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Factors Influencing Income Inequality in Namibia

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

This paper examines factors influencing income per person and inequality, applying hybrid Cobb-Douglas and Principal Component Analysis (PCA). The explanatory variables were found to be positively and significant, at one per cent. PCA found that three components "economic opportunity" with loading factor of 41.7%; followed by "educational and migration characterisation" percentage variation accounted for 17% and "household characterisation" accounted for a 14% variation explanation. The result shows that Namibia fail break the cyclical problem of poverty, unemployment and filling the required skills required for better economic growth.

Keywords: Namibia; income per person; Cobb-Douglas and PCA.

1. INTRODUCTION

The Namibian Gross Domestic Product (GDP) is estimated to be around $17.79 billion (2013 est.) and ranked 139 world-wide; however, the GDP annual growth is estimated at 4.4%. The GDP-composition by agriculture, industry and service sectors are: 6.2%, 30% and 63.6%, respectively [1].

The Namibian economy is highly influenced by the South African economy, due to two major

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reasons. Firstly, Namibia is a member of the Common Monetary Area (CMA) arrangement, that is, South African currency is legal tender along with the Namibian dollar currency, at a one-to-one ratio. The rationale behind this arrangement was to stabilise price inflation, as over 80% of Namibia's imports are sourced from South Africa, and was based on the assumption that the South African currency would remain stable with low price levels. Accordingly, it was considered an appropriate measure for obtaining basic food item price stability for Namibia [2]. Secondly, Namibia receives an annual share of import tax benefit collected through Southern Africa Custom Union (SACU), which amounts to about $26.4 million US dollars. However, these two issues create volatility and complicate government budget planning. Moreover, the Namibian economy remains volatile and vulnerable to economic and political risk emanating from South Africa, which renders current commodity prices unstable as South Africa becomes a net importer of foodstuff.

Despite the perception of economic growth, and of Namibia ultimately being upgraded to upper-middle income status, the nation still faces a number of social and economic challenges that include (i) high income inequality, with a Gini coefficient of 0.62; (ii) high poverty and high cost of living with poverty incidence estimated at 29% of the population, with an unemployment rate of 27.4%, and about half the population estimated being under severe poverty; (iii) relatively high HIV/AIDS prevalence rate standing at 18.2%; (iv) high infant and under-five mortality rates, estimated to be 32 and 42 deaths per 1000 live births, respectively; and (v) a high adult literacy rate of 89 per cent (NSA, 2012 & 2013). In addition to these, Namibia is lagging behind on achieving better records for the Human Development Index (HDI). In 2011, Namibia's HDI of 0.625 was below the world's HDI average of 0.682. Namibia also ranks 120 out of 187, while the country is classified as an upper middle-income country and the government target was to achieve 0.70 HDI. Clearly, this shows that the economy needs to expand at a rapid and sustainable pace, and be supportive and redistributive, which indicates that government policies are needed to address these challenges [3].

Table 1 presents the comparison of HDI of 2011 and the average Gini-coefficient between years 1990 to 2010 for the Southern Africa Development Community (SADC). As indicated below, the HDI for Namibia is ranked fourth in SADC countries, with Seychelles and Mauritius being the top countries in Africa. In achieving a higher HDI and a lower Gini-coefficient, Mauritius is doing relatively well in the SADC.

The Government has acknowledged the importance of planning as an integral part of economic and social development [4]. To address the above-mentioned challenges and attain sustained economic growth, employment creation and increased income equality, the government implemented the National Development Plan (NDP), known as vision 2030, structured in five-year sections [4].

Table 1. Comparison of HDI and Gini coefficient in Southern Africa development community

SADC countries	Rank	HDI	Gini-coeff
	2011	2011	1990-2010
Angola	148	0.486	0.586
Botswana	118	0.633	0.555
Democratic Republic of Congo	187	0.286	0.444
Lesotho	160	0.450	0.579
Madagascar	151	0.480	0.457
Malawi	171	0.400	0.447
Mauritius	77	0.728	0.381
Mozambique	184	0.322	0.459
Namibia	120	0.625	0.649
Seychelles	52	0.773	
South Africa	123	0.619	0.528
Swaziland	140	0.522	0.579
United Republic of Tanzania	152	0.466	0.342
Zambia	164	0.430	0.525
Zimbabwe	173	0.376	0.501

Source: [5]

The fourth and current NDP4 framework (2013 to 2017) targets to boost and sustain economic growth, employment creation, reduce income inequalities distribution, and reduce poverty [6,7].

To support vision 2030, there are other innervations, such as the Targeted Intervention Programme for Employment and Economic Growth (TIPEEG), which sought to promote labour-intensive economic growth, increase income equality, and promote focus on specific industries for expansion and employment creation, such as logistics, tourism, manufacturing and agriculture, which were given high priority focus in achieving the realisation of NDP4 [6].

Therefore, the motivation of this paper is (i) to attain an understanding of the relationship between household characteristics and labour productivity from a policy perspective, as job creation constitutes an important element in the government's efforts to boost the underlying supply capacity of the economy; and (ii) identify a research perspective for which Namibia might afford opportunities for conducting an in-depth case study on account of its rich variation in employment and labour productivity policy orientation and productivity performance across the economy. Thus, the results of this study will lead to a forward-looking assessment on how labour productivity should be handled in order to promote economic growth and poverty reduction. Furthermore, this paper will contribute to policy formulation.

Using household survey 2012 [8,6] data, this paper has endeavoured to analyse the factors influencing per capita income using a Cobb-Douglas production function for identification of factors influencing household per capita income (that includes the explanatory factors that may include immigration, gender equality, age and education). In addition to this, factors influencing income equality were analysed using Principal Component Analysis (PCA).

2. LITERATURE REVIEW ON FACTORS INFLUENCING INCOME INEQUALITY

There is a diversified range of discussions around the factors influencing income inequality or income per person. The direction and magnitude of these influences in studies for both developing and developed nations, however, often unclear, which factor causes higher or lower inequalities among the citizens or even among countries (see, for example, [1]). However, [9] has summarised factors influencing income inequalities into five categories, as presented below.

2.1 Economic Growth and the Overall Development Level of a Country

This group includes growth in the GDP, technological progress and the structure of the economy, income, consumption, saving and investment as being among the factors that influence economic growth. Higgins and Williamson (1999), cited in [9], reported an inverted U-shaped relationship between average income and income inequality, which concept was first introduced by Kuznets [10]: economic growth at the stage of lower economic development eventually leads to higher/increased inequality, but at later stage and with good policy intervention with better economic development, the level of inequality is likely to reduce. However, this theory was criticised by Gustafsson and Johansson (1997), cited in [9], in that the level of economic development is dependent on the particular country's choice and level of development, that is, guided by short-, medium- and long-term economic development strategies, and it is also obvious that it is influenced by regional and global geo-political and economic dynamics (Snower, 1999, cited in [9]. There is evidence that, as a large part of the population moves to a higher sector (for example, from agriculture into the industrial sector), inequality will increase, but if the movement is restricted by means of rural development intervention and supportive policy measures, then income distribution will more likely to narrow dawn (Gustafsson & Johansson, 1997, cited in [9].

Technological change can also be the cause of variations of wages, attributable to the fact that an increase in skilled workers would increase productivity of the skilled and semi-skilled personnel in the economy (Snower, 1999, cited in [9]. However, this can be corrected through appropriate policy measures, such as educational policy structure, which focuses on skilled output based on being demand-driven, rather than being supply driven [1].

Apart from the above-mentioned drivers of inequality, there are many other factors that influence income inequality, which include the availability of natural resources. Countries well-endowed with natural resources tend to have

greater inequality because of capital-based technology and a lower need for unskilled labour [1].

2.2 Macroeconomic Factors

The relationship between macroeconomic factors and income distribution is highly influenced by policy variables (that include expenditure and inflation) and by exogenous factors (such as changes in terms of trade) [1]. In addition to this, a set of demographic indicators also affect, along with inflation and unemployment, the size of a government's expenditure, external debt and foreign reserves, changes in the exchange rate, and other economic factors, the cause of income inequality [1]. High inflation mainly causes a deepening on inequality, because it redistributes resources from persons with fixed nominal income, usually the poor with fewer resources. However, through a progressive tax system, inflation can reduce the income share of the more affluent part of the population [1]. Sarel [11] has indicated that the policy advice offered by most economics theories focuses on the notion that macroeconomic stability, in addition to its valuable effect on growth, may have a beneficial effect on income distribution. The agreements routinely presented that are less affluent segments of the society are more vulnerable to inflation and macroeconomic instability, because (i) income is often defined in nominal terms with diverse range of access to financial instruments, such as indexation or hedging; (ii) tax system brackets typically do not keep up with inflation and become less progressive; and (iii) the inflation tax falls on money holders in a regressive way. However, [11], using cross sectional data across European countries, has found that macroeconomic variables that include inflation (including level, variability and rate of exchange rate), public consumption (comparing with private consumption), external position (both level and change), level of real exchange rate against US dollar, and price ratio investment/consumption, have no significant impact on changing income distribution.

2.3 Demographic Factors

Include processes of demographic development (that includes share of economically active population); the growth and density of population; urbanisation; level of human capital, level of education and health condition of population [10,13]. Apart from demographic factors, educational expansion and inequality tend to be inverted U-shape [12]. During the initial phases of development, a rise in the population's level of education increases inequality, because more highly educated employees earn higher income. A further rise and equalisation in the educational level equalise the income distribution and bring about a decline in inequality [13].

2.4 Political Factors

Include privatisation and the share of the private sector, including level of subsidies and tax collection, trade openness, labour mobility, social policy, and other decisions of economic policy (Durham, 1999, cited in [12]), which also influence income inequality.

2.5 Historical, Cultural and Natural Factors

Which include distribution of land ownership, people's attitude to inequality, and extent of shadow economy, which are all formed in the course of long history [13].

Determinants of economic geography also well documented, using Solow's (1956, cited in [12]) model, augmented with human capital. The model has been widely used in the empirical growth literature, owing largely to its simplicity and flexibility. For instance, despite being derived from a specific framework, the empirical version of the model is sufficiently general to be consistent with some endogenous growth models (Arnold et al., 2007, cited in [12].

The Solow model has been widely used as a theoretical framework to explain differences across countries in income levels and growth patterns. The model is based on a simple production function with constant returns-to-scale technology. In the augmented version of the model (Mankiw, Romer & Weil, 1992, cited in [12]), output is a function of human and physical capital, as well as labour (working-age population) and the level of technology.

Addressing inequality alone is not the single solution for income disparity, nor does it in itself support efforts in redistribution of resources: there are other factors have influence over redistribution, inequality and growth, for example monetary and fiscal policy system [4].

From the timeframe, inequality might influence growth positively at the beginning stage of

economic growth, thus with expectation spill-over effects drive innovation and entrepreneurship in the medium- and long-term [4]. As a few people in the economy become entrepreneurship, with others followers on the later stage (Lazear & Rosen, 1981, cited in [4]). On the other hand, inequality can also be destructive for economic growth since, as inequality expands the gap, fewer people can afford basic services, which results in the poor population segment becoming marginalised and increases their inability to remain healthy and accumulate human capital [14,15]. Political and economic instability may also reduce investment [16,17]. Therefore, as indicated by [18], relationship between inequality and growth might be nonlinear. Stiglitz et al. [19] also shows that the relationship between market inequality and redistribution indicates that higher inequality will create pressures for redistribution of resources, which will eventually lead to the application of appropriate policy measures.

However, the core questions will be how does inequality been measured, and how it is link between income per person growth and income inequality [26] provided comprehensive income inequality concept and its linkage to different policy intervention and factors. All these factors can vary and shape inequality as follows (see Fig. 1):

- Individual labour income: the dispersion of individual labour income amongst the working-age population reflects both the wage dispersion for full-time employees and the labour income dispersion of other groups make up the working-age population (part-time workers and the self-employed, as well as the unemployed and people not looking actively for a job).
- Household labour income: working-age families differ in size and composition, affecting the total labour income of households.
- Household market income: this includes both household labour and capital income.
- Household disposable income: Household disposable income covers all households and income sources, after taxes and cash transfers.
- Household adjusted disposable income: this adjusts household disposable income for in-kind transfers (e.g. public spending on health, education and social housing).

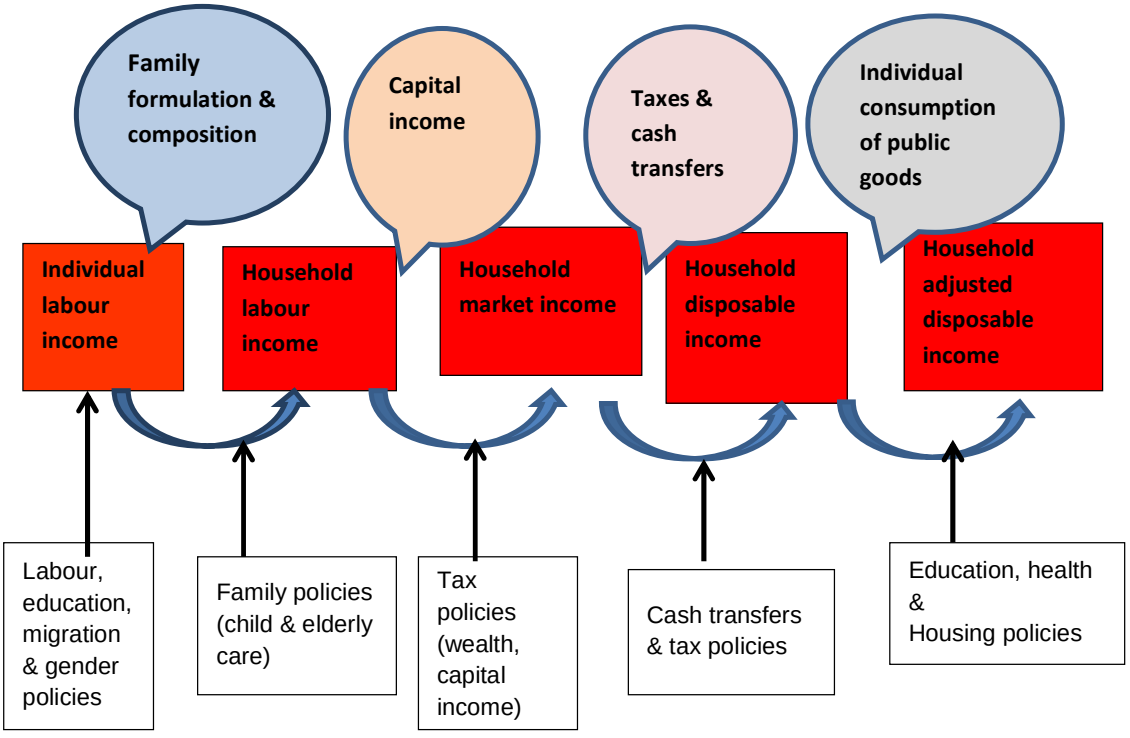

Fig. 1. Factors shape income inequality
Source: [19]

As has been presented above, there are a number of complex sets of factors affecting income inequality. To get an idea about how the income inequality level of a country is formed, it is necessary to analyse many possible factors. However, only a few studies have taken into account all, or a majority, of these factors in a regression analysis (Gustafsson & Johansson, 1997; Higgins & Williamson, 1999, cited in [12]). Such analysis requires a large data set with many indicators, which often leads to the problem of multicollinearity. Thus, it is very complicated to find an estimate for the influence of every single factor on income inequality, and even if found, it might be insignificant.

Therefore, in this study, two methodological approaches were applied to examine factors influencing per capita income: a Cobb-Douglas function was applied, while PCA was applied to examine factors influencing income inequality.

3. DATA AND METHODOLOGICAL APPLICATION

The data for the paper was taken from the Namibia Household Income and Expenditure Survey (NHIES) [8,6]. The data was analysed using the Cobb-Douglas production function and Principal Component Analysis (PCA) models. The following section presents the framework of the two methodological approaches.

3.1 Cobb-Douglas Production

Cobb-Douglas production regression was applied in the area of production economics, specifically microeconomics theory, labour market, and other productivity studies, across many sectors. The model was applied using input resource and output production functions [20]. This model is very helpful in reducing the difference between the observed, arbitrary dataset and responses predicated by linear approximation [20].

Following [20] study, the following presents a simplified form of the model:

$$PCI_i = \propto X_i^{\beta} \quad (1)$$

To measure the magnitude and extent of elasticity of the estimated coefficient, it was a necessary conduction to transform the model to log-linear and in the multiplicative forms, as follows:

$$lnPCI = \ln(\propto) + \beta_{0i} lnX_i \quad (2)$$

Assume $\ln(\propto)$ represent dummy variables for autonomous of PCI (that includes G, A and EDU), which is changed β_0 becomes autonomous of PCI; and X_i represent the age as main factor (determinant) of income, and β_i is the estimated effect of age to the income.

$$lnPCI = \beta_0 + \beta_i lnX_i \quad (3)$$

Where: PCI, G, A & Ed represent Per Capita Income; Gender, Immigration (rural to urban) education and age, respectively.

The Cobb-Douglas function should fulfil the basic assumption of parametric regression model suitability or assumption requirement (i) as to linearity, the ANOVA shows that it is significant at one per cent, (ii) as to normality – the histogram shows that it is normally distributed (see Appendix 1), (iii) the collinearity test, indicated by "Tolerance" and "Variance Inflation Factor" (VIF), comprises two-test predicates for each predictor that is able to check multicollinearity. The "tolerance" shows the degree of multicollinearity, which if it predicted a value found to be less 10%, would be an indication that there are redundant variables among the independent variables (collinearity among the variables), which require further investigation. On the other hand, the VIF can be used to measures the degree of multicollinearity among the independent variables in a regression model analysis, even though there are procedures to test against hypothesis, although less than ten is acceptable as a rule of thumb for obviating a need to process the output/results further. If it should be more than 10, this requires to be investigated in detail [14].

Heteroskedasticity as shown in the appendix 4 the "***normal P-P plot of the regression standardized residual being close to the expected cumulative probability"*** suggesting that residuals homoscedasticity tested using SPSS through syntax integration Breusch-Pagan & Koenker tested using ***"R"*** heteroskedasticity tested. The test found that it is significance level of chi-square df=P(H0: homoscedasticity) found to be 0.098 and 0.118 respectively; thus failed to reject the null hypothesis.

Details from [6], using data collected for the Namibia Household Income and Expenditure Survey (NHIES) (2012), comprised the main source of data.

3.2 Principal Component Analysis (PCA)

PCA, being multivariate, incorporates simultaneous observation and is applied to reduce redundant explanatory parameters to avoid multicollinearity problems by combining or removing irrelevant variables: using fewer observations creates relationships that are simplified for better interpretation and predictable value [21]. In addition to this, this model also generates robust linear relationships using reduced variables that can be used to summarise data without losing information in the process. This process of the model is also known as "dimensional reduction" or "parsimonious summarisation of the data" [17].

The PCA is computed by determining the eigenvectors and eigenvalues of the covariance matrix. The covariance matrix is used to measure how much the dimensions vary from the mean with respect to each other. The covariance of two random variables (dimensions) is their tendency to vary together, as shown in the model presented by [22] as follows:

$$Cov\,(X,Y) = E[E[X] - X].E[Y] - Y] \quad (3)$$

Where E[X] and E[Y] denote the expected value of X and Y, respectively; for a sampled dataset, this can be explicitly written out.

$$Cov\,(X,Y) = \sum_{i=1}^{N} \frac{(X_i - \bar{X}\,(Yi - \bar{Y})}{N} \quad (4)$$

With $\vec{X} = \text{mean}\,(\text{X})$ and $\vec{Y} = \text{mean}\,(\text{Y})$ where N is the dimension of the dataset. The covariance matrix is a matrix A with elements $\text{A}_{i,j} = cov(i,j)$. It centres the data by subtracting the mean of each sample vector [22].

In principal component analysis, the following important points are essential to follow to estimate best efficient and reliable interpretations [22]:

i. ***Kaiser-Meyer-Olkin (KMO):*** this measures the requirement for sampling size adequacy value ranges from zero to one; the computed KMO, when it closer to one indicates a better sampling size. More than 90% is known as 'marvellous', in between 80% to 90%, known as 'meritorious', in between 70% to 80% known as 'middling', in between 60% to 70% known as 'mediocre', between 50% to 60% known as 'miserable' (which should be interpreted with caution), and below 50% is unacceptable (which requires remedial process) [22]. The second important test, along with the KMO test is ***Bartlett's test of sphericity,*** which test the correlation matrix that an identify matrix; that includes diagonal elements should be one and all off-diagonal elements zero; implying that all of the variables are uncorrelated [23]. Should the expected result be less than 5%, the null hypothesis is to be rejected with a conclusion conclude that there are correlations in the data set and it is appropriate to conduct the factor analysis [23,24].

ii. ***Communalities:*** can be defined as the total amount of original variable shared with all other variables in the analysis [23,24]: A result of more than 40% would be acceptable for the analysis; if not, those with less than 40% need to be removed from the analysis. An important assumption of communalities is that the total variance of the original variables is explained by the components characterised [23].

iii. ***Eigenvalue and eigenvectors:*** the first measures the original total variance explained by each of the new derived variables, whereas the latter measures how much each loading factor component contributes to each new derived variables [12].

4. RESULTS AND DISCUSSION

4.1 Hybrid Cobb-Douglas Function Estimation

Table 2 presents the factors influencing the household per capita income. The estimated coefficient of all variables identified for this model was found to be highly significant at one per cent in all cases, and positively related to influence household income per person (with the exception that age square is a negative estimated coefficient, as expected). Age squared captures the law of diminishing returns, that is, an older person is expected to have reduced employability probability.

As presented in Table 2, the constant includes other factors which are not captured in the model, explaining the higher magnitude, as the estimated coefficient is highly elastic. Studies have indicated that factors influencing income inequality are multitudinous, but can be

summarised into five categories [13] and [12]. In this paper, the constant is shown to be significant, at one present with an estimated coefficient of 8.12. This implies that the unexplained factors have a bigger influence per capita income in Namibia.

As presented below in Table 2, R-Square found to be about 48% seems it is small compared with the large observation, however, as it has been explained in section-2 there are multitude factors influencing income inequality and in number of ways linked to household income. However, In this study aiming only examining the linkage between household characteristics to income inequality; that implying the bigger portion of variation is explained by other factors which are not included in this study (such as political factors; macroeconomics policy and other factors).

Rural to urban migration as factor of influencing income inequality in Namibia, however, it is highly significant and inelastic, which implies that a one per cent increase in a person's probability of migrating from rural to urban areas will lead to an increase in income of that person by 0.75 per cent. There are various reasons that might be used to support the results as to why rural to urban migration explains income inequality. According to Adam Smith (1776), [5], the scarcity of land and enclosures during industrial revolution was among the driving forces for rural to urban migration, as a "supply-push factor". In addition, within the context of the classical model theory, [5] show that "demand-pull factors" causing migration from rural to urban areas as a result of rapid development of manufacturing leads to more population growth and urban poverty, which dynamic eventually causes elastic and inelastic behaviour, respectively.

However, since migration in Namibia is mainly caused by push factors, attributable to poor farm productivity and the limitation of opportunity in the rural areas, this is likely to result in labour lost, as well as possible loss of capital effects on rural economies. Although migration was found to be inelastic, it is normal outcome because it is "supply driven". As shown in Table 2, the estimated coefficient for migration is shown to be inelastic (estimated coefficient at only 0.75). This implies that, of ten people who migrate, eight people will suffer an increase in inequality.

The positive and reciprocal relationship between gender equality and economic dynamics is well documented. For example, [5] has recommended fostering economic development as a means of promoting gender equality, asserting that "rising income and falling poverty levels tend to reduce gender disparities in education, health, and nutrition". The gender equality effects in this study are shown to be relatively smaller (estimated coefficient at 0.062), implying that it still has no significant effect on influencing income per capita in Namibia. For example, [6] shows that there are significant disparities in income, employment, and access to resources in Namibia between men and women.

Table 2. Cobb-Douglas estimation

Model	Unstandardised coefficients		Standardised coefficients	t	Sig.	Collinearity statistics	
	B	Std. error	Beta			Tolerance	VIF
(Constant)	8.121	0.002		3314.65	0.00		
Immigration	0.747	0.001	0.37	577.56	0.00	0.94	1.07
Sex/Gender	0.062	0.001	0.03	51.32	0.00	0.99	1.00
Age groupings	0.013	0.000	0.058	63.53	0.00	0.47	2.12
Education	0.226	0.001	0.22	324.44	0.00	0.85	1.18
AGESQ	-0.000	0.000	-0.03	-35.06	0.00	0.50	1.99
Model summary							
R. Square						0.48	
Adj R.Square						0.33	
ANOVA[a]						0.000	
F-statistics						15 045	
Observation						2 066 398	

a. Dependent Variable: HHLG

b. Predictors: (Constant), Level of education, Sex/Gender, Age groupings, Urban/Rural area

Source: own computation

Women experience somewhat higher unemployment rates (39 %) than men (28 %), when the broad measure of unemployment is used. When the strict definition of unemployment is used, the unemployment rate of female members (22%) remains higher than that of male members (19%).

Unemployment among women is higher in both rural and urban areas (52.8% and 35.7%) compared to men (41% and 25.8%). Of all the economically inactive population of Namibia, 14.9% are classified as homemakers, of which the majority are women [6]. Despite of women forming the bulk of caregivers, are considerably under-represented in the formal economy [7]. Female-headed households have an average per capita income of US$630, compared with male-headed households with an average per capita income of US$1100 (at April 2015 exchange rate) [6].

The influence of education in this model is estimated to be relatively larger, compared with the other variables, which implies that the probability of higher income per person is linked to the level of education. The explanation of the parameter is linked to the hypothesis that the higher educated one is the higher is the probability of employability. As shown in Appendix 2, Namibians completing tertiary level education accounted for 4%, compared with primary and secondary education, at about 32.9% and 32.8%, respectively, while no formal education accounted for 28.7%. This clearly shows the need in Namibia for capacity development intensification. However, in terms of gender distribution, the educational level attainment is almost 50:50 at all levels (see Appendix 3).

4.2 Principal Component Analysis

Table 3 presents the measure of sampling adequacy, and since the data was obtained from a survey of the entire population, it was expected to be suitable for the analysis, as the data included each and every of the variables.

Table 4 shows the extraction process of loading the variation of the income equality adequately, as the output result shows more than 50% of each variable, which is acceptable for analysis.

Table 5 presents the two important interpretations of PCA, which are the Eigenvalues and loading factors within the different variances. The Eigenvalues give the percentage of variance, which explained in this case that three components in total accounted for about 72% of variance. The first group of loading factor components is to do with ***"economic opportunity"*** (that include economic activity at aggregated level and detail level and also type of profession of citizens involved), which has the highest loading factor with a percentage variance of 41.7%, followed by ***"educational and migration characterisation"*** (including level of education and migration), the percentage variation of which accounted for 17%, and the third loading factor has to do with ***"household characterisation"*** (that includes age group, marital status and mobility), which accounted for 14 % variance in explaining the income per capita in Namibia.

Table 6 presents the three components of loading factors. The ***"economic opportunity"*** shows the loading factors of each of the component matrix that were then used to account for income per capita in Namibia. In the first loading factor components, the age structure and level of education, explain negatively the income equality in Namibia: this result coincides with econometric outputs, that is, the probability of higher education will lead to income equality, although the age structure implies that the younger citizen will have a higher employability probability. Economic activity (that might provide opportunity for employability), level of education, marital status, literacy and occupation emerge as positive influencers for income equality.

The second loading factor component has to do with ***"educational and migration characterisation"***. Economic activity and rural to urban immigration tend to influence positively, whereas literacy rate becomes negative. In the third component, the age structure becomes negative, which is consistent with the component, but immigration and marital status become positive.

Table 3. KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.681
Bartlett's Test of Sphericity	Approx. Chi-Square	7290743.460
	Df	28
	Sig.	.000

Table 4. Communalities

	Initial	Extraction
Economic activity	1.000	0.795
Age groupings	1.000	0.721
Level of education	1.000	0.731
Urban/Rural area	1.000	0.615
marital status	1.000	0.574
Literacy	1.000	0.680
Occupation	1.000	0.753
Economic activity grouped	1.000	0.924

Extraction Method: Principal Component Analysis.
Source: own computation

Table 5. Total variance explained

Component	Initial eigenvalues			Extraction sums of squared loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.338	41.722	41.722	3.338	41.722	41.722
2	1.354	16.923	58.645	1.354	16.923	58.645
3	1.101	13.756	72.401	1.101	13.756	72.401
4	.882	11.021	83.422			
5	.516	6.448	89.870			
6	.392	4.904	94.774			
7	.312	3.900	98.675			
8	.106	1.325	100.000			

Extraction method: Principal component analysis.
Source: Own computation

Table 6. Component Matrix[a]

	1	2	3
Economic activity	0.730	0.502	
Age groupings	-0.614		-0.564
Level of education	-0.550	0.631	
Urban/Rural area		0.427	0.634
marital status	0.632		0.417
Literacy	0.567	-0.572	
Occupation	0.790		
Economic activity grouped	0.866	0.349	
Extraction Method: Principal Component Analysis, a. 3 components extracted.			

Source: Own computation

5. CONCLUSIONS AND POLICY IMPLICATIONS

This paper endeavoured to analyse the factors influencing per capita income, using a Cobb-Douglas production function, while PCA was applied to factors influencing income inequality.

The Cobb-Douglas production function econometric analysis shows that factors, including immigration, gender equality, age and education, were found to be positively and significant, at one per cent, in explaining the household income per person, as expected. However, labour immigration show that it is more driven by supply-push factors, rather than demand-pull, and as a result was found to be inelastic, implying that this causes higher income disparity and also that agricultural farm productivity and capital would be lost for the rural areas.

PCA extracted three components that best explain the variation of income equality in Namibia: in total, it was estimated at about 72% variation explanation. The three components

extracted were “economic opportunity”, with loading factor of 41.7%, followed by “educational and migration characterisation” with a percentage variation accounting for 17%, and by “household characterisation”, accounting for a 14% variation explanation.

Because each urban job stimulates the migration of more than one rural worker, leading eventually to the average income per capita becoming not significant to change. Furthermore, the opportunity cost of urban job creation for the rural economy is larger than would be the case in a context of urban full employment. Therefore, it is necessary for government and donor agencies to focus on wide production efficiency and other support services (which may include tax and subsidy schemes).

The results of this paper show that Namibia does not seem to be breaking the cyclical problem of poverty, unemployment and not providing the required skills for better economic growth. Although the above-mentioned problems are socioeconomic problems, the solutions require strong political leadership and the desire for private and public partnership. In Namibia, unemployment seems to be of a structural nature as a result of the mismatch between skills and the requirements of job opportunities. Structural unemployment is long-lived and is not sensitive to changes in aggregate demand.

The above-identified variables that influence income per person and influence income equality, as analysed by regression and PCA, are mainly caused by structural factors such as skills deficit and the nature of the educational system itself (which mainly focus on being supply-driven).

In addition to this study by [26] on comparative study between OECD and developing countries the study found that cash transfers tend to be universal and are thus less redistributive. Income inequality for this group is considerably below the average. Though technological change and globalisation have played a role in widening the distribution of labour income, the marked cross-country variation is likely due to differences in policies and institutions. However, [26] conclusions and policies implication, summarizes as follows (i) education policies matter, that includes well-designed labour market policies and institutions can reduce inequality, (ii) removing product market regulations that stifle competition can reduce labour income inequality by boosting employment, (iii) Policies that foster the integration of immigrants; (iv) tax and transfer systems play a key role in lowering overall income inequality; and (v) policies aimed at boosting GDP per capita have an uncertain impact on income inequality. For instance, avoiding too-high and long-lasting unemployment benefits may raise employment over the long run but also widen the distribution of income among workers; this key finding also applicable to the case of Namibia.

Understanding the linkages between poverty, inequality and economic growth, and the identification of existing options for bridging the gap between rich and poor, are key public policy challenges, which require further research in the area.

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COMPETING INTERESTS

Author has declared that no competing interests exist.

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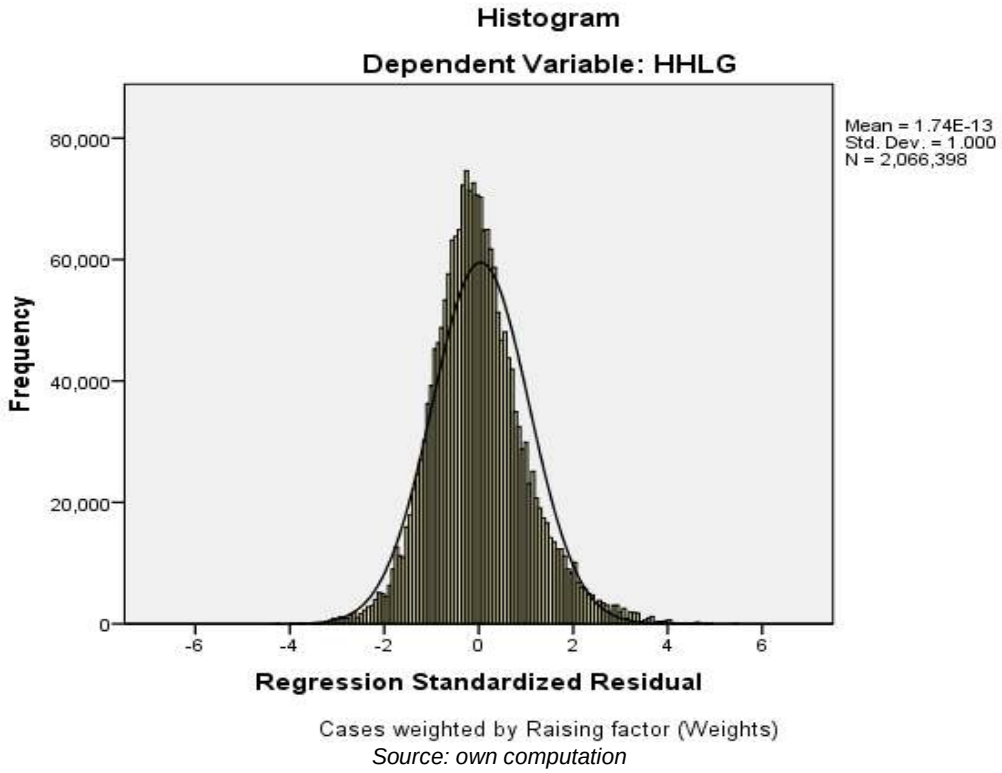
Appendix 1. Economic activity grouped

	Frequency	Per cent
Agriculture, forestry and hunting	183196	8.9
Fishing	13482	0.7
Mining and quarrying	10249	0.5
Manufacturing	29237	1.4
Electricity, gas and water supply	3756	0.2
Construction	32761	1.6
Wholesale and retail trade, repair of motor vehicles and mot	49816	2.4
Hotels and restaurants	16360	0.8
Transports, storage and communications	19109	0.9
Financial intermediation	8046	0.4
Real estate, renting and business activities	71728	3.5
Public administration and defence	46954	2.3
Education	36146	1.7
Health and social work	16828	0.8
Other communal, social and personal service activities	18300	0.9
Private households with employed persons	48796	2.4
Extra-territorial organisations and bodies	2182	0.1
Not applicable	1448641	70.1
Not stated	10810	0.5
Total	2066398	100

Source: Namibia Statistics Agency (2013). Namibia Household Income and Expenditure Survey (NHIES) (2012). Windhoek, Namibia

Appendix 2. Normality distribution of LN of the household per capita income



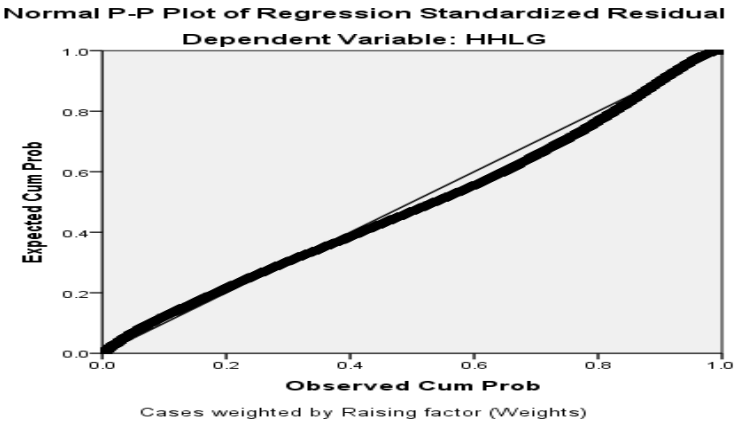
Source: own computation

Appendix 3. Basic economic indicators for Namibia

Basic Indicators			**2012**
Population size			2 085 927.00
Female			1 084 845.00
Male			1 001 082.00
Population composition			
Under 15 years			770 265.00
Working age 15 + years			1 315 662.00
Economically active population			
Employed			630 094.00
Unemployed – broad			238 174.00
Labour force			868 268.00
Labour force participation rate – broad			66
Unemployment rate – broad			27.4
Economically active population by sex			
Female employed			300 390.00
Male employed			329 704.00
Female unemployed – broad			140 172.00
Female unemployment rate – broad			31.8
Male unemployed			98 002.00
Male unemployment rate – broad			22.9
Male labour force participation rate – broad			69.1
Female labour force participation rate – broad			63.2
Comparative economic indicators	**2004**	**2008**	**2012**
Population 15 years and above	1 024 110.00	1 106 854.00	1 315 662.00
Labour force	493 448.00	678 680.00	868 268.00
Employed population	385 329.00	331 444.00	630 094.00
Unemployed population – broad	223 281.00	347 237.00	238 174.00
Not economically active Population	530 662.00	428 174.00	404 122.00
Unemployment rate – broad	36.7	51.2	27.4
Labour force participation rate	47.9	55.4	66

Source: Namibia Statistics Agency (2013). Namibia Household Income and Expenditure Survey (NHIES) (2012). Windhoek, Namibia

Appendix 4



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