A note on Economic Statistics and a sketch of National Accounts

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1 Introduction

Economic statistics is a wide and nuanced discipline which has, in a broader sense, the main goal to *measure* the economic system and its functioning. The problem with this "definition" is that it is not trivially clear what we should mean with the expressions "economic system" and (its) "functioning". As a matter of fact, we can look at the economic system from many different points of view. For example, we can consider it at macro-level, describing it as a system of flows and aggregates; we can address it at micro-level, as a system of interacting agents; we can focus on different territorial levels (countries, regions, sub-regions) and on different actors (e.g. families or companies) and domains, such as consumption, labour market, production, innovation, development... In addition, there is no neat (and it is increasingly vanishing) distinction between economic and social aspects of the "economic life" of a population. For example, is poverty an economic or a social issue? In a beyond GDP perspective, is promoting personal well-being (whatever this means) a pertinent goal of economic policies?

As a matter of fact, today dealing with the problem of "measuring the economic system" means addressing jointly a wide system of perspectives, involving a number of different concepts, methods and tools. Within such a context, this course aims at:

1. Providing a general and somehow "practical" idea of some typical topics of Economic Statistics, so as to make students capable to understand and interpret the meaning of the main economic indicators, usually discussed at public level.
2. Studying, in more details, two important areas of Economic Statistics, namely price index theory and time-series analysis. In particular, time-series analysis will be the topic addressed most deeply in the course, also for its practical importance in data analysis, beyond Economic Statistics.

Since the basic approach to the measurement of the Economic System is to consider it at aggregated level, hereafter we just sketch the essential concepts of the so-called System of National Accounts (SNA), which serves as a reference model, to the assessment and the governance of national economies. The text below has the main aim to fix some concepts

and notation, not to provide a deep understanding of National Accounts, which are not in the scope of the course.

1.1 A macro-level perspective on the economic system

Seen as a whole, we can sketch the national economic system as a network of interrelated processes involving the following macro-agents:

1. **Families**, which demand for goods and services, provides labour, capital and other resources (e.g. natural, like the land) and get remunerations and profits.
2. **Companies**, which produce goods and services, get proceeds and buy productive goods and services.
3. **Institutions**, which offer collective services, buy production goods and services, financing themselves through monetary transfers (like taxes).
4. **Collectivity**, which demands for collective services (e.g. miitary defense, legislative services...).

What kinds of processes exist among these agents? Basically, as mentioned above, they produce, consume and exchange goods and services, they exchange monetary, financial or real transfers and accumulate financial or real goods.

In addition to the above four agents, we must consider also the **Rest of the world**, which is an abstraction to mean all of those agents outside the considered nation (or economic territory), with which various kinds of transfers take place (import, export, financial transfers...).

At macro-level, the system of processes among the macro-agents can be given the form of a system of identities, relating each other some fundamental aggregates; in its essence, this set of identities consituts the System of National Accounts. We list below these relations, commenting on them briefly. All accounts refer to a defined unit of time (typically an year) and are expressed in monetary terms (i.d. in terms of values).

1. **Equilibrium of goods and services**:

$$M + V = X + C + A + E.$$

This identity means that the "objects"available within the system (left side) come from import (M) or internal production (V) and (right side) are used for *intermediate* (X) or *final* (C) *consumption*, for *accumulation* (A) or for *export* (E). If we consider *depreciation* (D), the above identity becomes

$$M + (V - D) = X + C + (A - D) + E$$

where $V - D$ is the *net production* and $A - D$ is the *net accumulation*.

2. **Production**:

$$V = X + Y$$

or, introducing depreciation,

$$V - D = X + (Y - D).$$

Here, $Y = V - X$ is the *Gross Domestic Product* (GDP), while $Y - D$ is the *Net Domestic Product* (NDP). GDP is "what"is added, through production, to the intermediate goods/services.

By using the production account, we can rewrite the equilibrium identities as

$$M + Y = C + A + E$$

and

$$M + (Y - D) = C + (A - D) + E.$$

3. **Income**:

$$Y + R_e - R_m + T_e - T_m = R$$

or

$$(Y - D) + R_e - R_m + T_e - T_m = R - D.$$

This relations represents the way the *income* of the residents in the economic system gets formed. The GDP (Y) is equal to the remuneration of the productive factors (e.g., work, capital); adding to it the remuneration of national productive factors abroad (R_e) and the transfers from abroad (T_e) - e.g. by emigrates - and subtracting the remuneration of foreign productive factors on the economic territory (R_m) and the transfers towards foreign countries (T_m), the income of the residents (R) is obtained. Considering depreciation decreases the net added value and, correspondingly, the net income.

4. **Income use**:

$$R = C + C_m - C_e + S$$

or

$$R - D = C + C_m - C_e + (S - D)$$

which say that income (left side) is devoted to (right side) *consumption* ($C + C_m - C_e$) and saving (S). Here, consumption is expressed as *national consumption*, which is the difference between the whole consumption in the economy (C) and that done by foreigners (e.g. tourists from abroad), plus the consumption that resident perform abroad (C_m). The introduction of depreciation is accounted for as usual, in the second version of the income use identity.

5. **Capital**:

$$S = A + B$$

or

$$S - D = (A - D) + B$$

Saving can be used for purchasing *durable goods*, i.e. for *gross accumulation* (A), or for *net accumulation* $(A-D)$, and/or are used for *financial lending* or *borrowing* (B).

6. **Rest of the world (balance of payments)**:

$$M + T_m + R_m + C_m + B = E + T_e + R_e + C_e$$

This identity simply says that what flows out of the economic system flows in the Rest of the world and viceversa, so that:

$$B = (E - M) + (T_e - T_m) + (R_r - R_m) + (C_e - C_m).$$

This identity can be directly derived using the previous accounts, in fact from

$$Y + R_e - R_m + T_e - T_m = R$$

and

$$M + Y = C + A + E$$

we have

$$R = (E - M) + (R_e - R_m) + (T_e - T_m) + C + A.$$

Since

$$R = C + C_m - C_e + S$$

we get

$$C + C_m - C_e + S = (E - M) + (R_e - R_m) + (T_e - T_m) + C + A$$

i.e.

$$C_m - C_e + S = (E - M) + (R_e - R_m) + (T_e - T_m) + A$$

Given that $S = A + B$, we can finally write

$$C_m - C_e + S = (E - M) + (R_e - R_m) + (T_e - T_m) + S - B$$

which then gives

$$B = (E - M) + (R_e - R_m) + (T_e - T_m) + (C_e - C_m).$$

By looking at the system of identities, we see that some fundamental economic aggregates get implicitly defined by the above relations, namely:

1. Y: Gross Domestic Product.
2. R: Income of the Residents.
3. S: Saving of the Residents.
4. B: Net lending.

These aggregates are the main "macro" objects that deserve to be measured, for a macro-level description and governance of the economic system. Clearly, one can get beyond the measurement of their value, to investigate the processes producing them or, overcoming the macro perspective, to analyze how those entities are distributed on statistical units (e.g., how income is distributed across individuals or families), how these distributions change over time, or on different regions and social groups. One can also restrict the study of these aggregates to specific productive sectors and also analyze the interrelationships among sectors, in terms of *interdependencies* and exchange of intermediate goods... All of these lines (and others) represent the various sub-domains of Economic Statistics.

Remark. It is clearly of interest to compare these aggregates over time, to track economic evolution, and across countries, to perform economic benchmarking. Aggregates are expressed in monetary terms (e.g in Euros or Dollars) and this leads to the problem of how to account for inflation (in temporal comparisons) and for the different internal purchasing power of the national currencies (in spatial comparisons). These issues will be touched upon, when focusing on Price Index Theory, later in the course.