Guyana 2010 Enterprise Surveys Data Set

I. Introduction

1. This document provides additional information on the data collected in Guyana between March 2011 and August 2011 as part of the Latin America and Caribbean (LAC) Enterprise Survey 2010, an initiative of the World Bank.

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 methodology, the sample 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 Guyana was selected using stratified random sampling, following the methodology explained in the *Sampling Note*[1]. Stratified random sampling[2] was preferred over simple random sampling for several reasons[3]:

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/locations.

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.)

[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

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 are used in the Enterprise Surveys: industry, establishment size, and location. The original sample design with specific information of the industries and locations chosen is described in Appendix E. For smaller economies, an Indicator Survey design is used, with a target of 150 completed interviews.

4. Industry stratification for the Indicator Surveys is designed to obtain 75 interviews in manufacturing and 75 interviews in service sectors. However, frequently due to the size of the manufacturing sector, less than the full 75 interviews are achieved.

5. Size stratification was defined following the standardized definition for the Enterprise Surveys: 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. In Guyana, due to the size of the sample target, the entire country was treated as one geographical location.

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 location) 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. EEC Canada was hired to implement the LAC 2010 enterprise surveys roll out in Guyana.

9. The sample frame for Guyana was produced from the Guyana Revenue Authority and the Guyana National Statistics Office. The sample frame contained the following information:

- Coverage;
- Up to datedness;
- Availability of detailed stratification variables ;
- Location identifiers- address, phone number, email;
- Electronic format availability;
- Contact name(s).

Counts from sample frames are shown below.

Sample Frames

Source: the Guyana Revenue Authority, National Statistics Office

Firm Size	Manufacturing	Services	Total
Small	57	119	176
Medium	65	77	142
Large	27	38	65
Grand Total	**149**	**234**	**383**

10. The sample frame then used for the selection of a sample with the aim of obtaining interviews with 150 establishments with five or more employees

11. The quality of the frame was assessed at the outset 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. Due to response rate and ineligibility issues, additional sample had to be extracted by the World Bank in order to obtain enough eligible contacts and meet the sample targets.

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 7.16% (24 out of 335)[4].

IV. Data Base Structure:

13. The structure of the data base reflects the fact that 2 different versions of the questionnaire were used. A Services questionnaire includes questions relevant to the service sectors; while the lengthier Manufacturing questionnaire adds questions relevant only to manufacturing. 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 proceeded by a prefix "*LAC"* indicate questions specific to LAC, 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.

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

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 location), *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 location. Different combinations of these variables generate the strata cells for each industry/location/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 locations
-*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 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 additional variables for location size by population (a3) and firm size by number of workers (*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. 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.

21. 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

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

23. Appendix B shows the overall estimates of the numbers of establishments in Guyana based on the sample frame.

24. 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.

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

26. Strict assumption: eligible establishments are only those for which it was possible to directly determine eligibility. The resulting weights, which include adjustments applied to panel firms (see below), are included in the variable
w_strict_fresh.

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

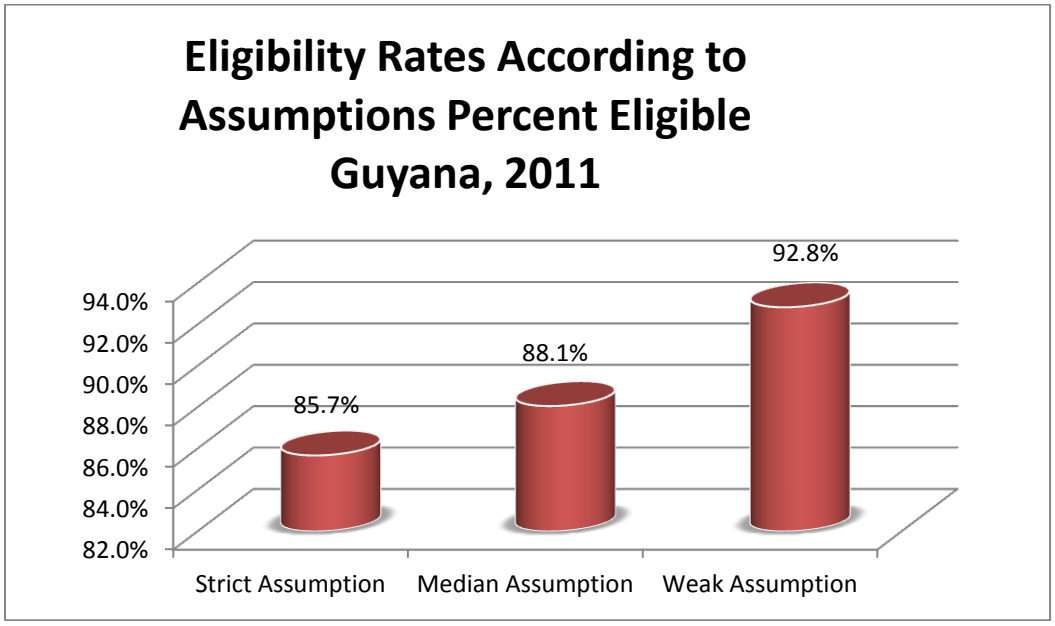
27. Median assumption: eligible establishments are those for which it was possible to directly determine eligibility and those that rejected the screener questionnaire or an answering machine or fax was the only response. The resulting weights are included in the variable *w_median_fresh*.

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

28. 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 bvwith 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 *w_weak_fresh*.

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

29. 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.



30. Universe estimates for the number of establishments in each industry-location-size cell in Guyana 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.

31. 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

32. 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]

33. Special care was given to the correct computation of the weights. It was imperative to accurately adjust the totals within each location/industry/size stratum to account for the presence of ineligible units (the firm discontinued business 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

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

business hours, no tone in the phone line, answering machine, fax line[6], 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.

34. Appendix C shows the cell weights for registered establishments in Guyana.

VII. Appropriate use of the weights

35. 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.

36. 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]

37. 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

38. 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

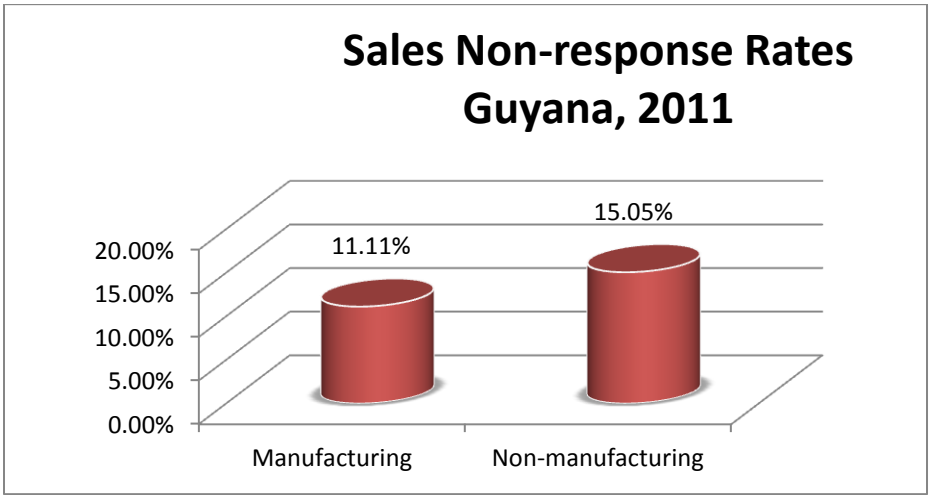
[6] For the surveys that implemented a screener over the phone.

[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 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.

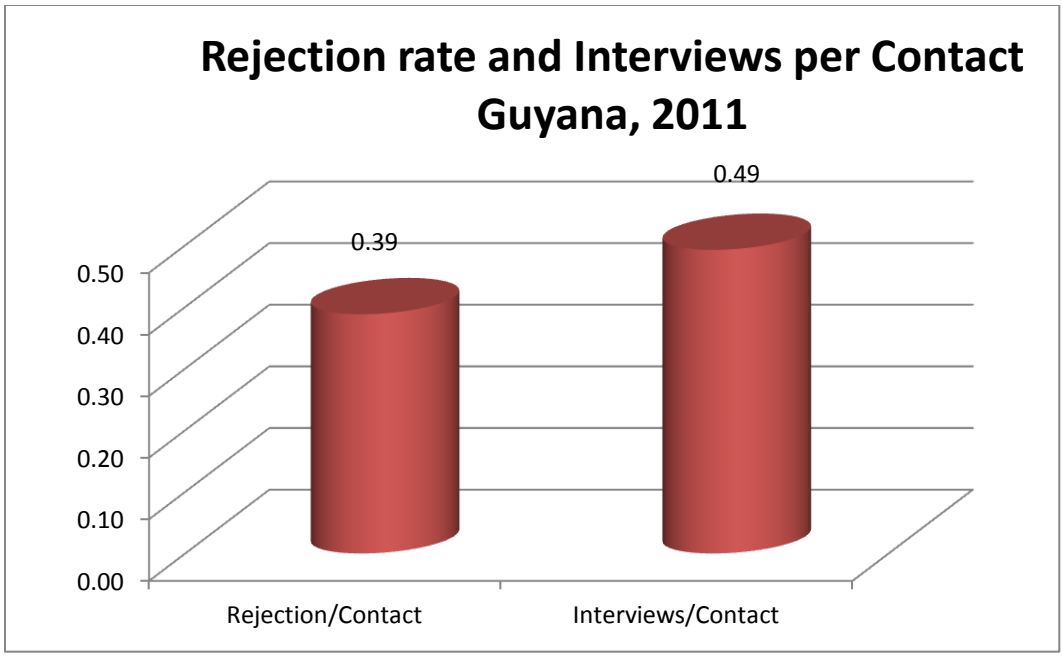
39. Item non-response was addressed by two strategies:
a- For sensitive questions that may generate negative reactions from the respondent, such as corruption or tax evasion, enumerators were instructed to collect the refusal to respond as a different option from don't know (-7).
b- Establishments with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



40. 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.

41. As the following graph shows, the number of realized interviews per contacted establishment was .49[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 .39.

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



42. 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 Guyana. 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. Samping: Design and Techniques, 1999.

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

Appendix A

Status Codes:

	Status	#
Eligibles	1.Elegible establishment (Correct name and address)	286
	2. Elegible establishment (Different name but same address - the new firm/establishment bought the original firm/establishment)	0
	3. Elegible establishment (Different name but same address - the firm/establishment changed its name)	1
	4. Elegible establishment (Wrong address - the firm/establishmen has changed address and the address could be found)	0
Ineligibles	5. The establishment has less than 5 permanent full time employees	2
	6. The firm discontinued businesses	14
	7. Not a business: private household	0
	8. Ineligible activity: education, agriculture, finances, governments…	8
Unobtainable	91. No reply *(after having called in different days of the week and in different business hours)*	0
	92. Line out of order	0
	93. No tone	0
	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	16
	13. Refuses to answer the screener	8
	14. In process *(the establishment is being called/ is being contacted - previous to ask the screener)*	**0**
	151. Out of target - outside the covered regions, firm moved abroad	0
	152. Out of target - firm moved abroad	0
	152. Out of target - Not registered with SAT	0
	Total	**335**

Sample Target	**150**
Complete interviews **(Total)**	165
Incomplete interviews	0
Elegible in process	0
Refusals	122
Out of target	24
Impossible to contact	16
Ineligible - coop.	0
Refusal to the Screener	8
Total	**335**

Appendix B

Universe Estimate, Guyana:

Source:

Firm Size	Manufacturing	Services	Total
Small	57	119	176
Medium	65	77	142
Large	27	38	65
Grand Total	**149**	**234**	**383**

Appendix C

Strict Cell Weights Guyana:

Strict assumption weights		
Firm Size	**Manufacturing**	**Services**
Small	1.69	3.12
Medium	1.81	1.86
Large	1.30	1.67

Weak Cell Weights Guyana:

Weak assumption weights	Column Labels	
Firm Size	**Manufacturing**	**Services**
Small	1.92	3.67
Medium	1.91	1.97
Large	1.30	1.71

Median Cell Weights Guyana:

Median assumptions weights	Column Labels	
Firm Size	**Manufacturing**	**Services**
Small	1.77	3.28
Medium	1.84	1.91
Large	1.30	1.67

Appendix D

Strict Universe Estimates

Strict Universe Estimates			
Firm Size	**Manufacturing**	**Services**	**Total**
Small	44.00	90.44	134.44
Medium	58.00	68.79	126.79
Large	26.00	35.00	61.00
Grand Total	**128.00**	**194.23**	**322.23**

Weak Universe Estimates

Weak Universe Estimates			
Firm Size	**Manufacturing**	**Services**	**Total**
Small	50.00	106.31	156.31
Medium	61.00	72.89	133.89
Large	26.00	36.00	62.00
Grand Total	**137.00**	**215.20**	**352.20**

Median Universe Estimates

Median Universe Estimates			
Firm Size	**Manufacturing**	**Services**	**Total**
Small	46.00	95.20	141.20
Medium	59.00	70.84	129.84
Large	26.00	35.00	61.00
Grand Total	**131.00**	**201.04**	**332.04**

Appendix E

Original Sample Design, Guyana:

Firm Size	Manufacturing	Services	Total
Small	25	25	50
Medium	25	25	50
Large	25	25	50
Grand Total	**75**	**75**	**150**

Completed Interviews, Guyana:

Firm Size	Manufacturing	Services	Total
Small	26	29	55
Medium	32	37	69
Large	20	21	41
Grand Total	**78**	**87**	**165**