THE IMPACT OF POPULATION GROWTH ON SAVINGS: A CASE OF PAKISTAN

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ABSTRACT

The population growth is considered as an important determinant of saving rate, but its relation varies from country to country. The aim of this study is to examine the various determinants that cause variation in gross domestic savings, with special focus on population growth. The research includes the time-series data of Pakistan comprising the period 1976-2009. This paper employs non-linear multiple-regression model to figure out the impact of various economic and non-economic variables on savings. The results show that population growth has a significant positive impact on domestic savings in the long-run. The declining trend of population growth fosters the proportion of working-age population, which reflects the potential of the rise in savings. Besides, some demographic and economic variables also contribute to the determination of savings. Increase in the age dependency ratio tends to decline the savings. Normally, life expectancy, per capita income, and discount rate leave a positive effect on savings, but in case of Pakistan, these variables enforce the significant negative impact. This is due to the high inflation and economic downturn. Hence, the Government's focus should be on maintaining economic stability to create opportunities for enhancing savings.

Keywords: Population Growth, Domestic Savings & Pakistan.

1. INTRODUCTION

Since a last century, the world is facing dramatic demographic changes. These changes are evidenced by the decline in population growth as well as in fertility and overall mortality rate in the world. The demographic variables are considered as the major determinants of variations in savings. The population structure has been recognized as significant and one of the key-factors

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affecting saving's behavior, especially in less-developed countries. Savings are the main concern of economic growth, because savings are the key component to boost the investment, which results in prosperity in the performance of economy. Bisat et al. (1997), Schmidt et al. (1996) and Sinha (1999), stated that for many decades, development economics identified the mobilization of domestic savings is very important and critical for economic growth (as cited by Ahmad et al., 2006). Even so, impact of population growth on savings is still conflicting. That is why; this issue is hardly debated and has grabbed the attention of many researchers throughout the world. It has been observed that life expectancy of the world population has increased, which has caused an increase in savings. On the other hand, population entering retirement phase of its age is increasing, because those who were born after 1945 are getting old and are about to retire. It is the consensus that population under 15 years of age and/or above 64 years of age are dis-savers; it means they are dependent on their family earning for their own expenditure or on their savings which they had made during their working age. Although the population growth of the globe is declining, the resulting changes in saving rate differ from one country to another. These differences occur due to variability of countries in terms of their per-capita income, life expectancy, age structure, education, and other attributes of individual countries, and are found especially in developing countries.

Pakistan, being a less-developed country, is having very low variations in the economy as compared to other developing countries in the region. Pakistan's savings results have been dismal throughout the history, contrasting other countries in the region. The population structure in Pakistan has transformed over the couple of decades, which is assumed as major factor behind the negative saving's trend. According to the figures revealed by *State Bank of Pakistan*, the overall dependency ratio has increased from 75 percent in 1951 to 88.3 percent in 2000, which is mostly comprised of young dependency proportion. Pakistan is behind other countries in reducing its population growth rate, so that it may increase its saving rate. However, the question is, does reduction in population growth really bring increase in the savings rate?

The answer is fuzzy. From the perspective of one school of thought, growth in population decreases the saving rate, because the increase in a number of young dependants requires more spending for their consumption. So, the overall decline in saving rate is the consequence of a rise

in consumption. Furthermore, growth in population will end up with a huge number of retirees, who are again dependants. Whereas another optimist school of thought states that increase in population growth also increases the portion of population in working age, who are actually the savers. Both views are right, but they differ in the terms of the individual characteristics of a country. Moreover, the resulting impact (favorable or unfavorable) on aggregate savings depends upon the age structure of population. In order to clear this blurred view, time-series data of Pakistan about its population growth and saving rate is used. This study analyzes that whether an increase in population of Pakistan's results on the decline in its saving rate, or increase in saving rate, or even there is no impact of population growth on Pakistan's economy.

In spite of immense importance of savings and its determinants, a small number of time-series studies have been done in case of Pakistan. Among those researches few of them have worked for household savings (Ahmad et al., 2006), whereas, few have induced the effect of the dependency ratio only, not the impact of life expectancy, which affects the aggregate savings modestly. Therefore, our research is distinct in a way that we have employed the dependency ratio as well as life expectancy. Additionally, the data used in this study is recent and updated. We have not considered only household savings rather corporate and public savings are taken in the account as well. In this paper, our main focus is to trace the impact of variations in population growth on gross domestic savings.

In section I, the introduction and background of this research are given. In section II, different views of authors are mentioned. In section III, trends in saving rate and population growth are unveiled. In section IV, data and methodology followed in this study is described. In section V, elaboration of the model and its interpretation is given. Finally, in section VI, a conclusion has been given about the determinants affecting savings and its impact on the economy of Pakistan.

2. LITERATURE REVIEW

There are many researches which emphasize the impact of population growth on savings. Almost all the authors have found significant impact of demographic factors on savings, but the direction of impact differs in the findings of different authors.

Some authors support the view that there is both positive and negative impact of population growth and/or other demographic factors (age structure, dependency ratio, etc.) on saving rate that offsets each other which results negligible or not any change in savings (Cook, 2005; Disney, 1996; Kelley, 2009; Shumaker and Clark, 1992).

While very few authors have the estimation that there is a positive impact of demographic factors on savings. Tang and Zhang, (2007) observed that when income increases, people save for health investment; health investment brings rise in life expectancy which in turn increases saving and human capital investment. Kinugasa and Mason, (2004) found results that provide robust and consistent evidence that over three-quarter gain in national saving rates is due to the enhancement in old-age survival rather than declining youth dependency.

On the other hand, most of the authors emphasized that population growth and some of the demographic factors have significant declining impact on aggregate saving rate. Population below the age of 15 and above age of 65 is comprised of dis-savers because they do not contribute in family income, rather they rely on working-age member of their family for their consumption and expenditure (Ahmad et al., 2006; Braun et al., 2009; Burney and Khan, 1992; Higgins, 2010; Kang, 1994; Kelley and Schmidt, 1996; Li et al. 2006). Apart from that, there are few researches, which prove that dependency ratio (including both young and old) is a most important factor in determining the total savings rate and has a significant declining impact on savings. Such as, Agrawal and Sahoo, (2009) applied their study on the time-series data of Bangladesh and came up with related results of diminishing influence of age dependency on saving rate. The negative relationship between age dependency and saving rate is observed in almost all Asian countries, because these countries are developing countries and face the similar problems like high population growth, acute poverty, less literacy, etc. (Guest and McDonald, 2001; Horioka and Wan, 2007; Thanoon and Baharumshah, 2005). Increase in life expectancy and decrease in fertility rate results in the enlarged proportion of old dependants in the population of a particular country. It is observed that in developed countries, the people save during their working age for the betterment of their life after retirement due to high life expectancy. Therefore, the involvement of old population in declining of saving rate is negligible (Heller and Symansky, 1998; Lee, et al., 2003; Wakita, et al., 2000; Webb and Zia, 1989).

Likewise, Attanasio and Banks (1998) concluded in their study that the saving rates decline after the retirement age in the USA, but keep rising in the U.K; it means that impact of retirees on saving rate vary from country to country. In many countries, the inverse relationship between old dependants and savings is not that much stronger, hence overall the impact is insignificant. In addition, some researches indicate that relatively young dependants are more dis-savers as compared to old dependants. Because young population is purely relying on their family income for consumption and expenditures, whereas old population is not as much dependant as young due to their pre-retirement planning and saving during their productive years (Deaton and Paxson, 1998; Ozcan, 2003; Salim and Bloch, 2010).

Besides demographic variations, there are certain other factors, which are involved in the fluctuation in saving rate, such as, income, inflation, interest rate, economic growth, etc. Income is essential in the determination of aggregate savings of economy, which determines economic growth. Income is used for two purposes, for consumption and for savings. If income increases, keeping the inflation rate constant, the consumption and saving would increase (Kalwij, 2006; Kennickell and McCluer, 1997; Taskin, 1996).

3. TREND IN POPULATION GROWTH AND SAVINGS

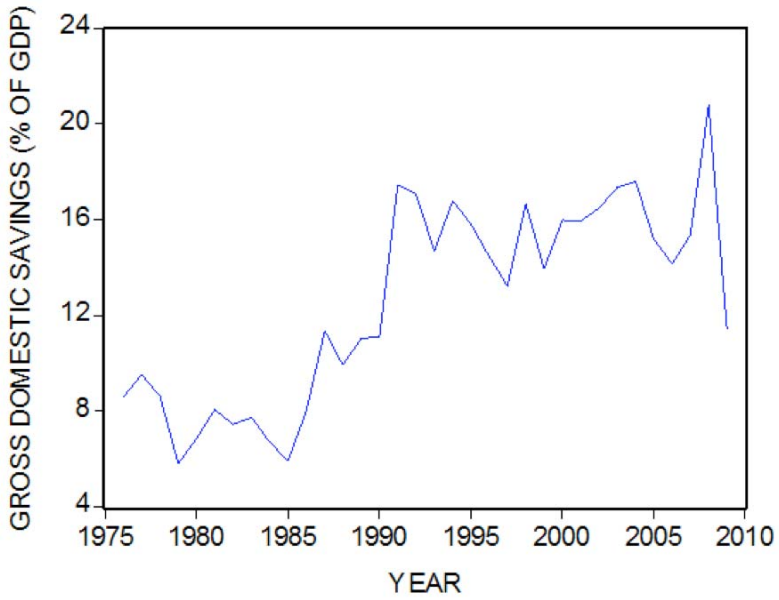
a) Trend of Savings in Pakistan:

Saving is one of the important and primary factors for economic growth. Savings, which are literally translated into investment and investment bring prosperity in an economy; become the engine that pulls the economic growth. Though investment can also be made through different other sources; that is, Foreign Direct Investment (FDI), Financial Assistance, Aid, and Borrowings, but saving is less risky and not as much costly as other sources of investment. As, Schultz (2005) observed in his research that stability in savings is of main concern of many countries because the decline in savings eventually slows down the potential for economic growth.

It is observed from the statistics of the previous years that the saving rate in Pakistan demonstrates so many fluctuations. It indicates that there is no consistency or stability in the

saving rate. The reasons behind this instability in saving rate are various, i.e. Demographic variations, age structure of population, life expectancy, per capita income, economic conditions, security threats, performance of banking sectors, etc.

Figure 01: Trend in Savings



As shown in Figure (01) above, there are so many ups and downs in the saving trend of Pakistan. During 1970-1985, saving has a downward inclination that could be due to worse economic conditions political instability, less awareness, more dependency. After that, savings started improving until starting of 1990 because economic conditions became favorable. Later, there were economic shocks like financial crisis, 9/11 incident and some other hostile events in the country that put a burden on savings to go down, but the saving rate was bouncing back itself that caused frequency in the saving rate. On the whole, there was almost stability in the movement of saving rate. Afterwards, there was a hike in saving rate that started from 2005 and continued up to about 20% in 2008. As the fertility rate started declining, changes in the age structure were observed, and most of the population moved in the working-age bracket that brought the positive impact on savings. In addition, the current account deficit shows improvement during these couple of years, due to which overall savings were pushed up.

Whereas, 2008 demonstrated a sudden waning in the saving rate that was the result of high inflation in food prices, Global Economic crisis, and fall in GDP growth rate.

This pattern of saving rate signals that overall there has not been a significant improvement in savings of Pakistan since the past three decades.

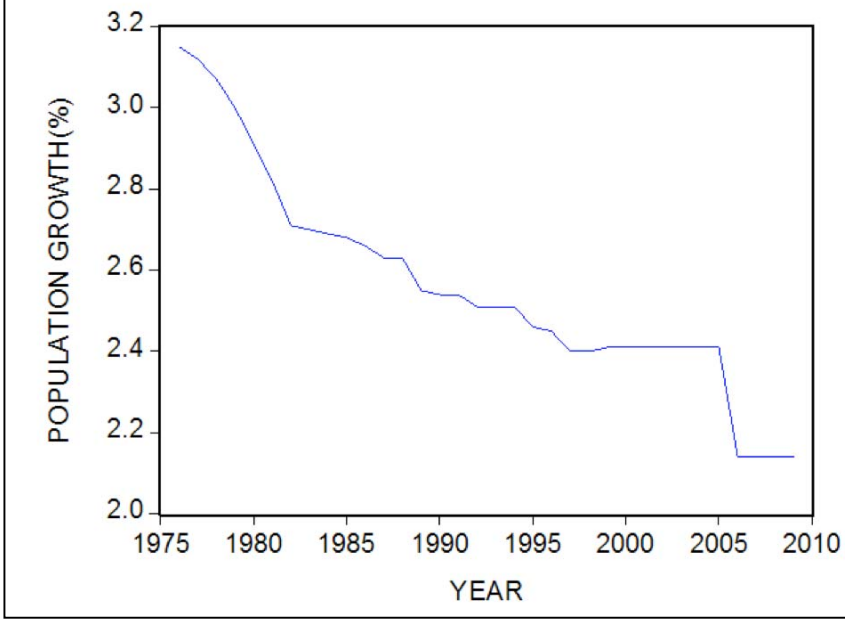
b) Trend of Population Growth in Pakistan:

Population growth is one of the highly important determinants of saving rate. Its impact generally varies in different time periods; that is, in short run the impact of population growth on savings is negative, while in the long run the population growth implies the positive impact on savings, provided that the fertility rate either declines or remains constant.

As shown in Figure (02), there is a downward trend in population growth in the almost past three decades. This declining trend indicates that population of Pakistan is increasing with decreasing rate. This turning down of population growth is due to urbanization and decline of the fertility rate in Pakistan. Population growth has declined from 3.15% in 1976 to 2.14% in 2006 and remained stagnant until 2009.

Though, the population of Pakistan has increased in absolute terms, there is negativity in population growth rate. That is why the proportion of working-age population is greater than that of the past; which has improved from 47% in 2001 to the estimate of 60.4% in 2011.

Figure 02: Trend in Population Growth



4. DATA AND METHODOLOGY

a) Data Sources and Econometric Procedure

This study includes the time-series data of Pakistan having 34 observations from the period 1976-2009. The data is taken from the World Bank and the Index Mundi. For this research, the most important and effective determinants of savings are taken as independent variables. They are population growth in percentage, total age dependency ratio (both young and old), total life expectancy (both male and female), discount interest rate, and GNI per capita. Our dependent variable is Gross Domestic Savings (% of GDP). In order to know the significance of independent variables, different tests have been applied, such as: Durbin-Watson test to check serial autocorrelation, Augmented Dickey Fuller Unit Root test to check whether data has stationarity or not.

b) Model Specification

Based on variables discussed above the following form of function has been structured:

$$ds_t = \beta_0 + \beta_1 dp_{t-3} + \beta_2 (1/dagd)_{t-1} + \beta_3 ddyp_{t-2} + \beta_4 di_t + \beta_5 di_t^2 + \beta_6 di_t^3 + u_t$$

t = 1, 2, 3, … , T

ds = 1st difference of Gross Domestic Savings (% of GDP)

dp = 1st difference of Population Growth

dagd = 1st difference of Total Age Dependency

ddyp = 2nd difference of GNI per capita

di = 1st difference of Discount Rate

u = Error term

Population growth, total life expectancy, total age dependency ratio, GNI per capita, and discount rate are taken as explanatory variables. Population growth is the main explanatory variable of savings. The research shows the positive as well as the negative impact of population growth on savings, depending on the age structure of population. In addition, life expectancy impacts saving rate favorably, especially in developed countries. People in developed countries

have high life expectancy; that is why they save more for their after-retirement expenditures of life. Moreover, the age dependency ratio is a very crucial determinant for savings, because the young and old dependants are the dis-savers, since they do not earn by themselves and depend on their family income for their expenditures. Furthermore, Gross National Income (GNI) per capita explains the per person income of the country, that helps in estimating the average savings of population. Last, discount rate has been used to value the net worth of savings by the population.

As shown in table (01), the Augmented Dickey-Fuller test is incorporated in an effort to examine the stationarity in variables by checking for unit root. The decision rule is that there exists non-stationarity in data of variable, if the data of respective variable claim for unit root in it.

The values of variables at the level, as shown in Table (01), simply show that whether the data is stationary. The values without asterisk (*) specify that there is a presence of unit root, hence the data is said to be non-stationary. There is only one variable, i.e. Life Expectancy, in the table which has no unit root, because it is significant at 1% level. In order to eradicate the unit root from the rest of the variables, the first difference is applied. As a result, all variables become stationary and significant at 1% except GNI per capita, which becomes significant and stationary by taking the second difference.

Table 01: Augmented Dickey-Fuller Unit Root Test

	VARIABLES					
Trend and Intercept	**Domestic Savings(% of GDP)**	**Population Growth**	**Age Dependency Ratio (Total)**	**Life Expectancy (Total)**	**GNI Per Capita**	**Discount Interest Rate**
Level	-3.037061	-2.462091	-3.185932	-4.596191***	-1.168375	-3.273537*
1st Difference	-5.396025***	-5.398329***	-4.977646***	-	-2.172737	-4.416411***
2nd Difference	-	-	-	-	-6.183774***	-

Note: * indicates 10% level of significance

** indicates 5% level of significance

*** indicates 1% level of significance

5. EMPIRICAL RESULTS AND ANALYSIS

In this study, time-series data of Pakistan is used and different statistical tests have been implied in order to know the effect of demographic factors on savings. Initially, any possible relation is checked out from dependent and independent variables, and then its positivity or negativity is observed. Subsequently, the significance of independent variables for determining the extent of their impact on dependent variable is measured.

As shown in table (02), six different models have been run for finding out the robustness of our variable of interest (population growth). Although, population growth does have a strong influence on the savings rate, the other demographic and economic variables also contribute to the fluctuations in it. So, the multiple models containing the different set of explanatory variables have been applied in this study.

As revealed from results, population growth has a highly significant positive effect on savings in all models undertaken in this study. This is because most of the population portion is in working age bracket. The population growth has the unit root, which has been removed by taking first difference for making the stationarity in data, and then it is lagged by 3.

The population growth coefficient shows very less variation in different models, which indicates the robustness of this variable. Notice that total life expectancy and total age dependency ratio are not used simultaneously in any model. The reason is to avoid multi-collinearity, because these two variables are significantly correlated with each other.

Many researches identify the significant positive impact of life expectancy on savings (Kageyama, 2003; Li et al., 2006; Zhang and Zhang, 2005). However, in the case of Pakistan, life expectancy impacts negatively on savings, but not significantly. Since, Pakistan is a developing country, where people do not save for their old age; they rather depend on their offspring for their expenditure. In addition, the age dependency ratio has a significant negative impact on savings. Since less the dependency more the savings made by population. Besides, GNI per capita shows the negative impact on savings.

Table 02:Impact of Demographic factors on Savings: 1976 - 2009

Dependent variable: Gross Savings (% of GDP)						
Independent Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Intercept	204.3358	1.56181***	234.4201	1.584523***	1.718045***	1.652946***
	(215.9031)	(0.447655)	(244.4429)	(0.428371)	(0.468756)	(0.423296)
DP(-3)	38.74269***	33.17893***	40.44139***	32.63794***	35.47625***	33.2326***
	(7.010433)	(6.086598)	(7.461042)	(5.964134)	(5.999118)	(5.939022)
LT	-6.355848		-7.310032			
	(6.926555)		(7.8414)			
LT^2	0.04974		0.057323			
	(0.055484)		(0.062833)			
1/DAGD(-1)		-0.0508*		-0.051975**	-0.04781*	-0.046151*
		(0.024795)		(0.024292)	(0.023283)	(0.023619)
DDYP(-2)	-0.051611***	-0.037139*	-0.055531***	-0.037854**	-0.053415***	-0.043483***
	(0.016466)	(0.018086)	(0.017881)	(0.016334)	(0.016302)	(0.015372)
DI	-1.270532***	-1.094616**	-1.097763**	-1.158865**	-1.188452**	-1.236833***
	(0.444944)	(0.4403)	(0.480127)	(0.429873)	(0.430759)	(0.423215)
DI^2	-0.231041**	-0.283061***	-0.204621*	-0.301086***	-0.289504***	-0.28534***
	(0.095561)	(0.089988)	(0.101476)	(0.083966)	(0.089945)	(0.082571)
DI^3	0.116466***	0.106843***	0.104275***	0.111687***	0.119165***	0.120373***
	(0.032546)	(0.032297)	(0.034953)	(0.031544)	(0.03117)	(0.030379)
DP(-2)*DAGD(-2)		6.124519		6.662401		
		(6.881326)		(6.567289)		
DP(-1)*LT(-1)			0.10348			
			(0.123313)			
DP(-1)*DDYP(-1)		0.309983	0.555615		0.09336	
		(0.311097)	(0.407052)		(0.437051)	
DP*DDYP*DAGD		0.241927				
		(0.419616)				
DP(-6)*DDYP(-6)*DAGD(-6)					1.149316*	
					(0.606272)	
DP*DDYP*LT			-0.001189			
			(0.005603)			
R-squared	0.726279	0.770494	0.754232	0.753523	0.817073	0.741992
Adjusted R-squared	0.639186	0.667216	0.624881	0.675098	0.730989	0.674686
SE of regression	1.682066	1.61541	1.715087	1.596164	1.555486	1.597176
F-statistic	8.339123	7.460398	5.830874	9.608247	9.491641	11.02411
Prob(F-statistic)	0.000055	0.000098	0.000506	0.000019	0.00006	0.000008
Durbin-Watson stat	2.61145	2.420803	2.633036	2.43579	2.463208	2.394325

Note: Standard errors of individual coefficients is given in brackets

* indicates 10% level of significance

** indicates 5% level of significance

*** indicates 1% level of significance

Logically, as per capita income increases, savings are supposed to increase as well; but due to continuous inflation growth in Pakistan, the impact of increase in per capita income is off-settled. Further, the empirical results show that the discount rate has a significant negative impact on saving rate. Normally, the rise in the discount rate causes improvement in saving rate, but in Pakistan it is quite the reverse. The inverse effect of an increase in the discount rate on savings is due to the high level of inflation and inefficiency of the banking sector. These reasons create uncertainty in future returns. Therefore, people in Pakistan are reluctant to save even at higher interest rates.

In addition, different interaction terms are used to find out their combined effect on dependent variable. The outcome is that the combined effect of independent variables on dependent variable is not that much significant; it means the independent variables explain the change in saving rate individually, but not mutually.

As mentioned in table (02), F-statistic of all models is significant; which means that these models are the best fit on the data of saving rate. Moreover, the adjusted R-square of all six models is quite good and acceptable. Furthermore, the Durbin-Watson of these models clearly defines that there is no serial correlation in models. This result is based on the decision rules of DW-statistic test.

In this study the total number of observations is 34 (from 1976 to 2009) and k=5 (number of independent variables). Therefore, the lower level for the Durbin-Watson d-statistic is 0.954 and upper level of it is 1.591. According to the empirical outcomes, the Durbin-Watson of all the models is greater than the upper level of the critical value of DW statistics and satisfies the decision rule of no auto-correlation.

In the above table (02), the model (6) clearly shows that all the independent variables are significant. That is why this model is far better than the rest of the models in table (02). Though each variable causes significant variation in savings, population growth occupies major share in variation in saving rate of Pakistan. Correspondingly, low standard error of regression indicates less deviation in results.

6. CONCLUSION

Domestic savings are very crucial source and key determinant for the economic growth. In Pakistan, the saving trend has been dismal for the last three decades. The figures show a very small increase of about 2.84% in the domestic saving rate from 8.59% to 11.43% during period 1976-2009. This research uses a non-linear multiple-regression model based on the time-series data of Pakistan from 1976 to 2009, and identifies the variables that determine the fluctuations in saving rate.

According to our findings, population growth in Pakistan has a significant positive impact on savings in long-term. Yet due to the influence of other factors, i.e. higher inflation, political instability, economic downturn, and unemployment, this positive impact becomes minor in nominal terms. While, the continuously decline in the fertility rate causes an increase in working-age population, that is the favorable sign for savings. The policy-makers should take steps to prosper the economic conditions in order to bring employment and stabilize the inflation in the country. So, the people in working age may get opportunities for earning, and thus for saving.

Furthermore, other demographic variables like the life expectancy and dependency ratio have a negative effect on savings. It is an outcome of worse economic conditions. In case of Pakistan, the impact of life expectancy is insignificant on savings, while that of age dependency is significant. Moreover, GNI per-capita and discount rate are also proven to be significant determinants of savings.

On the whole, the age structure of population implies strong variations in saving rate. If the major proportion of population would be in working-age category, then savings will tend to improve. In contrast, if the proportion of dependants would be greater in population, then savings will be forced to decline.

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