

MACROECONOMIC PERFORMANCE: REVISITING A KALDORIAN PERSPECTIVE

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MACROECONOMIC PERFORMANCE: REVISITING A KALDORIAN PERSPECTIVE[†]

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ABSTRACT

The international crisis, started in 2008, generated some skepticism on the economist's profession since it was not anticipated the magnitude of the international disturbance and its impact. The measure of such a crisis, among the countries, becomes relevant in an evaluation of the world's economy. This work deals with a tool that helps to measure, numerically, the performance of a country's economy along a crisis, as well as to compare the impact among other the countries. We start from the Kaldor's (1971) view through an approach known as the "Magic Square" – MS by taking into account sensitive parameters of a country's economy, following Kaldor's work. The original idea of the MS offered only a visual perspective. Here we extend the idea through a mathematical analysis that quantifies the geometry of the Square. As a result we end up with an index, here called Welfare Indicator, that intends to indicate the economic welfare of a country. As an application of the indicator we use recent economic data of Brazil and Chile. The results show the impact of the crisis in both countries.

Key words: Kaldor, Magical Square, Crisis, Brazil, Chile.

JEL Classification: F34, G01, G18, B, E12

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1. INTRODUCTION

The analysis of how economic crisis influences a country's economic performance has received renewed interest nowadays, due to the 2008 financial crash which started in the USA and spread almost worldwide. Such disturbance is still hitting many countries abroad. It also led to some skepticism on the advice of professional economists and well known research centers. They did not anticipate the magnitude of the crisis and its real impact, which turned out to be more than just financial. Furthermore, the orthodox macroeconomic theory and applications was unable to suggest proper policies to by-pass a number of real troubles still hitting many countries.

The question is how to evaluate the economic performance of a country along a crisis, or to compare the impact of the crisis among countries. One way is to take a view into the seminal article of Kaldor (1971) where the author assessed the macroeconomic performance of Britain. He introduced an analytical instrument to deal with conflicts in national policy objectives. His approach is based upon four economic criteria expressed in quantitative terms, as targets: full employment, balance of payments, rate of growth and wage-increase or income policy.

However, Kaldor's paper does not contain neither a mathematical analysis nor a single diagram. Latter, Karl Schiller (a German scientist and politician leader of the Social Democratic Party from 1966 to 1972) introduced a graphical representation of Kaldor's idea. The resulting intuitive diagram allowed a visual diagnosis of the macroeconomic evolution of a country. Such an instrument was called "Magic Square" – MS. Soon after, economists at the OCDE began using this tool with a minor modification (instead of Policy Objectives, Inflation was used) but otherwise preserving the fundamental Kaldor's idea.

In this paper we extend the geometric view of the MS to a numerical evaluation of a modified Magic Square area, which could not be calculated otherwise. As a consequence of the analysis an indicator of Economic Welfare is introduced.

2. "MAGIC SQUARE" REVISITED

The Magic Square has been conceived in such a way that its four directions (N, S, E and W) were aligned with Growth, Inflation, Trade and Unemployment indexes, respectively. All four directions are at different scales, even though expressed in percentages. In this conception, economists were able to take a quick look to the evolution of the economic situation of a country by joining adjacent indexes with straight lines. The state of the economy would then be related to the size "area" of the resulting quadrangle. Of course, the area of the quadrangle cannot be calculated, because of the non-uniform scales of the axes. Nonetheless, full acceptance had the concept of the ideal, wonderland, economy represented by the larger area of the quadrangle, which in fact was drawn as a lozenge with four right angles, therefore the name of Magic Square. In this section we re-define de axes of the MS as to make them uniform and make possible the computation of the quadrangle area.

In order to accomplish this task we define the domains of the original economic indexes. These bounding conditions¹ are given by historical circumstances representing a kind of "wonderland macroeconomic configuration". Let:

$$0 \leq \gamma \leq 10 \quad -2 \leq \tau \leq 4 \quad 10 \geq \varphi \geq 0 \quad 12 \geq \zeta \geq 0, \quad (1)$$

where, γ stands for Growth, τ for Trade, φ for Inflation and ζ for Unemployment. In the new MS, all four scales we arbitrary define to be uniform from 0 to a , where a is a numerical constant to be evaluated by normalizing to a **unit area** the modified MS. So, the new corresponding indexes are:

$$0 \leq \gamma' \leq a \quad 0 \leq \tau' \leq a \quad 0 \leq \varphi' \leq a \quad 0 \leq \zeta' \leq a. \quad (2)$$

Notice that, by this definition, we conceive a perfect square with uniform axes. The next task is to find the transformation relations from the un-primed to the primed variables.

Since all original variables - economic indexes - have linear scales, the new ones should also be linear. As an example, let us take the transformation of τ and then of φ , which may seem to be harder to visualize.

Trade τ :

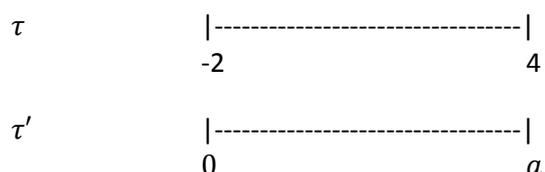


FIGURE 1

Of course, to any point in the τ axis will correspond, linearly, a τ' on the other. This is just what is found in a straight-line representation in an orthogonal coordinate system. So, taking τ in the x -axis and τ' in the y -axis, the straight line is shown in Fig. 2. The problem reduces to the finding of the straight line equation that goes through the points $(-2, 0)$ and $(4, a)$. The result:

$$\tau' = \frac{a}{6}(\tau + 2) \quad (3)$$

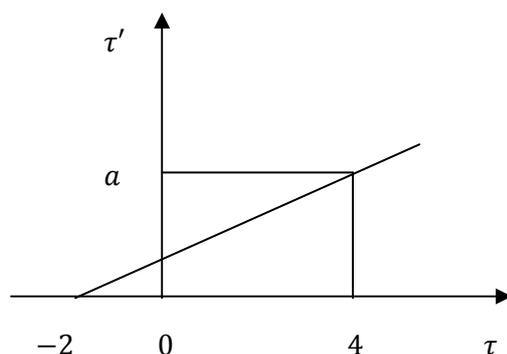


FIGURE 2

Inflation φ .

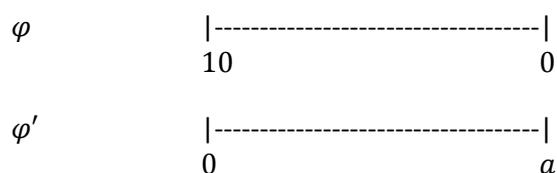


FIGURE 3

Likewise, the straight line equation that goes through the points (10, 0) and (0, a) is:

$$\varphi' = \frac{a}{10}(10 - \varphi) \quad (4)$$

In the same fashion we can find the scale transformation of the other two variables:

$$\gamma' = \frac{a}{10}\gamma \quad (5)$$

$$\zeta' = \frac{a}{12}(12 - \zeta) \quad (6)$$

Now, the modified MS (we would like to say, the 'primed' MS) is shown in Fig. 4.

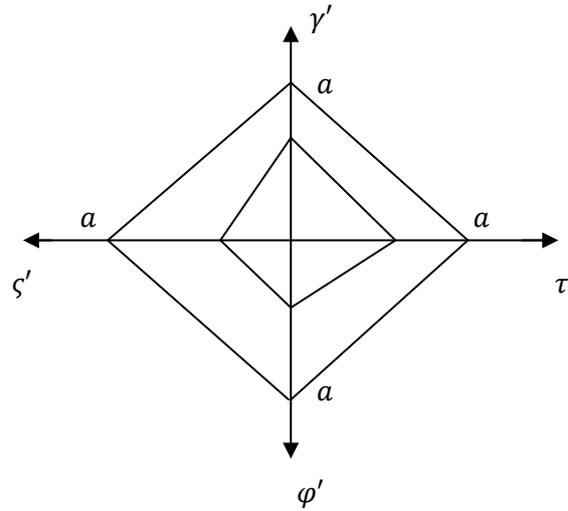


FIGURE 4

This figure shows the wonderland 'primed' MS, represented by the largest lozenge, which is a truly square figure rotated in 90° . Now we can find the value of a by defining the area A'_W , corresponding to the wonderland economy, to be 1. Therefore,

$$A'_W = 4 \times \frac{1}{2}a^2 = 1$$

So,

$$a^2 = \frac{1}{2} \quad (7)$$

For arbitrary values of γ , τ , φ and ζ , the real world economy is represented by the innermost quadrangle in Fig. 4. The corresponding area A' , of the quadrangle, is just the addition of all four rectangular triangles:

$$A' = \frac{1}{2}(\tau'\gamma' + \tau'\varphi' + \zeta'\varphi' + \zeta'\gamma') \quad (8)$$

At this point we remember that the original idea of the MS was to allow a quick look to the state of the economical situation of a country. In fact, by looking to the evolution of the size "area" of the quadrangle, one could know the evolution of the "health" of the economy of a country. Equation (8) is exactly the numerical value of the surface area we looked for.

Furthermore, substituting all values of the primed variables (γ' , τ' , φ' and ζ'), from Eqs. (3) through (6), into A' of Eq. (8), we have:

$$240A' = (\tau + 2)\gamma + (\tau + 2)(10 - \varphi) + \frac{1}{2}(12 - \zeta)(10 - \varphi) + \frac{1}{2}(12 - \zeta)\gamma \quad (9)$$

With these considerations, and based on Eq. (9), we introduce a new economy index:

ϵ – **Index of Economic Welfare**, given by the equation:

$$240\epsilon = (\tau + 2)\gamma + (\tau + 2)(10 - \varphi) + \frac{1}{2}(12 - \zeta)(10 - \varphi) + \frac{1}{2}(12 - \zeta)\gamma \quad (10)$$

It can be verified that the range values of ϵ are given by:

$$0 \leq \epsilon \leq 1, \quad (11)$$

where 0 corresponds to a catastrophic economy of a country (Growth $\gamma = 0$, Trade $\tau = -2$, Inflation $\varphi = 10$ and Unemployment $\zeta = 12$) whereas 1 (or 100%) portrays the wonderland economy ($\gamma = 10$, $\tau = 4$, $\varphi = 0$ and $\zeta = 0$).

3. THE CASE OF BRAZIL AND CHILE

As an application we use available data of the current world crisis (triggered by the financial crush of 2008 in USA). We refer now to the data of Table 1 (Source: IBGE and IMF Annual Report, 2011). This table shows the values we used before the actual crisis, 2004-2007, and during the crisis, 2008-2011, of both countries.

TABLE 1

	BRAZIL		CHILE	
	2004-2007	2008-2011	2004-2007	2008-2011
γ	4,7	3,7	5,2	3,3
τ	1,2	-1,9	3,2	0,4
φ	5,3	5,6	3,0	3,8
ζ	8,7	5,5	7,9	6,4

Substituting these values into Eq. (10) we end up with the following meaningful results:

ϵ	19.0%	11.3%	36.8%	20.6%
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These numerical results, of the now called index of economic welfare, indicate that Chile's economy welfare was better than the Brazilian before and during the crisis. However, the rate of change of the index ($\frac{\Delta\epsilon}{\Delta t}$) in these two intervals reveals that the Brazilian economic welfare was less affected (-1,3%/y) than the Chilean's (-4.05%/y)

4. CONCLUDING REMARKS

The main purpose of this work was to make possible the numerical evaluation of the economy performance of a country based on a new approach to the Magical Square originally conceived by Kaldor (1971). The result of our algebraic analysis lead us to define a new index, ϵ , here called Index of Economic Welfare.

The formal approach was applied to the economies of Brazil and Chile, because of the availability of the data. By this comparison, it was established that the current world crisis, during the relevant period (2008-2011), affected more to Chile than Brazil.

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