

The Ukraine 2013 Enterprise Surveys Data Set

I. Introduction

1. This document provides additional information on the data collected in Ukraine between January 2013 and November 2013 as part of the fifth round of the Business Environment and Enterprise Performance Survey (BEEPS V), a joint initiative of the World Bank Group (“WB”) and the European Bank for Reconstruction and Development (“EBRD”). It is an enterprise survey whose objective is to gain an understanding of firms’ perception of the environment in which they operate. The survey was until now administered four times at an interval of three years. This has added an important element of dynamics in the study of business environment in transition countries.

The Enterprise Surveys, through interviews with firms in the manufacturing and services sectors, capture business perceptions on the biggest obstacles to enterprise growth, the relative importance of various constraints to increasing employment and productivity, and the effects of a country’s business environment on its international competitiveness. They are used to create statistically significant business environment indicators that are comparable across countries. The Enterprise Surveys are also used to build a panel of enterprise data that will make it possible to track changes in the business environment over time and allow, for example, impact assessments of reforms.

The report outlines and describes the sampling design of the data, the data set structure as well as additional information that may be useful when using the data, such as information on non-response cases and the appropriate use of the weights.

II. Sampling Structure

2. The sample for Ukraine was selected using stratified random sampling, following the methodology explained in the *Sampling Manual*¹. Stratified random sampling² was preferred over simple random sampling for several reasons³:

a. To obtain unbiased estimates for different subdivisions of the population with some known level of precision.

b. To obtain unbiased estimates for the whole population. The whole population, or universe of the study, is the non-agricultural economy. It comprises: all manufacturing sectors according to the group classification of ISIC Revision 3.1: (group D), construction sector (group F), services sector (groups G and H), and transport, storage, and communications sector (group I). Note that this definition excludes the following sectors: financial intermediation (group J), real estate and renting activities (group K, except sub-sector 72, IT, which was added to the population under study), and all public or utilities-sectors.

c. To make sure that the final total sample includes establishments from all different sectors and that it is not concentrated in one or two of industries/sizes/regions.

¹ The complete text can be found at http://www.enterprisesurveys.org/documents/Implementation_note.pdf

² A stratified random sample is one obtained by separating the population elements into non-overlapping groups, called strata, and then selecting a simple random sample from each stratum. (Richard L. Scheaffer; Mendenhall, W.; Lyman, R., “Elementary Survey Sampling”, Fifth Edition).

³ Cochran, W., 1977, pp. 89; Lohr, Sharon, 1999, pp. 95

d. To exploit the benefits of stratified sampling where population estimates, in most cases, will be more precise than using a simple random sampling method (i.e., lower standard errors, other things being equal.)

e. Stratification may produce a smaller bound on the error of estimation than would be produced by a simple random sample of the same size. This result is particularly true if measurements within strata are homogeneous.

f. The cost per observation in the survey may be reduced by stratification of the population elements into convenient groupings.

3. Three levels of stratification were used in this country: industry, establishment size, and region. The original sample design with specific information of the industries and regions chosen is described in Appendix E.

4. Industry stratification was designed in the way that follows: the universe was stratified into one manufacturing industry, and two service industries (retail, and other services).

5. Size stratification was defined following the standardized definition for the rollout: small (5 to 19 employees), medium (20 to 99 employees), and large (more than 99 employees). For stratification purposes, the number of employees was defined on the basis of reported permanent full-time workers. This seems to be an appropriate definition of the labor force since seasonal/casual/part-time employment is not a common practice, except in the sectors of construction and agriculture.

6. Regional stratification was defined in 5 regions (city and the surrounding business area) throughout Ukraine.

III. Sampling implementation

7. Given the stratified design, sample frames containing a complete and updated list of establishments as well as information on all stratification variables (number of employees, industry, and region) are required to draw the sample. Great efforts were made to obtain the best source for these listings. However, the quality of the sample frames was not optimal and, therefore, some adjustments were needed to correct for the presence of ineligible units. These adjustments are reflected in the weights computation (*see below*).

8. IPSOS was hired to implement the Ukraine 2013 enterprise survey. There were local subcontractors in each of the 5 regions surveyed.

9. The sample frame used for the survey in Ukraine was from: Business-Guide™. The Enterprises of Ukraine. The database contained the following information

- Coverage;
- Up to datedness;- Availability of detailed stratification variables;
- Contact name(s).

Counts from the sample frame are shown below.

Sample Frame

Source: Business-Guide™. The Enterprises of Ukraine, 2012

Region	Employees	Food	Garments	Minerals	Machinery	Retail	Other Manufacturing	Other Services	Grand Total
Kiev	5-19	139	95	64	182	549	1354	5709	8092
	20-99	75	38	62	107	201	727	2249	3459
	100+	59	18	36	34	69	197	452	865
	Total	273	151	162	323	819	2278	8410	12416
East	5-19	212	118	138	341	931	1462	6401	9603
	20-99	182	77	83	264	375	946	2764	4691
	100+	142	12	48	121	96	340	579	1338
	Total	536	207	269	726	1402	2748	9744	15632
West	5-19	116	106	61	92	584	784	2991	4734
	20-99	87	76	50	63	176	445	1131	2028
	100+	74	28	27	30	53	155	250	617
	Total	277	210	138	185	813	1384	4372	7379
South	5-19	113	53	61	88	475	531	2762	4083
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	100+	47	13	15	31	38	85	206	435
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North	5-19	88	52	65	110	345	550	2122	3332
	20-99	91	45	39	77	121	320	872	1565
	100+	68	19	21	39	52	88	191	478
	Total	247	116	125	226	518	958	3185	5375
Grand Total		1569	782	811	1652	4215	8278	29837	47144

10. The enumerated establishments were then used as the frame for the selection of a sample with the aim of obtaining interviews at 1000 establishments with five or more employees.

11. The quality of the frame was assessed at the onset of the project through visits to a random subset of firms and local contractor knowledge. The sample frame was not immune from the typical problems found in establishment surveys: positive rates of non-eligibility, repetition, non-existent units, etc.

12. Given the impact that non-eligible units included in the sample universe may have on the results, adjustments may be needed when computing the appropriate weights for individual observations. The percentage of confirmed non-eligible units as a proportion of the total number of sampled establishments contacted for the survey was 7.5% (272 out of 3642 establishments)⁴. Breaking down by stratified industries, the following sample targets were achieved (using a4a and a6a):

⁴ Based on out of target contacts and impossible to contact establishments

Sample design

Region	Employees	Food	Garments	Minerals	Machinery	Retail	Other Manufacturing	Other Services	Grand Total
Kiev	5-19	17	20	13	19	14	17	21	121
	20-99	9	7	12	11	7	9	8	63
	100+	5	3	7	4	2	4	6	31
	Total	31	30	32	34	23	30	35	215
East	5-19	17	27	29	31	22	21	23	170
	20-99	17	16	16	22	9	10	8	98
	100+	10	0	9	11	4	8	8	50
	Total	44	43	54	64	35	39	39	318
West	5-19	13	23	13	11	14	10	7	91
	20-99	9	17	9	5	6	6	6	58
	100+	8	4	4	3	4	4	3	30
	Total	30	44	26	19	24	20	16	179
South	5-19	13	12	13	9	14	7	5	73
	20-99	9	6	8	7	5	4	6	45
	100+	5	1	2	3	2	4	5	22
	Total	27	19	23	19	21	15	16	140
North	5-19	9	11	15	13	8	7	8	71
	20-99	11	11	7	8	5	5	4	51
	100+	8	2	3	3	4	4	2	26
	Total	28	24	25	24	17	16	14	148
Grand Total		160	160	160	160	120	120	120	1000

IV. Data Base Structure:

13. The structure of the data base reflects the fact that 3 different versions of the questionnaire were used. The basic questionnaire, the Core Module, includes all common questions asked to all establishments from all sectors. The second expanded variation, the Manufacturing Questionnaire, is built upon the Core Module and adds some specific questions relevant to manufacturing sectors. The third expanded variation, the Retail Questionnaire, is also built upon the Core Module and adds to the core specific questions relevant to retail firms. Each variation of the questionnaire is identified by the index variable, *a0*.

14. All variables are named using, first, the letter of each section and, second, the number of the variable within the section, i.e. *a1* denotes section A, question 1. Variable names preceded by a prefix "ECA" indicate questions specific to the Eastern Europe and Central Asia region, therefore, they may not be found in the implementation of the rollout in other countries. All other suffixed variables are global and are present in all country surveys over the world. All variables are numeric with the exception of those variables with an "x" at the end of their names. The suffix "x" denotes that the variable is alpha-numeric.

15. There are 2 establishment identifiers, *idstd* and *id*. The first is a global unique identifier. The second is a country unique identifier. The variables *a2* (sampling region), *a6a* (sampling establishment's size), and *a4a* (sampling sector) contain the establishment's classification into the strata chosen for each country using information from the sample frame. The strata were defined according to the guidelines described above.

16. There are three levels of stratification: industry, size and region. Different combinations of these variables generate the strata cells for each industry/region/size combination. A distinction should be made between the variable *a4a* and *d1a2* (industry expressed as ISIC rev. 3.1 code). The former gives the establishment's classification into one of the chosen industry-strata, whereas the latter gives the actual establishment's industry classification (four digit code) in the sample frame.

17. All of the following variables contain information from the sampling frame. They may not coincide with the reality of individual establishments as sample frames may contain inaccurate information. The variables containing the sample frame information are included in the data set for researchers who may want to further investigate statistical features of the survey and the effect of the survey design on their results.

- a2* is the variable describing sampling regions

- a6a*: coded using the same standard for small, medium, and large establishments as defined above. The code -9 was used to indicate units for which size was undetermined in the sample frame.

- a4a*: coded using ISIC Rev 3.1 codes for the chosen industries for stratification. These codes include most manufacturing industries (15 to 37), retail (52), and (45, 50, 51, 55, 60-64, 72) for other services.

18. The surveys were implemented following a 2 stage procedure. Typically first a screener questionnaire is applied over the phone to determine eligibility and to make appointments. Then a face-to-face interview takes place with the Manager/Owner/Director of each establishment. The variables *a4b* and *a6b* contain the industry and size of the establishment from the screener questionnaire. Variables *a8* to *a11* contain additional information and were also collected in the screening phase.

19. Note that there are additional variables for location (*a3x*) and size (*l1*, *l6* and *l8*) that reflect more accurately the reality of each establishment. Advanced users are advised to use these variables for analytical purposes.

20. Variable *a3x* indicates the actual location of the establishment. There may be divergences between the location in the sampling frame and the actual location, as establishments may be listed in one place but the actual physical location is in another place.

21. Variables *l1*, *l6* and *l8* were designed to obtain a more accurate measure of employment accounting for permanent and temporary employment. Special efforts were made to make sure that this information was not missing for most establishments.

22. Variables *a17x* gives interviewer comments, including problems that occurred during an interview and extraordinary circumstances which could influence results. Please note that sometimes this variable is removed due to privacy issues.

V. Universe Estimates

23. Universe estimates for the number of establishments in each cell in Ukraine were produced for the strict, median and weak eligibility definitions. The estimates were the multiple of the relative eligible proportions.

24. Appendix B shows the overall estimates of the numbers of establishments in Ukraine based on the sample frame.

25. For some establishments where contact was not successfully completed during the screening process (because the firm has moved and it is not possible to locate the new location, for example), it is not possible to directly determine eligibility. Thus, different assumptions about the eligibility of establishments result in different adjustments to the universe cells and thus different sampling weights.

26. Three sets of assumptions on establishment eligibility are used to construct sample adjustments using the status code information.

27. Strict assumption: eligible establishments are only those for which it was possible to directly determine eligibility. The resulting weights are included in the variable *wstrict*.

Strict eligibility = (Sum of the firms with codes 1,2,3,4,&16) / Total

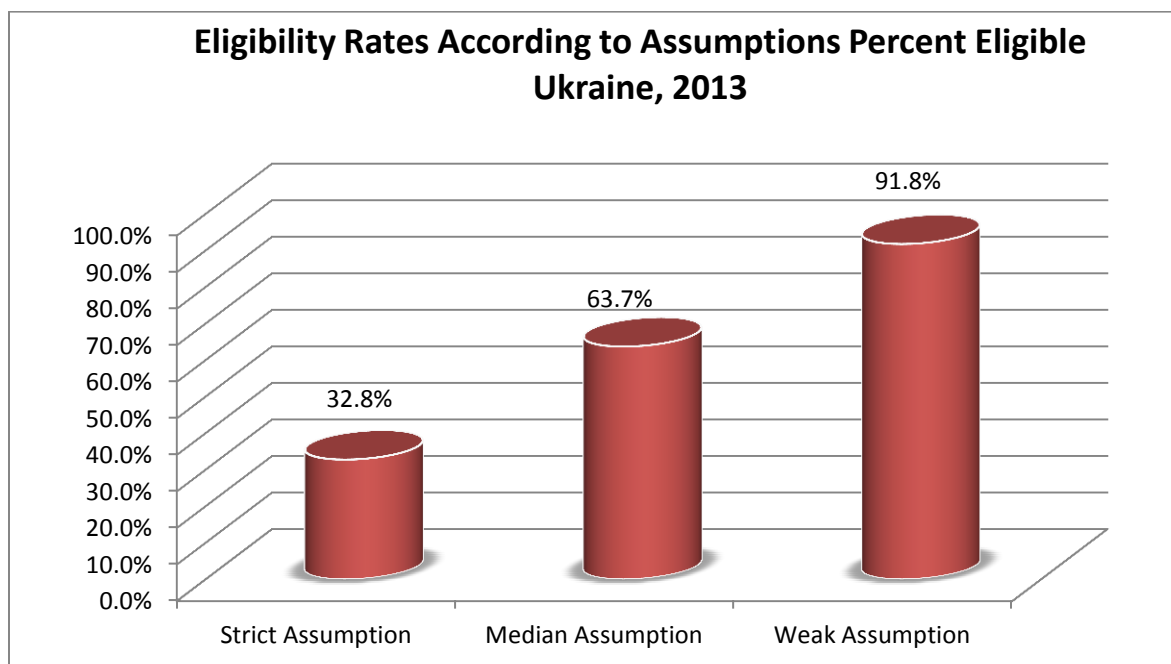
28. Median assumption: eligible establishments are those for which it was possible to directly determine eligibility and those that rejected the screener questionnaire or an answering machine or fax was the only response. The resulting weights are included in the variable *wmedian*.

Median eligibility = (Sum of the firms with codes 1,2,3,4,16,10,11, & 13) / Total

29. Weak assumption: in addition to the establishments included in points a and b, all establishments for which it was not possible to contact or that refused the screening questionnaire are assumed eligible. This definition includes as eligible establishments with dead or out of service phone lines, establishments that never answered the phone, and establishments with incorrect addresses for which it was impossible to find a new address. Under the weak assumption only observed non-eligible units are excluded from universe projections. The resulting weights are included in the variable *wweak*.

Weak eligibility= (Sum of the firms with codes 1,2,3,4,16,91,92,93,10,11,12,&13) / Total

30. The indicators computed for the Enterprise Survey website use the median weights. The following graph shows the different eligibility rates calculated for firms in the sample frame under each set of assumptions.



31. Universe estimates for the number of establishments in each industry-region-size cell in Ukraine were produced for the strict, weak and median eligibility definitions. Appendix D shows the universe estimates of the numbers of registered establishments that fit the criteria of the Enterprise Surveys.

32. Once an accurate estimate of the universe cell projection was made, weights for the probability of selection were computed using the number of completed interviews for each cell.

VI. Weights

33. Since the sampling design was stratified and employed differential sampling, individual observations should be properly weighted when making inferences about the population. Under stratified random sampling, unweighted estimates are biased unless sample sizes are proportional to the size of each stratum. With stratification the probability of selection of each unit is, in general, not the same. Consequently, individual observations must be weighted by the inverse of their probability of selection (probability weights or *pw* in Stata).⁵

34. Special care was given to the correct computation of the weights. It was imperative to accurately adjust the totals within each region/industry/size stratum to

⁵ This is equivalent to the weighted average of the estimates for each stratum, with weights equal to the population shares of each stratum.

account for the presence of ineligible units (the firm discontinued businesses or was unattainable, education or government establishments, establishments with less than 5 employees, no reply after having called in different days of the week and in different business hours, no tone on the phone line, answering machine, or fax line⁶, wrong address or moved away and could not get the new references). The information required for the adjustment was collected in the first stage of the implementation: the screening process. Using this information, each stratum cell of the universe was scaled down by the observed proportion of ineligible units within the cell. Once an accurate estimate of the universe cell (projections) was available, weights were computed using the number of completed interviews.

35. Appendix C shows the cell weights for registered establishments in Ukraine.

VII. Appropriate use of the weights

36. Under stratified random sampling weights should be used when making inferences about the population. Any estimate or indicator that aims at describing some feature of the population should take into account that individual observations may not represent equal shares of the population.

37. However, there is some discussion as to the use of weights in regressions (see Deaton, 1997, pp.67; Lohr, 1999, chapter 11, Cochran, 1953, pp.150). There is not a strong large sample econometric argument in favor of using weighted estimation for a common population coefficient if the underlying model varies per stratum (stratum-specific coefficient): both simple OLS and weighted OLS are inconsistent under regular conditions. However, weighted OLS has the advantage of providing an estimate that is independent of the sample design. This latter point may be quite relevant for the Enterprise Surveys as in most cases the objective is not only to obtain model-unbiased estimates but also design-unbiased estimates (see also Cochran, 1977, pp 200 who favors the used of weighted OLS for a common population coefficient.)⁷

38. From a more general approach, if the regressions are descriptive of the population then weights should be used. The estimated model can be thought of as the relationship that would be expected if the whole population were observed.⁸ If the models are developed as structural relationships or behavioral models that may vary for different parts of the population, then, there is no reason to use weights.

VIII. Non-response

39. Survey non-response must be differentiated from item non-response. The former refers to refusals to participate in the survey altogether whereas the latter refers to the

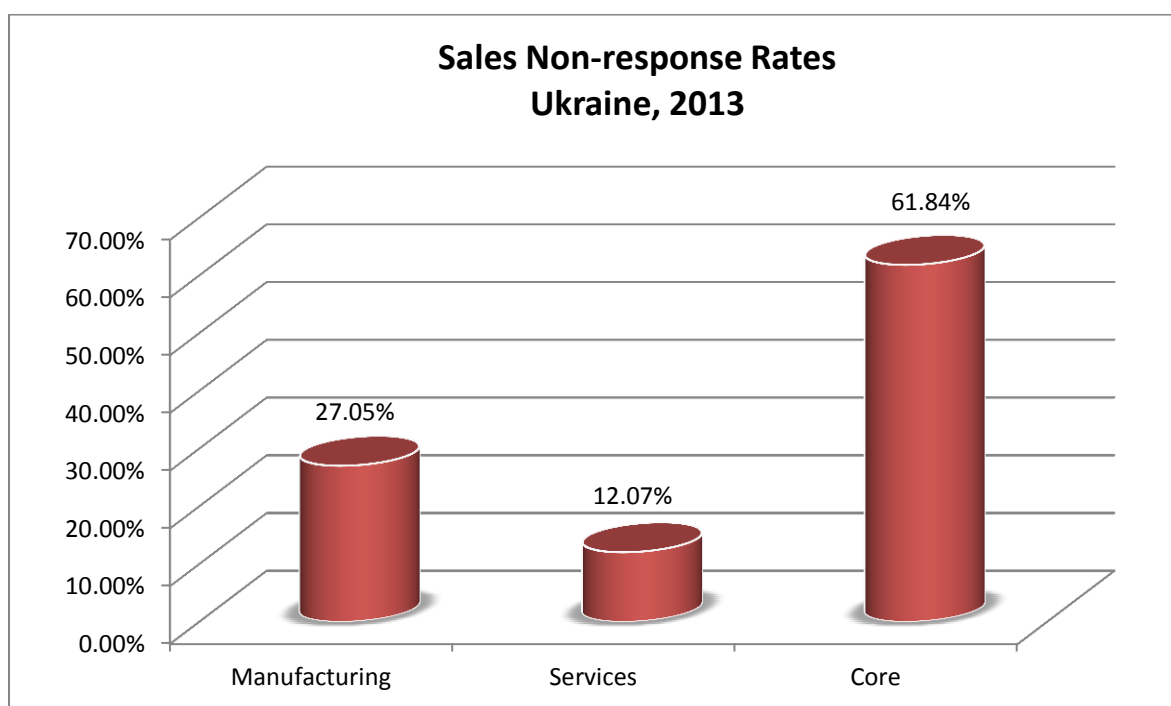
6 For the surveys that implemented a screener over the phone.

7 Note that weighted OLS in Stata using the command regress with the option of weights will estimate wrong standard errors. Using the Stata survey specific commands svy will provide appropriate standard errors.

8 The use of weights in most model-assisted estimations using survey data is strongly recommended by the statisticians specialized on survey methodology of the JPSM of the University of Michigan and the University of Maryland.

refusals to answer some specific questions. Enterprise Surveys suffer from both problems and different strategies were used to address these issues.

40. Item non-response was addressed by two strategies:
- a- For sensitive questions that may generate negative reactions from the respondent, such as corruption or tax evasion, enumerators were instructed to collect the refusal to respond as a different option from don't know (-8).
 - b- Establishments with incomplete information were re-contacted in order to complete this information, whenever necessary. However, there were clear cases of low response. The following graph shows non-response rates for the sales variable, *d2*, by sector. Please, note that the coding utilized in this dataset does not allow us to differentiate between "Don't know" and "refuse to answer", thus the non-response in the chart below reflects both categories (DKs and NAs).



41. Survey non-response was addressed by maximizing efforts to contact establishments that were initially selected for interview. Attempts were made to contact the establishment for interview at different times/days of the week before a replacement establishment (with similar strata characteristics) was suggested for interview. Survey non-response did occur but substitutions were made in order to potentially achieve strata-specific goals. Further research is needed on survey non-response in the Enterprise Surveys regarding potential introduction of bias.

42. As the following graph shows, the number of realized interviews per contacted establishment was 0.28⁹. This number is the result of two factors: explicit refusals to

⁹ The estimate is based on the total number of firms contacted including ineligible establishments.

participate in the survey, as reflected by the rate of rejection (which includes rejections of the screener and the main survey) and the quality of the sample frame, as represented by the presence of ineligible units. The number of rejections per contact was 0.35.



43. Details on the rejection rate, eligibility rate, and item non-response are available at the strata level. This report summarizes these numbers to alert researchers of these issues when using the data and when making inferences. Item non-response, selection bias, and faulty sampling frames are not unique to Ukraine. All Enterprise Surveys suffer from these shortcomings, but in very few cases they have been made explicit.

References:

Cochran, William G., Sampling Techniques, 1977.

Deaton, Angus, The Analysis of Household Surveys, 1998.

Levy, Paul S. and Stanley Lemeshow, Sampling of Populations: Methods and Applications, 1999.

Lohr, Sharon L. Sampling: Design and Techniques, 1999.

Scheaffer, Richard L.; Mendenhall, W.; Lyman, R., Elementary Survey Sampling, Fifth Edition, 1996.

Appendix A

Status Codes Total:

ELIGIBLES	
1. Eligible establishment (Correct name and address)	1117
2. Eligible establishment (Different name but same address - the new firm/establishment bought the original firm/establishment)	18
3. Eligible establishment (Different name but same address - the firm/establishment changed its name)	11
4. Eligible establishment (Wrong address - the firm/establishment has changed address and the address could be found)	35
16. Panel firm - now less than five employees	0
5. The establishment has less than 5 permanent full time employees	9
6. The firm discontinued businesses	174
7. Not a business: private household	54
8. Ineligible activity: education, agriculture, finances, governments...	17
151. Out of target - outside the covered regions, firm moved abroad	6
152. Out of target - firm moved abroad	0
153. Impossible to find	0
91. No reply (<i>after having called in different days of the week and in different business hours</i>)	567
92. Line out of order	192
93. No tone	28
94. Phone number does not exist	90
10. Answering machine	24
11. Fax line - data line	10
12. Wrong address/ moved away and could not get the new references	133
13. Refuses to answer the screener	1079
14. In process (<i>the establishment is being called/ is being contacted - previous to ask the screener</i>)	24
Total	3599

Response Outcomes Total:

Complete interviews (<i>Total</i>)	1002
Incomplete interviews	0
Eligible in process	3
Refusals	174
Out of target	6
Impossible to contact	1044
Ineligible - coop.	6
Refusal to the Screener	1079
Total	3599

Status Codes Fresh:

ELIGIBLES	
1. Eligible establishment (<i>Correct name and address</i>)	885
2. Eligible establishment (<i>Different name but same address - the new firm/establishment bought the original firm/establishment</i>)	13
3. Eligible establishment (<i>Different name but same address - the firm/establishment changed its name</i>)	8
4. Eligible establishment (<i>Wrong address - the firm/establishment has changed address and the address could be found</i>)	23
16. Panel firm - now less than five employees	0
5. The establishment has less than 5 permanent full time employees	9
6. The firm discontinued businesses	141
7. Not a business: private household	44
8. Ineligible activity: education, agriculture, finances, governments...	13
91. No reply (<i>after having called in different days of the week and in different business hours</i>)	452
92. Line out of order	176
93. No tone	20
94. Phone number does not exist	74
10. Answering machine	17
11. Fax line - data line	9
12. Wrong address/ moved away and could not get the new references	112
13. Refuses to answer the screener	906
14. In process (<i>the establishment is being called/ is being contacted - previous to ask the screener</i>)	18
151. Out of target - outside the covered regions, firm moved abroad	5
152. Out of target - firm moved abroad	0
153. Impossible to find	0
Total	2934

Response Outcomes Fresh:

Complete interviews (<i>Total</i>)	810
Incomplete interviews	2
Eligible in process	1
Refusals	116
Out of target	5
Impossible to contact	860
Ineligible - coop.	5
Refusal to the Screener	906
Total	2934

Status Codes Panel:

ELIGIBLES		
Eligible	1. Eligible establishment (<i>Correct name and address</i>)	232
	2. Eligible establishment (<i>Different name but same address - the new firm/establishment bought the original firm/establishment</i>)	5
	3. Eligible establishment (<i>Different name but same address - the firm/establishment changed its name</i>)	3
	4. Eligible establishment (<i>Wrong address - the firm/establishment has changed address and the address could be found</i>)	12
	16. Panel firm - now less than five employees	0
Ineligible	5. The establishment has less than 5 permanent full time employees	0
	6. The firm discontinued businesses	33
	7. Not a business: private household	10
	8. Ineligible activity: education, agriculture, finances, governments...	4
Unobtainable	91. No reply (<i>after having called in different days of the week and in different business hours</i>)	115
	92. Line out of order	16
	93. No tone	8
	94. Phone number does not exist	16
	10. Answering machine	7
	11. Fax line - data line	1
	12. Wrong address/ moved away and could not get the new references	21
	13. Refuses to answer the screener	173
	14. In process (<i>the establishment is being called/ is being contacted - previous to ask the screener</i>)	6
	151. Out of target - outside the covered regions, firm moved abroad	1
	152. Out of target - firm moved abroad	0
	153. Impossible to find	0
Total		665

Response Outcomes Panel:

Complete interviews (<i>Total</i>)	192
Incomplete interviews	0
Eligible in process	2
Refusals	58
Out of target	1
Impossible to contact	184
Ineligible - coop.	1
Refusal to the Screener	173
Total	665

Appendix B

Sampling Frame, Ukraine:

Source: Business-Guide™. The Enterprises of Ukraine, 2012

Region	Employees	Food	Garments	Minerals	Machinery	Retail	Other Manufacturing	Other Services	Grand Total
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	100+	74	28	27	30	53	155	250	617
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	100+	47	13	15	31	38	85	206	435
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	100+	68	19	21	39	52	88	191	478
	Total	247	116	125	226	518	958	3185	5375
Grand Total		1569	782	811	1652	4215	8278	29837	47144

Appendix C

Ukraine, administrative divisions



Oblast	Grouping used for stratification purposes in BEEPS V
Kyiv	Kyiv
Kyivska	East
Dnipropetrovska	
Donetska	
Kharkivska	
Luhanska	
Sumska	
Zaporizka	
Chernivetska	West
Ivano-Frankivska	
Khmelnitska	
Lvivska	
Rivnenska	
Ternopil'ska	
Volyn'ska	
Zakarpatska	South
Autonomous Republic of Crimea	
Kherson'ska	
Mykolayiv'ska	
Odeska	
Sevastopol	
Cherkaska	North
Chernihiv'ska	
Kirovohrad'ska	
Poltav'ska	
Vinnitska	
Zhytomyr'ska	

Appendix D

Strict Cell Weights Ukraine – Panel

Region	Employees	Food	Garments	Minerals	Machinery	Retail	Other Manufacturing	Other Services
Kyiv	5-19	4.7	1.0	1.0		1.0	2.6	1.6
	20-99		1.2	1.5		1.0	1.2	
	100+	1.0	1.9	1.9	1.0	1.0		1.0
East	5-19	4.7	1.4	1.7		3.8	1.4	2.7
	20-99	3.2	3.2	1.6		1.5	3.2	
	100+	1.0		1.6			1.0	1.0
West	5-19	1.0	1.0	1.0		1.0	1.0	1.4
	20-99	1.3	1.1	1.1	2.0	1.3	1.0	1.0
	100+	2.0	1.8	2.4		1.0	1.0	1.0
South	5-19	1.2	1.4	1.1	1.0	1.0	1.0	2.5
	20-99	1.1	1.3	2.6		1.0	3.0	1.0
	100+	1.1			1.0			1.0
North	5-19	3.0	1.7			1.4	4.0	4.7
	20-99	1.0	1.0	1.0				1.0
	100+	1.0	2.9	1.0			1.0	1.0

Strict Cell Weights Ukraine – Fresh

Region	Employees	Food	Garments	Minerals	Machinery	Retail	Other Manufacturing	Other Services
Kyiv	5-19	2.3	3.6	2.5	1.4	13.8	19.2	44.4
	20-99	2.5	2.8	2.6	1.6	11.9	25.9	46.0
	100+	7.6	2.1	1.9	1.8	19.4	11.5	14.1
East	5-19	4.3	2.1	2.9	1.5	15.0	20.3	49.9
	20-99	4.1	2.3	3.7	2.0	16.6	30.4	65.4
	100+	6.3		3.6	1.9	7.8	15.6	17.5
West	5-19	7.0	4.0	5.0	2.4	26.1	103.8	259.9
	20-99	6.7	3.9	11.9	3.3	23.0	97.8	163.1
	100+	5.8	6.7	4.6	3.5	12.4	63.3	34.2
South	5-19	3.7	1.9	4.3	4.1	16.1	29.6	167.2
	20-99	4.4	4.4	3.3	1.3	18.1	22.1	77.7
	100+	3.3		3.2	2.6	5.5	6.2	19.4
North	5-19	3.9	2.8	2.4	1.6	24.3	26.9	82.0
	20-99	3.9	3.6	4.4	2.3	9.5	20.6	62.0
	100+	5.0	3.3	9.1	2.8	4.7	12.7	19.4

Median Cell Weights Ukraine – Panel

Region	Employees	Food	Garments	Minerals	Machinery	Retail	Other Manufacturing	Other Services
Kyiv	5-19	10.1	1.0	1.9		2.0	6.0	5.3
	20-99		3.0	4.9		2.8	3.5	
	100+	2.1	4.7	5.8	1.0	1.8		3.0
East	5-19	6.8	1.9	2.8		5.7	2.1	5.8
	20-99	5.8	5.4	3.4		2.9	6.1	
	100+	1.1		3.3			1.3	1.0
West	5-19	1.0	1.0	1.0		1.0	1.0	2.1
	20-99	1.6	1.3	1.5	2.1	1.6	1.0	1.0
	100+	2.4	2.0	3.2		1.0	1.0	1.6
South	5-19	1.7	2.0	1.9	1.0	1.2	1.5	5.3
	20-99	2.0	2.2	5.5		1.9	5.8	1.3
	100+	1.9			1.0			1.0
North	5-19	3.8	2.0			1.9	5.4	9.0
	20-99	1.3	1.0	1.3				2.1
	100+	1.3	4.2	1.6			1.2	1.0

Median Cell Weights Ukraine – Fresh

Region	Employees	Food	Garments	Minerals	Machinery	Retail	Other Manufacturing	Other Services
Kyiv	5-19	5.0	6.0	6.7	2.9	33.1	48.5	147.2
	20-99	5.4	4.6	6.9	3.5	29.1	66.9	155.7
	100+	16.5	3.5	5.1	3.7	47.3	29.5	47.2
East	5-19	8.3	3.1	6.7	2.7	32.0	45.4	146.6
	20-99	8.0	3.4	8.8	3.8	36.2	69.8	196.5
	100+	12.1		8.5	3.5	16.8	35.5	52.1
West	5-19	9.4	4.1	8.2	3.1	39.0	163.2	535.3
	20-99	9.1	4.1	19.9	4.3	35.2	157.1	343.3
	100+	7.8	7.0	7.6	4.5	18.8	101.0	71.4
South	5-19	7.3	2.8	10.3	7.7	35.1	67.7	501.2
	20-99	8.8	6.6	8.0	2.6	40.2	51.6	238.1
	100+	6.6		7.7	5.0	12.2	14.4	58.9
North	5-19	5.4	3.1	4.2	2.2	38.2	44.5	177.6
	20-99	5.5	3.9	7.8	3.1	15.3	34.8	137.4
	100+	7.1	3.6	15.9	3.8	7.5	21.4	42.7

Weak Cell Weights Ukraine - Panel

Region	Employees	Food	Garments	Minerals	Machinery	Retail	Other Manufacturing	Other Services
Kyiv	5-19	12.8	1.1	2.5		2.8	9.1	7.4
	20-99		3.7	6.8		4.3	5.7	
	100+	2.4	4.9	6.7	1.0	2.2		3.8
East	5-19	11.1	2.8	4.7		10.4	4.1	10.5
	20-99	10.3	8.7	6.1		5.6	12.8	
	100+	1.7		5.0			2.3	1.2
West	5-19	1.1	1.0	1.0		1.2	1.2	2.6
	20-99	2.0	1.4	1.9	2.4	2.2	1.3	1.3
	100+	2.4	1.9	3.4		1.0	1.1	1.9
South	5-19	1.9	1.9	2.1	1.0	1.5	1.9	6.3
	20-99	2.3	2.3	6.4		2.4	7.9	1.7
	100+	1.8			1.0			1.0
North	5-19	6.5	3.1			3.5	10.7	16.7
	20-99	2.4	1.0	2.5				4.2
	100+	1.9	5.8	2.5			2.2	1.7

Weak Cell Weights Ukraine – Fresh

Region	Employees	Food	Garments	Minerals	Machinery	Retail	Other Manufacturing	Other Services
Kyiv	5-19	7.7	8.7	10.7	4.7	47.5	82.3	277.4
	20-99	7.3	6.0	9.8	5.0	37.4	101.5	262.8
	100+	23.2	4.7	7.5	5.5	62.6	46.2	82.2
East	5-19	11.8	4.2	10.1	4.1	43.0	72.4	259.9
	20-99	10.2	4.2	11.8	5.1	43.7	99.6	312.0
	100+	16.0		11.8	4.8	21.0	52.3	85.4
West	5-19	12.0	5.0	11.0	4.1	46.8	231.9	845.7
	20-99	10.4	4.5	23.8	5.2	37.8	199.8	485.8
	100+	9.2	7.9	9.4	5.6	20.9	132.6	104.2
South	5-19	8.8	3.3	13.0	9.7	40.0	91.3	751.7
	20-99	9.5	6.9	9.1	2.9	41.0	62.3	319.7
	100+	7.4		9.1	5.8	12.8	17.9	81.6
North	5-19	9.1	4.9	7.4	3.9	60.6	83.4	370.6
	20-99	8.3	5.7	12.3	5.0	21.7	58.4	256.8
	100+	11.0	5.4	26.0	6.3	11.0	37.0	82.4

Appendix E

Strict Universe Estimates Ukraine – Panel

Region	Employees	Food	Garments	Minerals	Machinery	Retail	Other Manufacturing	Other Services	Grand Total
Kyiv	5-19	5	11	3	0	3	3	3	28
	20-99	0	4	2	0	2	2	0	10
	100+	3	2	2	1	1	0	1	10
	Total	8	16	6	1	6	5	4	47
East	5-19	5	6	3	0	4	3	3	23
	20-99	3	3	2	0	2	3	0	13
	100+	2	0	2	0	0	2	2	8
	Total	10	9	7	0	5	8	5	43
West	5-19	5	6	4	0	3	7	6	31
	20-99	3	5	3	2	3	4	4	23
	100+	4	4	2	0	2	3	1	16
	Total	12	14	10	2	8	14	11	70
South	5-19	5	9	4	3	4	2	5	32
	20-99	3	3	3	0	2	3	3	17
	100+	1	0	0	1	0	0	3	5
	Total	9	11	7	4	6	5	11	53
North	5-19	3	5	0	0	4	4	5	21
	20-99	3	5	3	0	0	0	2	13
	100+	2	3	2	0	0	2	1	10
	Total	8	13	5	0	4	6	8	44
Grand Total		47	64	35	7	29	38	38	258

Strict Universe Estimates Ukraine – Fresh

Region	Employees	Food	Garments	Minerals	Machinery	Retail	Other Manufacturing	Other Services	Grand Total
Kyiv	5-19	38	33	40	18	152	307	844	1433
	20-99	22	11	26	20	59	181	368	687
	100+	15	4	6	11	19	46	70	171
	Total	75	48	72	48	231	535	1283	2291
East	5-19	69	49	89	45	300	385	1098	2036
	20-99	65	34	77	30	133	274	523	1137
	100+	50	0	32	17	31	94	105	329
	Total	185	83	198	93	464	753	1726	3502
West	5-19	56	68	35	31	287	312	780	1569
	20-99	47	51	24	26	92	196	326	761
	100+	35	13	9	14	25	63	68	228
	Total	138	133	68	71	404	570	1174	2558
South	5-19	37	17	22	20	161	148	502	907
	20-99	26	13	20	16	54	88	233	451
	100+	17	0	6	5	11	25	39	103
	Total	81	30	48	41	227	261	773	1461
North	5-19	31	20	32	24	121	161	410	799
	20-99	35	21	22	16	48	103	186	431
	100+	25	3	9	8	19	25	39	129
	Total	91	45	63	48	188	290	635	1359
Grand Total		569	339	448	301	1513	2408	5591	11170

Median Universe Estimates Ukraine – Panel

Region	Employees	Food	Garments	Minerals	Machinery	Retail	Other Manufacturing	Other Services	Grand Total
Kyiv	5-19	10	11	6	0	6	6	11	49
	20-99	0	9	5	0	6	7	0	27
	100+	6	5	6	1	2	0	3	23
	Total	16	25	16	1	13	13	14	99
East	5-19	7	8	6	0	6	4	6	36
	20-99	6	5	3	0	3	6	0	24
	100+	2	0	3	0	0	3	2	10
	Total	15	13	12	0	9	13	8	70
West	5-19	5	6	4	0	3	7	8	33
	20-99	3	5	5	2	3	4	4	26
	100+	5	4	3	0	2	3	2	19
	Total	13	15	12	2	8	14	14	78
South	5-19	7	12	8	3	5	3	11	48
	20-99	6	4	5	0	4	6	4	29
	100+	2	0	0	1	0	0	3	6
	Total	15	16	13	4	9	9	18	83
North	5-19	4	6	0	0	6	5	9	30
	20-99	4	5	4	0	0	0	4	17
	100+	3	4	3	0	0	2	1	13
	Total	10	15	7	0	6	8	14	61
Grand Total		69	84	61	7	45	57	67	390

Median Universe Estimates Ukraine – Fresh

Region	Employees	Food	Garments	Minerals	Machinery	Retail	Other Manufacturing	Other Services	Grand Total
Kyiv	5-19	81	54	107	38	365	777	2796	4216
	20-99	49	19	69	42	146	468	1245	2037
	100+	33	7	15	22	47	118	236	479
	Total	162	79	191	102	558	1363	4277	6732
East	5-19	132	71	209	84	639	863	3225	5224
	20-99	127	51	184	57	290	628	1572	2909
	100+	97	0	77	31	67	213	313	798
	Total	356	123	470	173	996	1704	5109	8931
West	5-19	75	70	57	40	429	490	1606	2767
	20-99	64	53	40	35	141	314	687	1333
	100+	47	14	15	18	38	101	143	376
	Total	186	137	112	93	607	905	2435	4475
South	5-19	73	26	51	38	351	339	1504	2381
	20-99	53	20	48	31	121	206	714	1192
	100+	33	0	15	10	24	57	118	258
	Total	158	45	115	79	496	603	2336	3832
North	5-19	43	21	54	33	191	267	888	1498
	20-99	50	24	39	22	77	174	412	797
	100+	36	4	16	12	30	43	85	225
	Total	129	49	109	67	298	483	1386	2520
Grand Total		991	433	998	512	2955	5058	15544	26491

Weak Universe Estimates Ukraine – Panel

Region	Employees	Food	Garments	Minerals	Machinery	Retail	Other Manufacturing	Other Services	Grand Total
Kyiv	5-19	13	12	7	0	8	9	15	65
	20-99	0	11	7	0	9	11	0	38
	100+	7	5	7	1	2	0	4	26
	Total	20	28	21	1	19	21	19	128
East	5-19	11	11	9	0	10	8	11	61
	20-99	10	9	6	0	6	13	0	43
	100+	3	0	5	0	0	5	2	15
	Total	25	20	21	0	16	26	13	120
West	5-19	5	6	4	0	4	8	11	38
	20-99	4	6	6	2	4	5	5	33
	100+	5	4	3	0	2	3	2	19
	Total	14	15	13	2	10	17	18	90
South	5-19	7	11	8	3	6	4	13	52
	20-99	7	5	6	0	5	8	5	36
	100+	2	0	0	1	0	0	3	6
	Total	16	16	15	4	11	12	21	94
North	5-19	6	9	0	0	11	11	17	54
	20-99	7	5	7	0	0	0	8	28
	100+	4	6	5	0	0	4	2	20
	Total	18	20	12	0	11	15	27	102
Grand Total		93	99	82	7	66	90	97	534

Weak Universe Estimates Ukraine – Fresh

Region	Employees	Food	Garments	Minerals	Machinery	Retail	Other Manufacturing	Other Services	Grand Total
Kyiv	5-19	122	78	170	61	522	1317	5271	7541
	20-99	66	24	98	59	187	711	2102	3248
	100+	46	9	22	33	63	185	411	770
	Total	235	112	291	153	772	2212	7784	11559
East	5-19	189	98	313	126	861	1376	5719	8682
	20-99	163	63	247	77	350	896	2496	4291
	100+	128	0	106	44	84	314	512	1188
	Total	480	160	667	247	1295	2586	8727	14161
West	5-19	96	85	77	53	515	696	2537	4059
	20-99	73	58	48	42	151	400	972	1742
	100+	55	16	19	23	42	133	208	495
	Total	224	159	143	117	708	1228	3717	6296
South	5-19	73	35	96	59	303	500	1853	2919
	20-99	75	34	62	35	109	292	770	1377
	100+	55	5	26	19	44	74	165	388
	Total	203	74	184	112	455	867	2788	4684
North	5-19	88	30	65	49	400	457	2255	3343
	20-99	57	21	55	35	123	249	959	1499
	100+	37	0	18	12	26	72	163	327
	Total	182	50	138	95	549	777	3377	5169
Grand Total		1323	555	1423	724	3778	7670	26394	41868

Appendix F

Original Sample Design, Ukraine:

Region	Employees	Food	Garments	Minerals	Machinery	Retail	Other Manufacturing	Other Services	Grand Total
Kiev	5-19	17	20	13	19	14	17	21	121
	20-99	9	7	12	11	7	9	8	63
	100+	5	3	7	4	2	4	6	31
	Total	31	30	32	34	23	30	35	215
East	5-19	17	27	29	31	22	21	23	170
	20-99	17	16	16	22	9	10	8	98
	100+	10	0	9	11	4	8	8	50
	Total	44	43	54	64	35	39	39	318
West	5-19	13	23	13	11	14	10	7	91
	20-99	9	17	9	5	6	6	6	58
	100+	8	4	4	3	4	4	3	30
	Total	30	44	26	19	24	20	16	179
South	5-19	13	12	13	9	14	7	5	73
	20-99	9	6	8	7	5	4	6	45
	100+	5	1	2	3	2	4	5	22
	Total	27	19	23	19	21	15	16	140
North	5-19	9	11	15	13	8	7	8	71
	20-99	11	11	7	8	5	5	4	51
	100+	8	2	3	3	4	4	2	26
	Total	28	24	25	24	17	16	14	148
Grand Total		160	160	160	160	120	120	120	1000