Pil E.A.

Theoretical possible scenarios for the development economic crises and the way out of them*State University of Aerospace Instrumentation
(Russia, Saint-Petersburg)*

doi: 10.18411/scienceconf-06-2021-14

Abstract

The article deals with the issues of classification different kinds of scenarios for countries using surfaces which their economy and population can occupy. Some formulas which are presented in this article allow us to calculate these surfaces. Present 2D-figures show us how economic crises can develop during time.

Keywords: economy, GDP, population, decrease, increase, economic crises, way out of crises.

Both growth and decline conditions in economy develop under the influence of a wide range of factors, among which is decrease or increase in the numbers of population due to certain objective reasons. To reveal the interrelation of predicted growth or decline in economy e_t , and hence predicted increase or decrease in the numbers of population p_t table 1 was constructed to present all possible scenarios of dependence of variables e_t and p_t discussed. In the further discussion, economy is taken as the DGP of a country, which explains interchangeability of these terms in the context. Figures in Table 1 show one x-axis Q_t instead of two Q_{et} and Q_{pt} with varying scales and values, where Q_{et} and Q_{pt} are given as percentages

Hereinafter in all the graphs of Table 1, a dashed line indicates the e_t parameter, and the full line indicates the p_t parameter.

Scenario 1

In this scenario economy e_t and population p_t are constants not changing in time, i.e. $e_t = \text{const}$ and $p_t = \text{const}$ (see Row 1). Herein the first digit indicates the number of Row, the second, the number of column. Changes in p_t and e_t are described by the following linear equation: $y_{et} = Q_{et}$ and $y_{pt} = Q_{pt}$.

Cell 11 shows a variation of the number of population Q_{pt} exceeding the economic variables Q_{et} , i.e. $Q_{pt} > Q_{et}$. Characterization of such condition requires introduction of a variable Q_{pet} , which indicates the predicted difference of Q_{pt} and Q_{et} and is calculated using the following formula (1).

$$Q_{pet} = Q_{pt} - Q_{et}. \quad (1)$$

In this case, the higher value Q_{pet} is, the lower the standard of living of the population as consumption rates per capita decrease. To simplify, we consider consumption rates of goods, food and services to be equal with the upper and middle classes and low-income groups. Otherwise, higher values of Q_{pet} will mean upper classes wishing to at least preserve the current levels of consumption which, in condition of limited resources, means less goods and services for middle- and lower-income classes.

The following scenarios and variations appear possible in this case:

1. the population will be suffering lower standards of living with no opposition;
2. the population suffering lower standards of living will turn to sects and cults with resulting further worsening of their economic condition;
3. given any chance population will try to emigrate, legally or illegally, into more economically developed countries, primarily to those with low birth

- rates and high demand for workforce, mostly high-skilled and qualified, which is the current condition in European countries;
4. national government will be increasing the number of festivities and public entertainment to distract the population from worsening economic conditions;
 5. national government will resort to the policy of confronting either the external or internal enemies to divert attention of the population from worsening economic conditions to ‘public enemies’ pretending them to be blamed with the existing decline. This scenario is proven by history of many modern countries;
 6. national government will resort to the policy of stimulating consumption of alcoholic beverages by the population for such option is much more simple, quick, effective and efficient than construction of sports facilities and promotion of the healthy way of living. The population in this case is much easier to manipulate and they reveal less willingness and readiness to become actively involved in the country’s political life. In addition, increased sales of spirits increase public revenues. The population will suffer degradation resulting in irreversible deterioration of the nation’s gene pool;
 7. national government will resort to the policy of befuddling the population of younger ages promoting sub-cultures to distract them from involvement in political life of the country;
 8. national government will suppress opposition and pressure groups leaders using various options: court action, exile, imprisonment, asylums and similar institutions, physical elimination, forced emigration etc. In this latter case the leaders of opposition will be establishing centers abroad and using mass-media, global network and other legal and illegal means will be trying to undermine the existing regime under which their compatriots continue living;
 9. national government will resort, either openly or using concocted reasons, to massive resettlements of politically active population from urban to rural localities to be reformed with manual labor;
 10. national government will be increasing the share of military sector making it controlling and underlying the whole economy which will result in lower standards of living and high probability of military conflicts similar to those in Germany in the past century;
 11. national government, to distract the country’s population from democratic reforms, will initiate a military conflict with a weaker neighboring nation similar to that initiated by Iraq in 1990–1991;
 12. national government seeking to improve the nation’s economic condition will enter into a military conflict initiated by a third nation similar to that entered into by the US when high growth rates of the country’s GDP were in direct relation to supplies of weapons and food to the parties in conflict;
 13. population through the procedure of democratic election will impeach and depose the current government either accompanied by a deposition of the upper class as in Chile and Venezuela, or through a ‘color revolution’ as in the Ukraine and Georgia;
 14. population will unroll a revolution to depose the existing regime and change the socio-economic formation as in Romania, Tunisia and other countries.

Table 1

Variations in interdependence of changes in theoretically predicted economy e_t and population p_t

№	1	2	3	4
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Cell 12 shows dependencies of economic indicators exceeding the number of population, i.e. $Q_{et} > Q_{pt}$. In this case the standards of living of the population will be the higher,

the higher is Q_{ept} value calculated by Formula (2) promoting well-being and prosperity of the population.

$$Q_{ept} = Q_{et} - Q_{pt}. \quad (2)$$

Figures for variables e_t and p_t changing linearly can be characterized by the angle α of a given straight line to x-axis. In the variation discussed $\alpha = 0$ for all cases. In theory, the angle α_t can be within the range of $-90^\circ \leq \alpha_t \leq +90^\circ$. Thus, the sign of angle α_t either indicates growth (if positive) or decline (if negative) of the variables discussed.

Scenario 2

Row 2 presents variations in linear development of economy e_t and the number of population p_t with the figures of dependencies plotted intersecting in point T_c , with vales of T_{ct} and T_{cQ} along the coordinate axes t and Q_t .

Within Scenario 2 the following variations in development are possible:

- the number of population p_t is increasing at a faster rate than economy e_t , Cell 21. In such case it is rational that the value T_{ct} be maximum which will allow to delay the populating impoverishment;
- economy e_t is increasing at a faster rate than the number of population p_t , Cell 22. In such case it is rational that the value T_{ct} be the minimum. Such condition will allow reduction in time rates to improve the well-being of the population;
- economy e_t is decreasing at a faster rate than the number of population p_t , Cell 23. In such case it is rational that the value T_{ct} be the maximum. Such condition will allow avoiding fast rates of impoverishment while providing time for emergency measures to both increase the number of population and improve the economic conditions;
- the number of population p_t is decreasing at a faster rate than economy e_t , Cell 24. In such case it is rational that the value T_{ct} be approximating the minimum. Such condition will allow minimizing time required to improve the well-being of the population. This variation has certain ethical implications since sensible and prudent population will refrain from improving their standards of living at the expense of the other population, the condition aggravated by decreased numbers of population causing reductions in labor force and hence resources for public goods. Thus, for this Scenario it appears rational to apply mechanized and automated processes of production, integration of innovative technologies etc. This scenario is applicable for countries with high rates of population, poor economic conditions and hence over-abundant workforce.

Since the figures plotted can be subdivided into classes and subclasses, with groups also identifiable within them, general conclusions are to be applicable to all these. This condition can be relied upon to avoid the necessity of discussing each line individually.

Scenario 3

Here scenario 3, which was inserted into this group, though it could have been included into the group of nonintersecting curves. In this scenario variables e_t and p_t are parallel to axis t at first, and then they start changing according to a complex law in the points of bend of T_{be} and T_{bp} , where the tangent changes its direction, with similar coordinates (Cells 31 and 32), or with different coordinates (Cells 33 and 34). These Cells also show projections of points T_{be} and T_{bp} to axis t , which are T_{bet} and T_{bpt} respectively. Due to the fact that the coordinates of points T_{be} and T_{bp} are different, we introduced here two new properties of T_{ep} and T_{pe} , which are calculated with the formulas: $|T_{ep}| = T_{bet} - T_{bpt}$; $|T_{pe}| = T_{bpt} - T_{bet}$. Here the values of T_{ep} and T_{pe} are considered according to the absolute value, as they can be the following: $T_{bpt} > T_{bet}$; $T_{bpt} < T_{bet}$ or $T_{bpt} = T_{bet}$.

If the economy e_t and population p_t change their linear law to a more complex one at the same time, i.e. $T_{bet} = T_{bpt}$, as it is presented in Cells 31 and 32, let us add new parameters in order to make conclusions: $\pm\Delta e_t$; $\pm\Delta p_t$; Δt_e and Δt_p , where $\pm\Delta e_t$ is growth or recession of the economy in the time period Δt_e in question, unit, and $\pm\Delta p_t$ is growth or decrease of population in the time period Δt_p in question, pers. This means that we need to know how variables e_t and p_t will

increase or decrease within the time period Δt_e or Δt_p . In this case values Δt_e and Δt_p should be taken as equal, i.e. $\Delta t_e = \Delta t_p$. In effect it is desirable to assume that values Δt_e and Δt_p are equal to one, i.e. one hour, day, week, month or year, depending on specific conditions and the prospect of timely receiving accurate information on changes taking place in the economy or population.

Thus, we can note down the following three formulas for Cell 31:

1. $\Delta p_t - |-\Delta e_t| = 0$;
2. $\Delta p_t - |-\Delta e_t| > 0$;
3. $\Delta p_t - |-\Delta e_t| < 0$.

As for Cell 32, we can note down the following:

4. $\Delta e_t - |-\Delta p_t| = 0$;
5. $\Delta e_t - |-\Delta p_t| > 0$;
6. $\Delta e_t - |-\Delta p_t| < 0$.

For the sake of simplicity here the + sign was omitted.

In Cells 31 and 32 in question there are the following two evolution scenario possible:

1. When variables e_t and p_t change by the same value, i.e. when $|\pm \Delta e_t| = |\pm \Delta p_t|$. If the values are equal $|\pm \Delta e_t| = |\pm \Delta p_t|$, it is desirable for Cell 31 that the value of point T_{bpt} be at its maximum, as in this case the population's wealth will decrease far in the future. As for values $|\pm \Delta e_t|$ and $|\pm \Delta p_t|$, here they must be at their minimum, as in this case the population's wealth will decrease very slowly;

2. When variables e_t and p_t change according to different laws, i.e. $|\pm \Delta e_t| \neq |\pm \Delta p_t|$. Here it is desirable for variables e_t and p_t in box 31 that the sum of values $|\pm \Delta e_t|$ and Δp_t be at its minimum $(|\pm \Delta e_t| + \Delta p_t) \rightarrow \min$. In this case population growth and simultaneous recession of the country's economy will take place more smoothly. As for Cell 32, here it is desirable to have maximum Δe_t and $|\pm \Delta p_t|$ values, as in this case population's wealth will increase in a minimum time period.

For Cells 33 and 34 there are the following two evolution scenarios possible:

1. If the economy starts falling earlier than population starts growing, it is desirable that the value of T_{ep} tend to the maximum, i.e. $T_{ep} \rightarrow \max$, as in this case population will slide into poverty slower (Cell 33);
2. If the economy starts improving later than population starts decreasing, it is desirable that the value of T_{pe} tend to the minimum, i.e. $T_{pe} \rightarrow \min$, as in this case growth of population's income may have a good impact on birth rate (Cell 34).

Scenario 4

Row 4 shows variables e_t or p_t , with the difference as compared to the above that either variable is a curve which at first reduces to its minimum T_{emin} (T_{pmin}), then increasing and intersecting with the straight line twice. In Cells 41 and 42 the straight lines discussed increase, in Cells 43 and 44 they decline.

The parameters are to have the following values.

For parameters Δe_t and Δp_t :

- Cells 41, 43:

before the minimum point: $-\Delta p_t \rightarrow \max$;

after the minimum point: $\Delta p_t \rightarrow \min$.

- Cells 42, 44:

before the minimum point: $-\Delta e_t \rightarrow \min$;

after the minimum point: $\Delta e_t \rightarrow \max$.

For parameters T_{pea} :

- Cell 41: $T_{pea} \rightarrow \max, T_{pea1} \rightarrow \max, T_{pea2} \rightarrow \max$;
- Cell 42: $T_{pea} \rightarrow \min, T_{pea1} \rightarrow \min, T_{pea2} \rightarrow \min$;
- Cell 43: $T_{pea} \rightarrow \max, T_{pea1} \rightarrow \max, T_{pea2} \rightarrow \max$;
- Cell 44: $T_{pea} \rightarrow \min, T_{pea1} \rightarrow \min, T_{pea2} \rightarrow \min$.

In this Scenario in choosing either maximum or minimum values of the parameters discussed a certain ambiguity arises in interpretation. For instance, if in Cell 44 parameter T_{ct1} is a maximum, the economic well-being of the population will be decreasing during a long period to shift to fast increase. If the value of parameter T_{ct1} is a minimum, the economic well-being of the population be decreasing fast and then increasing fast. The latter option, with $T_{ept1} \rightarrow \min$ is deemed more rational.

To calculate the new parameters Formula (3) can be used

$$T_{pea} = T_{pea1} + T_{pea2} = T_{ct2} - T_{ct1} = (T_{ptmin} - T_{ct1}) + (T_{ct2} - T_{ptmin}), \quad (3)$$

where T_{ca1}, T_{ptmin} etc. are coordinates of respective points on axis t .

Scenario 5

This Scenario is similar to Scenario 5 with a curve maximum. The curve first rises to its maximum $T_{emax} (T_{pmax})$, and then slopes down and intersects with the straight line twice. In Cells 51 and 52 the straight lines discussed first slope upwards and in Cells 53 and 54 downwards.

The parameters are to have the following values:

For parameters Δe_t and Δp_t :

- Cells 51, 53:

before the maximum point: $\Delta p_t \rightarrow \min$;

after the maximum point: $-\Delta p_t \rightarrow \max$.

- Cells 52, 54:

before the maximum point: $\Delta e_t \rightarrow \max$;

after the maximum point: $-\Delta e_t \rightarrow \min$.

For parameters T_{pea} :

- Cell 51: $T_{pea} \rightarrow \min, T_{pea1} \rightarrow \min, T_{pea2} \rightarrow \min$;
- Cell 52: $T_{pea} \rightarrow \max, T_{pea1} \rightarrow \max, T_{pea2} \rightarrow \max$;
- Cell 53: $T_{pea} \rightarrow \min, T_{pea1} \rightarrow \min, T_{pea2} \rightarrow \min$;
- Cell 54: $T_{pea} \rightarrow \max, T_{pea1} \rightarrow \max, T_{pea2} \rightarrow \max$.

The parameters introduced can be calculated with the Formula (4)

$$T_{pea} = T_{pea1} + T_{pea2} = T_{ct2} - T_{ct1} = (T_{ptmax} - T_{ct1}) + (T_{ct2} - T_{ptmax}), \quad (4)$$

where T_{pea1}, T_{ptmax} etc. are coordinates of respective points on axis t .

Scenarios 6 and 7

These Scenarios are characterized by figures plotted for e_t and p_t intersecting in one point T_c .

The parameters are to have the following values:

- Cell 61: $T_{ct} \rightarrow \min, \Delta e_t \rightarrow \max, \Delta p_t \rightarrow \min$;
- Cell 62: $T_{ct} \rightarrow \max, \Delta e_t \rightarrow \max, \Delta p_t \rightarrow \min$;
- Cell 63: $T_{ct} \rightarrow \min, -\Delta e_t \rightarrow \min, -\Delta p_t \rightarrow \max$;
- Cell 64: $T_{ct} \rightarrow \max, -\Delta e_t \rightarrow \min, -\Delta p_t \rightarrow \max$;
- Cell 71: $T_{ct} \rightarrow \min, \Delta e_t \rightarrow \max, -\Delta p_t \rightarrow \max$;
- Cell 72: $T_{ct} \rightarrow \max, -\Delta e_t \rightarrow \min, \Delta p_t \rightarrow \min$.

The below three Scenarios 8, 9 and 10 show curves intersecting in two points. Here variables e_t and p_t can be characterized by either coincident minimums and maximums, i.e. $T_{ptmin} = T_{etmin}$ etc. (Cells 81, 82, 91, 92, 101 and 102), or different minimums and maximums, i.e. $T_{ptmin} > T_{etmin}$ or $T_{ptmin} < T_{etmin}$ etc. (Cells 83, 84, 93, 94, 103 and 104).

Scenario 8

Description of Scenarios given in Row 8 and in Rows 9 and 10 requires plotting figures for variables e_t and p_t with maximums and minimums both on one straight line and displaced from it, hence, the below parameters are to be introduced:

1. T_{pnen} is the difference between the coordinates of points T_{ptmin} and T_{etmin} . m.u;
2. T_{enpn} is the difference between the coordinates of points T_{ptmax} and T_{etmax} . m.u;
3. T_{pxex} is the difference between the coordinates of points T_{ptmax} and T_{etmax} . m.u;
4. T_{expx} is the difference between the coordinates of points T_{etmax} and T_{ptmax} . m.u;
5. T_{pxen} is the difference between the coordinates of points T_{ptmax} and T_{etmin} . m.u;
6. T_{expn} is the difference between the coordinates of points T_{etmax} and T_{ptmin} . m.u;
7. T_{pnex} is the difference between the coordinates of points T_{ptmin} and T_{etmax} . m.u;
8. T_{enpx} is the difference between the coordinates of points T_{etmin} and T_{ptmax} . m.u.

The above eight parameters demonstrate shifting vertexes in figures of e_t and p_t , with lower values of index $enpx$ indicating the first intersection point be a curve, in this case the coordinate of the minimum point of variable e_t , and the second intersection point being the maximum point of variable p_t , i.e. $T_{etmin} > T_{ptmax}$.

Row 8 shows variations of figures for variables e_t and p_t as two curves with minimums and intersections in two points. Here in Cells 81 and 82 their minimums lay along the same straight line, while in cells 83 and 84 they are shifted relatively to each other by value of T_{enpn} (Cell 83) or by value of T_{pnen} (Cell 84).

The parameters are to have the following values.

For parameters Δe_t and Δp_t :

- Cells 81, 82, 83 and 84:

before the point T_{ep} and T_{bp} : $-\Delta e_t \rightarrow \min$, $-\Delta p_t \rightarrow \max$;

after the point T_{ep} and T_{bp} : $\Delta e_t \rightarrow \max$, $\Delta p_t \rightarrow \min$.

For parameter T_{pea} :

- Cells 81 and 83: $T_{pea} \rightarrow \max$;
- Cells 82 and 84: $T_{pea} \rightarrow \min$.

For parameters T_{enpn} and T_{pnen} :

- Cells 83 and 84: at $T_{bet} > T_{bpt}$, $T_{pnen} \rightarrow \min$;

at $T_{bet} < T_{bpt}$, $T_{enpn} \rightarrow \max$.

For parameters Q_{enpn} and Q_{pnen} :

- Cells 81 and 83: $Q_{enpn} \rightarrow \max$;
- Cells 82 and 84: $Q_{pnen} \rightarrow \min$.

Scenario 9

Row 9 shows variations in figures for variables e_t and p_t as two curves with maximums and intersections in two points. Here in Cells 91 and 92 their maximums lie along the same straight line, while in Cells 93 and 94 they are shifted relatively to each other by value of T_{pxex} (Cell 93) or by value of T_{expx} (Cell 94).

The parameters are to have the following values.

For parameters Δe_t and Δp_t :

- Cells 421, 422, 423 and 424:

before the points T_{ep} and T_{bp} : $\Delta e_t \rightarrow \max$, $\Delta p_t \rightarrow \min$;

after the points T_{ep} and T_{bp} : $-\Delta e_t \rightarrow \min$, $-\Delta p_t \rightarrow \max$.

For parameters T_{epx} and T_{pex} :

- Cells 421 and 423: $T_{pex} \rightarrow \min$;
- Cells 422 and 424: $T_{epx} \rightarrow \max$.

For parameters T_{expx} and T_{pxex} :

- Cell 423: at $T_{bet} > T_{bpt}$, $T_{pxex} \rightarrow \max$;

at $T_{bet} < T_{bpt}$, $T_{expx} \rightarrow \min$.

- Cell 424: at $T_{bet} > T_{bpt}$, $T_{pxex} \rightarrow \min$;

at $T_{bet} < T_{bpt}$, $T_{expx} \rightarrow \max$.

For parameters Q_{enpn} and Q_{pnex} :

- Cells 421 and 423: $Q_{enpn} \rightarrow \max$;
- Cells 422 and 424: $Q_{pnex} \rightarrow \min$.

Scenario 10

Row 10 shows variations in figures for variables e_t and p_t as two curves with maximums and intersections in two points. Here in Cells 101 and 102 their maximums and minimums lie along the same straight line, while in Cells 103 and 104 they are shifted relatively to each other by value of T_{pxex} (Cell 103) or by value of T_{expx} (Cell 104).

The parameters are to have the following values.

For parameters Δe_t and Δp_t :

- Cells 101 and 103:

before the points T_{ep} and T_{bp} : $\Delta e_t \rightarrow \max$, $-\Delta p_t \rightarrow \max$;

after the points T_{ep} and T_{bp} : $-\Delta e_t \rightarrow \min$, $\Delta p_t \rightarrow \min$.

- Cells 101, 102 and 104:

before the points T_{ep} and T_{bp} : $-\Delta e_t \rightarrow \min$, $\Delta p_t \rightarrow \min$;

after the points T_{ep} and T_{bp} : $\Delta e_t \rightarrow \max$, $-\Delta p_t \rightarrow \max$.

For parameters T_{epx} and T_{pex} :

- Cells 101 and 103: $T_{pex} \rightarrow \max$;
- Cells 102 and 104: $T_{epx} \rightarrow \min$.

For parameters T_{enpx} and T_{pnex} :

- Cells 433: at $T_{bet} > T_{bpt}$, $T_{pnex} \rightarrow \max$;

at $T_{bet} < T_{bpt}$, $T_{pnex} \rightarrow \max$.

- Cells 434: at $T_{bet} > T_{bpt}$, $T_{enpx} \rightarrow \min$;

at $T_{bet} < T_{bpt}$, $T_{enpx} \rightarrow \min$.

For parameters Q_{pxen} and Q_{expn} :

- Cells 101 and 103: $Q_{expn} \rightarrow \max$;
- Cells 102 and 104: $Q_{pxen} \rightarrow \min$.

In addition to these scenarios variables e_t and p_t they have ‘intersection point’ T_c (rows 7–10). Since intersection point T_c is characterized by same coordinates for figures of e_t and p_t it is termed here ‘the point of equilibrium’. In this point the population of a given country consumes the whole of food, other goods and services produced within the country.

These variables e_t and p_t can be also merging into one line or curve together. So such merging figures allow us to introduce a new term ‘equilibrium of economy and population’, i.e. a condition when the values of the country’s GDP and the number of population are equal $Q_{eti} = Q_{pti}$.

Now let us introduce the following three definitions to *equilibrium of the economy and population*.

Theoretically predicted equilibrium in economy and population refers to equality of $Q_{eti} = Q_{pti}$, when the population consumes the total amount of food, other goods and services in a period of time Q_{eti} , which are produced during the same period of time domestically without any losses and imports Q_{eim} .

Q_{eti} and Q_{pti} are taken here for 100%. Here, the universal expression will be formulated as $Q_{eti} = Q_{pti} + Q_{eim}$ at $Q_{eim} = 0$. Hence, the total of 100% of food, other goods and services will be consumed by 100% of population in a period of time. It follow from here, that every person consumes equal numbers of food, other goods and services despite varying incomes.

Losses here refer primarily to losses resulting from ‘wear and tear’ in collection, transportation, storing and processing of agricultural produce and their delivery to the end-consumer and later in the process of home food procession, cooking and serving. Losses in other consumer goods refer to faulty and substandard items, damage in loading-unloading operations, transportation etc. after which they are to be disassembled and/or utilized. Another assumption in relation to non-foods is that they will be used during the period stated with no repair required after which time they are to be replaced. Services are assumed to fully correspond to the service wanted and ordered by the customer and provided in stated time with the quality required.

Practically attainable equilibrium of economy and population refers to equality $Q_{epi} = Q_{ppi}$, when the population consumes in a period of time the total amount of food, other goods and services which are produced during the same period of time domestically given losses Q_{eti} and without any imports.

In this case the following expressions are true: $Q_{epi} > Q_{eti}$ or $Q_{epi} = Q_{eti} + Q_{eti}$.

Effective equilibrium of economy and population refers to equality $Q_{eri} = Q_{pri}$, when the population consumes in a period of time the total amount of food, other goods and services which are produced during the same period of time domestically given losses Q_{eti} and the difference between the effective and theoretically predicted Q_{eti} is compensated by imports Q_{eim} .

In this case the following expressions are true: $Q_{eti} = Q_{eim}$, $Q_{eri} = Q_{pri} + Q_{eim}$.

It should be noted that the amount of foods, other goods and services to be consumed is to be scientifically justified by estimated and practically proven standards and norms Q_{sn} for the period discussed or a point in time in a given country. Otherwise, the population will either start gaining or losing weight, in terms of the amount of food consumption. In terms of non-food products (durables) disequilibrium in consumption will result in either increased numbers of waste and entities to recycle or utilize them, or increased amounts of exports to less developed countries; insufficient amounts of outputs will cause shortages.

Thus, the expression here can be given as $Q_{sn} = Q_{esn} / Q_{pi}$, where Q_{sn} is scientifically justified amount of consumed food, non-food goods and services, in measurement units; Q_{esn} is the amount of food, non-food goods and services produced for scientifically justified consumption, in measurement units; Q_{pi} is the number of population in a country, number of people.

Another essential condition in this case is the necessary requirement for the national government to possess strategic food and commodities reserve stock, various metals and other raw materials etc., and mothballed facilities and equipment for production for military purposes for survival in extreme cases of poor crops, natural disasters and military actions. Mothballed facilities for military purposes are affordable for either economically advanced nations, or totalitarian regimes.

If the amount of food, non-food goods and services produces in a period of time Q_{pti} exceeds the scientifically justified calculations Q_{sn} ($Q_{pti} > Q_{sn}$), the surpluses can be used in the following ways:

- exported;

- added to the nation's strategic reserve stock;
- exported and added to the nation's strategic reserve stock.

A scenario is possible in this case when given $Q_{pti} = Q_{sn}$ in countries with low levels of wages and salaries and standards of living or those suffering a sharp decline in economy population will be unable to consume all of the food, non-food and services output produced, these surpluses will be exported to countries with higher standards of living increasing the country's exports revenues, if they will be bought there [1].

These Figures in Table 1 became the basis for calculations which allowed us to find different kinds of way out of economic crises [2].

1. Pil E.A. The Theory of Economic Crises. – St.-Petersburg: Asterion, 2017. – 1064 p.
 2. Pil E.A. The ways out of the economic crises using analyse 3D figures Veu and variable X5eu // Norway Journal of development of the International Science. №54/2021. Vol.2 64 p – P. 16–23
-