Life Quality, Recession Remedy and Energy Strategy

Aleksandr Yufa, Ph.D., D.Sc.
Content

• The Medicine of Economics: Government is the Medical Doctor for the Economy
• Recession as Economic Illness: Two Oil Shocks
• Life Quality: Multivariate Cross-Country Study
• Energy Strategy as Recession Remedy
• Power Market Design Flaws and Improvement
Basic Concepts of the Medicine of Economics

- The major goals of medicine of economics are diagnostics, prophylactics, and treatment of economic diseases such as recession, inflation, stagflation, unemployment, or poverty.
- The diagnostics component is necessary for understanding the conditions of economics and forecasting its future development.
- The prophylactic component supports sustainable economic growth and protects healthy economies from diseases.
- Treatment operates on economic diseases to return the economy to its initial conditions or to improve them. Possible treatments include shock therapy, import substitution, and export promotion.
FIGURE 1. World Economies' Illnesses and Recoveries from 1962 to 1993

Exporters of Manufactures - Middle Income
- Bulgaria (02-35-57)
- Hungary (01-35-37)
- Korea (00-32-35)
- Poland (39-90-93)

GDP per capita

Exporters of Manufactures - High Income
- Canada (01-32-59)
- Finland (01-34-59)
- Hong Kong (01-33-38)
- Norway (01-35-19)
- Oman (01-35-19)
- Peru (01-35-19)
- Portugal (01-34-59)
- Spain (01-35-19)
- Sweden (01-34-59)

Exporters of Primary Products - Low Income
- Botswana (01-34-59)
- Honduras (01-33-38)
- Mali (01-34-59)
- Morocco (01-35-09)
- Paraguay (01-34-59)
- Togo (01-35-09)

GDP per capita

Exporters of Primary Products - Middle Income
- Argentina (01-34-59)
- Bangladesh (01-34-59)
- Bolivia (01-34-59)
- Chile (01-34-59)
- Colombia (01-34-59)
- Ecuador (01-34-59)
- Paraguay (01-34-59)
- Peru (01-34-59)

Exporters of Primary Products - High Income
- Australia (01-34-59)
- Belgium (01-34-59)
- Brazil (01-34-59)
- Canada (01-34-59)
- Chile (01-34-59)
- Colombia (01-34-59)
- Costa Rica (01-34-59)
- Indonesia (01-34-59)
- Japan (01-34-59)
- Mexico (01-34-59)
- Netherlands (01-34-59)
- New Zealand (01-34-59)

GDP per capita

Exporters of Fuels (Mainly Oil)
- Angola (01-34-59)
- Azerbaijan (01-34-59)
- Bahrain (01-34-59)
- Botswana (01-34-59)
- Chad (01-34-59)
- Qatar (01-34-59)

Exporters of Services - Low Income
- Bangladesh (01-34-59)
- Bolivia (01-34-59)
- Chile (01-34-59)
- Colombia (01-34-59)
- Costa Rica (01-34-59)
- Dominican Republic (01-34-59)
- Ecuador (01-34-59)
- Paraguay (01-34-59)

GDP per capita

Exporters of Services - Middle Income
- Belgium (01-34-59)
- Bolivia (01-34-59)
- Canada (01-34-59)
- Chile (01-34-59)
- Colombia (01-34-59)
- Costa Rica (01-34-59)
- Dominican Republic (01-34-59)
- Ecuador (01-34-59)
- Paraguay (01-34-59)

Exporters of Services - High Income
- Australia (01-34-59)
- Belgium (01-34-59)
- Brazil (01-34-59)
- Canada (01-34-59)
- Chile (01-34-59)
- Colombia (01-34-59)
- Costa Rica (01-34-59)
- Dominican Republic (01-34-59)
- Ecuador (01-34-59)
- Paraguay (01-34-59)
- Portugal (01-34-59)

Diversified Exporters - Low Income
- Bangladesh (01-34-59)
- Botswana (01-34-59)
- Central African Republic (01-34-59)
- Kenya (01-34-59)

GDP per capita

Diversified Exporters - Middle Income
- Bangladesh (01-34-59)
- Botswana (01-34-59)
- Central African Republic (01-34-59)
- Kenya (01-34-59)
- Mozambique (01-34-59)
- Namibia (01-34-59)
- South Africa (01-34-59)
- Swaziland (01-34-59)

GDP per capita

Diversified Exporters - High Income
- Australia (01-34-59)
- Austria (01-34-59)
- Belgium (01-34-59)
- Brazil (01-34-59)
- Canada (01-34-59)
- Chile (01-34-59)
- Colombia (01-34-59)
- Costa Rica (01-34-59)
- Dominican Republic (01-34-59)
- Ecuador (01-34-59)
- Paraguay (01-34-59)
- Portugal (01-34-59)
- South Africa (01-34-59)
- Swaziland (01-34-59)

GDP per capita
Regression Equation: \( \text{DEPTH} = 0.98841 + 0.0356 \times \text{LENGTH} \)

Correlation: \(-0.62757\)  \(N = 83\)  Std. Err. of Est.: \(0.1134301\)
FIGURE 3. Average Depth Vs Length of Crisis

- Exporters of Manufacture
- Exporters of Primary Products
- Diversified Exporters
- Exporters of Services

Income:
- L - Low
- M - Middle
- H - High

Years of Crisis

Reduced GNP
FIGURE 8
Matrix Plot for Main Factors in 1993

GNP
ENERGY
BIRTH
LIFE
ENROLL
HEALTH
WATER
NEWSPAP
FREEDOM
FIGURE 9
Tree Diagram for 91 Countries in 1993
Complete Linkage with Euclidean distances
FIGURE 10. Regression Control Charts for 1950-2020: LIFE = A - B * BIRTH

1950
A = 86.747  B = 0.9544

1955
A = 88.184  B = 0.9344

1960
A = 88.616  B = 0.9089

Kuwait

1965
A = 87.484  B = 0.8695

East Timor

1970
A = 86.428  B = 0.8326

Jordan

1975
A = 84.923  B = 0.7731

E. Timbuktu

1980
A = 86.104  B = 0.7703

1985
A = 85.752  B = 0.7329

Afghanistan

1990
A = 85.724  B = 0.7121

2000
A = 85.504  B = 0.6831

East Timor

2010
A = 86.689  B = 0.7336

Afghanistan

2020
A = 89.284  B = 0.8986
FIGURE 11: Regression Control Chart for LIFE vs BIRTH in 1950-2020

Regression Equation: LIFE = 88.224 - .8699 * BIRTH

Correlation: -.8846
N = 1812
Std Err of Est: 6.17101
FIGURE 12
Life Expectancy = 93 - Birth Rate for 1950-2025

1950-55
1955-60
1960-65
1965-70
1970-75
1975-80
1980-85
1985-90
1990-95
2000-05
Figure 13
X-Bar chart for (LIFE + BIRTH) in 1950-2025

X-Bar mean: 92.4569; Process sigma: 6.42135

Histogram of Means
No of obs

X-Bar chart: (LIFE+BIRTH)

Nodes

Samples

Nodes

Samples

111.721
924588
731928
FIGURE 14
REGRESSION CONTROL CHART for Life Expectancy = Birth Rate in 1950-2025
Correlation = -0.8436 N = 1812 Std Err of Est.: 6.171001

GABON

KUWAIT

EAST TIMOR

CAMBODIA

JORDAN

KENYA
FIGURE 15
Tree Diagram for 219 Countries in 2000
Complete Linkage
Euclidean distances
FIGURE 16
Scatter plot for Life Expectancy Against Death Rate
FIGURE 17
REGRESSION CONTROL CHART for LIFE EXPECTANCY vs. GNP per capita

Regression Equation: LIFE EXPECTANCY = 22.928 + 13.005 \times \log_{10}(GNP\ per\ capita)

Correlation: 0.782673  N = 219  Std. Err. of Est.: 7.129452

LIFE EXPECTANCY

AFGHANISTAN
ALBANIA
ALGERIA
AMERICAN
ANDORRA
ANGOLA
ANGUILLA
ANTIGUA
ARGENTINA
ARMENIA
ARUBA
AUSTRALIA
AUSTRIA
AZERBAIJAN
BAHAMAS
BAHRAIN
BANGLADESH
BARBADOS
BELARUS
BELGIUM
BELIZE
BENIN
BERMUDA
BHUTAN
BOLIVIA
BOSNIA
BOTSWANA
BRAZIL
BRITISH
BRUNEI
BULGARIA
BURKINA
BURUNDI
CAMBODIA
CAMEROON
CANADA
CAPE VERDE
CAIF MAN
CENTRAL
CHAD
CHILE
CHINA
COLOMBIA
COMOROS
CONGO
CONGO, REPUBLIC
COOK ISLANDS
COLOMBIA
COTE D'IVOIRE
CROATIA
CUBA
CYPRUS
CZECH REPUBLIC
DENMARK
DJIBOUTI
DOMINICA
DOMINICA
ECUADOR
EGYPT
EL SALVA
ERITREA
ESTONIA
ETHIOPIA
FAEROE ISLANDS
FIJI
FINLAND
FRANCE
FRANCE, G
FRANCE, P
GABON
Gambia
GEORGIA
GERMANY
GHANA
GIBRALTAR
Greece
GREENLAND
GRENADE
GUADALOUPE
GUAM
GUATEMALA
GUERNSEY
GUINEA
GUINEA-BISSAU
HAITI
HONDURAS
HUNGARY
IRELAND
ISRAEL
ITALY
JAMAICA
JAPAN
JERSEY
JORDAN
KAZAKHSTAN
KENYA
KIRIBATI
KOREA, NORTH
KOREA, SOUTH
KUWAIT
KYRGYZSTAN
LAOS
LATVIA
LEBANON
LESOTHO
LIBERIA
LIBYA
LIECHTENSTEIN
LITHUANIA
LUXEMBOURG
MACEDONIA
MADEIRA
MALAWI
MALAYSIA
MALEDIVES
MALI
MALTA
MARSHALL
MARTINIQUE
MAURITANIA
MAURITIUS
MAYOTTE
MEXICO
MICRONESIA
MOLDOVA
MONACO
MONGOLIA
MOZAMBIQUE
NAMIBIA
NAURU
NEPAL
NETHERLANDS
NETHERLANDS ANTILLES
NEVIS
NICARAGUA
NIGER
NIGERIA
NORWAY
OMAN
PAKISTAN
PANAMA
PALESTINE
PARAGUAY
PERU
PHILIPPINES
POLAND
PORTUGAL
PUERTO RICO
QATAR
REUNION
ROMANIA
RUSSIA
RWANDA
SAINT HELENA
SAINT KITTS
SAINT LUCIA
SAINT PIERRE
SAINT VINCENT
SAMOA
SAN MARINO
SAO TOME
SIOUX
SIERRA LEONE
SINGAPORE
SLOVAKIA
SLOVENIA
SOLOMON
SOMALIA
SOUTH AFRICA
SPAIN
SWEDEN
SWITZERLAND
SYRIA
TAIWAN
TAJIKISTAN
TANZANIA
THAILAND
TONGA
TRINIDAD
TUNISIA
TURKEY
TUVALEN
UKRAINE
UNITED ARAB EMIRATES
UNITED KINGDOM
UNITED STATES
URUGUAY
UZBEKISTAN
VANUATU
VENEZUELA
VIETNAM
WALDHEIM
ZAMBIA
ZIMBABWE

Life Expectancy vs. GNP per capita

LIFE EXPECTANCY

AFGHANISTAN
ALBANIA
ALGERIA
AMERICAN
ANDORRA
ANGOLA
ANGUILLA
ANTIGUA
ARGENTINA
ARMENIA
ARUBA
AUSTRALIA
AUSTRIA
AZERBAIJAN
BAHAMAS
BAHRAIN
BANGLADESH
BARBADOS
BELARUS
BELGIUM
BELIZE
BENIN
BERMUDA
BHUTAN
BOLIVIA
BOSNIA
BOTSWANA
BRAZIL
BRITISH
BRUNEI
BULGARIA
BURKINA
BURUNDI
CAMBODIA
CAMEROON
CANADA
CAPE VERDE
CAIF MAN
CENTRAL
CHAD
CHILE
CHINA
COLOMBIA
COMOROS
CONGO
CONGO, REPUBLIC
COOK ISLANDS
COLOMBIA
COTE D'IVOIRE
CROATIA
CUBA
CYPRUS
CZECH REPUBLIC
DENMARK
DJIBOUTI
DOMINICA
DOMINICA
ECUADOR
EGYPT
EL SALVA
ERITREA
ESTONIA
ETHIOPIA
FAEROE ISLANDS
FIJI
FINLAND
FRANCE
FRANCE, G
FRANCE, P
GABON
Gambia
GEORGIA
GERMANY
GHANA
GIBRALTAR
Greece
GREENLAND
GRENADE
GUADALOUPE
GUAM
GUATEMALA
GUERNSEY
GUINEA
GUINEA-BISSAU
HAITI
HONDURAS
HUNGARY
IRELAND
ISRAEL
ITALY
JAMAICA
JAPAN
JERSEY
JORDAN
KAZAKHSTAN
KENYA
KIRIBATI
KOREA, NORTH
KOREA, SOUTH
KUWAIT
KYRGYZSTAN
LAOS
LATVIA
LEBANON
LESOTHO
LIBERIA
LIBYA
LIECHTENSTEIN
LITHUANIA
LUXEMBOURG
MACEDONIA
MADEIRA
MALAWI
MALAYSIA
MALEDIVES
MALI
MALTA
MARSHALL
MARTINIQUE
MAURITANIA
MAURITIUS
MAYOTTE
MEXICO
MICRONESIA
MOLDOVA
MONACO
MONGOLIA
MOZAMBIQUE
NAMIBIA
NAURU
NEPAL
NETHERLANDS
NETHERLANDS ANTILLES
NEVIS
NICARAGUA
NIGER
NIGERIA
NORWAY
OMAN
PAKISTAN
PANAMA
PALESTINE
PARAGUAY
PERU
PHILIPPINES
POLAND
PORTUGAL
PUERTO RICO
QATAR
REUNION
ROMANIA
RUSSIA
RWANDA
SAINT HELENA
SAINT KITTS
SAINT LUCIA
SAINT PIERRE
SAINT VINCENT
SAMOA
SAN MARINO
SAO TOME
SIOUX
SIERRA LEONE
SINGAPORE
SLOVAKIA
SLOVENIA
SOLOMON
SOMALIA
SOUTH AFRICA
SPAIN
SWEDEN
SWITZERLAND
SYRIA
TAIWAN
TAJIKISTAN
TANZANIA
THAILAND
TONGA
TRINIDAD
TUNISIA
TURKEY
TUVALEN
UKRAINE
UNITED ARAB EMIRATES
UNITED KINGDOM
UNITED STATES
URUGUAY
UZBEKISTAN
VANUATU
VENEZUELA
VIETNAM
WALDHEIM
ZAMBIA
ZIMBABWE

Life Expectancy vs. GNP per capita

Life Expectancy

AFGHANISTAN
ALBANIA
ALGERIA
AMERICAN
ANDORRA
ANGOLA
ANGUILLA
ANTIGUA
ARGENTINA
ARMENIA
ARUBA
AUSTRALIA
AUSTRIA
AZERBAIJAN
BAHAMAS
BAHRAIN
BANGLADESH
BARBADOS
BELARUS
BELGIUM
BELIZE
BENIN
BERMUDA
BHUTAN
BOLIVIA
BOSNIA
BOTSWANA
BRAZIL
BRITISH
BRUNEI
BULGARIA
BURKINA
BURUNDI
CAMBODIA
CAMEROON
CANADA
CAPE VERDE
CAIF MAN
CENTRAL
CHAD
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ECUADOR
EGYPT
EL SALVA
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GIBRALTAR
Greece
GREENLAND
GRENADE
GUADALOUPE
GUAM
GUATEMALA
GUERNSEY
GUINEA
GUINEA-BISSAU
HAITI
HONDURAS
HUNGARY
IRELAND
ISRAEL
ITALY
JAMAICA
JAPAN
JERSEY
JORDAN
KAZAKHSTAN
KENYA
KIRIBATI
KOREA, NORTH
KOREA, SOUTH
KUWAIT
KYRGYZSTAN
LAOS
LATVIA
LEBANON
LESOTHO
LIBERIA
LIBYA
LIECHTENSTEIN
LITHUANIA
LUXEMBOURG
MACEDONIA
MADEIRA
MALAWI
MALAYSIA
MALEDIVES
MALI
MALTA
MARSHALL
MARTINIQUE
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MONGOLIA
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NEVIS
NICARAGUA
NIGER
NIGERIA
NORWAY
OMAN
PAKISTAN
PANAMA
PALESTINE
PARAGUAY
PERU
PHILIPPINES
POLAND
PORTUGAL
PUERTO RICO
QATAR
REUNION
ROMANIA
RUSSIA
RWANDA
SAINT HELENA
SAINT KITTS
SAINT LUCIA
SAINT PIERRE
SAINT VINCENT
SAMOA
SAN MARINO
SAO TOME
SIOUX
SIERRA LEONE
SINGAPORE
SLOVAKIA
SLOVENIA
SOLOMON
SOMALIA
SOUTH AFRICA
SPAIN
SWEDEN
SWITZERLAND
SYRIA
TAIWAN
TAJIKISTAN
TANZANIA
THAILAND
TONGA
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UNITED STATES
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VANUATU
VENEZUELA
VIETNAM
WALDHEIM
ZAMBIA
ZIMBABWE
FIGURE 18
3D Contour Plot for Life Expectancy
Distance Weighted Least Squares
FIGURE 19
3D Contour Plot for Birth Rate
Distance Weighted Least Squares
FIGURE 20
3D Contour Plot for Death Rate
Distance Weighted Least Squares
FIGURE 21
3D Contour Plot for GNP per capita
Distance Weighted Least Squares
FIGURE 22
3D Contour Plot for Life Expectancy Vs Birth Rate and GNP per capita
Distance Weighted Least Squares
FIGURE 23
3D Contour Plot for Life Expectancy Vs Birth and Death Rates
Distance Weighted Least Squares
Birth Rate = 61.263 - 0.4678 \times \text{Literacy}
Figure 25
Quadratic Regression Control Chart for Death Vs Birth Rate

$Death Rate = 15.0898 - 0.7754 \times Birth Rate + 0.0182 \times Birth Rate^2$
Figure 26
Matrix Plot for Main Factors in 2006

Birth Rate

Life Quality

Economic Freedom

Energy per capita
LIFE QUALITY = GDP PER CAPITA * LIFE EXPECTANCY

GOLDEN LIFE QUALITY = LIFE QUALITY/PRICE OF GOLD

• HIGH LIFE QUALITY IS ASSOCIATED WITH:
  HIGH ENERGY CONSUMPTION PER CAPITA,
  LOW BIRTH RATE AND
  HIGH ECONOMIC FREEDOM

• NUCLEAR POWER, RENEWABLE ENERGY AND
  EFFICIENT CARS ARE KEYS TO THE US ENERGY
  INDEPENDENCE

• BIRTH CONTROL COULD BE DONE BY LITERACY,
  EDUCATION AND PREVENTIVE MEASURES WITH
  MINIMAL ABORTION
Life Quality = 4.7774 \times 10^6 \times \exp(-0.1073 \times \text{Birth Rate}); R Square = 44.12\%
Figure 28

\[ \text{Life Quality} = 339.6778 \times \exp(1.1015 \times \text{Economic Freedom}) \]; \text{ R Square} = 52.04\%
Life Quality = 2.7754 \times 10^5 + 346.0436 \times \text{Energy per capita}; R^2 = 68.51\%
Figure 30. Multiple Regression Control Chart for Life Quality

Observed=-40,691.965+1.0176*Predicted; R Square=84.25%

Life Quality=490.7785*Birth Rate^(-0.4166)*Economic Freedom^2.0532*Energy per capita^0.6362
Figure 31. Multiple Regression Control Chart for Life Quality in Developing Countries

Observed = -40,691.965 + 1.0176*Predicted; R Square = 84.25%

Life Quality = 490.7785*Birth Rate^(-0.4166)*Economic Freedom^2.0532*Energy per capita^0.6362
Figure 32
Life Quality in NIS after breakdown of USSR
Figure 33

NIS Relative Life Quality after breakdown of USSR (YR1991=100%)
Figure 34

NIS Relative Life Quality Recovery after breakdown of USSR

[Graph showing relative life quality recovery for different countries over years from YR1991 to YR2006, with countries including Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.]
Figure 34. Golden Life Quality for 7 NIS, oz. per capita

Belarus
Estonia
Kazakhstan
Latvia
Lithuania
Russian Federation
Ukraine
Figure 35. Golden Life Quality for 9 Developed Countries, oz. per capita
Energy Strategy against Recession

• Creation of the US National Power Grid as an important part of National Energy Strategy
• Construction of “Electricity Highways” – Direct Current Transmission Lines to open the door for cheap power from mid-section of the country to the coasts
• Re-build Nuclear Power Plants instead of demolished with existing infrastructure and manpower
• Create Universal Power Market Rules for the entire country
Standard Market Design Problems

- Business Risk (High Power Price Volatility)
- Generators Bankruptcy (Low Rate of Return)
- High Uniform Prices set by the most expensive marginal unit
- Large On-line Surpluses (Partial Dispatch)
- Higher Air Pollution (Lower Fuel Efficiency)
- Low Transparency (More Call Tickets)
- Price Taker Philosophy under Uniform Pricing
- Unsatisfactory design of the Energy Market (96% of total money involved) led to creation of many additional (often artificial) markets and auctions
- All-in-one Market Price shows significant mark-up to the current Energy Price, so real price of energy is much higher than misleading lower energy only price
- High Zonal Prices in CT caused by wheeling power from Canada to NY
Main Route Causes for Problems

• Ten Offer Blocks
• Delayed State Estimator only input to Unit Dispatch Software and LMP Calculator
• Clearing Mechanism
• Negative Markets interaction (e.g. Regulation and Energy)
• Demonstration only Unit Performance Audits
Ten Offer Blocks

• Legalized Opportunity for Economic Withholding
• Large on-line ballast because of partial unit dispatch
• Higher heat rate and air pollution
• Unstable dispatch solution which jumps from one unit offer block to another unit
Clearing Mechanism

• Most of businesses use pay as bid approach
• Current clearing price approach along with ten offer blocks leads to unreasonably wide ranged prices, increasing process variation
• Zonal LMP approach helps partially localize high prices, but only because of congestion
• Pay as bid approach will allow to recover stranded costs and to have needed rate of return for the generators, lowing prices under competition
• Each unit should bid high enough for good profit margin, but low enough to win a competition
Goals for Quality Improvement

• Lower Process Variation (Market Volatility)
• Fair Market Design for Investment Recovery
• Reliable Dispatch based on the Latest Information
• Fuel Efficiency with Lower Heat Rate
• Cleaner Environment with Lower Air Pollution
• Market Transparency with easier Settlements
• Customer Satisfaction (less Call Tickets)
Solutions

• Limit number of offer blocks to two: zero – for self schedule contracts only, and positive – for the spot portion
• Implement pay as bid approach for Energy Market and pay for ancillary services by the same flat energy offer
• Apply regular statistical approach for Unit Performance Audits with Average Performance Rate instead of demonstration
• Set wholesale Energy Price to Weighted Average System Price instead of Marginal Uniform Price
• Let NY and PJM pay congestion uplift for CT caused by wheeling power