

The Burundi 2014 Enterprise Surveys Data Set

I. Introduction

1. This document provides additional information on the data collected in Burundi between August 2014 and February 2015. The objective of the Enterprise Survey is to gain an understanding of what firms experience in the private sector.

As part of its strategic goal of building a climate for investment, job creation, and sustainable growth, the World Bank has promoted improving business environments as a key strategy for development, which has led to a systematic effort in collecting enterprise data across countries. The Enterprise Surveys (ES) are an ongoing World Bank project in collecting both objective data based on firms' experiences and enterprises' perception of the environment in which they operate.

The Enterprise Surveys currently cover over 130,000 firms in 135 countries, of which 121 have been surveyed following the standard methodology. This allows for better comparisons across countries and across time. Data are used to create statistically significant business environment indicators that are comparable across countries. 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 Burundi 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 two sectors: Manufacturing and Services.

5. For the Burundi Enterprise Survey (ES), 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).

6. Regional stratification for the Burundi ES was defined in three regions: Bujumbura, Gitega, and Ngozi.

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. TNS Opinion was hired to implement the Burundi 2014 enterprise surveys roll out.

9. The frame used involved two lists: (i) Liste des operateurs commerciaux du Burundi from Office Burundais des Recettes (OBR) and (ii) Répertoire des Entreprises pour échantillon de EECI 2013 from Institut de Statistiques et d'Etudes Economiques du Burundi (ISTEEBU). Sample frame counts can be found in Appendix B. The database contained the following information

- Detailed stratification variables;
- Location identifiers- address, phone number, email;
- Contact name(s).

10. The enumerated establishments with 5 employees or more were then used as the sample frame for the Burundi Enterprise Survey with the aim of obtaining interviews at 150 establishments.

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. In addition, the sample frame contains no telephone/fax numbers so the local contractor had to screen the contacts by visiting them.

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 14.7% (43 out of 293 establishments)⁴.

Breaking down by industries and size, the following sample targets were achieved (using screener variables a3a, a4b and a6b):

Achieved sample

	Manufacturing	Services	Grand Total
Bujumbura	54	57	111
1-Small	9	39	48
2-Medium	42	14	56
3-Large	3	4	7
Gitega	1	21	22
1-Small		16	16
2-Medium	1	5	6
3-Large			
Ngozi	5	19	24
1-Small	4	18	22
2-Medium	1		1
3-Large		1	1
Grand Total	60	97	157

IV. Data Base Structure:

13. The structure of the data base reflects the fact that 3 different versions of the survey instrument were used for all registered establishments. Questionnaires have common questions (*core* module) and respectfully additional manufacturing and retail specific questions. The eligible manufacturing industries have been surveyed using the *Manufacturing* questionnaire (includes the *core* module, plus manufacturing specific

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

questions). Retail firms have been interviewed using the **Retail** questionnaire (includes the *core* module plus retail specific questions) and the residual eligible services have been covered using the core module only (**Other Services** questionnaire). 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 (some exceptions apply due to comparability reasons). Variable names preceded by a prefix “AF4” and “SNG” indicate questions specific to the region or Burundi, 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 micro, 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 codes for the chosen industries for stratification. These codes include most manufacturing industries (15 to 37), other manufacturing (2), retail (52), and (45, 50, 51, 55, 60, 63, 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. However, the phone numbers were unavailable in the sample frame, and thus the enumerators applied the screeners in person. 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 variables for 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. 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.

20. 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.

21. Note that the fiscal years in Burundi are equivalent to the calendar year

V. Universe Estimates

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

22. Appendix B shows the overall estimates of the numbers of establishments in Burundi based on the sample frame.

23. 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.

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

25. 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*.

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

26. 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*.

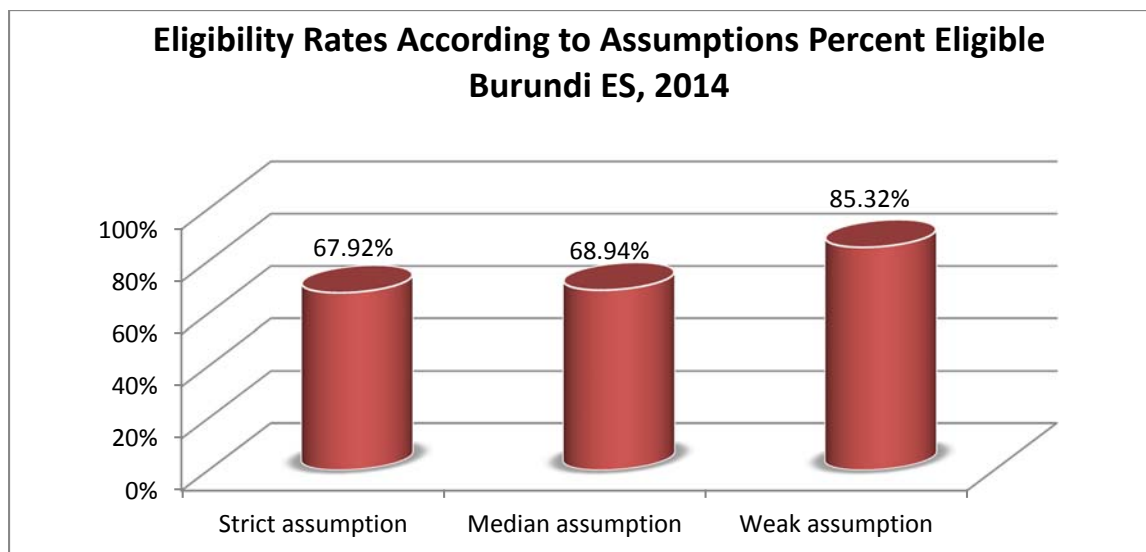
$$\text{Median eligibility} = (\text{Sum of the firms with codes } 1, 2, 3, 4, 16, 10, 11, \& 13) / \text{Total}$$

27. 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

28. 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.



29. Universe estimates for the number of establishments in each industry-region-size cell in Burundi 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.

30. 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

31. 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

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

32. 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 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 in the phone line, answering machine, 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.

33. All size firms in the Service sector in Bjumbura have equal weights due to the lack of achieved interviews. Therefore weights in the Service sector are not size – specific. Appendix C shows the cell weights for registered establishments in Burundi.

VII. Appropriate use of the weights

34. 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.

35. 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 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

36. 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

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.

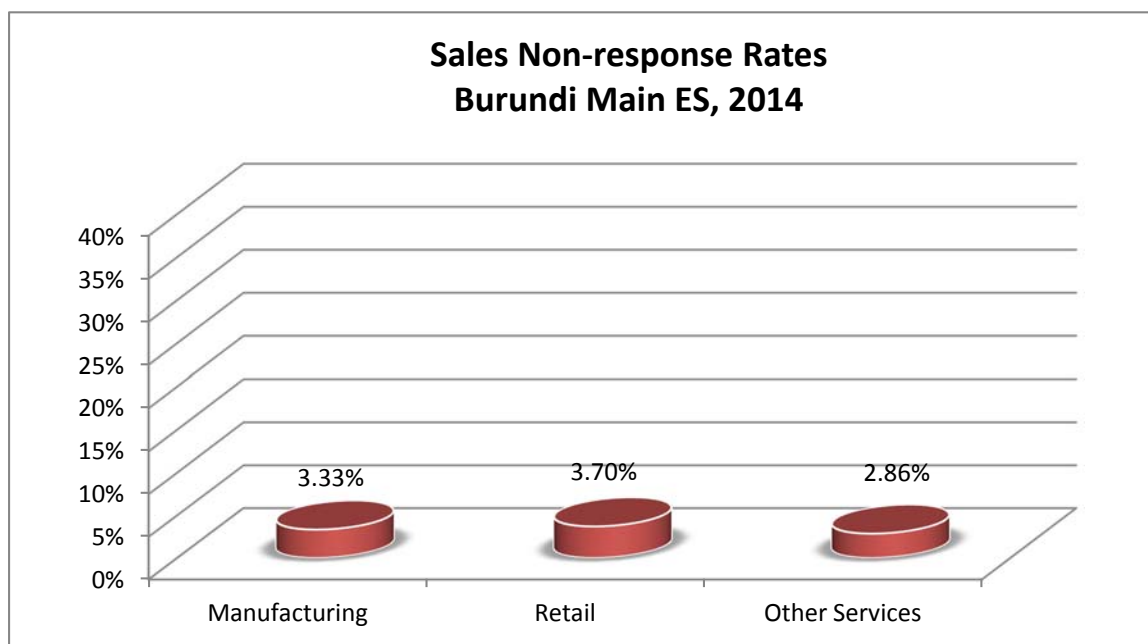
⁸ The use weights in most model-assisted estimations using survey data is strongly recommended by the statisticians specialized on survey methodology of the JPSM of the University of Michigan and the University of Maryland.

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

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

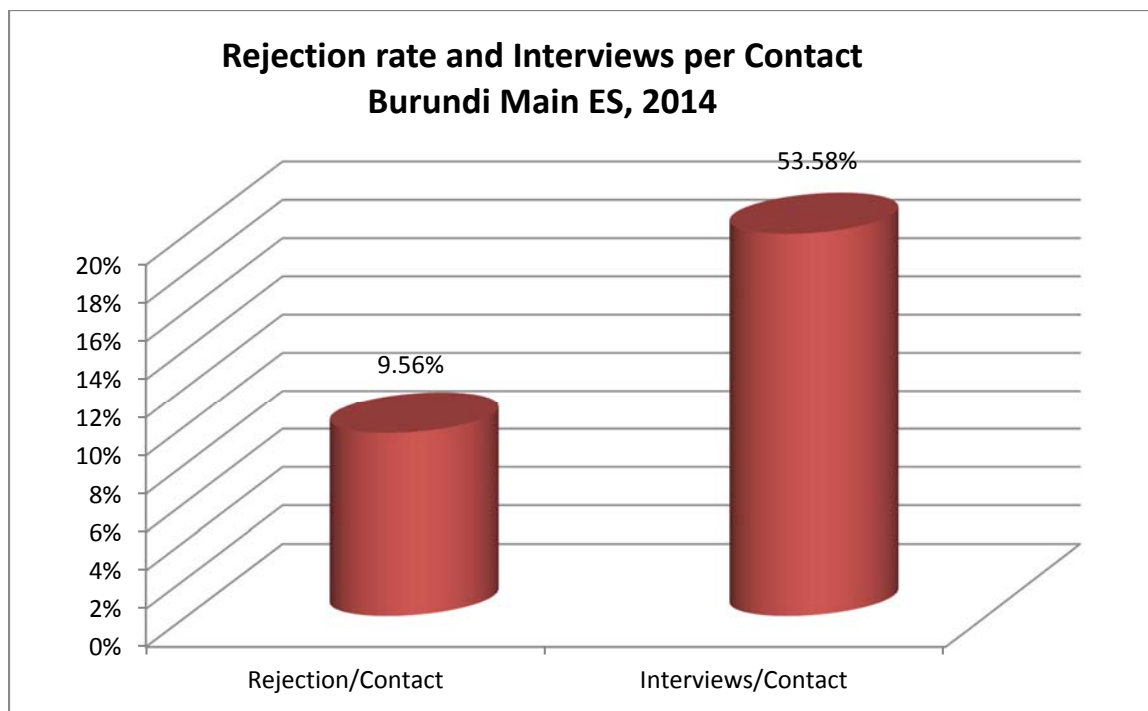
38. Item non-response was addressed by two strategies:
- a- For sensitive questions that may generate negative reactions from the respondent, such as corruption or tax evasion, enumerators were instructed to collect the refusal to respond as a different option from don't know (-7).
 - b- Establishments 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 charts below reflect both categories (DKs and NAs).



39. 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.

40. As the following graph shows, the number of interviews per contacted establishments was 53.58%⁹. This number is the result of two factors: explicit refusals to 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 9.56%.



41. Details on the rejection rate, eligibility rate, and item non-response are available at the level strata. 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 Burundi. 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.

⁹ The estimate is based on the total no. of firms contacted including ineligible establishments.

Appendix A

Status Codes Enterprise Survey (ES):

	Burundi
1. Eligible establishment (Correct name and address)	183
2. Eligible establishment (Different name but same address - the new firm/establishment bought the original firm/establishment)	2
3. Eligible establishment (Different name but same address - the firm/establishment changed its name)	1
4. Eligible establishment (Wrong address - the firm/establishment has changed address and the address could be found)	13
5. The establishment has less than 5 permanent full time employees	3
6. The firm discontinued businesses	0
7. Not a business: private household	23
8. Ineligible activity: education, agriculture, finances, governments...	14
91. No reply (<i>after having called in different days of the week and in different business hours</i>)	6
92. Line out of order	9
93. No tone	5
94. Phone number does not exist	0
10. Answering machine	0
11. Fax line - data line	0
12. Wrong address/ moved away and could not get the new references	28
13. Refuses to answer the screener	3
14. In process (<i>the establishment is being called/ is being contacted - previous to ask the screener</i>)	0
151. Out of target - outside the covered regions	3
152. Out of target - moved abroad	0
154. Out of target - establishment is HQ without production or sales of goods or services	0
155. Out of target - establishment was not in operation for the entire last fiscal year	0
	293

Response Outcomes Enterprise (ES) Survey:

	Burundi
Sample target	157
Complete interviews (Total)	157
Incomplete interviews	4
Elegible in process	13
Refusals	25
Ineligible	40
Impossible to contact	48
Ineligible - coop.	3
Refusal to the Screener	3
(Screener) in Process	0
	293

Appendix B

Universe Burundi:

Source: Office Burundais des Recettes (OBR), Institut de Statistiques et d'Etudes Economiques du Burundi (ISTEEBU)

	Manufacturing	Services	Grand Total
Bujumbura	138	788	926
1-Small	74	552	626
2-Medium	48	171	219
3-Large	16	65	81
Gitega	4	52	56
1-Small	2	44	46
2-Medium		8	8
3-Large	2		2
Ngozi	9	50	59
1-Small	6	48	54
2-Medium	2	2	4
3-Large	1		1
Grand Total	151	890	1041

Appendix C

Strict Cell Weights Burundi:

	Manufacturing	Services
Bujumbura		
1-Small	1.15	
2-Medium	1.32	
3-Large	1.00	
4-Small-Medium-Large Collapsed		12.31
Gitega		
1-Small	1.42	2.41
2-Medium		1.00
3-Large		
4-Small-Medium-Large Collapsed		
Ngozi		
1-Small	1.00	2.72
2-Medium	1.45	1.57
3-Large	1.00	
4-Small-Medium-Large Collapsed		

Median Cell Weights Burundi:

	Manufacturing	Services
Bujumbura		
1-Small	1.19	
2-Medium	1.33	
3-Large	1.00	
4-Small-Medium-Large Collapsed		12.22
Gitega		
1-Small	1.45	2.44
2-Medium		1.00
3-Large		
4-Small-Medium-Large Collapsed		
Ngozi		
1-Small	1.07	2.86
2-Medium	1.50	1.60
3-Large	1.00	
4-Small-Medium-Large Collapsed		

Weak Cell Weights Burundi:

	Manufacturing	Services
Bujumbura		
1-Small	1.40	
2-Medium	1.62	
3-Large	1.00	
4-Small-Medium-Large Collapsed		17.03
Gitega		
1-Small	1.73	3.03
2-Medium		1.00
3-Large		
4-Small-Medium-Large Collapsed		
Ngozi		
1-Small	1.07	3.00
2-Medium	1.55	1.73
3-Large	1.00	
4-Small-Medium-Large Collapsed		

Appendix D

Strict Universe Estimates

	Manufacturing	Services	Grand Total
Bujumbura	84	480	565
1-Small	47	0	47
2-Medium	26	0	26
3-Large	11	0	11
4-Small-Medium-Large Collapsed	0	480	480
Gitega	3	41	44
1-Small	1	34	35
2-Medium	0	7	7
3-Large	2	0	2
4-Small-Medium-Large Collapsed	0	0	0
Ngozi	7	45	53
1-Small	5	43	48
2-Medium	1	2	3
3-Large	1	0	1
4-Small-Medium-Large Collapsed	0	0	0
Grand Total	95	566	661

Median Universe Estimates

	Manufacturing	Services	Grand Total
Bujumbura	86	477	563
1-Small	49	0	49
2-Medium	27	0	27
3-Large	11	0	11
4-Small-Medium-Large Collapsed	0	477	477
Gitega	3	41	45
1-Small	1	34	36
2-Medium	0	7	7
3-Large	2	0	2
4-Small-Medium-Large Collapsed	0	0	0
Ngozi	8	47	55
1-Small	5	46	51
2-Medium	1	2	3
3-Large	1	0	1
4-Small-Medium-Large Collapsed	0	0	0
Grand Total	98	565	663

Weak Universe Estimates

	Manufacturing	Services	Grand Total
Bujumbura	101	664	765
1-Small	57	0	57
2-Medium	32	0	32
3-Large	11	0	11
4-Small-Medium-Large Collapsed	0	664	664
Gitega	4	49	53
1-Small	2	42	44
2-Medium	0	7	7
3-Large	2	0	2
4-Small-Medium-Large Collapsed	0	0	0
Ngozi	8	50	58
1-Small	5	48	53
2-Medium	2	2	3
3-Large	1	0	1
4-Small-Medium-Large Collapsed	0	0	0
Grand Total	112	763	876

Appendix E

Original Sample Design, Burundi:

	Manufacturing	Services	Grand Total
Bujumbura	69	37	106
1-Small	42	8	50
2-Medium	19	11	30
3-Large	8	18	26
Gitega	1	21	22
1-Small	1	14	15
2-Medium	0	7	7
3-Large	0	0	0
Ngozi	5	17	22
1-Small	3	16	19
2-Medium	1	1	2
3-Large	1	0	1
Grand Total	75	75	150

Completed Interviews, Burundi:

	Manufacturing	Services	Grand Total
Bujumbura	54	57	111
1-Small	9	39	48
2-Medium	42	14	56
3-Large	3	4	7
Gitega	1	21	22
1-Small		16	16
2-Medium	1	5	6
3-Large			
Ngozi	5	19	24
1-Small	4	18	22
2-Medium	1		1
3-Large		1	1
Grand Total	60	97	157

Appendix F

Local Agency team involved in the study:

Local Agency	Name: OutReach Development Solutions Country: Burundi Membership of international organization: Rwanda Organization of Professional Consultants Activities since: 2007
Enumerators involved:	Enumerators: 15 Recruiters: 7
Other staff involved:	Fieldwork Coordinators: 3 Data Entry: 2 Data Processing: 4

Sample Frame:

Characteristic of sample frame used:	All operating businesses in Burundi
Source:	<ul style="list-style-type: none"> • Institut de Statistiques et d'Etudes Economiques du Burundi (ISTEEBU) • Office Burundais des Recettes (OBR)
Quality of sample frame	The sample frame from ISTEEBU had both the formal and informal business and more than 55% contained inaccurate information that was the most required i.e address, phone numbers, correct names of businesses. The list from OBR had only the names of taxpayer (Enterprises) and only categorized by Large, Medium and Small taxpayers.
Year and organism who conducted the last economic census	Institut de Statistiques et d'Etudes Economiques du Burundi, 2012
Year:	2013 - 2014
Other sources for companies statistics	<ul style="list-style-type: none"> • Business Directory • Burundi Chamber of Commerce and Industry • Marie de Bujumbura

Sectors included in the Sample:

Original Sectors	Food, Textile, Non-metals – Mineral products, Metals,
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	Chemicals, Carpentry, Other manufacturing, Retail and Other services
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Fieldwork and country situation:

Date of Fieldwork	August 2014 – February 2015
Country	Burundi
Use of CAPI	<ul style="list-style-type: none"> No
Problems found during fieldwork:	<ul style="list-style-type: none"> Getting appointments with managers/high ranking officials of the big enterprises was extremely difficult as it required going through the normal channel of writing an official letter and waiting for a reply. As of June 30, 2014 all unregistered mobile numbers were disconnected from their respective networks and this affected many of the enterprises which had either landlines or mobile numbers only. Lack of operational contact details made it very difficult to get in touch with them. Many respondents were uncomfortable with the length of the questionnaire and in many cases the interview was done in bits with different persons taking part and often this led to provision of contradicting information. Many business owners suspected that the study is meant to get tax and social security defaulters hence were not ready to provide figures that were related to sales or staff costs
Country specific situation	The preparation of the July 2015 Parliamentary and Presidential elections was underway from November 2014 until the close of the project. This effectively led to a lot of cancellation of appointments.