



ANNEX 1: POPULATION, LABOR FORCE, AND EMPLOYMENT IN ARMENIA: DIFFERENCES BETWEEN NSS ADMINISTRATIVE DATA, LABOR FORCE SAMPLE SURVEY DATA AND SPSS MODEL DATA AND WHAT THEY MEAN FOR THE SPSS MODELING APPROACH

In the course of presentations, discussions, and comments of the MLSI on the first draft of the Report being prepared by the SPSS Project, it has become apparent that there is need to be explicit about the exact meaning of various labor market definitions being used. In addition, it has become apparent that there are non-trivial differences between labor market and employment aggregates estimated by the model and data generated by the National Statistical Service (NSS). Such differences arise either from differing definitions or from different approaches to data. The model is initialized on the 2001 Census of Armenia, which offers a number of advantages. All data, from employment by sector to labor force status to population are disaggregated by age, sex, and rural-urban place of residence, and all are consistent. On the other hand, NSS administrative data are regularly updated, and there have been many changes in Armenia since 2001. However there are also differences between NSS sources on labor statistics: the administrative statistics are collected and estimate the labor market in Armenia based on information submitted by MLSI SESA on unemployment and job seekers and on official statistical forms submitted by enterprises and businesses on the number of employed and employment flows according to the State Law on Statistics. The other source for measuring the labor market developments in Armenia are Labor Force Sample Surveys (LFS).

We need to understand these differences. This Annex will provide a description of approaches and results pertaining to population, labor force status, and employment. This has four salutary effects. It forces us to be explicit on definitions, which will improve the quality of discussions. It allows us to understand why differences are observed and to ask ourselves whether they are important or not. It provides a basis for what changes, if any, in approach are called for. Finally, it provides an ideal opportunity to consider carefully just how the model, or at least a key part of it, operates.

1.1. De facto and de jure population, labor force, and employment

De facto population refers to the population physically in residence, *de jure* refers to the population legally in residence. Similar concepts apply to labor force and employment. In Armenia, there are two major aspects of the distinction:

1.1.1 The 2001 Census reported both de facto and de jure population estimates by age, sex, and urban rural residence.

- a. Some persons enumerated *de jure* in Armenia were actually physically abroad. Taking total population for the country as a whole, population *de facto* was enumerated at 3,001.6 thousand whereas population *de jure* was enumerated at 3,186.8 thousand, a difference of about 185 thousand or 6 percent.
- b. One may speculate that some persons enumerated *de facto* as living in rural zones were actually urban residents *de jure* and *vice versa*.

1.1.2 The 2001 Census reported only de jure labor force and employment data. In order to estimate these, we have applied population de facto / de jure multiplicative factors to de jure labor force and employment data.

1.2. Labor force and employment definitions according to NSS administrative statistics and Labor Force Survey

NSS Administrative Statistics estimate the labor market using the following definitions:

Labor resources: Two definitions are given – (i) “all the employed and unemployed” i.e. labor force participants and inactive population (ii) “employable population of working age, working pensioners, and working adolescents.” Adolescents/persons of pensionable age (APPA) who are unemployed and looking for a job are also part of “labor resources” and fall under definition (i) but not under definition (ii). Definition (ii) **should be amended** to include “A/PPA who are unemployed, i.e. who are looking for a job but cannot find one.” That would reconcile the apparent discrepancy. At any rate, there is no dispute that A/PPA who are not working and not looking for a job are not considered unemployed and hence do not count as part of labor resources.

Economically active population (also known as active labor force): This is defined as the sum of the employed and unemployed populations (presumably of all ages) i.e. a labor supply in the reporting period.

Labor force participation rate: This is defined as active labor force over labor resources or active labor force over the total population of the relevant age group.

Economically inactive population: Defined as persons of working age not in the labor force, not working, and for any reason not looking for a job; includes students, persons engaged in housekeeping or providing care. Note that the definition does not include the institutionalized population, and members of the military, as well as adolescents of working age in child care institutions. Note that the economically active population plus economically inactive population equals labor resources (according to the NSS estimates).

Employed population: This includes wage and non-wage earners (employers, self-employed, unpaid family workers). Those who do volunteer job for both organizations and households as well as those who do unpaid construction or other work in their own household are not considered employed.

Unemployed population: NSS administrative statistics on unemployment include only persons who have registered with the State Employment Services. The institutional population and persons serving in the military are not included in the unemployed population. They are not included in the active labour force, as well. But in the Census, , they are.

Unemployment rate: This is defined as unemployed over labor resources or active labor force over the total population of the relevant age group.

The NSS Labor Force Survey estimates the labor market using ILO definitions:

Labor resources: defined as all who are employed and unemployed i.e. labor force participants and inactive population

Economically active population (active labor force): Defined as the sum of the employed and unemployed populations (of all ages).

Labor force participation rate: Defined as active labor force over labor resources or active labor force over the total population of the relevant age group.

Economically inactive population: Defined as persons not working and for any reason not looking for a job.

Employed population: These are persons who, during the week prior the survey, have done a job for hire or not for hire, even if the job was for 1 hour, regardless the time when they will receive the

income from that job. The definition includes all those who are wage earners or self-employed, have registered or unregistered businesses, unpaid family members who are in the non-agricultural sector and military servants (except for conscripts).

Unemployed population: Persons who met the following criteria during the 4 weeks prior the survey: have no job or income earning activity; were actively looking for a job using all possible means; were ready to start the job within 2 weeks once they get an offer. Persons who were not working during the survey but have had a job offer and were ready to start the job within 2 weeks were also considered as unemployed.

Unemployment rate: Defined as unemployed over labor resources or active labor force over the total population of the relevant age group.

The SPSS model estimates based on Census data are in fact using the ILO definitions so our model estimates are closer to LFS data.

There is no such thing as “labor resources” in the Census and consequently in the SPSS model – every member of the population 15 and over is either economically inactive or active; if the latter, he/she is employed or unemployed. Economic activity under 15 is reported as zero – the table starts with the 15-19 age group.

Economically inactive population: the model uses the 2001 Census data adjusted by the *de facto / de jure* factor as according to Census the economically inactive population over 15 is reported to be 803.7 thousand, as opposed to the *de jure* enumeration of 841.7 thousand.

Economically active population: Economically active population over 15, again adjusted by the *de facto / de jure* factor,

Employed/Unemployed: the Census adopted the ILO definition of unemployment so SPSS data are closer to ILO definitions.

These estimates are summarized in the table below.

Table 1: Labor Force and Employment

| Labor Force | | | | |
|-------------|---|---------------------------------------|--|-----------------------------|
| Age | Working? | | Not working? | |
| | Looking for a job | Not looking for a job. | Looking for a job | Not looking for a job |
| 0-14 | No such thing | Economically active (very low number) | Economically active (very low number) | Not economically active |
| 15-62 | Economically active | | Economically active; unemployed | Not economically active |
| 63+ | Economically active (low, but not inconsequential number) | | Economically active; unemployed (low, but not inconsequential number) | Not economically active |
| Sum | Total employment = wage earners + non-wage earners (employers, self employed, unpaid family laborers) | | Total unemployment = Economically active population - Total unemployment | Total economically inactive |
| | Total economically active | | | Total economically inactive |
| | Labor resources | | | |

1.3. Labor force and employment according to 3 estimates

Labor force participation according to 3 estimates is presented in table 2 below. It is worth mentioning that the SPSS model and LFS survey count the employment from age 15, while NSS administrative statistics considers labor force participation since 16 years of age. While this could be used as an explanation to notably lower estimates for labor resources and active population of NSS administrative sources, however the main explanation can be the estimate of unemployment. As mentioned above NSS administrative data consider as unemployed those who are officially registered with SESA and those were only 83 thousand in 2007, while the overwhelming majority of people who were actively looking for a job do not apply to SESA.

But NSS administrative sources also show a lower number for the total active and inactive population, which is hard to explain at the moment as the total number of population estimated by NSS and SPSS model are rather close – 3,222.9 thousand and 3,232.3 thousand respectively. Why are there significant differences between the NSS official statistical data and the 2001 Census numbers adjusted downward to reflect *de facto* population? Here are a few possibilities:

According to Wikipedia, there are 60,000 persons serving in the Armenian military. Since economically active plus economically inactive equals the total population, these must be included in the economically active population. One of the economic sectors of activity for the economically active population is “public administration and defense.” So, we are quite confident that the military is included. We do not know whether they are in the NSS’s administrative statistics on active labor force.

Here is another possibility: We can adjust both economically active and inactive populations, by age and sex, down by population-wide age- and sex-specific *de facto / de jure* factors. A logical case could be made that the *de jure* economically active population should be adjusted down proportionally more (these persons are especially likely to be abroad) and the economically inactive population adjusted downward proportionally less (these persons are especially likely to be in Armenia).

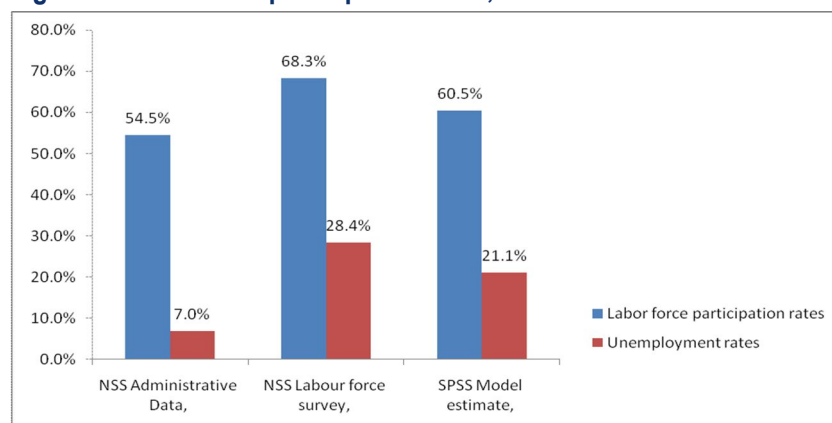
Table 2: Labor Resources, Employment and Unemployment, 2007

| | <u>Labour resources</u> | <u>Including</u> | | <u>Including</u> | |
|-------------------------|--------------------------------|-------------------------------------|-----------------------------------|-------------------------|--------------------------|
| | | <u>Non Active population</u> | <u>Active Labour force</u> | <u>Employed</u> | <u>Unemployed</u> |
| | | | | | |
| NSS Administrative Data | 2,171.4 | 987.2 | <u>1,184.3</u> | <u>1,101.5</u> | <u>82.8</u> |
| NSS Labour force survey | <u>2,430.3</u> | 770.9 | <u>1,659.4</u> | <u>1,188.5</u> | <u>470.9</u> |
| SPSS Model estimate | 2,566.5 | 1,014.9 | <u>1,551.6</u> | <u>1,223.6</u> | <u>328.</u> |

Summing up we could state that the SPSS model estimates are somewhere in the middle, showing quite realistic numbers for the labor market in Armenia.

In fact going further, implied labor force participation rates are not much different – $1184.3 / 2171.4 = 54.3$ percent for the NSS administrative data and $1551.6 / 2566.5 = 60.5$ percent for the SPSS model. One is based on “labor resources” and the other is based on total population. While unemployment rates estimates are closer to LFS survey results.

Figure 1: Labor force participation rates, 2007



1.4. Informal / hidden employment and agriculture

NSS RA estimates the informal employment / hidden employment based on LFS data. For these estimates NSS uses the following definitions:

1. Wage earners without a formal labor contract
2. Hired workers who received in kind remuneration
3. Unregistered self-employed
4. Unregistered employers

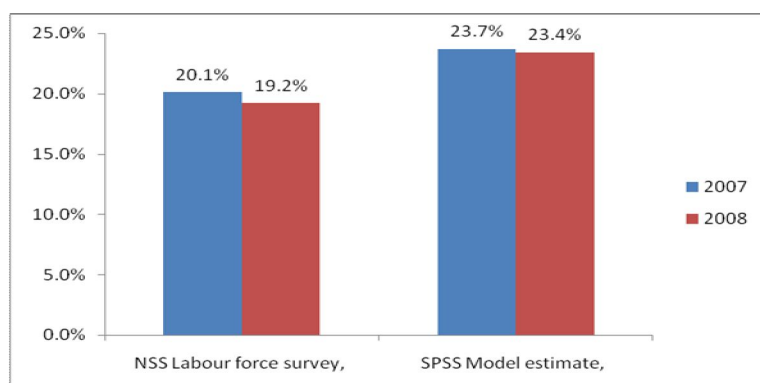
Informal / hidden employment is essentially non-agricultural in nature. While there are some wage workers in agriculture, and many of these are informal / hidden, the majority of persons in agriculture are self-employed or unpaid family workers. Subject to the assumption that informal / hidden employment is non-agricultural, we have the identity:

Total employment = Formal employment + Informal / hidden employment + Agricultural employment

The NSS for 2007 has estimated that informal employment / hidden employment accounts for 20.1 percent of non-agricultural employment. The Census does not give estimates for formal versus informal / hidden non-agricultural employment. However, by making assumptions on a sector-by sector basis (transport, construction, etc.) we estimated that the share of informal / hidden employment in total non-agricultural employment is about 23.7 percent in 2007. This is close to the independent estimate from NSS.

While we were working on this report, the NSS produced a “Labor Force and Informal Employment in Armenia” report based on 2008 LFS data. We have compared the Model estimates for informality and the NSS estimations for 2008 as well and conclude that though the estimates are close NSS reported higher decline in informality compared to our estimations (Figure 2):

Figure 2: Informal employment according to MSS LFS and SPSS Model estimates



Agricultural employment

Despite a higher estimate for total employment, the model gives a lower estimate for agricultural employment. This is for two reasons. First, the Census estimate for the share of agriculture in total employment is lower than the NSS administrative estimate to begin with. One speculation is that, in the 2001 enumeration, many persons who had left non-agricultural employment for farming (laid off workers and public servants, for example) reported their old, non-agricultural occupation. If this is the case, the 2007 NSS administrative statistics give actual occupation, i.e. agriculture. Second, the share of agriculture in total employment is estimated to fall between 2001 and 2007 in the model. This is because, to line up on LFS unemployment estimates, we assumed significant declines in urban unemployment, but not rural unemployment, which was already low. The effect is to re-distribute total employment towards the non-agriculture sector.

Table 3: Total, Agricultural, and Formal / Informal Non-agricultural Employment, NSS 2007 Administrative Data and Model Estimates Based on Initialization with De jure 2001 Census Data

| | Total employment | Agriculture | Non-agriculture | |
|--------------------------------|------------------|-------------------------------|---|--|
| <u>NSS Administrative Data</u> | 1,101.5 thousand | 506.9 thousand (46.0 percent) | 594.6 thousand (54.0 percent) of which | |
| | | | 475.1 thousand formal (79.9 percent) | 119.5 thousand informal / hidden (20.1 percent) ¹ |
| <u>NSS Labour force survey</u> | 1,188.5 thousand | 434.2 thousand (36.5 percent) | 754.3 thousand (63.5 percent), of which | |
| | | | 602.7 thousand formal (79.9 percent) | 151.6 thousand informal / hidden (20.1 percent) |
| Model estimate 2007 | 1,223.6 thousand | 380.8 thousand (31.1 percent) | 842.8 thousand (68.9 percent) of which | |
| | | | 642.7 thousand formal (76.3 percent) | 200.1 thousand informal / hidden (23.7 percent) |

The first draft of the MLSI paper presented a much-commented on table in the form of a social insurance “cascade,” starting from total labor force at the top and trickling down to the covered population at the bottom. The basic purpose was to show that, because unemployment is high, because much employment is agricultural, and because much non-agricultural employment is

¹ There is no possibility for NSS administratively estimate the informal employment so we apply her the LFS survey estimate.

informal or hidden in nature, social insurance coverage is limited. This, it was argued, means that resources available to finance social insurance benefits are limited and a large proportion of the population will eventually receive low social insurance benefits because they are not contributing to the system. In the core part of the report (Chapter 3 figure 3.6) we present this cascade using 2008 LFS and NSS administrative data. While Tables 4, 5 and 6 below present the “cascade” according to the model, NSS administrative and LFS estimates for 2007 in order to keep the track of estimates we were talking in this annex. The final cell contains the number of persons who contributed to the social insurance system in 2007 and we can see that the share of contributors has increased significantly between 2007 and 2008.

One unfortunate consequence of the “cascade” is that it throws into sharp relief differences between the shares of formal sector employees contributing – a “hot number” because it can be interpreted as a compliance rate. The compliance rate is higher if we look at NSS administrative data, and use the share of informal employees taken from LFS data. While if we look SPSS model estimates and LFS estimates of compliance rates we see quite similar estimates at about 78% (75.9% according to SPSS model and 78.1% according to LFS). One way of finessing the problem is to note that, in one approach (the administrative data), the share of all employed persons contributing is 42.7 percent; in the other (model results), it is 39.8 percent and by LFS it is 39.4 percent – a difference that would hardly be noticed. It is what is going on in-between that raises questions.

Table 4: The Social Insurance Cascade in 2007 According to Model Results

| | | | | | | |
|-----------------------|-----------------------|-------------------------------|----------------------------|---------------------------|----------------|---------|
| Active labor force => | 1,551.6 thousand | (100.0%) | | | | |
| | of which, employed => | 1,223.6 thousand | (78.9%) | | | |
| | | of which, non-agricultural => | 842.8 thousand | (68.9%) | | |
| | | | of which, formal sector => | 642.7 thousand | (76.3%) | |
| | | | | of which, contributing => | 487.6 thousand | (75.9%) |

Table 5: The Social Insurance Cascade in 2007 According to NSS Administrative Statistics

| | | | | | | |
|-----------------------|-----------------------|-------------------------------|----------------------------|---------------------------|----------------|---------|
| Active labor force => | 1,184.3 thousand | (100.0%) | | | | |
| | of which, employed => | 1,101.5 thousand | (93.0%) | | | |
| | | of which, non-agricultural => | 594.6 thousand | (54.0%) | | |
| | | | of which, formal sector => | 475.1 thousand | (79.9%) | |
| | | | | of which, contributing => | 470.5 thousand | (99.0%) |

Table 6: The Social Insurance Cascade in 2007 According to NSS LFS Statistics

| | | | | | |
|-----------------------|-----------------------|-------------------------------|----------------------------|---------------------------|-------------------------------------|
| Active labor force => | 1,659.4 thousand | (100.0%) | | | |
| | of which, employed => | 1,188.5 thousand | (71.6%) | | |
| | | of which, non-agricultural => | 754.3 thousand | (63.5%) | |
| | | | of which, formal sector => | 602.6 thousand | (79.9%) |
| | | | | of which, contributing => | 470.5 thousand ² (78.1%) |

Having been raised, the issue deserves an answer. Why does the model and LFS estimate a lower compliance rate? The model starts off with a higher number of active labor force participants, very close to LFS so, that despite having assumed a lower employment rate (proportion of active labor force employed) both estimates of total employment are still nearly 10 percent higher.

Not only the estimates of employment are higher, but the share which allocated to the non-agriculture sector are significantly higher compared to administrative statistics.

These comparisons allow us to state that SPSS model is very close in its estimates of the Armenian labor market, and in fact the compliance rate still needs to be improved, while NSS administrative statistics should review their approach to the estimate of agricultural employment.

To be more confident of the SPSS model estimates on the Armenian labor market and on overall pension system developments, and also to encourage the Model user's trust to this tool, we prepared Annex 4, a comparative table of key indicators necessary to understand the micro-economic developments in Armenia and pension reform implications on Pillar I balance using the SPSS model results and the results produced by the Pension Working Group's modeling team using the WB PROST model.

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² LFS does not provide information on contributors here the official number for 2007 is applied