Equalization fund in Estonia

There are some basic principles that we have tried to follow building up an equalization formula. In our opinion equalization formula should:
- meet the objectives;
- be simple;
- be non-manipulable;
- consist of components we want to equalize;
- be predictable;
- be motivative;
- take into account the features of each formulas´ components;
- take into account only the universal characteristics convenient for majority.

Objectives
Equalization fund should follow objectives. So it is important to analyze the affect of equalization fund and its every component in regular base and in perspective of many years (back and further) to see if we are achieving the objectives we have set. It is quite normal that the different situations need a little bit different equalization fund formula. There can't be a perfect equalization fund that would be convenient for every situation. We must also take into account that in developing countries the socio-economical and political situation changes rapidly.

Simple
Formula should be easily understandable and not too specific in its components (not unnecessarily regulative). It is understandable that every local government has unique qualities, but it is not necessary to take all those differences into account on supporting the <u>main</u> acting costs (remark: investments were not taken into account).

Manipulable
Components used on calculating the transfers should be stable, easily predictable and not easily tampered by local governments. It also means that the central government could not tamper local government units' indicators (any subjective decisions should be not acceptable). For the same reason the revenue estimates are not proper components (except if the estimates are done by strictly regulated way without the chance to intervene, but even then the use of estimates is not recommended).

Equalization
Not all revenues or expenditures should be equalized between local governments, because the differences sustain competitiveness between local governments and motivation to develop. Too precise equalization (all units are taken to same level) would diminish the local government activeness. For example if the income of assets realization would be a component in equalization, it could diminish the local governments interest to sell unneeded properties (depends how well the equalization works). Equalization formula should take into account not the actual expenditures, but the average estimates of expenditure for concrete type of local government.

Predictable

For long term budgeting it is important that local governments can and will plan their income from equalization fund years ahead. It will also give local governments a certain level of stability and possibility to evaluate their future capability.

Motivative

It is important that the local government would be motivated to boost their income and to use their resources efficiently. If the equalization formula is not well planed it could have some negative affects towards efficiency. If increase in income will negatively influence the equalization fund transfer at the same amount, then the local governments would not be interested to increase their income. In the same time if the chosen indicators are too specific in terms of expenditure, the local government would be too much interested in increasing their indicator value and not finding the most efficient solution for that field (for example: disabled people receiving social services from local governments versus disabled people with officially signed guardians). But it is not negative if the central government wants to make an impact in some certain field and for achieving that goal the equalization fund would consist of very specific indicator for some early years until local governments have developed the desired practice.

Formulas components

It is important to closely analyze every chosen component – is it stable, can it be manipulated, is it statistically qualitative and so on. Right indicators will have positive affect to formulas´ reliability and stability. The good indicator can even have positive effect on local governments' activity. For example using the length of local governments' roads and streets in equalization formula makes local governments more active to register all their roads and streets in statistical records and so to take responsibility for upkeep of roads and streets.

Objectives

Equalization fund has some objectives it must fill. So it is important also analyze the effect of equalization fund and every component in it regularly and in perspective of many years (back and forth) to see if we are achieving the objectives we have set. It is quite normal that the different situations need a little bit different equalization fund formula. There can't be a perfect equalization fund that would suit in every situation. We must also take into account that in developing countries the surroundings will change rapidly.

Characteristics of majority

It is not wise to build up the equalization fund regarding specific features relevant to minority of local governments. Specific problems of some local governments should be solved by separate measures. Equalization fund is (usually) a measure for majority. Those separate measures can be a part of equalization fund as an addend, but it has a high risk of triggering the ongoing desire to account other "distinctive" features also (all local governments are unique in some matter). Their uniqueness can be taken into account building up the governments' investment grants policies.

1. Equalization fund formula 2003-2007

New equalization fund formula was implemented in 2003 after 1,5 year preparations. Estonians equalization fund main idea is to equalize local governments' abilities to cover main operating costs by evaluating the local governments' main incomes usable without restraints and the comparable expenditures needs. For that reason the local governments' income and expenditures are looked together. For example Danish has a separate formula for income and expenditures equalization.

In Estonia we use vertical equalization and the equalization fund is completely financed by state budget. So richer local governments don't finance equalization of others.

The total amount of equalization fund and its distribution principles are the subject of annual negotiations between state government and associations of local governments. In common the total amount of equalization fund can't be lower than previous year (expect the case state transfers some function from local government level to state level).

The main part of the formula compares local governments calculated income and expenditure needs as follows:

$$Tn = (AK - AT)*k$$

In where:
Tn – Equalization fund transfer to a local government unit
AK - Calculated expenditure need of local government unit
AT - Calculated revenues of local government unit
k - Support level coefficient

If local government units calculated average expenditure need exceeds its calculated revenues then the local government unit is funded from equalization fund. In 2007 there were 21 of 227 (9,3%) local government units that were not supported from equalization fund. For example in 2003 there were 13 of 241 (5,4%) local government units that did not obtain equalization grant. It would be quite normal if 50%-70% of local governments in distant future would be funded from equalization fund. The lower number implies that more local governments are capable to fund themselves by own income sources and are therefore less dependent on government's decisions about equalization funds volume. This is very positive.

The **support level coefficient** constitutes the extent in what the calculated expenditure need is compensated when the revenues don't cover the expenditure need. The coefficient is a subject on each year negotiations with and local governments. In 2003 the support level coefficient was 0,88 and 2004-2007 it has been 0,9. Higher coefficient means more security and higher compensation level for (poorer) local governments, but in the same time it reduces drastically local governments' motivation to increase their other incomes.

1.2 Calculated average operating expense

The **calculated average operating expense** is calculated by the next formula:

$$AK = \left(\sum_{n=1}^{6} Cn * Pn \right)$$

In where:
Cn – value of each indicator of local government unit
Pn - Calculated average operating expense of local governments for each indicator unit
Σ Cn*Pn – each indicator is multiplied by respectively calculated value of each indicator unit

In simple it means that we have 6 parameters that we take into account to calculate average expenditure need. At the moment those are four population age groups (Number of children (0–6 years), number of school-age children (7–18 years), number of the labor force (19–64 years), number of elders (65+ years) based on data of Register of Population), the calculated length of local roads and city streets (roads with hard cover 0,26; city streets 0,74; roads not with hard cover 0,047) in kilometers of local government unit and the number of disabled people with official guardians or receiving other social service from local government.

The calculation process is done as follows (2007):

Indicator	Indicator value	Calculated average indicator unit value	Calculated average operating expense
Number of Children	C1	P1	C1*P1
Number of School-Age Children	C2	P2	C2*P2
Number of Labor Force	C3	P3	C3*P3
Number of Elders	C4	P4	C4*P4
Calculated length of local roads and city streets	C5	P5	C5*P5
Disabled people receiving social service	C6	P6	C6*P6
TOTAL			SUM

1.2.2 Calculated average indicator unit value

Average expenditure need was calculated on the basis of three years (2000-2002) local governments' budget expenditures without investments and expenditures done with earmarked grants. Three-year basis helps reduce the influence of deviations in expenditures structure. To signify the importance of the recent years expenditures structure each year expenditures were taken into account in different proportions (2002 – 0,5; 2001 – 0,3; 2000 – 0,2). Firstly we distinguished the main indicators that correlated with expenditures in each field and the indicator value was found through regression analyze (Excel function LINEST). The indicators values in different fields were summarized. Correlative indicators for different fields were chosen as follows:

Administration	Education	Culture and Sport	Social-care and health service	Economic activities
Labor force	Children	Labor force	Elders	Labor force
	School-Age Children	Elders		Elders
				Local roads and city streets

After finding the indicators basic comparative values, those values were increased as high as possible (keeping the proportions between indicators) to distribute the total

amount of equalization fund provided. Those proportions have been basically changed only when some other functions have been assigned to local governments. The values on indicators have been increased every year (al least by consumer price index) to allocate the total amount of equalization fund Usually the increase of value of parameters is higher than the consumer price index because otherwise the increase of revenues lowers the local governments need for equalization fund.

1.2 Calculated revenues

Calculated revenues consist of three local governments own revenues: income from personal income tax, calculated average land tax and user charges of natural resource estimates. Those incomes formed 72% of local governments own (without grants) income in 2006. Rest of local governments own income consist of mainly revenues of economic activities (14%) and income of assets realization (13%). Revenues of economic activities and income of assets realization are not the revenues that should be equalized between local governments and those revenues were not taken into account.

The **calculated average revenue** of local government unit is calculated since 2006 as follows:

$$AT = \left[TM_{2006} * 0,5 + TM_{2005} * 0,3 + TM_{2004} * 0,2 + \underset{ARVEST}{MM} + \underset{ARVEST}{RESM} \right]$$

In where:
TM - Returns of personal income tax on previous three years (therefore 2003-2006 when calculating the 2007 equalization fund transfers) of a local government unit
MM ARVEST - Calculated tax on land (1,25% from price of land taxation in 2006) of local government unit
RESM ARVEST - Estimated natural resources usage charge of local government unit in 2007

Income of personal income tax from recent years is taken account in bigger proportions than income form earlier years as seen in the formula. The reason for that is to take more into account the last years change in revenues.

Instead of actual income from land tax the calculated average land tax is used to encourage local governments to increase their land tax rates. We use for all local governments average rate as 1,25%. Local governments can change the land tax rate between 0,6-2,5. If the actual income from land tax is used then the local governments have no reason to increase their land tax because they lose the 90% of its income in decrease of equalization fund.

From 2003 to 2005 different calculated average revenue formula existed:

$$AT = \left[\left(1 + 1/3 \frac{\left[(TM_{2003} - TM_{2002})/TM_{2003} + (TM_{2002} - TM_{2001})/TM_{2002} \right]}{2} \right) * \underset{2001-2003}{TM_{KESK}} + \underset{ARVEST}{MM} + \underset{ARVEST}{RESM} \right]$$

The formula in 2003-2005 was more complex than in 2006-2007. The reason for it was that until 2003 the local governments' revenues consisted also of personal income tax paid due to realization of assets, shares or other securities. The personal income tax from realization of assets and securities made local government income volatile that needed to be smoothed. Since 2004 the tax reform was implemented what made

the income from personal income tax stable and the former complex formula was not needed anymore (in some cases the former formula didn't work very well in those new conditions and needed to be changed not only to simplify the formula).

2. Negative sides of the valid equalization fund

Low motivation level

90% of increase in revenues from personal income tax is lost by in decrease of equalization fund in three years. Therefore some could say that local governments receiving transfers from equalization fund are not interested in boosting their economy to increase personal income tax. It is questionable if its true or not because local governments should have more important reasons to boost their economy than to keep for example 40% of increase in personal income tax. The average revenue formula that was valid in 2003-2005 kept 40% of local governments increased income, but it was at the same time unstable than the newer one.

Also local governments who do not receive transfers from equalization fund can keep 100% of increase in personal income tax. So there can be said that local governments should be interested to become wealthy enough to not receive transfers from equalization fund.

Do not include quite enough infrastructure elements

The equalization fund should take into account besides of population structure some infrastructure features (reflecting costs of maintenance and amortization of property). At the moment the infrastructure elements are under represented. Although we have detail information about local governments balance, it has not been used because of the low quality in capital assets accounting. It can be also possible that taking account local governments' capital assets from balance would initiate to overvalue their assets (so to manipulate the formula).

Some elements are not quite stable and out of reach of local governments manipulations.

3. Developments in short term

Natural resources usage charge estimate should be substituted with income from natural resources usage charge from previous three years actual (similar to personal income tax) because of the high risks making the incorrect estimates.

To increase the local governments' motivation in increasing the personal income tax, the calculated average revenue formula should be changed. There are two perspective ways to do that – lowering the support level coefficient or changing the weights in calculation of the average personal income tax.

The equalization fund should take into account more local governments infrastructure elements. Besides balance sheet accounting it is also under consideration to take into account for example the number of school classes or kindergarten groups opened by local governments and etc.

Increasing the values of other indicators by losing the indicator "disabled people receiving social service". This has been the goal since 2006 when this indicator was added to formula (new function was assigned to local governments and its was important to form a practice within local governments in offering the social services for adult disabled peopled). Otherwise this indicator is unnecessary, reduplicative and manipulative by local governments.

4. Calculation Example

Initial data of indicators and the calculated average operating expense calculation

Indicator	Indicators value in local government unit (Cn)	Indicators unit value (EEK)* Pn	Calculated average operating expense
Number of Children	932	13 146	12 252 072
Number of School-Age Children	2204	10 454	23 040 616
Number of Labor Force	8504	4 330	36 822 320
Number of Elders	2716	6 290	17 083 640
Calculated length of local roads and city streets (km)	27,5	44 710	1 229 525
Disabled people receiving social service	747	8 444	6 307 668
TOTAL			96 735 841

* Same for all local governments

Initial data on revenues and the calculated average revenues

Revenues	2004	2005	2006	2007*	Calculated average
Personal income tax	48 371 821	54 193 817	64 928 359		58 396 689
Land tax			927 388		927 388
Natural resource usage charge				187 806	187 806
TOTAL					59 511 883

* Estimation

Equalization fund transfer calculation

Calculated average operating expense	Calculated average revenues	Calculated shortage	Equalization fund transfer*
96 735 841	59 511 883	37 223 958	33 502 000

* 90% of calculated shortage (rounded)

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Chart 1

Revenues from personal income tax, land tax and natural resource usage tax per capita in local governments in 2006 compared to national average indicator.
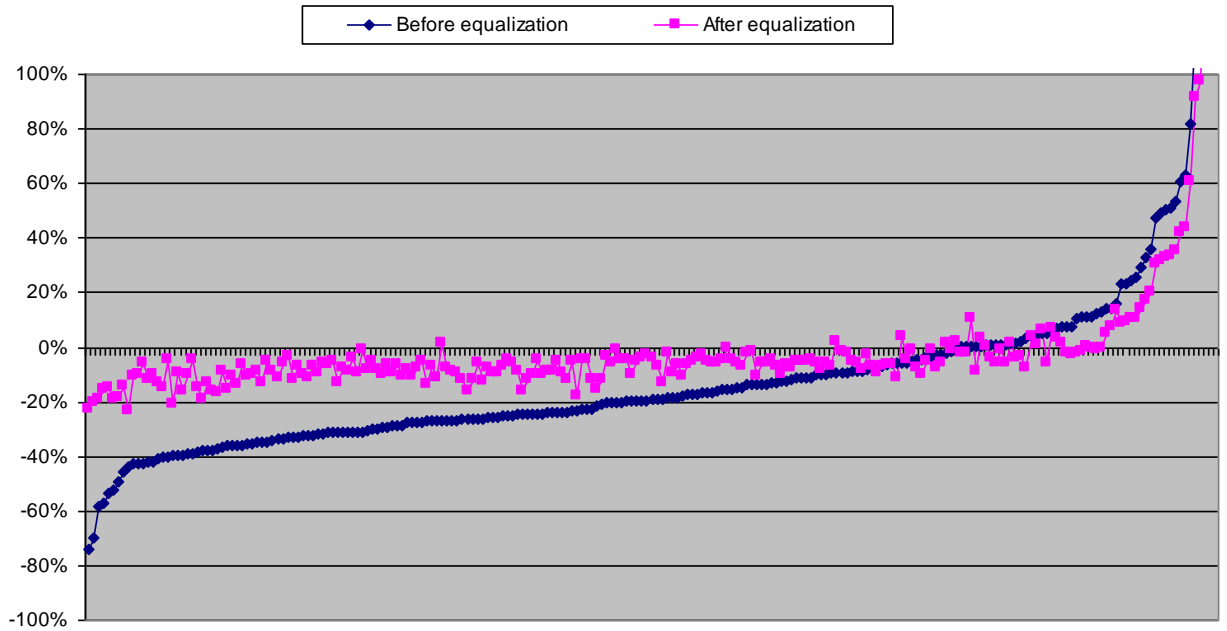
Calculating average indicator unit value

1. Expenditures structure and calculating average

Designing equalization fund in 2004 data of local governments' expenditures in Estonia was gathered in eleven domains:
- Common administration
- National defense and public order
- Economy
- Health service
- Culture and art
- Sport and leisure
- Education and science
- Social care

For better quality of regression analyze some of those domains were aggregated. In this process there have been taken into account the mutual aspects of different domains and the importance of each field. For example the local governments' national defense costs are practically non-existent and therefore can be influenced by unusual expenditures – so the regression analyze in this domain alone would not be successful.

Aggregated domains were:
- Administration (common administration, national defense and public order)
- Education (education and science)
- Economical activities (economy)
- Culture and sport (culture and art, sport and leisure)
- Social care and health-service (social care, health service)

Average expenditure need was calculated on the basis of three years (2000-2002) local governments' budget expenditures without investments and expenditures done with earmarked grants. Three-year basis helps reduce the influence of deviations in expenditures structure. To signify the importance of the recent years expenditures structure each year expenditures were taken into account in different proportions $(2002 - 0,5; 2001 - 0,3; 2000 - 0,2)$.

Example

2000	2001	2002	Average expenditure cost
2642	2724	3003	2642*0,2+2724*0,3+3003*0,5=2847

2. Choosing the indicators and regression analyze

Firstly we distinguished the main indicators that were available for each local government and seemed reasonable (for example: population divided to age-groups, population density, area, households, calculated average of local roads and city streets, unemployment etc). Then the regression analyzes between indicators and expenditures were done with each domain. The possible indicators and their values was found through regression analyze using Excel function LINEST.

Excel function LINEST calculates the statistics for a line by using the "least squares" method to calculate a straight line that best fits your data, and returns an array that describes the line[1].

The equation for the line is: y = mx + b or y = m1x1 + m2x2 + ... + b

LINEST formula form
=LINEST(known_y's;known_x's;const;stats)
known_y's – expenditures cost
known_x's – indicator(s)
const – must be set to "0" as we are not looking for constants
stats – for additional statistics this must be set to "1".

Following preparations were done:
1. For better overview, separated sheets for each domain were created, including only necessary data for concrete domain.
2. The total number of population was added for each sheet.
3. For each domain calculative average expenditure per capita was found for each local government.
4. The data was sorted by calculative expenditure per capita.
5. Top10 from both sides were not included in linest formula (about 10% of total local governments) to exclude exceptional values. Additional including or excluding was used if necessary. For example the capital city Tallinn (too different expenditure structure) or local governments in small islands (too exceptional) were excluded in some cases.
6. If calculating with many indicators, these indicators must be at the columns side by side.

To use the LINEST function the following should be done:
1. Fill the formula with necessary data. For example =LINEST(B11:B190;C11:E190;0;1)
2. Selecting the cell where the function was entered and area at least three more rows downward and as far the right as variables used plus one. For example if variables used were three, then the selected are must be four rows high and four rows long.
3. Area still selected, select also the formula, and click ctrl+shift+enter.
4. The necessary information is shown.

The LINEST function results used are shown as follows[1]:
-    Values for each indicator are shown in the 1st row (backwards).
-    Standard deviation for each indicator is shown in the 2nd row.
-    Coefficient of determination is shown in the 1st column and 3rd row.
-    In the 4th row is useful information for F-statistics[2].

It is suggested that only those formulas' results would be used which have a strong correlative connection with the costs (smallest coefficient of determination of all used

[1] Microsoft Excel Help
[2] F-critical values: http://www.biokin.com/tools/fcrit.html

formulas was 0,942 when finding the indicators values for Estonian equalization fund).

Important:
1. This analyze can be done with mixing different variables, but it is important to carefully choose which indicators or results should be used. **The LINEST function does not show if the most appropriate set of independent variables has been chosen**. For example: although the number of working people might have a strong(-er) positive effect on general education costs, it would be wise to use the number of youths instead (it is clear that the number of working people correlates strongly with number of children and therefore the working people have on strong correlative impact to education costs also).
2. The formula with negative values usually can't be used (except if the negative variable would have decreasing effect on expenditures in real life). It is possible to exclude or include more local governments to get positive values for each indicator.
3. Comprehensive and balanced approach is necessary on getting the final results. Each variable value might have been carefully chosen under every domain, but the total results must be also observed by human perspective. For example if would be wise to take into account all age groups when creating the final equalization formula and with comparable values. Therefore it is sometimes necessary to take into account the results of lower correlative value under some domains. Balanced approach is important in association of local governments' future behavior. For example, if the summarized results would be: children valuing 10000 per unit and elderly valuing 100 per unit. This kind of results would diminish the local governments' efforts to spend on and to keep elderly people in their region. The local governments would instead turn most of their efforts towards increasing the number of children in their region.

This method helps us to find the concrete values for **supporting our clear perspective**, but as there are many ways to get the final results (all mathematically correct), we have to find manually the one that best suits with our perspective. Keeping also in mind those indicators might have a strong effect on local governments' future behavior. So in choosing between available formula results, we should consider if they are the best variables to describe the local governments' expenditures and if they have a positive effect on local governments' future behavior. As this regression analyze is not the method for calculating the local governments' total sum of support needed, the founded basic values are important **mainly as ratios between each other**.

The summarized indicators values aka averages cost per unit are named Pn in our formula.

3. Calculating the Pn values for certain years

The regression analyze was done in 2004. In 2005-2007 the average cost per unit was found by increasing the average cost per unit values used in 2004. Increasing level of the Pn values depends of the equalization fund status in stage budget. In Estonia the equalization fund is fixed sum in state budget. It means that it can't to be exceeded. We have had also a policy that the equalization fund distributed is not decreasing also.

As was said before the regression analyze final results gave us proportions of the indicators values (Pn) when calculating the calculative expenditure costs for each local government. As the equalization fund total cost is also fixed in the state budget the Pn values are increased as much as possible (keeping the indicator values proportions intact) to distribute the entire equalization fund between local governments.

It is also possible not to fix the total sum of equalization fund in state budget (making it dependant of conditions). In this case there is also possible to increase the Pn values after the 1st year by the consumer price index for example. As in developing countries increase in incomes is usually greater than the consumer price index, the need for the equalization fund would diminish every year. But it holds some risk for the state budget if the consumer price index happens to be greater than the increase in local governments' income. At the same time the state may also undergo the recession and there would be no funds available to increase the equalization fund spending.

The regression analyze can be redone after some longer period (5 or 10 years).