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Wide dialogue to create
and methodologically support
a network for involving migrant
youth into civic society**



**INTERNATIONAL
CONFERENCE
"SHAPING THE FUTURE:
POLITICS & ECONOMICS"**

ERASMUS+ PROGRAMME OF THE EUROPEAN UNION



*PROJECT FUTURE "Shaping the diverse common FUTURE –
Wide dialogue to create and methodologically support a
network for involving migrant youth into civic society"*

INTERNATIONAL CONFERENCE "SHAPING THE FUTURE: POLITICS & ECONOMICS"



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Proceedings of the conference highlight the results of studies on pressing issues of migration in the world; adaptation of migrants in new social and cultural environments; European values and socio-political conflicts.

For researchers, teachers, graduate students, theoreticians and practitioners interested in the issues of international migration in the world politics and economics.



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INVOLVE OF THE ECONOMIC STATE OF THE COUNTRY WITH THE LEVEL OF MIGRATION

To determine such a link between a country's economic situation and migration, it is necessary to find an economic indicator that would characterize the entire country's economy. It was hypothesized that such an indicator could be the probability of default in the country.

The Gilles Duphrenot and Anne-Charlotte Paret's "Sovereign Default in Developing Countries" was used to calculate the probability, namely their projections of four major sources of vulnerability in the country [1]. This development defines three levels of risk of default, it is safe to dangerous: green, yellow and red.

Determining the green, yellow, or red default risk levels for each of the 4 selected factors does not clearly understand the default probability level. Additional calculations are required. We describe these metrics by adding conventions.

The paper [1] indicates that the most vulnerable to default are countries that have admitted at least 1 default in the previous 5 years. (*Ypd* – years from the previous default). The same authors include countries with a rather fragile macroeconomic environment in the zone of high risk of default, that is, in which there are:

- a significant decrease in the national currency - devaluation of more than 43% (year-on-year change) (*Dnc* – devaluation of the national currency);
- deep decline in production - real *GDP* growth below 3.4% (*Rgdpg* – real GDP growth);
- excess of the budget deficit (*Bdo* – budget deficit overrun) by 10.4% of *GDP*;

– excess debt service ratio (E_{dsr} – excess debt service ratio) to budget revenues (Br – budget revenues) by 11.3%, and also that:

– external public debt (E_{pd} – external public debt) is over 59% of sovereign debt (Sd – sovereign debt);

– coverage of total short-term debt (T_{std} – total short-term debt) by gross international reserves (Gir – gross international reserves) below 97%;

– total external debt (E_{pd} – external public debt) exceeds total export (Te – total exports) by 337%, etc.

There are four main sources of vulnerability:

1) The first source of vulnerability is debt service as a share of fiscal revenue

The model distinguishes between three modes: one characterized by low debt service vulnerability (less than 9% of budget revenues) (Br – budget revenues), high debt service vulnerability mode (where the latter is more than 14% of budget revenues), and an intermediate level.

2) Second source of vulnerability (Is – Internal savings) in % of GDP)

For the "internal savings" model, there are three modes (0, 1 and 2) limited by internal savings of 21.7% and 24.6% of GDP .

3) Third source of vulnerability (Fr – Foreign reserves) in % of short-term external debt (T_{std} – total short-term debt).

For the Foreign Currency Reserves model, two modes (0 and 1) are distinguished by foreign currency reserves of 78.5% of short-term external debt.

4) The fourth source of vulnerability - External debt in % of E – exports) (E_{pd} – external public debt)

For the external debt model, the three modes (0, 1 and 2) are limited by external debt of 126.8% and 258.3% of exports.

Let us summarize all these parameters into one table (Table 1).

Table 1 – Summary of default indicators according to [1]

Sources of vulnerability	Indicator	Default risk		
		Low	Middle	Hi
Basic	Debt servicing as a fraction of fiscal revenue (Epd / Br)	9%<	>9% & 14%<	>14%
	Internal Savings (Is / GDP)	21,7%<	21,7%> & 24,6%<	>24,6%
	Foreign reserves ($Fr / Tstd$)	78,5%<	78,5%>	>78,5%
	External debt (Epd / E)	126,8%<	>126,8% & 258,3%<	>258,3%
Extra	Years from previous default ($5 - Ypd$)	< 0	>0 & <4	>4
	Devaluation (Dnc)	<43%	>43%	>43%
	Real GDP Growth (0.034 - $Rgdpg$)	<0	>0 & <3,3%	>3,3%
	External sovereign debt (Epd / Sd)	<59%	>59%	>59%

To determine the default probability for a country, all of these metrics should be combined into a single formula of the form

$$P = \sum_{i=1}^8 I_i k_i , \quad (1)$$

where, I_i – function of the value of the indicator from the table. 2.20, which takes values from 0 to 1, k_i – weight factor, and

$$\sum_{i=1}^8 k_i = 1 . \quad (2)$$

Since the authors of [9] identified the first four indicators as the main ones, we define the sum of the weight coefficients for them as 0.8. Then the sum of the weights for the additional indicators will be 0.2. Since there are four indices in two groups, each major indicator has a weighting factor of 0.2 and an additional indicator of 0.05.

A uniform breakdown of the weights between the indicators is made due to the lack of information regarding the relative level of impact of each indicator on the risk of default.

To construct the functions of the values of a metric, we create a table containing, as an argument, the value of the metric and, as a function, the magnitude of the default probability through this metric (Table 2). It sets zero as zero, and 1 as the sum of the largest value and the average range difference.

Table 2 – Summary of default indicators

Sources of vulnerability	Indicator	Default risk			
		0,25	0,5	0,75	1
Basic	Debt servicing as a fraction of fiscal revenue (Epd / Br)	9%	11,5%	14%	19%
	Internal Savings (Is / GDP)	21,7%	23,15%	24,6%	27,5%
	Foreign reserves ($Fr / Tstd$)	25%	50%	78,5%	100%
	External debt (Epd / E)	126,8%	192,55%	258,3%	389,8%
Extra	Years from previous default (5 - Ypd)	1	2	3	4
	Devaluation (Dnc)	10,75%	21,5%	32,25%	43%
	Real GDP Growth (0.034 - $Rgdpg$)	0,85%	1,7%	2,55%	3,4%
	External sovereign debt (Epd / Sd)	14,75%	29,5%	44,25%	59%

Since linear proportions were used to determine the risk limit, the critical probability values were used to determine the coefficients of the formulas for I_i as linear dependences of the form

$$I_i = a_i + b_i x, \quad (3)$$

where, a_i – free member, b_i – angular coefficient, x – the numerical value of the default risk indicator.

The calculation was performed in a spreadsheet of MS Excel processors, the application "Regression".

In the table 3 summarizes the coefficients of these dependencies and the quality index of the approximation (R^2).

Table 3 – Numerical values of coefficients of linear models I_i

Sources of vulnerability	Indicator	Odds		
		Free member (a_i)	Angular coefficient (b_i)	Quality of approximation (R^2)
Basic	Debt servicing as a fraction of fiscal revenue (Epd / Br)	-0,368571	7,4285714	0,965714286
	Internal Savings (Is / GDP)	-2,4793103	12,807881	0,965714286
	Foreign reserves ($Fr / Tstd$)	0,0016635	0,9835683	0,997338351
	External debt (Epd / E)	-0,0581531	0,2824551	0,965714286
Extra	Years from previous default ($5 - Ypd$)	0	0,25	1
	Devaluation (Dnc)	0	2,3255813	1
	Real GDP Growth ($0.034 - Rgdpg$)	0	29,411764	1
	External sovereign debt (Epd / Sd)	0	1,6949152	1

As can be seen from the table. 2.22, the quality of the approximation is high, so these coefficients can be added to formula (2.17). Given the weighting coefficients of k_i , the calculation of the probability of default will be conducted by the following formula

$$\begin{aligned}
P = & -0,01129792 + 1,485714284 \frac{Epd}{Br} + 2,56157634 \frac{Is}{GDP} + \\
& + 0,196713678 \frac{Fr}{Tstd} + 0,05(5 - Ypd) + 0,465116278 Dnc + \\
& + 5,88235294(0.034 - Rgdp) + 0,33898305 \frac{Epd}{Sd}
\end{aligned} \quad (4)$$

The World Bank data [2-6] was then used to obtain the necessary indicators for the calculation, the result of which is reported in Table. 4.

Table 4 – Comparison the share of migrants with probability of default

Country	The overall level of migration	Population	The share of migrants	The probability of default
Afghanista	-314,602	37,172.39	-0,85%	69,09%
Albania	-69,998	2,866.38	-2,44%	82,73%
Algeria	-50,002	42,228.43	-0,12%	66,00%
Angola	32,066	30,809.76	0,10%	63,00%
Argentina	24,000	44,494.50	0,00%	67,00%
Armenia	-24,989	2,951.78	-0,85%	70,00%
Australia	791,229	24,992.37	3,17%	18,18%
Austria	324,998	8,847.04	3,67%	5,45%
Azerbaijan	6,002	9,942.33	0,06%	62,00%
Bahrain	239,000	1,569.44	0,02%	56,00%
Bangladesh	-1,847,503	161,356.04	-1,14%	79,09%
Belarus	43,648	9,485.39	0,46%	44,00%
Belgium	240,000	11,422.07	0,00%	64,00%
Bolivia	-47,520	11,353.14	-0,04%	65,00%
Bulgaria	-24,001	7,024.22	-0,34%	65,00%
Cambodia	-149,999	16,249.80	-0,92%	71,82%
Cameroon	-24,000	25,216.24	0,00%	60,00%
Canada	1,210,159	37,058.86	3,27%	10,91%
Chile	558,539	18,729.16	2,98%	19,09%
China	-1,741,996	1,392,730.00	-0,13%	72,00%
Colombia	1,023,981	49,648.68	2,06%	10,91%
Cyprus	25,000	1,189.27	0,00%	58,00%
Czech Republic	110,057	10,625.69	1,04%	48,00%
Denmark	75,998	5,797.45	1,31%	10,91%
Dominican Republic	-150,000	10,627.17	0,00%	68,00%
Ecuador	182,000	17,084.36	0,00%	65,00%
Egypt, Arab Rep.	-190,164	98,423.60	-0,19%	67,00%
Estonia	19,555	1,320.88	1,48%	5,45%

Country	The overall level of migration	Population	The share of migrants	The probability of default
Finland	70,000	5,518.05	0,00%	64,00%
France	182,636	66,987.24	0,27%	61,00%
Georgia	-50,000	3,731.00	0,00%	63,00%
Germany	2,719,112	82,927.92	3,28%	14,55%
Ghana	-50,000	29,767.11	0,00%	67,00%
Greece	-80,000	10,727.67	0,00%	64,00%
Guatemala	-46,073	17,247.81	-0,27%	71,00%
Guinea	-20,000	12,414.32	0,00%	54,00%
Haiti	-175,000	11,123.18	0,00%	56,00%
Honduras	-34,000	9,587.52	0,00%	60,00%
Hong Kong	146,542	7,451.00	1,97%	19,09%
Hungary	29,999	9,768.78	0,31%	60,00%
India	-2,663,434	1,352,617.33	-0,20%	65,00%
Indonesia	-494,777	267,663.43	-0,18%	71,00%
Iran,	-274,998	81,800.27	-0,34%	71,00%
Iraq	39,171	38,433.60	0,10%	66,00%
Ireland	118,020	4,853.51	0,24%	56,00%
Israel	50,002	8,883.80	0,56%	40,00%
Italy	744,713	60,431.28	1,23%	10,91%
Jamaica	-56,658	2,934.86	-1,93%	69,09%
Japan	357,800	126,529.10	0,00%	64,00%
Jordan	51,099	9,956.01	0,51%	36,00%
Kazakhstan	-90,000	18,276.50	0,00%	62,00%
Kenya	-50,000	51,393.01	0,00%	58,00%
Kuwait	197,600	4,137.31	0,05%	54,00%
Mexico	-300,000	126,190.79	0,00%	55,00%
Moldova	-6,935	3,545.88	-0,20%	67,00%
Morocco	-257,096	36,029.14	-0,71%	72,00%
Mozambique	-25,000	29,495.96	0,00%	62,00%
Myanmar	-816,564	53,708.39	-1,52%	81,82%
Nepal	208,549	28,087.87	0,74%	38,00%
Netherlands	80,000	17,231.02	0,00%	69,00%
New Zealand	74,403	4,885.50	1,52%	9,09%
Nicaragua	-106,360	6,465.51	-0,16%	68,00%
Nigeria	-300,000	195,874.74	0,00%	59,00%
Norway	140,000	5,314.34	0,00%	60,00%
Oman	437,000	4,829.48	0,01%	59,00%
Pakistan	-1,166,895	212,215.03	-0,55%	72,00%
Panama	56,000	4,176.87	0,00%	60,00%
Paraguay	-82,780	6,956.07	-0,12%	69,00%
Peru	495,345	31,989.26	1,55%	13,64%
Philippines	-335,758	106,651.92	-0,31%	68,00%
Poland	-146,976	37,978.55	-0,39%	72,00%
Portugal	-30,001	10,281.76	-0,29%	72,00%
Puerto Rico	-489,932	3,195.15	-15,33%	98%

Country	The overall level of migration	Population	The share of migrants	The probability of default
Qatar	200,000	2,781.68	0,01%	65,00%
Romania	-369,997	19,473.94	-1,90%	83,64%
Russian Federation	912,279	144,478.05	0,63%	36,00%
Saudi Arabia	674,895	33,699.95	2,00%	8,18%
Senegal	-100,001	15,854.36	-0,63%	66,00%
Singapore	135,142	5,638.68	2,40%	15,45%
Somalia	-200,002	15,008.15	-1,33%	75,45%
South Africa	727,026	57,779.62	1,26%	13,64%
Spain	200,000	46,723.75	0,00%	61,00%
Sri Lanka	-489,932	21,670.00	-2,26%	77,27%
Sweden	200,000	10,183.17	1,96%	17,27%
Switzerland	259,999	8,516.54	3,05%	12,73%
Tajikistan	-99,999	9,100.84	-1,10%	89,09%
Tanzania	-200,381	56,318.35	-0,36%	69,00%
Thailand	97,222	69,428.52	0,14%	62,00%
Tunisia	-20,000	11,565.20	0,00%	68,00%
Turkmenistan	-25,001	5,850.91	-0,43%	69,00%
Uganda	843,469	42,723.14	1,97%	15,45%
Ukraine	50,001	44,622.52	0,11%	60,00%
United Arab Emirates	200,000	9,630.96	2,08%	17,27%
United Kingdom	1,303,250	66,488.99	1,96%	14,55%
United States	4,774,029	327,167.43	1,46%	9,09%
Uruguay	-15,000	3,449.30	-0,43%	69,00%
Uzbekistan	-44,314	32,955.40	-0,13%	71,00%
Vietnam	-399,999	95,540.40	-0,42%	70,00%
Yemen, Rep.	-150,000	28,498.69	0,53%	37,00%

Countries such as Syria, through war and Turkey, were removed for the sake of refugees from Syria in the first place seeking to reach Turkish territory. Both Sudan and Eritrea were removed for the same reasons. Venezuela removed due to economic catastrophe caused by incompetent leadership. In addition, small countries and small migrations have been removed.

The share of migrants was found as the ratio of the number of migrants to the population of the country.

The correlation coefficient of the last two columns is -0.5886, which indicates a rather high correlation between the probability of default and migration in the country.

The minus sign means the obvious notion: the better the state of the country's economy, the more people want to live there. Conversely, the worse the economy (ie, when the probability of default is high), the more people want to leave the country.

Further studies should clarify the default probability formula taking into account the percentage of migrants. Such a model should be built using neural networks, then the accuracy of the prediction can be greatly increased.

References

1. Gennaioli, N. Sovereign Default, Domestic Banks and Financia Institutions [Electronic resource] / N. Gennaioli, A. Martin, S. Rossi // Universitat Pompeu Fabra. – 2006. – Mode of access: <http://www.econ.upf.edu/~martin/GMR.pdf>. – Date of access: 15.07.2016.
2. Net migration\ International Monetary Fund – <https://data.worldbank.org/indicator/SM.POP.NETM?end=2018&start=2018&view=map>
- 3.
4. GDP per capita (current US\$)\ International Monetary Fund, Government Finance Statistics Yearbook and data files. License : CC BY-4.0 [Electronic resource] / International Monetary Fund . – Mode of access: <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD>
5. Compensation of employees \$)\ International Monetary Fund, Government Finance Statistics Yearbook and data files. License : CC BY-4.0 [Electronic resource] / International Monetary Fund . – Mode of access: <https://data.worldbank.org/indicator/GC.XPN.COMP.CN>
6. Labor force, total \ International Monetary Fund, Government Finance Statistics Yearbook and data files. License : CC BY-4.0 [Electronic resource] / International Monetary Fund . – Mode of access: <https://data.worldbank.org/indicator/SL.TLF.TOTL.IN>