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Nigeria vision 20:2020 can dream become reality? Evidence from national accounts

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Abstract. The Nigerian Government has used national perspective plans as an economic tool since independence. Unfortunately these plans are often irrelevant to the actual economic problems of the country. The latest economic plan is the 'Vision 20:2020' whose main goal is to bring Nigeria into top 20 biggest economies by the 2020. The Nigerian public as well as some Nigerian economists doubt whether government plan will succeed.

The purpose of this study is to find the true economic-growth determinants of national economy structure. We use so-called SSVS procedure to find to find candidate-variable of the true growth model. Next we estimate simple OLS model to find coefficient's signs of the variables obtained from SSVS procedure. We found that Vision 20:2020 plots a good direction for Nigerian economy, but Nigerian authorities should be alert on reforming public administration and government provided service.

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INTRODUCTION

Ever since Nigeria gained independency from the United Kingdom, authorities have tried to put forward a national economy by introducing economy planning. All of those plans, including the famous Structural Adjustment Programme (SAP), failed to push forward Nigerian economy. Since 1973, oil crisises have pushed up oil prices and Nigeria has gained inflows of petrodollars. (Osabuohien et. al., 2012) The new plan for boosting the Nigerian mainland economy is the so-called Vision 20:2020. The main goal of the plan is to bring Nigeria to the top 20 biggest economies in the World by 2020. Considering Nigeria's previous experience with national plans it is valuable to study weather Vison 20:2020 is a step in the right direction.

One of the 'Vision' objectives is to make the Nigerian economy less oil-dependent and strengthen domestic industry. Our study hence concentrates on the two objectives: first is to select variable, influence economic growth and than, second to estimate OLS[1] model. The methodology is similar to our previous work (Thomas and Brycz, 2014). This time we are also motivated to perform Stochastic Search Variable Selection using Gibbs sampling, as 'Viosion' perception among economists is mixed. Many previous national programs were based on the well-known growth theories, but somewhat failed. Hence we chose Bayesian Inference, as it is atheoretical.

The first part describes the main goals of the 'Vision' and provides literature survey on the reception of Vision by the economists. The second part describe the data, methodologies used in the study and present the main outcomes. The last one provides with conclusion of the study and policy-makers advise.

THE 20:2020 VISION AND ECONOMIC GROWTH

The 20:2020 Vision blueprint was published in December 2009 by the National Planning Commission. Section 3, titled "Optimizing the Key Sources of Economic Growth", describes the most important factors affecting economic growth. To achieve its stated goal the Vision plan (p.49) assumes the factors are: i) stimulating primary production ii) increase production of processed and manufactured goods for export; iii) stimulating domestic and foreign trade value-added goods and services; iv) strengthening linkages among key sectors of the economy. The main objectives are described in the table 1.

Table 1

Main drivers of economic growth in Vision 20:2020

Economy sector	Goal
Primary production	– Raise in primary production means development of the natural mineral industry; both the output and the efficiency. Agriculture sector is to produce more raw food such as citrus and palm oil. – Development of the oil and gas industry, which is to stimulate local value added – Steel 12.2 million tones/annum in 2020 – Irrigated area 25% in 2020
Production for export	– Raise in manufactured/processed goods for export – Industrial Parks – Incubators – importing technology and know-how – Raise in R&D sector – Raise in export of non-oil goods
Stimulate domestic and foreign trade in value-added	– Raise in trade of non-oil production both domestic and foreign – South-South integration – rise in trade with: BRIC – Regional specialization of industry – Promote small/medium firms
Linkages between key sectors	– Strengthen credit access – Increase railway network and public transport

Source: Vision 20:2020

[1] See Gazda, Kwiatkowski, Puziak (2014)

Ezirim (et. al. 2010) doubts whether the ambitious plan described in table 1 will succeed, as oil in Nigeria accounts for over 95 percent of export earnings, 40 per cent of GDP and 70 per cent of the Federal Government Revenue and the oil sector provides employment for less than 10 per cent of the Nigerian labor force. Onyenekenwa (2010) states that the 'Vision' is a utopia, as the vast of majority of the Nigerian populace lives in highly underdeveloped rural areas. Olaseni and Alade (2012) argue that infrastructural development is crucial to achieve Vision's' goal. The infrastructure development can be sped up by changing the current meltdown of funding, governance and high corruption. Sanusi (2010) stated that the last ten years were very bright for Nigeria's economic performance and reforms such as a raise in human capital, promotion in high-quality infrastructure, and a firm fiscal policy will lead Nigeria to achieve the stated goals of the Vision. Amakom and Nwogwugwu (2012) state that a rise in electricity production may lead to economic growth through the development of industry. Adekola (2014) states that public investment should concentrate on human capital, which in turn will promote economic growth. Nduke et al (2013) assessed the impact of trade openness on economic growth in Nigeria using casualty methodology. During Post-SAP period in Nigeria, which is 1986-till date, trade openness has been driven by economic growth. Summing up the discussion above it is noted that there are a diversity of opinions as to whether all directions stated in the Vision will lead to economic growth.

METHODOLOGY

Our estimation strategy consists of the Bayesian inference, which let combine knowledge from all the combination of models built from all the independent variables used. Not choosing classical methodology is motivated by literature survey on Nigerian development programs in which are not consistent conclusion to the government action that will drive Nigerian economic development further.

The method we choose is known as an atheoretical approach, as we don't establish any theoretical background – simply many previous Nigeria government programs based on well-known growth theory failed somewhat to push Nigerian economy. The Bayesian approach is described in (Kwiatkowski, Błażejowski, Gazda, 2012, pp. 98-111) - having many independent variables it is not possible or enormous time consuming to estimate simple OLS model. Another difficulty arises from analyzing only one model in the OLS method, as explanatory power of regression model uncernity. Although Bayesian approach finds the probability of predictors' inclusion, there is computational problem as one should estimate all the combination – 2^p models i.e. having 3 predictors, 8 models will be estimated[2].

Similarly, as in our previous work (Solomon and Brycz, 2014), we use so-called Stochastic Search Variable Selection (SSVS), which aim is to choose candidate variable to further consideration. In other words one wonts to obtain parsimonious model. Estimation of 2^p models would be too difficult for computers. McCulloch (1993, 1997) proposed SSVS based on Gibbs sampler. The problem lies in calculation posterior probability $f(\gamma|Y)$, where γ_i is the latent variable, which indicates 1 for including variable and 0 for excluding. Here Gibbs sampler generate sequence of γ's, which in many cases converges to $\gamma \sim f(\gamma|Y)$. Garcia-Donato and Martinez-Beneito (2013) considered 2^p model selection as:

[2] For example Kwiatkowski, Błażejowski, Gazda (2012) used MC^3 algorithm to simplify the problem

$$M_\gamma : Y \sim N_N\left(\alpha 1 + \boldsymbol{X}_\gamma \boldsymbol{\beta}_\gamma, \sigma^2 \boldsymbol{I}\right), \gamma \epsilon \left\{0,1\right\}^p \tag{1}$$

where: Y is N-dimensial vector of dependent variable, X is N x p full rank matrics of independent variables, $\gamma = (\gamma_{1,\ldots} \gamma_p)$ is the p-dimensial vector of binary variables (as stated in George and McCulloch, 1993), hence X_γ is N x k_γ (and $k_\gamma = \sum \gamma_i$)

The model space M can be represented only by $\{0,1\}^p$ i.e. where $\gamma = 0$ then $M_0 = \mathbf{Y} \sim N_N(\alpha \mathbf{1}, \sigma^2 \boldsymbol{I})$ The posterior distribution over the model space is calculated using Bayes factor to compare competing models: $B_{\gamma 0} = m_\gamma(\mathbf{y})/m_0(\mathbf{y})$. Bayes factor, having specified prior *g*, is discribed in the equation 2:

$$B_{\gamma 0} = \left(1 + g\frac{SSE_\gamma}{SSE_0}\right)^{-(N-1)/2} \left(1+g\right)^{(N-k_\gamma-1)/2} \tag{2}$$

Since SSE is the sum of squares all posterior calculation can rely on 'visited' models, hence calculation procedure is easy to perform on the simple computer.

Garcia-Donato and Martinez-Beneito (2012) provided R-package 'BayesVarSel'. We used the command Gibbs.Bvs to determine Highest Posterior Model. Having variable selected, OLS growth model is estimated to determine the sign of the parameters, as procedure Gibbs.Bvs does not provide with standard deviation.

DATA

We use Central Bank of Nigeria's database on GDP industry brake down at 1990 constant level prices over the span 1986q1-2013q4. The period selection is motivated by Nduke et al (2013), as changes during SAP-program changed economic environment. At first the data are transformed into quarter-to-quarter growth: $x_i = x_t/x_{t-1}$. Table 2 provides data description and Fisher-PP individual unit root tests for transformed data and their first difference. All the variable was seasonally adjusted by Census-X12 procedure.

Table 2

Nigeria GDP in industry brake down and indiwidual variable unit roots

Variable	Description	PP test P	PP test p first difference
1	2	3	4
Y	Total GDP	0.0000	0.0000
x1	Agriculture>Crop Production	0.0000	0.0000
x2	Agriculture>Livestock	0.0008	0.0000
x3	Agriculture>Forestry	0.0086	0.0000
x4	Agriculture>Fishing	0.0059	0.0000
x5	Industry>Crude Petroleum & Natural Gas	0.0003	0.0000
x6	Industry>Solid Minerals	0.0009	0.0000
x7	Industry>Solid Minerals>Coal Mining	0.0128	0.0000
x8	Industry>Solid Minerals>Metal Ores	0.0000	0.0000
x9	Industry>Solid Minerals>Quarrying & Other Mining	0.0009	0.0000

1	2	3	4
x10	Industry>Manufacturing>Oil Refining	0.0152	0.0000
x11	Industry>Manufacturing>Cement	0.0089	0.0001
x12	Industry>Manufacturing>Other Manufacturing	0.0044	0.0000
x13	Building & Construction	0.0023	0.0000
x14	Wholesale & Retail Trade	0.2424	0.0000
x15	Services>Transport>Rail Transport & Pipelines	0.0000	0.0001
x16	Services>Transport>Water Transport	0.0003	0.0000
x17	Services>Transport>Air Transport	0.0000	0.0001
x18	Services>Communication	0.3897	0.0000
x19	Services>Communication>Telecommunications	0.4037	0.0000
x20	Services>Utilities	0.0131	0.0000
x21	Services>Utilities>Electricity	0.0128	0.0000
x22	Services>Utilities>Water	0.0056	0.0000
x23	Service>Finance & Insurance	0.0024	0.0000
x24	Service>Finance & Insurance>Financial Institutions	0.0022	0.0000
x25	Services>Real Estate & Business Services	0.0016	0.0000
x26	Services>Real Estate & Business Services>Real Estate	0.0257	0.0000
x27	Services>Producers of Govt. Services	0.0005	0.0000
x28	Services>Producers of Govt. Services>Public Administration	0.0004	0.0000
x29	Services>Producers of Govt. Services>Education	0.0141	0.0000
x30	Services>Comm., Social & Pers. Services	0.0232	0.0000
x31	Services>Comm., Social & Pers. Services>Private non-Profit Organizations	0.0275	0.0000
x32	Services>Comm., Social & Pers. Services>Other Service	0.0140	0.0001
x33	Services>Comm., Social & Pers. Services>Broadcasting	0.0066	0.0000

Source: own calculation. Null hypothesis: individual unit root process.

After transforming data to quarter-to-quarter growth, some series were still integrated of order of one (see Table 1). Further we use all variable in first difference. Dependent variable is GDP growth and explanatory variable are all industry, services and manufacture listed in the CBN database.

OUTCOME

Table 2

GDP components and its posterior inclusion probabilities, highest posterior model and median posterior model

	Incl.prob.	HPM	MPM	beta
1	2	3	4	5
(Intercept)	1.0000	*	*	0.0003
x5	1.0000	*	*	0.1729
x30	1.0000	*	*	-0.1847
x32	1.0000	*	*	0.0448
x12	0.9962	*	*	0.2220
x3	0.9764	*	*	0.6736
x25	0.9380	*	*	-1.2070

1	2	3	4	5
x28	0.9015	*	*	0.8686
x26	0.8919	*	*	0.7516
x27	0.8043	*	*	-0.7533
x14	0.7819	*	*	0.2964
x1	0.7742	*	*	0.3051
x15	0.7398	*	*	-0.0019
x20	0.5503	*	*	-0.5979
x9	0.4924	*		0.3690
x21	0.4797			0.4054
x13	0.4648			-0.0398
x6	0.3838	*		-0.2607
x16	0.3599			0.0359
x10	0.3481			0.0043
x8	0.3014			0.0034
x24	0.2709			-0.2448
x22	0.2703			-0.0863
x23	0.2662			0.2547
x4	0.2108			0.0028
x11	0.1806			-0.0032
x7	0.1780			-0.0017
x33	0.1684			0.0375
x29	0.1660			-0.0370
x31	0.1433			-0.0004
x19	0.1332			0.0142
x2	0.1309			-0.0062
x18	0.1309			-0.0073
x17	0.1259			-0.0006

Source: own calculation, HPM stands for Highest posterior Probability Model and MPM for Median Probability Model. (*) donotes inclusion in the HPM or MPM, beta are estimates of the model-averaged estimator of the regression parameters.

The crude oil industry, crop production are the most probable economic drivers and forestry industry is the most probable threat to economic growth. Other economies sectors that are high probable to be included in the *true* model are: industry of solid minerals, wholesale and retail trade and manufacturing. All of their inclusion probability is above 90 per cent.

Highest posterior model should be built from 16 covariates, which is consistent with high probability posteriori model dimension. The posterior probability of the *true* model dimension between 15 and 20 covariates accounts for 85 per cent (figure 1). This leads to conclusion that HPM dimension selection is highly probable.

The next step in our procedure is estimating OLS model using covariates selected by HPM (table 3)

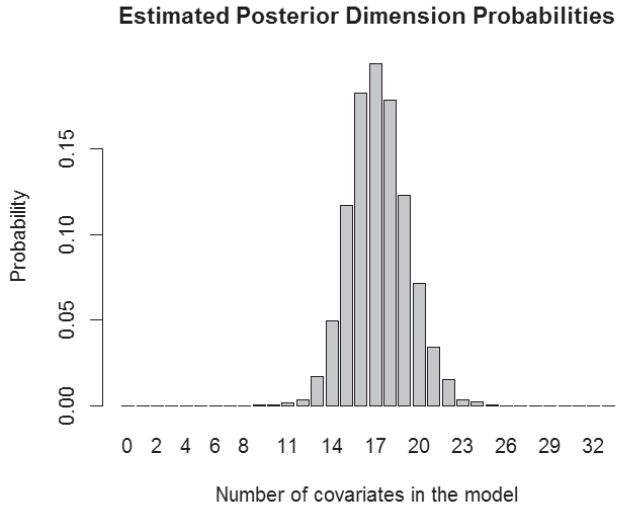

Figure 1. Posterior dimension of the *true* model.
Source: own calculation

Table 3

OLS estimation of HPM model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X5	0.1657	0.0215	7.7076	0.0000
X30	-0.1717	0.0184	-9.3485	0.0000
X32	0.0377	0.0065	5.8214	0.0000
X12	0.2057	0.0284	7.2526	0.0000
X3	0.7186	0.0928	7.7467	0.0000
X25	-1.5514	0.2085	-7.4408	0.0000
X28	1.0148	0.2261	4.4884	0.0000
X26	1.0113	0.1567	6.4552	0.0000
X27	-0.9766	0.2673	-3.6539	0.0004
X14	0.3893	0.0924	4.2119	0.0001
X1	0.1692	0.0657	2.5764	0.0116
X15	-0.0022	0.0009	-2.5624	0.0120
X20	-0.1724	0.0447	-3.8570	0.0002
X9	1.4979	0.5467	2.7401	0.0074
X6	-1.3142	0.5428	-2.4213	0.0175
C	0.0143	0.0894	0.1602	0.8730

Source: own calculation

All the variable in the table 3 are statistically significant and are the same sign as in the HPM model.

CONCLUSION

The question is whether Vision's objective for domestic development can boost economic growth in Nigeria. In spite of Nigeria's oil-dependent economy, other sources can boost economy. Rise in primary production such as crop production, solid minerals are both increasing economic growth and the 'Vision' goals. The choice to develop agricultural industry seems to be a good idea, as the majority of nation's populace lives in the rural area. Developing domestic demand and production are also strengthening long-term economic growth in Nigeria.

There are also some threats for economic growth. This includes services provided by the government in general and public administration in particular. Other risk for Nigerian prosperity is manufacturing industry and forests explaatation.

Summing up, the outcome of our study gives credit to the 'Vision 20:2020'. Strengthen domestic sectors of economy and infrastructure can speed up economic growth, but Nigerian authorities should be alert on reforming public administration and developing public services efficiency.

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