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Economic Size and Debt Sustainability against Piketty's "Capital Inequality"

Hye-jin Cho

Hyejin.Cho@malix.univ-paris1.fr

Economics, University of Paris 1, Pantheon-Sorbonne, Room 502, Maison des Sciences Economiques, 106-112, Boulevard de l'Hopital 75013 Paris FRANCE

Abstract. This article presents a methodology designed to facilitate alternative variables measuring economic growth. A capital-labor split of Cobb-Douglas function is adapted for use in the context of economic growth. A capital/income ratio and two fundamental law of capitalism originated by Thomas Piketty illustrate capital inequality undervalued than labor inequality. In addition, the article includes export and external debt as strong alternatives. Empirical data of the World Bank are analyzed to demonstrate broad differences in economic sizes. The case analysis on Latin America as an example of different sized economy is also discussed.

Keyword. Capital-labor split, factors of production, capital/income ratio, Thomas Piketty, Capitalism, Economic size, Debt sustainability, Latin America, Import substitution industrialization (ISI) model, Insolvent external debt, Openness, External debt to exports ratio

1. Introduction

1.1 Questions about stability of the Capital-Labor split

“in the 2000s several official reports published by the Organization for Economic Cooperation and Development (OECD) and International Monetary Fund (IMF) took note of the phenomenon (a sign that the question was being taken seriously). The novelty of this study is that it is to my knowledge *the first attempt to place the question of the capital-labor split and the recent increase of capital's share of national income* in a broader historical context by focusing on the evolution of the capital/income ratio from the eighteenth century until now.“

ref: Thomas Piketty (2014) *Capital in the Twenty-First Century*.

Until when, can we use the Cobb-Douglas function with the mindset to believe the stability of the Capital-Labor split? The rational answer with alternative solutions should be pursued to this question. At the first step, we can think about weakness of this method.

Firstly, the Solow residual which is a number describing empirical productivity growth in an economy from year to year and decade to decade is hard to be calculated because it's "residual" which is the part of growth that cannot be explained through capital accumulation or the accumulation of other traditional factors, such as land or labor.

The equation in Cobb-Douglas form is: $Y = A K^A L^B$ where total output Y is as a function of total-factor productivity A , Capital input K , Labor input L and two input's respective shares of output. (A and B are the capital input share of contribution for K and L respectively)

Even though Robert Solow defined rising productivity as rising output with constant capital and labor input perfectly, he left undefined part as the Solow residual. Problem is that Solow residual has pro-cyclical. Traditionally, total output is measured by inputs of labor and capital. TFP (TFP) called multi-factor productivity (MFP) accounting for all inputs cannot be measured directly and accounts for effects in total output not caused by inputs. Indeed, there are two sided directions to analyze the economy.

Especially, Multifactor Productivity (MFP) is measured as below:

$$MFP_i = Y_i - \psi_i$$

where Y_i denotes actual output and ψ_i denotes predicted output,

$$\log_e(Y) = \alpha_0 + \beta_i \log_e(K_i) + \gamma_i \log_e(L_i)$$

so we get,

$$MFP = \frac{\Delta(\ln f)}{\Delta t} = \frac{\Delta(\ln Y)}{\Delta t} - \frac{s_L \times \Delta(\ln L)}{\Delta t} - \frac{s_K \times \Delta(\ln K)}{\Delta t}$$

where f is the global production function: Y is output, t is time, S_L is the share of input costs attributable to labor expenses, S_K is the share of input costs attributable to capital expenses, L is a dollar quantity of labor, K is a dollar quantity of capital, M is a dollar quantity of materials, S is a dollar quantity of (business) services, E is energy or exergy (available energy), only used in some models.

Secondly, like Total Factor Productivity (TFP), Growth accounting exercises are open to the Cambridge Critique. The aggregation problem is the major part of this debate. The style that the representative agent solves the decision problem in the function assuming the entire economy cannot be from the debate about the collection problem of different inputs, sudden shocks, rate of profit and a large number of heterogeneous workplaces. Hence, some economists believe that the method and its results are invalid.

Otherwise, we can indirectly establish the model to find determinants of TFP. Neoclassical economics started with the classical factors of production of land, labor and capital. Further distinctions from classical and neoclassical microeconomics include capital-the result of investment, fixed capital, working capital, financial capital and technological progress. Additionally, entrepreneurship, human capital, intellectual capital, social capital, natural resources and energy can be considered.

1.1. Methodology about Factors of Production (ref: author, 2014)

Input: Three Factors of Production
Classical economics of Adam Smith, David Ricard: Labor, Capital Stock, Land (Natural Resource)
Marxism Labor, The subject of labor, The instruments of labor
Neoclassical microeconomics different format: Capital, Fixed Capital, Working Capital, Financial Capital, Technological progress
+add: Entrepreneurs (Frank Knight), Human Capital, Intellectual Capital, Social Capital (Pierre Bourdieu), Natural resources (Ayres-Warr), Energy
Output: Finished Goods (National Income)
Factor Payments: Rent, Wage, Interest, Profit

So we need to think "Weightness" on Labor, Capital and other factors at the next step. I agree the opinion of Thomas Piketty that there is the structure of inequality with respect to both labor and capital actually changed since the ninetieth century as below.

“To what extent are inequalities of income from labor moderate, reasonable, or even no longer an issue today? It is true that inequalities with respect to labor are always much smaller than inequalities with respect to capital. It would be quite wrong, however, to neglect them, first because income from labor generally accounts for two-thirds to three-quarters of national income, and second because there are quite substantial differences between countries in the distribution of income from labor, which suggests that public policies and national differences can have major consequences for these inequalities and for the living conditions of large numbers of people.”

ref: Thomas Piketty. Capital in the Twenty-First Century.

2. Dynamics of the capital/income ratio of Thomas Piketty

2.1 $r > g$

“...If, moreover, the rate of return on capital remains significantly above the growth rate for an extended period of time (which is more likely when the growth rate is low, though not automatic), then the risk of divergence in the distribution of wealth is very high...”

“...This fundamental inequality, which I will write as $r > g$ (where r stands for the average annual rate of return on capital, including profits, dividends, interest, rents, and other income from capital, expressed as a percentage of its total value, and g stands for the rate of growth of the economy, that is, the annual increase in income or output), will play a crucial role in this book. In a sense, it sums up the overall logic of my conclusions....”

ref: Thomas Piketty (2014) Capital in the Twenty-First Century.

Thomas Piketty defined about capital inequality. This is the similar viewpoint of boom and burst. Boom and burst is a time period of a severe business cycle. Several economic indicators are denoted as sustained increases followed by a sharp and rapid contraction.

Times of increased business and investment have collapsed leaving widespread poverty such as the depression of 1837 and 1857 in the United States. For example, in the early 1800s in Ohio people were buying land on credit to sell at twice the price but land became too expensive to buy. At the same time, wheat prices became too low to transport wheat to market. Wheat was \$1.50 per bushel in 1816 ; by 1821, 20 cents. The automaker Paul Hoffman said “we can not live with a crash with 26 depressions over 100 years including the burst of the 1930s.”

2. 2 The First Fundamental Law of Capitalism $\alpha = r \times \beta$

“In order to illustrate the difference between short-term and long-term movements of the capital/income ratio, it is useful to examine the annual changes observed in the wealthiest countries between 1970 and 2010, a period for which we have reliable and homogeneous data for a large number of countries. To begin, here is a look at the ratio of private capital to national income, whose evolution is shown in Figure 5.3 for the eight richest countries in the

world, in order of decreasing GDP: the United States, Japan, Germany, France, Britain, Italy, Canada, and Australia.”

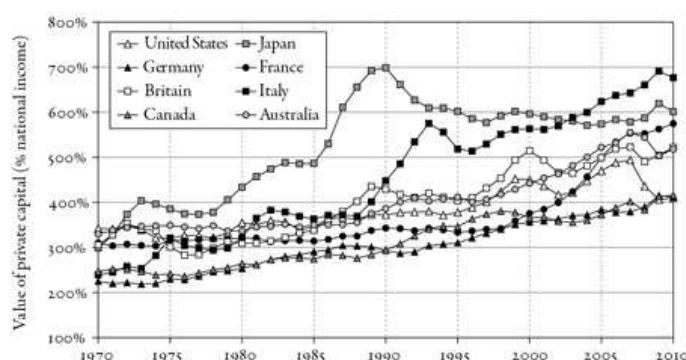


FIGURE 5.3. Private capital in rich countries, 1970–2010

(ref: piketty.pse.ens.fr/capital21c)

“ Figure 5.3 displays annual series and shows that the capital/income ratio in all countries *varied constantly in the very short run*. ”

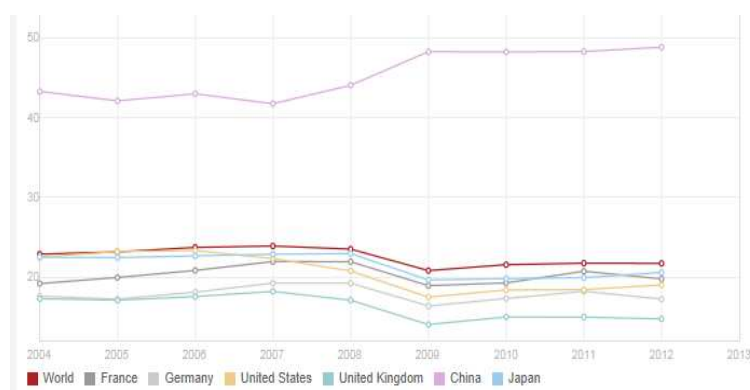
“.... can now present the first fundamental law of capitalism, which links the capital stock to the flow of income from capital. *The capital/income ratio* β is related in a simple way to the *share of income from capital in national income*, denoted α . The formula is $\alpha = r \times \beta$, where r is *the rate of return on capital*. ...”

ref: Thomas Piketty (2014) *Capital in the Twenty-First Century*.

In the figure 5, the slope is upward in the end. It implies interpretation about long-run or short-run economy is possible.

However, depending on the date of the World Bank as below, it’s impossible to explain about capital formation except for data of China. China has the highest gross capital formation (% of GDP) from 2004 to 2013. Indeed, this level is higher than the world’s one. France, Germany, United States and Japan’s graphs are similar except for China’s one.

2.2. Gross Capital Formation (% of GDP)



(ref : World Bank national accounts data and OECD National Accounts data files, May, 2014)

Let's check the definition of gross capital formation. Gross capital formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales, and "work in progress." According to the 1993 SNA, net acquisitions of valuables are also considered capital formation.

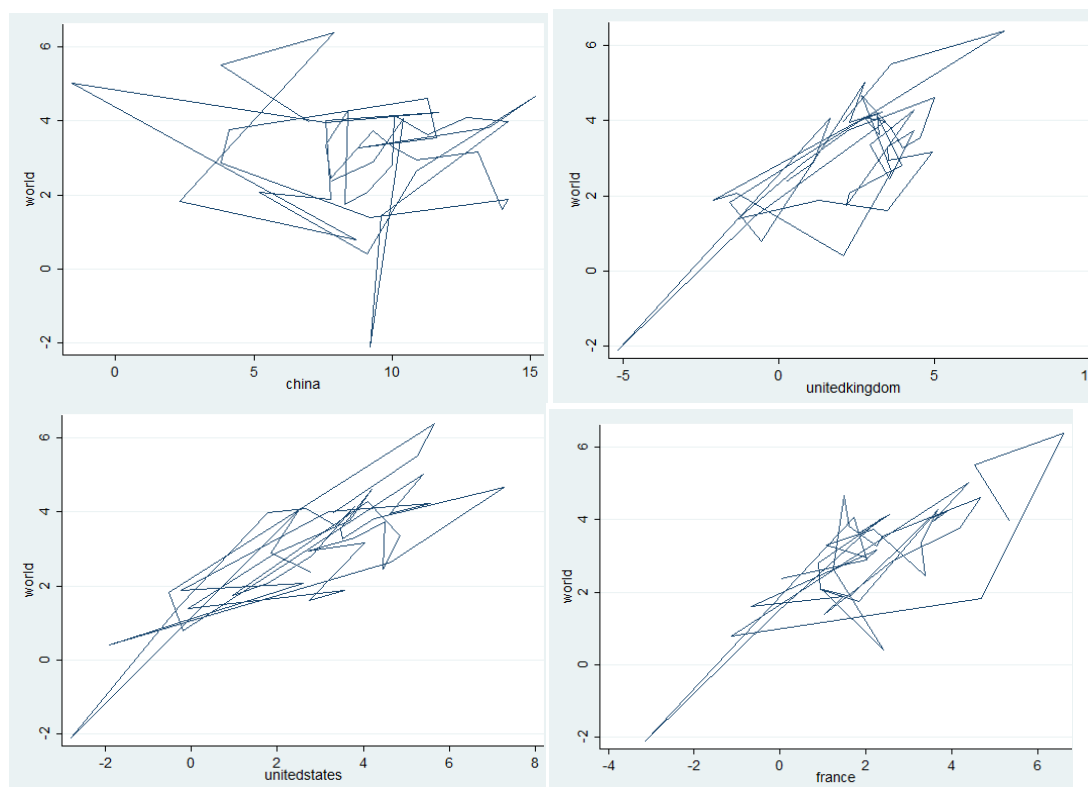
Hence, sudden shock on capital should be considered. Availability whether it can be used as data should be detected for global empirical data.

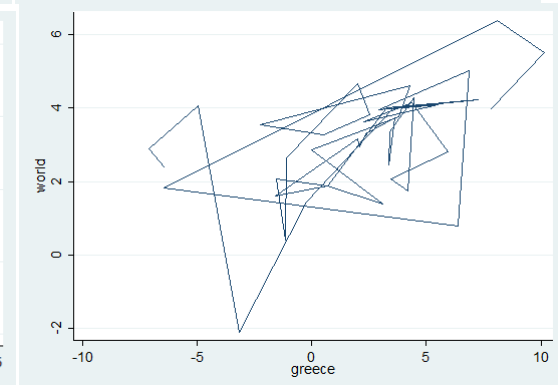
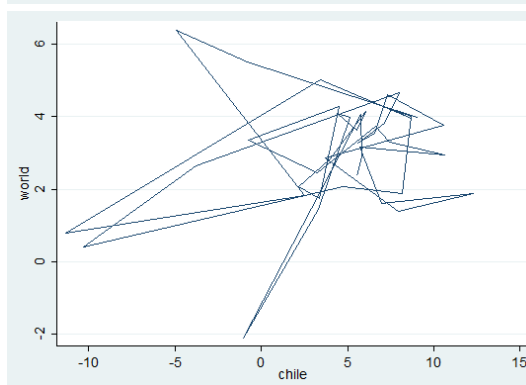
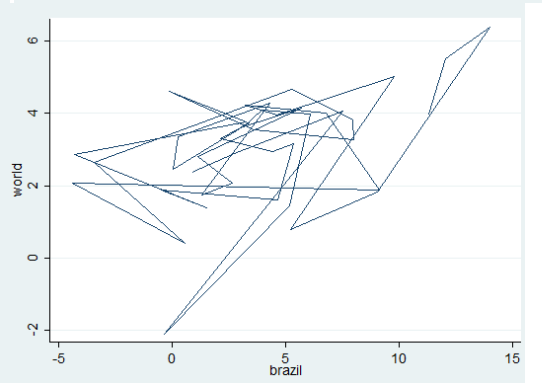
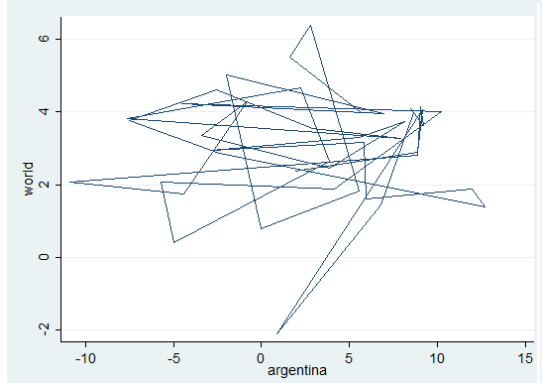
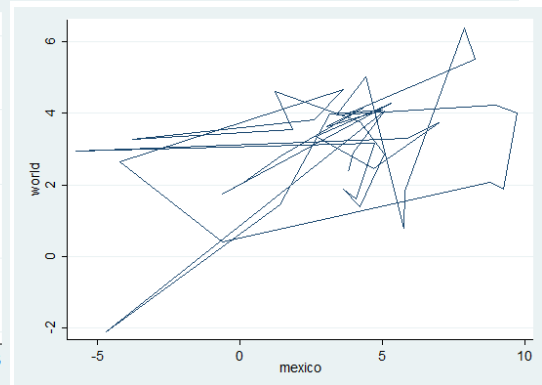
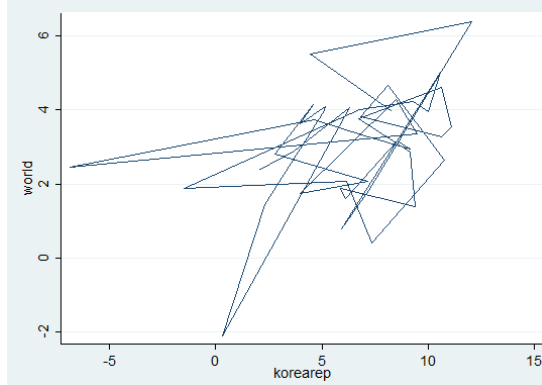
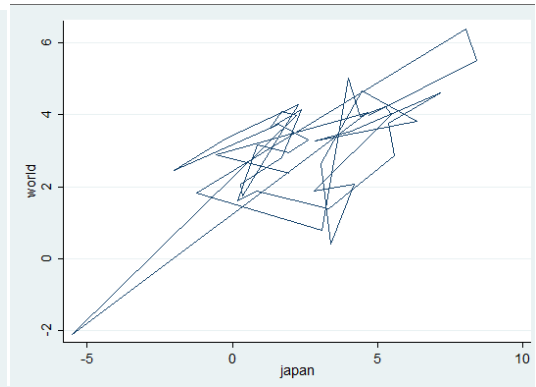
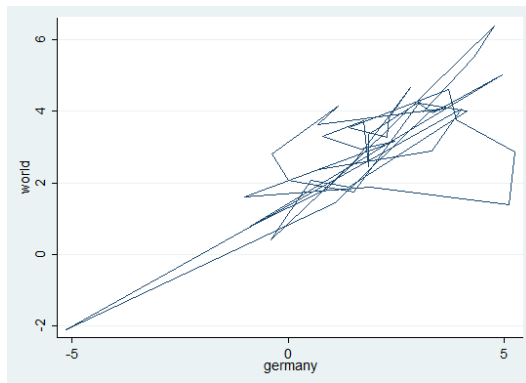
2.3 The Second Fundamental Law of Capitalism: $\beta = s / g$

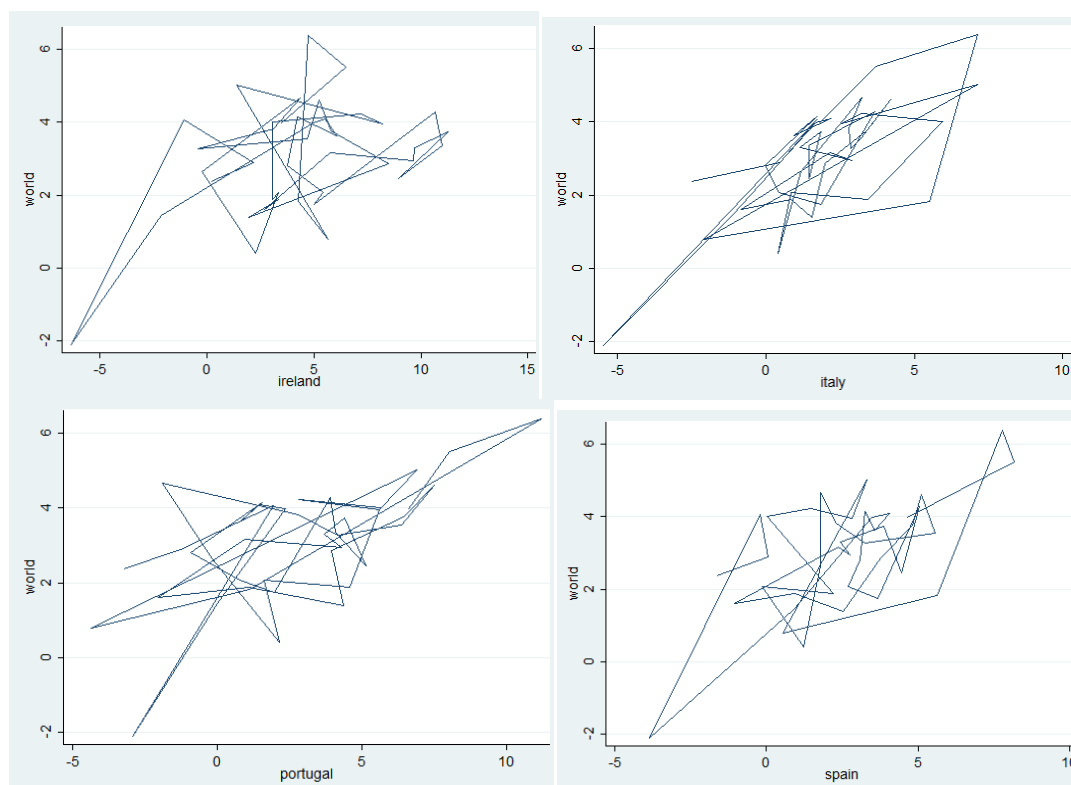
"...In the long run, the capital/income ratio β is related in a simple and transparent way to the savings rate s and the growth rate g according to the following formula: $\beta = s / g$"

ref: Thomas Piketty (2014) *Capital in the Twenty-First Century*.

As below, there are graphs of correlation between countries' gdp growths and the world's one. China has very different shape of correlation with the world's one from other's.







GDP growth graphs of United Kingdom, United States, France, Germany, Japan, Ireland, Italy, Portugal and Spain have similar upward tendencies. China's one looks like South Korea, Mexico, Argentina, Brazil and Chile.

In the long run, can the capital/income ratio β be reflected by the volatility of the savings rate s and the growth rate g ? Most of all, if we do not divide into countries depending on their economic sizes, we face aggregation problem. If we have outstanding value than averaged value in the long run, we can not say stabilization of dynamics and boundary of optimal values by the end. Hence, we will search for the aggregated value which makes us calculate the end of economic phase. It will makes us to explain inflation, unemployment, economic cycle and time preference. However, in reality, decision makers decide after seeing the extreme value. In politics, there is no history the neutral party dominate to win the election. It's a crucial thing to start to admit different sized economies and different backgrounded countries at the beginning.

3. Economic Size and Debt Sustainability

3.1. Trade condition

Depend on data of World Bank, from 1970 to 2013, the correlation between world's one and countries' exports of goods and services is positive. (Observation 43)

Exports of goods and services

```
. tsset year, yearly
    time variable: year, 1970 to 2013
        delta: 1 year
```

```
. correlate world china unitedkingdom unitedstates france germany japan korearep mexico argentina brazil chile greece ireland italy portugal spain
(obs=43)
```

	world	china	united-m	united-s	france	germany	japan	korearep	mexico	argent-a	brazil	chile	greece	ireland	italy	portugal	spain
world	1.0000																
china	0.9405	1.0000															
unitedking-m	0.5924	0.3751	1.0000														
unitedstates	0.8832	0.7900	0.6468	1.0000													
france	0.8993	0.8258	0.5620	0.7695	1.0000												
germany	0.9683	0.8941	0.5465	0.8095	0.8096	1.0000											
japan	0.5181	0.3912	0.5296	0.3523	0.3885	0.5935	1.0000										
korearep	0.8449	0.6952	0.6351	0.7774	0.7363	0.8560	0.5582	1.0000									
mexico	0.9091	0.8664	0.4934	0.7960	0.8577	0.8733	0.3104	0.8049	1.0000								
argentina	0.8342	0.8387	0.3617	0.5639	0.6925	0.8749	0.5447	0.6645	0.7441	1.0000							
brazil	0.6918	0.7306	0.2065	0.3751	0.6576	0.7104	0.5045	0.5445	0.5740	0.7780	1.0000						
chile	0.8302	0.8606	0.3809	0.7245	0.7212	0.8176	0.3636	0.7013	0.8035	0.7478	0.6735	1.0000					
greece	0.7510	0.6470	0.5549	0.6935	0.8143	0.6839	0.4917	0.7873	0.6688	0.5067	0.6020	0.6394	1.0000				
ireland	0.9146	0.8468	0.5172	0.8310	0.8989	0.8567	0.1944	0.7590	0.9173	0.7070	0.5607	0.7418	0.6628	1.0000			
italy	0.9031	0.7886	0.7651	0.8251	0.8875	0.8302	0.5112	0.7585	0.8035	0.6994	0.5183	0.6392	0.7364	0.8447	1.0000		
portugal	0.7728	0.7389	0.3284	0.6727	0.7230	0.7756	0.2717	0.6924	0.8569	0.5946	0.6060	0.7372	0.6005	0.7685	0.5978	1.0000	
spain	0.9122	0.8396	0.5292	0.7607	0.9290	0.8601	0.3238	0.7707	0.9310	0.7223	0.6315	0.6871	0.7032	0.9541	0.8702	0.8164	1.0000

From 1971 to 2012, among the correlation between world's one and countries' GDP growth, China and Argentine's ones have negative values. (Observation 42)

GDP growth

```
. tsset year, yearly
    time variable: year, 1971 to 2012
        delta: 1 year
```

```
. correlate world china unitedkingdom unitedstates france germany japan korearep mexico argentina brazil chile greece ireland italy portugal spain
(obs=42)
```

	world	china	united-m	united-s	france	germany	japan	korearep	mexico	argent-a	brazil	chile	greece	ireland	italy	portugal	spain
world	1.0000																
china	-0.0539	1.0000															
unitedking-m	0.7440	0.2611	1.0000														
unitedstates	0.8277	0.0932	0.7400	1.0000													
france	0.7557	-0.3750	0.5449	0.5192	1.0000												
germany	0.7516	-0.2165	0.4128	0.5139	0.7187	1.0000											
japan	0.6904	-0.1311	0.4414	0.4927	0.5575	0.6547	1.0000										
korearep	0.4124	-0.0192	0.4016	0.3494	0.3844	0.4110	0.5317	1.0000									
mexico	0.3986	-0.2336	0.0250	0.2509	0.3576	0.4041	0.3846	-0.1103	1.0000								
argentina	0.0538	0.2677	-0.0126	-0.0275	-0.0778	0.1137	-0.1849	-0.1720	0.1524	1.0000							
brazil	0.4848	-0.1495	0.2327	0.1806	0.4440	0.3089	0.3272	0.1246	0.2979	0.1858	1.0000						
chile	0.2680	0.2042	0.0775	0.3134	0.1194	0.3131	0.0613	-0.0036	0.1311	0.2586	0.0275	1.0000					
greece	0.5008	-0.0818	0.4651	0.4337	0.4427	0.3425	0.4424	0.1664	0.2375	-0.1414	0.3403	-0.0647	1.0000				
ireland	0.4282	-0.0331	0.4954	0.4508	0.4436	0.2994	0.1960	0.1388	0.3208	-0.1863	-0.0524	0.1375	0.4483	1.0000			
italy	0.7481	-0.3120	0.5058	0.5200	0.8464	0.7342	0.5977	0.4675	0.3781	-0.0511	0.5117	0.2184	0.3769	0.3500	1.0000		
portugal	0.6214	-0.3770	0.4655	0.4043	0.8098	0.6472	0.5895	0.3449	0.2592	-0.1020	0.3890	0.1805	0.4951	0.3735	0.7559	1.0000	
spain	0.6357	-0.2734	0.5678	0.4214	0.7821	0.5245	0.4195	0.2819	0.1823	-0.0890	0.3775	-0.0294	0.5579	0.5725	0.6648	0.7244	1.0000

From 1970 to 2013, the correlation between world's one and countries' GDP per capital is positive. (Observation 43)

GDP per capital

```
. tsset year, yearly
    time variable: year, 1970 to 2013
        delta: 1 year
```

```
. correlate world china unitedkingdom unitedstates france germany japan korearep mexico argentina brazil chile greece ireland italy portugal spain
(obs=43)
```

	world	china	united-m	united-s	france	germany	japan	korearep	mexico	argent-a	brazil	chile	greece	ireland	italy	portugal	spain
world	1.0000																
china	0.8802	1.0000															
unitedking-m	0.9665	0.7830	1.0000														
unitedstates	0.9783	0.7991	0.9830	1.0000													
france	0.9878	0.8176	0.9752	0.9718	1.0000												
germany	0.9832	0.8027	0.9629	0.9664	0.9955	1.0000											
japan	0.9111	0.6655	0.8813	0.9238	0.9197	0.9453	1.0000										
korearep	0.9814	0.8536	0.9745	0.9721	0.9725	0.9691	0.8947	1.0000									
mexico	0.9587	0.8236	0.9650	0.9691	0.9432	0.9348	0.8684	0.9639	1.0000								
argentina	0.8366	0.7221	0.7442	0.7959	0.8117	0.8478	0.8779	0.7926	0.7783	1.0000							
brazil	0.9299	0.9482	0.8302	0.8489	0.8902	0.8885	0.7844	0.8947	0.8475	0.8435	1.0000						
chile	0.9519	0.9623	0.8924	0.8941	0.9124	0.9046	0.7859	0.9441	0.9147	0.8079	0.9706	1.0000					
greece	0.9684	0.8484	0.9704	0.9501	0.9772	0.9586	0.8318	0.9654	0.9423	0.7311	0.8854	0.9263	1.0000				
ireland	0.9477	0.8176	0.9840	0.9569	0.9527	0.9307	0.8091	0.9651	0.9538	0.6762	0.8289	0.9036	0.9826	1.0000			
italy	0.9791	0.7904	0.9800	0.9754	0.9942	0.9884	0.9203	0.9661	0.9381	0.7950	0.8596	0.8883	0.9689	0.9526	1.0000		
portugal	0.9799	0.8338	0.9836	0.9736	0.9871	0.9794	0.8902	0.9820	0.9612	0.7866	0.8810	0.9250	0.9882	0.9791	0.9841	1.0000	
spain	0.9794	0.8356	0.9816	0.9649	0.9902	0.9769	0.8715	0.9751	0.9497	0.7596	0.8801	0.9204	0.9933	0.9783	0.9884	0.9942	1.0000

From 1980 to 2012, the correlation between world's one and countries' GNI per capital ppp is positive. (Observation 27)

GNI per capital ppp

```
. tsset year, yearly
      time variable: year, 1980 to 2012
            delta: 1 year

. correlate world china unitedkingdom unitedstates france germany japan korearep mexico argentina brazil chile greece ireland italy portugal spain
(obs=27)
```

	world	china	united-m	united-s	france	germany	japan	korearep	mexico	argent-a	brazil	chile	greece	ireland	italy	portugal	spain
world	1.0000																
china	0.9804	1.0000															
unitedking-m	0.9965	0.9802	1.0000														
unitedstates	0.9976	0.9706	0.9973	1.0000													
france	0.9945	0.9628	0.9949	0.9977	1.0000												
germany	0.9934	0.9553	0.9850	0.9921	0.9919	1.0000											
japan	0.9777	0.9202	0.9697	0.9809	0.9833	0.9937	1.0000										
korearep	0.9947	0.9756	0.9967	0.9947	0.9949	0.9878	0.9753	1.0000									
mexico	0.9798	0.9549	0.9780	0.9816	0.9822	0.9788	0.9696	0.9821	1.0000								
argentina	0.9304	0.9110	0.9191	0.9294	0.9199	0.9341	0.9232	0.9221	0.9547	1.0000							
brazil	0.9879	0.9533	0.9821	0.9872	0.9822	0.9884	0.9829	0.9813	0.9674	0.9288	1.0000						
chile	0.9880	0.9718	0.9893	0.9889	0.9882	0.9811	0.9684	0.9919	0.9882	0.9519	0.9765	1.0000					
greece	0.9921	0.9879	0.9932	0.9868	0.9856	0.9780	0.9549	0.9914	0.9653	0.8959	0.9691	0.9792	1.0000				
ireland	0.9891	0.9917	0.9934	0.9868	0.9837	0.9695	0.9441	0.9901	0.9719	0.9159	0.9632	0.9876	0.9936	1.0000			
italy	0.9857	0.9389	0.9854	0.9927	0.9957	0.9905	0.9905	0.9862	0.9781	0.9233	0.9821	0.9826	0.9687	0.9669	1.0000		
portugal	0.9926	0.9582	0.9910	0.9952	0.9977	0.9940	0.9876	0.9934	0.9829	0.9267	0.9831	0.9893	0.9819	0.9799	0.9950	1.0000	
spain	0.9977	0.9812	0.9975	0.9964	0.9960	0.9887	0.9716	0.9960	0.9780	0.9174	0.9802	0.9888	0.9955	0.9935	0.9853	0.9939	1.0000

From 1970 to 2013, the correlation between world's one and countries' gross capital formation is positive. (Observation 27)

Gross capital formation

```
. tsset year, yearly
      time variable: year, 1970 to 2013
            delta: 1 year

. correlate world china unitedkingdom unitedstates france germany japan korearep mexico argentina brazil chile greece ireland italy portugal spain
(obs=43)
```

	world	china	united-m	united-s	france	germany	japan	korearep	mexico	argent-a	brazil	chile	greece	ireland	italy	portugal	spain
world	1.0000																
china	-0.7490	1.0000															
unitedking-m	0.8368	-0.7364	1.0000														
unitedstates	0.6107	-0.4891	0.5601	1.0000													
france	0.7413	-0.6488	0.6634	0.1572	1.0000												
germany	0.7950	-0.7988	0.6305	0.3276	0.6390	1.0000											
japan	0.8684	-0.8217	0.7339	0.3414	0.6454	0.9278	1.0000										
korearep	0.0089	0.2667	-0.1280	-0.0514	-0.4036	-0.0719	0.0471	1.0000									
mexico	0.3386	-0.0991	0.0996	0.0799	0.4694	0.0573	0.0931	-0.0722	1.0000								
argentina	0.4279	-0.2998	0.2619	0.1080	0.5608	0.2872	0.2526	-0.3632	0.3944	1.0000							
brazil	0.6688	-0.4427	0.5867	0.0796	0.6187	0.5013	0.6397	0.0308	0.3862	0.4524	1.0000						
chile	-0.2654	0.5253	-0.2972	-0.2606	-0.4089	-0.3245	-0.2886	0.5596	-0.0382	-0.3342	-0.0913	1.0000					
greece	0.7294	-0.8255	0.7530	0.4301	0.7564	0.7155	0.7277	-0.3766	0.1089	0.3666	0.4209	-0.6208	1.0000				
ireland	0.5633	-0.5411	0.4452	0.6798	0.4442	0.3062	0.3093	-0.1758	0.3913	0.3421	0.0675	-0.3075	0.5907	1.0000			
italy	0.8497	-0.7640	0.7371	0.4513	0.8242	0.6342	0.7294	-0.2096	0.4446	0.4607	0.6053	-0.4686	0.7783	0.5742	1.0000		
portugal	0.6303	-0.6201	0.4865	0.5959	0.3832	0.5241	0.5521	-0.0254	0.3391	0.0794	0.3343	-0.2453	0.4181	0.6055	0.5617	1.0000	
spain	0.2551	-0.2653	0.3867	0.0558	0.5390	0.0348	0.0966	-0.2535	0.3103	0.1790	0.1415	-0.0400	0.4746	0.5319	0.3792	0.0630	1.0000

From 1970 to 2012, the correlation between world's one and countries' gross savings have negative value. (Observation 14)

Gross savings

```
. tsset year, yearly
      time variable: year, 1970 to 2012
            delta: 1 year

. correlate world china unitedkingdom unitedstates france germany japan korearep mexico argentina brazil chile greece ireland italy portugal spain
(obs=14)
```

	world	china	united-m	united-s	france	germany	japan	korearep	mexico	argent-a	brazil	chile	greece	ireland	italy	portugal	spain
world	1.0000																
china	-0.2623	1.0000															
unitedking-m	0.5978	-0.6705	1.0000														
unitedstates	0.6245	-0.5471	0.8384	1.0000													
france	0.3293	0.3047	-0.4119	-0.2846	1.0000												
germany	0.0327	0.3357	-0.6349	-0.6434	0.8394	1.0000											
japan	0.0053	-0.0902	-0.4779	-0.4503	0.6933	0.8386	1.0000										
korearep	-0.0103	0.5675	-0.6589	-0.6957	0.6475	0.8496	0.5903	1.0000									
mexico	0.4434	-0.7125	0.8185	0.7329	-0.3262	-0.5132	-0.3047	-0.6254	1.0000								
argentina	0.0216	-0.2550	0.5578	0.5394	-0.7014	-0.8123	-0.7340	-0.8338	0.5956	1.0000							
brazil	0.2854	-0.1802	-0.0678	-0.2503	0.3986	0.4801	0.6384	0.4319	-0.1687	-0.5585	1.0000						
chile	0.0239	0.7177	-0.6932	-0.6634	0.7548	0.8158	0.4768	0.9299	-0.6582	-0.7590	0.3675	1.0000					
greece	-0.2550	-0.6022	0.3648	0.3794	-0.4924	-0.4791	-0.1070	-0.7051	0.2518	0.3675	-0.2303	-0.8011	1.0000				
ireland	0.1448	0.7883	-0.3557	-0.1048	0.4875	0.2571	-0.1589	0.3720	-0.3109	-0.1412	-0.3196	0.6046	-0.6400	1.0000			
italy	0.5424	-0.4032	0.8387	0.7907	-0.3890	-0.6317	-0.6667	-0.5787	0.7317	0.6097	-0.4267	-0.5511	0.1488	0.0062	1.0000		
portugal	0.2773	-0.3135	-0.0746	-0.2274	0.5229	0.5497	0.7193	0.4131	0.0486	-0.4789	0.6404	0.3098	-0.1960	-0.2961	-0.2571	1.0000	
spain	0.6429	-0.0380	0.0719	0.0580	0.6123	0.5567	0.4178	0.5557	0.0133	-0.5539	0.3143	0.4755	-0.4234	0.2226	0.1958	0.5306	1.0000

From 1970 to 2012, the correlation between world's one and countries' FDI is no observation.
FDI – no observation

```
. tsset year
      time variable: year, 1970 to 2012
            delta: 1 year

. correlate world china unitedkingdom unitedstates france germany japan korearep mexico argentina brazil chile greece ireland italy portugal spain
no observations
r(2000);
```

From 1961 to 2013, the correlation between world's one and countries' inflation consumer prices have negative value. (Observation 3)

Inflation consumer prices

```
. tsset year
      time variable: year, 1961 to 2013
            delta: 1 unit

. correlate world china unitedkingdom unitedstates france germany japan korearep mexico argentina brazil chile greece ireland italy portugal spain
(obs=3)
```

	world	china	united-m	united-s	france	germany	japan	korearep	mexico	argent-a	brazil	chile	greece	ireland	italy	portugal	spain
world	1.0000																
china	0.9475	1.0000															
unitedking-m	0.9333	0.9991	1.0000														
unitedstates	0.9830	0.8727	0.8515	1.0000													
france	0.7750	0.5323	0.4964	0.8779	1.0000												
germany	0.6277	0.3458	0.3062	0.7599	0.9784	1.0000											
japan	0.2465	-0.0763	-0.1179	0.4203	0.8035	0.9092	1.0000										
korearep	0.8640	0.9796	0.9872	0.7568	0.3514	0.1503	-0.2750	1.0000									
mexico	-0.9992	-0.9592	-0.9465	-0.9751	-0.7499	-0.5970	-0.2088	-0.8828	1.0000								
argentina	-0.8721	-0.6699	-0.6382	-0.9471	-0.9851	-0.9283	-0.6892	-0.5071	0.8525	1.0000							
brazil	0.9921	0.9001	0.8811	0.9982	0.8480	0.7201	0.3658	0.7942	-0.9866	-0.9264	1.0000						
chile	0.7029	0.4387	0.4007	0.8216	0.9943	0.9949	0.8626	0.2492	-0.6749	-0.9611	0.7864	1.0000					
greece	-0.0136	0.3068	0.3464	-0.1969	-0.6424	-0.7869	-0.9724	0.4918	-0.0252	0.5011	-0.1385	-0.7207	1.0000				
ireland	0.7585	0.5104	0.4740	0.8653	0.9997	0.9834	0.8185	0.3273	-0.7327	-0.9804	0.8341	0.9967	-0.6618	1.0000			
italy	0.4143	0.1016	0.0598	0.5744	0.8963	0.9686	0.9842	-0.1003	-0.3787	-0.8067	0.5249	0.9386	-0.9157	0.9073	1.0000		
portugal	0.8496	0.6365	0.6036	0.9320	0.9917	0.9438	0.7205	0.4685	-0.8286	-0.9990	0.9089	0.9723	-0.5388	0.9881	0.8320	1.0000	
spain	0.9260	0.7567	0.7287	0.9796	0.9562	0.8751	0.5942	0.6100	-0.9107	-0.9923	0.9659	0.9194	-0.3900	0.9484	0.7272	0.9859	1.0000

Among the correlation with the world's one, exports of goods and services, GDP per capital and gross capital formation have positive correlation value. This is the reason why we need to focus on trade condition beyond no trade condition and complete market condition.

3.2. Export and Debt sustainability

In case of debt sustainability, the debt to export criterion should be considered with the size of countries. (Roubini, N. 2001) Suppose you have two countries, A and B that are identical. Their GDP is 100 each, their external debt is 50 each and their exports are 20 each. Then the debt to GDP ratio is 50% for each and the debt to export ratio is 250% each. Assume that, at this ratio, both countries are solvent. Now take the two countries and merge them. Total GDP will be 200, total debt will be 100 and total exports will be 20. Roubini, N. (2001) mentioned this is because exports among each other are now inter-regional rather than international trade. Hence, economic problems with no trade cannot be solved in reality.

By the end of this case, the combined A+B economy has a debt to GDP ratio that is still 50% but now the debt to export ratio is 500%, a figure that is clearly unsustainable and would suggest default.

Indeed, using the debt to export criterion, same two economies look solvent if they are a separate country and insolvent if they are joined in one country. This suggests that the

debt to export ratio may be a faulty measure of solvency; larger countries with greater intra-regional, rather than international trade, would look insolvent while smaller countries with similar fundamental would look solvent just because their export to GDP ratio is higher.

However, in the example, the export to GDP ratio is lower for a larger country with greater amount of inter-regional, rather than international trade. But a small open economy, like Argentina, is usually more open than a larger economy; thus, low export to GDP ratio may reflect currency overvaluation, high degrees of trade protection and other policy restrictions to openness rather than structural factors that explain lower openness. Thus, an economy that should be more open than it is and has a large debt to export ratio may find it harder to service its external debt. For example, if export ratios are low, even a large real depreciation may not improve exports and trade balance enough to reduce a resource (trade balance) gap necessary to prevent insolvency. So, the degree of openness (export to GDP ratio) within countries or beyond countries does affect country's ability to service its debt.

As below, through the dickey fuller test - examines a unit root is present in an autogressive model, validity of variables can be detected more. These data are arranged yearly from 1970 to 2012 can be distinguished whether it has a unit root, a feature of processes that evolve through time that can cause problems in statistical inference.

dickey fuller test	p-value	Mexicogniperc	0.298
Worldinfconsumerp	0.3432	Argentnagniperc	0.3281
Chinainfconsumerp	0.0997	Brazilgniperc	0.3169
United Kingdominfconsumerp	0.0351	Chilegniperc	0.267
United Statesinfconsumerp	0.0279	Greecegniperc	0.0641
Franceinfconsumerp	0.046	Irelandgniperc	0.2209
Germanyinfconsumerp	0.0676	Italygniperc	0.0459
Japaninfconsumerp	0.241	Portugalgniperc	0.5748
Korea, Rep.infconsumerp	0.0657	Spaingniperc	0.115
Mexicoinfconsumerp	0.0459	Worldgdpperc	0.5265
Argentnainfconsumerp	0.0061	Chinagdpperc	0.1349
Brazilinfconsumerp	0.1299	United Kingdomgdpperc	0.0888
Chileinfconsumerp	0.4592	United Statesgdpperc	0.0062
Greeceinfconsumerp	0.5022	Francegdpperc	0.3853
Irelandinfconsumerp	0.3117	Germanygdpperc	0.5728
Italyinfconsumerp	0	Japangdpperc	0.1964
Portugalinfconsumerp	0.3045	Korea, Rep.gdpperc	0.0356
Spaininfconsumerp	0.2629	Mexicogdpperc	0.298
Worldgsaving	0.4606	Argentnagdpperc	0.2843
Chinagsaving	0.7955	Brazilgdpperc	0.3086
United Kingdomgsaving	0.2142	Chilegdpperc	0.267
United Statesgsaving	0.0053	Greecegdpperc	0.0641
Francegsaving	0.099	Irelandgdpperc	0.2209
Germanygsaving	0.2228	Italygdpperc	0.0459
Japangsaving	0.4214	Portugalgdpperc	0.0484
Korea, Rep.gsaving	0.1076	Spaingdpperc	0.0193
Mexicogsaving	0.014	Worldgdpg	0.0031
Argentnagsaving	0.0041	Chinagdpg	0
Brazilgsaving	0.0093	United Kingdomgdpg	0.0023
Chilegsaving	0.0009	United Statesgdpg	0.0104

Greecegcsaving	0.0184	Francegdpg	0.0234
Irelandgsaving	0.0006	Germanygdpg	0.227
Italygsaving	0	Japangdpg	0.0099
Portugalgsaving	0.0619	Korea, Rep.gdpg	0.0125
Spaingsaving	0	Mexicogdpg	0.0041
Worldgcf	0	Argentinagdpg	0
Chinagcf	0.6332	Brazilgdpg	0.017
United Kingdomgcf	0.0827	Chilegdpg	0.1073
United Statesgcf	0.0176	Greecegdpg	0
Francegcf	0.0507	Irelandgdpg	0.0034
Germanygcf	0.0006	Italygdpg	0.1602
Japangcf	0.0001	Portugalgdpg	0.2253
Korea, Rep.gcf	0.0004	Spaingdpg	0
Mexicogcf	0.0058	Worldexp	0.0245
Argentinagcf	0	Chinaexp	0.162
Brazilgcf	0.0089	United Kingdomexp	0.0108
Chilegcf	0.1748	United Statesexp	0.0038
Greecegcf	0.2375	Franceexp	0.1233
Irelandgcf	0.0319	Germanyexp	0.0557
Italygcf	0.0095	Japanexp	0
Portugalgcf	0.1592	Korea, Rep.exp	0.0023
Spaingcf	0.332	Mexicoexp	0.081
Worldgniperc	0.7192	Argentinaexp	0.0479
Chinagniperc	0.768	Brazilexp	0.073
United Kingdomgniperc	0.3285	Chileexp	0.3792
United Statesgniperc	0.0176	Greeceexp	0.6203
Francegniperc	0.3853	Irelandexp	0.5382
Germanygniperc	0.3763	Italyexp	0.5295
Japangniperc	0.1964	Portugalexp	0.4947
Korea, Rep.gniperc	0.0049	Spainexp	no obs

(Ref, author made by the Dickey fuller test of countries' variables extracted from the World Bank, 2014)

infconsumerp= inflation consumer prices, gsaving=gross savings, gcf=gross capital formation, gniperc=gni per capital ppp, gdpperc=gdp per capita, gdpg=gdp growth, exp=exports of goods and services

4. Debt management of Latin America

4.1. Debt history of Latin America

In the 1960s and 1970s many Latin American countries, notably Brazil, Argentina, and Mexico, borrowed huge sums of money from international creditors for industrialization; especially infrastructure programs. These countries had soaring economies at the time so the creditors were happy to continue to provide loans. Initially, developing countries typically garnered loans through public routes like the World Bank. After 1973, private banks had an influx of funds from oil-rich countries and believed that sovereign debt was a safe investment.

Between 1975 and 1982, Latin American debt to commercial banks increased at a cumulative annual rate of 20.4 percent. This heightened borrowing led Latin America to quadruple its external debt from \$75 billion in 1975 to more than \$315 billion in 1983, or 50 percent of the region's gross domestic product (GDP). Debt service (interest payments and the repayment of principal) grew even faster, reaching \$66 billion in 1982, up from \$12 billion in 1975.

When the world economy went into recession in the 1970s and 80s, and oil prices skyrocketed, it created a breaking point for most countries in the region. Developing countries also found themselves in a desperate liquidity crunch. Petroleum exporting countries – flush with cash after the oil price increases of 1973-74 – invested their money with international banks, which 'recycled' a major portion of the capital as loans to Latin American governments. The sharp increase in oil prices caused many countries to search out more loans to cover the high prices, and even oil producing countries wanted to use the opportunity to develop further. These oil producers believed that the high prices would remain and would allow them to pay off their additional debt.

As interest rates increased in the United States of America and in Europe in 1979, debt payments also increased, making it harder for borrowing countries to pay back their debts. Deterioration in the exchange rate with the US dollar meant that Latin American governments ended up owing tremendous quantities of their national currencies, as well as losing purchasing power. The contraction of world trade in 1981 caused the prices of primary resources (Latin America's largest export) to fall.

While the dangerous accumulation of foreign debt occurred over a number of years, the debt crisis began when the international capital markets became aware that Latin America would not be able to pay back its loans. This occurred in August 1982 when Mexico's Finance Minister, Jesus Silva-Herzog declared that Mexico would no longer be able to service its debt. Mexico declared that it couldn't meet its payment due-dates, and announced unilaterally, a moratorium of 90 days; it also requested a renegotiation of payment periods and new loans in order to fulfill its prior obligations.

The banks had to somehow restructure the debts to avoid financial panic; this is usually involved in new loans with very strict conditions, as well as the requirement that the debtor countries accept the intervention of the International Monetary Fund (IMF). There were several stages of strategies to slow and end the crisis. The IMF moved to restructure the payments and reduce consumption in debtor countries. Later the IMF and the World Bank encouraged opened markets.

The debt crisis of 1982 was the most serious of Latin America's history. Incomes dropped; economic growth stagnated; because of the need to reduce importations, unemployment rose to high levels; and inflation reduced the buying power of the middle classes. In fact, in the ten years after 1980, real wages in urban areas actually dropped between 20 and 40 percent. Additionally, investment that might have been used to address social issues and poverty was instead being used to pay the debt.

In response to the crisis most nations abandoned their import substitution industrialization (ISI) models of economy and adopted an export-oriented industrialization strategy, usually the neoliberal strategy encouraged by the IMF, though there are exceptions

such as Chile and Costa Rica who adopted reformist strategies. A massive process of capital outflow, particularly to the United States, served to depreciate the exchange rates, thereby raising the real interest rate. Real GDP growth rate for the region was only 2.3 percent between 1980 and 1985, but in per capita terms Latin America experienced negative growth of almost 9 percent. Between 1982 and 1985, Latin America paid back 108 billion dollars.

4.2. Latin American structuralism between 1950 and 1980: Import substitution industrialization (ISI) model

Import substitution industrialization (ISI) is a trade and economic policy that advocates replacing foreign imports with domestic production. ISI is based on the premise that a country should attempt to reduce its foreign dependency through the local production of industrialized products. The term primarily refers to 20th-century development economics policies.

ISI policies were enacted by countries within the Global South with the intention of producing development and self-sufficiency through the creation of an internal market. ISI works by having the state lead economic development through nationalization, subsidization of vital industries (including agriculture, power generation, etc.), increased taxation, and highly protectionist trade policies. Import substitution industrialization was gradually abandoned by developing countries in the 1980s and 1990s due to structural indebtedness from ISI related policies on the insistence of the IMF and World Bank through their structural adjustment programs of market-driven liberalization aimed at the Global South.

In the context of Latin America development, the term Latin American structuralism refers to the era of import substitution industrialization in many Latin American countries from the 1950s until the 1980s. The theories behind Latin American structuralism and ISI were organized in the works of Raúl Prebisch, Hans Singer, Celso Furtado, and other structural economic thinkers, and gained prominence with the creation of the United Nations Economic Commission for Latin America and the Caribbean (UNECLAC or CEPAL). While the theorists behind ISI or Latin American structuralism were not homogeneous and did not belong to one particular school of economic thought, ISI and Latin American structuralism and the theorists who developed its economic framework shared a basic common belief in a state-directed, centrally planned form of economic development. In promoting state-induced industrialization through governmental spending through the infant industry argument, ISI and Latin American structuralist approaches to development are largely influenced by a wide range of Keynesian, communitarian and socialist economic thought. ISI is often associated and linked with dependency theory, although the latter has traditionally adopted a much broader Marxist sociological framework in addressing what they perceive to be the cultural origins of underdevelopment through the historical effects of colonialism, Eurocentrism, and neoliberalism. Import substitution policies were adopted by most nations in Latin America from the 1930s until the late 1980s.

ISI was most successful in countries with large populations and income levels which allowed for the consumption of locally produced products. Latin American countries such as Argentina, Brazil, Mexico, and (to a lesser extent) Chile, Uruguay and Venezuela, had the most success with ISI. This is so because while the investment to produce cheap consumer products may pay off in a small consumer market, the same cannot be said for capital-intensive industries, such as automobiles and heavy machinery, which depend on larger

consumer markets to survive. Thus, smaller and poorer countries, such as Ecuador, Honduras, and the Dominican Republic, could implement ISI only to a limited extent. Peru implemented ISI in 1961, and the policy lasted through to the end of the decade in some form.

“By the early 1960s, domestic industry supplied 95% of Mexico’s and 98% of Brazil’s consumer goods. Between 1950 and 1980, Latin America’s industrial output went up six times, keeping well ahead of population growth. Infant mortality fell from 107 per 1,000 live births in 1960 to 69 per 1,000 in 1980, [and] life expectancy rose from 52 to 64 years. In the mid 1950s, Latin America’s economies were growing faster than those of the industrialized West.

4.3. Export-oriented industrialization: Continued with import substitution industrialization by Latin American countries

Export-oriented industrialization (EOI) sometimes called export substitution industrialization (ESI), export led industrialization (ELI) or export-led growth is a trade and economic policy aiming to speed up the industrialization process of a country by exporting goods for which the nation has a comparative advantage.

From the Great Depression to the years after World War II, under-developed and developing countries started to have a hard time economically. During this time, many foreign markets were closed and the danger of trading and shipping in war-time waters drove many of these countries to look for another solution to development. The initial solution to this dilemma was called import substitution industrialization.

Both Latin American and Asian countries used this strategy at first. However, during the 1950s and 1960s the Asian countries, like Taiwan and South Korea, started focusing their development outward, resulting in an export-led growth strategy. Many of the Latin American countries continued with import substitution industrialization, just expanding its scope. Some have pointed out that because of the success of the Asian countries, especially Taiwan and South Korea, export-led growth should be considered the best strategy to promote development.

4.4. Risk management in major Latin America countries: (Mexico, Argentina, Brazil, Chile)

Among Latin America, the adoption of solvency II which is EU directive - codifies and harmonizes the EU insurance regulation primary concerning the amount of capital that EU insurance companies must hold to reduce the risk of insolvency- is realistic in Mexico. In the second half of 2008, the Mexican regulator (Comisión Nacional de Seguros y Fianzas, or CNSF) shared with the Mexican association of insurance companies (Asociación Mexicana de Instituciones de Seguros, or AMIS) a draft of a project of insurance law (the proposed law) in which a Solvency II-type regime was incorporated. The draft considered an initial date for this proposed law of January 2012. Since that time (end of 2008) through 2009 and the beginning of 2010, the proposed law was discussed and reviewed between CNSF and AMIS. The actual initial date is January 2014. However, the proposed law did not approved by the Mexican Congress.

If the strong solvency regulation is existed like Argentina, the conflict of two regulations between local solvency regulation and international one should be considered for the stable adoption. The current framework does not seem to indicate that an extended application of the Solvency II methodology will be feasible in the near future, except for the offices and branches of European-based insurance companies.

The regulatory agency, SSN (Superintendencia de Seguros de la Nación) only mentioned the adoption of Solvency II without clear criteria. Actually, the insurance industry is tightly regulated in Argentina. SSN resolutions cover most aspects of insurance company activity, including unearned premiums and methods of mathematical reserve valuation. The agency establishes minimum valuation methods arising from formulas used to value out-of-court, mediation and lawsuit payables, as well as *incurred but not reported* (IBNR) claims reserves. Most insurance companies use these mechanisms to value their payables. As of 30 June 2011 (last fiscal year-end), all insurance companies in the market calculated their capital to be credited based on the issued premiums indicator. Of 155 insurers, only 4 carried minimum capital deficit as of this date. In recent months, the SSN announced the launch of a strategic plan of insurance, inviting all industry participants to bring their vision to define the insurance policy to be used during the period 2012–2020.

The existence of many solvency regulations can be analyzed with the conflict inside rules in Brazil so the Own Risk and Solvency Assessment (ORSA) is needed to integrate them. Brazil has adopted international regulations at each pillar. For Pillar I, the adoption of International Financial Reporting Standards (IFRS) as Brazilian generally accepted accounting principles (GAAP) in 2010. Detailed monthly reporting requirements of individual policy and claims data for the Insurance Supervisory Authority (Superintendência de Seguros Privados, SUSEP) were introduced in 2004 at the level of Pillar II. In 2004, the Supervisory Authority introduced the requirement that each insurance company should produce an annual actuarial valuation report proper to Pillar III.

In Chile, A new law that would require insurance companies to withhold risk-based capital was sent to Congress for approval on 30 September 2011. The methodology for calculating risk-based capital in Chile has yet to be made public. It is expected that the Chilean regulator will publish a consultative white paper with details around the calculation of risk-based capital in the third quarter of 2012. The SVS (Superintendencia de Valores y Seguros) has demonstrated interest in performing the first Quantitative Impact Study (QIS) by the end of 2012.

4.5. Insolvent external debt of Latin America

Since Latin American countries, such as Mexico and Brazil, were not able to pay back their foreign debts, it showed that Latin America is not able to keep up with the pace in which their debts grew. Before the crisis, Brazil and Mexico tried to borrow money to enhance economic stability and reduce the poverty rate. But after continuously borrowing money, they fell in the whirlpool of debt, and the innovations and improvements from the past few years became meaningless.

During the 1970s the world fell into an international recession which strained and put stress onto the economies of countries all over the world. Many major nations and countries attempted to slow down and stop inflation in their countries by raising the interest rates of the money that they loaned, causing Latin America's already enormous debt to increase further. Between the 1970 and 1980, Latin America's debt levels had increased by more than one thousand percent.

The crisis caused the per capita income to drop and also ironically increased poverty as the gap between the wealthy and poor increased dramatically. Due to the plummeting employment rate, children and young adults were forced to join the drug trade, and some even began prostitution.

Latin America, unable to pay their debts, turned to the IMF (International Monetary Fund) who provided money for loans and unpaid debts. In return, the IMF forced Latin America to make reforms that would favor free-market capitalism. The IMF also helped Latin America utilize austerity plans and programs that will lower total spending in an effort to recover from the debt crisis. The efforts of the IMF brought Latin America's economy to become a capitalist's free-trade type of an economy that is a type of economy preferred by wealthy and fully developed countries.

Latin America's growth rate fell dramatically due to the government's austerity plan prevented them from further spending. The living standards also fell alongside the growth rate caused much anger and hatred from the people towards the IMF. This caused the IMF to become a symbol that people came to dislike as more and more people began to reject the IMF's policies imposed the power of international agencies over Latin America.

Since the 1980 several countries in the region have experienced a surge in economic development and have initiated debt management programs in addition to debt relief and debt rescheduling programs agreed to by their international creditors. The following is a list of external debt for Latin America based on a 2012 report by The World Factbook.

4.5 External debt for Latin America

Rank	Country – Entity	External Debt (million US\$)	Date of information
26	Brazil	405,300	31 December 2012.
35	Argentina	130,200	31 December 2012.
40	Mexico	125,700	31 December 2012.
45	Chile	102,100	31 December 2012.
49	Colombia	73,410	31 December 2012.
51	Venezuela	63,740	31 December 2012.
63	Peru	4,200	31 December 2012.
77	Cuba	22,160	31 December 2012.
78	Ecuador	20,030	31 December 2012.
81	Dominican Republic	16,580	31 December 2012.
82	Guatemala	16,170	31 December 2012.
83	Uruguay	15,900	31 December 2012.
85	Panama	14,200	31 December 2012.
86	El Salvador	12,840	31 December 2012.
88	Costa Rica	12,040	31 December 2012.
112	Nicaragua	5,228	31 December 2012.
114	Honduras	4,884	31 December 2012.
123	Bolivia	4,200	31 December 2012.
139	Paraguay	2,245	31 December 2012.

4.6. Openness and External debt to exports ratio

Debt burden indicators include the (a) Debt to GDP ratio, (b) External debt to exports ratio, (c) Government debt to current fiscal revenue ratio etc. This set of indicators also covers the structure of the outstanding debt including the (d) Share of foreign debt, (e) Short-term debt, and (f) Concessional debt in the total debt stock.

4.6. External debt to exports ratio

Country - Entity (million\$)	external debt	exports	Ratio (External debt/Exports)
Brazil	405,300	242,000	1.674793388
Argentina	130,200	85,360	1.525304592
Mexico	125,700	370,900	0.338905365
Chile	102,100	83,660	1.220415969
Colombia	73,410	59,960	1.224316211
Venezuela	63,740	96,900	0.657791538
Peru	4,200	47,380	0.088644998
Cuba	22,160	5,600	3.957142857
Ecuador	20,030	23,770	0.842658814
Dominican Republic	16,580	9,467	1.751346784
Guatemala	16,170	9,864	1.639294404
Uruguay	15,900	9,812	1.620464737
Panama	14,200	17,970	0.790205899
El Salvador	12,840	5,804	2.212267402
Costa Rica	12,040	11,470	1.049694856
Nicaragua	5,228	4,160	1.256730769
Honduras	4,884	6,946	0.703138497
Bolivia	4,200	11,770	0.356839422
Paraguay	2,245	4,700	0.477659574

Ref: world fact book, 2012

The ratio of gross external debt to exports provides a quick indicator of the capability of an economy to repay external debt with enhanced revenue from sales to foreign countries. A ratio below 1 suggests that debt can be repaid rapidly, theoretically in less than one year. Conversely, the higher the ratio, the lower the country's capability to finance the debt with revenue from exports.

5. Conclusions

A capital-labor split of Cobb-Douglas function which continues to be widely used by economists, has little empirical support. Even though neo-classical economists have proposed mathematical and theoretical realisms of economic growth by using the function, it was never empirically validated as the appropriate model for economic growth. Indeed, Thomas Piketty, a French economist, brought up this debated topic about capital inequality in

his book, *Capital in the Twenty-First Century* in 2014.

I agree with him in that there is the structure of inequality with respect to both labor and capital actually changed since the nineteenth century of the chapter: Beyond Cobb-Douglas “The Question of the Stability of the Capital-Labor Split. Some research questions like “Did the Increase of inequality cause the financial crisis?”, “The illusion of marginal productivity”, “The Question of Time Preference” and “Is there an equilibrium distribution?” are fresh and fancy to break old fixed ideas.

I feel the solution is weak to support his brilliant idea enough. At the part4, the talk is suddenly changed to tax and pension (PAYGOs) without connection with previous capital inequality. Tax issues on Capital and Chinese millionaires are far from the real data of capital formation because it is very high value in China. We cannot see any empirical data of China’s one in his book even though the major capital part is by China. It seems hard to accept a solution of redistribution by immigration and an opinion about the central bank just as a loan deal before redistribution of wealth.

In the article, the most recent data shows that export and external debt may be correlated to explain economy growth. In addition, to point out miscalculation of ratio analysis depending on economic size, the example by Roubini, N. (2001) is demonstrated. To conclude, through the case analysis of Latin America, in detail, economic size and debt sustainability as economic growth indicators are emphasized by empirical data.

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