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Government Revenues And Government Expenditures, Or Fiscal Synchronization: Empirical Evidence From South And Eastern Asia

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Abstract

To understand and solve budget deficit problems, some academics proposed budgets cuts while some suggests increase in taxes. This paper estimates the causal relationship among three fiscal variables for ten countries for period of 1980 to 2017. By using Johnson co-integration test, the results reveal three co-integrating effects for, Bangladesh and Mongolia, two for India and Japan, one for Srilanka, Nepal, China, DPR_Korea, REP_Korea, while no for Pakistan. The Toda and Yamamoto granger causality tests reveals evidence of tax-and-spend hypothesis for china, Pakistan, and Nepal. For Nepal we found support for spend-and-tax hypothesis. There is evidence of neutrality for Japan, DPR_Korea, REP_Korea, Mangolia, India, Srilanka, and Bangladesh. The results validates that south and eastern asian countries tax policies has lessor impact to reduce budget deficits and did not offer permanent solution for fiscal problems.

Introduction

Budget deficits causes problems for governments both in developed and developing worlds. These deficits pressures governments to increase interest rates and ultimately capital formation become slower. In recent times a large number of studies were carried to examine the deficit problems. Numerous academia suggests cut in government expenditures to overcome deficits and believe rising taxes will simply cause high expenditures (Friedman M 1978), the causal relationship between government revenues and expenditures is not straight forward and considering one component and ignore the other can negatively affect deficit solution. Joulfaian and Mookerjee, 1991; Baghestani & Mcnown 1994; Cheng S 1999; Narayan & Narayan (2005); Nwosu and Okafor, (2014) examined three hypothesis, first, government revenues causes expenditures, second, expenditures cause revenues, third, both occurred concurrently. The causal relationship between government revenue and government spending is of vital importance to understand and to quantify its isources. These hypothesis has both theoretical and empirical policy implications, on the theoretical side the Tax (revenue)-spend (expenditures) hypothesis examine that higher revenue leads to higher government expenditures, the possible causal relationship is unidirectional running from government revenues to spending. The spend-and-tax hypothesis holds that, deficits cause governments to raise taxes to match its spending, this increase uphold by government and remain a permanent raise in taxes, this expected causal relationship is unidirectional from expenditure to revenues. Third hypothesis, fiscal synchronization hold that, governments spending budgets on projects are determine by revenues sources and may change bidirectional. The debate among academia has been increased in recent past with increasing trends in government budgets deficits both in developing and developed world. On the policy implication side, if the revenue causes expenditures then government can eliminate deficits by increasing revenues. Second, if government spend first and finance program later, will unbalance the pattern and cause a permanent shift in government taxes (Peacock and Wisemen, 1979).Third, if government avoid fiscal synchronization, then government expenditures will increase at higher phase then revenues (Narayan & Narayan 2005).

To check the causal relationship we have chosen ten countries from two regions, Asia and Eastern Asia where all countries are developing except, Japan and among them eight are facing budget deficits. The causal relationship of any direction between government expenditures and revenues has its policy implication. The contribution of this work are as follows,

1. In this study we analyzed annual data for 27 years, structural changes in the data is important, as reported by Payne et al (2008)
2. In the literature no study were found on these two regions of the world which examined comprehensive measures of government expenditures and government revenues.
3. Most of the countries included in this study are newly industrialized and are not examined for causal relationship among the interest variables.

The rest of the paper is organized as follow. Section 2 presents the theoretical and empirical literature. Section 3 data collection. Section 4 explain empirical methodology. Section 5 presents results and discussions. Section 6 conclude the paper with policy implications for stakeholders.

Literature Review

The causal relationships between government revenue and expenditure remained debatable issue in public finance. The causal relationships between government revenue and expenditure to budgets deficit has not been empirically resolved, importantly, which variable should be of primary interest for policy makers. Theoretically, volume of studies in the developed and developing world appeared in last three decades to examine its importance and its implications for governments (Musgrave 1966; Friedman 1978; Narayan and Narayan 2006). Irrespective of their relationships the policy implication of these findings are significant. The tax-and-spend hypothesis was presented by (Friedman 1978 & 2003), stated that rising taxes will simply give government an opportunity to spend more on projects, but it wouldn't reduce government budget deficits. Public rule ensure government spend what is receive in form of taxes. But (Friedman 1978) also explained reducing taxes can lead higher budgets deficits, as taxes have positive impact on government expenditures. To reduce the budgets deficits the government should reduce its spending. The Tax lead government expenditure hypothesis were also examined by (Moalusi, 2004), his point view was, with a cut in taxes brings reduction in the cost of government programs. The pressure on new programs are intensified, which results in higher budget deficits and can be realized of reduction in tax revenue and government spending. The spend-and-tax hypothesis hold that expenditures cause revenue proposed by (Peacock and Wisemen, 1961 & 1979).They stated crisis situations brings permanent changes in expenditure pattern of governments. Initially crisis increase government expenditure more in proportion to increase in taxes, this brings continuous changes in fiscal variables initially justify by crises situation become public permanent tax policy, hence government will have no choice but to increase the taxes to match its spending. Fiscal Synchronization hypothesis hold that government may change expenditures and revenue concurrently (Musgrave 1966; Meltzer & Richard 1981; Gounder et al 2007). It means government revenue decisions are not made in absence of expenditures, and the causality remains bidirectional, under this belief government brings down expenditures with a belief it will results, increase in taxes in the future. In the developing and developed world context most literature discusses the causal relationship among government revenues and expenditures in country scenario.

Raza et al, (2019) examined a non-linear relationship between government revenues and expenditures in Pakistan for period of 1972-2014, he reported co-integration among government revenues and expenditures and fiscal synchronization in the government budget process. Ali and Shah (2012) examined revenue and expenditures data from (1976-2009) found no long term causal relationship between government revenues and expenditures. Kaur R, & Kaur R (2018) by using Toda and Yamamoto modified Wald test for Indian state government receipt and spending, they found neutrality between government receipt and spending. Maitra (2011) used data of government revenue and expenditure from 1973 to 2009 for Sri Lanka, by using VAR model, the study validate spend-and-tax hypothesis. Narayan (2005) by using bond testing approach examined and have found co-integration for three countries, and tax-and-spend hypothesis were reported for Indonesia, Sri Lanka, and Singapore in short run and for Nepal both in short and long run. The spend-and-tax hypothesis were found for Indonesia and Sri Lanka in Long run. For remaining countries, Philippines, Pakistan, India, Thailand, and Singapore neutrality have found. Dritsaki (2018) by using Toda and Yamamoto methodology examined the spending and revenues pattern of Greece and found unidirectional causal relationship from government revenues towards spending. Narayan and Narayan (2006) by Using Toda and Yamamoto methodology they examined the causal relationship between government revenues and expenditures for 12 developing countries and found support for tax-and-spend hypothesis in Venezuela, Chile, Haiti, El Salvador, and Mauritius. The spend-and-tax hypothesis were found for Haiti, for Ecuador, Uruguay, Guatemala, South Africa, and Peru neutrality were found.

Chang et al (2002) examined the causal relationship between government revenue and expenditures for ten industrialized countries (USA, UK, Japan, Canada, Thailand, Taiwan South Korea, South Africa, Australia, and New Zealand). For seven countries (UK, South Korea, USA, Japan, Taiwan, South Africa, and Australia) co-integration exist among revenues and expenditure. Causality results reveals a unidirectional relationship from government revenues to expenditures for, Japan, Taiwan, South Korea, UK, and USA. The same unidirectional causal relationship running from government expenditure to revenues were found for South Africa and Australia. Owoye (1995) examined the causal relationship between revenue and expenditures for G7 countries and have found unidirectional causality from government revenue to government spending for Japan and Italy. He also found bidirectional causal relationship for five countries. Mookerjee (1991) examined the relationship between revenues and expenditures for industrialized countries and found support for tax-and-spend hypothesis for all countries except for Japan, Iceland, and Canada, while spend-and-tax hypothesis were found for all countries except, Canada, Japan, and Ireland.

No two studies in the academic literature predicts the same causal relationship among government revenues and expenditures while many papers contradicts previous studies. This study is an attempt to increase the understandings of academia in relation to government earning and expenditure in newly industrialized countries of south and eastern asian countries.

Data Source and Variables Calculations

Data has been collect CSMAR, a non-for profit organization. Annual data of ten countries from Asia and eastern Asian countries from 1980-2017 were collected. Table one give details of variables calculations. All the variables are calculated at current and constant prices.

Variables	Abbreviation	Measures
Real Gross Domestic Product	RGDP	Total sum of goods and services produced valued at pre-determined market prices.
Government Revenues	GR	Primarily Industry+ Secondary Industry +Industry+ construction + whole sale, retail and catering trade+ transportations, storage, post and telecommunication +other sectors
Government Expenditures	GE	Final consumption expenditures+ household consumption expenditures+ General government consumption expenditures+ Gross capital formation+ gross fixed capital formation.

Total revenues and total expenditures are classified into, revenue and capital receipt, revenue and capital expenditures. The revenue receipt are non-redeemable or revenue titled with no future obligations while capital receipt are those creating liability and will decrease state assets in future. Revenue expenditures include spending on state department's responsible and did not create physical assets while capital expenditures are direct expenditures on serving debts or spending social developments.

Empirical Methodology

4.1 Augmented Dickey Fuller (ADF) Unit Root tests

To check the causal associations of interest variables, the time series of variables are tested for stationarity. The Augmented Dickey Fuller (ADF) are carried to check weather series have Unit root or not? If the series are found having unit root, it is non-stationary, and do not have unit root and series is considered stationary. In this paper we have used auto regressive equation proposed by (Lukovic & Grbic 2014).

$$\Delta Y_\tau = \alpha_0 + \alpha_1\tau + \alpha_2 Y\tau - 1 + \sum_{i=1}^{n} \delta_i Y\tau - i + \omega_\tau \qquad (1)$$

Where, Y_τ are the observed variables GR_τ and GE_τ, $\alpha_0, \alpha_1, \alpha_2, \delta_i$ are the set of parameters which are estimated, and ω_τ a white nose error.

4.2 Toda and Yamamoto Granger Causality test

Causality test is used to examine causal relationship among two variables. Granger (1969), Engle and Granger (1987), and Johansen and Jesulious (1990) proposed various causality tests to quantify the cause and effect relationship between two variables affecting each other with distributed legs. Granger Causality test is useful when we are interested in direction of causality not on magnitude of impact. In this study we used robust granger causality test of Toda and Yamamoto (1995), the advantage of this method is it follows asymptotic chi-squared distribution. In Grangar way the causality test are performed conventionally by estimating Vector Autoregressive (VAR) models. For Joint significance of variables Granger Non-Causality test recommends Wald F-test in unrestricted Vector Autoregressive (VAR) models. When time series data are cointergarted then Wald F-test is not valid for Granger Non-Causality, because it lacks standard distribution (Toda and Phillips 1993). Toda and Yamamoto (1995) proposed modified Wald test to restrict parameters of VAR model. Two steps are involved to run this method, first, determination of optimal leg length (S) and maximum order of integration (dmax) of variables used in the model. In this paper, Akaike Information Criterion (AIC) is used to determine optimal leg length (S) and ADF unit root test or maximum order of integration (dmax). Once VAR (S) and dmax are obtained then VAR optimal leg length (p= s+dmax) at level will be estimated. Second, Wald test on the (S) coefficients matrix to draw inferences on Granger Causality. The above discussion is explained in the following equations,

$$lnY_\tau = \sigma_0 + \sum_{I=1}^{s+dmax} \omega_i \ln Y_{\tau-1} + \sum_{I=1}^{s+dmax} \partial_i \ln GR_{\tau-I} + \sum_{I=1}^{s+dmax} \gamma_i \ln GE_{\tau-I} + \varepsilon_{1\tau} \quad (2)$$

$$lnGR_\tau = a_0 + \sum_{I=1}^{s+dmax} \alpha_i \ln GR_{\tau-1} + \sum_{I=1}^{s+dmax} \beta_i \ln GE_{\tau-I} + \sum_{I=1}^{s+dmax} \pi_i \ln Y_{\tau-1} + \varepsilon_{2\tau} \quad (3)$$

$$lnGE_\tau = \theta_0 + \sum_{I=1}^{s+dmax} \delta_i \ln GE_{\tau-1} + \sum_{I=1}^{s+dmax} \varphi_i \ln GR_{\tau-I} + \sum_{I=1}^{s+dmax} \tau_i \ln Y_{\tau-1} + \varepsilon_{3\tau} \quad (4)$$

lnGR is calculated by taking natural logarithm of government expenditures and ln GE natural logarithm of government revenues. ln Y is the natural logarithm of real Gross domestic product. $\varepsilon_{I\tau}, \varepsilon_{2\tau}$, , and $\varepsilon_{3\tau}$ are independent random errors having zero mean values and finite covariance matrix (Narayan & Narayan, 2006).

5 Results of stationarity and co-integration

Table 2 show the augmented dickey fuller test results and p-value of each variable against null hypothesis. It was found that, GDP, Government revenues, and government expenditures are non-stationary at level. All the three variables are stationary at order I (1) except china and Bangladesh which are stationary at I (2).

• Country	Series	T-Stat at level	T-Stat at 1st Diff	T-Stat at 2nd Diff
China	GDP	5.248168	0.658842	-7.343104***
	TR	-2.964392	-1.903234	-2.53046
	TE	5.081935	0.286645	-7.219617***
Japan	GDP	-1.948312	-20.0339***	-
	TR	-3.111972	-19.32771***	-
	TE	-2.950205	-20.4438***	-
DPR_ Korea	GDP	-1.244868	-11.53631***	-
	TR	-1.150713	-11.19009***	-
	TE	-1.251863	-10.98609***	-
REP_Korea	GDP	-2.933823	-12.02503***	-
	TR	-2.55044	-11.40125***	-
	TE	-8.039899	-	-
Mongolia	GDP	5.163363	0.401205	-7.653374***
	TR	2.393275	-9.560818***	-
	TE	-0.749078	-13.12827***	-
Pakistan	GDP	4.273836	-13.52696***	-
	TR	4.135193	-13.74115***	-
	TE	3.880672	-13.41739***	-
India	GDP	4.126754	-3.802499***	-
	TR	3.546969	-3.625077***	-
	TE	3.462001	-3.386252**	-
Bangladesh	GDP	4.600870	0.626614	-5.13124***
	TR	4.774890	0.687782	-5.225345***
	TE	4.441068	0.513419	-4.446576***
Sri Lanka	GDP	3.775781	-9.344954***	-
	TR	3.572680	-9.537214***	-
	TE	4.330833	-9.117332***	-
Nepal	GDP	1.272942	-13.58352***	-
	TR	2.525390	-12.84435***	-

• Country	Series	T-Stat at level	T-Stat at 1st Diff	T-Stat at 2nd Diff
	TE	1.220347	-13.67587***	-

Source: Author Calculations
Note: (***), (**), and (*) implies statistical significance at 1%, 5%, and 10% respectively.
The null hypothesis is rejected and there is absence of unit root among interest variables, concludes stationarity of time series.

Table 3: Co-integration test results

Country	Hypothesis	Trace Test	Prob	Eigen Max	Prob
East Asia					
China	H0 : r = 0	43.03438	0.0009	34.19810	0.0004
	H0 : r <= 1	8.836279	0.3807	6.584025	0.5395
	H0 : r <= 2	2.252254	0.1334	2.252254	0.1334
Japan	H0 : r = 0	33.40575	0.0184	18.94856	0.0984
	H0 : r <= 1	14.45719	0.0712	9.246658	0.2662
	H0 : r <= 2	5.210535	0.0224	5.210535	0.0224
DPR_ Korea	H0 : r = 0	37.67749	0.0050	31.38260	0.0013
	H0 : r <= 1	6.294889	0.6607	3.762730	0.8835
	H0 : r <= 2	2.532159	0.1115	2.532159	0.1115
REP_Korea	H0 : r = 0	29.91265	0.0485	21.67621	0.0419
	H0 : r <= 1	8.236440	0.4405	6.495703	0.5504
	H0 : r <= 2	1.740738	0.1870	1.740738	0.1870
Mogolia	H0 : r = 0	32.93761	0.0210	17.45260	0.1517
	H0 : r <= 1	15.48500	0.0502	10.53983	0.1788
	H0 : r <= 2	4.945171	0.0262	4.945171	0.0262
South Asia					
Pakistan	H0 : r = 0	22.70850	0.2607	13.31448	0.4237
	H0 : r <= 1	9.394027	0.3302	9.334001	0.2594
	H0 : r <= 2	0.060025	0.8064	0.060025	0.8064
India	H0 : r = 0	51.47725	0.0000	36.75872	0.0002
	H0 : r <= 1	14.71853	0.0652	13.05722	0.0769
	H0 : r <= 2	1.661316	0.1974	1.661316	0.1974
Bangladesh	H0 : r = 0	84.54188	0.0000	52.33004	0.0000
	H0 : r <= 1	32.21183	0.0001	29.47225	0.0001
	H0 : r <= 2	2.739583	0.0979	2.739583	0.0979
Sri Lanka	H0 : r = 0	56.52883	0.0000	43.34315	0.0000
	H0 : r <= 1	13.18568	0.1082	12.85967	0.0824

	H0 : r <= 2	0.326015	0.5680	0.326015	0.5680
Nepal	H0 : r = 0	52.50069	0.0000	45.28498	0.0000
	H0 : r <= 1	7.215707	0.5527	6.416472	0.5604
	H0 : r <= 2	0.799235	0.3713	0.799235	0.3713

Source: Author Calculations

The co-integrations results reveals that except Pakistan, all nine countries of South and East Asia, Gross Domestic Product , government revenues and expenditures are move together.

5.1 Results of Toda and Yamamoto Granger Causality Test

As we were interested to check the causality among revenue and expenditures. The Engle and Granger (1987) Johanson and Jesulious (1991) are not free of limitations, the pre-requests' include, unit root test and co-integration but sensitive to model specifications. To overcome these limitations we employ more robust causality test presented by Toda and Yamamoto (1995). Some caution is required while interpreting the causal relationships among three variables because in budget financing near elections, government officials in spite of tax financing switch to debt financing or deliberately lower taxes on goods to secure maximum number of seats (Hasan and Lincoln 1997).

Table 4 presents the results of Toda and Yamamoto Granger Causality of ten countries from south and Eastern Asia. The results reveals that a unidirectional casualty is running from government revenue to government expenditures for China, Pakistan, and Nepal. These results validates the Tax-and-Spend Hypothesis. For Nepal the casualty run from government expenditures to government revenues and validate the hypothesis of spend-and-tax hypothesis. For reaming countries, DPR_ Korea, REP_Korea, Mogolia, India, Bangladesh, and Sri Lanka there is no causal relation among government revenues and expenditures and hence exists neutrality among government revenues and expenditures, it means government revenues and expenditures decisions are made independently. Our results are in line with findings of Narayan (2005) in his work he report neutrality in five out of nine countries he study included India. For causal relationship between GDP and Government revenues and expenditures, we found, bidirectional casualty between GDP and Government expenditures for China, DPR of Korea, and Nepal, and a Unidirectional casualty between GDP and Government expenditures for Srilanka. Same bidirectional casualty were found between GDP and Government revenues for India, and unidirectional casualty were found between GDP and Government revenues for China.

Table 4: Granger causality test

Country	Null Hypothesis	F-Stat	Prob
China			
	TR>GDP	0.93999	0.4265
	GDP>TR	6.65589	0.0005
	TE>GDP	4.22208	0.0086
	GDP>TE	4.73453	0.0047
	TE>TR	9.27083	3.00E-05
	TR>TE	2.94800	0.0391
Japan			
	TR>GDP	1.10195	0.3547
	GDP>TR	1.36753	0.2604
	TE>GDP	0.60086	0.6167
	GDP>TE	0.66593	0.576
	TE>TR	0.97143	0.4116
	TR>TE	0.87413	0.4591
DPR of Korea			
	TR>GDP	0.42678	0.7345
	GDP>TR	0.55673	0.6455
	TE>GDP	2.24106	0.0916
	GDP>TE	2.25623	0.0925
	TE>TR	0.86664	0.4629
	TR>TE	0.50991	0.6768
Republic of Korea			
	TR>GDP	1.83848	0.1487

	GDP>TR	1.69610	0.1764
	TE>GDP	1.45231	0.2356
	GDP>TE	2.06622	0.1131
	TE>TR	1.43872	0.2394
	TR>TE	2.05864	0.1142
Mongolia			
	TR>GDP	1.26079	0.2952
	GDP>TR	1.12161	0.3469
	TE>GDP	0.43573	0.7282
	GDP>TE	1.25623	0.2968
	TE>TR	0.24860	0.862
	TR>TE	1.20255	0.3159
Pakistan			
	TR>GDP	12.9401	1.00E-06
	GDP>TR	11.7365	3.00E-06
	TE>GDP	1.03559	0.3827
	GDP>TE	0.91769	0.4373
	TE>TR	2.06086	0.1139
	TR>TE	2.36858	0.0786
India			
	TR>GDP	2.79447	0.04712
	GDP>TR	3.02862	0.03555
	TE>GDP	11.2403	5.00E-06
	GDP>TE	16.6461	4.00E-08
	TE>TR	12.5928	1.00E-06
	TR>TE	14.8867	2.00E-07
Bangladesh			
	TR>GDP	17.2035	2.00E-08
	GDP>TR	16.9850	3.00E-08
	TE>GDP	8.43648	8.00E-05
	GDP>TE	9.85678	2.00E-05
	TE>TR	18.5737	8.00E-09
	TR>TE	22.0665	5.00E-10
Sri Lanka			
	TR>GDP	1.42754	0.2426
	GDP>TR	1.19103	0.32
	TE>GDP	10.0039	2.00E-05
	GDP>TE	7.98022	0.0001
	TE>TR	11.5998	3.00E-06
	TR>TE	9.01739	4.00E-05
Nepal			
	TR>GDP	0.11441	0.9514
	GDP>TR	0.10221	0.9585
	TE>GDP	2.40069	0.0756
	GDP>TE	3.15595	0.0305
	TE>TR	2.75623	0.0525
	TR>TE	2.79803	0.0468

Source: Author Calculations

Thus, we found causal relationship between taxes and expenditure in China, Pakistan, and Nepal. Increase in country expenditures are the results of increase revenues. Expenditures are mainly focused on household well-being oriented as given in tables one, Final consumption expenditures, household consumption expenditures, education, and health. Likewise, revenues are increased in response to increase in expenditures, the feedback

causal effect were found in Nepal. The findings of Narayan (2005) find tax-and-spend hypothesis for Indonesia, Sri Lanka, and Singapore in short run and for Nepal both in short and long run. The spend-and-tax hypothesis were found for Indonesia and Sri Lanka in Long run. For remaining five countries, Philippines, Pakistan, India, Thailand, and Singapore found neutrality. Our study detects one way causality flowing from taxes to expenditures for china, Pakistan, and Nepal. The feedback casualty for Nepal are perfectly matching the results of Narayan (2005). Yet no consistent and firm conclusion can be drawn from the causal relationship between government revenues and expenditures for most of the countries. Differences in results are the outcome of differences in political system, budget process, and model specifications. All these factors are responsible for variations in results. Furthmore, It is not empirically feasible to estimate and conclude which factor contribute in divergence of results and how much.

Conclusions and Policy Recommendations

Understanding of government revenue and expenditures is important for policy makers to avoid continuous budgets deficits. We examined the Gross Domestic Product, Government Revenues, and Government Expenditures for ten countries. Nine out of ten countries have co-integration among GDP, Government Revenues, and Expenditures. For china, Pakistan, Nepal, Government revenues causes government expenditures and are consistent with tax-and-spend hypothesis. The tax-and-spend hypothesis for china, Pakistan, and Nepal indicates the demand for good and service is grown larger from 1990 to 2017, and hence widen government spending base. However, this does not means that lower taxes will cause lower expenditures, the government in situations of lower tax returns opt for debt financing rather than tax financing For Nepal Government expenditures Grenger causes government revenues and are consistent with spend-and-tax hypothesis. For Japan, DPR_ Korea, REP_Korea, Mogolia, India, Bangladesh, and Sri Lanka, we neutrality among government revenues and expenditures and are inconsistent with fiscal synchronization hypothesis.

Policy Recommendations

The results validates that south and eastern Asian countries tax policies has lessor impact to reduce budget deficits and did not offer permanent solution for fiscal problems. The bottom line of deficit issue is to reduce spending's. In contrast our findings support increase in taxes may be a good solution to budget deficit problem in China, Pakistan, and Nepal. On the other hand, in Japan, DPR_ Korea, REP_Korea, Mogolia, India, Bangladesh, and Sri Lanka budget deficits can be reduce if revenues and expenditures are controlled simultaneously.

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