern were the unit of enquiry – whether it would be the establishment or the company – and the question which persons would be most appropriate to approach for the MM and the ER interview

Table 3. Initial design – Questionnaire / survey re-design

Variable	Description	Comments
Number of new/modified questions	Number of new and modified questions in the questionnaire	The topic of the survey for the two waves was different. The first wave of ECS (ESWT 2004/05) focused on working time and work-life balance while the 2nd ECS studied the practices for flexibility at work and the development of social dialogue in the establishments. Consequently, the questionnaire had to undergo an extensive revision. Both questionnaires (MM and ER) mainly contained new questions. However, a limited set of questions remained unchanged in order to be able to capture some trends over the time.
Time needed to fill in the questionnaire	The estimated average time required to fill in the questionnaire	The pilot survey (pre-test) showed that the average length of both the MM and the ER interviews exceeded 30 minutes (rather than the intended duration of 20 and 15 minutes respectively). Any changes to the questionnaire as a result of the pre-test were therefore focused on reducing the length of

⁵ Available at: <http://www.eurofound.europa.eu/about/work/previous.htm>

		both interviews [see ‘Measurement errors’].
User needs satisfaction	The level of user satisfaction measured by appropriate index and survey (alternative process)	<p>User demands were collected through the consultations organised for the preparation of the next round of the survey where the participants represent users, stakeholders, subject-matter experts, etc.</p> <p>This practise is regarded to be efficient for the determination of current and future user needs [see ‘Description of the needs of users and assessment of their satisfaction’].</p>

Table 4. Initial design – Tendering

Variable	Description
Number of requests for the tender specifications	Tender specifications were available for downloading from the internet.
Number of requests for clarification	Information is not available.
Number of bids received	Two (2) bids were received.
First bidders’ score	The technical part of the awarded consortium received 85 points.
Ratio of successful bidder’s financial offer to estimated budget	No overall budget was specified in the tender specifications.

Evaluation – Initial Design

The main focus of the initial design has been the preparation of the MM and ER master questionnaires and their testing (pre-test) in a pilot survey. The topics that the new questionnaires cover have been discussed by a board of stakeholders and users, comprised of the Eurofound research team responsible for the ECS, the Advisory Committee of Eurofound for this project, experts from various international organisations and the contractor to implement the ECS 2009. Their involvement has been proven efficient to reflect in the ECS 2009 recent employment-related policy questions, bring subject-matter expertise and address practical issues relevant to the fieldwork.

The practise of pre-testing the questionnaire was also an opportunity to test the length of the questionnaire and thus the duration of the interviews and the degree to which questions are equally understood in all different countries and languages.

The tendering process for awarding the implementation of the ECS 2009 is open enough, announced through various channels as well as through Eurofound website, with well-drafted specifications that set out quality and performance standards.

Although the initial design appears to have been very satisfactorily established, the main concern for future consideration is the long and intense period of consultations, reflections, discussions and revisions, including the time required for the pre-test. This is partially due to the fact that the topics of the ESWT 2004/05 and ECS 2009 differ significantly.

Below we present some actions that could be implemented in the future to further promote and develop this process:

- Learn from the experience gained from ECS 2009:
 - Use the results from the evaluation of the survey process and of the statistical output (current document) and prioritize areas for improvement
 - Carry out post contract evaluation, including detailed costs and timing, in order to learn any lessons for the future.

- Consider the implementation of a user satisfaction survey on the ECS 2009 data and results. The results of such a survey will provide valuable input:
 - to reflect user needs in future rounds, especially those coming from user groups that have not been involved in the consultations for the preparation of the ECS 2009
 - to improve the quality aspects of the statistical output with which users are least satisfied. Prioritize actions according to the priorities set by users
 - to complete the set of required components of a quality assurance framework of a statistical product (see also Chapter 2)

3.2 Conceptual Design

During this process the questionnaire takes its final form, the survey is designed and the sample/data collection and data processing specifications are made available for use by the network members for the subsequent survey implementation. The outcomes of the pre-test serve also at this stage for the finalization of the questionnaires and implementation of eventual changes in the survey concept.

Most of the steps of to the conceptual design are relevant and have an effect on the Accuracy dimension of the statistical output (Section 4.2). An important issue in the preparation of the 2nd ECS was the lack of complete and up-to-date address registers that would satisfy the requirements of the survey. Most difficulties were reported regarding the availability of information on establishment level. This is an issue that needs to be addressed in order to produce harmonised data within the optimum time (limit the use of screening phase, the use of additional address databases, etc.).

The survey design was developed taking into consideration all the discussions and comments received during the meetings. The aim was to establish a design that would provide high quality data reflecting user and policy needs.

Identification and measurement of key process variables – Conceptual Design

In the following tables we have summarized the main findings on the process indicators for each one of the sub-processes of the Conceptual Design process:

1. Finalisation of questionnaire
2. Survey design
3. Sampling / data collection design
4. Data processing design

Table 5. Conceptual design – Finalization of questionnaire

Variable	Description	Comments
Number of questions	Number of questions in the questionnaire	Overall, the questionnaire for the 2nd ECS contains 141 questions (100 in the MM questionnaire and 41 in the ER questionnaire), compared to the 145 questions of the former survey (92 in the MM questionnaire and 53 in the ER questionnaire).
Time to fill the questionnaire	The average time required to fill in the questionnaire	The duration of the interview was on average 20 minutes for management representatives and 15 minutes for employee representatives.

Table 6. Conceptual design – Survey design

Variable	Description	Comments
Conformity with specifications	The extend to which specifications are followed	No important deviations with regard to specifications of survey design. TNS Infratest Sozialforschung (TNS), the contractor of the ECS 2009 implementation, followed the specifications drafted by Eurofound to design the survey. The implementation of fieldwork was the responsibility of the contractor's local institutes.
Methodological soundness	The correctness and appropriateness of the selected methodology for the task at hand	<p>The survey covered 30 countries, including all 27 EU Member States and Croatia, Macedonia and Turkey. Interviews were carried out in establishments with 10 or more employees. The survey covered all sectors of activity, with the exception of agriculture, forestry and fishing, private households, and extraterritorial organisations [see 'Target population and statistical in unit in ECS']. In each establishment a management (MM) interview was conducted. Where formal employee representation existed, an interview with an employee representative was conducted if possible (ER interview).</p> <p>For the MM interview the most senior person responsible for personnel in the chosen establishment was selected. The choice of the ER respondent was made based on pre-defined selection rules. These rules were drafted in cooperation between the network of Eurofound's EIRO (European Industrial Relations Observatory) correspondents, TNS Infratest Sozialforschung and the Eurofound team.</p> <p>However, there are still concerns on the soundness of the methodology with regard to the selection/identification of management and/or employee representatives [see 'Interviews'].</p>

Table 7. Conceptual design – Sampling / data collection design

Variable	Description	Comments
Conformity with specifications	The extent to which specifications are followed	<p>Sampling was designed on the base of a matrix consisting of two sectors of activity (Industries and Services) and 5 size-classes (10 to 19, 20 to 49, 50 to 199, 200 to 499, and 500 or more employees). Each cell was given a quota according to the structure of the national economy [see 'Stratification and selection of the sample'].</p> <p>In several countries address registers meeting all requirements set by Eurofound were not</p>

		<p>available, while in some of them, address registers of suitable quality were available only on company-level, not establishment level. The contractor employed some practical solutions to overcome this issue, like application of screening procedure and using other, mainly commercial, registers [see ‘Screening procedure’].</p> <p>The target number of MM interviews was 500, 1000 or 1500 depending on the size of the country. In total the target for MM interviews was 26800 establishments. More than expected (27160) MM interviews were conducted.</p> <p>Regarding the ER interviews, it was assumed that on the average of all countries it would be possible to conduct ER interviews in approximately 25% of the MM interviews. This aim was almost reached, with ER interviews being carried out in 24.2% of all surveyed establishments (6569 ER interviews in total of 30 countries) [see ‘Sample sizes’].</p>
Percentage of CATI Interviews	The percentage of interviews proposed to be done with CATI	All interviews were proposed to be done with as Computer Assisted Telephone Interviews (CATI).
Average training time	The average time spent on training per interviewer	<p>Interviewers were given general written guidelines on the specific challenges of the survey (aim, information about Eurofound, available supportive material, strategies for succeeding high response rates, hints on specific questions, etc.). CATI supervisors and fieldwork managers of all countries were additionally briefed on the survey.</p> <p>There is no detailed information available on the interviewers’ average training time.</p>
Interviewers’ workload	The average number of interviews per interviewer in each country and total.	On average there were approximately 45 MM interviews per interviewer (the ratio MM interviews/interviewer ranged from 10 in Slovakia to 167 in Croatia).
Percentage re-interviewing	The percentage of interviews subject to quality control and re-interviewing.	No re-interviewing was requested in the tender specifications.

Table 8. Conceptual design – Data Processing Design

Variable	Description	Comments
Conformity with specifications	The extent to which specifications are followed	Consistency and plausibility checks were entered in the CATI questionnaire. Ex-post data checking and cleaning was done using an online data-checking tool. These checks were already administered for the interim data files, so that there was the possibility to correct any programming mistakes during fieldwork already. The program checked the filters of the questionnaire, the coherence, the codification and

		<p>the correct storage of the data.</p> <p>After completion of approximately 30 interviews fieldwork was paused while interim data sets were sent to the TNS Opinion coordination centre for checking. The interim data sets for each country were checked with regard to technical correctness of the programmed CATI (completeness, filters etc.) and the structure of the data file (card-column-format, variable names, codes). Within about an hour, fieldwork institutes received an automated check report.</p>
Number of variables subject to editing	Total number of variables that are subject to editing	<p>Data validation was applied at the level of:</p> <ul style="list-style-type: none"> • Variable: A set/range of acceptable values was established for each variable and each recorded value (all variables) and at the level of respondent. • Respondent: Acceptable combinations of values for each group of logically related variables were developed.
Percentage of re-coding	The percentage of assigned codes subject to quality control and recoding.	<p>Only for one third of the countries it was possible to deliver the data with the new NACE Rev. 2. Two thirds of the countries delivered NACE Rev. 1.1. In the former set of countries (10 countries), the data were recoded into NACE Rev 1.1. The problem of having national data-sets with different NACE versions (Rev 1.1 and Rev 2) was solved by creating a new harmonised variable.</p> <p>The syntax used for the NACE harmonisation has been made available in the Technical Report for the ECS 2009 (Annex D).</p>
Soundness of weighting methodology	The correctness and appropriateness of the selected methodology for the task at hand	<p>The contractor has considered Sector and Size to calculate weights. The 10-cell matrix used for the sampling (cross-tabulation of size and sector) was used as base for the weighting.</p> <p>Weighting was applied to correct for disproportionalities in the sample (by country, size and sector) and the disproportional non-response, since willingness to participate in a survey depends – among others – on size and sector of the establishment.</p>

Evaluation – Conceptual Design

The analysis of the key process variables above reveals that overall the contractor has taken care so that the survey is designed in line with specifications. Moreover, the contractor has documented in sufficient detail all steps of the conceptual design process.

Two are the main problematic issues of this process, which have also been identified by the contractor: a) the suitability and quality of address registers that have been used as survey frames, especially in what regards availability of information at establishment level and b) the appropriate selection of MM and ER representatives.

The lack of suitable establishment based address register is however one of the basic problems for all European-wide establishment surveys and this should be taken into consideration.

Below, we have identified some areas for further improvement and have also made suggestions on actions to be taken in future rounds:

- Maintaining a larger part of the questions in the MM and ER questionnaires would allow for measuring trends. Where new policy demands are to be addressed, Eurofound could accompany a trend-oriented core questionnaire with ad-hoc modules meeting emerging needs.
- Reduce the length of time period required for the preparation and finalization of the questionnaire. In the previous round this period lasted for 8 months (February 2008 – October 2008), which is considered to be a long period for the purpose of developing two questionnaires.
- Reconsider the practice of applying quota in the sampling matrix cells, because this introduces bias in the selection of units since a unit selected at random may then be dropped because the quota of the respective cell has been reached.
- In sampling, limit the use of screening and of commercial business registers. Possibly, use information on establishment level collected in the ECS 2009 to build the frame population of the next round. Make sure that a mechanism is developed to up-date the register with new companies/establishments, remove companies/establishments that do not exist anymore, etc. Learn from best practises applied on this issue in other relevant surveys at the time.
- Add in the specifications that the contractor measures and reports data validation and editing metrics (e.g. percentage of re-coding, ratio between wrongly records to total number of records, item response rate) to Eurofound.
- Analyse item non-response: which questions resulted in high rates of item non-response?
- Work on the efficient identification and selection of respondents for the employee representative interviews (see Recommendation 6).

3.3 Survey Implementation

The survey sample is selected based on the sampling protocol. After completion of approximately 30 interviews the country datasets were checked with regard to technical correctness of the programmed CATI and structure of the data file. The TNS Opinion, coordinator of fieldwork, produced automated check reports within an hour and returned them to the fieldwork institutes. This real time checking was also efficient to identify problems in fieldwork (e.g. low response rates) and react accordingly. For instance, the regular monitoring of the results from the ER interviewing had revealed very low rates of employee representation for Portugal (rates considerably below the results measured in the ESWT 2004). Interviewing in Portugal was therefore interrupted in order to search for the causes of this phenomenon. It turned out that an inaccuracy in the formulation of an item in the question identifying the existing bodies of employee representation (MM650_01) might be a cause for this.

Identification and measurement of key process variables – Survey Implementation

In the following tables we have summarised the main findings on the process indicators for the Survey Implementation process. No sub-processes have been identified.

Table 9. Survey Implementation

Variable	Description	Comments
Conformity with sample design	The extent to which sampling plans are followed	In line with project specifications, representative, stratified samples were drawn, using a sampling matrix, at establishment level. Quotas were assigned to each cell of the matrix reflecting the structure of the national economy. Addresses within cells were then drawn at random. The only deviation is that the

		<p>“Producing Industries” were intentionally oversampled in order to get a sufficiently high number of interviews from this important sector.</p> <p>All interviews carried out were CATI interviews using a centrally programmed script developed by TNS Infratest/TNS Opinion [see ‘Measurement errors’].</p>
Contact rates	The ratio of successful contacts to total number of establishments/employee representatives contacted	<p>Successful contacts of management representatives have reached on average 87.2% (median value 91.4%) of the contacted enterprises [see ‘Non-response Errors’].</p> <p>In establishments where MM interviews were carried out, the management representative was asked to provide the contact details of the employee representative (if present) and give his consent to an ER interview. However, ER representative were not present everywhere and where they were, not all MM respondents agreed to an ER interview.</p> <p>ER representatives were successfully contacted in 92.5% of the establishment where an MM interview was realised, ER representation was in place and an interview was allowed.</p>
Response rate	The ratio of completed interviews to the total number of attempted interviews	<p>The average response rate is 29.1% for MM interviews. In those countries that did not apply screening, the average response rate for MM interviews was 33.4%, in those that did apply screening it was 21.5%.</p> <p>The average response rate for ER interviews was 63% (median 63.6%; based on the management survey sample).</p> <p>Average response rates (at enterprise level) for other business surveys are as follows:</p> <ul style="list-style-type: none"> • Continuous Vocational Training Survey (CVTS): 63.3%⁶ • ESENER: 29.5% (33.1% for countries that applied screening, and 25.5% for the others) <p>For the collection of CVTS data a multi-mode data collection method has been used (postal questionnaire, face-to-face interviews, web-based questionnaires), while the methodology used in the ESENER collection is identical to the one used in ECS. No information for response rates for SBS statistics is published.</p> <p>Measures should be taken in the next rounds to increase response rates – e.g. change mode of data collection [see ‘Non-response Errors’].</p>
Agreement with re-interviewing	The degree to which initial and repeated	No re-interviewing was requested in the tender specifications.

⁶ CVTS ESMS file: http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/en/trng_cvts_esms.htm

	interviews agree with each other	
Conformity with schedule	The delay in completing the fieldwork in days compared to original schedule	Finalisation of fieldwork (including employee representative interviews) was scheduled for February 2009. The actual fieldwork took place between 27 January 2009 and 5 May 2009. In the majority of countries fieldwork did not start until mid-February 2009 [see paragraph 4.3].
Real time quality assessment of fieldwork	Procedures implemented to check quality in real time	After completion of approximately 30 interviews the country datasets were checked and automated check reports were returned to fieldwork institutes within a very short period. Moreover, TNS opinion has developed a coordination tool used for 'live' monitoring of the progress of fieldwork in all surveyed countries. By comparing the status of each country to the objectives set from the beginning, any delay was immediately identified and an immediate action took place whenever regarded necessary.

Evaluation – Survey Implementation

Overall survey implementation is satisfactory but not without problems. One of its assets is the well-established quality assurance framework that enables real-time monitoring of the fieldwork process. However, the main issue that requires further consideration and improvement is the low response rate. The main focus of Eurofound should therefore be drawn to that direction:

- Consider the use of multi-mode data collection method. Besides telephone interviews consider also on-site face-to-face interviews or the possibility of establishing a web-based questionnaire.
- Identify other sources of response errors (e.g. length of the questionnaire, non-respondents share some common characteristics, etc.). Analyse the behaviour of non-respondents (including non-contacts).
- Take into consideration cost and time (i.e. fieldwork duration) constraints in deciding on the actions to be taken in future rounds of the survey in order to improve response rates.

3.4 Data Processing

During this process the TNS network members perform actual data processing of the collected data. This data processing includes the implementation of data edits and validation rules, the coding of the raw data and finally the calculation of weights and estimation of results.

Identification and measurement of key process variables – Data processing

The data processing phase is further decomposed into the following sub-processes:

1. Data entry
2. Data coding
3. Data editing
4. Weighting

For the needs of the assessment of the ECS 2009 we have limited information in order to make a sound assessment of the data input, data coding and data editing sub-processes. Eurofound should consider in the future better tracking of related-processes variables as follows:

1. Data entry

- Data entry error rate: The percentage of data values that were wrongly entered in the initial input
- Percentage of data that had to be completely re-entered: The percentage of data records that had been re-entered (data input failed the check)

2. Data coding

- Agreement with specifications: Overall assessment on whether the specifications on coding are met
- Coefficient of agreement: The ratio of the commonly assigned codes to the total examined (CA = ‘Common codes’ / ‘All codes’)

According to the contractor (TNS opinion) responsible for fieldwork, standardised encoding was guaranteed by the central production and verification of CATI scripts. Moreover, the CATI software supports automatic consistency and plausibility checks and generates messages for the interviewer to correct with the help of the respondent in real-time. Since we do not have any information to assess the extent of input errors and the efficacy of data coding, we recommend that Eurofound should ask in future implementations the contractor to monitor these indicators.

3. Data editing

- Agreement with specifications: Overall assessment on whether the specifications on editing are met
- Failure rate: The rate of edit failures (per variable and country). It is given as the number of records for which an edit failure occurred divided by the total number of records.

Ex post data checks and cleaning are carried out in an online data-checking tool that the filters of the questionnaire, the coherency, the codification and the correct storage of the data. The in-build checks were administered first to the interim files so that it would be possible to correct errors still in the fieldwork period. A description of the data processing design is also provided in Table 8. Moreover, automatic correction rules have been applied before the error files are sent back to the fieldwork agencies for verification/further correction. However, we still miss metrics on the failure rates to assess on the extent of errors and/or missing items.

The contractor provided Eurofound with edited data. Moreover, edited data is passed on to other responsible units/network members of TNS for weighting and further analysis.

Table 10. Data processing - Weighting

Variable	Description	Comments
Agreement with specifications	Overall assessment on whether the specifications on weighting are met	The weighting methodology is in compliance with the specifications, i.e. weighting process meets the minimum requirements of Sector and Establishment size, set by Eurofound [see ‘Weighting’].
Distribution of weights	For each country the distribution of weight size.	Two different types of weights were calculated: establishment proportional weights and employee proportional weights. Two issues relevant to the weighting procedure are of concern: <ul style="list-style-type: none"> • The accuracy of the estimated distributions of establishments and of employees at the

		<p>absence of reliable establishment address based information that have been used for the determination of weighting factors</p> <ul style="list-style-type: none"> The large range of the weights that were calculated, which goes at the expense of the stability of estimates. Due to the variance of the weighting factors, this process increases the variance in the sample [see ‘Weighting’].
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Evaluation – Data processing

Based on the descriptions of data processing design and practises provided by the contractor we may conclude that data processing has been developed and elaborated in a very satisfactory degree. However, this conclusion would be stronger upon availability of metrics on data entry, coding and editing as described in the previous section. We recommend that Eurofound considers adding to the specifications of future implementations of the survey that the contractor submits metrics on the abovementioned indicators. Information on these indicators would be valuable to identify problems with respect to the survey instrument, the efficacy of the translation, identify questions that are most commonly misinterpreted, identify questions for which codes are mostly mistaken, etc.

With regard to the weighting sub-process, we recommend that actions are taken in the future on the following issues:

- Improve the estimations of the distributions of establishments and of employees that are used for determining the weightings factors. This depends heavily on the improvements in the determination of the survey frame.
- Consider adding in the specifications of the next ECS that countries (or regional institutes of the contractor responsible for fieldwork) should trim the weights used. Trimming the weights means limiting extremes, i.e. very big and very small weights, so that the range of the weights is restricted.

3.5 Data Dissemination – Reporting

This process ensures that deliverables of high quality are produced by the end of the contract that allow timely release of results, detailed description of the survey methodology and other metadata as well as final dissemination of survey data set. It also ensures that further analysis will be appropriate and conformant to scientific standards.

Detailed presentation of the available ECS statistics and publications as well as an assessment of the quality of the statistical output is provided in sections 4.1 and 4.4. Overall, the impression is that accessibility and clarity of ECS statistics is good, judging also from the increasing user data requests (see detailed figures in ‘Description of the needs of users and assessment of their satisfaction’).

Identification and measurement of key process variables – Data dissemination

In the following tables we have summarized the main findings on the process indicators for the Data Dissemination process. No sub-processes have been identified.

Table 11. Data dissemination – Reporting

Variable	Description	Comments
Time needed to prepare the data files for dissemination	The time needed for the preparation of the data files that are published or/and used in the ‘overview’ report.	Fieldwork ended in May 2009. The dataset was then used by TNS Infratest to carry out the analyses for the overview report (which they were also contracted to produce). The final version of the dataset was provided to Eurofound on 1 October 2009. The First Findings Resume and First results of the survey were published in December 2009, 7 months after the end of the fieldwork.
Time needed to compile the report	The time needed to compile the report.	The Overview Report was published in March 2010, i.e. 10 months after the end of the fieldwork). Analytic reports on the topic have not yet been disseminated (in December 2010).
Parties involved in the preparation of reports	Indication of all parties involved in the preparation of reports.	The Overview report was prepared by TNS research group, managed by Eurofound and evaluated by the Advisory Committee before publication.

Evaluation – Data dissemination

Based on the reactions of users on the ECS data published so far we may conclude that users are satisfied with the information published. However, it would be much safer to make this conclusion based on replies of users from a user satisfaction survey, which has not been carried out for the needs of ECS. The fieldwork was completed in May 2009 and the first findings were published in December 2009.

In view of further shortening the period for the preparation of data for publication, Eurofound should identify the stages in the data production chain (fieldwork, data processing, in-house preparation of data files for dissemination, etc.) and reasons for delays in order to further improve timeliness of the ECS statistics.

Post-survey Actions

After dissemination of data, all actions taken to analyse data, as well as to analyse the quality of the statistical output and evaluate the overall exercise with the aim to improve future implementations are referred to as ‘post-survey’ actions.

TNS Infratest Sozialforschung, the company that has carried out the preparation and the implementation of the 2nd ECS wave, has published a Technical and a Sampling report. This report provides detailed description of all aspects of the survey. It also highlights difficulties and problems that arose during the survey.

The preparation of the current report, on behalf of Eurofound, can also be regarded as a post-survey action. Its aim is to assess the quality of the survey processes and of the statistical output and to identify strengths and weaknesses in view of implementing improvements in future rounds of this survey.

The preparation of the ‘Eurofound Survey Impact Tracking report: 2008 – 2009’ also belongs to the post-survey actions. In the Impact Tracking reports Eurofound summarizes qualitative and quantitative data on a number of ‘impact indicators’, monitoring EU policy papers, reports and other sources for evidence of its contributions to EU policy (number of citations, number of article cuttings and media reach, number of downloads).

Moreover, the usual practise of Eurofound for all the completed survey is to present the findings of the assessment of the quality of the survey to the Advisory Committee. The meeting that was organized for the needs of the ECS 2009 took place in May 2010. Feedback received is also considered for future implementations of the survey.

Evaluation – Post-survey actions

Eurofound has analyzed the output of the ECS exercise to a satisfactory extent. The results of a user satisfaction survey are however still needed to have a more complete picture about users' perception on the quality of the data produced.

Moreover, it is recommended that all post-survey actions are carried out in a more systematic basis under one single quality assurance framework.

4 Quality Assessment of statistical output

This chapter provides an overall assessment of the quality of the 2nd European Company Survey (ECS). It is based on the following five dimensions of quality:

1. **Relevance**: It is the degree to which statistics meet current and potential user's needs. It includes the production of all needed statistics and the extent to which concepts used (definitions, classifications, etc.) reflect user needs.

The section on relevance involves the identification of the users of ECS statistics and provides a description of their needs. It also presents the impact tracking results of the 2nd ECS with a view to making an assessment of the users' interest and satisfaction with the survey data.

2. **Accuracy**: It denotes the closeness of computations or estimates to the true values.

Accuracy is assessed through two types of errors, i.e. the sampling errors and the non-sampling errors. The section provides a full description of the ECS methodology with emphasis on the sampling characteristics and the data collection. A number of quantitative indicators, such as response rates, are produced in order to assess the implementation of the second wave and identify any weaknesses.

3. **Timeliness and Punctuality**: they refer to time and dates, but in a different manner:

- Timeliness reflects the length of time between the availability of statistics and the event or phenomenon they describe.
- Punctuality refers to the time lag between the release date of the data and the target date on which they should have been delivered, with reference to dates announced in the official release calendar.

A timeline of the whole survey cycle is constructed covering all stages. The aim is to examine in which stages there is place for improvement in order to optimise the length of the survey process.

4. **Accessibility and Clarity**: They refer to the simplicity and ease for users to access statistics using simple and user-friendly procedures, obtaining them in an expected form and within an acceptable time period, with the appropriate user information and assistance.

A description of all means available for the communication of ECS statistics is provided followed by an assessment of their quality. The dimension of clarity is assessed through the existence of methodological and explanatory notes that accompany ECS data publications.

5. **Coherence and Comparability**:

- Coherence reflects the extent to which statistics are in agreement with relevant or related statistics originating from different statistical procedures.

- Comparability aims at measuring the impact of differences in applied statistical concepts and definitions on the comparison of statistics between geographical areas, non-geographical domains or over time. It is the extent to which differences between statistics are attributable to differences between the true values of the statistical characteristics.

These two dimensions are easily confused. Coherence refers to the ability to combine, in various ways and for different uses, similar statistics from different sources while comparability refers to the ability to compare statistics about the same characteristic between different points in time, geographical areas or statistical domains.

The assessment of coherence of the ECS statistics with statistics from other relevant surveys is made through data comparisons on common variables. However, in the interpretation of differences care has been taken to allow for different concepts or/and different methodologies used that could explain such differences.

The assessment of comparability is divided into two categories. The first deals with the comparability over country in which we examine the differences between participating countries concerning the implementation of concepts, the coverage, the start-end dates of the survey, etc.

The second category refers to the comparability over time where the 2nd ECS is compared with the 1st wave (ESWT 2004/2005) in methodological and conceptual matters. Such a comparison serves in assessing the data comparability between the two waves and the improvements / weaknesses reported in the second round of the ECS.

4.1 Relevance

Description and classification of users

The European Foundation for the Improvement of Living and Working Conditions is one of the first Community institutions established. It provides high quality information on living and working conditions that helps monitoring and developing related policies in Europe.

Data from all three Eurofound surveys⁷ and in particular the ECS are of major importance for the following groups of users:

- European Foundation Stakeholders: these are mainly Members of the Governing Board, European Social Partners, the European Commission, the European Parliament and national governments and social partners. ECS statistics, as well as related publications, are used for policy making, comparisons and benchmarking. Evidence of the use of the survey data can be found in the references made in numerous policy documents of the European bodies.
- Trade unions, employer's confederations and companies: ECS output is used in order to develop new policies related to workplace practices, industrial relations, social dialogue and partnership.
- International organisations (OECD, ILO, etc.): International organisations are using ECS data in combination with data from other regions into studies, assessments and data products with a wider geographical coverage.
- Non Governmental Organisations (NGOs): make use of ECS data to set up priorities in their agenda and support their arguments and advance their goals.
- Academia, Researchers: use of ECS data for carrying out independent research in the area. Researchers and students use the findings of the survey and they are usually interested in detailed data and metadata. They use the micro-data that is made publicly available after some embargo time. Their use of data may lead to publications in refereed journals.

⁷ The three surveys carried out by the European Foundation are: the European Company Survey ([ECS](#)), the European Quality of Life Survey ([EQOLS](#)) and the European Working Conditions Survey ([EWCS](#)).

- Media, the general public: use of the findings as an input to public dialogue and the democratic process. International or national media – specialised or for the general public – are interested both in figures and analyses or comments.

Description of the needs of users and assessment of their satisfaction

The 2nd ECS was embedded in the 4-year programme 2009-2012 “Europe at work: Better life and opportunities for all”. For the preparation of the survey, i.e. the questionnaire design and survey design, consultations took place between users, experts, including academic and survey experts as well as tripartite stakeholder representatives. Participants to consultations have stressed the need to reflect in the ECS 2009 recent employment-related policy questions, like the different flexibility strategies used by firms in order to cope with challenges such as workload variations, problems in Human Resources Management or measures of restructuring or reorganisation.

The suggestions of participants of consultations, among which were also users, were taken into account in the development of ECS 2009. This demonstrates a very responsive attitude towards users and their needs and to a large extent assures the continuing relevance of ECS data. The main requirements of users in terms of methodology are presented below:

- Provide results of high accuracy appropriate for policy making purposes at a European Level.
- Achieve sufficient accuracy for detailed figures (by country, economic activity etc.) so that differences and trends can be identified.
- Produce highly comparable data based on harmonised methodology across member states of the EU, candidate countries and other European countries.
- Adapt the content of the survey to the evolving needs of Eurofound stakeholders and other users while maintaining, to a limited extent, a core set of variables unchanged so that trends can be identified and estimated.
- Distribute anonymised datasets to interested researchers after a certain period of time needed to protect the confidentiality of respondents (embargo).
- Provide extensive documentation on the survey methodology and implementation including quality assessment so that users can make the best use of data for their purposes.
- Meet the aforementioned user needs within a specified budget.

At this stage it is difficult to assess the satisfaction of users with the ECS 2009 data. There is no information from user-satisfaction survey. Thus, we will make some inference on the interest that users have shown on the results of the ECS 2009 according to their reaction to the publication of data and related report as reported in the Impact Tracking Report 2008-2009 (ver. July 2010)⁸ prepared by Eurofound.

So far there are two reports published by Eurofound concerning the ECS statistics of the second wave. The first was a résumé of the first findings of the survey published on December 2009. The second report was an overview of the survey with information on all topics covered by the 2nd ECS including also information on the survey methodology. The ECS 2009 overview was published on March 2010 accompanied by a press release regarding the survey outcomes (please refer to section 4.4 for more details on ECS publications). As of September 2010, there have been 964 (of which 269 in 2008-2009) downloads of the ECS résumé but we have no information about the number of downloads concerning the overview report.

On its website Eurofound offers users access to an interactive tool (Survey Mapping Tool – SMT) which provides aggregate data on a broad range of questions, which can be broken down by a number of key background variables.. The table below lists the top viewed questions. Table 12 give an indication about which issues/data have attracted the greatest interest.

⁸ Leonikas, T. and Sandor, E, (2010) “EF Survey Impact Tracking Report 2008-2009”

Table 12. Survey Mapping Tool page view

ECS-2009	Published 14 December 2009	2009	Jan-10	Feb-10
Total page views		1,306	1,856	826
Top viewed questions:				
Q.MM200_1 Companies with night workers (11pm to 6am)		171	180	136
Q.MM650 Companies with employee representation		80	159	
Q.MM400_1 Companies using temporary agency workers in the last 12 months		62		42
Q.MM559 Companies with autonomous teamwork			47	27

The Eurofound survey data files are also made publicly available through the UK Data Archive (UKDA). The microdata for the 2nd ECS have been available since 17th September 2010.

Another indicator of the impact of ECS statistics is the number of references to the ECS 2009 data or to ECS-based publications made in EU policy documents. Eurofound gathers this information for all the surveys on a regular basis but analysis for 2010 has not been completed yet.

Finally, information on the number of article cuttings and on media reach, regarding the two recently published reports on the 2nd ECS, is presented below. It appears that media interest in the survey results is very high.

Table 13. Media monitoring regarding the ECS 2009 publications

Date	Type	Description	Article cuttings	Media reach (number of persons)
03 March 2010	Survey launch	Joint Eurofound-EP event, key stakeholder invitations, press briefing, EU-wide press release distribution, press conference, news on website, publication online, survey mapping tool, video news release, electronic press kit.	277	14,456,630
15 December 2009	First Findings	EU Presidency event, press conference, key stakeholder briefing, EU-wide press release distribution, press conference, news on website, publication online, survey mapping tool, video news release, electronic press kit.	77	4,018,630
TOTAL			354	18,475,260

Finally, the ECS has a role larger than just being a source of data – research by other parties benefit from the methodological value of Eurofound survey design. In particular, the leading role of Eurofound in developing a pan-European company survey that takes different stakeholder perspectives into account is confirmed by the fact that EU-OSHA (European Survey of Enterprises on New and Emerging Risks (ESENER)) and to a lesser extent CEDEFOP (pilot project – an employer survey on skill needs in Europe) used ECS methodology and experience as a reference in developing their data collection projects.

4.2 Accuracy

Accuracy, in the general statistical sense, denotes the closeness of computations or estimates to the exact or true values.

A word which is immediately associated with accuracy is “error” since accuracy is used to mean “the inverse of the total error, including bias and variance”. The larger the error is, the lower the accuracy. However, the definition of “error” is wide: it can encompass deficiencies, mistakes, bias, sampling variation etc. In other words, error is the result of all phenomena that distort the accuracy of the final statistics.

The following typology of errors is commonly adopted nowadays in statistics:

- Sampling errors
- Non sampling errors, which in turn cover:
 - Coverage errors;
 - Measurement errors;
 - Processing errors; and
 - Non response errors;

These various types of errors are analysed in detail in this section, as all of them do not have the same impact on accuracy. Quantitative estimates are better than qualitative assessments as they give an idea of the extent of the error and where it is possible they are computed (even approximately as in sampling errors). However, as it is often the case, it is much easier to assess the cause of error than the error itself.

The following sections provide further information on each type of error.

Sampling errors

Sampling errors arise from the fact that not all units of the frame population, but only a sample of them, are enumerated. The statistics produced from a sample survey will differ from the values which would be computed if exactly the same survey operations were applied to the whole frame population. The difference is the sampling error.

The assessment of sampling errors is made through a thorough description of the sampling design in the 2nd ECS. Following the steps of the design we indicate the issues that affect the quality of the sample.

Target population and statistical unit in ECS

The statistical population of the 2nd ECS was all establishments with 10 or more employees. It covered all sectors of activity except for three, i.e. the ‘Agriculture, Forestry and Fisheries’ sector, ‘Private households’ and ‘Extraterritorial organisations’ (usually embassies). These sectors were deliberately excluded from the target population, mainly due to anticipated sampling limitations (quite few establishments satisfying the threshold of at least 10 employees), difficulties in achieving an interview (mainly for the latter sector), etc. The decision was taken by the board of participants to the consultations of the preparation of the ECS 2009. Moreover, their exclusions did not raise concerns since their share in total figures would be quite small compared to the rest of the sectors.

On the other hand, it was decided to include the ‘Public sector’ in the sample in order to explore the practices in public establishments that may differ from the private sector. However, the coverage of these establishments was very difficult due to insufficient registers. More information on the coverage is presented in section 4.2.2.1 (“Coverage errors”).

The statistical unit of the survey was decided to be the establishment, i.e. the local unit or the reporting unit where work takes place⁹. However, in most of the countries the information available in address registers was on company level rather than on establishment level. In such cases, a screening phase was first implemented in order to select the establishments to be interviewed. This was necessary in 17 countries that participated in the 2nd ECS: Belgium, Bulgaria, Czech Republic, Estonia, Ireland, Greece, Cyprus, Lithuania, Hungary, Malta, Portugal, Romania, Slovenia, Slovakia, Croatia, FYROM and Turkey. The implementation of the screening phase was intended to ensure the homogeneity of the statistical unit among participating countries and the production of comparable data.

Screening procedure

The screening procedure was implemented in the 17 countries mentioned above in order to select establishments where - in the absence of a suitable register at establishment level - sampling had to be based on a company-based register. This procedure was applied through telephone interviews that included a set of questions to be addressed at each company. The initial sample of companies was drawn from the address source. The larger size classes (i.e. the size-bands 200 to 499 and especially 500+) were oversampled in order to avoid underrepresentation of larger firms, especially in the transition from company level to establishment level. For example, a company with more than 500 employees may be divided in many units that each have 50-249 employees.

The screening interview was carried out in companies that were randomly selected using the sampling matrix. The questions assessed the following characteristics:

- single-site or multi-site company
 - continue with the main interview if it is a single-site company
- total number of employees in the multi-site company (filter out companies with less than 10 employees)
- number of establishments within the multi-site company and distribution of these establishments according to the pre-defined size classes

In cases where all establishments belonged to the same size class one unit was randomly selected. If this unit was the one approached at the screening phase, then the interviewer continued with the main interview. Otherwise, the screening phase ended by requesting contact details concerning the randomly selected establishment.

If there were establishments that belonged in different size classes, then only one size class was randomly selected and within this class an establishment was again randomly drawn.

At this point we need to highlight two issues regarding the implementation of the screening procedure that may affect the quality of the sample selection. Establishments belonging to multi-site companies have smaller probabilities to be selected as only one establishment within a company would be drawn. On the contrary, in an establishment address source all units have the same probability in each stratum to be included in the final sample regardless being part of a multi or a single-site company.

Another thing that needs to be considered is the sector of activity of the sampling units. There may be cases where a multi-site company consists of establishments that belong to different NACE categories. It is possible that an establishment belongs to a different NACE category than the company of which it is a part. Where such establishments are sampled based on a company register, a bias might occur, because the establishment would be assigned to a certain cell in the sampling matrix based on the NACE category of its parent company.

⁹The establishment is defined as the most homogeneous unit of production for which the business maintains accounting records from which it is possible to assemble all the data elements required to compile the full structure of the gross value of production (total sales or shipments, and inventories), the cost of materials and services, and labour and capital used in production.

Stratification and selection of the sample

The sample was stratified by size class and sector of activity (NACE) into 10 strata (5x2) according to the following specifications:

- 5 size classes, based on the number of persons employed: 10-19, 20-49, 50-199, 200-499, 500 and more
- 2 NACE categories: Producing Industries (NACE Rev. 1.1 C-F resp. NACE Rev.2, B-F) and Service Sector (NACE Rev. 1.1 G to O resp. NACE Rev.2, G-S)

The selection of establishments within each stratum was made at random.

Sample sizes

The target sample size for the 2nd ECS depended on the population size of each country. Thus, the countries that participated in the survey were divided into three groups (small, medium and large). In the first group, the target size was 500 interviews, in the second 1000 interviews and in larger countries 1500 interviews.

Table 14 shows the sample sizes achieved in each country as well as the size of the universe (number of establishments within the target population). The third column shows the sampling fraction, i.e. the ratio of the sample size divided by the universe size.

Table 14. Sample sizes and sampling fractions in the ECS 2009

Country	Number of Establishments			Finite Population Correction (FPC)
	Universe size	Sample size	Sampling fraction (%)	
EU-27	3011000	24640	0.82	0.996
BE	54000	1016	1.88	0.991
BG	37000	502	1.36	0.993
CZ	79000	1014	1.28	0.994
DK*	34000	1023	3.01	0.985
DE*	564000	1500	0.27	0.999
EE	13000	500	3.85	0.981
IE	20000	503	2.52	0.987
EL	57000	1005	1.76	0.991
ES*	282000	1509	0.54	0.997
FR*	327000	1500	0.46	0.998
IT*	300000	1502	0.50	0.997
CY	5000	505	10.10	0.948
LV*	17000	509	2.99	0.985
LT	24000	560	2.33	0.988
LU*	4000	501	12.53	0.935
HU	69000	1045	1.51	0.992
MT	2000	349	17.45	0.909
NL*	96000	1002	1.04	0.995
AT*	48000	1016	2.12	0.989
PL*	176000	1500	0.85	0.996
PT	83000	1012	1.22	0.994
RO	119000	500	0.42	0.998

SI	13000	536	4.12	0.979
SK	42000	520	1.24	0.994
FI*	27000	1000	3.70	0.981
SE*	74000	1001	1.35	0.993
UK*	445000	1510	0.34	0.998
HR	18000	500	2.78	0.986
MK	6000	520	8.67	0.956
TR	179000	1500	0.84	0.996
TOTAL	3214000	27160	0.85	0.996

Note. Asterisks denote countries that did not implement screening.

The estimation of standard error assumes that the population is infinite or at least so large that the effect of withdrawing items during the sampling process is negligible. Therefore, when the size of the sample becomes a large fraction of the size of the population, it is recommended to use the finite population correction (FPC) factor, when analysing the data.

FPC is defined as the square root of the ratio $(N-n) / (N-1)$, where N is the population size and n is the sample size. If it is close to 1, then there is almost no effect. When FPC is much smaller than 1, then the relatively large size of the sampling as compared to the population would indeed improve precision. In such situations the standard error would need to be reduced by multiplying it with the FPC factor.

Table 14 makes clear that for most of the countries the FPC factors are close to 1, indicating that the fraction of the sample as compared to the population has no significant effect on the standard error of the sample mean. However, for four countries (Luxembourg, Cyprus, Malta and FYROM: the smallest countries in terms of population size), the sample exceeds 5% of the population. Ignoring the finite population correction would result in overestimating the standard error of the estimates, in these countries and, consequently, treating estimates conservatively (as less precise than they really are).

Weighting

Design weights are used in order to compensate for the unequal probability of selection of sampling units. In the case of ECS, no design weights have been determined.

Weights are also used to adjust for under/over-coverage of different subgroups of the population, thus removing bias introduced by the sampling and data collection phases of the survey. However, weighting does increase the variance of estimates.

Weighting (post-stratification) was considered necessary for ECS 2009 data to correct for the disproportional samples (by country, size and sector) and the disproportional non-response, since it was believed that willingness to participate in a survey depends – among others – on size and sector of the establishment. In the ECS 2009 two types of weighting were implemented, i.e. an establishment proportional weighting and an employee proportional weighting. This approach was chosen in order to be able to make conclusions for both the establishments and the employees and ensure that findings closely reflect the universe. Both approaches were based on the following weighting matrix, which is based on the sampling matrix that cross-tabulates five size class with two sectors (Producing Industries and Service Sector). In the weighting matrix a differentiation within the “Services” section between sectors of activity mainly made up by private organisations (“Private Services”) and sectors made up mainly by public entities (“Public Services”) has been introduced.

Table 15. Weighting matrix for the ECS 2009

Sector/Size class	Producing Industries (NACE Rev.1.1 C-F / NACE Rev.2 B-F)	Private Services (NACE Rev.1.1 G-K & O / NACE Rev.2 G-N & R-S)	Public Services (NACE Rev.1.1 L-N / NACE Rev. 2 O-Q)
10 – 19 employees			
20 – 49 employees			
50 – 249 employees			
250 – 499 employees			
500 + employees			
Total sector:			

In order to be able to weight the survey data, national statistical institutes were asked to collect information from the universe for each cell of the weighting matrix. In particular the following figures were requested:

- Distribution of establishments by size class (10-19, 20-49, 50-249, 250-499 and 500 and over employees) and by sector of activity (Producing industries, Service sector and Public services)
- Distribution of employees by size class (10-19, 20-49, 50-249, 250-499 and 500 and over employees) and by sector of activity (Producing industries, Service sector and Public services)

The availability of reliable statistical data on the universe of establishments for several countries has been an issue, since in many cases statistical offices could provide information at the company level only. The same problem persists for the case of reliable statistics for the universe of employees in establishments for part of the countries. To overcome this problem, the contractor calculated estimates of the desired distributions:

- The first approach that was used to produce estimates of the distribution of establishments was the application of the known ratios of the number of companies over the number of establishments, calculated for countries where both units were available, to the rest of the countries where company information was available only.
- Another approach was to use the results from the national Labour Force Surveys. LFS statistics are considered to be of high quality and moreover they cover the ECS target population almost completely. It was therefore proven to be the best choice for estimating the requested information on the universe.

As mentioned above the calculation of weights was based on the 15-cell weighting matrix (Table 15). The analysis on distributions of both establishment and employee proportional weightings show much variability in the respective values. Generally, the larger the weighting range (i.e. differences between minimum and maximum weight) the heavier the weighting, and thus the produced estimates are less reliable.

In future implementations of the survey Eurofound should consider trimming the weights (i.e. limiting extreme – very big and very small weights); however this will be at the expense of representativeness of the weighted sample/figures. Optimal solutions need to be considered to allow for a good balance between representativeness of the data and reliability.

Non-sampling errors

Non-sampling errors occur in all phases of a survey. They add to the sampling errors (if present) and contribute to decreasing overall accuracy. The assessment of these errors is made separately for each of the four types, i.e. the coverage, the measurement, the processing and the non-response errors.

Coverage errors

Coverage errors (or frame errors) are due to divergences between the target population and the frame population. The target population is the population of interest, i.e. the population under analysis and which is supposed to be finally represented by the statistical results. The frame is a physical tool (e.g. a register) to reach the units to be enumerated, exhaustively (census) or on a sample basis. Any discrepancy between the frame and the target population generates coverage errors. Three types of coverage errors are distinguished: (i) under-coverage, in which case specific groups of the target population are underrepresented in the frame and thus not at all or partially covered, (ii) over-coverage, in which case groups of the frame population are covered by the survey while they should not and (iii) multiple listings.

As a consequence, the existence of coverage errors depends on the quality of the sampling frame used for the selection of the sample. In ECS 2009, the establishments to be interviewed were selected from address sources that should fulfil certain requirements:

- Be regularly up-dated with reference to new-born enterprises, mergers, break-ups, deaths, etc.
- Be complete and easy to use, covering all establishments within the target population of the survey
- Include detailed information for contacting the establishments (full address, telephone numbers, etc.)
- Have a clear reference to the sector of activity and the size class of establishments (at least a rough estimation of the number of employees)

In the ECS 2009, there were two types of registers used, i.e. the commercial address providers and the official national registers.

The first type refers to registers that are built up and maintained by marketing and advertisement companies. Examples of commercial address sources are the yellow-pages registers and registers based on economic balances and other economic data, sometimes supplemented by voluntary self-registrations for commercial purposes. Both of them may be quite comprehensive and easy to use as they usually refer to end-users. However, information on the size of the establishment and even on the sector of activity it belongs is not always included. The greatest advantage of these sources is that they have up-to-date telephone numbers since this is the most important mean of contacting the establishment of interest.

As regards the national registers, these are registers established by state-owned or (co-)financed bodies such as the National Statistical Offices, the Chambers of Commerce, etc. The main advantage of this type is their completeness. In most of the cases, establishments are obliged to provide up-to-date information regarding their contact details, sector of activity and number of employees. The most important drawback, however, of official registers, is the under-coverage or non-coverage of establishments in the public sector, such as 'Public Administration', 'Education' and 'Health Care'.

The address sources used in the 2nd ECS for the selection of the sample are given in Annex 1. In most of the countries, where the selected address source provided information only on company level and not on establishment level, an additional register was used. Half of the countries used official national registers and the other half commercial registers. In 13 countries the information provided in the selected register was on establishment level. In the rest of the countries a screening procedure was applied in order to identify the establishments within the company. More information on the screening phase is provided in section 4.2.1.2.

As regards the sectors coverage in the available registers, most countries made efforts to include all relevant sectors in their sample, for instance by using additional address source. However, in 9 countries (BG, EL, ES, HU, NL, AT, PL, MK and TR) three sectors were still under-covered in the final sample. These were the 'Public Administration', 'Education' and 'Health and Social Work'. This introduces coverage errors in the results of the survey. The effect of these errors in the accuracy of the results depends on the relative size and magnitude of these sectors in total figures (universe). Effort

should thus be made in future implementations of the survey to identify sources of information on these particular sectors.

Measurement errors

Measurement errors occur during data collection and cause recorded values of variables to be different from the true ones. Their causes are commonly categorized as:

- Survey instrument: the form, questionnaire or measuring device used for data collection may lead to the recording of wrong values.
- Respondent: respondents may, consciously or unconsciously, give erroneous data.
- Interviewer: interviewers may influence the answers given by respondents either by the way they ask the questions or by making mistakes while recording the answers.

Measurement errors may cause both bias and extra variability of statistical outputs. Bias is usually the main problem. The evaluation of measurement errors depends on the type of data.

Questionnaire

The ECS questionnaire for the second wave was the result of a close cooperation between the members of the ECS research team. The preparation and development of the master ECS questionnaire started in February 2008 and ended in October 2008. Various versions of both the MM and ER questionnaires were studied in order to come up with questionnaires that would efficiently cover the information needs for the 2nd ECS. The survey questions had to be specific enough to take the national work context into account and general enough to allow for cross-country comparison of the answers.

The ECS questionnaire was tested in a pilot survey carried out in September/October 2008 in Germany, Spain, France, Italy, Hungary, Poland, Sweden and the United Kingdom. The aim was to test the survey's concept and questionnaire. In addition, the pilot measured the average duration of the interviews based on either of the questionnaires (MM and ER).

Overall, 333 MM interviews and 77 ER interviews were carried out in the pilot survey. Both questionnaires appeared to be working well. Most difficulties were encountered in smaller establishments and in establishments in the service sector.

The main problem detected in the pilot survey was the length of both questionnaires. As regards the MM questionnaire, the results of the test showed that it should be shortened to at least one third, as the average length of the interview exceeded 30 minutes. It was therefore suggested to skip some questions that did not produce interesting results or were too difficult to answer. Similar suggestions were made for the ER questionnaire where the average length was double than the one foreseen. Improvements on the wording of some questions were also recommended.

The final version of the ECS questionnaire was submitted in November 2008. Except for the necessary shortenings in both questionnaires, there were also some rearrangements in the sequence of questions in order to maintain a straightforward and logic structure of the questionnaires.

Translation process

The ECS questionnaire was translated into all official national languages of countries participating in the survey. Overall, 38 different country versions were produced. The translation process lasted from November 2008 to February 2009 and was closely monitored by the TNS Opinion¹⁰ group in each country.

¹⁰ TNS Opinion is an international coordination centre situated in Brussels, sister company of the TNS Infratest Sozialforschung, that was involved in the preparation and implementation of the 2nd ECS

The translations were made by native speakers with long experience in translating survey documents and well informed on the scope and content of this survey.

Back translation was applied; the national versions of the ECS questionnaire were again translated in English by a different translator than the one who did the initial translation. The produced translations were further checked with the English master questionnaire. The final corrections on the local versions of the questionnaire were made based on the errors detected through back translation. The translated questionnaires were submitted to the Eurofound EIRO¹¹ network in order to check the correct implementation and translation of the survey's terminology and afterwards there were returned to countries for further corrections.

The processes followed for the development and the translation of the ECS questionnaire have contributed to its quality. Improvements could be made in reducing the time spent on questionnaire preparation. Please refer to the recommendations on the questionnaire in Chapter 6.

Interviews

Having finalised the ECS master questionnaire for the MM and the ER interview, the next step was the training of the interviewers. This took place at the local telephone studios and the fieldwork institutes in each country. After having this centralised training session led by TNS Infratest and Eurofound the supervisors and the managers of the local fieldwork agencies trained the interviewers. The training of interviewers was based on guidelines that included information on Eurofound, the scope and content of ECS survey, the supporting material available for the survey as well as explanations on difficulties and specific questions related to both questionnaires.

MM interviews were conducted in each establishment by contacting the most senior person responsible for the personnel of the chosen establishment. This person was usually the Human Resources manager or the general manager of the establishment, especially in smaller units where no HR manager exists. In establishments where an MM interview was carried out, where the MM respondent indicated that a form of formal employee representation was in place at the level of the establishment, and provided the contact information of the ER representative for the purpose of an interview, an ER interview was conducted, usually with the chairperson of the employee representative body. Specific routing was applied at establishments with multiple employee representatives.

All interviews were carried out as Computer Assisted Telephone Interviews (CATI) mainly by TNS fieldwork institutes. In the few countries where no TNS fieldwork institute exists, long-standing cooperation partners of TNS were responsible for fieldwork. Within each country, CATI interviewing was done centrally from one or more telephone studios in order to ensure efficient sample management and consistent quality control of the interviewing.

The number of interviews (MM and ER) achieved in each country is given in Annex 2. The number of realised MM-interviews in many cases was larger than foreseen. The ratio of ER-interviews over MM-interviews varies substantially between countries. This could be due to cultural differences in the definition of employee representation and its prevalence (in Finland, Sweden and Denmark, the share of completed ER interviews is considerably higher than in countries like Portugal, Malta, Turkey and Greece) or in the willingness of the managers to permit an ER interview.

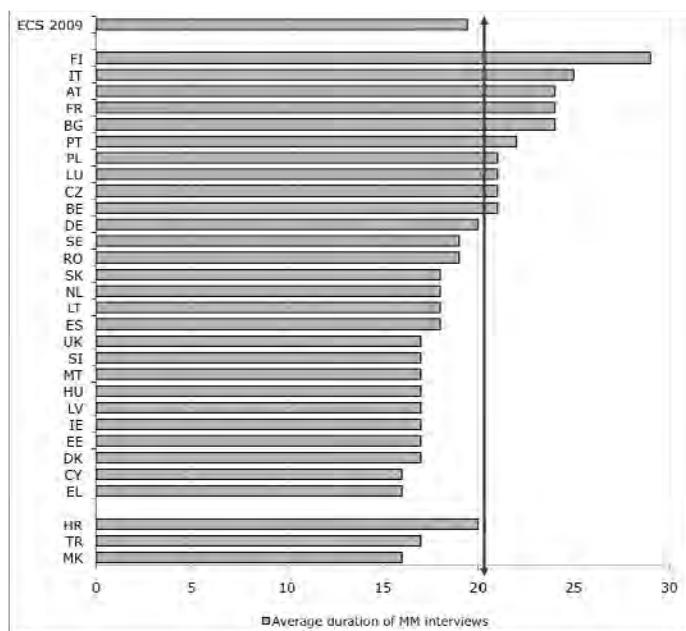
A critical issue in the assessment of measurement errors in the ECS survey is interview duration. Research has shown that excessive interview duration negatively affects data quality as respondents lose their concentration and willingness to answer all the questions.¹²

¹¹ EIRO stands for European Industrial Relations Observatory

¹² According to Lester and Wilson (1995), from the University of Reading in the U.K., "an interview exceeding 10 minutes is dangerous, and one exceeding 12 minutes is very dubious indeed as to data quality". The actual length of the CATI interview depends on three things: the length of the questionnaire itself, the efficiency of the CATI instrument and the experience of the interviewers.

Figure 2 and Figure 3 respectively show the average duration of MM and ER interviews by country. The vertical line in each graph represents the intended duration, which was 20 minutes for MM interviews and 15 minutes for ER interviews. Eurofound had specified this duration in the contract with TNS Infratest. Overall, the EU average length in the ECS 2009 was 19.6 minutes for the MM and 16.9 minutes for the ER interview.

Figure 2. Average duration of MM interviews in ECS 2009 (in minutes)



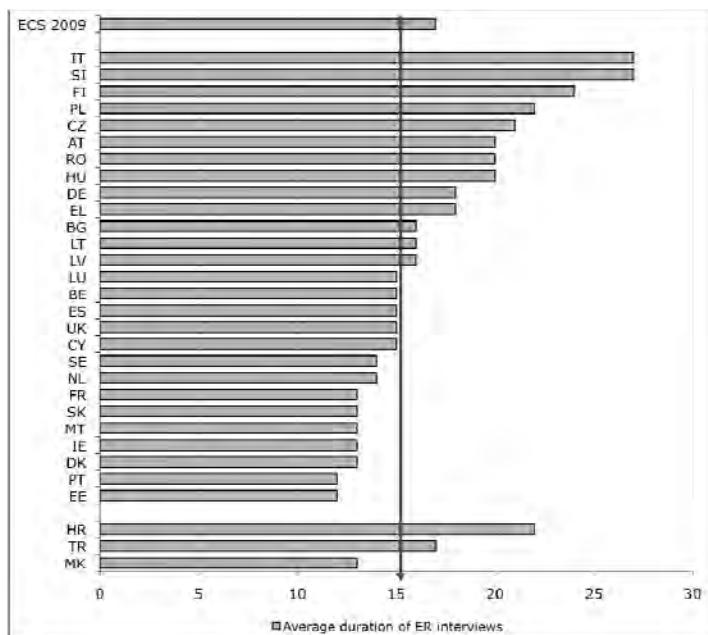
Note. The vertical line indicates the intended duration of the MM interview (20 minutes).

With regard to the MM interview, the majority of countries did not exceed the recommended duration. In three countries (CY, EL and MK) the average length was only 16 minutes, in 10 countries average interview duration exceeded 20 minutes. The longest MM interviews are reported for Finland where the MM interview lasted 29 minutes on average.

The situation is different in ER interviews. The average length of the interview reached 17 minutes in total. Half of the countries participating in the survey exceeded the recommended duration. In particular in Italy and Slovenia, ER interview lasted 27 minutes exceeding the respective length of MM interview in these countries.

It is recommended that reasons for acceding the intended interview duration in some countries as well as the effects of long interviews on the quality of the responses (for example because of declining attentiveness) are investigated in the future.

Figure 3. Average duration of ER interviews in ECS 2009 (in minutes)



Note. The vertical line indicates the intended duration of the ER interview (15 minutes).

Processing errors

Processing errors may come up during data entry and the coding of answers. An automated checking program was built for this survey. This program checked the filters of the questionnaire, the coherency, the codification and the correct storage of the data.

The local institutes submitted their data files in ASCII format via a secured TNS Info web portal that was created specifically for this survey. The files were checked and automated reports were sent to the local institutes. They cleaned the data file if necessary and submitted a corrected version of the data file. The process was repeated as many times as was necessary.

Given the procedure followed for the checking of the dataset and the corrections implemented, processing errors in the 2nd ECS are considered negligible.

Non-response errors

Non-response is the failure of a sample survey (or a census) to collect data for all data items in the survey questionnaire from all the population units designated for data collection. The difference between the statistics computed from the collected data and those that would be computed if there were no missing values is the non-response error. Non-response error can affect the quality of survey statistics.

There are two types of non-response:

1. unit non-response which occurs when no data are collected about a population unit designated for data collection, and
2. item non-response which occurs when data only on some but not all the survey data items are collected about a designated population unit.

In the present assessment we focus on the first type of non-response, the unit (i.e. establishment or ER representative) non-response. Unit non-response arises from three reasons:

- Inability to contact the sampled establishment or person. Non-contacts arise because interviewers cannot contact the sampling unit (establishment), cannot reach anyone at the sampling unit or the respondent is away or otherwise unavailable during the interview period.
- Inability of the contacted person to provide responses to the survey (due to illness, disability or language problems).
- Refusal to the interview request.

In order to assess the effect of non-response errors in the ECS 2009 data we compute four different rates based on the AAPOR13 definitions (please see detailed formulae in Annex 7.1):

- Response rates - The number of completed interviews with reporting units divided by the number of eligible reporting units in the sample
- Cooperation rates - The proportion of all cases interviewed of all eligible units ever contacted
- Refusal rates - The proportion of all cases in which a sampling unit or the respondent refuses to be interviewed, or breaks-off an interview, of all potentially eligible cases.
- Contact rates - The proportion of all cases in which the responsible person in the sampling unit was reached

In the following paragraphs we present the analysis of the non-response errors for MM interview and ER interview.

Management (MM) Interviews

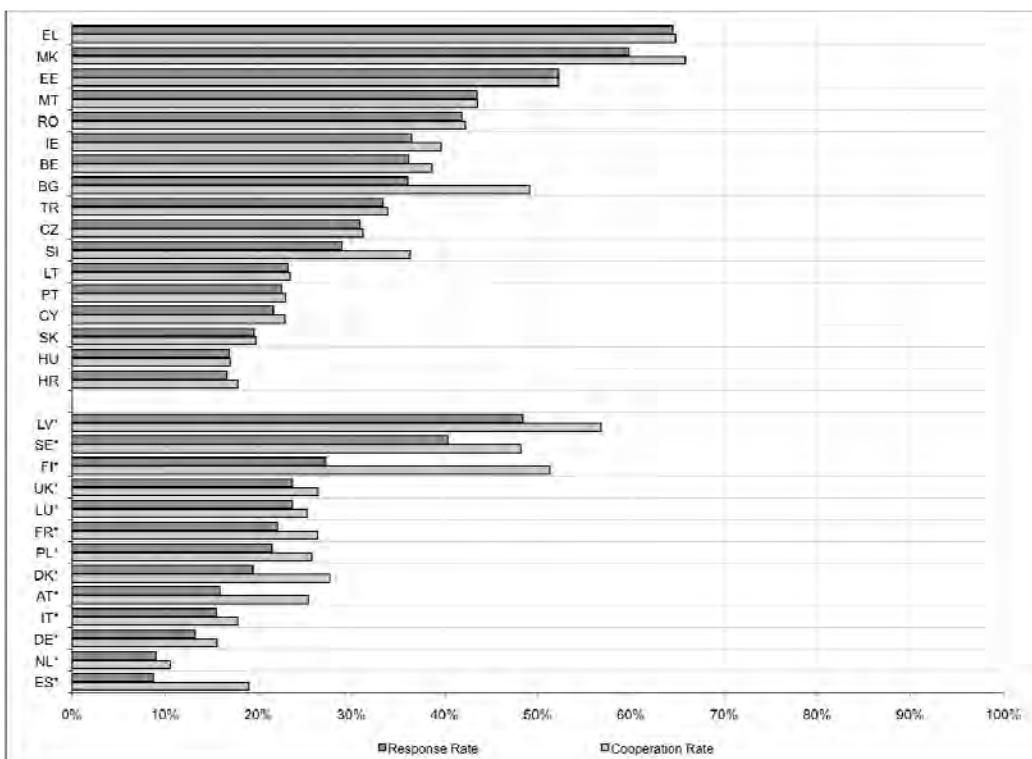
Based on the fieldwork outcomes of the 2009 ECS we have calculated these four rates for the MM interviews. The rates and the data used for the computations are available in Annex XX. We should be very careful when comparing countries that did implement screening with those that did not, as the screening procedure implies a two-step sampling approach for those establishments that are part of a multi-site company. In Figure 4 we have split the countries into two groups based on whether they did or did not apply screening.

Out of the countries that implemented screening, Greece achieved the highest response rate (64.5%) while the lowest response rate is noted in Croatia (16.6%). For the groups of countries that did not implement screening, Latvia achieved the highest response rate (48.4%) and Spain the lowest (8.7%).

Three out of five countries where refusal rates exceed 70% belong to the set of countries that applied screening. Moreover, these countries (Hungary, Slovakia and Portugal) are the top-rated in that respect. This finding reveals that the impact of screening to persuade respondents to participate is low. Contact rates are quite high in almost all countries with a median value of 91.4%. Notable exceptions with considerably lower contact rates are Spain (45.9%) and Finland (53.0%; see Table A3 in Annex 3).

¹³ The American Association for Public Opinion Research, 2008, Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for surveys, revised edition, Lenexa, Kansas

Figure 4. Response rates and cooperation rates in EU Member States and Candidate countries, ECS 2009 - MM interviews (%)



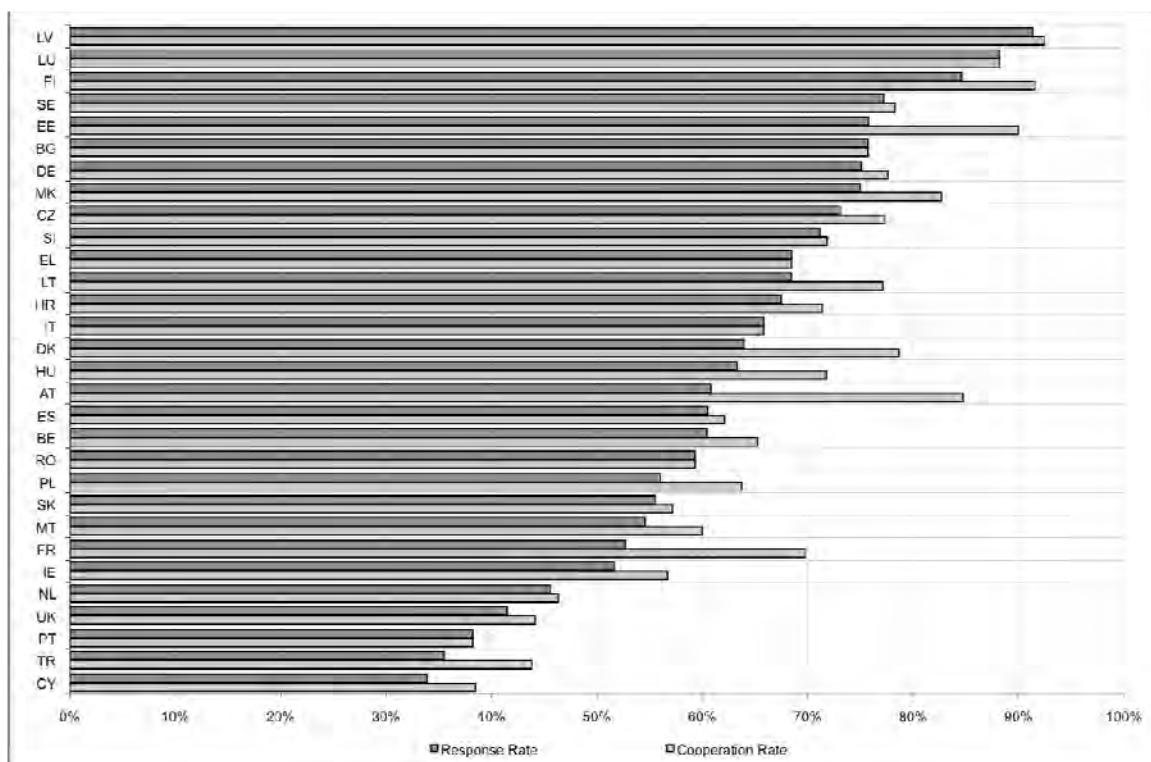
Note. Asterisks denote countries that did not implement screening.

Employee Representative (ER) Interviews

Similar to the assessment of MM interviews we have calculated the four rates for the ER interviews (See Annex 3). Figure 5 shows that the highest response rate is noted in Latvia (91.3%) while the lowest response rate is in the United Kingdom (41.5%). Cooperation rates are close to or slightly higher than response rates in all countries. Refusal rates are below 50% with the exception of Cyprus and the United Kingdom (52.5%). Contact rates are again high exceeding 80% in almost all countries.

It should be noted that the presented ER response rates are based only on the population of establishments where an MM interview was realised. They are not based on the total survey population (i.e. establishment population). The rates for the total survey population can be obtained by multiplying the appropriate rate for ER and MM interviews respectively (e.g. for FYROM the ER response rates that corresponds to the survey population is the product of the ER response rate that corresponds to the population of realized MM interviews times the MM response rate, i.e. $75\% \times 59.8\% = 44.8\%$).

Figure 5. Response rates and cooperation rates in EU Member States and Candidate countries, ECS 2009 - ER interviews (%)



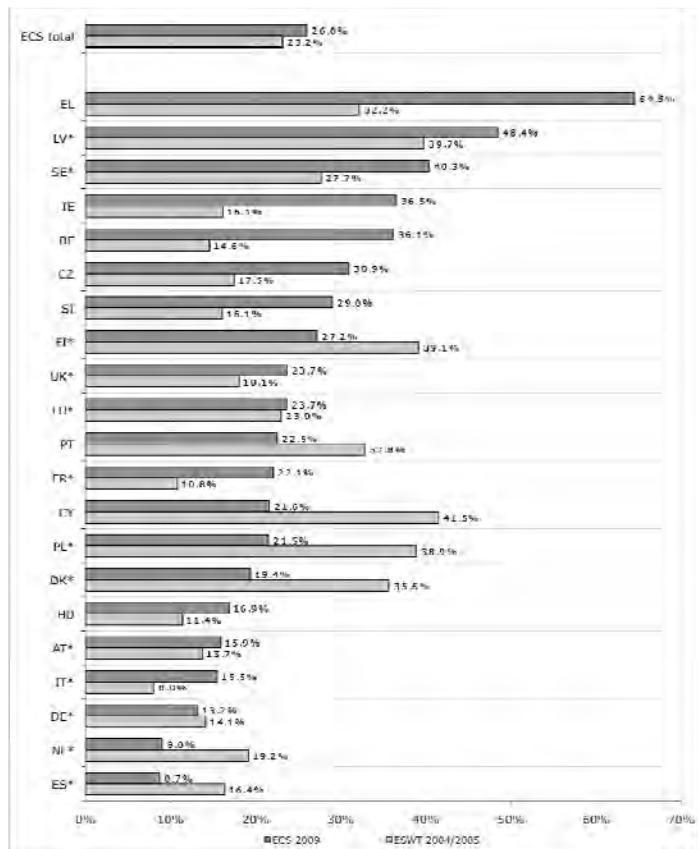
Comparison of response rates in the 1st and 2nd ECS

Response rates are an important indicator of data quality. In the ECS 2009, the contractor has made significant efforts to increase response rates and therefore improve the quality of statistics. In particular, in view of the preparation of the ECS 2009 the contractor a) has taken care to make the survey attractive to the respondents by ensuring that topics covered and the questions introduced to the questionnaire are of interest to the respondents, b) has drafted a letter to introduce the survey to those that are more sceptical to participate, c) has trained interviewers adequately to explain the survey's aims to respondents and moreover to be flexible to arrange telephone meetings with the assistance of the CATI software, d) has tried to extend fieldwork as long as possible in order to maximise contact attempts and keep non-contact rates to a minimum and e) has improved the process of monitoring response so that reactions to non-response are prompt.

All the abovementioned efforts have indeed resulted in improvements in the response rates between the 1st (ESWT 2004/2005) and the 2nd wave (ECS 2009) in the majority of the countries. However, despite these attempts response rates of the ECS 2009 are still not satisfactory. It should be mentioned though that low response rates are common to establishment and company surveys in general.

Figure 6 presents differences between the two waves for the MM interviews. It is evident that in most of the countries the response rates in the ECS 2009 are higher than in the ESWT 2004/2005. In particular in Greece, the response rate has doubled in the second wave. On the other hand, in 8 countries response rates have decreased, which is worrying. This is most noticeable in Cyprus where the response rate of the ECS 2009 is almost half that of the ESWT.

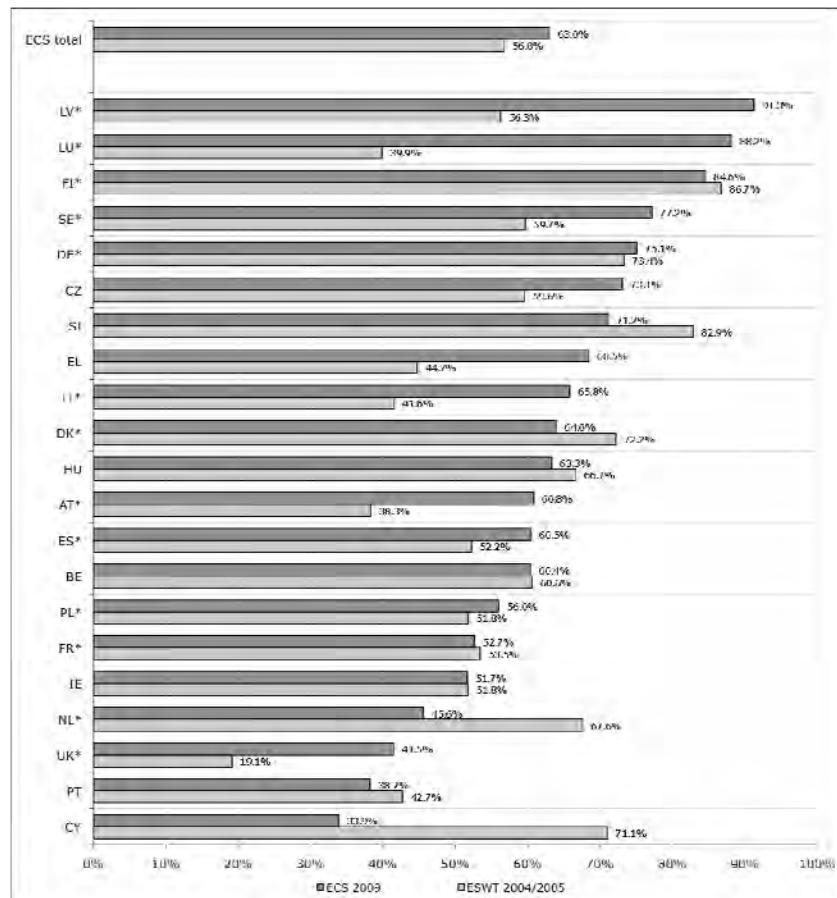
Figure 6. Response rates for the MM interviews in ECS 2009 and ESWT 2004/2005



Note. Asterisks denote countries that did not implement screening in any of the two waves. Only LU carried out a screening procedure in ESWT 2004/2005 but not in ECS 2009

The situation is similar in ER interviews where in general the response rates have increased in the 2nd wave. Figure 7 demonstrates differences between the two waves for the ER interviews. In almost all countries, there has been an improvement in the second wave. The greatest increase is shown in Luxembourg. It should be noted though that this country carried out a screening phase in the first wave but not in the second wave. Ten countries show a decline in the response rates for the ECS 2009 which is trivial in most of the cases. Notable exception is again Cyprus where the response rate is less than half the rate of the ESWT, as it was also noted for the MM interviews.

Figure 7. Response rates for the ER interviews in ECS 2009 and ESWT 2004/2005



Note. Asterisks denote countries that did not implement screening in any of the two waves. Only LU carried out a screening procedure in ESWT 2004/2005 but not in ECS 2009

4.3 Timeliness and Punctuality

The timeliness of ECS statistics could be assessed by the time lag between the starting date of the survey and the date of dissemination of data. We may, therefore, assess the timeline of the whole survey cycle based on the dates presented in the following table. This table could also give us indication about the stages that could be shortened in next rounds to improve overall timeliness of the survey. Punctuality is not very relevant for the ECS as the survey does not follow any official statistical calendar.

A rather long time was needed to design the survey questionnaire, which is reasonable given that many actors were involved in the work and the need to change the questionnaire significantly compared to ESWT2004/2005. The fieldwork period was initially foreseen to last for 1-2 months but it finally took approximately 3.5 months. The reasons why the fieldwork lasted for longer than expected should be further investigated.

The process of the production of publications is still ongoing. The first results were disseminated 7 months after the end of the fieldwork. This is quite satisfactory compared to other surveys.

Table 16. Timeline of the survey cycle

Survey stage	Starting Date	Ending Date
Publication of procurement notice	18 th July 2007	3 rd September 2007
Contract beginning	30 th November 2007	
Questionnaire development	February 2008	10 November 2008
Pilot survey	16 September 2008	8 October 2008
Questionnaire translation	24 November 2008	30 January 2009
Questionnaire programming	29 January 2009	4 February 2009
Briefing of interviewers	12 January	27 January
Fieldwork period	27 January 2009	5 May 2009
Data-cleaning, weighting etc	May 2009	June 2009
Final data checks	July 2009	September 2009
Data set made available to Eurofound staff	October 2009*	
1st Dissemination of results (Resume, Swedish Presidency conference, Survey Mapping tool)	December 2009	
Detailed dissemination (Overview report results)	March 2010	

* This date refers to the clean dataset. Eurofound received the raw dataset earlier and did data checking on it.

4.4 Accessibility and Clarity

Accessibility and clarity refer to the simplicity and ease for users to access statistics using simple and user-friendly procedures, obtaining them in an expected form and within an acceptable time period, with the appropriate user information and assistance: a global context which finally enables them to make optimum use of the statistics.

In the present assessment we do not separate accessibility from clarity for better presentation of the results.

Dissemination status

The results of the ECS 2009 were made available on a dedicated Eurofound web page in December 2009. Eurofound's [survey mapping tool](#) allows users to view the data as a map, bar chart or table, compare national data with EU averages, view breakdowns by company size, industry/services and public/private sector and download aggregated data as a .csv file (compatible with Excel).

The first publication based on the ECS 2009 data was published on 14/12/2009. This publication was a [resume](#) of the first findings of the survey. This resume is available for downloading in pdf format in 23 different languages.

The full [overview report](#) is also available for downloading with descriptive statistics for all variables (published on 01/03/2010). The statistics are presented in short text and in either graphs or tables. Up to now, the overview report is available in pdf format only in English.

The main findings are presented in a 4-minutes [video](#) (published on December 2009). There are also summary reports which present descriptive statistics for key variables accompanied by a video presentation in each key section.

Since September 2010, the ECS 2009 data set is publicly available through UK Data Archive (UKDA) in the University of Essex, one of the best known archives for social science data sets. For downloading the data, interested individuals must register at the UKDA. The UKDA provides the Eurofound with information about the data set user profile through quarterly reports.

Explanatory material and methodological information

Most descriptive statistics are self evident. Moreover, the accompanying text makes their meaning clear to the reader. Some of the reports contain explanations of concepts / terminology and presentations of classifications / nomenclatures used.

All reports contain methodological information. The overview gives a summary of the way the survey was conducted. A dedicated section on [methodology](#) is also available on the Eurofound website, covering survey design, sampling, fieldwork, weighting, classifications and quality assurance. Finally, the website contains the survey questionnaires in all languages in which the survey was conducted.

Overall, the accessibility to ECS statistics is considered very good since Eurofound provides numerous reports and presentations that are quite useful and easy to read from all types of users. The survey mapping tool provides easy access to survey variables. One thing that could be considered in the future is to integrate data from previous waves in the survey mapping tool. Results from the ESWT are currently not easy to access.

As regards clarity, the methodological information provided so far is sufficient and helpful for the users.

4.5 Comparability and Coherence

Comparability over country

Comparability between countries might be affected by several factors i.e. questionnaire translation, fieldwork period, differences in sampling frames etc.

Owing to the double translation with a series of checks on translation the concepts in ECS are quite comparable between countries and differences that may appear reflect different legal and cultural frames rather than survey incomparability. The languages in which the ECS questionnaire was translated in each country are presented in Annex 7.4.

In the majority of the countries, the fieldwork period in the ECS 2009 started in mid February and ended in April 2009. The earliest starting date was 27th January 2009 (in Sweden) and the latest finishing date was 5th May 2009 (in Turkey). In general, differences in fieldwork period were small and are not expected to have an impact on the comparability of the results.

The duration of the fieldwork was approximately two months. The shortest duration was reported in Latvia (only 16 days). In Estonia, as well, the fieldwork lasted less than one month (only 19 days) despite having the latest starting date. On the contrary, in Sweden, where the fieldwork started in late January, it finally ended in mid April after two and a half months. The starting and ending date of the fieldwork per country are shown in Annex 4.

Another factor that may affect the data comparability between countries is the coverage of population in the different sectors and size classes. Not all countries managed to deliver data according to the requested breakdowns. With reference to the sectors, the main issue is the limited coverage of 'Public Services'. For the size classes, Belgium, Denmark, Greece, France, Luxembourg, Hungary, Poland and Turkey provided different breakdowns than the one requested mainly due to national particularities regarding the existence of large size establishments.

Such differences in coverage may have an effect on the data comparability for the ECS 2009 since the total population in each country consists of different sub-populations regarding the sector and size class. This inconsistency should be taken into consideration by the users of ECS data in cases of data comparisons at aggregated levels (all NACE categories, all size classes, etc.).

As regards the sectors of activity covered in the ECS 2009, we should also make a reference to the classification of these sectors. The most common codification used by countries is the NACE classification that was recently revised (new version NACE Rev.2 was available in 2008). In the ECS 2009, there were 18 countries that classified the sectors of activity according to NACE Rev. 1.1 while 13 used NACE Rev. 2 or other codification compatible with the new revision.

Geographical comparability between countries with different versions of NACE could be affected due to the existing differences in the codification of the two revisions. In order to overcome this problem in the ECS 2009, a new variable was created that provided a harmonised code for the sectors of activity. In that way, the different codification does not affect ECS data and thus, any comparisons between the national datasets are feasible.

Comparability over time

The Establishment Survey on Working Time and Work-Life Balance (ESWT) was the first wave of the European Company Survey carried out in 2004/2005. It was implemented in two phases: first in all EU-15 countries (carried out in 2004) and secondly in 6 of the 10 Member States that joined the EU in 2004, i.e. the Czech Republic, Cyprus, Latvia, Hungary, Poland and Slovenia (carried out in 2005).

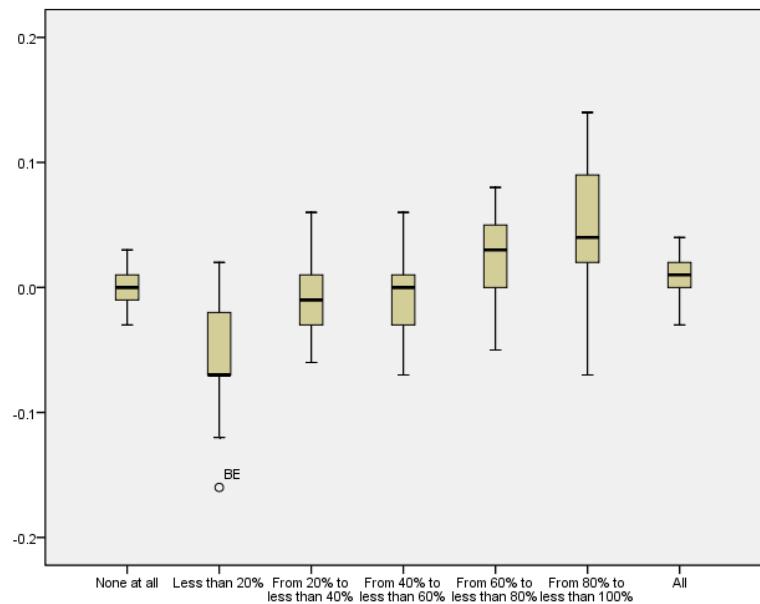
The target population was all establishments with 10 or more employees belonging to any sector of activity except for ‘Agriculture, Forestry and Fishing’ and ‘Private Households’. The sample was stratified based on two NACE categories (Producing Industries and Service Sector) and five size classes (10-19, 20-49, 50-199, 200-499 and 500 and more employees).

When looking at the way the ESWT 2004/2005 and the ECS 2009 were implemented, there do not appear to be significant comparability issues. The methodology followed in each step of the survey, i.e. from the sampling design to the collection and dissemination of the relevant statistics was almost the same. In addition, the formal procedures for development, piloting and translation of the ESWT questionnaire were similar to the procedures followed in ECS 2009. The data collection was done by CATI and there were again two types of interviews, one for the Management (MM interview) and one for the Employee representative (ER interview) of the establishment. An analysis of the distribution of the sample across the predefined size classes, comparing between the ESWT 2004/2005 and the ECS 2009, did not show any significant differences.

Common variables in the questionnaires of the two waves

Although the main objective of the survey was different in the two waves, there were some common sections/variables. The ‘Contact Phase’ and ‘Background Information’ sections were almost identical in the two questionnaires. A further 15 variables were included in both waves. These variables mainly concerned the sections on ‘Challenges the Establishment is faced with’ and ‘Working Time Arrangements’.

Figure 8. Proportion of female employees – Relative differences between ECS 2009 and ESWT 2004/2005



With reference to the common methodology of the two waves a comparison for the variables in common is feasible. Figure 8 presents the outcomes for the variable ‘Proportion of Female Employees’ based on the data from ESWT 2004/2005 and ECS 2009. The variable classifies the establishments into seven categories according to the proportion of female employees in each establishment. The box-plots show the relative differences in the percentage of establishments belonging in each of these categories between the two waves.

In most categories the differences are close to zero showing that the distribution of establishments in these categories did not change significantly between the two waves. Most differences appear in the category ‘Less than 20%’ as well as in ‘From 80% to less than 100%’ with an average difference close to 5% in both classes. In particular the first class, the proportion of establishments with less than 20% female employees, declined in all countries. The sharpest decline was reported in Belgium where the difference between the two waves was 16%. However, this difference does not necessarily indicate a lack of comparability; it is very well possible that it is due to changes in the actual proportion of male dominated establishments between 2004 and 2009. As regards the class ‘From 80% to less than 100%’, the proportion of establishments was increased in almost all countries.

Overall, the comparability over time is considered to be high having in mind the common methodology implemented in the two waves of the survey. The data comparison presented above confirms the existence of such comparability and does not provide any evidence for severe methodological inconsistencies since the differences reported between the two waves appear to reflect the actual changes over time.

Coherence with other statistics

The consistency of ECS statistics can be assessed by comparing them to relevant statistics from other sources. Unfortunately, no comparable statistics are available on the European level. Eurostat’s 2007 Structural Business Statistics (SBS) would be a likely source, but SBS collects information on all enterprises and not on establishments (which is the target population of the ECS). Furthermore, the concepts that are covered in both the SBS and the ECS are measured differently in the two surveys. Consequently, the data transformations and selection procedures required to enable comparison

between the two, would affect the substantive outcomes of the variables such, that a comparison in this respect would be very difficult to interpret.

Another potential source would be EUCOWE, a project collecting statistical information on operating hours, working times, capacity utilization and employment in six European countries (France, Germany, the Netherlands, Portugal, Spain and the United Kingdom). Although this survey does have establishment as its statistical unit, it covers establishments of all sizes whereas the ECS only covers establishments with at least ten employees. The variables on employee size were measured in different ways in the two surveys. The main objection, however, for a reliable comparison with EUCOWE is that it was conducted in 2003. This makes it difficult to assign methodological implications to the outcome of a comparison with the results with the ECS which was conducted six years later in a very different economic context.

So, although attempts at comparing the ECS with data from other sources were made, conclusions on the quality dimension of coherence with other statistics can not be drawn at this point.

5 Conclusions and recommendations

The overall quality of the 2nd ECS is considered to be high based on the findings of the quality assessments of both survey output and process. However, the following issues need further examination in order to further improve the survey.

- Sampling Frame

Unlike most business surveys ECS includes public services. However in many countries there is under-coverage of establishments providing “Public Services”, sectors L (public administration), M (education) and N (health and social work). Although the problem is not reported in a quantitative way indicating its extent it is reported to be more prevalent when commercial rather than public registers are used to produce the sampling frame since the latter in generally have good coverage of these sectors at the time of extraction.

Most registers provide data on company level rather than on establishment level. This is a well known problem. As the legal unit is the enterprise it is quite common that registers include them instead of establishments. However, a register of companies forces the implementing organisation to either use auxiliary information or screen the selected company selecting an establishment to survey. This, even if properly administered, affects the quality of the survey as it increases the variance of estimates due to unequal selection probability of establishments.

- Response rates

The response rates for the MM interviews are low, which is common for business surveys. As a consequence, due to the design of the survey, the percentage of establishments in which an ER interview is carried out, is low in general and very low in some countries.

It is important to invest resources to improve the response rate. Potentially, this can be done in an efficient way using different modes of data collection (self completed questionnaires, followed by CATI, followed by visits to the establishment). Alternatively face to face visits can be organised in a complementary non-response analysis that will elicit answers of non-respondents to be used to correct initial estimates.

- Comparability

Comparability over time has shown to be good, which is in line with expectation given the similar methodological design of the ESWT 2004-2005 and the ECS 2009. However, the topics of the two surveys are different and thus the number of common indicators is limited. If Eurofound wishes to monitor trends over time, the number of core questions that are included unchanged in every wave, will need to be increased.

Based on the quality assessment, for the next ECS the following recommendations could be considered to further improve the quality of the survey:

1. Registers

Sampling frames are essential for the selection of the units to be included in the sample and, thus, the quality of the sample. So far, countries have used various address sources, like national business registers, commercial registers or even yellow-page databases in order to identify their sample and be able to get in contact with the establishments. There is a clear need for a high quality register that would cover all the necessary information.

Business registers for statistical purposes are the main source for business demography, as they keep track of business creations and closures as well as the structural changes in the economy by concentration or de-concentration, brought about by operations such as mergers, takeovers, break ups, split offs and restructuring.

Since these registers are the main sampling frame used in the ECS it is essential to ensure their quality. A national business register must have complete coverage of all enterprises with detailed contact information. National business registers shall comply with the Regulation (EC) No 177/2008 on establishing a common framework for business registers. In addition, the Commission has also established a recommendation manual on business registers which provides all the characteristics that must be included in these registers and important guidelines for their maintenance.

According to the aforementioned regulation, national business registers shall be compiled of:

- all enterprises carrying on economic activities contributing to the gross domestic product (GDP), and their local units
- the legal units of which those enterprises consist
- truncated enterprise groups and multinational enterprise groups; and all-resident enterprise groups.

The business register shall be updated at least annually and the frequency of updating shall depend on the kind of unit, the variable considered, the size of the unit and the source generally used for the update.

The regulation also defines the unit characteristics that must be reported in the business register. The main items requested are identification characteristics (name, address, etc.), demographic characteristics (date of unit birth), stratification characteristics (NACE, number of persons employed, etc.).

Amadeus database is a database of comparable financial information for public and private companies across Europe. It contains information on over 15 million companies and can be used as a sampling frame for the survey. This database includes contact details of the company, company profile and financial data. The database offers hundreds of criteria that can help the search of units, such as the country, the size and the sector of activity of the company.

However, the use of Amadeus database still presents some serious shortcomings. The information provided usually refers to the companies rather than the establishments. In addition, despite efforts to include public companies in their database, the majority of records refer to the private sector. It also has a much higher threshold for company size than the current 10 workers or more used by the ECS. We mainly present it for reasons of comparison and discussion on the availability of alternative databases. Any use of the Amadeus database will have to include the use of additional registers to complete the sampling frame which will likely render it an inefficient approach.

2. Unit of enquiry: Company (enterprise) vs. Establishment (local unit)

The ECS collects information on establishments. However, in a large number of the participating countries no suitable register on the establishment level is available for sampling. In the 2009 ECS, an establishment address register was available in only 13 countries, in the other countries a screening phase had to be implemented to identify the establishments from the business registers holding information on the enterprise level.

The absence of establishment level registers in many countries leads to problems with accuracy. An establishment belonging to a company with many other establishments is less likely to be selected in the sample than that of a single establishment company. To correct this bias weighting has to be implemented that will affect the accuracy of estimates. Furthermore it also defers part of the sampling process to interviewers in the field. They need to go through a procedure to identify all local units and select in a random way the one to be included in the sample. This can lead to non measurable coverage errors and requires a rigid and verifiable quality assurance process.

However the main determinant for the choice of sampling unit is the kind of information sought. If the information is better assessed at company level (like information on strategy, policy, procedures) then the enterprise should be chosen. If information relates to implementation and followed practices then the establishment level is more appropriate.

We therefore believe that the ECS should continue to use the establishment (local unit) as the reporting unit. Furthermore the loss of accuracy due to weighting in countries without a register of establishments is a problem that can be addressed if the nominal sample size is increased by the design effect of the selection probability weighting so that the effective sample size and hence the sampling error is the same for all countries (see analysis of optimal sample sizes in Annex 5).

3. Broad topicality vs. narrow focused survey

The issue of broad topically vs. narrow focused survey has to do with the topics that the survey covers. As already mentioned, although the two rounds of the Eurofound company survey (ESWT 2004/2005 and ECS 2009) do not differ in terms of target population covered and methodology used, they focus on different topics: the ESWT aimed at collecting information on working time and work-life balance policies in establishments while the ECS 2009 focused more on the development of social dialogue in companies. The decision on the topics has been made upon policy and stakeholders needs at the time of preparation of each round. Although methodological differences are not an issue, the change of topics makes the analysis of trends over time possible only for subset of the variables collected.

Should a stronger focus on trends be desirable, it is recommended that in future revisions of the set of variables to be included in the ECS, care is taken to ensure continuity of the topics covered. Ideally we suggest that a combination of a broad common set of variables accompanied by ad-hoc specific module(s) is adopted in future development(s) of ECS. This has been a common practise in a number of European surveys. The common set of variables does not change in order to make statistical analysis over time feasible, while the ad-hoc module is used as an instrument to collect specific information of interest. Sometimes, the ad-hoc module is also used in place of a pilot survey; it's a pilot test for the future inclusion of new variables in the core common set variables.

4. Measures to reduce non-response

The ECS is a company survey that is carried out through telephone interviews. Although this data collection method is not expensive it usually has low response rates. Therefore, it is of great importance to implement new measures in reducing non-response.

Some of the measures that could be implemented are:

- methodological guidelines including specific actions to reduce non response
- in advance notification to the enterprises either by post or by e-mail informing them about the forthcoming survey and highlighting its scope
- face to face interviews for bigger enterprises
- well-trained and experienced interviewers in order to minimise their influence on the data quality
- non-response analysis (a survey of non respondents). Re-contacting the enterprises who have refused participation to the survey and request (face to face using experienced interviewers) to reply to a radically reduced questionnaire that will also include the reasons for refusal. This will help identify the reasons for non response as well as the main characteristics of non-respondents

and will provide some answers to key questions that can then be used to correct for non-response biases in the estimates.

5. Survey Mode (multimode survey)

The general idea is that instead of selecting the best mode in terms of efficiency (cost to achieve a desired level of accuracy) to successively use more than one modes. In general more cost effective methods usually provide less accuracy usually in the terms of non-response bias. This trade off has been proposed that can be alleviated via the use of multiple methods of data collection.

The most studied case is to improve the response rate of a postal interview by using a telephone stage to elicit responses from non-replying (yet not including refusals) units. Furthermore, the ever increasing penetration of IT in businesses has open up the potential to substitute in part or in whole traditional and expensive/time consuming modes with internet based ones. Offering more options is also said to reduce the response burden to businesses which might explain the Response Rate improvement.

Multimode, especially using web-based modes has been used extensively in market research due to its cost efficiency in the last decade. In the meantime statistical research has provided the methods and standards that can help incorporate them in the more demanding academic research and Official statistics context. In this sense it is probably advisable to move into at least piloting the method in the next implementation of the ECS. In the last years a substantial body of research has been developed to tackle the methodological issues that arise from the use of multiple modes allowing the final data set to be coherent.

Annexes

Annex 1 – Registers used in the sampling

Table A1. Address sources used in the 2nd ECS

Country	Address source	Type of source	Unit	Coverage of sectors	Additional address source
BE	Belfirst	Commercial address-provider	Company	All relevant sectors except for 'Public Administration' which is clearly under-represented	YES
BG	Bulgarian National Statistical Institute (BNSI)	Official national register	Company	Very limited coverage of 'Public Administration', 'Education' and 'Health and Social Work'	YES
CZ	Albertina database	Commercial address-provider	Company	All relevant sectors including 'Public Administration'	NO
DK*	KOB	Commercial address-provider	Establishment	All relevant sectors including 'Public Administration'	NO
DE*	Establishment register of the Federal Agency of Labour	Official national register	Establishment	All relevant sectors including 'Public Administration'	NO
EE	Estonian Business Register	Official national register	Company	'Public Administration' and 'Education' hardly represented	YES
IE	BILL MOSS Partnership - Business Register	Commercial address-provider	Company	All relevant sectors including 'Public Administration'	NO
EL	ICAP Business Databank	Commercial address-provider	Company	'Public Administration', 'Education' and 'Health and Social Work' are under-represented	YES
ES*	SCHOBER	Commercial address-provider	Both companies and establishments	Only few addresses for 'Public Administration', 'Education' and 'Health and Social Work'	YES

FR*	SIRENE Address- Register	Official national register	Establishment	All relevant sectors including 'Public Administration'	NO
IT*	Dun & Bradstreet	Commercial address- provider	Establishment	All relevant sectors including 'Public Administration'	NO
CY	Business Register of the Statistical Service of the Republic of Cyprus	Official national register	Company	All relevant sectors except for 'Public Administration'	YES
LV	Business Register of the Central Statistical Bureau of Latvia	Official national register	Both companies and establishments	All relevant sectors including 'Public Administration'	NO
LT	Business information service and debt collection organisation: JSC "Credit reform"	Official national register	Company	All relevant sectors including 'Public Administration'	NO
LU*	EDITUS	Commercial address- provider	Establishment	All relevant sectors including 'Public Administration'	NO
HU	HBI LTD	Official national register	Company	'Public Administration', 'Education' and 'Health and Social Work' are under- represented	NO
MT	Employment & Training Corporation 2007	Official national register	Company	All relevant sectors including 'Public Administration'	NO
NL*	Chamber of Commerce Establishment Register	Official national register	Establishment	'Public Administration', 'Education' and 'Health and Social Work' are under- represented	YES
AT*	Dun & Bradstreet B2B Austria 2006	Commercial address- provider	Establishment	'Public Administration', 'Education' and 'Health and Social Work' are somewhat under-represented	YES
PL*	PCM	Commercial address- provider	Establishment	All relevant sectors including 'Public Administration'	NO
PT	Informa Dun &Bradstreet	Commercial address- provider	Company	All relevant sectors except for 'Public Administration'	YES
RO	www.ListaFir me.ro	Official national	Company	All relevant sectors including 'Public	NO

		register		Administration'	
SI	IPIS Register of Slovene companies	Commercial address-provider	Company	All relevant sectors including 'Public Administration'	NO
SK	Albertina database	Commercial address-provider	Company	All relevant sectors including 'Public Administration'	NO
FI*	Profinder BtoB by Fonecta	Commercial address-provider	Establishment	All relevant sectors including 'Public Administration'	NO
SE*	SCB Företagsregister	Official national register	Both companies and establishments	All relevant sectors including 'Public Administration'	NO
UK*	DUN & BRADSTREET U.S.	Commercial address-provider	Establishment	All relevant sectors including 'Public Administration'	NO
HR	Institute for Business Intelligence	Official national register	Company	All relevant sectors including 'Public Administration'	NO
MK	Central registry of the Republic of Macedonia	Official national register	Company	Public Administration', 'Education' and 'Health and Social Work' are hardly covered	YES
TR	Chambers of Commerce	Official national register	Company	All private business sectors; 'Public Administration' not covered; 'Education' and 'Health and Social Work' hardly covered	NO

Note. Asterisks denote countries that did not implement screening.

Annex 2 – Number of interviews achieved in each country

Table A2. Number of MM and ER interviews in the ECS 2009

Country	MM-Interviews	ER-Interviews	ER in % of MM
EU-27	24640	6214	25%
BE	1016	287	28%
BG	502	128	25%
CZ	1014	242	24%
DK	1023	394	39%
DE	1500	558	37%
EE	500	72	14%
IE	503	93	18%
EL	1005	76	8%
ES	1509	375	25%
FR	1500	441	29%
IT	1502	320	21%
CY	505	60	12%
LV	509	147	29%
LT	560	128	23%
LU	501	164	33%
HU	1045	183	18%
MT	349	24	7%
NL	1002	249	25%
AT	1016	205	20%
PL	1500	367	24%
PT	1012	39	4%
RO	500	137	27%
SI	536	153	29%
SK	520	100	19%
FI	1000	565	57%
SE	1001	541	54%
UK	1510	166	11%
HR	500	162	32%
MK	520	129	25%
TR	1500	64	4%
TOTAL	27160	6569	24%

Annex 3 - Unit response rates

Below we present the four different unit non-response rates as defined by AAPOR¹⁴.

Response rates - The number of complete interviews with reporting units divided by the number of eligible reporting units in the sample. This is defined as:

$$RR1 = \frac{I}{(I + P) + (R + NC + O) + UE},$$

which is the number of complete interviews (I) divided by the number of interviews (complete plus partial (I+P)) plus the number of non-interviews (refusal and break-off (R) plus non-contacts (NC) plus others (O)) plus all cases of unknown eligibility (UE).

Cooperation rates - The proportion of all cases interviewed of all eligible units ever contacted. This is defined as:

$$COOP1 = \frac{I}{(I + P) + R + O},$$

which is the number of complete interviews (I) divided by the number of interviews (complete plus partial (I+P)) plus the number of non-interviews that involve the identification of and contact with an eligible respondent (refusal and break-off (R) plus other (O)).

Refusal rates - The proportion of all cases in which a sampling unit or the respondent refuses to be interviewed, or breaks-off an interview, of all potentially eligible cases. This is defined as:

$$REF1 = \frac{R}{(I + P) + (R + NC + O) + UE},$$

which is the number of refusals (R) divided by the interviews (complete and partial (I+P)) plus the non-respondents (refusals (R), non-contacts (NC), and others (O)) plus the cases of unknown eligibility (UE).

Contact rates - The proportion of all cases in which the responsible person in the sampling unit was reached. This is defined as:

$$CON1 = \frac{(I + P) + R + O}{(I + P) + (R + NC + O) + UE},$$

which is the number of interviews (complete plus partial (I+P)) plus the number of non-interviews that involve the identification of and contact with an eligible respondent (refusal and break-off (R) plus other (O)) divided by the interviews (complete and partial (I+P)) plus the non-respondents (refusals (R), non-contacts (NC), and others (O)) plus the cases of unknown eligibility (UE).

For the calculation of the aforementioned rates the following components are required:

1. Number of complete interviews (I)
2. Number of partial interviews (P)

¹⁴ The American Association for Public Opinion Research, 2008, Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for surveys, revised edition, Lenexa, Kansas

3. Number of non-contacts (NC)
4. Number of refusals (R)
5. Number of other types of non-response (O)
6. Number of addresses of unknown eligibility in the sampling frame (UE)
7. Number of not eligible addresses in the sampling frame (NE) –

Table A3. Main indicators from survey outcomes - MM interviews

Country	Response Rate	Cooperation Rate	Refusal Rate	Contact Rate
EL	64.5%	64.8%	34.9%	99.6%
MK	59.8%	65.8%	28.7%	90.8%
EE	52.2%	52.2%	29.3%	100.0%
LV*	48.4%	56.8%	20.6%	85.3%
MT	43.5%	43.5%	23.7%	99.9%
RO	41.9%	42.2%	56.8%	99.2%
SE*	40.3%	48.2%	38.0%	83.7%
IE	36.5%	39.6%	48.0%	92.0%
BE	36.1%	38.7%	46.5%	93.4%
BG	36.0%	49.1%	35.2%	73.4%
TR	33.4%	33.9%	63.1%	98.6%
CZ	30.9%	31.2%	62.2%	99.0%
SI	29.0%	36.3%	49.5%	79.8%
FI*	27.2%	51.3%	25.6%	53.0%
UK*	23.7%	26.4%	65.6%	89.5%
LU*	23.7%	25.2%	33.1%	93.7%
LT	23.2%	23.4%	21.0%	99.0%
PT	22.5%	22.9%	75.7%	98.2%
FR*	22.1%	26.3%	61.1%	83.7%
CY	21.6%	22.8%	68.5%	94.6%
PL*	21.5%	25.8%	60.6%	83.5%
SK	19.5%	19.7%	77.5%	99.0%
DK*	19.4%	27.7%	18.1%	70.0%
HU	16.9%	17.0%	82.5%	99.4%
HR	16.6%	17.8%	11.0%	93.3%
AT*	15.9%	25.4%	29.7%	62.6%
IT*	15.5%	17.8%	66.0%	87.2%
DE*	13.2%	15.6%	71.0%	84.8%
NL*	9.0%	10.6%	74.5%	85.3%
ES*	8.7%	19.0%	36.0%	45.9%
Median value (countries without (*))	33.4%	36.3%	48.0%	98.6%
Median value (countries with (*))	21.5%	25.8%	38.0%	83.7%

Note. Asterisks denote countries that did not implement screening.

Table A4. Main indicators from survey outcomes – ER interviews (management survey sample)

Country	Response Rate	Cooperation Rate	Refusal Rate	Contact Rate
LV	91.3%	92.5%	4.3%	98.8%
LU	88.2%	88.2%	2.2%	100.0%
FI	84.6%	91.6%	7.6%	92.4%
SE	77.2%	78.3%	7.8%	98.6%
EE	75.8%	90.0%	8.4%	84.2%
BG	75.7%	75.7%	9.5%	100.0%
DE	75.1%	77.6%	18.3%	96.8%
MK	75.0%	82.7%	5.8%	90.7%
CZ	73.1%	77.3%	11.2%	94.6%
SI	71.2%	71.8%	2.8%	99.1%
EL	68.5%	68.5%	20.7%	100.0%
LT	68.4%	77.1%	17.1%	88.8%
HR	67.5%	71.4%	25.4%	94.6%
IT	65.8%	65.8%	34.2%	100.0%
DK	64.0%	78.6%	4.7%	81.3%
HU	63.3%	71.8%	24.9%	88.2%
AT	60.8%	84.7%	9.5%	71.8%
ES	60.5%	62.1%	30.6%	97.4%
BE	60.4%	65.2%	14.3%	92.6%
RO	59.3%	59.3%	40.7%	100.0%
PL	56.0%	63.7%	18.9%	87.9%
SK	55.6%	57.1%	25.6%	97.2%
MT	54.5%	60.0%	36.4%	90.9%
FR	52.7%	69.8%	19.7%	75.5%
IE	51.7%	56.7%	16.1%	91.1%
NL	45.6%	46.4%	45.2%	98.4%
UK	41.5%	44.1%	52.5%	94.0%
PT	38.2%	38.2%	7.8%	100.0%
TR	35.6%	43.8%	0.0%	81.1%
CY	33.9%	38.5%	52.5%	88.1%

Annex 4 – Comparability over countries

Table A5. Languages used for the ECS 2009 questionnaire

Country	Language version(s)
BE	French, Flemish
BG	Bulgarian
CZ	Czech
DK	Danish
DE	German
EE	Estonian, Russian
IE	English
EL	Greek
ES	Spanish
FR	French
IT	Italian
CY	Greek
LV	Latvian, Russian
LT	Lithuanian
LU	Luxembourgish, French, German, English
HU	Hungarian
MT	Maltese, English
NL	Dutch
AT	German
PL	Polish
PT	Portuguese
RO	Romanian
SI	Slovenian
SK	Slovakian
FI	Finnish, Swedish
SE	Swedish
UK	English
HR	Croatian
MK	Macedonian
TR	Turkish

Figure A1. Duration of the fieldwork in ECS 2009

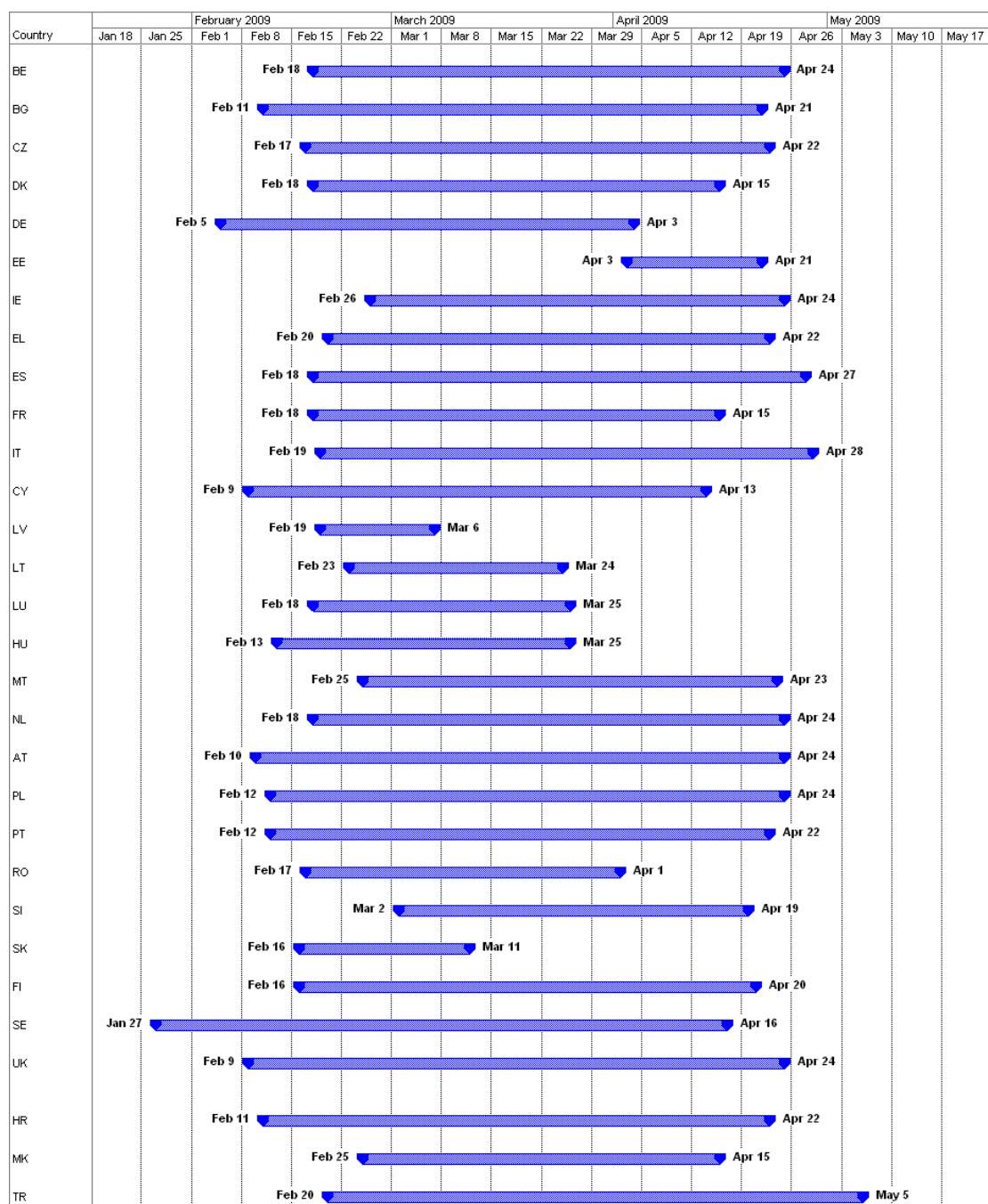


Table A6. NACE classification and size classes in the ECS 2009

Country	Codification of sectors ¹⁵	Sectors coverage	Size classes
BE	SIC, NACE Rev. 1.1	All relevant sectors covered; separate figures for Public Administration available	10-19, 20-49, 50-199, 200-499, 500+
BG	NACE Rev.1.1	Covers only private sector; NACE Rev. 1.1 L and M are therefore hardly covered at all; N probably underrepresented; Financial intermediation NACE Rev. 1.1 J also not fully covered (ONLY ON COMPANY LEVEL)	10-19, 20-49, 50-249, 250-499, 500+
CZ	NACE Rev. 2	All relevant sectors covered (ONLY ON COMPANY LEVEL)	10-19, 20-49, 50-249, 250-499, 500+
DK*	NACE Rev.1.1	All relevant sectors covered	10-19, 20-49, 50-99, 100+
DE*	WZ 2008 (NACE-compatible with NACE Rev. 2)	All relevant sectors covered	10-19, 20-49, 50-249, 250-499, 500+
EE	NACE Rev. 2	Sectors Rev.2 O not represented at all, underrepresented P and Q	10-19, 20-49, 50-249, 250-499, 500+
IE	NACE Rev. 2	All relevant sectors	10-19, 20-49, 50-249, 250-499, 500+
EL	NACE Rev.1.1	NACE Rev.1.1 L, M, N are only partially covered	10-19, 20-49, 50-99, 100+
ES*	NACE Rev. 2	All relevant sectors except for Public Administration; NACE Rev 2 P and Q under-represented	10-19, 20-49, 50-249, 250-499, 500+
FR*	NAF-codes; compatible with NACE Rev. 2	All relevant sectors	10-19, 20-49, 50-199, 200-499, 500+
IT*	NACE Rev. 2	All relevant sectors	10-19, 20-49, 50-249, 250-499, 500+
CY	NACE Rev. 1.1	All relevant sectors	10-19, 20-49, 50-249, 250-499, 500+
LV	NACE Rev. 2	All relevant sectors	10-19, 20-49, 50-249, 250-499, 500+
LT	NACE Rev. 2	NACE Rev. 2 “O” (Public Administration”) is not included, NACE Rev. P (“Education”) and Q (“Human Health and Social Work”) are only partially covered	10-19, 20-49, 50-249, 250-499, 500+
LU*	SIC, NACE Rev: 1.1	NACE Rev. 1.1. Public Administration is excluded and NACE M (Education) is under-represented	10-19, 20-49, 50-99, 100+
HU	NACE Rev. 1.1	All relevant sectors covered but NACE Rev.1.1 L, M and N are strongly under-represented	10-19, 20-49, 50-249, 250+
MT	NACE Rev. 1.1	All relevant sectors	10-19, 20-49, 50-249, 250-499, 500+

¹⁵ The codification of sectors is either made according to NACE Rev. 1.1 or NACE Rev.2. The new revision of NACE classification, Rev. 2, came into force from 1st January 2008 with significant differences in the coding of sectors even on 1-digit level compared to Rev. 1.1

NL*	NACE Rev. 1.1	All relevant sectors; statistics on Public Administration, Public Education, Public Healthcare and the Mining Industries supplemented by information from LISA	10-19, 20-49, 50-249, 250-499, 500+
AT*	NACE Rev. 1.1	All relevant sectors	10-19, 20-49, 50-249, 250-499, 500+
PL*	NACE Rev. 1.1	All relevant sectors	10-49, 50-249, 250-999, 1000+
PT	NACE Rev. 2	NACE Rev. 2 (“Public Administration”); sectors P (“Education”) and Q (“Human Health and Social Work”) under-represented	10-19, 20-49, 50-249, 250-499, 500+
RO	NACE Rev. 1.1	All relevant sectors	10-19, 20-49, 50-99, 100-249, 250-499, 500+
SI	NACE Rev. 2	All relevant sectors covered, but NACE Rev. 2 O (“Public Administration”) strongly under-represented	10-19, 20-49, 50-249, 250-499, 500+
SK	NACE Rev. 1.1	All relevant sectors	10-19, 20-49, 50-249, 250-499, 500+
FI*	NACE Rev. 1.1	All relevant sectors	10-19, 20-49, 50-249, 250-499, 500+
SE*	NACE Rev. 2	All relevant sectors	10-19, 20-49, 50-249, 250-499, 500+
UK*	NACE Rev. 1.1	All relevant sectors	10-19, 20-49, 50-249, 250-499, 500+
HR	NACE Rev. 1.1	All relevant sectors	10-49, 50-249, 250-499, 500+
MK	NACE Rev. 1.1	NACE Rev. 1.1 L, M and N strongly under-represented	10-19, 20-49, 50-249, 250-499, 500+
TR	Partly NACE Rev. 1.1, partly no reliable sector code available from the address source	NACE Rev. 1 L is not covered (for security reasons), NACE M and N are underrepresented	10-49, 50-150, 151-250, 251+

Annex 5 – Optimum sample sizes

In order to determine the optimum sample size for the needs of the ECS, we have experimented with three different candidate approaches:

- Approach A – Apply the same sample size to all countries (equal sample size): Consider using the same sample size for all countries. We have experimented with samples sizes A1 = 1000, A2 = 1100 and A3 = 1500.
- Approach B – European-adjusted sample size: Consider introducing a weighting factor for the calculation of sample size. Weights denote the relative magnitude of the countries (in terms of number of establishment) in the EU total: $w_i = \frac{x_i}{X}$, where i is the country, x_i the number of establishments in country i (from SBS 2007), X the total number of establishments in EU-27 (or other country aggregate).
- Approach C – 25% of European-adjusted and 75% of equal-based sample size: This is a combination of the previous two approaches. Apply a 1:3 ratio and determine the sample size to be 25% of the European-adjusted sample size plus 75% of the ‘equal’ sample size. We have experimented with three variations of this approach, applying each time the three different ‘equal’ sample sizes (C1 = 1000, C2 = 1100 and C3 = 1500)

We examine the efficacy of each approach in terms of cost-effectiveness. We wish allow for the trade-off between accuracy and cost and decide on the equilibrium that will optimise sample size (and thus accuracy) for reasonable cost.

Table A7. Different approaches for sample size calculation and respective costs (in Euros)

		EU-27		Total EU ¹⁶	
		Total Sample size	Total cost	Total Sample size	Total cost
ECS 2009		24640	€1.484.843,0	26640	€1.604.843,0
Approach A	A1: ni=1000	27000	€1.555.500,0	29000	€1.671.500,0
	A2: ni=1100	29700	€1.667.400,0	31900	€1.790.600,0
	A3: ni=1500	40500	€2.115.000,0	43500	€2.267.000,0
Approach B		25003	€1.587.726,0	26638	€1.695.934,0
Approach C	C1: ni=1000	26616	€1.568.780,0	28532	€1.683.116,0
	C2: ni=1100	28641	€1.652.705,0	30707	€1.772.441,0
	C3: ni=1500	36741	€1.988.405,0	39407	€2.129.741,0

Table below demonstrates for each approach and its variations the total sample size and the corresponding total cost. Figures are calculated for the EU-27 aggregate as well as for a ‘Total EU’ aggregate, i.e. EU27, HR and TR. We have also included in the table the ECS 2009 data as benchmark, taking into consideration that accuracy problem of the ECS 2009 had basically to do with non-sampling issues (i.e. coverage problems and high non-response), rather than sampling errors as such.

The cost formula used is: $C = a \times n + b$, where parameters a and b are country specific and have been provided by the contractor of the ECS 2009.

¹⁶ EU-27, HR, TR (no information available for MK)

We follow the *reductio ad absurdum* method to end up with suggestions on the selection of the optimum sample size. Based on the figures of Table , we can make the following suggestions:

- Approaches A3 and C3 give rather excessive sample sizes, which increase the budget considerably. We rule them out.
- We'd rather not favour the application of equal sample size to all countries, since important country specificities (total population, total number of enterprises, etc.) need to be taken into consideration. Although, equal sample sizes optimises for comparisons between countries it is at the same time a bad choice for European Aggregates as well as sectoral comparisons. This is because of unequal selection probabilities due to different population sizes. In countries with small populations the selection probability is much larger than those in larger countries. Therefore, appropriate weighting applied for computation of European aggregates and sectoral estimates will, in some cases be quite large for large countries and small for small ones. This survey design will result to a large design effect and small effective sample size. Based on this reasoning, approaches A1 and A2 are also ruled out.
- Approach B while optimised for European and sectoral estimates produces absurdly small sample sizes in small countries.
- Approach C provides a compromise as it allows to some extent country specificities (magnitude of the country in terms of share of its establishments in the EU total) and introduces a threshold so that sample sizes do not get too tiny in small countries.

The final decision on the most appropriate approach between C1 and C2 is to be taken by Eurofound, also upon the maximum budget available. Closer to the ECS 2009 total budget is C1.