Is Corruption Supporting or Dragging Incomes and Labour Productivity in Brics Nations?

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This study estimates various production functions for the BRICS nations by using macro level data, and applying the Fully Modified OLS technique to both dynamic panel data and time series data sets, after duly testing for their stationarity. It is then found that one important and often ignored factor in the growth of at least three of the five BRICS nations is the rampant corruption present in them, which enables a saving of time and resources by enabling a circumventing of stifling rules and regulations. It is also discerned that a major reason responsible for obtaining insignificant labour coefficients in any production analysis is the involvement of labour itself in corrupt activities, which is rendering labour ineffective for production, and thus maybe instigating the adoption of labour saving technologies.

1. INTRODUCTION

Three very important issues have always concerned the economists in the past two-three decades. These being the falling labour productivity levels in the newly industrialising economies; the source of the unprecedented and stupendous growth of the BRICS nations in the new millennium, especially after their almost immediate recovery from the aftermath of the Global Financial Crisis of 2008-09; and finally, the impact of high corruption levels on the economies of developing countries. The low, and even falling or stagnant labour productivity levels of the developing countries have been variedly explained in terms of the adverse effects of labour migration out of the rural economy (Rozelle, Taylor and DeBrauw, 1999), excessive dependence on capital for bringing about growth (Herd and Daugherty, 2007), resource mis-allocation (Hsieh and Klenow, 2009), changing demand patterns and labour saving technologies

(Chandrasekhar and Ghosh, 2007) etc. On an identical note, corruption's pre-supposedly adverse impact on economies has been explained in terms of its redirecting resources into unproductive directions (Schleifer and Vishny, 1993), reducing allocative efficiency (Clark and Riis, 2000), instigating tax evasion in return for bribes (Blackburn, Bose and Haque, 2004), negatively impacting health care and education services (Gupta, Davoodi, and Tiongson 2001), adversely impacting foreign direct investments (Wei, 2000; Habib and Zurawicki, 2002; Smarzynska and Wei, 2002; Zhou, 2007; Freckleton, Wright and Craigwell 2012) etc. Similarly, the higher than the world average growth performance of the BRICS nations has been explained in terms of their possession of all the ingredients essential for growth, viz. high natural resource richness, gradually reducing economic restrictions, democratic political setup, governments committed to economic growth, a highly qualified labour force, and few other such factors. Owing to the high growth performance of the BRICS nations, almost all the aspects of these nations' growth process have been studied in detail including the determinants of FDI into and out of the BRICS nations (Vijayakumar, Sridharan, and Rao, 2010; Ranjan, and Agrawal, 2011; Holtbrügge, and Kreppe, 2012; Agrawal, 2015), the impact of global factors on their stock markets (Mensi, Hammoudeh, and Reboredo, 2014), their growth linkages (spillovers) with the other Low Income Countries (Mlachila, and Takebe, 2011; Yang and Samaké, 2011), the impact of their education policies on their growth process (Yuan, 2013), their Carbon Dioxide emission levels (Wu *et al*, 2015) etc.

But, all of these three important issues have always been dealt with independently of each other. It has never been recognised that the BRICS nations, besides being high growth nations are also high corruption infested nations, and that

they have grown despite the presence of corruption in them, producing a paradoxical combination of ‘high growth with high corruption’. So much so that, their Corruption Perception Indices (the CPI hereafter) by Transparency International (the most unanimously accepted and frequently quoted index of corruption) have been consistently below 50 (out of 100, with 100 indicating the least corrupt and 0 indicating the most corrupt) and their world corruption ranks have been consistently above 50, since the inception of the series in 1995. Even some African and Latin American nations, as Uruguay, Chile, Botswana, Ghana, Rwanda, Namibia, fare better than the BRICS nations in terms of corruption. Even in the latest CPI figures just brought out in February 2018, all the BRICS nations are placed with 127 countries (out of the 183 surveyed) scoring less than 50. Their individual scores are even lower than the global average of 43.07. Even the much talked about Demonetisation drive of India in November 2016 failed to improve its CPI, which continues to remain at 40 in 2017 as it was in 2016. The Enterprise Surveys of the World Bank (ESWB) even finds both the ‘Incidence of Corruption’ (as measured by the percentage of firms facing at least one bribe payment request) and the ‘Depth of Corruption’ (percentage of transactions where a gift or informal payment was demanded) to be the highest in India amongst all the BRICS nations, and one of the highest in the world. Interestingly still, the BRICS nations’ corruption levels show no sign of abatement with their ensuing growth. Brazil has even been quoted by the Transparency International, as “experiencing a serious deterioration in corruption since 2012”. It is therefore pertinent to investigate whether the supposedly adverse economic impact of corruption is either somehow not at work in the BRICS nations or that, the BRICS nations have been able to grow despite the adverse implications of corruption on their economies, on the basis of their inherent

growth potential. Or else, corruption is actually supporting their growth, even while it may be adversely impacting the growth of other nations.

Also, it has never been recognised that the developing countries in general facing stagnant or falling labour productivity levels also tend to be usually highly corrupt nations. Given the fact that corruption is essentially a human act, any involvement of labour in corrupt activities or ways is highly likely to have the first and foremost implications for its own productivity levels, either favourably or adversely, a fact that has been missed in all calculations of labour productivities thus far. Corruption can adversely affect labour productivity by diverting its efforts and talents towards rent seeking activities, such as towards investments in political capital, away from entrepreneurship and innovation. Or else, the corruption embedded in the system can boost labour productivity by eliciting a greater work effort by the workers, owing to the possibility of obtaining higher earnings through bribery. But given the much observed stagnant labour productivities in many developing nations, it is very much possible that their high corruption levels are constraining productivity.

In a nutshell, the high corruption present in the developing countries in general and the BRICS nations in particular may hold the key for the hitherto unexplained high growth of the BRICS nations on the one hand, and the stagnant productivities of South Asian and East Asian nations, including the BRICS group on the other. In the light of the possible implications of corruption for the growth of BRICS nations in particular and labour productivity in general, the present study aims to combine the above mentioned three important and yet hitherto independent issues into one integrated analysis. This is done by first investigating the possible role of corruption

(interchangeable with bribery, as it is it the most visible and unanimously accepted form of corruption) in the ever rising incomes of the BRICS nations, and thereafter identifying the impact of their high corruption on their labour productivity. The BRICS nations serve as an ideal ground for conducting any such analysis since they can represent many different nations at the same time. Like some of the most advanced nations, they are extremely resource rich, derive bulk of their output from the secondary and tertiary sectors, and are among the top ten nations of the world in terms of the GDP (except for South Africa). Simultaneously, akin to some of the most politically, economically and socially oppressed nations, the BRICS nations were also subjected to colonialism, communism, apartheid, and/or military dictatorship in the recent past. They are also alike many nations which are now trying to liberalize, globalize and privatize. But like many economically restricted economies of the world, they continue to lie in the 'Mostly Unfree' to 'Moderately Free' categories of the Index of Economic Freedom. Besides, like some of the most backward nations of the world, the BRICS nations have continued poor levels of socio-economic development, especially India.

The investigation here is done for the 1996-2016 period, over which the CPI indicators are available, and over which the BRICS nations have experienced high growth combined with high corruption. The data used is the macro level data obtained from the World Bank Data sets, on which the Fully Modified OLS (FMOLS) approach is applied at both the time series and dynamic panel data level, after duly sequentially testing for their stationarity and cointegration. The FMOLS technique has the merit of being a single equation method and therefore does not use too many degrees of freedom and is therefore ideal in our small sample case. Besides, it accounts for series

of different orders of integration, so long as they are cointegrated. For panel data, both a BRICS panel (including all the five BRICS nations) and an exclusively India-China panel have been investigated separately. The latter is done to confirm the OECD's 'Asian Paradox' hypothesis (according to which Asian nations are especially notorious for having 'high corruption with high growth'), since incidentally, the two BRICS nations of India and China also happen to be Asian giants. The analysis is conducted by using EViews.9. The definitions of all the variables is given in the appendix. Since corruption is an ambiguous and subjective term, meaning different things to different people at different times, this study adopts the same definition of corruption as has been adopted by the Transparency International, ie. "the abuse of entrusted pubic power for private gain", which is also now the most commonly accepted definition, at least in the academic parlance.

2. CORRUPTION'S IMPACT ON INCOME AND LABOUR PRODUCTIVITY: THEORY AND ECONOMETRIC MODELS

The impact of corruption on the economy of a country has always been discerned by estimating a corruption augmented production function wherein, corruption is included in the neo-classical production function, akin to other physical inputs. That is,

$$Y = (T)^{\alpha} (L)^{\beta} (K)^{\theta} (C)^{\eta} \quad \ldots\ldots. (1)$$

where Y is the level of output, the T is the technology parameter, the L is the physical labour force, the K is the physical capital invested and the C is the index of corruption.

But estimating such a production function tantamounts to assuming that the other factors of production (herein and otherwise principally labour and capital) are independent of any influence of corruption on them. In a scenario where corruption is inherent in the economic system since times immemorial, such as in most of the Asian and African economies, the factors of production 'cannot ever' escape its influence on them. Both their level of employment and their productivity get conditioned by the presence of corruption in the economy. Corruption can either boost their employment by assisting in the removal of all hurdles in the process of investment, or else, can discourage it by increasing uncertainty and chaos. Regarding productivity, although corruption can impact the productivity of both labour and capital, yet its greatest impact is likely to be on the former, since corruption is essentially a human act. That is, the contribution of labour to output is not only affected by investments in human capital and physical capital but also by labours' own involvement in corrupt ways, and by its working in an overall corrupt environment. In such a scenario, the production function should then ideally be given by:

$$\mathbf{Y(C) = f(L(C), K(C))} \qquad \ldots\ldots. (2)$$

So that

$$\mathbf{dY = [\partial Y/\partial L(C)]\,[\partial L(C)/\partial C]\,dC + [\partial Y/\partial K(C)]\,[\partial K(C)/\partial C]\,dC} \qquad \ldots\ldots. (3)$$

wherein the (∂L(C)/∂C and ∂K(C)/∂C) capture the employment impact of corruption and (∂Y/∂L(C) and ∂Y/∂K(C) capture the productivity of inputs in the presence of corruption in the economy. Hence the total impact of impact of corruption on the output

of an economy depends upon its impact on the employment and the productivity of the two critical factors under consideration.

Most theoretical and empirical studies using the corruption augmented production function approach suggest a negative impact of corruption on income levels ($dY/dC < 0$), by arguing that corruption is wasteful in resources by inducing a loss of entrepreneurial time in negotiating bribery deals, and by generating chaos and uncertainty, thus dampening factor employment ($\partial L(C)/\partial C<0$ and $\partial K(C)/\partial C<0$ in terms of the present analysis). It is least recognised in these studies that, by contrast, it is also very much possible for corruption to support growth, and hasten investments (the employment effect of corruption; $\partial L(C)/\partial C>0$ and $\partial K(C)/\partial C>0$) by enabling a quick and easy getting around of cumbersome rules and regulations in an economically restricted environment. In this context, it needs to be recognised that despite decades of carrying out liberalisation, the level of economic freedom (as given by the Index of Economic Freedom, IEF), the quality of governance (as given by the Worldwide Governance Indicators, WGI) and the level of per capita income levels attained in the BRICS nations is still nowhere near the levels already attained in some of the least corrupt nations of the world (such as Hong Kong, Singapore, Finland, Denmark, Netherlands, Australia etc.). Especially the three BRICS nations of Brazil, India and China, still lie in the 'Mostly Unfree' category of the Index of Economic Freedom (IEF) despite undertaking economic reforms for over two decades now, with their IEF 2016 score lying between 59.9-50. Their Ease of Doing Business (EDB) score is also one of the lowest in the world and their EDB rank above 100. There, therefore exists an ample scope to use bribery to counter the existing cumbersome economic restrictions. The possibility of bribery prevents delays and saves much precious time in trying to

meet and complying with numerous, meaningless and unnecessary rules and regulations. This is utterly important since according to the EDB 2016 report, in these nations over 200 days are required in dealing with construction permits, over 400 days (1500 in the case of India) for enforcing contracts, several years for resolving insolvency etc. There is therefore an ample scope for corruption to play a supporting role in their economic growth by boosting investments and hence encouraging the employment of factors of production.

Regarding corruption's impact on labour productivity, the former can either boost the latter by inducing and eliciting a greater work effort by the workers (a high positive $\partial Y/\partial L(C)$), owing to the possibility of obtaining higher earnings through bribery. Or else, it can dampen labour productivity (a low positive $\partial Y/\partial L(C)$) by diverting their efforts and talents towards rent seeking activities, such as towards investments in political capital, away from entrepreneurship and innovation, or else by adversely affecting their quality during the selection process, by the selection of the not so deserving candidates in jobs, promotions and educational institutes in the first place through bribery. The resulting selection of the wrong and underserving candidates then seriously hampers their contribution to output all along. Additionally, the corruption present in the system can keep the entire education system of the nation faulty, so that even the deserving students are not able to contribute effectively to output, owing to the practically useless education imparted to them. For instance, the inherent corruption in the Indian economy does not allow any reform of the education sector to take place, even if all surveys repeatedly indicate that 65-85% of all graduates produced in the nation are not employable. Besides, in a scenario where the general working conditions and the working environment is infested with

corruption, even the most honest and the most deserving, well, highly, and foreign educated are unable to contribute effectively to output. Their much deserving efforts and contribution are sacrificed and deliberately sabotaged to satisfy personal greed and agenda, by a select few higher ups. Essential facilities are not provided, infrastructure is kept shabby, essential demands are not met, their services are not recognised etc. all of which act as a huge dis-incentive to contribute effectively, even if having the willingness and capability to do so. It is therefore not surprising that many worthy Indians who are unable to contribute effectively at home, produce astonishing results on foreign lands. Similarly, the productivity of investment can be stifled by corruption (a low positive $\partial Y/\partial K(C)$) by inducing the manufacturing of substandard equipment and machinery, which also do not undergo adequate and necessary quality checks, with the assistance of bribery.

Nevertheless in the present analysis, at first, the overall impact of corruption on output is determined by estimating the usual corruption augmented production function to maintain continuity and offer comparison with the other studies. Thereby the equation (1) yields the following log-linear form of the production function:

$$\mathbf{logGDP_t = \beta_A + \beta_{1A} TREND + \beta_{2A}\, logGDCF_t + \beta_{3A}\, logLABOUR_t + \beta_{4A}\, logCORR_{t-i} + \beta_{5A}\, (logCORR_{t-j})^2 + \epsilon_{At}} \quad \text{.....MODEL A}$$

$$\mathbf{logGDP_t = \beta_B + \beta_{1B} TREND + \beta_{2B}\, logGDCF_t + \beta_{3B}\, logLABOUR_t + \beta_{4B}\, logCUMCORR_{t-i} + \beta_{5B}\, (logCUMCORR_{t-j})^2 + \epsilon_{Bt}} \quad \text{.....MODEL B}$$

where the GDP is a measure of output (Y), the TREND is a measure of technology parameter (T), the GDCF is a measure of capital stock (K) and LABOUR is a measure of the labour input (L) and the CORR and CUMCORR are measures of the corruption variable. The log transformation has the advantage of linearizing the production function, of smoothening the different series, reducing variability, and making the probability distribution function more normal with constant mean and variance, and thus making it amenable to an application of standard regression techniques, for carrying out estimations. Also, the coefficients then represent the elasticity of the dependent variable with respect to the independent variables and hence independent of any units of measurement.

In addition, the corruption variables in the two models have been suitably lagged, to avoid any possible endogeneity between output (the dependent variable) and corruption, due a possible reverse negative causality from current GDP to current corruption, through improvements in the law and order situation made possible by a larger GDP. Lagging also has the advantage of capturing any lagged impact of corruption on output, since any act of corruption may not immediately alter production levels within the same accounting year, but its impact may be felt after a couple of years owing to gestation lags in the production process. A non-linear term of the corruption variable has also been incorporated, since corruption may impact output differentially in different nations and at different magnitudes. Again, it has also been suitably lagged to avoid any in-built multicollinearity between corruption levels and corruption squared.

An important point to note here is that, two different variants of the corruption term are tested in the two models, to capture two different aspects of corruption to arrive at robust estimates. The Model A includes corruption levels (logCORR), which is the magnitude of corruption embedded in the system, as measured by the number of bribery incidents incorporated in the Corruption Perception Index (CPI). The Model B, on the other hand, includes cumulative corruption (logCUMCORR). This derives inspiration from the Grossman and Helpman (1991) model of endogenous growth through foreign knowledge spillovers instigated by trade, wherein the variable 'cumulative trade' captures accumulated foreign knowledge and technical and managerial skills. Likewise, herein cumulative corruption captures the knowledge, skill, training and experience embedded in acts of corruption, since not everyone is equally apt at indulging in corruption. Corruption is also after all a human act, and therefore like all other acts of human beings, it involves a prior accumulated knowledge of the existing rules and regulations, their implications, loopholes, the possible repercussions on not following them, ways of approaching the officials etc.

Regarding corruption's impact on productivity, the usual method would be to regress labour (and capital) productivity on corruption besides other determining variables. While this would surely discern the possible, favourable or adverse, impact of corruption on the two, yet it would fail to exhibit the overall impact that corruption is having on the production structure of the economy. To identify the latter, along with corruption's impact on factor productivity, the estimates of the following basic neo-classical two factor production function (wherein both the factors and the GDP already incorporate or are infested with the impact of corruption existing in the system):

$$\mathbf{logGDP_t = \beta_C + \beta_{1C}TREND + \beta_{2C}\, logGDCF_t + \beta_{3C}\, logLABOUR_t + \epsilon_{Ct}} \quad \textbf{…MODEL C}$$

are compared with the estimates of the following corruption parameterised production functions, wherein both the output and the inputs have been purged of the impact of corruption on the economy by their parameterisation with respect to corruption.

$$\mathbf{logNGDP_t = \beta_D + \beta_{1D}TREND + \beta_{2D}logNGDCF_t + \beta_{3D}logNLABOUR_t + \epsilon_{Dt}}$$

……**MODEL D**

$$\mathbf{logNCUMGDP_t = \beta_E + \beta_{1E}TREND + \beta_{2E}logNCUMGDCF_t + \beta_{3E}logNCUMLABOUR_t + \epsilon_{Et}}$$

…….**MODEL E**

The Model D is parameterised with respect to corruption levels (CORR) as indicated by the operator ‘N’, and the Model E is parameterised with respect to cumulative corruption (CUMCORR), as indicated by the operator ‘NCUM’. The Model C is the production function that has always been estimated in any analysis of production and productivity, without realising that in a scenario of rampant corruption present in the system, it is incorporating the effect of corruption on employment and productivity of factors. On the other hand, the Models D and E have been purged of the impact of corruption and therefore give a true picture of the production process and the productivity structure of the economy. A comparison then of Model C with that of D and E brings out the impact of corruption on the economy’s production structure.

3. EMPIRICAL ESTIMATES

For all the five models (A, B, C, D and E), the empirical analysis is conducted for both panel data (both BRICS panel and the India-China panel) and time series data sets (for each BRICS nation separately). The panel sequential unit root tests suggests that logGDP and logGDCF are integrated of order one, I(1) (non-stationary), while logLABOUR, logCORR and logCUMCORR are stationary, I(0). Subsequently, the Kao test for cointegration among the variables in the five models for panel data suggest the presence of cointegrating relationships between them, as the null of 'no cointegration' can be rejected at all levels of significance. Similarly, the sequential unit root testing for time series analysis for each country individually yields obtains most series to be I(1) except for logCORR, and logCUMCORR which are I(0) for Brazil, China and South Africa. Since all series in both panel and time series data are I(1) or I(0) and are cointegrated, they are amenable to an FMOLS estimation. The number of variables in each model is constrained by the small length of the data itself.

3.1 CORRUPTION'S IMPACT ON INCOME : RESULTS

The panel data results presented in Table 1 clearly reveal a growth enhancing impact of corruption levels (logCORR), at least in the India-China panel (column (3)), so much so that the GDP increases by 0.8% point due to a 1% increase in lagged corruption levels. This is higher than that due to the increase in any other input included in the production function. Therefore the corruption embedded in the system is indeed assisting in the growth of the Indian and the Chinese economies by enabling a getting around of the still existing cumbersome rules and regulations. By contrast, corruption is obtained to be counter-productive in both the models in the BRICS panel (columns (1) and (2)). While both the trend and the capital input have the expected positive and significant impact in both the panels, in both the models (columns (1) to (4)), the

contribution of capital to output is distinctly higher than that of technological up-gradation, as captured by the coefficient of the trend variable.

Table 1 : Panel Data Analysis: Output Impact of Corruption				
	BRICS Panel		India-China Panel	
	(1) Model A	(2) Model B	(3) Model A	(4) Model B
TREND	0.008** [.0028]	0.007** [.0723]	0.039** [.0000]	0.032** [.0000]
logLABOUR	-0.783** [.0184]	-0.685** [.0835]	-2.402** [.0000]	-2.581** [.0000]
logCAPITAL	0.588** [.0000]	0.720** [.0000]	0.249** [.0000]	0.325** [.0003]
logCORRUPTION(-i)	-0.374** [.0713]	-0.045 [.2618]	0.843** [.0001]	0.034 [.3101]
$(logCORRUPTION)^2(-j)$	-0.155** [.0035]		0.135** [.0019]	
Adjusted R^2	0.996	0.994	0.998	0.997
The ** indicates significance at 10% level. The figures in the square brackets are the corresponding p values				

But one interesting result that emerges herein is the negative and statistically significant impact of the labour input on output, across all four columns, but more so in the India-China panel than in the BRICS panel. In the former, even a 1% increase in labour employment is sufficient to reduce output by nearly 2.5% points, suggesting a strong counter-productive impact of labour. Such an adverse contribution of labour to output is sufficient to deter any increase in employment opportunities and encourage a greater dependency on capital to increase output.

On conducting the time series analysis for each country individually (given in Tables 2(i) and 2(ii)) to confirm the panel data results, the growth supporting effect of corruption is again obtained for at least three (Brazil, India and China) of the five

BRICS nations (columns (1), (2), (5), (7) and (8)). Of these three, for Brazil and China, even the knowledge and skills accumulated in acts of corruption (cumulative corruption, CUMCORR), as captured by Model B (columns (2) and (8)), is supporting output growth. Interestingly enough, in both India and China, the contribution of corruption to output is even much higher than that of capital (columns (5) and (7)). By contrast, in the other two BRICS nations, Russia and South Africa, the chaos and uncertainty induced by corruption is actually dragging economic growth (columns (3) and (9)).

Table 2(i) : Time Series Analysis: Output Impact of Corruption

	Brazil		**Russia**		**India**	
	(1) Model A	**(2) Model B**	**(3) Model A**	**(4) Model B**	**(5) Model A**	**(6) Model B**
C	0.647	1.269	-0.409	-2.529	4.912	2.432
TREND	0.004** [.0028]	0.001 [0.5113]	0.009** [.0000]	0.007** [.0014]	0.033** [.0000]	0.029** [0.0000]
logLABOUR	0.771** [.0000]	0.424** [.0388]	1.872** [.0000]	2.611** [.0004]	-1.449** [.0006]	-0.012 [.9264]
logCAPITAL	0.223** [.0000]	0.313** [.0000]	0.181** [.0000]	0.178** [.0003]	0.173** [.0001]	0.167** [.0000]
logCORRUPTION(-i)	0.076** [.0199]	0.058** [.0001]	-0.225** [.0870]	0.022 [.5324]	0.552** [.0094]	-0.069** [.0049]
logCORRUPTION^2(-j)	0.037** [.0002]		-0.083** [.0104]		0.023 [.4840]	
Adjusted R^2	0.999	0.999	0.998	0.993	0.998	0.999

The ** indicates significance at 10% level. The figures in the square brackets are the corresponding p values

Also again, the contribution of labour to output is negative in cases of both India (in which case it is also highly statistically significant) and China, so much so that a 1% increase in the labour input reduces the GDP by as much as almost 1.5% ((columns (5), (7) and (8)). This confirms that labour is ineffectively contributing to

output in these two nations, a fact that has often been explained in terms of job-less growth and falling or stagnant labour productivity levels, as elucidated in the introduction. But in this study in the following section I seek to explain this adverse contribution of labour to output in terms of the rampant corruption existing in the two economies. Nevertheless, both trend and capital continue be positive and significant across all the five countries across both the models (columns (1) to (10)), with again physical capital's contribution to output being again much more than that of technological up-gradation.

Table 2(ii) : Time Series Analysis: Output Impact of Corruption				
	China		**South Africa**	
	(7) Model A	**(8) Model B**	**(9) Model A**	**(10) Model B**
C	4.180	7.646	1.539	1.575
TREND	0.027** [.0036]	0.023** [0.0212]	0.004** [.0005]	0.005** [0.0003]
logLABOUR	-1.216 [.1579]	-2.099 [0.1645]	0.545** [.0005]	0.225** [0.0895]
logCAPITAL	0.397** [.0056]	0.433** [.0034]	0.341** [.0000]	0.297** [.0000]
logCORRUPTION(-i)	0.622** [.0040]	0.083** [0. 0831]	-0.219** [.0037]	0.003 [0.8573]
$(logCORRUPTION)^2(-j)$	0.028 [.6240]		-0.013 [.2737]	
Adjusted R^2	0.999	0.999	0.999	0.996
The ** indicates significance at 10% level. The figures in the square brackets are the corresponding p values				

3.2 **CORRUPTION'S IMPACT ON LABOUR PRODUCTIVITY: RESULTS**

The panel data analysis results for the impact of corruption on labour's contribution to output, obtained by comparing the estimates of the basic neo-classical production

function (Model C, which is infested or inundated with the impact of corruption in the economy) and the corruption parameterised production functions (Models D and E), are presented in Table 3.

Table 3 : Panel Data Analysis: Labour Productivity Impact of Corruption						
	BRICS Panel			India-China Panel		
	(1) Model C	(2) Model D	(3) Model E	(4) Model C	(5) Model D	(6) Model E
TREND	0.005 [.1637]	-0.003 [.2630]	0.003 [.4845]	0.035** [.0000]	0.026** [.0018]	0.010 [.2421]
logLABOUR	-0.366 [.3600]	0.477** [.0591]	0.304** [.0005]	-2.406** [.0000]	-1.212** [.0034]	0.461** [.0222]
logCAPITAL	0.644** [.0000]	0.712** [.0000]	0.786** [.0000]	0.278** [.0008]	0.491** [.0006]	0.611** [.0015]
Adjusted R^2	0.989	0.989	0.992	0.997	0.994	0.989
The ** indicates significance at 10% level. The figures in the square brackets are the corresponding p values.						

A comparison of the estimates of Model C with Models D and E for both the BRICS panel and the India-China panel (ie. comparing column (1) with (2) and (3), and comparing (4) with (5) and (6) in Table 3) yields the striking result that now, the contribution of labour to output not only becomes positive, but also highly statistically significant on parameterisation. That is, a mere removal of the adverse impact of corruption on the production process renders labour highly productive, irrespective of the magnitude of jobless growth, labour migration, resource mis-allocation, changing demand patterns, labour saving technologies and many other factors taking place in the economy and hence recognised by the other authors. While this being so, even the contribution of capital to output increases by more than one and a half times, while the contribution of technology remaining unchanged.

The results of the panel data are further corroborated by time series analysis, given in Tables 4(i), 4(ii) and 4(iii). It is again seen that the contribution of labour to output, which was either positive and yet insignificant (in cases of Brazil and China, columns (1) and (10)), or negative and significant (in the case of India, column (7)), becomes positive and highly significant (columns (2), (3), (8), (9), (11), and (12)) on parameterising the entire production function with respect to either corruption levels (CORR) or cumulative corruption (CUMCORR). Even in the case of South Africa, where the contribution of labour to output was already positive and significant (column (13)), the magnitude of labour coefficient increases by three to four times (columns (14) and (15)). Labour now emerges as such an important factor for production in three out of five BRICS nations that, its contribution to output turns out to be even two (Brazil and South Africa) to four (India) times more than that of capital. It is only in China where capital continues to remain the more dominant factor of production, thus suggesting the capital based growth of China. Nevertheless, this result certainly suggests that the rampant corruption present in these four BRICS nations, especially in India, is indeed constraining labour productivity by several notches, by either keeping the education system faulty or making the selection procedure fraudulent or by diverting labour's efforts into unproductive or even counterproductive activities. Probably that is why, the Enterprise Survey by the World Bank finds the depth and incidence of corruption to be the maximum in case of India, amongst all the five BRICS nations. Another interesting result that emerges from this investigation is that even the contribution of capital to output increases somewhat consequent upon parameterisation in all the five BRICS nations, so that a removal of the impact of corruption makes capital also more productive.

Table 4(i) : Time Series Analysis: Corruption's Impact on Labour Productivity Levels						
	Brazil			Russia		
	(1) Model C	(2) Model D	(3) Model E	(4) Model C	(5) Model D	(6) Model E
C	1.935	0.915	0.881	-0.852	0.839	0.821
TREND	0.008** [.0307]	0.006** [.0000]	0.000 [.8809]	0.009** [.0000]	0.011** [.0000]	0.007** [.0341]
logLABOUR	0.229 [.5314]	0.615** [.0000]	0.638** [.0000]	1.714** [.0006]	1.353** [.0000]	0.722** [.0000]
logCAPITAL	0.217** [.0000]	0.188** [.0000]	0. 314** [.0000]	0.196** [.0000]	0.192** [.0001]	0.227** [.0027]
Adjusted R^2	0.996	0.998	0.999	0.992	0.994	0.997
The ** indicates significance at 10% level. The figures in the square brackets are the corresponding p values						

Table 4(ii) : Time Series Analysis: Corruption's Impact on Labour Productivity Levels						
	India			China		
	(7) Model C	(8) Model D	(9) Model E	(10) Model C	(11) Model D	(12) Model E
C	4.727	0.706	0.044	1. 573	0.686	0.332
TREND	0.031** [.0000]	0.022** [.0007]	0.027** [.0000]	0.018 [.1129]	0.012 [.1269]	0.009 [.1650]
logLABOUR	-0.911** [.0001]	0.031 [.9514]	0.909** [.0000]	0.067 [.9552]	0.044 [.8776]	0.374** [.0196]
logCAPITAL	0.127** [.0014]	0.245** [.0311]	0.242*** [.0009]	0.477** [.0055]	0.592** [.0019]	0.590** [.0002]
Adjusted R^2	0.998	0.989	0.997	0.998	0.998	0.992
The ** indicates significance at 10% level. The figures in the square brackets are the corresponding p values						

The only contrasting result emerges for Russia, wherein parameterisation in fact reduces the magnitude of contribution of labour to output by almost half (columns (5) and (6)), while still keeping it positive and significant and certainly greater than that of capital. This supports my earlier argument that in some cases, herein Russia, the incentive to receive higher earnings through bribes indeed induces a greater work effort by the labour. So that, the corruption embedded in the production structure

(before parameterisation) is actually making the labour almost two times more productive. But this also suggests that even with rampant corruption, labour's efforts are not getting diverted into unproductive or counter-productive activities in Russia.

Table 4(iii) : Time Series Analysis: Corruption's Impact on Labour Productivity Levels			
South Africa			
	(13) Model C	**(14) Model D**	**(15) Model E**
C	1.553	1.158	1.035
TREND	0.005** [.0001]	0.001** [.0825]	0.003** [.0348]
logLABOUR	0.249** [.0121]	0.984** [.0000]	0.691**** [.0000]
logCAPITAL	0.297**** [.0000]	0.372**** [.0000]	0.345**** [.0000]
Adjusted R^2	0.997	0.994	0.999
The ** indicates significance at 10% level. The figures in the square brackets are the corresponding p values			

4. DISCUSSION AND CONCLUSIONS

An attempt has been made in this paper to investigate and analyse the role of corruption in the growth process of the BRICS nations. That is, whether the BRICS nations have grown owing to the support provided by the rampant corruption prevalent in their economies (dY/dC>0), or else, they have grown on the basis of their own inherent growth potential based on their vast resource base, despite the adverse implications of corruption on their economies. It is then found that corruption has indeed played an important part in the growth process of at least Brazil, India and China, probably owing to the continuing high economic restrictions in them, which could be easily circumvented with the help of bribery, thus boosting investments. This

analysis thus does support the ‘Asian Paradox’ hypothesis propounded by the OECD, according to which the South and East Asian nations are notorious for high growth with high corruption, since the two BRICS nations of India and China are also Asian giants. By contrast, regarding the other two BRICS nations, South Africa lies in the ‘Moderately Free’ category of the IEF, and Russia offers the highest ‘Business Freedom’ amongst all the BRICS nations according to the IEF 2016 report. Russia also requires the least number days for ‘Starting a Business’, ‘Registering Property’, ‘Paying Taxes’, Enforcing Contracts’, and almost the least number of years for ‘Resolving Insolvency’ amongst all the BRICS nations according the EDB 2016. In such a scenario the existence of corruption in the economies of Russia and South Africa introduces chaos and uncertainty, which then actually compromises their economic growth.

An attempt is also made here to estimate the effect that corruption is having on the factor productivity of the BRICS nations. This has been done by comparing the corruption infested production function with the corruption free production function. The influence of corruption on the production process in the latter is removed by parameterising the entire production function with respect to corruption. Given that these nations are infested with high corruption, the factors of production there cannot escape the influence of corruption on them. It is then found that the corruption existing in the economies of four (Brazil, India, China, and South Africa) out of five BRICS nations is indeed seriously constraining the productivity of labour force (an extremely low $\partial Y/\partial L(C)$), possibly by either diverting the labour’s efforts towards rent seeking activities, or keeping the entire education system faulty or making the selection procedure fraudulent. It is probably this ineffectiveness (in terms of insignificant labour

coefficients obtained) of labour force for carrying out production in a scenario of corruption that has been explained in the other studies in terms of jobless growth or capital based growth, but which have been unearthed in this study in terms of the ill effects of corruption. This ineffectiveness of labour for production owing to the incumbent corruption may also be instigating the entrepreneurs to emphasise on capital for production and adopting labour saving technologies.

But, once the ill effects of corruption are removed, labour turns out to be even two to four times more productive than capital, notwithstanding the high labour migration out of the rural economy, resource mis-allocation, changing demand patterns etc. that may still be proceeding alongside in these economies. These factors, as identified by other authors, may be important in their own perspective, but the importance of corruption in keeping productivities of both labour and capital low cannot be overlooked, which may in fact be even a bigger contributor to falling productivity levels than these other factors, as corruption is becoming increasingly organised over time. Therefore besides correcting other imbalances in the economy, it is utmost essential and prudent to control corruption effectively to raise productivity levels of all the factors of production in general and of labour in particular.

Combining the two contrasting impacts of corruption on income and productivities, it follows from equation (3) that the incumbent corruption in the economy is boosting the employment of factors despite keeping their productivity low, especially that of capital, to such a high extent that corruption is in fact assisting in the overall growth of the BRICS economies, especially that of Brazil, India and China. My own quick estimates of the trivariate regression of (log) capital and labour input on (log)

corruption and trend, yields positive and statistically significant coefficients (results presented in Appendix), thus justifying my foregoing analysis. Thus this study proves that in a scenario characterised by high economic rigidities all around, the high rampant corruption in the economy may keep the productivity of inputs somewhat low but boost their employment to such an extent by enabling a getting around of rules and regulations that, the latter is able to more than compensate the former, thereby leading to an overall increase in output. Nevertheless, this does not justify the continuing of corruption in these economies, given the adverse social and moral implications of it. It rather suggests the immediate need to reduce and remove corruption to prevent it from unfavourably affecting labour productivity, to enable labour to contribute effectively to output.

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Appendix Tables

Time Series Analysis: Corruption's Impact on Labour and Capital Employment						
	Brazil		**Russia**		**India**	
Dependent Variable →	**logLABOUR**	**logCAPITAL**	**logLABOUR**	**logCAPITAL**	**logLABOUR**	**logCAPITAL**
C	1.862	0.183	1.993	2.280	1.485	-3.575
TREND	0.009** [.0000]	0.021** [.0000]	0.002** [.0001]	0.035** [.0001]	0.008** [.0000]	0.053** [.0000]
logCORR	0.012 [.8341]	1.034** [.0947]	-0.078 [.6040]	-0.268 [.9077]	0.588** [.0474]	2.945** [.0513]
Adjusted R^2	0.992	0.874	0.757	0.717	0.903	0.905
The ** indicates significance at 10% level. The figures in the square brackets are the corresponding p values						

Time Series Analysis: Corruption's Impact on Labour and Capital Employment				
	China		**S.Africa**	
Dependent Variable →	**logLABOUR**	**logCAPITAL**	**logLABOUR**	**logCAPITAL**
C	2.589	0.543	0.834	0.512
TREND	0.003** [.0000]	0.053** [.0000]	0.004** [.0001]	0.021** [.0000]
logCORR	-0.009 [.8341]	1.056** [.0947]	0.223** [.0676]	1.141** [.0627]
Adjusted R^2	0.974	0.991	0.882	0.912
The ** indicates significance at 10% level. The figures in the square brackets are the corresponding p values				