

THE CHILEAN NIGHTMARE

An Economic Systems Approach to Fundamentalism

By Aedil Suarez Ph.D.

Director of Industrial Engineering Department, UTEM (the Technological University of the State of Chile), and Affiliate Chair, Economists for Peace and Security – Chile.

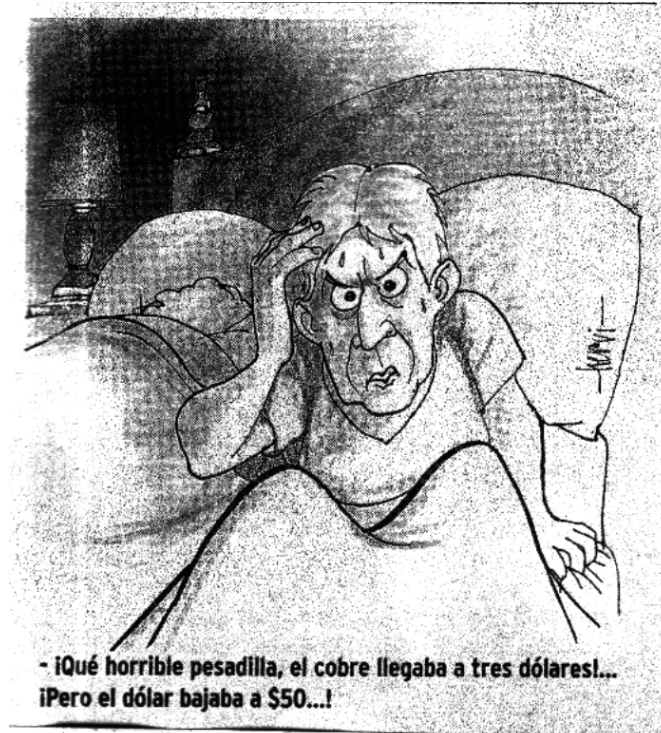
ABSTRACT:

This paper springs from the publication of several cartoons that are very dangerous from the point of view of economics: First, the now-famous cartoons of the Prophet Mohammed commissioned by a Danish newspaper and reprinted throughout Europe. These cartoons led to violence in the Islamic world, against Danish institutions in particular and Western embassies in general, including the Chilean embassy in Damascus. The second cartoon was published in *La Tercera*, a Chilean newspaper, in early December 2005.

Chile is a developing country dependent on copper prices in London; that price is currently at its highest level and growing. But is this good news for the Chilean people? The answer is not so clear. First, Chile retains a Pinochet-era law which automatically assigns 10% of the profit from copper extraction to military expenditures, including the purchase of F-16 fighters, Leopard tanks, submarines, and combat ships, in the absence of any credible threat. Secondly, because of externally imposed neo-liberal economic policies, the market unofficially indexes the price of copper to a dollar price in Chilean coins, which in turn improves the profit margins of import firms, while excluding from the market small- and medium-sized enterprises, many owned by Arabic families. Import firms employ 1% of the Chilean population, while small- and medium-sized enterprises (PYMES) employ 80%. The indexing of copper to the dollar creates a significant level of instability in the Chilean economy.

What is the relationship between the Danish and Chilean cartoons? Simply put, fundamentalism is deeply problematic whether in economics or religion.

NOTE: I would like to thank my Economic Systems students at UTEM, Rodrigo Martínez Lorca and Daniel Núñez Reyes.



*What a horrible dream! Copper was over \$3, but the dollar went below 50 pesos.
La Tercera Newspaper, December 2nd, 2005.*

1. THE MODEL

Using a price of copper of 3 US\$ per pound and the price of the dollar at 50 Chilean pesos, it is possible to simulate this caption step-by-step.

- a. To graph and obtain both functions:

Time in Months	Price of Copper (US cents)	Price of Dollar in Chilean Pesos
May-2005	147	582
Jun-05	160	583
Jul-05	164	579
Aug-05	172	561
Sep-05	175	541
Oct-05	184	529
Nov-05	193	543
Dec-05	209	510
X (virtual)	300	50

PC: price of copper (US cents/pound)

PD: price of dollar (Chilean pesos)

T: months (from May of 2005)

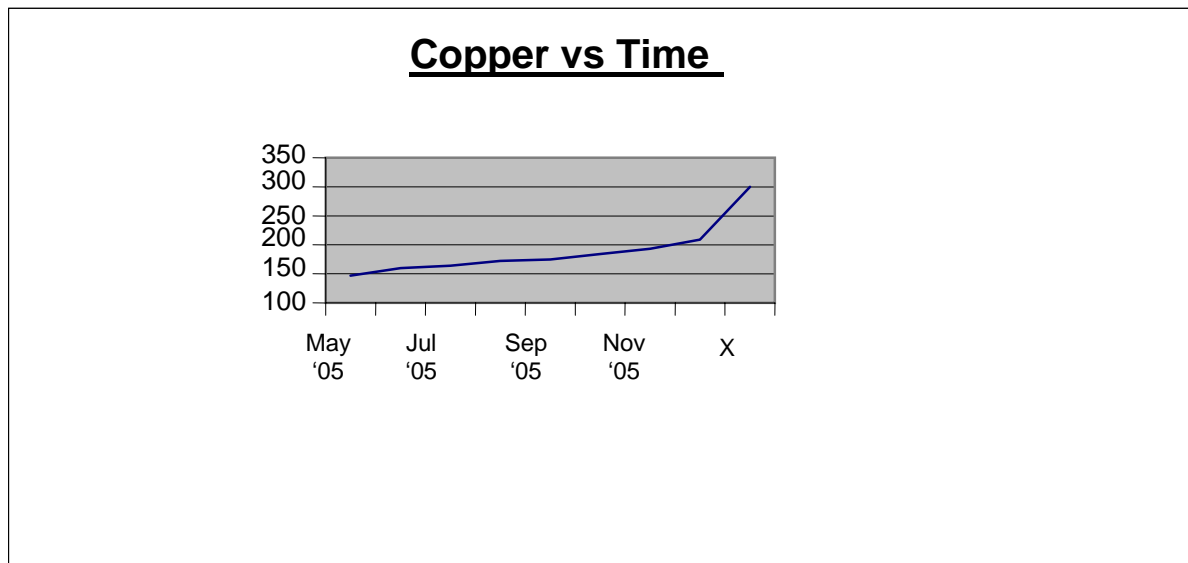
By means of a simple regression, applying the method of the ordinary square minima, we arrive at the following equation:

$$PC = 140,0357143 + 7,880952381 * T$$

Econometric Explanation:

- For a scenario where $T = 0$ (month 0), the price of the Copper will be 140.03 cents/ pound.
- The increase (or decrease) in one month explains the increase (or decrease) in 7.88 cents/pound of copper.

The following graph shows this model's trend:



Dollar v/s Time:

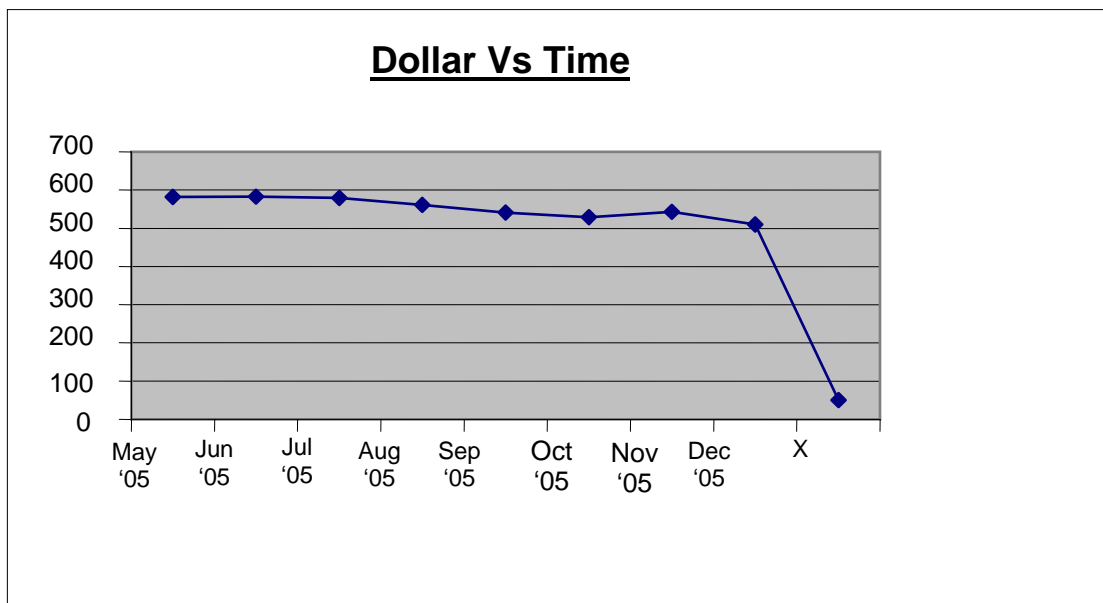
By means of a simple regression, applying the method of the ordinary square minima (OSM), we arrive the following equation:

$$PD = 600,3214286 - 10,4047619 * T$$

Econometric Explanation:

- a. For a scenario where $T = 0$ (month 0), the price of the Dollar will be of 600.32 pesos.
- b. The increase (or decrease) in one month explains the decrease (or increase) of 10.40 pesos in the price of the Dollar.

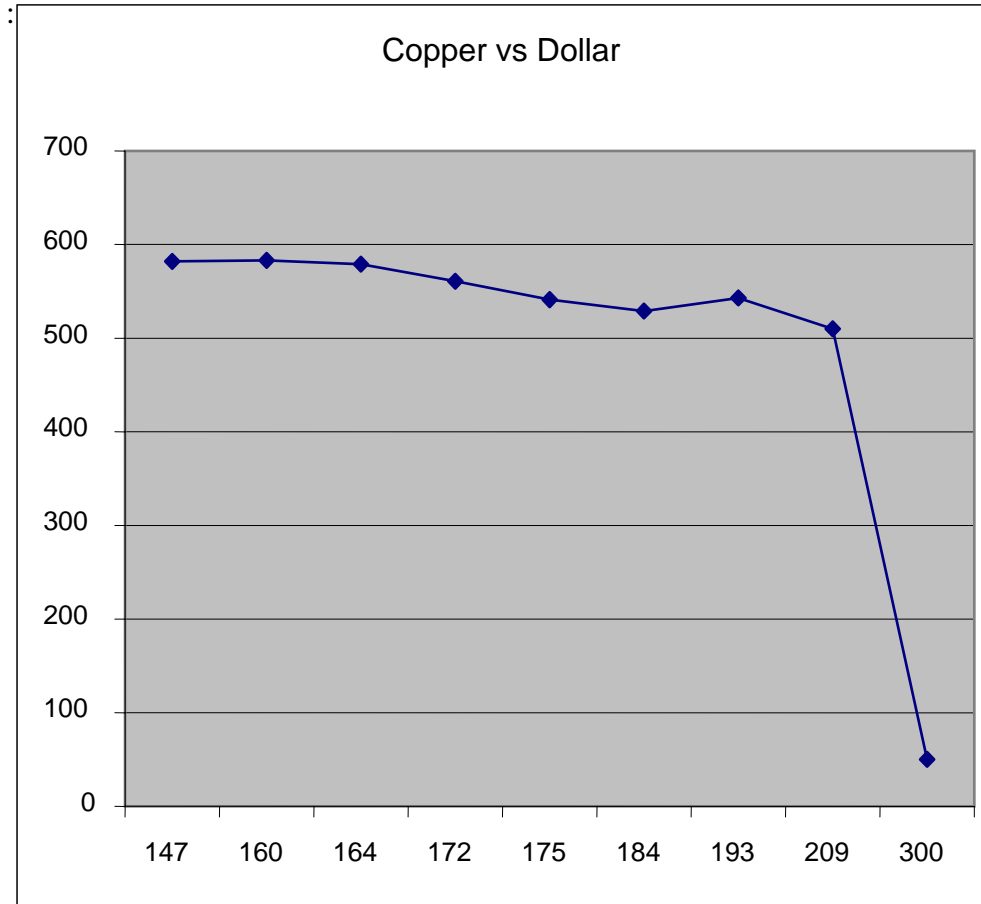
The following graph shows this model's tendency:



Copper vs Dollar:

Finally, we will graph the trend of copper vs. the dollar, with the equation

$$PD = 776.745366 - 1.272053 * PC$$



Econometric Explanation:

- For a scenario where the price of copper is 0/pound, the price of the Dollar will be 776.74 pesos/dollar.
- The increase (or decrease) in one cent of the copper price explains the decrease (or increase) in 1.27 pesos in the price of the dollar.
- In Chile a one cent change in the price of copper represents in Chilean exports approximately USD 100,000,000.

2. MACROECONOMIC PREDICTION OF EFFECT ON PYMES

PYMES must compete with import products; therefore the effect is negative, insofar as they lower the price of the dollar. Import articles are therefore cheaper and consumers will prefer them to the expense of Chilean PYMES. Only the PYMES that work with

import products will benefit, but these represent a small percentage of the total. This is a serious effect, because PYMES represent 80% of Chile's employed population.

Next we will evaluate different scenarios for PYMES, fluctuating different prices of the Copper and Dollar in time. What it will happen to the PYMES in May of 2006, under the current trends in the price of the dollar?

Solution:

May of 2006 = month 13.

$$PD = 600,3214286 - 10,4047619 * 13$$

$$PD = 465.059$$

This means the price of the dollar will be 465.059 pesos. This is untenable for the PYMES, because the price of their products must be lowered to but of the half the current price of imported products.

In a scenario in which the price of the copper reaches 3 dollars per pound, according to the mathematical pattern PYMES surrenders:

$$PC = 140,0357143 + 7,880952381 * T$$

$$T = (PC - 140,0357143) / (7,880952381)$$

$$T = (300 - 140,0357143) / (7,880952381)$$

$$T = 20$$

This implies that in month 20, that is to say, in December of 2006, the price of copper will reach 3 dollars for pound and the price of the dollar, according to "The Chilean Nightmare" will fall to 50 pesos (the virtual scenario).

On the other hand, according to our model:

$$PD = 600,3214286 - 10,4047619 * T$$

The price of the dollar in 50 pesos::

$$T = (PD - 600,3214286) / (- 10,4047619)$$

$$T = (50 - 600,3214286) / (- 10,4047619)$$

$$T = 53$$

This means that in month 53, that is to say, in September of 2009, the price of the Dollar will fall to 50 pesos.

Finally, within both these scenarios of the prices of copper and of the dollar in the coming months, the PYMES will be adversely affected, economically diminished, which indeed will be a terrible nightmare for the Chilean people.

3. FURTHER MACROECONOMETRIC IMPLICATIONS

We go still further using other tools of macroeconomic models, specifically the multiple regression combining all the variables in the game. E.g., the variable month is the exit variable (clerk, endogenous or explained); and the entrance (independent, exogenous or explanatory) variables are those of the price of copper and the price of the dollar. Using this method, we arrive at the following model:

The exit shows the results from the adjustment to a model of multiple lineal regressions to describe the relationship between the month and two independent variables. The equation of the adjusted pattern is

$$\text{MONTH} = -16.4878 + 0.12135 * \text{I Price copper} - 0.000522912 * \text{I Price Dollar}$$

R-square = 96.7394 percentage

R-square (fitting for g.l.) = 95.4352 percentage

Standard error of est. = 0.523345

Half absolute error = 0.342009

Statistical of Durbin-Watson = 1.55343 (P=0.1033)

Residual autocorrelation in Lag 1 = 0.0877283

Since the p-value in the chart ANOVA is inferior at 0.01, a relationship exists and is statistically significant among the variables for a confidence level of 99%.

The statistical R-square indicates that the pattern explains 96.7394% of the variability in month. The statistical adjusted R-square, which is more convenient to compare models with different numbers of independent variables, is 95.4352%. The standard error of the estimate shows the typical deviation of the residuals to be 0.523345.

This value can be used to build the prediction limits for the new observations selecting the Formless option of the text menu.

The half absolute error (HAE) of 0.342009 it is the half value of the residuals.

The statistical Durbin-Watson (DW) examines the residuals to determine if there is some significant correlation based on the order in which the data have been introduced in the file. Since the p-value is superior at 0.05, there is no indication of serial autocorrelation in the residuals.

To decide the simplification of the pattern, keep in mind that the highest p-value in the independent variables is 0.7867, belonging to PD (price of the dollar). Since the p-value is superior or similar to 0.10, this term is not statistically significant for a level of trust of 90% or superior. Therefore, we should consider removing PD from the pattern.

For the combined scenario of a copper price of 3 dollars and a dollar price of 50 pesos, the pattern of regression multiple samples is:

$$\text{MONTH} = -16.4878 + 0.12135 * (300) - 0.000522912 * (50)$$

The result is: MONTH = 20.

This is consistent with the result of our previous model of simple regression. While these methods are incompatible for the purposes of comparison, the trend is ominous for a strong, democratic Chilean economy.

3. REAL DATA AND FORECASTING

Date	Price copper	% dif	Price dollar	% dif
(before cartoon)				
May 05/2005	147		582	
Dec 05/2005	209	42.2	510	- 12.4
	Monthly average	6.2		- 1.77

(after cartoon)				
Dec 05/2005	209		510	
Feb 03/2005	231	10.5	528	3.5
	Monthly average	5.25		1.75

These data imply transparency in our model of the the commodities market for copper, because according to real data and forecasting results our model yields extremely similar results.

But the behavior of the dollar has been, and is forecasted to be, quite different, including a dramatic change from a negative to a positive trend in a very short period, after the “Chilean Economic Nightmare” cartoon.

4. CONCLUSION AND RECOMMENDATION

The price of copper is an exogenous variable for a macroeconomic model of Chile. Certainly it is possible that in we may reach the cartoon’s high price of 3 dollars/pound: in only one month, January 2006, the price of this raw material increased 8.2%. But curiously, since the Chilean nightmare cartoon, the price of dollar has increased 3.5% in the same period, to the joy of export leaders.

What can we say about the indexing of copper prices to the dollar? Perhaps an economic miracle, the invisible hand, has already responded to the nightmare scenario.

Economics and religion are of course distinct subjects, but neither is isolated from the other nor from political or cultural phenomena. Neo-liberalism is not a religion, but like Islam and indeed Christianity it has its fundamentalist adherents. It is possible that in the strong reactions, both economic and religious, to two very different kinds of cartoons, we

are seeing the tip of a socioeconomic iceberg, or (to use another metaphor), the threshold of a social explosion or revolution.

Bibliography

1. Central Bank of Chile: price of US Dollar
2. London Metal Exchange: price of copper
3. The Economist System: software on line www.TheEconomistSystem.com